PHILIPPINES CLIMATE CHANGE MITIGATION PROGRAM

A Joint Program of the

Philippines Department of Energy

US Agency for International Development

TERMINAL REPORT

Technical Assistance to DOE for Enhancing Private Sector Participation in New and Renewable Energy Investments for Off-Grid Rural Electrification (TASK 1 – Refranchising Study)

Submitted to the:

United States Agency for International Development (USAID)

and the

Department of Energy
Manila, Philippines

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This report was prepared under the terms and conditions of Contract No. 492-C-00-97-00063.

TERMINAL REPORT

TASK #1- DEVELOPMENT OF STANDARD FRANCHISE WAIVER AGREEMENT AND EVALUATION OF RE-FRANCHISING

I. BACKGROUND

Energy is recognized as an important ingredient for alleviating the incidence of poverty in rural communities. Rural electrification is therefore a priority program of the Department of Energy and its attached agencies. A major challenge besetting the sector today is how to accelerate expansion of electricity to some 8,000 barangays still outside the reach of the grid. In the past, government has been directly subsidizing these expansion programs, however, with current budget deficits and rising costs of grid extension, the government is hard pressed to continue the same strategy as before.

The involvement of the private sector in the delivery of energy services in the off-grid particularly using decentralized renewable energy systems is viewed as a strategy that can help bridge the funding gap for an accelerated rural electrification program. To encourage the entry of private sector and even LGUs as new industry players, it is important to show that a viable renewable energy market exists and that the new players can enter this market without difficulty.

The DOE is adopting a “market packaging approach” whereby unelectrified barangays are to be clustered into “market packages which will then be studied to determine their feasibility. The DOE requested and the USAID agreed to provide DOE with a technical assistance (TA) under its Climate Change Mitigation Program, for the conduct of specific preparatory activities prior to the preparation of actual feasibility studies.

Objective of the TA

The purpose of the TA is to provide DOE with immediate institutional support, by way of targeted, well-defined activities, for facilitating the entry of private sector investors in the off-grid renewable energy based rural electrification. The TA will enable the DOE to set the stage for a longer term program of transforming the RE-based rural electrification into a viable business proposition for the private sector.

II. Task # 1 – Facilitating the Development of Standard Franchise Waiver Agreement and Evaluation of Re-franchising

Scope of Work

Task # 1 involves the provision of direct technical support for the DOE and NEA in facilitating the entry of private sector in the franchise areas already awarded to electric cooperatives. The task has two components:

a) Development and Adoption of a Standard Franchise Waiver Agreement

- Review and evaluation of “franchise waiver agreements” that have already been signed and implemented by existing private sector investors such as Shell Renewables in Aklan and Palawan, and those which are still being negotiated/to be signed, e.g., those of SB-RESCO;

- Drafting of a “standard franchise waiver agreement” (SFWA) based on findings from (a) the original EC franchises,and from other relevant reference materials;

- Organization and facilitation of meetings and consultations with stakeholders to see their inputs and consensus on the draft SFWA;

- Formalization of the concurrence on the SFWA through signing of Board Resolution by at least two (2) ECs with concurrence by the NEA;

- Promulgation of the SFWA via formulation of DOE policy guidelines on the use of the SFWA by electric coops in dealing with third party energy service investors.

(b) Evaluation and Recommendations on Re-franchising

- Review and evaluation of the Philippine electricity distribution franchise law in relation to DOE’s “market packaging”paradigm for off-grid rural electrification;

- Research, evaluation and analysis of the economic and technical soundness of re-franchising, both in theory and in practice;

- Formulation of recommendation and draft DOE policy directive regarding refranchising in the Philippines.

SPECIFIC DELIVERABLES AND TIMETABLE

The following are the deliverables and their timing as scheduled for Task #1

1. Standard Franchise Waiver Agreement (SFWA)

(a) Draft Document	End of Week 2
(b) Final SFWA document	End of Week 5
(c) Signed EC Board Resolutions on SFWA (at least two (2) ECs)	End of Week 8

2. Evaluation Study on Re-franchising

(a) Draft Document	End of Week 3
(b) Final Document	End of Week 8

3. Government/DOE Policy Directive on SFWA And Re-franchising	End of Week 9
Terminal Report	By May 11, 2001

III. Activities Undertaken and Outputs Delivered

1. Development of the SFWA

The development of the SFWA was done using two basic approaches.

a) Review of documents

A review of relevant documents was done to check on the current situation. Among the documents reviewed were:

- NEC policy issuances
- MOAs regarding franchise waivers/transfers by various utilities, i.e., Waivers between ECs, Waiver between an EC and a private utility, Sale of facilities between utilities and etc.
- MOA between Aklan Electric Cooperative, Inc. (AKELCO) and Shell Renewables
- MOA between ZANECO and SB –RESCO

The outputs of the review were used in the formulation of the draft SFWA.

b) Stakeholders Consultation

Extensive consultations with the various stakeholders were carried out. This involved an iterative process whereby a first level consultation was done at the NEA focusing particularly with the office involved in Franchising, namely, National Electrification Commission –Technical Staff (NEC-TS) and Legal Department and Coop Development Group. The results of the consultation were used as inputs in the preparation of a draft SFWA (See ANNEX A & B for list of stakeholders consulted and ANNEX C for comments from NEA). The draft was then discussed with the PHILRECA Board of Directors, the various ECs and NEA officials. In order to broaden the scope of the consultation process, the same draft was disseminated to all ECs with a request for their specific comments and recommendations. Five ECs, namely BENECO, CANORECO, ORMECO, ANECO, and BATELEC II, responded to the request by Fax. There comments are incorporated in the summary of comments by PHILRECA and the ECs (See ANNEX D)

After receiving and consolidating all the comments, a revised draft was again prepared and this time discussed in a special session with ECs, called for the purpose through NEA. Said consultation was focused on ECs on whose franchises the long list of market packages is located. The SFWA was discussed with the group, looking at each provision in order to ensure that everything was covered and no provision is objectionable.

Again, results of said consultation were used as inputs to prepare the Final Draft SFWA. Finally the same draft was present to the PHILRECA Board and NEA Legal staff (for review of the language) before it was submitted to DOE/PA as the Final SFWA document on April 27, 2001 (See ANNEX E)

Signed Board Resolutions

This task was dependent on the output of Task #4 consultant who was supposed to identify priority projects and from which Task #1 consultant would negotiate for a franchise waiver for said projects. However, up until April 4, 2001 (5^{th} week), the priority sites were not yet identified.

The solicitation for the ECs to pass a Board Resolution (BR) concerning the waiver of selected areas could not be initiated until April 18, 2001, after receiving the long list of Market packages from the Task # 3 consultant. Since the third party is not yet identified, it was deem appropriate to simply ask for a “waiver in principle” from the ECs in the meantime, until such time that the ECs can do the proper negotiation with an interested third party. After the discussions with the ECs on April 18, those who signified agreement to the possible waivers were requested to schedule the passage of the BR for the franchise waiver in their next Board meeting. Since consultant was dependent on the schedules of the EC Board meetings, it was not possible to simply rush the passage of the BRs. In order to facilitate approvals, Consultant prepared a “model” Board Resolution which was then disseminated to all the GMs who signified interest and on whose area coverage, selected sites have been included in the long list of market package.

The contract called for 2 ECs to sign-off on a BR waiving selected areas of their franchise. This requirement was exceeded. Efforts by this consultant generated a total of 3 BRs actually signed, i.e., ZAMSURECO I, MASELCO, and ISELCO II.

Initially two (2) ECs, namely CAGELCO I and ZAMSURECO I committed to pass their resolutions within the following week. ZAMSURECO I subsequently passed its BR on April 20, 2001, a copy of which is attached. (ANNEX F) However, the CAGELCO I Board meeting, which was scheduled for April 29 was postponed. Follow-ups with the EC indicated that the BR would be taken up on next scheduled Board Meeting on May 26, 2001.

Meantime, it was learned that two other ECs were also meeting on May 26, 2001. From discussions with the General Manager, MASELCO Board is amenable to pass a BR for the Waiver of Balud municipality but not the other areas. The GM promised to send a letter of intent on this subject by May 12, 2001 (see ANNEX G). Subsequently, the BR was signed on May 26, 2001, a copy of which is attached (ANNEX H).

Discussions were also held with the GM as well as with the Board President of VRESCO for the waiver of unenergized areas in Calatrava Town, Neg. Occ. The GM however informed this Consultant, that several barangays of this town are already included in the “O Ilaw” Program of NPC. In fact, according to the GM, a memorandum of agreement was recently signed between VRESCO and NPC to this effect.

Finally, ISELCO II also signified its desire to have their “market package” considered and agreed to sign a BR for temporary waiver of two municipalities. The BR passed by the EC Board is attached in ANNEX I.

2. Evaluation of Re-franchising

The contract also called for a short, evaluative study on the issue of re-franchising. The activities involved in the conduct of the study included the following:

a) Research and analysis on relevant laws covering franchising

   Two basic documents were covered. First the Constitution of the Philippines upon which the legal basis of franchising of utilities emanated. Second, P.D. 269, which delegated the franchising powers of Congress to the NEA/NEC.

b) Review of existing practices and research on documentary evidence showing difficulties of the ECs in keeping the covenants of the franchise agreement. MOAs and other forms of agreement on temporary and permanent waivers of franchises were reviewed and evaluated.

c) Selection of sample ECs where many of the barangays remained unenergized. Four (4) ECs were selected from Luzon, Visayas and Mindanao. These ECs were used as sample cases to determine whether the concept of re-franchising is valid or not, from the perspective of the EC's technical, financial and economic viability. Using NEA's project evaluation model, the expansion program of the 4 ECs were evaluated. (See Study on Re-Franchising for details). The idea is to check whether or not the ECs would be able to comply with their franchise mandate of "total electrification on an area coverage basis" within the next 4 years (until 2004).

d) CAGELCO I Electric Cooperative was selected for a special look at the impact of over-extension of line to the entire network of a coop. Results of the special study were incorporated in the report.

e) From the results of the evaluation, as to practicality, technical feasibility and economic viability of the current EC franchise, it was then concluded that the concept of re-franchising is valid. The primary conclusion is that without substantial government subsidies, further expansion will only result in the downward spiral of EC operations. Geographic as well as technical and economic considerations confirm that current franchises are no longer optimal and changes need to happen in order that government can continue to pursue and get a chance to attain its goal of total barangay electrification soon.

f) Recommendations were made on the premise that re-franchising is only the first step. Without any follow-through in terms of the implementation of a concrete off-grid electrification program, any effort at re-franchising will not lead to acceleration of rural electrification.

A draft report on the Franchising Study was submitted May 7, 2001. The draft was subsequently revised considering the comments received from Arlene Pamintuan of PA. The final draft was submitted May 10 to DOE and May 11, 2001 to PA. The final report is being submitted, as a separate document, together with this Terminal Report.

3. DOE Policy Directive on SFWA/Re-franchising

Following the preparation of the SFWA, a draft DOE Circular directing NEA and the ECs to allow third parties to operate in the off-grid areas within the EC franchise was formulated. The Circular likewise specified the use of the SFWA as a model by which ECs may negotiate and contract with third parties for the waiver of their franchise in selected areas. The draft was submitted for

DOE's comments on April 17, 2001. A subsequent draft was resubmitted after incorporating comments from PA's Arlene Pamintuan. Since there were no comments received from DOE the same draft Circular is considered final. (ANNEX J)

IV. Issues and Problems Encountered

1. On the SFWA

The preparation of the SFWA took longer than prescribed in the contract. The reason for this was that it basically took longer time and more effort to consult with the various stakeholders. Scheduling of meetings was difficult as the ECs are based from different parts of the country. Consultant had to time the meetings to coincide with scheduled meetings of the PHILRECA Board or meetings called for by NEA. Even at NEA, one-on-one meetings had to be resorted to in order that one can get comments from all the units concerned. Multiple meetings with the same stakeholders had to be conducted, as the consultation process had to be iterative in order to get the best results.

The Board Resolutions from the EC likewise were not easy to pass, mainly because one had to await the schedules of the Board meetings of the ECs. Careful and patient explaining had to be done to ease the fears of the ECs on the possible entry of for-profit companies in their franchises. For this reason, the ECs preferred to give only "temporary" waivers.

As per agreement, this consultant was to await for the list of priority sites from Task #4 before it can start negotiating for the signing of the BRs. Consultant waited until April 4 but without any success[1]. In order to save the situation, Consultant requested permission to use instead the sites for Task #3 – Market Packages as basis for negotiating with the ECs. This suggestion was accepted by DOE/PA on May 4. 2001. However, it was not until April 18, 2001 that the long list of market package sites were made available. In this light, consultant only had a few weeks to negotiate for the BRs. Since meetings of the EC Boards are usually scheduled on the first and last week of the month, it was not possible to get the BRs through by May 11, 2001. An extension was therefore necessary to get another BR approved as per contract. However, this altogether resulted in a positive effect, in that, three (3) were finally signed, instead of just two (2) BRs as required per contract.

2. Study on Re-franchising

[1] Task #4 consultant encountered problems with the GFIs regarding confidentiality of information on projects that were supposed to be evaluated and used as basis for identifying priority sites.

The study took a while to draft because NEA was in the process of revising the work programs of the ECs. Consultant had to wait until this was completed before the expansion programs of the 4 selected ECs could be processed. Several runs of the model had to be done and it took time to counter-check the outputs. Limited information being gathered on the technical condition of the lines did not allow for detailed look at the effect of the expansion on the networks of the sampled ECs. However, a special study was made on the network of CAGELCO I since it has already managed to put all EC data on GIS and therefore there was sufficient information to make a simulation of the line extension projects. A project that would help ECs to put their network on GIS would go a long way to improve technical analysis and decision-making. The upgrading of NEA's investment model would also help to do more solid evaluation of the EC franchises and enable NEA to define what should be included in the grid and which areas should be defined as off-grid. Such model should include choice of technologies particularly for the off-grid.

3. DOE Policy

Receiving comments from DOE would have helped in fine-tuning the Circular further. However, this consultant is confident that all the important aspects are already included in the final draft. What is necessary and outside the purview of this task is the crafting of the document into the form and style that DOE uses for its official policy directives. This is possibly the task of DOE Legal before the document can be forwarded to the Secretary for signature. As of the moment, the style was modeled after a DOE Circular No. 2000-03-004 "Further Amending Energy Regulations No. 1-95 Dated January 2, 1995 Entitled: Rules and Regulations Implementing Executive Order No. 215 on Private Sector Participation in Power Generation as amended by Department Circular No. 97-01-001 Dated January 21, 1997 signed by Sec. Mario V. Tiaoqui. Hopefully this same style is still acceptable to DOE.

V. Estimation of Total Level of Efforts per Deliverable (in Percentage)

1. SFWA	32%
2. Board Resolution	21%
3. Evaluation of Re-franchising	32%
4. DOE Policy Directive	10%
5. Terminal Report	5%
	100%

Note: Total effort took much more than 40 man-days allotted for the purpose.

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LIST OF ANNEXES

Annex No.

A	-	List of Stakeholders consulted (NEA)
B	-	List of Stakeholders consulted (PHILRECA/ECs)
C	-	Summary of Comments (NEA)
D	-	Summary of Comments (PHILRECA/ ECs)
E	-	Final Draft Standard Franchise Waiver Agreement
F	-	Board Resolution on Waiver of Franchise (ZAMSURECO I)
G	-	Letter of Intent to Waive Franchise in Balud, Masbate
H	-	Board Resolution on Waiver of Franchise (MASELCO)
I	-	Board Resolution on Waiver of Franchise (ISELCO II)
J	-	Draft DOE Circular on Policy Direction re Waivers of Franchise
K	-	Weekly Reports

Annex A

TA FOR ENCHANCING PRIVATE SECTOR PARTICIPATION IN RENEWABLE ENERGY INVESTMENTS FOR OFF-GRID RURAL ELECTRIFICATION
TASK #1- ON FRANCHISING

LIST OF STAKEHOLDERS CONSULTED

National Electrification Administration

1. Dir. Julinette Bayking – Chief of Staff, Office of the Administrator
2. Dir. Yolanda Manundo – Director, NEC-Technical Staff
3. Jun Alferez- Div. Chief, NEC- Franchising Division
4. Rey Fabro – Technical Staff, NEC-TS
5. Atty. Romulo Maristaza – Legal Officer, Department
6. Atty. Nenita Molas – Legal Officer, Legal Department
7. Dep. Leonardo Olaño, Deputy Administrator for Engineering
8. Dep. Edita Bueno – Deputy for Cooperatives Development
9. Dir. Alicia Mercado – Director, Coop Development Department
10. Dir. Nelia Irorita – Director, Planning Department
11. Engr. Roberto del Rosario – Div. Chief, Planning Department
12. Ms. Salome Soriano – Div. Chief, Planning Department
13. Renato Subijano – Technical Staff, Planning Department
14. Engr. Thomas Villaflor - AF/FM Project Head, Engineering Department

Annex B

TA FOR ENCHANCING PRIVATE SECTOR PARTICIPATION IN RENEWABLE ENERGY INVESTMENTS FOR OFF-GRID RURAL ELECTRIFICATION
TASK #1- ON FRANCHISING

LIST OF STAKEHOLDERS CONSULTED

Electric Cooperatives/ PHILRECA

1. Rizalino M. Culalic – President, PHILRECA and Gen. Manager, PANELCO III
2. Ben C. Cañete – Board President, LEYECO II and Secretary, PHILRECA
3. Wilfredo Billena – Gen. Manager, ILECO II and Treas. PHILRECA
4. Gerardo P. Verzosa – Gen. Manager, BENECO and BOD PHILRECA*
5. Edilberto I. Bassig – Gen. Manager, CAGELCO I, and BOD PHILRECA**
6. Pio Mariñas – Gen. Manager, SOCOTECO I and BOD PHILRECA
7. Jose S. Dominguez – Gen. Manager, ZAMECO II and BOD PHILRECA
8. Augustus I. Portem – Gen. Manager, CANORECO and BOD PHILRECA*
9. Carlos B. Itable – Gen. Manager, BOHECO I and BOD PHILRECA
10. Resnoc C. Torres – AMRECO Board President
11. Cyril E. Tria – Gen. Manager, ILECO I
12. Wendell Ballesteros – Gen. Manager, PHILRECA
13. Luvelindo Natividad – Acting Gen. Manager, MASELCO**
14. Ludovico Lim – Gen. Manager, ANTECO**
15. Danilo T. Davila, Sr. – Gen. Manager, VRESCO**
16. Francisco Savellano – OIC, ISELCO II**
17. Oscar L. Pueblos – Gen. Manager, SAMELCO I**
18. Ponciano R. Rosales – Gen. Manager, SAMELCO II**
19. Roy F. Merro – Gen. Manager, DORELCO/LEYECO I**
20. Patrick A. Flores – Gen. Manager, NUVELCO**
21. Gil Altamira – Gen. Manager, ILECO III**
22. Gabriel Tordesillas – Gen. Manager CAGELCO II**
23. Eduardo B. Castor – Gen. Manager, ZANECO**
24. Decca Judilla – Gen. Manager, ZAMSURECO I**
25. Horacio T. Santos – Gen. Manager, ANECO*
26. Alex C. Labrador – Gen. Manager, OMECO*
27. Evangel Manundo – Gen. Manger, BATELEC II*
28. Christopher Rios – Gen. Manager, CENECO
29. Alberto Canlas – Gen. Manager, NOCECO

Note: All ECs were sent copies of the draft SFWA for their comments by FAX.
* ECs that responded to the call for comments by FAX
** ECs on whose franchise areas the short-listed market packages are located.

Annex C

TA FOR ENCHANCING PRIVATE SECTOR PARTICIPATION IN RENEWABLE ENERGY INVESTMENTS FOR OFF-GRID RURAL ELECTRIFICATION TASK #1- ON FRANCHISING

Summary of Comments from NEA

1. The NEC-TS confirmed that the current franchises boundaries are no longer optimal. They attested that many ECs resort to internal arrangements between among themselves, to correct deficiencies in the franchise. Most common of these is the arrangement whereby one EC services a municipality/ies belonging to a neighboring franchise. In these instances, waivers of franchises are resorted, too.

2. Monitoring of all the on-going arrangement is difficult. Legally however, all these arrangements must be approved by NEC, as the Franchising Authority that gave out the franchises to the ECs.

3. There is no objection on the part of NEA to the idea of drafting a Standard Franchise Waiver Agreement (SFWA) as this would simply institutionalize what is already happening in a number of ECs. NEA likewise acknowledged that since the agency cannot accommodate all the financial requirements of ECs for extending the grid to all the unserved areas, and that the ECs without financial assistance, particularly in the form of subsidies cannot implement their line expansion projects, then the entry of third parties in the off-grid should be encouraged.

4. The SFWA is perceived as a good transition. In case the EC and the third party agree to a permanent transfer of franchise in the future, the NEA would have no difficulty evaluating the franchise application of the third party as it is already operating in the area.

5. As the legally constituted authority on franchising, NEA/NEC has to approve the SFWA before it becomes executory.

6. The SFWA should have a specific period of waiver.

7. LGUs need not be a party to the contract if they are not specifically giving any monetary or fiscal incentives that will directly benefit the off-grid project. LGUs cannot be the recipient of any facilities turned over by third parties after end of contract as they are not authorized to operate, maintain and distribute power unless granted a franchise to do so by NEC.

8. ECs, six months prior to expiration of the franchise waiver agreement has to be evaluated, as to whether or not it would like to reassume franchise jurisdiction over the area. On a case to case basis, the arrangements, including monetary value for transfer of infrastructures set up by the third party should be specified in the contract in case of a re-take by the EC.

9. Tariff rate should be consistent with ERB rules.

10. Efficiency and quality standards must also be consistent with NEA/ERB standards

11. In case of conflict, there should be an exhaustion of executive avenues first before matters are bought to any court. NEA can be an arbiter in case of conflict with its decision subject to an appeal with DOE.

NOTE : Meetings were held on iterative basis using working drafts of the SFWA until it was finalized.

Annex D

TA FOR ENCHANCING PRIVATE SECTOR PARTICIPATION IN RENEWABLE ENERGY INVESTMENTS FOR OFF-GRID RURAL ELECTRIFICATION
TASK #1- ON FRANCHISING

Summary of Comments by PHILRECA/ECs

1. The concept of an SFWA is generally ok. This is applicable for ECs that still have a lot of unserved areas. Each of the ECs should be able to evaluate their capability to energize their remaining areas and if not, they should be open to other arrangements.

2. Some ECs welcome the idea as they are amenable that they would not be able to serve their remaining unserved barangays between now and the DOE/NEA target date of 2004. However, they feel that the waivers should only be on a temporary basis. An outright waiver would appear that they are reneging on their mandate.

3. While some EC managers agree that most of the areas in the long-list of market packages are candidates for the franchise waiver, they are not ready to commit outright because they are apprehensive of negative reactions from the Board of Director who represents the same area in the EC Board. The issue is that if an area is waived, this would render the representation of its respective Board Member as unnecessary.

4. The ECs are generally concerned about the tariff rates that the third party service provider would charge. ERB regulation on the tariff is preferred.

5. The service provider should ensure continuous delivery of services and apply for permanent franchise should the EC decide not to reassume franchise jurisdiction.

6. However, the ECs are also concerned that the service provider should only generate power sufficient for the needs of its service area and not go beyond it, meaning become a competitor of the ECs on its grid, once the open access provision is passed.

7. Each EC should determine for itself whether the participation of the LGU in its negotiation for the FWA would be relevant or not. For some ECs, they prefer to involve the LGUs to avoid future political conflicts.

8. A suggestion was offered on the possibility of the EC also including an already connected area in the FWA. While most ECs agree that they have connected areas that would be better off if energized on a decentralized manner, they would not like this provision to be specifically included in the SFWA because they are apprehensive that this would open them up to political maneuvers by some LGUs that would like to take-over their systems. ECs by nature are very prone to political pressures and they would like to, as much as possible, avoid this.

9. Two ECs committed pass a waiver in principle for selected areas in their franchise. These are ZAMSURECO I and CAGELCO I who were both scheduled to hold their Board Meetings on the week of April 23.

10. Some ECs requested for the list of interested service providers. It was however explained to them that the areas will still be marketed and that a feasibility will be done on the priority market packages before they are offered to private sector.

Annex E

FINAL DRAFT

MEMORANDUM OF AGREEMENT
(STANDARD FRANCHISE WAIVER AGREEMENT)

KNOW ALL MEN BY THESE PRESENTS THAT:

This Memorandum of Agreement is entered into by and between:

(THE ELECTRIC COOPERATIVE), a corporate entity organized and existing pursuant to Presidential .Decree (P.D.) 269, as amended, represented herein by its President _______________ and referred to hereinafter as EC;

AND

(XYZ COMPANY), a corporation organized under the laws of the Republic of the Philippines, represented herein by __________________ and referred to hereinafter as the SERVICE PROVIDER;

AND

(LOCAL GOVERNMENT UNIT – OPTIONAL)

WITNESSETH:

WHEREAS, the EC has been granted the franchise in the province of ____________________ covering the municipalities of _______________. … , to operate and distribute electricity services on an area coverage basis pursuant to P.D. 269, as amended, provided that the financial viability of the EC is not impaired;

WHEREAS, as the franchise holder, the EC has the sole right and responsibility to provide adequate, dependable and reasonably priced electric services within its franchise;

WHEREAS, the EC desires to extend electricity services to all barangays within its coverage; however, it has determined that it cannot economically extend its distribution lines to some barangays located far from its existing grid;

WHEREAS, the SERVICE PROVIDER has offered to finance, install/construct and operate decentralized energy systems to service designated areas within the EC franchise on a commercially sustainable manner;

WHEREAS, the SERVICE PROVIDER has the financial and technical capability to provide such services;

WHEREAS, the EC agrees to waive its franchise privilege to the SERVICE PROVIDER, covering some selected areas and for a reasonable period of time, in order to accelerate electrification of the entire coverage area by 2004, pursuant to the national Rural Electrification Program;

NOW THEREFORE, for and in consideration of the foregoing premises, the Parties hereto resolve and agree as follows:

UNDERTAKING BY THE EC

1. The EC hereby waives its franchise over the following areas:

   (List of specific areas)

   for a period of *(specify duration)* years.

2. The EC shall provide assistance to the SERVICE PROVIDER by way of facilitating networking with LGUs and National Government agencies to ensure integration of this off-grid electrification program with national and local development plans.

3. The EC shall undertake oversight monitoring of the operations of the SERVICE PROVIDER to ensure compliance of the terms and conditions of this Agreement.

4. The EC, six (6) months prior to the expiration of waiver, shall evaluate whether or not it is ready to takeover the provision of services to the areas covered by the waiver; Should the EC decide to reassume jurisdiction over the subject areas, it agrees to take over the systems installed therein, including all the equipment and physical structures, after paying the SERVICE PROVIDER, the assessed and reasonable price, (*parties may specify transfer price formula*) as the value thereof; Otherwise, the SERVICE PROVIDER may continue to operate the systems until such time that the EC fully pays the agreed amount or be allowed, after due notice and given reasonable time, to remove and transfer all its energy service delivery assets from the service area at its own cost.

Should the EC decide not to reassume franchise jurisdiction, the same shall be construed to mean that the SERVICE PROVIDER may apply for permanent franchise over the area with the National Electrification Commission (NEC).

UNDERTAKING BY SERVICE PROVIDER

1. The SERVICE PROVIDER shall provide energy services to all the barangays covered by this waiver as specified in Section A.1 above, at rates as approved by the Energy Regulatory Board (ERB);

2. The SERVICE PROVIDER shall construct, install and provide the infrastructure, equipment and products necessary to distribute electricity services in the above areas, at its own cost and according to the agreed work program, hereto attached and considered as part of this Agreement; not to exceed a maximum of *<u>(specify)</u>*years;

3. The SERVICE PROVIDER shall ensure continuous delivery of services to consumers in accordance with quality and efficiency standards as agreed, to wit *<u>(specify agreed standards);</u>*

   Provided that, the same quality and efficiency standards are consistent with those set by Department of Energy (DOE), National Electrification Administration (NEA) and Energy Regulatory Board (ERB);

5. The SERVICE PROVIDER shall ensure sufficiency of funds necessary for the delivery services in the capacity and time frame agreed and as required by consumers in the service area;

6. The SERVICE PROVIDER shall allow the EC and NEA to monitor its operations and submit to both organizations transparent cost information and such other information necessary to ensure compliance to this Agreement;

7. The SERVICE PROVIDER shall, upon termination of this franchise waiver, agree to turnover ownership of infrastructures, equipment and products established at the site, subject to the terms and conditions stipulated in A.4 of this Agreement;

UNDERTAKING BY THE LGU
(Optional, only if LGU agrees to provide specific assistance/contribution to the Service Provider)

1. Provide local permits
2. Provide subsidy and/or equity
3. Assist in getting national permits (ECC, etc.)

PROVISION COMMON TO ALL PARTIES

1. *Effectivity Clause*. The Parties hereby understand that this Agreement shall take effect only upon the approval of the NEC/NEA, the government agency that granted franchise rights to the EC.

2. *Pre-termination, Extension or Modification Clause*. The EC reserves the right to pre-terminate this franchise waiver agreement, in case of non-compliance by the Service Provider with any of the terms or provisions of this Agreement, upon confirmation by NEA; Otherwise, any pre-termination, extension or modification of this Agreement shall be done only upon mutual consent of herein parties, provided that in such cases, the party negatively affected shall not be precluded from seeking financial or monetary consideration for said pre-termination, extension or modification.

3. *Conflict Resolution Clause*. Should there be any unsettled issues arising from this Agreement, both parties agree to seek the assistance of the NEA, which shall act as arbiter in the resolution of these issues, subject to appeal to DOE.

IN WITNESS HEREOF, all the parties hereto have caused this Agreement to be signed and executed this _____ day of _________________ at _______________________, Philippines.

For the EC: For XYZ Company

_________________________ ____________________________

Signed in the presence of:

_________________________ ____________________________

Approved:

____
NEA Administrator

(REPUBLIC OF THE PHILIPPINES)
(PROVINCE OF _______________) S.S
(City of ______________________)

BEFORE ME this ______day of _____________, 2001, in the municipality of ____________________, Province of ___________________, Philippines, personally appeared ________________________with his residence certificate no. ____________ issued on _______________, 2001 at _________________ and ___________________ with their residence certificates no.____________ issued on _________________, 2001 at __________________, respectively, known to me to be the same persons who executed the foregoing document and they acknowledged the same to be their own free voluntary act and deed.

WITHNESS MY HAND AND NOTARIAL SEAL on the date and place first above written.

Notary Public
PTR No.
Until December 31, 2001
TAN

Doc. No. ______
Page No. ______
Book No. ______
Series of 2001.

FDraft/gsy/4-25-01

Annex F

EXCERPT OF THE MINUTES OF THE 4TH SPECIAL BOARD MEETING OF THE ZAMSURECO-I BOARD OF DIRECTORS HELD ON APRIL 20, 2001 AT DAT'S DINER CONFERENCE ROOM, PAGADIAN CITY.

Present:			
	Leopoldo A. Colegado	-	President/Presiding
	Camila T. Diaz	-	Vice President
	Protacio S. Elmidulan Jr.	-	Secretary
	Rogelio A. Mondarte	-	Treasurer
	Nora Y. Quiñones	-	Auditor
	Merwin P. Reyes	-	P R O
	Custodio S. Mayol	-	Member
	Teodulo J. Yanoyan Jr.	-	Member
	Gervacio A. Raña	-	Member
	Decca O. Judilla	-	Ex-Officio Member/General Manager
Also Present:			
	Atty. Alexander A. Acain	-	Legal Counsel
	Corcini M. Saltiga	-	Finance Manager
	Tita C. Pallasca	-	Institutional Manager
	Henry V. Gumapon	-	Technical Services Manager
	Jeanith C. Espra	-	Internal Audit Manager
	Rogelio V. Lumo	-	Area I Manager
	Freddie B. Vergara	-	Area III Manager
	Melanie C. Ubas	-	HRD-O
Absent:			
	Jeanith C. Espra	-	Internal Audit Manager

"BOARD RESOLUTION NO. 58 s. 2001
A RESOLUTION TEMPORARILY WAIVING THE EC'S FRANCHISE OBLIGATION TO OTHER ELECTRIC SERVICE PROVIDERS TO ENERGIZE THE UNSERVED BARANGAYS IN THE MUNICIPALITIES OF MIDSALIP AND SOMINOT

WHEREAS, The municipalities of Midsalip and Sominot are part of the franchise of Zamboanga del Sur 1 Electric Cooperative, Inc. (ZAMSURECO-1);

WHEREAS, The Board recognizes the necessity to energize all barangays within its franchise in line with the Government's target of energizing 100% of barangays by 2004;

WHEREAS, For lack of sufficient funds and in consideration of the far distance of the above-cited municipalities from the main grid of the EC, it is not possible for the EC to connect said municipalities to its grid within the short-term;

WHEREAS, In order to accelerate electrification of these municipalities, it is practical and more cost-effective to allow other service providers to provide funds and operate decentralized systems in these areas, for a limited period, until such time that the EC can already serve the area efficiently and viably;

NOW THEREFORE, on motion of BM Elmidulan, Jr. duly seconded it was

RESOLVED AS IT IS HEREBY RESOLVED to, in principle, allow a private party service provider to put –up decentralized energy systems and distribute electricity services to the unserved barangays of Midsalip and Sominot, subject to subsequent approval by Board of the Franchise Waiver Agreement to be signed by and between the EC and the Service Provider, and subject further to approval of the same Waiver Agreement by the National Electrification Commission through NEA;

RESOLVED FURTHER, to authorize the General Manager to begin negotiation with any interested party and prepare all necessary documents to put into effect this resolution;

RESOLVED FINALLY, to furnish copy of this resolution to the National Electrification Administration (NEA) and to Region IX Electrification Director Engr. Patricio Dela Peña for information, comments and reference.

APPROVED UNANIMOUSLY."

I hereby certify to the correctness of the foregoing resolution.

PROTACIO S. ELMIDULAN JR.
BOD Secretary

Approved:

LEOPOLDO A. COLEGADO
BOD President

MASBATE ELECTRIC COOPERATIVE, INC.
(MASELCO)
Pinamarbuhan, Mobo, Masbate

May 12, 2001

MS. GRACE S. YENEZA
Consultant, USAID Project Off-Grid
Rural Electrification

Dear Ms. Yeneza:

This has reference to the technical assistance for enhancing by private sector participation in renewable energy investment for off-grid rural electrification, wherein you identified several barangays in our franchise area as possible recipient of subject project.

As we had mentioned in our meeting last April 18, 2001, we prefer the barangays located in the Municipality of Balud to be included in the said project.

We will send you our official confirmation and the franchise waiver agreement as soon as our Board of Directors have meet and officially approved the same.

Very truly yours,

LUVELINDO I. NATIVIDAD
Acting General Manager

MILES\WORD.L2USAID

Annex H

MASBATE ELECTRIC COOPERATIVE, INC.
(MASELCO)
Pinamarbuhan, Mobo, Masbate

MINUTES OF THE REGULAR BOARD MEETING OF THE BOARD OF DIRECTORS ON MAY 26, 2001 AT MASELCO BOARDROOM, PINAMARBUHAN, MOBO, MASBATE

RESOLUTION NO. 19
Series of 2001

RESOLUTION TEMPORARILY WAIVING MASELCO'S FRANCHISE OBLIGATION TO ENERGIZE VARIOUS UNENERGIZED BARANGAYS

WHEREAS, various unenergized barangays are part of the franchise of Masbate Electric Coop.,Inc. (MASELCO);

WHEREAS, the Board recognizes the necessity to energize all barangays within franchise in line with the Government's target of energizing 100% of barangays by 2004;

WHEREAS, for lack of sufficient funds and in consideration of the far distance of various barangays from the main grid of MASELCO, it is not possible to/for MASELCO to connect said Municipalities to its grid within the short-term;

WHEREAS, in order to accelerate electrification of these Municipalities, it is practical and more effective to allow other service providers to provide funds and operate decentralized systems in these areas for a limited period until such time that MASELCO can already serve the area efficiently and viably;

NOW THEREFORE, on motion of Director Efren F. Abejuela duly seconded by Director Antonio Z. de Jesus, be it

RESOLVED, as it is hereby resolved to, in principle, to allow a private party service provider to put-up decentralized energy systems and distribute electricity services to various unenergized barangays, subject to subsequent approval by the Board of the Franchise Waiver Agreement to be signed by and between MASELCO and the Service Provider, and subject further to approval of the same Franchise Waiver Agreement by the National Electrification Commission through NEA;

RESOLVED further, to authorize AGM Luvelindo I. Natividad to begin negotiation with any interested party and prepare all necessary documents to put into effect this resolution;

RESOLVED finally, to furnish a copy of this resolution to NEA and its Regional Office for information and reference

Unanimously approved.

I hereby certify to the correctness of the foregoing resolution.

Certified Correct:

ALBERTO L. ANTONIO
Acting Secretary

Attested:

FILEMON A. BAILON
President

Annex I

ISABELA II ELECTRIC COOPERATIVE, INC.
Alibagu, Ilagan, Isabela

EXCERPT FROM THE MINUTES OF THE REGULAR BOARD MEETING OF THE BOARD OF DIRECTORS OF ISELCO II HELD ON MAY 18, 2001 AT THE COOP BOARD ROOM, ALIBAGU, ILAGAN, ISABELA.

Present:	ANDRES M. PASCARAN	President
	PETE GERALD L. JAVIER	Vice President
	LEONARDO N. PAGUIRIGAN	Secretary
	JULITO C. UY	Treasurer
	ERNI G. BAGGAO	Auditor
	FRANCISCO B. DUMLAO	P.R.O.
	JAIME C. PURUGGANAN	Member
	LORETO V. MARTINEZ, JR.	Member
	FRANCISCO B. SAVELLLANO	AGM &Ex-Officio Member

CERTIFIED TRUE COPY
OFFICE OF THE BOARD

RESOLUTION No 30 s., 2001

RESOLUTION TEMPORARILY WAIVING
THE ISELCO II FRANCHISE OBLIGATION
TO ENERGIZE THE UNSERVED BARANGAYS
IN THE MUNICIPALITIES OF BENITO SOLIVEN
AND SAN MARIANO, ISABELA.

WHEREAS; Some far flung barangays in the Municipalities of Benito Soliven and San Mariano, Isabela are not yet energized and are considered unviable barangays and part and parcel of the franchise area of the Isabela II Electric Cooperative, Inc.;

WHEREAS; The Board recognizes the necessity to energize all barangays within its franchise area in line with the Government's target of energizing 100%of barangays by year 2004;

WHEREAS; For lack of sufficient funds and in coordination of the far distance of the above-cited barangays in the two municipalities concerned from the main grid of the Coop, it is not possible to connect the lines in these barangays to its grid within the short – term required;

WHEREAS; In order to accelerate electrification of these far flung barangays in the two municipalities, it is practical and more cost effective to allow other service providers to provide funds and operate decentralized systems in these areas, for a limited period, until such time that the EC can already serve the area efficiently and viably.

WHEREFORE, on motion of Dir. Erni G. Baggao duly seconded by Dir. Leonardo N. Paguirigan, it was;

RESOLVED AS IT IS HEREBY RESOLVED TO, in principle allow a private party service provider to put up decentralized energy systems and distribute electricity services to unserved barangays of Benito Soliven and San Mariano, Isabela, subject to subsequent approval by the Board of the Franchise Waiver Agreement and or Memorandum of Agreement to be signed by and between the Coop and the service provider; and subject approval of the same Franchise Waiver Agreement by the National Electrification Commission through NEA;

RESOLVED FURTHER; To authorize the General Manager to begin negotiation with any interested party and prepare all necessary documents to put into effect this Resolution;

RESOLVED FINALLY, to furnish a copy of this Resolution to NEA and its Regional Office for information and reference.

UNANIMOUSLY APPROVED BY THE BOD en banc.

I HEREBY CERTIFY TO THE CORRECTNESS OF THE FOREGOING RESOLUTION OF THE BOD.

(SGD) LEONARDO N. PAGUIRIGAN
BOD Secretary

ATTESTED BY:

(SGD) ANDRES M. PASCARAN
BOD President

CERTIFIED TRUE COPY FROM THE ORIGINAL FILE

Certified by: MARIROSE B. SIBAYAN
OIC Sec. to the BOD

Annex J

Draft for DOE Consideration

DEPARTMENT CIRCULAR No. ____________

ENCOURAGING PRIVATE SECTOR PARTICIPATION IN RURAL ELECTRIFICATION BY ALLOWING THIRD PARTY ENTRY INTO THE FRANCHISE AREAS OF ELECTRIC COOPERATIVES BY VIRTUE OF TEMPORARY WAIVER OF FRANCHISE IN SELECTED AREAS

WHEREAS, consistent with the national policy of economic growth with social equity, the Department of Energy (DOE) aims to improve access to energy by all sectors of society through the acceleration of rural electrification;

WHEREAS, the DOE, through NEA targets to energize 100% of barangays by year 2004;

WHEREAS, by virtue of their franchise, the ECs have the sole right and responsibility to provide adequate, dependable and reasonably priced electric services within their franchise areas;

WHEREAS, the ECs desire to extend electricity services to all barangays within their coverage; however, some ECs would not be able to economically extend their distribution lines, particularly to those located far from its existing grid without full government subsidies;

WHEREAS, the government lacks the necessary resources to continue granting full subsidy to support the expansion plans of ECs.

WHEREAS, the government wishes to optimize the use of its resources and leverage its funds with other non-government fund sources in the rural electrification sector;

WHEREAS, increased private sector and other third party participation in the rural electrification efforts is essential; and in order for this to take place, it is necessary to provide the legal means for third party access to the unserved areas within the EC franchises;

NOW THEREFORE, the DOE hereby adopts and promulgates the following policy directives for the rural electrification sector.

Section 1. *Entry of New Players.* New players may be allowed to provide energy services in the unserved areas of the EC franchises, provided that the EC franchise holders agree to such arrangement;

Section 2. *Franchise Waiver by ECs.* The entry of new players into the EC franchise areas shall be governed by a Franchise Waiver Agreement entered into between the EC and the Service Provider as approved by the National Electrification Commission/NEA.

Section 3. *Use of Standard Franchise Waiver Agreement.* To facilitate negotiations between parties, the ECs are encouraged to use the attached Standard Franchise Waiver Agreement (SFWA) in forging their agreements with new players.

Section 4. *Encouraging ECs to Allow Private Sector Participation.* NEA shall encourage the ECs to undertake the Franchise Waiver approach to allow private sector participation in their respective coverage areas, particularly, in selected sites, where ECs can no longer economically connect to the grid; Provided however, that if an interested party is willing, the EC may also consider waiving its franchise for selected areas which are already connected to the grid but continued operation, of which, is a financial burden to the EC.

Section 6. *Conduct of Information Drive.* In support of this policy direction, the NEA is directed to conduct appropriate information drive among ECs to disseminate this new policy and encourage ECs to use the SFWA.

Section 7. *Review of Franchise Agreements.* It is recognized that over the last thirty years, there have been significant changes in the economic and physical developments in each of the franchise areas that justifies the need to review the franchises granted to ECs. For this reason, the NEA is therefore directed to review all existing franchises for the purpose of determining the need to re-modify said franchises based on current condition of the EC and the franchise area itself. If such need is found to be inherently beneficial, the NEA shall then proceed to prepare an implementation plan for undertaking an appropriate franchise reform program.

Section 8. This Circular shall take effect immediately a day after its complete publication in at least two (2) newspapers of general circulation.

Fort Bonifacio, Taguig, Metro Manila _____________, 2001

____
Secretary
Department of Energy

Gsy/draft DOE Circular/4-26-01

Annex K

TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification

Task #1 – Weekly Report #1
by G.S. Yeneza

Target for the Week:

To gather relevant information regarding existing franchise waiver agreements between ECs and RESCOs and conduct initial consultations with NEA/NEC-TS.

Activities Undertaken:

1. Contacted Silver Navarro/NEA and Laurie Navarro to request for a copies of the Shell Renewables/CPC waiver agreement and Smith-Bell RESCO draft agreement with Zamboanga del Norte Electric Cooperative (ZANECO) as mentioned in the TOR.

2. Met with the officers of the National Electrification Commission-Technical Staff to discuss work assignment, consult their views and request relevant documents. During the meeting, the following information were gathered:

   a. That there had been a number of requests for transfer of franchise rights between two ECs, between ECs and PIOUs, and between ECs and small entrepreneurs/multi-purpose cooperatives;

   b. That these transfers of franchise are done either on a temporary or permanent basis; and

   c. That in many cases, waivers of franchise by ECs are made through simple Board Resolutions and not through contracts/MOA.

   Requested the NEC-TS for sample copies of relevant Board Resolutions as well as their comments on the waiver agreement between Shell/CPC and Aklan Electric Cooperative (AKELCO). NEC-TS agreed to provide these by Mar. 20.

3. Visited the Office of the NEA Corporate Secretary and gathered information on policies concerning the grant of franchise rights to utilities.

4. Conducted initial discussions with NEA Legal Officer to gather his thoughts on the subject of re-franchising and requested for his comments on the Shell/CPC and AKELCO waiver agreement.

5. Discussed with NEA Director for Coop Development to determine possible schedules of consultations with ECs and Philreca.

6. Reviewed the two agreements, Shell/CPC and AKELCO agreement and the SB-RESCO and ZANECO draft agreement. Noted that the subject of the SB-RESCO agreement is that of a PPA and not about waiver of franchise.

Target for Next Week: To do further consultations, gather comments from NEC-TS and NEA Legal Office and some Philreca Officers. Prepare initial draft for standard franchise waiver agreement (SFWA) to be used as discussion paper during consultations.

TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification

Task #1 – Weekly Report #2
by G.S. Yeneza

Target for the Week:

To do further consultations, gather comments from NEC-TS and NEA Legal Office and some Philreca Officers. Prepare initial draft for standard franchise waiver agreement (SFWA) to be used as discussion paper during consultations.

Activities Undertaken:

1. Prepared first draft of SFWA was prepared and submitted to DOE/PA Consulting.

2. Discussed first draft of SFWA with NEC-TS, NEA Legal Officer and NEA Director for Coop Operations and requested for their further comments.

3. Sent letter to PHILRECA requesting for consultations with PHILRECA Board on Mar. 27, 2001 (their schedule for the month).

4. Requested PHILRECA to send copies of draft SFWA to PHILRECA Board members for their comments.

5. Followed-up request for information from NEC-TS on previous waivers of franchises submitted for notation/approval by NEC.

6. Conducted research on viability of further extensions to the grid by ECs with remaining unserved areas.

7. Organized pictures and descriptions of projects to be given as inputs to Task 2 and Task 6.

Target for Next Week: To do further consultations, gather comments from NEC-TS and NEA Legal Office and NEA officials on first draft of SFWA. Meet with PHILRECA Board on Mar.27, 2001. Prepare final draft of SFWA. Get Rosvid's inputs on possible project sites and begin to contact ECs involved in these sites. Prepare initial report on re-franchising.

TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification

Task #1 – Combined Weekly Reports #3-6
Combined Report for Period March 16-April 15, 2001
by G.S. Yeneza

Target for the Period:

1. Prepare initial draft for standard franchise waiver agreement (SFWA) to be used as discussion paper during consultations.

2. Conduct further consultations, gather comments from NEC-TS and NEA Legal Office and NEA officials on first draft of SFWA. Meet with PHILRECA Board on Mar.27, 2001.

3. Prepare final draft of SFWA.

4. Get Rosvid's inputs on possible project sites and begin to contact ECs involved in these sites.

5. Prepare initial report on re-franchising.

6. Coordinate with NEA on the holding of consultative meeting with ECs to discuss final draft of the SFWA.

Activities Undertaken:

1. Prepared a revised draft of the SFWA and discussed this further with NEC-TS, NEA Legal Officer, DA for Technical Services and NEA Director for Coop Operations.

2. Held consultation with PHILRECA Board last March 29, 2001 (meeting originally scheduled on Mar. 27, 2001) and discussed the rationale and merits of the SFWA as well as gather their initial comments on the first draft document. The Board was informed that a copy of the draft document was sent to all ECs in order to broaden the base of the consultation process. The Board agreed that based on the comments gathered, Consultant will prepare a final draft to be presented in a subsequent meeting to be held on April 19, 2001.

3. Met with selected EC managers in Region VI (CENECO, VRESCO, ILECO I and NOCECO) and discussed the draft SFWA. In said meeting, there was one important suggestion made, i.e., that the SFWA should also consider including some areas which may already be connected to the grid using subsidy funds but are found to be burdensome to the ECs. It was suggested that these areas, if removed from the EC franchise and included in a market package may in fact help to improve viability of a market package.

4. This consultant believe this may be a good idea to consider particularly for small island systems where the poblacion is already serviced by the EC but the entire area

can in fact be operated as a decentralized system by a private operator. A good example may be the municipality of Laoang in NORSAMELCO.

5. Followed-up with Rosvid Sunico, Task #4 Consultant, for the list of ECs on whose franchise possible projects are being contemplated and for which Waivers of Franchise will be necessary. However, based on discussion with Mr. Sunico, Arlene Pamintuan of PA Consulting and Reuben Quejas and Fely Arriola of DOE, no candidates were identified under the list being considered by the Project Evaluation Contractor. Hence this consultant proposed and it was agreed that instead, consultant will select 2 of the most appropriate ECs from Task #3 - market packages and proceed to get the EC Boards to sign Board Resolutions on Waiver of Franchises to support the market packages. Consultant however, indicated apprehension that because of the delay in the selection of sites and due to the limited time, the actual signing of the Board Resolutions may not happen during the period of the consulting contract. Best effort however, will be done to try to advance the signing of the Board Resolution at the earliest possible time.

6. Met with Cooperatives Development Director to coordinate a meeting with selected ECs re draft SFWA and Market Packages. It was agreed that a meeting will be called by NEA in the afternoon of April 18, 2000 for the purpose. Consultant drafted a letter for DOE's signature requesting NEA to hold such meeting. Draft letter was sent to Mr. Reuben Quejas last April 6, 2001.

7. Discussed with NEA Planning Staff and requested to sample a selection of ECs to test the viability of further extensions to their grid. Held discussions with Planning Staff on how the assumptions will be up-dated to ensure validity of results. Sample runs using current NEA Investment Analysis Model will be used in the to show necessity for re-modification of the franchises of selected ECs. A draft report has been prepared and will be submitted as soon as sample runs are completed. NEA Staff promised to provide sample runs by April 20, 2001.

8. Prepared draft DOE Circular on Private Sector Participation in Off-grid Electrification and use of the SFWA by the ECs.

Target for Next 2 Weeks:

1. Complete draft of franchising study.
2. Conduct final consultation with ECs. Select two sites for which EC Board Resolutions for waivers of franchise will be requested.
3. Prepare draft Board Resolutions, schedule meeting with EC Boards and discuss said resolutions with ECs (site visits) to seek Board Approvals.
4. Submit Draft Refranchising Study
5. Finalize DOE Circular

TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification

Task #1 – Combined Weekly Reports #7-8
Combined Report for Period April 16 - 30, 2001
by G.S. Yeneza

Target for the Period:

1. Conduct consultations with ECs on whose franchise areas market packages have been identified

2. Prepare Final Report based on Consultations with ECs

3. Complete draft report on re-franchising

4. Begin negotiation with at least two (2) ECs for the passage of Board Resolution on Waiver of Franchise

The activities identified above are based on some adjustments made on my work program due to the following:

1. Consultations with ECs and the Philreca had to be scheduled based on their scheduled meetings in Manila. Since there was no funding provided for the calling of a special meeting in Manila, the NEA had to be requested to call such meeting. The meeting schedule therefore had to conform to the schedules of other NEA meetings with the ECs in order to conserve on EC travel funds. Consultations on the draft and final draft of the SFWA had to be done on an iterative process and this took more time than was scheduled under my contract. However, such iterative process was useful in ensuring that sufficient information and discussions on the purpose as well as detailed provisions included in the SFWA were engendered.

2. Consultation with Mr. Rosvid Sunico, Consultant for Task # 4 did not result in the identification of two (2) ECs where Board Resolution on Franchise Waivers may be secured. In order to solve this gap, this consultant suggested that instead, ECs where market packages are identified, from Task #3 can be utilized as the target ECs for the subject Board Resolution. This decision was made only on April 5, 2001 in a meeting at the PA Consulting Office with Mr. Reuben Quejas, Fely Ariola, Rosvid Sunico and Arlene Pamintuan in attendance.

3. Subsequently, efforts were made by this consultant to meet with Arlene Lafrades, consultant for Task #3 to get her list of market packages. The list was finally provided on April 16. Meantime, this consultant was able to arrange with NEA to call for a meeting of ECs on April 18 to discuss the SFWA and generate EC concurrence on the passage of a Board Resolution for the waiver of franchise on some selected areas.

4. Meantime, completion of the draft refranchising study was also delayed because Consultant had to wait for some revisions and up-dating on the work program of ECs being done by the NEA Planning Group. Such information was necessary in order to

analyze the extent that ECs desire to extend their grids, the cost of planned extension and whether or not such extension is economically feasible or not.

Activities Undertaken:

1. Based on the developments above-mentioned, consultation with ECs were conducted on April 18, 2001. Fourteen (14) of fifteen (15) ECs invited were able to attend. Philreca Executive Director Wendell Ballesteros was also present in said meeting. The final draft of the SFWA was presented and the ECs were allowed to comment on each provision. There were no adverse position presented, except for the provision were the ECs are given allowed to also waive their franchises to areas already connected with the grid. While they are willing to do this, they were citing possible political pressure from LGUs if such provision is included. However, they agree that should there be any interested party, they are willing to negotiate for inclusion on already connected areas, if this can improve the market and if there are no adverse reaction from the consumers in said areas.

2. In order to facilitate the passage of Board Resolutions (BR) by the ECs, this Consultant volunteered to draft a simple Board Resolution for the consideration of the EC. A draft BR was prepared and a copy was provided to the ECs. At least 2 ECs were having their Board Meeting before end of April. In this regard, detailed discussions were held with the General Managers of these 2 ECs to get their commitment to pass the BR.

3. A meeting with Philreca Board was held on April 19, 2001. In said meeting the final draft SFWA was presented. Consultant also made a report on the result of discussion held with the ECs the day before. Again, the Philreca Board concurred with the suggestion not to include the waiver, areas that are already connected. The draft BR was also discussed and there were volunteers from some Philreca members to discuss the same with other ECs in their regions. They were interested to find out whether there are already parties that have signified interest in undertaking decentralized electrification in the off-grid areas.

4. Consultant worked with NEA staff to determine the viability of line expansion programmed by ECs between 2001-2004. Sensitivity analysis using NEA Investment Planning Model were done. Results of this are expected to come out by May 3, 2001. Results will be incorporated in the Refranchising Study.

5. Final draft of the SFWA was prepared based on the meeting with the ECs and Philreca.

6. A revised draft of the DOE Circular was also prepared incorporating comments made by Arlene Pamintuan of PA Consulting. Said draft was transmitted to Dir. Francis Benito and Reuben Santos of DOE for their comments. No comments have so far been received from DOE, on the first draft of the Circular. A follow-up with DOE will be made.

TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification

Task #1 – Weekly Report #9
Period May 1-7, 2001
by G.S. Yeneza

Target for the Period:

1. Complete draft report on re-franchising
2. Follow-up negotiation with at least two (2) ECs for the passage of Board Resolution on Waiver of Franchise
3. Begin Draft of Terminal Report

Based on adjusted work programmed, the following were accomplished during the week.

1. Completed draft of the Re-franchising Study.

2. Follow-up on the ECs that have signified willingness to pass Board Resolution (BR) for Waivers of Franchise in selected areas within their franchise. In the absence of an identified party, the BR will contain only a general provision indicating willingness of EC to a temporary waiver of franchise, the details of which will be further negotiated between the parties later on.

3. The progress of the BR passage are as follows:

   - ZAMSURECO I reported that its BR will be for ratification on May 6, 2001.
   - CAGELCO II had to a postponement of EC Board Meeting postponed scheduled for April 29 to May 8, 2001.
   - MASELCO also reported that a BR on the Franchise Waiver is already included in their agenda for May 9, 2001 Board Meeting.
   - Other in the prioritized list of market packages were also asked to pass their respective BRs. However, this will have to wait for the next scheduled Board Meeting.

   These ECs will be follow-up within the following week to ensure passage of the BRs. To facilitate the passage of the BRs, I prepared a model BR for consideration of the ECs. (see attached)

   It should be noted that because I worked on the long-list of the market packages, the ECs that had been asked to pass their BRs on Franchise Waivers are not all included in the prioritized list. This somehow creates difficulty because the ECs may expect that if they pass the BR, their area would be included in the priority list. Note also that since the Prioritized List of Market Packages was only given out on May 3, there was no way that I could delay negotiation for the signing of the BRs until the Priority List were identified.

4. Consultation summaries were prepared as part of the Terminal Report.

PHILIPPINES CLIMATE CHANGE MITIGATION PROGRAM

A Joint Program of the

Philippines Department of Energy

US Agency for International Development

TERMINAL REPORT

Technical Assistance to DOE for Enhancing Private Sector Participation in New and Renewable Energy Investments for Off-Grid Rural Electrification (TASK 2 – Consultations with Local Governments on Investments in New and Renewable Energy)

Submitted to the:

United States Agency for International Development (USAID)

and the

Department of Energy
Manila, Philippines

By:

DEVELOPMENT PLANNING AND ENVIRONMENTAL MANAGEMENT, INC.

Prepared for:

Prime Contractor - PA Consulting, Inc

3rd Floor, Department of Energy Building
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This report was prepared under the terms and conditions of Contract No. 492-C-00-97-00063.

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TERMINAL REPORT

TASK 2

TECHNICAL ASSISTANCE FOR ENHANCING PRIVATE SECTOR PARTICIPATION IN NEW AND RENEWABLE ENERGY INVESTMENTS

This Terminal report consists of four parts namely: (a) a review of activities carried out under this Task; (b) a summary of the results of the consultation workshops; (c) recommendations resulting from those consultations; and, (c) recommendations on activities to follow through on the results of the consultations.

REVIEW OF ACTIVITIES UNDERTAKEN

The deliverables of Task 2 are as follows:

1. Selection of local governments in which to hold consultation workshops for the purpose of determining how a national Program for the Promotion of New and Renewable Energy sources (NRE) could be made acceptable to local government units (LGUs).
2. The design of presentation kits for use in those consultation workshops.
3. The conduct of the consultation workshops.
4. On a best effort basis, generate expressions of interest from the participants in the workshops.
5. The generation of information on the seven LGUs to be covered by the Task.
6. Recommendations on follow through activities in the LGUs in which the consultations were held.
7. Terminal report.

Work on the Task consisted broadly of five phases, namely:

- Selection of the LGUs;
- Preparation of presentation or briefing materials;
- Preparations for the consultation workshops;
- Conduct of the consultation workshops; and
- Completion of reports.

A brief description of each phase follows.

Phase	Description
Selection of LGUs	This phase consisted of intensive discussions with the United States Agency for International Development (USAID), the Department of Energy (DOE) and the PA Consulting. Both USAID and the DOE understandably had their respective concerns to address by way of this activity. To satisfy all those concerned, the Task 2 Team decided to cover eight rather than the contracted seven LGUs. Other than the challenge posed by differing priorities of the concerned agencies, the Task 2 Team encountered no serious difficulties. The memorandum summarizing the basis for the final selection is attached as Annex 1. The selected LGUs were Nueva Vizcaya; Masbate; Northern Samar; Laoang, Northern Samar; Capiz; Antique; Lanao del Norte; and, Zamboanga del Norte. With the LGUs defined, the Team proceeded to organize teams to coordinate preparations for the consultations.
Design of Presentation and Briefing Materials	This also entailed extensive consultations with the Department of Energy, specifically the office of Engr. Ruben Quejas. A total of three consultation meetings were held. The briefing materials consisted of a reference document using a "Question and Answer" format and a PowerPoint presentation. A copy of the reference document is presented as Annex 2 and the PowerPoint presentation is presented in Annex 3. A diskette copy of the PowerPoint presentation is attached to this report for reference. A major difficulty encountered was the initial dearth of case materials to show the participants. The first drafts of the materials consisted mostly of non-Filipino cases. With the help of the other Task consultants, the Team was able to gather enough information to generate a more "Filipinized" version of the New and Renewable Energy Development program.
Preparations for the Consultation Workshop	This phase was the most difficult in the Task. It consisted of three parallel activities, namely: (a) the design of the Consultation Workshop process; (b) the gathering of information relevant to the Consultation Workshops; and, (c) actual field preparation work. The most valuable pieces of information gathered were the maps, the data showing the level of energization by barangay, and the key local players in the energy sector. This helped the team determine which municipalities and barangay heads to invite, and what institutions had to be tapped to ensure

	effectiveness of Consultation-Workshops. In Mindanao, the role of the Mindanao State University in Iligan (MSU-IIT) was critical as they used their network to ensure that the preparations were in order. The last activity was the most difficult. It consisted of three tasks, namely: informing the selected LGUs and key institutions of the planned event; requesting their assistance to coordinate the preparations; and requesting the LGU to host the activity. When informed of their selection, all except Nueva Vizcaya province agreed to cooperate. Governor Agbayani said he would be very busy attending to his re-election bid. A surrogate LGU was selected: Kasibu, Nueva Vizcaya. It turned out to be a good site as it was (and still is) in the midst of an initiative to establish a NRE facility in four of its barangays. Capiz and Masbate provinces begged off barely fourteen days before the scheduled consultation. This and other coordination problems encountered were attributable to the closeness of the start date to two major events in the Philippine calendar namely the Holy Week and synchronized elections. The latter was the most troublesome. The local chief executives were afraid of organizing events that would be snubbed. Guide to field coordinators containing their prepared talking points with Local Chief Executives (LCEs); the prepared team itineraries; and sample correspondence to other local players are shown under Annex 4A-B.
Conduct of Consultation Workshops	The Consultation Workshops were conducted within March 26 and April 18. The Holy Week served as a break between the two batches of LGUs. Not much difficulty was encountered during the workshops. The worst that happened were tardiness of participants. In Lanao del Norte the workshop started at 10:00 AM continuing into 6:00 PM. A Facilitator and a Co-Facilitator from the Team handled each Consultation Workshop. When present, representatives from the DOE and the Affiliated Non-Conventional Energy Centers (ANECs) or the local electric cooperative served as the technical resource persons alternately. For Zamboanga del Norte, in the absence of both the ANEC and the DOE, the MSU-IIT provided expert counsel to the participants. A summary of the Consultation Workshop results is presented in the next section. The schedule of Consultation Workshops is attached as Annex 5.

Reports	The documentation reports on the workshops were completed one week (April 26) after the last consultation (Masbate, April 19). The terminal report was completed on May 10. No difficulties were experienced in this phase.

SUMMARY OF CONSULTATION WORKSHOPS RESULTS

The Consultation Workshop activity consisted of 6 activities including the Opening Activity, designed for a maximum running time of 8 hours. The six activities included:

- Opening Activity
- Introduction of the Philippine Rural Electrification Program, New and Renewable Energy and the Market Package Concept
- Current Reality Dialogue
- DOE Information on Next Steps for the LGU
- Expression of Interest to the Program
- Closing Activity

In all, four (4) provinces, eighteen (18) municipalities and forty-two (42) barangays were represented in the Consultation Workshops. A total of 144 officials and private citizens participated in said activities.

A copy of the Workshop Design is presented in Annex 6. The table below summarizes the major results of activities 2-5 of the Consultation Workshops.

Workshop Activity	Major Results
Introduction of the Philippine Rural Electrification Program, New and Renewable Energy (NRE) and the Market Package Concept	Very few clarificatory questions were asked on the Philippine Rural Electrification Program. Of more interest to the participants were the presentation on the NRE and the Market Packages. The NRE discussions centered on the cost of installation and the technical requirements as well as features of the installation. On the Market Package, the discussion centered on the clustering approach used. In all consultations conducted, none of the identified service area clusters reached ten barangays. The facilitators observed that at the most, four barangays would form a cluster. The use of the pre-identified clusters in breaking up barangays into workshop groups had to be reviewed in the light of some communities' opinion that such clusters would not work. Wide dispersion of households and connectivity reasons were commonly cited in questioning the validity of the market packages.

Current Reality Dialogue	In assessing the demand for electricity, none opted for a free ride to electrification. Of the 19 clusters or workshop sub-groups, 17 stated that they need electricity so much that they are willing to invest in it given the right price. The remaining two clusters opted to allow private investors to take the lead under a BOT arrangement. But they offered to provide funding (from their 20% development fund) should the private investor request for equity counterpart from them or in the event that the private investor drops the electrification project.[1] It was noted that several times, participants agreed that upland households are willing to pay the right price for electricity. The distribution of demand by user type varied widely among the 19 clusters. On the average the projected percentage distribution in the use of power was as follows: ▪ Residential 32% ▪ Livelihood 56% ▪ Public Services 12% A rundown of the identified hindering and favoring factors is presented in this section. The most mentioned favoring factor is LGU support followed by the availability of a resource, support of an organization and finally the technical capacity to implement an NRE project. For subsequent activities, the participants often mentioned the following: ▪ Search for financing source ▪ Preparation of feasibility studies ▪ Issuance of resolutions in support of the project ▪ Network with their higher LGUs to request for counterpart funding ▪ For the local electric cooperative to provide training to barangays with NRE projects ▪ Assess the resource in terms of its capacity (volume flow) for micro-hydro ▪ Conduct information, education campaigns to

[1]Participants in the two clusters explained that they would wait first for an investor to finance the planned NRE project in the light of a private sector's expressed interest to pursue an NRE project in the area under a BOT arrangement. See the Masbate Consultation Workshop proceedings.

	educate people on the NRE ▪ Seek investors in NRE potentials
DOE Information on Next Steps for the LGU	Where the DOE was present, the representative was asked to comment on the "next steps" identified by the participants. In Kasibu, the DOE was engaged in discussions on the technical requirements of the solar and micro-hydro systems. In Antique and Northern Samar, the representative expounded on the requirements of government financial institutions (GFIs). The discussions were varied. The roles of ANECs were also discussed.
Expression of Interest to the Program	Informal expressions of interest were prepared by the participants. In Kasibu and Antique, narrative EOIs were drafted on site by the participants and signed by everyone. In other sites, posters were produced, either by cluster or in plenary, and signed by the participants.[2] In the first two consultations in Northern Samar, a formal Expression of Interest (EOI) to be signed by the participants was provided. The legal language and the idea of signing the EOI dampened the enthusiasm of the participants, as it was perceived to carry a legal obligation on their part. This prompted the Team to drop the more formal format and opt for the more informal process of eliciting EOIs. Please see sample format of formal EOI in Annex 7.

[2] Please refer to the Consultation Workshop Proceedings for reproduction of EOI posters.

SUMMARY OF HELPING FACTORS

LGU Support

- 20% of IRA may be used for the projects (7)
- Willingness of barangays to provide counterpart funds from their IRA (2)
- Counterpart from the LGU may be made available (2)
- IRA is available (2)
- Barangay resolutions can be issued
- Barangay support in the form of 20% IRA
- Barangay teachers and officers can help
- Some municipal counterpart funds
- Electric posts made available by barangays
- Counterparting is accepted, fast release of budget from ANIAD to projects
- Financial assistance from LGU
- LGUs and stakeholders are cooperative
- Receptivity of LCEs to NRE
- Resolutions issued requesting for support from the DOE
- Right of eminent domain
- P500, 000 cash in bank with additional funds from the IRA (Guibo, Siayan)
- The Mayor and the barangay council support the effort

Support from Other Organizations

- Presence of cooperatives and other groups (3)
- Coordination of NGOs and LGUs is good (2)
- Presence of institutions that can be of help (NORMASELCO, TESDA, ANEC and DOST) (2)
- Presence of local NGOs (2)
- Acceptance by barangay council and local people's organization
- Cooperatives are active
- Existing partnerships between people's organizations, non-government organizations, local governments and ANECs.
- Financial assistance from the NGOs
- NGOs supportive of NRE initiatives
- Presence of farmers' cooperative
- Strong community organization
- Supportive Electric cooperative and NAPOCOR
- High level of interest in NRE by the NAPOCOR and LANECO
- Province is host of ER 1-94
- Regular release in share in national wealth to the province

Resource Is Available

- Solar and wind resources available/plentiful (3)
- Abaton falls, Sibuton falls
- Availability of resource
- Barangay water sources
- Cabagian and Palmera falls
- Falls and wind are available
- Maliao River
- Micro-hydro sites have been identified by the LGUs
- Natural resources
- Panagawayan falls for mini hydro
- Panay River
- Waterfalls
- Rivers and streams abound
- Salog River for micro-hydro
- Streams and rivers abound
- Sunlight is available
- Available local materials
- Water resources will be maximized
- Water supply is available (Panay River)

Technical Capability to Implement the Project

- Availability of electricians and technicians (3)
- Available human resources/manpower available (3)
- Availability of skilled people/trained labor (2)
- Barangay electricians are available
- Existing solar project
- Experience in solar energy
- Presence of ANEC
- Presence of electricians and technicians
- Technical capability

Community Preparedness

- Bayanihan spirit is alive (2)
- Concern for watershed conservation
- Cooperative spirit of the residents
- Feasibility studies completed
- People are willing to pay higher that the current P100 they spend for electricity or lighting
- Strong community organizing skills brought by ANIAD

Complements Other Projects

- Agri-producing area
- CBRMP can complement
- Income generating projects in place in some municipalities
- Need for water
- Presence of ecotourism sites
- Salvador is covered by corn cluster program
- Tourism potential

Effective Implementation of Electrification Programs

- Barangay electrification program
- Electrification under the ARC program
- LANECO and NPC programs are implemented province-wide
- On-going barangay electrification program
- Proposed electrification of MASELCO

Other Factors

1. Accessibility
2. Accessibility by road
3. Low labor cost for maintenance
4. Rare typhoons
5. Transparency in government transactions

SUMMARY OF HINDERING FACTORS

Technical Constraints to Construction or Installation of the Facility

- Lack of farm-to-market road/ Poor road condition/network (6)
- Lack of accessibility for delivery of materials (4)
- Inaccessibility of project site (3)
- Right of way (ROW) problems (2)
- Transportation problems (2)
- Catubig river obstacle
- Construction will be difficult
- Difficult terrain
- Inadequate communication facilities
- Location of sites
- Micro-hydro may need lots of materials to construct
- No hardware to implement the project
- Off-grid areas
- Some micro-hydro sites are far away
- Source of materials to be used

Community Preparedness

- Dole-out mentality (3)
- Expensive fees / Fees are not affordable (2)
- Expensive fees (P50-100)
- Financial constraints on the part of the households
- Insufficient information
- Low income (2)
- Need for capability building
- No champion or prime mover
- No community support
- No support from landowners
- No viable organization to manage the facility later
- P60 a month is too much
- Some micro-hydro potentials are located in private lots
- Too expensive at P90 per month
- Tribal resistance to the project
- Waiver from cultural minorities for the implementation of the project

Fund Limitations

- Lack of financial resources/investment funds (7)
- Lack of counterpart support from LGUs (2)
- No financial support (2)
- Financial support needed for the electrification program
- MASELCO agrees to connect sites if the LGU helps cover the cost of clearing coconut trees

Technical Limitations to Implement the Project

- Absence of RE service companies in the province
- Lack of expertise in NRE
- Lack of technical personnel
- Lack of technical skills
- Limited technical knowledge of NRE
- Needs technical studies
- No experts or technical personnel
- Dispersed households
- Household distribution dispersed in target barangays
- Limited sunlight
- Some sites are used for irrigation purposes
- Typhoons are common and will affect risk as well as construction

Bureaucratic Requirements

- Bureaucratic red-tape delays implementation (2)
- DENR has not issued any policy on need for ECC for RE projects
- Difficult to get approval of agencies
- Implementing arm of the project has not been identified
- Lack of transparency delays implementation
- Poor networking between agencies

Peace and Order

- Peace and order situation is bad (3)
- Insurgency
- Crime situation

Politics

- Political factors (2)
- Political affiliation: Favoritism
- Politics or intervention of politicians in development of a site

RECOMMENDATIONS RESULTING FROM CONSULTATION WORKSHOPS

The following are two sets of recommendations, based principally on the results of consultations with local government officials and other participants to the workshops held between March 26 and April 20, 2001. The first set of recommendations deals with how the local government units (LGUs) can be motivated to actively support the New and Renewable Energy (NRE) Development Program of the Department of Energy (DOE). The second set concerns suggestions on an initial batch of local governments which may be approached for the implementation of the DOE's NRE Program.

Some of the recommendations may seem obvious but we state them anyway for emphasis and in recognition of the strategic role that local governments play in countryside development. In that regard we start by invoking Section 2.c of the Local Government Code of 1991 requiring "all national government agencies and offices to conduct periodic consultations with appropriate local government units, non-governmental and people's organizations and other concerned sectors of the community before any project or program is implemented in their respective jurisdictions." Related provisions in the Code include Sections 26 and 27.

MOTIVATING LGUs TO SUPPORT THE GOVERNMENT'S NEW AND RENEWABLE ENERGY RESOURCES DEVELOPMENT PROGRAM

Involve local government units (LGU) in the design of NRE projects from conceptualization to implementation.

The workshops merely confirmed how LGUs could be of tremendous help in initiating NRE projects in their localities. The workshops specifically showed:

- How LGUs could facilitate rapid assessments of NRE resources, using local knowledge;
- How cooperative they could be in facilitating preparations for more detailed studies on each potential NRE resource;
- The LGUs' openness to venture with private parties in the development of NRE resources;
- Their willingness to provide financial and other forms of support to viable NRE projects, if need be.

Asked about their level of interest in NRE projects for their off-grid zones, all 19 of the barangay clusters formed during the Consultation Workshops said that they were willing to implement the projects even if they have to invest in it.[3]

As observers at the Consultation Workshops, one could not help but notice the subtle authority that local chief executives (especially Governors) held over Electric Cooperatives. That relationship could be crucial when the need for waivers arises.

There is also the need for the LGU's support in preparing the community to ensure the viability of the NRE facility. Community unpreparedness was the second most-mentioned hindrance to NRE development during the workshops.

As experienced in the workshops, there appears to be possible differentiation of roles for each level of LGU. At the ***provincial level***, the following concerns could be addressed:

The workshops yielded information on a number of LGU initiatives in NRE development, including two mini-hydro development projects (Lanao del Norte and Zamboanga del Norte)

Participants mentioned local government supports the most as a "helping factor" in the implementation of the NRE Program. A summary of "Helping and Hindering Factors" is attached for reference. The more common forms of support are:

- *Counterpart funds from their respective development funds (20% of regular income). Antique had appropriated more than P1.0 million for its electrification program while several barangays had set aside substantial amounts as their counterpart to NRE projects. The municipality of Siayan in Zamboanga del Norte, has a barangay (Guibo) with P500,000 ready for investment in an NRE project.*
- *Making available non-financial LGU resources. In Zamboanga del Norte, the Governor verbally committed financial support to viable NRE projects identified and the provincial team of electricians who also complement the local electric cooperative's technical pool.*

- The role or contribution of the local electric cooperative.
- Networking with national agencies and private sector establishments with capacity to finance or provide technical assistance to NRE initiatives.
- Commitments for financial support to municipalities and barangays willing to implement NRE projects. The province receives substantial portions of the shares in natural wealth of LGUs. The barangays and municipalities could use these proceeds for their NRE projects. Some provinces also provide "support to barangays" from the development fund, on a regular basis.

On the other hand, actual project planning is best done at the ***municipal level***, participated in by the barangay clusters. The planning process, which to some extent was done in Laoang, Kasibu, Tapaz and Dimasalang covered initial identification of resources, assessment

[3] *In two clusters, the participants said they would wait first for an investor to finance the planned NRE project before they invest in an NRE Project, considering that there were identified private companies that expressed interest under a BOT arrangement. See the Masbate Consultation Workshop proceedings.*

of community preparedness and the LGU's financial capacity and making an initial estimate of demand for energy, at the barangay level. It was observed that a process could be designed so that a structured municipal-barangay level project planning could be completed quickly.

Given basic technical information, the community can very well assist experts in pointing out local resources and other factors that can be tapped and considered in planning and designing NRE facilities, and immediately rule out options that do not match local realities and preferences. Such a process can be tedious and costly without the key informant's cooperation and active participation.

Annex 8 presents a summary of a participatory planning process in which information and insights vital to the formulation of a realistic project plan can be generated and organized. Involvement of the LGUs and community representatives in such a process has served as a venue not only for project planning but also ultimately for bonding the key local players to the project and the subsequent effort.

Except perhaps for coastal or island communities, peculiarities of a site in terms of its physical characteristics as well as the customs (of indigenous peoples) and livelihood systems of its people, distinguish one NRE Project Package from another. There may be a need to design a method, or structured process, for customizing certain NRE project components.

- *Cultural Minorities in LGUs Covered by the Consultations*
- *More than 20% of Zamboanga del Norte's population is Subanon, most of them occupying the province's hinterland.*
- *Antique's aeta population is concentrated in the highlands where micro-hydro potentials abound.*
- *70% of Kasibu's population consists of a mixture of Igorot, Benguet, Bugkalot and other Cordillera tribes-people.*
- *Lanao's del Norte's uplands are inhabited mostly by Muslim communities.*

The components of NRE projects referred to are:

- Organization and management;
- Financial packaging; and
- Marketing.

Twice, tribal opposition was mentioned as a hindering factor to NRE project implementation. As noted earlier, the unpreparedness of communities was the second most-mentioned hindrance to project implementation. On the other hand, it is the careful handling of tribal communities by an NGO that figured prominently in what appears to be a successful initiative in Kasibu, Nueva Vizcaya. In the same light, not all barangays share the exact same level of enthusiasm for NRE projects. It was only in Kasibu that the team experienced four barangays sharing the same level of excitement for the NRE projects in the pipeline (one under installation).

Peculiarities arising from differences in existing or potential livelihood systems of upland communities is another reason for customization The people of Guibo, Siayan Zamboanga want electricity to power their eco-tourism potential while the tribal communities of Dine, Pao, Siguem and Paqued, all in Kasibu want electricity for their common work facility and water supply. On the other hand, the barangays of Salvador in Lanao del Norte want electricity for milling and entertainment.

There may also be a need to customize the clustering of communities on the basis of localized characteristics rather than pre-determined factors based on statistics. Localized characteristics could range from customs and tradition, which bear on the community's decision to tap an NRE source, to the readiness of a community to sustain an NRE facility, i.e. the issue of user fees.

In all consultations conducted, none of the identified service area clusters reached ten barangays. The facilitators observed that at the most, four barangays would form a cluster. The use of the pre-identified clusters in breaking up barangays into workshop groups had to be reviewed in the light of some communities' opinion that such clusters would not work. Wide dispersion of households and connectivity reasons were commonly cited in questioning the validity of the market packages.

No Need To Wait for the Clusters

At the Zamboanga del Norte workshop, the participants were flabbergasted when a participant from Guibo, Siayan suddenly announced that the barangay had P500,000.00 in the bank for its NRE project. Then and there, the barangay requested for assistance to proceed. Were we supposed to tell him to wait for at least nine other barangays to form a Market Package?

The Kasibu group number only four barangays, two of which have been "energized", having been connected to the grid. The participants remarked that only eight households have actually been connected to the grid. How can this situation figure in the Market Package clustering?

In the north and in Mindanao, the likelihood of tribal communities being affected by NRE projects is high and therefore all the reason to be sensitive to unique cultural features. In the workshops of Kasibu, Lanao del Norte, Zamboanga del Norte and Antique, concerns of tribal and cultural communities figured with some prominence in the discussions. The De La Salle University's experience with cultural minorities in the installation of a micro-hydro project should be a good reference.

In the same vein, the NRE Program should not be hasty is advising communities to form "cooperatives" that would own the facility, or having a "juridical personality." The approach, which was extensively promoted during Marcos' time led to frustrations with the cooperatives movement.

The Kasibu experience should be a good source of learning in this regard. The community organization taking the initiative in the NRE project deliberately refrained from forming a formal cooperative until such time that they believe they are prepared, organizationally, to call themselves one.

Affiliated Non-conventional Energy Centers (ANECs), being closer to the LGUs, should be accorded more support to actively promote NRE. Their skills in dealing with the political and socio-cultural aspects of NRE development need strengthening.

Politics and community unpreparedness combined were mentioned most often by workshop participants as the hindering factors to NRE development. Surprisingly, lack of technical skills was one of the least mentioned as a hindrance.

ANECs representatives were present in four of the eight workshops. The ANEC for Region VI (based in Iloilo City) came prepared and was very knowledgeable on the Antique area and the technical aspects of NRE. Its representatives distinguished themselves during the discussions thus illustrating the potential role that ANECs can play in promoting NRE technology among LGUs.

A noticeable deficiency in the discussion on NRE technology was the lack of local examples, particularly of successful cases of viable NRE-based systems in the Philippines. Most systems in place were established through grant financing while the Shell RESCO and Atulayan experiences in Aklan and Camarines Sur, respectively have not yet been assessed.

In that regard, it is suggested that a Conference of ANECs be organized as a forum for sharing experiences and insights not only on technology but also in the political and socio-cultural aspects of NRE project implementation.

The number of ANECs needs to be increased at a ratio of at least one per province. Before reaching such a standard, ANECs will have to tap every resource available. One such resource is the Project Development Assistance Center (PDAC) based in the National Economic and Development Authority's (NEDA) regional office. PDACs are mandated to assist LGUs in their project development needs.

Facilitate the release of LGUs' share in national wealth from Government Owned and Controlled Corporations (GOCCs) and agencies (NGAs) and assist LGUs access financial resources from funds established under ER-1-94.

At the consultations, the National Power Corporation (NAPOCOR) explained sources of funds that LGUs may tap to finance NRE projects, other than the financing programs of the Development Bank of the Philippines and the Land Bank. These funds include: (a) the LGU's share in national wealth as stipulated in Articles 386-392 of the Implementing Rules and Regulations (IRR) of the Local Government Code of 1991; and, (b) funds established under ER 1-94.

For the former, provinces may learn from Lanao del Norte, which regularly receives its share from the National Power Corporation while barangays may learn from Guibo, Siayan, and Zamboanga del Norte. Likewise, Kasibu barangays received funding from the Philippine National Oil Corporation (PNOC) to finance their micro-hydro project.

Funds generated from the share in national wealth are substantial. Under the Code, if the proceeds were derived from the development and utilization of hydrothermal, geothermal and other uses of energy, 20% of the LGU's share may be used for development and livelihood projects while 80% must be used to "lower the cost of electricity in the LGUs where the source of energy is located".
On the other hand, funds established under ER 1-94 may be used for projects of cooperatives, including livelihood and NRE projects of communities. Lanao del Norte has had experience in accessing this fund source.

There should be more policy and networking support to LGUs. This is a role best performed by the Department of Energy. In addition the Department must be ready to serve as mediator between Electric Cooperatives and LGUs over cases affecting the implementation and operation of NRE facilities.

Four NRE projects encountered at the workshops resulted from networking activities of the Department of Energy. These are the mini-hydro project in Zamboanga del Norte, Capiz and Lanao del Norte, the hybrid system in Masbate and the micro-hydro project in Kasibu. In Zamboanga del Norte, the DOE linked the province to Smith-Bell. In Masbate, the LGU was linked by the DOE to Breeze Electric. In Kasibu, the DOE linked the interested farmers' groups to the PNOC. These experiences point to a vital role that the DOE can play in supporting LGU initiatives: linking LGUs to investors.

The Department of Energy, NAPOCOR and the Philippine National Oil Company (PNOC) need to develop guidelines that will facilitate the release of LGUs' shares in national wealth as well as access to the funds established under ER 1-94.

At the consultation in Dimasalang, Masbate, a cluster of barangays expressed preference to manage its own NRE project. The local electric cooperative was open to the idea provided they are paid royalties for the franchise. The LGU representatives found this unacceptable. This is one case where intermediation perhaps by the DOE will be necessary for NRE and off-grid electrification to prosper.

Allow both the LGUs, NGOs, private groups and local electric cooperatives to develop creative mechanisms that will promote the viable operation of NRE Systems within franchise areas.

There was no instance in which local electric cooperatives (LECs) expressed opposition to the operation of NRE systems within their franchise areas. In all cases, the LECs encouraged LGU representatives to establish and operate NRE systems. There has to be ways of formally reflecting such supportive attitude in agreements between LGUs and local electric cooperatives. Waiver of franchise rights is only one of those ways.

> *The consultation workshop in Dipolog City coincided with the signing of a Memorandum of Agreement between Smith-Bell RESCO, the Zamboanga del Norte Electric Cooperative and the Provincial Government, to cooperate towards developing a mini-hydro plant.*
>
> *Likewise the Philippine Rural Reconstruction Movement in Kasibu and the Nueva Vizcaya Electric Cooperative signed a Memorandum of Agreement for the former to develop and operate a micro-hydro plant in four barangays of the municipality.*

In Kasibu, the NUVELCO agreed to allow the PRRM to establish a micro-hydro system for certain barangays. However, there is a provision in the memorandum of agreement (MOA) categorically stating that the MOA is not a waiver of franchise.

Without discounting their involvement in large scale (more than 10 barangays, as described in the Market Packaging concept), commercial development of NRE systems within the next few years, Local governments are likely to be implementing small scale, community-based initiatives involving one to four barangays at most. Many may even be *"stand alone"* installations in conjunction with barangay-level facilities such as water supply, street lighting or communications. Such initiatives may require less sophisticated arrangements.

But when such sophisticated arrangements become necessary, it would be useful to have available, tested models illustrating alternative management or organizational set-ups that could be used as basis for crafting more appropriate arrangements.

Implement the NRE Program in the Autonomous Region of Muslim Mindanao (ARMM) areas in partnership with Muslim institutions.

Muslim participants in the Lanao del Norte workshop noted the National Electrification Administration report showing large numbers of unenergized barangays in the ARMM area. To boost the Program and ensure its success, MSU-IIT Chancellor Dr. Mar Salazar, who served as resource person in the Lanao and Zamboanga del Norte workshops, suggested that genuine, and respected Muslim institutions be intensively involved in the program's implementation. He said that the Mindanao State University- Institute of Technology (MSU-IIT) in Iligan is particularly keen in participating in the initiative.

It was observed that the institution is already into NRE activities. The MSU has satellite campuses throughout Muslim Mindanao and enjoys the respect of all Muslim communities.

RECOMMENDATIONS ON FOLLOW THROUGH ACTIVITIES

Consultations in eight LGUs were conducted. In all, participation was enthusiastic, despite, or perhaps because of, the novelty of the subject matter. Surprisingly, LGU representatives, especially those at the barangay level, had one or two project ideas ready by the end of each consultation. The following represents the Task 2 Team's thoughts on the level of readiness of the eight LGUs for NRE initiatives.

A simple set of criteria was agreed upon by the members of the Task 2 Team, particularly those who were involved in the preparations for and the conduct of the workshops. Not included in the set of criteria were factors that were used in the ranking of the Market Packages such as number of unenergized households, average household income and others. The assessment focused on factors that would be indicative of their readiness and willingness to implement NRE projects in their areas.

Only six factors were considered namely:

1. **Availability of funds to implement an NRE project**

   This is indicated by amounts set aside by the local government for the implementation of an identified NRE project.

2. **NRE projects identified or contemplated, with a resource already identified**

   This is indicated by an identified resource that the community or the LGU believes is a viable source of NRE. These include hydro, biomass, solar or wind source. LGUs appeared to be confident about their water and solar sources for projects.

3. **The local electric cooperative's level of support**

   This is indicated by the participation shown by the local electric cooperative at the workshop as well as its actual support to community initiatives in NRE development as evidenced by documentation and accounts by key informants at the workshop.

4. **Presence of an investor willing to invest in an NRE Project or an Organization willing to provide funds for NRE Projects in the Province/Municipality**

   Investors include the LGU, a donor, a private investor, the electric cooperative or an organization or institution contemplating to secure funds for a local NRE project. Organizations refer to national agencies or private institutions known to be peddling funds to LGUs or communities willing to implement NRE projects.

5. **ANEC presence in the LGU**

The LGU will need technical advice in the installation of the NRE system. The presence of an active ANEC in the area will be important. In the absence of an active ANEC, the presence of another active institution knowledgeable in the technology would do.

6. **Perceived general interest of the local leadership and officials in the development of NRE projects in the area.**

This will be based on a subjective assessment by the workshop facilitators, of the general level of interest shown by the local officials as indicated by their support during the preparations, their participation in the consultations and declarations made at the workshop. The presence of either the chief executives of the LGU is indicative of the importance they give to NRE development, or at least the rural electrification program as a whole.

Based on the above factors, the Team ranked the readiness of the LGUs as follows:

Most Ready

- Zamboanga del Norte
- Antique
- Kasibu Barangays

As may be gleaned from the table below, these LGUs or communities are ready for project-level technical assistance. Project development activities including the validation of NRE resource availability could already proceed in these LGUs. However, follow through activities should include expanding the coverage of the NRE program and promoting investments in larger scale projects

Ready but needs further support in terms of project identification and study. The NRE program will also need some social marketing push.

- Masbate
- Lanao del Norte
- Northern Samar (including Laoang)

This set of LGUs, while displaying keen interest in the NRE program, needs more assistance in defining the project sites. Perhaps because the workshops were conducted during the campaign period, not much attention was given to making financial commitments to the NRE Program. Pledges were made during the workshops but these do not carry any weight. Further work must be done to convince local officials to commit financial resources to achieve gains in the local rural electrification program. Rapid assessment activities using the methodology presented in Annex 1 could be used to help the LGUs determine the financial resource requirements of their NRE program.

Least Ready

- Tapaz, Capiz

It is suggested that further work in this municipality be terminated considering that electrification, according to them, is not the first priority.

Characterizing the LGUs' Readiness for NRE Program / Projects Using Prioritization Factors 1, 2 and 3

Factor Considered / Local Government	1 *Availability of funds to implement an NRE project*	2 *NRE projects identified or contemplated but with a resource already identified*	3 *The local electric cooperative's level of support*
Zamboanga del Norte	P500,000.00 is available immediately for an NRE project in the municipality of Siayan. The amount is currently deposited in a bank.	A micro-hydro project was identified in barangay Guibo, Siayan. The municipal government had written the Department of Energy for assistance. The DOE replied that it was sending a team to evaluate the site. The development of a mini-hydro is currently subject of a memorandum of agreement between the local electric cooperative. The province and the Smith-Bell Resco	The representative of the electric cooperative participated actively in the consultation and sat with the representative of the municipality of Siayan. While the subject of franchise waiver was not discussed, the representative said there was no really not to allow the implementation of the project by the LGU. The electric cooperative gets substantial support from the provincial government in the form of electric lines, posts and a team of linemen under the provincial government's employ.
Antique	In the year 2000, the provincial government allocated P1.2 million from its 20% development fund to finance NRE projects.	A micro-hydro project has been identified in the municipality of Bugasong. It was subject of a feasibility study financed by the USAID. Also DOE projects have been identified in 5 barangays of five municipalities.	The representative of the Antique Electric Cooperative committed to provide technical assistance to communities investing in NREs. They also expressed openness to waive their franchise rights in off-grid areas. Discussions with the electric cooperative's management also revealed their desire to be a co-investor to NRE projects in the province.
Kasibu, Nueva Vizcaya	The barangay councils of Dine and Pao have set aside unspecified amounts to complement the funds to be invested by the Philippine Rural Reconstruction Movement and the Philippine National Oil Company for proposed micro-hydro projects.	Micro-hydro sources have been identified in the barangays of Dine and Pao.	There was no representative from the local electric cooperative. But there is an existing agreement between the Nueva Vizcaya Electric Cooperative (NUVELCO) and the Philippine Rural Reconstruction Movement (PRRM) in which the latter is allowed to implement an NRE project under the condition that the management and operation of the facility is turned over to a community planning, monitoring and evaluation committee. Under the agreement, the NUVELCO shall provide technical training to the community, hauling support and serve as "external consultant".

Characterizing the LGUs' Readiness for NRE Program / Projects Using Prioritization Factors 1, 2 and 3 (continued)

Factor Considered / Local Government	1 *Availability of funds to implement an NRE project*	2 *NRE projects identified or contemplated but with a resource already identified*	3 *The local electric cooperative's level of support*
Laoang, North Samar	No funds have been set aside by the municipal government although a pledge to do so was made during the workshop. The municipality provided batteries to a DOE battery-charging project in Batad Island.	The Abaton, Sibunot, Cabagian and Palmera falls were mentioned as possible project sites.	There were representatives of the Northern Samar Electric Cooperative but their participation was very limited. In the workshops though, they committed to providing training support to communities.
Lanao del Norte	No funds have been set aside for NRE projects. However, the barangays of the municipality of Salvador expressed their plan to allocate some of their barangay funds for a micro-hydro project.	Representatives of the municipality of Salvador identified parts of the Salug river for a micro-hydro project. Most of the beneficiaries would belong to the Muslim communities.	The representative of the Lanao del Norte Electric cooperative, together with representatives of the National Power Corporation (NAPOCOR) were very supportive of the effort. LANECO has set up one solar panel in the province as pilot. Although there was no firm commitment on the draft franchise waiver agreement, the representative did not discount the possibility of it being approved by the LANECO board.
Northern Samar	No funds have been budgeted for NRE projects although according to the participants, barangays and municipalities have set aside funds for barangay electrification projects in the past.	Provincial government participants did not identify specific project sites.	"Buck passing" between the Northern Samar Electric Cooperative (NORSAMELCO) and the NAPOCOR was reported by the participants.
Dimasalang, Masbate	The municipality set aside funds for the purchase of generators, which provide electricity for only three hours and is expensive to maintain. They are willing to set aside funds for NRE projects. As of the workshop, no funds had been allocated for the purpose. However during the workshop the barangays of San Vicente, Calabad, Balantay and Rizal set aside a total of P282,000 for NRE projects.	They have identified several barangays in the municipality for solar and wind projects. Preference is for solar-based systems. The four barangays mentioned were specified as project sites for solar-based systems.	The Masbate Electric Cooperative is very supportive of efforts to install NRE systems in the province. They have set up solar systems in two municipalities and have agreed to the operation of a hybrid NRE system by Breeze Electric. They have also committed to secure funds, if necessary to support village-level NRE initiatives.
Tapaz, Capiz	No funds have been set aside for NRE initiatives. The community representatives expressed their preference for roads.	A micro-hydro installation was planned in the past for barangay Minan. The project fell through.	No representative of the Capiz Electric Cooperative was present.

Characterizing the LGUs' Readiness for NRE Program / Projects Using Prioritization Factors 4, 5 and 6

Factor Considered / **Local Government**	4 *Presence of an investor willing to invest in an NRE Project or an Organization willing to provide funds for NRE Projects in the Province/Municipality*	5 *ANEC presence in the LGU*	6 *Perceived general interest of the local leadership and officials in the development of NRE projects in the area*
Zamboanga del Norte	A representative of the Smith-Bell RESCO stayed through most of the workshop and listened intently to the discussions. She was obviously watching out for potential investment opportunities. In addition, the municipality of Siaya and the barangay government of Guibo have funds for an NRE project.	The Affiliated Non-Conventional Energy Center for Zamboanga del Norte is the Mindanao State University in Marawi City (MSU-Marawi). It is perceived to be weak. However, its sister institution, the MSU-Iligan Institute of Technology, is willing to provide the service expected of an ANEC not only for Zamboanga del Norte but for the entire Muslim communities.	The provincial staff maintained close contact with the Team as preparations for the workshop were made. They helped in the arrangements and waived their fees for the use of the conference venue. Governor Amatong graced the opening and declared full support for the program in the form of financial and technical assistance to barangays with viable NRE initiatives. He believes that NREs will be the only way to energize the inaccessible barangays.
Antique	While carrying out preparatory work the Antique Electric Cooperative officials revealed their intention to be a co-investor in any NRE initiative in the province. ANELCO covers 16 of the 18 municipalities of Antique. Two others are served by the Aklan Electric Cooperative.	ANEC presence in Antique is strong. They have had joint undertakings with Antique local governments in the past and are respected as an authority on NRE. The Central Philippines University serves as the ANEC for Region 6.	The staff of the Antique Integrated Area Development Project (ANIAD) provided helped the Task 2 team prepare for the workshop. They also were active during the workshop itself and maintained very close coordination with the Task 2 Manila Office. The Governor himself gave instructions to his staff to support the effort. The province made arrangements for the workshop to be held at the Evelio Javier Training Center. The Center's Executive Director welcomed the participants to the workshop.
Kasibu, Nueva Vizcaya	The Philippine Rural Reconstruction Movement, Bayombong Field Office, will serve as the major investor, with the community providing their resources as well.	ANEC presence in the province is poor. No representative was at the workshop to help explain the technology. Fortunately, the DOE representative was present to help in explaining the technology.	The municipal Mayor and other town officials are not keen on the project, which is strongly supported by the barangays. The barangay government of Dine organized the workshop and offered a community facility as venue and overnight place for the facilitating team.

Characterizing the LGUs' Readiness for NRE Program/Projects Using Prioritization Factors 4, 5 and 6

Factor Considered / Local Government	4 *Presence of an investor willing to invest in an NRE Project or an Organization willing to provide funds for NRE Projects in the Province/Municipality*	5 *ANEC presence in the LGU*	6 *Perceived general interest of the local leadership and officials in the development of NRE projects in the area*
Laoang, Northern Samar	There has not been any known interest to invest in NRE projects in the municipality.	ANEC presence in the region, including the province of Northern Samar is strong. A representative of the University of Eastern Philippines actively participated in the workshop by sharing his technical knowledge on the subject matter. The ANEC has taken the initiative to conduct measurements of wind power in the province. It also assisted the DOE in implementing the Batad Island Project. A distinctive feature of the ANEC is its capacity to "play politics" with LGU officials.	The municipal Mayor attended the workshop but could not commit resources to future NRE initiatives. The municipal officials however were very supportive of the consultation and did what they could to make it a successful activity.
Lanao del Norte	One private sector representative, from the Mindanao Cooperative Institute of Technology, expressed its interest to invest in NRE initiatives. The MCIT's desire to invest in NRE projects was encouraged by the NAPOCOR representative who said that they preferred financing NRE projects initiated by private sector organizations. MCIT is supported actively by the MSU-IIT. The NAPOCOR manages funds under ER 1-94. The funds can be used for NRE projects operated by community-based cooperatives. The local electric cooperative did not express any objection to such initiatives.	The Affiliated Non-Conventional Energy Center covering Lanao del Norte is the Mindanao State University in Marawi City (MSU-Marawi). It is perceived to be weak. However, its sister institution, the MSU-Iligan Institute of Technology, is willing to provide the service expected of an ANEC not only for Zamboanga del Norte but for the entire Muslim communities.	Lanao del Norte posed the least problem in terms of preparatory work. The Governor herself saw to it that the activity was supported. The Governor's husband, ex-Governor Abdullah Dimaporo, guested the closing, in behalf of the Governor. He said that the province is willing to set aside funds for barangay initiatives and will support efforts to access shares of municipalities and barangays in national wealth for the NAPOCOR. The province is pushing for the mini-hydro-project in Bacolod under a Build-Operate-Transfer arrangement. The feasibility study on the project has been completed and the Regional Development Council has indorsed its submission to the Investment Coordinating Council (ICC) of the National Economic and Development Authority (NEDA).

Characterizing the LGUs' Readiness for NRE Program / Projects Using Prioritization Factors 4, 5 and 6 (continued)

Factor Considered / **Local Government**	4 *Presence of an investor willing to invest in an NRE Project or an Organization willing to provide funds for NRE Projects in the Province/Municipality*	5 *ANEC presence in the LGU*	6 *Perceived general interest of the local leadership and officials in the development of NRE projects in the area*
Northern Samar	No investors in NRE projects have been identified.	ANEC presence in the region, including the province of Northern Samar is strong. A representative of the University of Eastern Philippines actively participated in the workshop by sharing his technical knowledge on the subject matter. The ANEC has taken the initiative to conduct measurements of wind power in the province. It also assisted the DOE in implementing the Batad Island Project. A distinctive feature of the ANEC is its capacity to "play politics" with LGU officials.	The provincial government was very supportive of the activity but emphasized that their priority concern was still electrification through the grid. They expressed their plan to move for grid connection through Allen Samar from Sorsogon (Luzon). The province has supported grid electrification by providing posts and electric wires to the electric cooperative. The Governor did not commit to providing funds for NRE projects although barangay and municipal representatives to the workshop said they would be asking their respective officials for financial support to the NRE Program.
Dimasalang, Masbate	Other than DOE, which funded the solar project in Batad island, there is no investor interest to set up NRE facilities in the municipality. However, one group of barangays prefers to wait for investors interested in a BOT arrangement.	No representative from the ANEC, which is based in Pili, Camarines Sur. It is too far to be an effective promoter of NRE technologies.	The Mayor was there to grace the workshop. The municipality helped tremendously to ensure the activity's success. The barangay officials who were present pledged to allocate more than P200,000 as a pool from their Internal Revenue Allotments (IRA) as counterpart for NRE projects.
Tapaz, Capiz	A French company with funding from the Japanese Bank for International Cooperation (JBIC) prepared a feasibility study on the proposed mini-hydro plant in Tapaz. It was not sure if the French company is interested in setting up the facility under some financing mode. Other than this, no investor has expressed interest in Tapaz.	As stated earlier, the ANEC presence in Region 6 is strong. They have had joint undertakings with local governments in the past and are respected as an authority on NRE.	As the consultation gave the barangay captains the municipal officials an opportunity to match the need for NRE projects to the communities' other concerns. In the discussions, roads turned out to be of higher priority over electrification. Next was livelihood for the upland communities.

Annex 1
Memorandum re the final List of LGUs Targeted for Consultation Workshops

March 13, 2001

Fax Message

For:	Director Francis Benito Mr. Reuben Quejas Mr. Chat Tatlonghari
Cc:	Ms. Arlene Pamintuan

In an effort to come up with a "compromise list" we propose to go back to Masbate, field validate our perception on it and exert every effort to make it work. Masbate will however replace Nueva Vizcaya which we would have loved to do, knowing its potential. Below is a list of LGU's that we really hope will address everyone's concern:

Region 5, Masbate

The DOE informed us that the province appears to be ready for an RE package. USAID apparently supports the view. It has received very little attention in terms of development assistance in the past. Its League of Municipalities is still in its infancy after 10 years of effort. The Evelio Javier Foundation, which works closely with the municipalities are wary of the dynamics in Masbate. A strong provincial leadership is an advantage but we understand that the program will be dealing more with the municipalities. Six municipalities of the province qualify under Land Bank's credit criteria (in connection with its Renewable Energy Program). If the latter is listed by rank, the highest among Masbate's municipalities, Aroroy, is ranked 198th in a total of 349. We intend to hold a provincial level workshop in Masbate (1).

Region 6, Capiz and Antique:

Again these two LGUs are DOE seem to be DOE priority. Both provinces are ably led by their respective Governors, particularly Governor Bermejo (Capiz). The latter is probably one of the best the provinces will ever have. We know of their long wish to develop a potential microhydro in Tapaz, an upland municipality with power problems of its own. Antique on the other has a strong League of Municipalities and a long history of civil society involvement in governance, a feature that will come in a handy when support for power development is called for. Capiz and Antique are lucky for having the strong support of the Gerry Roxas Foundation, based in Capiz but with strong links in all Panay Island Provinces. GRF is a very influential institution. We propose to hold two (2) provincial-level workshops in these provinces but will need additional funds to cover airfare, land travel and preparatory work LOE. Both provinces were not in the original list, i.e., Cotabato, Lanao del Norte, Masbate, Northern Samar.

Region 8, Northern Samar:

Everybody agrees on the need for support to Northern Samar. Practically all of its municipalities have unserved barangays. Its league of Municipalities has displayed a lot of initiative in the last few years. Its NGO sector is militantly active and can be counted upon for support when RE issues are brought up before the local development councils both at the provincial and municipal levels. The province, I believe is a good choice. We propose to hold a provincial and a municipal workshops in the province (2).

Region 9, Zamboanga del Norte:

Again a DOE priority. Like Northern Samar, many of its barangays are unserved. Many of its municipalities, which border Zamboanga Sur have a long history of civil conflict (MNL/MILF/NPA). But its Governor, Isagani Amatong, belongs to the likes of Governor Vic Bermejo of Capiz: democrat, strong, honest and viciously pro-decentralization. His line of leadership is impeccable. I would highly rate the likelihood of success of a project under his leadersip. Civil society membership in his development council is active and progressive. We plan to hold one provincial workshop in Dipolog City.

Region 12, Lanao del Norte:

USAID has a long presence in the province through ILAP, GEM, and GOLD. There are pockets of unserved barangays, particularly Muslim areas, in the province. ILAP in particular has succeeded in bringing some level of stability in its once-MILF/MNLFzones and the USAID would like to follow through on those gains. It would be a good learning experience to hold a consultation with one of the more advanced ILAP sites (Tangkal). We probably will be holding the workshop in Tangkal, subject to Governor Dimaporo's approval.

Please agree on the list so we can proceed to prepare for the workshops. Time is running out on us with the coming Holy Week and elections. We plan to hold all workshops before the Holy Week. It may be difficult to hold these after that period.

Thank you.

Butch Ragragio

Annex 2

Sample of Consultation workshop Handouts

“Frequently Asked Questions on the Opportunities for Investing in New and Renewable Energy for LGUs

PHILIPPINES CLIMATE CHANGE MITIGATION PROGRAM

A Joint Program of the

Philippines Department of Energy

US Agency for International Development

TERMINAL REPORT

Technical Assistance to DOE for Enhancing Private Sector Participation in New and Renewable Energy Investments for Off-Grid Rural Electrification (TASK 3 – Identifying Market Packages)

Submitted to the:

United States Agency for International Development (USAID)

and the

Department of Energy
Manila, Philippines

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This report was prepared under the terms and conditions of Contract No. 492-C-00-97-00063.
The opinions expressed herein are those of the authors and do not necessarily reflect the views of the USAID.

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Executive Summary

Introduction

1. Rural electrification is given the needed impetus under the Medium Term Philippine Development Plan (1999-2004) with the past and the present administration's thrust of attaining 100% electrification of barangays by year 2004.

2. The Department of Energy spearheads the implementation of the "O-Ilaw Program". As of December 2000, there are still about 8,245 non-electrified barangays in the country. For the period 1999 - 2000, there are about 2,000 additional barangays electrified. In order to achieve 100% barangay electrification by year 2004, the sector targets about 2,000 barangays energized per year.

3. To further elevate the level of efforts on rural electrification, specifically for remote and isolated barangays, the DOE intends to intensify private sector involvement and mobilize the various local government units in undertaking rural energy investments under a market-based scenario. The USAID Technical Assistance (TA) to the DOE for Enhancing Private Sector Participation in Renewable Energy Investments for Off-grid Rural Electrification aims to provide immediate institutional support to the DOE.

4. In facilitating the entry of the private sector in RE investments for off-grid rural electrification, the DOE must show that RE markets exist and that RE investments are viable.

5. The primary objective of Task 3 is to systematically group non-electrified barangays in the country to constitute several market packages with sufficient critical mass of base customer that may potentially be the showcase of viable RE investments by the private sector.

The Screening and Prioritization of Market Packages: Conceptual Framework

6. The market package is redefined in the study from a cluster of ten or more non-electrified barangays to a municipal-based grouping of all non-electrified barangays in that municipality.

7. The criteria used in identifying and prioritizing market packages are enumerated below and will be adequately discussed in the report:
   - *Level of energization*
   - *Aggregate population of non-electrified households*
   - *Household financial indicators*
     - ✓ Household annual income
     - ✓ Household annual disposable income
     - ✓ Household monthly energy expenditures

- *LGU Financial Capacity* as indicated by the municipality classification by DOF
- *Household population density*
- *Security condition*.

8. The general framework of the screening and prioritization process is shown in the table below:

Stages	Population/Sample	Criteria
1 Regional Shortlisting	Whole Philippines	Regional Energization Status
		Peace and Order Condition
2 Municipal Shortlisting		
- 1st Level	565 Muncipalities/Cities	Municipal Energization Index
- 2nd Level	259 Municipalities	10 or more non-electrified barangays
- 3rd Level	163 Municipalities	MA sample municipality
3. Prioritization	87 Municipalities	No. of HHs in non-electrified barangays
		HH monthly energy expenditures
		HH annual income
		HH annual disposable income
		Household population density
		Municipal financial capacity

The Long-list (87) and the 25 Prioritized Market Packages

9. Briefly discussed below are observations on the 87 Long list of municipal market packages:

Region 2

- The ECs that cover the nine municipality market packages are CAGELCO I, ISELCO II and NUVELCO;
- The levels of energization in the coverage areas of the ECs are in the range of 70% - 75%;
- The number of non-electrified barangays in the candidate market packages are between 11 - 25 barangays;
- The level of energization in each of the municipalities is very low compared to the ECs overall level of energization, i.e., between 8% - 56%;

Region 5

- The ECs that cover the twenty-one (21) municipality market packages are CASURECO I, CASURECO IV, ALECO, MASELCO, and SORECO II;
- The levels of energization in the coverage areas of the ECs are in the range of 32% - 88%;
- The number of non-electrified barangays in the market packages are between 11 - 31 barangays;
- The levels of energization in the municipality market packages are in the ranges of 3% - 73%;

Region 6

- The ECs that cover the 18 candidate municipality market packages are AKELCO, ANTECO, CAPELCO, ILECO I, ILECO II, ILECO III and VRESCO;
- The levels of energization in the coverage areas of the ECs are in the range of 64% - 85%;
- The number of non-electrified barangays in the candidate market packages are between 10 - 46 barangays;
- The levels of energization in the municipality market packages are in the ranges of 12% - 75%;

Region 8

- The ECs that cover the 28 municipality market packages are LEYECO I, NORSAMELCO, ESAMELCO, SAMELCO I, SAMELCO II, and SOLECO;
- The levels of energization in the coverage areas of the ECs are in the range of 44% - 78%;
- The number of non-electrified barangays in the candidate market packages are between 10 - 49 barangays;
- The levels of energization in the municipality market packages are in the ranges of 8% - 71%;

Region 9

- The ECs that cover the eleven (11) municipality market packages are ZANECO, ZAMSURECO I, and ZAMSURECO II;
- The levels of energization in the coverage areas of the ECs are in the range of 49% - 60%;
- The number of non-electrified barangays in the candidate market packages are between 10 - 34 barangays;
- The levels of energization in the municipality market packages are in the ranges of 7% - 67%;

10. The 25 prioritized market packages are shown in the table and are briefly described:

<u>*Number of Households*</u>

- The minimum number of households in the non-electrified barangays in the prioritized market packages is 2,110 households found in Dueñas, Iloilo while the municipal market package with the biggest size is the Calatrava, Negros Occidental which numbered about 5,810 households.
- The median household size is about 3 - 4 persons.
- This is a comfortable market size for private sector investors not to mention other consuming sectors, such as the local industry, commercial and service establishments.

M.P. #	Region	Province	Municipality	Electric Cooperative
1	2	Cagayan	Baggao	CAGELCO I
2		Isabela	Benito Soliven	ISELCO II
3			San Mariano	
4	5	Albay	Bacacay	ALECO
5			Libon	
6			Oas	
7			Rapu-Rapu	
8		Masbate	Balud	MASELCO
9			Cataingan	
10			Esperanza	
11			Mandaon	
12			Masbate	
13			Milagros	
14			Palanas	
15	6	Capiz	Dumarao	CAPELCO
16		Iloilo	Dueñas	ILECO II
17		Negros Occ	Calatrava	VRESCO
18	8	N. Samar	Catubig	NORSAMELCO
19			Las Nanas	
20			Laoang	
21		W. Samar	Tarangnan	SAMELCO I
22			Daram	SAMELCO II
23		E. Samar	Guiuan	ESAMELCO
24	9	Zamboanga Norte	Sergio Osmeña	ZANECO
25			Sibuco	ZAMSURECO II

Average Annual Household Income

- Sergio Osmeña, Zamboanga Norte has the lowest average annual household income of about PhP 22,529.00 while Baggao, Cagayan reported the highest average annual household income of PhP 76,270.00.
- There are three municipality market packages with average annual household income below PhP 30,000.00 and these are Calatrava, Negros Occidental (PhP 28,892.82), Cataingan, Masbate (PhP 29,504.50) and Sergio Osmeña, Zamboanga Norte.
- The median average annual household income is about PhP 39,000.00.

Average Household Energy Expenditures

- The average monthly household energy expenditures range from a minimum of PhP 53.64 (Sergio Osmeña, Zamboanga Norte) to a maximum of PhP 251.54 (Esperanza, Masbate).
- The median average monthly household energy expenditures is roughly PhP 148.00.

Average Annual Household Disposable Income

- Surprisingly, data from the Market Assessment survey showed that households have savings which can be spent to cover additional cost for improved supply and services of electricity. The minimum HH disposable income recorded is PhP 1,122.84 (Cataingan, Masbate) and the highest HH disposable income gathered is PhP 31,976.36 (Benito Soliven, Isabela).
- The median is about PhP 10,000.00 per annum.

Household Population Density (HPD)

- Baggao, Cagayan is relatively the least dense among the 25 priority market packages. There are about four households for every square kilometer.
- Guiuan, Eastern Samar is comparatively the most dense with a HPD of 65 households per square kilometer.

Municipal Financial Capacity (Class)

- Almost half of the priority market packages are classified as fourth class municipality (Annual Income of PhP 8M or more but less than PhP 12M);
- Baggao, Cagayan and San Mariano, Isabela are first class municipalities and based on DOF classification, these municipalities have an average annual income of more than PhP 20M.
- Calatrava, Negros Occidental and Masbate, Masbate are second class municipalities (Annual Income of PhP 16M or more but less than PhP 20M).
- There are five municipalities that are classified as third class municipalities (annual income PhP 12M or more but less than Php 16M);
- The remaining five muncipalities are classified as fifth class municipalities (annual income PhP 4M or more but less than PhP 8M).

Mentoring of DOE Staff on Rural Electrification Market Packaging

11. One of the deliverables of Task 3 is the mentoring of a DOE-EUMB/NCED staff in identifying rural electrification market packages. Specifically, Task 3 focuses on five regions and there are still a large number of non-electrified barangays that need to be clustered together to be attractive to the private sector. Thus, the intent of this deliverable is to provide the DOE staff adequate appreciation and skills in handling/processing vast information to continue with the rural electrification market packaging. Rodel Padrique was assigned to work with the consultant. He participated in most of the meetings and consultations and particularly in processing the information.

12. To facilitate systematic use of the information gathered, a database program was developed. The DOE staff provided vital inputs in developing the program.

13. A special database system for the conduct of the market package identification and prioritization was developed. The computer database program based on Microsoft ACCESS 97 contained all the secondary data used in the identification and analysis of the market packages. Aptly called "Market Package (MKTPACK) for Off-grid Electrification", the program was used to conduct the prioritization of the 25 market packages.

Conclusions

14. Preliminary review and assessment of relevant statistics show that non-electrified barangays can be clustered and grouped into market packages that may be potentially attractive to private investors.

15. Due to the very large service area coverage of certain electric cooperatives, there are municipalities with very high economic growth potentials that have remained poorly energized. Examples of these municipalities are Baggao, Cagayan and San Mariano, Isabela.

16. Targeted and coordinated efforts to address rural off-grid electrification may lead to the expeditious provision of electricity services to the non-electrified barangays. A consultation with officials of concerned electric cooperatives revealed their willingness to waive or better yet, to collaborate with a third party to facilitate the energization of the remaining non-electrified barangays in their area coverage.

Recommendations

17. A market package is redefined in this paper as a municipality-based grouping of all non-electrified barangays in that municipality. If a waiver can be successfully secured from the concerned EC, the municipality will then be under two service providers, the EC and the new private investor.

    Hypothetically, it will be more efficient to put a service area (a municipality) under one management. Municipalities which have been electrified by the ECs (one barangay electrified) simply to comply with the thrust of 100% energization at the municipal level may see the prospects of service expansion as dim.

    It is viewed, therefore, that there is merit in certain municipalities for the EC to waive its rights over the whole municipality. Asset disposal/turn over, among other concerns, may be a barrier.

    It is recommended that a policy study be done to look into the legal and operational aspect of turning over the whole municipality to the new energy delivery partner.

18. There are 163 short-listed municipal market packages that may be potentially attractive to private sector investors. However, due to time limitations and the availability of salient information, only 87 (out of the 163 market packages) were further characterized.

It is recommended that a characterization of the remaining 76 municipal market packages be done. This can be done two ways:

- *Using the NSO FIES data sets but data extracted to the barangay and municipal levels;*
- *Conduct of a mini- survey that can be done by the Affilliated Noncon Energy Centers.*

19. *It is recommended that methodology of identifying market packages be also applied to the other regions that have not been covered by this Task.*

List of Abbreviations and Acronyms

AKELCO	Aklan Electric Cooperative
ALECO	Albay Electric Cooperative
ANTECO	Antique Electric Cooperative
ARMM	Autonomous Region of Muslim Mindanao
CAGELCO	Cagayan Electric Cooperative
CAPELCO	Capiz Electric Cooperative
CASURECO	Camarines Sur Electric Cooperative
CTP	Capacity to pay
DOE	Department of Energy
DOE-NCED	DOE-Nonconventional Energy Division
DOF	Department of Finance
DORELCO	Don Orestes Romualdez Electric Cooperative
EC	Electric cooperative
ESAMELCO	Eastern Samar Electric Cooperative
FIES	Family Indome and Expenditures Survey
HH	Household
HPD	Household Population Density
ILECO	Iloilo Electric Cooperative
IPP	Independent power producer
IRA	Internal revenue allotment
ISELCO	Isabela Electric Cooperative
kW	Kilowatt
kWh	Kilowatt-hour
LE	Level of energization
LEYECO	Leyte Electric Cooperative
LGU	Local Government Unit
MA	Market Assessment
MASELCO	Masbate Electric Cooperative
MEI	Municipal energization index
MKTPACK	Market Package
NCED	
NEA	National Electrification Administration
NORSAMELCO	Northern Samar Electric Cooperative
NRE	New and renewable energy
NSCB	National Survey Coordination Board
NSO	National Statistics Office
NUVELCO	Nueva Viscaya Electric Cooperative
PhP	Philippine peso
RE	Renewable energy
SAMELCO	Samar Electric Cooperative
SOLECO	Southern Leyte Electric Cooperative

List of Abbreviations and Acronyms

SORECO	Sorsogon Electric Cooperative
USAID	United States Agency for International Development
VRESCO	V-M-C Rural Electric Service Cooperative, Inc.
WB	World Bank
WTP	Willingness to pay
W/m^2	Watt per meter squared
ZAMSURECO	Zamboanga del Sur Electric Cooperative
ZANECO	Zamboanga del Norte Electric Cooperative

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CHAPTER 1

INTRODUCTION

1. Rural electrification is given the needed impetus under the Medium Term Philippine Development Plan (1999-2004) with the past and the present administration's thrust of attaining 100% electrification of barangays by year 2004.

2. The remaining task of rural electrification is still enormous requiring huge capital investments for the rehabilitation/upgrade of distribution lines, extension of wires to remote areas and installation of isolated systems, all against the backdrop of tight budgetary capacity of the government. As of December 2000, there are still about 8,245 non-electrified barangays in the country. About 99% percent of the total non-electrified barangays, i.e. 8,127 non-electrified barangays, are within the service areas of the electric cooperatives. Due to the archipelagic configuration of the country, decentralized electrification (off main grid) is expected to be the cost-effective option for about 40% of the non- electrified barangays. In many instances, new and renewable energy (NRE) sources have the potential for being the cost-effective off-grid options.

3. The Department of Energy spearheads the implementation of the "O-Ilaw Program". The program centerpiece is the National Electrification Administration (NEA) regular rural electrification program through the electric cooperatives with complementary programs namely IPP Program and the "Adopt a Barangay" Program. For the period 1999 - 2000, there are about 2,000 additional barangays electrified. To achieve 100% barangay electrification by year 2004, the sector targets about 2,000 barangays energized per year.

4. To further elevate the level of efforts on rural electrification, specifically for remote and isolated barangays, the DOE intends to intensify private sector involvement and mobilize the various local government units in undertaking rural energy investments under a market-based scenario.

5. The USAID Technical Assistance (TA) to the DOE for Enhancing Private Sector Participation in Renewable Energy Investments for Off-grid Rural Electrification aims to provide immediate institutional support to the DOE. The TA shall pursue targeted and well-defined coordination activities with the electric cooperatives, local government units, and the private sector players to enable the DOE to set the stage for a longer term program of transforming RE-based off-grid rural electrification into a viable business portfolio for the private sector investors.

6. The TA has six major task areas namely:
   - Task 1 : Facilitating Policy Reform and Development in Electricity Franchising

- Task 2 : Coordination and Consultation with LGUs
- **Task 3 : Identifying the Market Packages**
- Task 4 : Project Evaluation, Prioritization and Financing
- Task 5 : Coordination and Consultation with Private Sector and Civil Society
- Task 6 : Research, Analysis & Packaging of Critical RE Investment Information

7. The scope of work of Task 3: Identifying the market Packages are as follows:
   - Formulate a concensus-based "market packaging methodology" for defining off-grid rural electrification markets;
   - Identify at least 50 market packages and from its long list, prioritize 25 renewable energy (RE) - based market packages;
   - Prepare individual "market briefs" for the 25 RE-based market packages.

8. The Task 3 activities entailed processing of various relevant .information. For a systematic and organized processing of data to identify market packages, a database program using MS Access was developed.

OBJECTIVE/S

9. In facilitating the entry of the private sector in RE investments for off-grid rural electrification, the DOE must show that RE markets exist and that RE investments are viable.

10. The primary objective of Task 3 is to systematically group non-electrified barangays in the country to constitute several market packages with sufficient critical mass of base customer that may potentially be the showcase of viable RE investments by the private sector. Proper consultations with relevant players will be done.

CHAPTER 2

11. This chapter shall present the methodology formulated to define and prioritize market packages. This shall discuss the set of criteria and operating guidelines used to identify the long list of market packages and from the long list, prioritize market packages.

12. The methodology presented is a result of many consultations and meetings with various officials of relevant agencies and associations.

Basic Assumptions

13. Several completed and on-going activities provide basic empirical data that were used as assumptions and bases for defining the criteria and developing the methodology for identifying the market packages. The salient information are below:

<u>*Non-electrified Barangay Profile:*</u>

- Average number of household : 170 households
- Range of number of household : 20 - 500 households
- Average household size : 5 - 6 persons/HH
- Average population : 1,000 inhabitants
- Average rural barangay land area : 6 - 7 square kilometers
- Household segmentation by annual income
  - ✓ 50% of households : less than PhP30,000.00
  - ✓ 30% of households : PhP30,000.00-PhP45,000.00
  - ✓ 20% of households : above PhP45,000.00

<u>*Renewable Energy Service Company Operation*</u>

- Min. customer base : 600 households
- Min. market package HH population : 1, 700 HH

<u>*Rural Electrification Market Penetration*</u>

- Market penetration rate : 35 percent

14. The initial definition of a market package is a cluster of ten or more non-electrified barangays with adequate number of base customer that can be considered a viable market for a private operation. The task recommends that the market package geographical boundaries be changed from merely aggregate geographical boundaries of ten or more non-electrified barangays to definite municipal boundaries. The market package shall then be comprised of all non-electrified barangays in the candidate municipalities. The merits of this new definition are:

- *Greater chances of achieving electrification target.* All the non-electrified barangays in a candidate municipality will have equal chances of being electrified. If the first definition of a market package be used, there will be cases where some isolated non-electrified barangays in the candidate municipality will not be included in the package and will still remain under the EC franchise. The potential for these left-out non-electrified barangays to be electrified is nil.

- *Economy of scale of operation for private sector/civil society cum LGU partnership*. Application of the new definition shall result to bigger market packages; i.e. a market package may be comprised of 25 or even more non-electrified barangays. The bigger the potential market, the rural energy project operator will have greater mix of options to make the operation viable and sustainable.
- *Assist EC in achieving greater efficiency*. The off-grid municipalities are often times far from the main grid and do not have the adequate number of base customer to justify extending the lines to them. Assigning the non-electrified barangays in these off-grid municipalities to a new operator will relieve the EC of its responsibility and may then concentrate its efforts to its remaining coverage area.

15. In a consultative meeting with the General Managers of ECs of Regions 2, 5, 6, 8, and 9, it was cited that a market package may even be composed of non-electrified barangays in two or more municipalities depending on certain characteristics of the areas. This may be validated in the more detailed investigation that will be done following this technical assistance.

Criteria for Identifying Market Packages

16. The various initiatives in rural electrification promote the optimization of government and private partnership. Specifically, this task shall establish criteria in identifying market packages that address the thrust and requirements of both sectors.

17. On the government side, the major consideration is to improve the access to energy services of regions/municipalities in order to stir economic development and consequently uplift the social and economic conditions of the population. The level of energization will be used as a criterion to address this government objective. Likewise, in line with the vision of increasing involvement of various LGUs in rural energy investment through provision of policy support and leveraging funds sourced from local counterpart funding and/or servicing any bank loan, financial soundness of the LGU as measured by its annual income or its IRA will be a major consideration.

18. The salient elements of a market package that would be critical for private investment decision are level of demand (existing and potential for growth), household income, energy expenditures and disposable income, market configuration (e.g. household population density). The easing out of the candidate

market package from the electric cooperative franchise area is also a major legal concern of private investors and this will be addressed by Task 1 of this TA.

19. The criteria to be used in identifying and prioritizing market packages are briefly presented below. The specific application of these criteria will be discussed at length in the next section.

- *Level of energization.* In ensuring social equity through access to energy services, regions and municipalities with very low levels of energization will be prioritized for this undertaking.

- *Aggregate population of non-electrified households*. To achieve economy of scale of operation and attract private sector interest, priority should be given to market packages with higher aggregate household population in non-electrified barangays.

- *Household financial indicators.* The household financial indicators shall include household income, energy expenditures and disposable income. The primary source of information for these indicators is the recently completed survey, the "Market Assessment for Rural Electrification". These indicators will be treated independently to present clear insights on the financial capacity of the target non-electrified household population.

  Households with average annual income belonging to the upper 50% (national) of the market segmentation pyramid (Income distribution classification scheme based on NSCB, 2000 Philippine Poverty Statistics) will be prioritized. Based on the MA report, non-electrified households belonging to this category have an average annual income of PhP 30,000.00 and above. It is assumed that these households will be able to afford connection fees and the monthly tariffs.

  Likewise, households with higher current energy expenditures are likely to be the potential market for electrification systems which offers better quality and longer services, at least at their current level of expenditures or even a little higher. The national average household energy expenditures is computed at PhP 179.98 per month. For the households in income classes "poor" and "less poor", the average household energy expenditures are PhP 285.00 and PhP 647.88 per month, respectively. These figures, however, should be checked and corrected for households operating diesel genset for commercial purposes.

  Household disposable income is a derived information based on the survey raw data, household total income less household total expenditures. Households with relatively higher disposable income (or savings) will have the capacity, even so the willingness, to pay higher than their current energy expenditures for improved energy/electricity services.

- *LGU Financial Capacity*. To be used as a guide for assessing financial capacity of LGUs is the Department of Finance DO No. 24-97 issued on March 26, 1997 prescribing new income brackets for the reclassification of provinces, cities and municipalities and amending DO NO. 35-95 issued May 25, 1995. The income classification of provinces, cities and municipalities shall among other purposes, serve as basis for the *determination of administative and statutory aids, financial grants and other forms of assistance to local governments*. The new classification of municipalities shall be based on the following income brackets (based on LGUs financial statements for CYs 1992-1995):

Table 1. Classification of Municipalities, Average Annual Income

Class	Average Annual Income
First	P 20M or more
Second	P 16M or more but less than P 20M
Third	P 12M or more but less than P 16M
Fourth	P 8M or more but less than P 12M
Fifth	P 4M or more but less than P 8M
Sixth	Below P 4M

Financing institutions use this classification among other criteria to evaluate the credit worthiness of LGUs.

- *Security condition*. Priority will be given to areas with relative good security environment.

Identifying Rural Electrification Market Packages: Conceptual Framework

20. The framework presents criteria, assumptions and the processes of screening/shortlisting at various level, i.e, regional, and municipal, to identify the potential market packages that may be subject for further study and for offering to the private sectors and the various LGUs. Likewise, the framework shall discuss the criteria to be used in ranking the market packages as to its potential attractiveness for future rural electrification investment.

Regional Shortlisting

21. The 8,127 non-electrified barangays are not proportionately distributed in the country. There are regions that are still poorly energized and this is one of the many factors that cause slow economic development in the area. The regional distribution of non-electrified barangays in the country is shown in Table 2.

22. To ensure equity to access to energy/electricity services among regions, there is a need to reduce the level of regional disparity in terms of number of non-electrified

barangays. The first five regions with very high number of non-electrified barangays will be prioritized.

Table 2. Regional Profile of Non-electrified Barangays in EC Service Areas December 2000

Region "A"	**Total No. of Barangays in EC Areas** "B"	**Number of Non- electrified Barangays** "C"	**Regional Share To Total Non-electrified Barangays** "D" = "C"/8,127 *100	**Priority Ranking**
1	3,033	61	0.75	15
2	2,377	468	5.76	7
3	2,097	76	0.94	14
4	3,513	604	7.43	6
5	3,408	849	10.45	4
6	3,869	805	9.91	5
7	2,715	429	5.28	9
8	4,388	1,298	15.97	1
9	2,145	911	11.21	3
10	1,437	211	2.60	12
11	1,270	292	3.59	10
12	1,054	441	5.43	8
ARMM	2,357	1,260	15.50	2
CAR	1,106	209	2.57	13
CARAGA	1,306	213	2.62	11
Grand Total	36,095	8,127	100.00	

Source: NEA Planning Department

Municipal Short-listing

23. All municipalities in the prioritized regions will be included in the second level short-listing (Municipal Short-listing). The process will have three levels of screening using the following parameters:
    - Municipal Energization Index
    - Municipalities with ten (10) or more non-electrified barangays
    - MA Survey Municipality

24. The 1st Level Screening uses the Municipal Energization Index (a ratio of the Municipal % Energization to that of the National % Energization) as the screening tool.

25. Originally, the parameter used is the ratio of the Municipal % Energization to that of the Electric Cooperative % Energization in its service area.

26. The NEA Red Book Schedule of Electrification by grid up to year 2004 is arguably very optimistic. Since the intent of the TA is to identify off-grid market packages, the first level screening aims to identify the off-grid municipalities in the prioritized regions. To date, there is no clear definition/delineation which municipalities are on-grid and off-grid.

27. The indicator/criteria that can be used to identify off-grid municipalities are the levels of energization of the electric cooperative for its whole coverage areas and that of the specific municipalities identified. Municipalities with very low level of energization compared to the level of energization of the appropriate EC will be considered off-grid municipalities. It is hypothesized that municipalities with lower level of energization vis-à-vis EC level of energization (whole coverage area) are municipalities that are least prioritized for electrification due to factors such as long distance from the main grid, bad terrain, lack of adequate number of base customer, among others. Municipalities with level of energization lower than the EC level of energization will be prioritized

28. In a consultation with top officials of electric cooperatives, it was validated that this screening tool is useful. Most of the short-listed municipalities that have been identified using this method have been confirmed by the EC officials to be good candidates as off-grid market packages.

29. However, an analysis of the resulting list of municipalities short-listed showed that there are municipalities with comparatively low level of energization that are screened out while there are municipalities with relatively high level of energization that are included in the list of potential market packages. The indicator/criteria failed to take into account the wide variation of level of energization of electric cooperatives.

30. This observation led to the use of the Municipal Energization Index (MEI). All municipalities with MEI less than 1.0 are potential candidates

31. The 2nd Level Screening shall take into account that a "potentially attractive market package" must be of sufficient size. Based on the empirical data earlier cited, a market package of ten or more non-electrified barangays may constitute a potentially attractive market for private investment.

32. Municipalities with ten or more non-electrified barangays scheduled for electrification (per NEA Red Book) within the period 2001 - 2004 will be short-listed and are candidate market packages.

33. Also, a consensus (as a result of various consultations with officials of DOE-NCED and NEA) is reached that barangays electrified through privately-owned or LGU-owned diesel gensets will be included in the market package. The NEA Red Book identifies some barangays as being energized by gensets. The MA survey further noted that there are many barangays reported as non-electrified in the RED Book but are actually electrified through gensets. Barangays that are reported energized through NRE systems are not included in the package. However, in the operationalization of these initiatives, the concerned EC will have the option to

include these NRE-based barangays among the non-electrified barangays that are due for franchise right waiver.

34. The 3rd Level Screening is preparatory to the prioritization of market packages. Generally, the municipalities that have passed the 1st and 2nd level screening are already candidate market packages that may be potentially attractive to the private sector given the size of the package in terms of number of non-electrified barangays. However, further characterization of these market packages should be done to make the offering to the private sectors successful. In the earlier section, characteristics such as aggregate number of non-electrified households, their average household income, household energy expenditures, household disposable income, among others are important to examine.

35. Primary source of information needed to characterize the market packages is the recently completed "Market Assessment for Rural Electrification", co-financed by DOE, USAID, and World bank. The survey provide raw data on the household income, household total expenditures, capacity to pay (household energy expenditures), among others, up to the level of the barangay. The 1995 Family Income and Expenditure Survey (FIES) of NSO also presents data on household income and expenditures for energy/electricity. However, the data will be of a different time frame and the level of disaggregation that is readily available would be at regional or the provincial level. Extracting data up to the municipal and barangay levels by NSO is possible but will take some time.

36. The 3rd level screening, therefore, shall consider only the municipalities that have been covered in the Market Assessment survey.

37. All municipalities that passed the three level screening shall constitute the long list of potential market packages.

Prioritization of RE-Based Market Packages: Conceptual Framework

38. Most, if not all, short-listed municipalities are potentially RE-based market packages due to the following characteristics:
    - Long distance from the primary tapping point;
    - Poor access road and rough terrain
    - Dispersed settlements
    - Low energy use (typically < 1 kWh/day)

39. The short-listed municipalities were presented in a consultation to the officers of the electric cooperatives namely:
    - ANTECO
    - CAGELCO I
    - CAGELCO II
    - DORELCO

- ILECO I
- ILECO III
- ISELCO II
- MASELCO
- NUVELCO
- SAMELCO I
- SAMELCO II
- VRESCO
- ZAMZURECO
- ZANECO

The general sentiment was that there is willingness to waive or partner with a third party to pursue electrification in those areas using off-grid electrification systems. Under the current arrangements, grid expansion for most of the short-listed municipalities will have negative impact on the technical efficiency of the ECs due primarily to systems losses.

40. The prioritization of market packages shall be based on the following parameters:
    - Level of demand (in terms of aggregate number of households in non-electrified barangays)
    - Household energy expenditures
    - Household disposable income
    - Household total income
    - Household population density
    - Municipality financial capacity

41. The primary indicator for the level of demand is the total number of households in the non-electrified barangays in the market packages. The non-electrified barangays scheduled for electrification for year 2001 - 2004 comprise the market package. The household population data are based on the NSO 1995 census of population.

42. The household population for 2000 will be estimated using the municipal statistic on population growth and the average household size. This information, however, will be presented in the market briefs of the prioritized NRE-based market packages.

43. The household financial indicators, which include household energy expenditures, disposable income and the total income, will primarily be taken from the raw data of the Market Assessment survey. There are about one to four barangays surveyed in the municipalities covered in the MA. The simple averages of the barangay data generated from the MA are used as basic statistics for the market packages.

44. The household population density is defined as the ratio of the household population in the non-electrified barangays to that of the municipal land area. This indicator is particularly important for mini/micro-grid systems.

45. The municipality financial capacity, using the DOF classification, shall provide insights on the readiness of the local government units to pursue joint-venture undertakings with the private investors.

46. The data points for each of the parameters will be equal to the number of municipalities short-listed.

47. The assignment of weights for each of the criteria put greater emphasis on private sector investment decision parameters. Furthermore, sensitivity analysis can be done by changing the weight assignments to the criteria depending on the objective of the activity. For the purpose of this study, following weights are given to the parameters/attributes as follows:
    - Number of HHs in non-electrified barangays : 25 points
    - Household energy expenditures : 15 points
    - Household annual disposable income : 15 points
    - Household annual income : 10 points
    - Household population density : 15 points
    - Municipal financial capacity : 20 points

48. There are various ways of assigning weights to the criteria/attributes. One is by identifying ranges (referred to as "class" in statistics) for each of the attributes and assigning point rating for each of the classes. The first run was done using this method. However, results are not good because several packages garnered the same point rating.

49. It is important that for each of the data points for the attributes to have distinct and unique point ratings to be able to do good prioritization. For simplicity, linear functions (i.e. $y = mx + b$) for each of the attributes were established.

50. Extreme values will be grouped as either low range group (10% of the lower data points) and high range group (10% of the higher data points) with corresponding point value.

51. The 25 market packages with the highest rating shall correspond to the 25 prioritized RE-based market packages.

Table 3. Identification of Market Packages (Screening and Prioritization)

Stages	Population/Sample	Criteria
1 Regional Shortlisting	Whole Philippines	Regional Energization Status
		Peace and Order Condition
2 Municipal Shortlisting		
- 1st Level	565 Muncipalities/Cities	Municipal Energization Index
- 2nd Level	259 Municipalities	10 or more non-electrified barangays
- 3rd Level	163 Municipalities	Market Assessment sample municipality
3. Prioritization	87 Municipalities	No. of HHs in non-electrified barangays
		HH monthly energy expenditures
		HH annual income
		HH annual disposable income
		Household population density
		Municipal financial capacity

CHAPTER 3

52. This chapter shall present and analyze the results of the application of the methodology discussed in the previous chapter.

53. The characteristics of the market packages, both in the long list and the twenty-five prioritized market packages, will be discussed.

Identification of Market Packages

Regional Short-listing

54. The prioritized regions based on the ranking shown in Table 2 are as follows:
    - Eastern Visayas Region (Region 8)
    - Autonomous Region of Muslim Mindanao (ARMM)
    - Western Mindanao Region (Region 9)
    - Bicol Region (Region 5)
    - Western Visayas Region (Region 6)

55. Considering the very volatile peace and order situation of the region (a major decision area for private investors), ARMM is substituted with other candidate regions. Region 4, ranked number 6, was not considered as a substitute region for ARMM because of the numerous on-going efforts in energy development in the region.

56. Region 2 is the next and best candidate replacement for ARMM as indicated by the NEA Proposed Barangay Electrification Schedule (2000-2004), commonly referred to as the "NEA Red Book", for having vast potential for NRE-based rural electrification.

57. The final short-listed regions, therefore, are:
    - Eastern Visayas Region (Region 8)
    - Western Mindanao Region (Region 9)
    - Bicol Region (Region 5)
    - Western Visayas Region (Region 6)
    - Cagayan Valley Region (Region 2)

58. The five prioritized regions account for about 4,331 non-electrified barangays in the country and this represent a little more than half the total number of non-electrified barangays in the country.

Municipal Screening and Short-listing

59. The objective of the municipal screening and short-listing is to identify potential off-grid market packages based on the new definition, i.e., a "municipal market package" and that will be potentially attractive to the private sector investors.

60. There are about 565 municipalities/cities in the EC coverage areas in Regions 2, 5, 6, 8, and 9 and the breakdown is as follows:
- Region 2 : 97 Municipalities/Cities
- Region 5 : 113 Municipalities/Cities
- Region 6 : 132 Municipalities/Cities
- Region 8 : 143 Municipalities/Cities
- Region 9 : 80 Municipalities/Cities

61. The 1st level screening shall eliminate municipalities with Municipal Energization Index of one and above (MEI = 1, >1). The National % Energization as of December 2000 is 77%.

62. Municipalities in Regions 2, 5, 6, 8, and 9 with MEI = 1, >1 are shown in Annex A-1. Based on this screening process, the 565 municipalities/cities are trimmed down to 259 municipalities. The regional breakdown of these municipalities are as follows:
- Region 2 : 29 Municipalities
- Region 5 : 46 Municipalities
- Region 6 : 44 Municipalities
- Region 8 : 77 Municipalities
- Region 9 : 63 Municipalities

63. The 259 municipalities are within the area coverage of 38 ECs with the following level of energization (L.E.) profile:
- 75% < L.E. : 23 ECs
- 50% - 75% : 11 ECs
- L.E. < 50% : 4 ECs

64. The four ECs with very low level of energization are MASELCO (32%), TISELCO (40%), NORSAMELCO (44%) and ZAMSURECO II (49%).

65. About 61 municipalities (of the 259 short-listed municipalities) are found in the service areas of the four ECs with very low level of energization. These represent almost a quarter of the short-listed municipality market packages. The range of level of energization in these municipalities is 2% - 75%. More concretely, below is a profile of the level of energization of the 61 municipalities:
- 75% < L.E. : zero Municipality
- 61% - 75% : 7 Municipalities

- 50% - 60% : 9 Municipalities
- L.E. < 50% : 45 Municipalities

66. From a national perspective, the level of energization at the municipality has wide variation from the lowest of 3% to the highest 100%. It is worthwhile to note that there are incidence of municipalities of very low level of energization (< 40%) in ECs with level of energization higher than 75%. As disclosed by the EC officials during the consultative meeting with them, these municipalities are very far from the main tapping point, have bad terrain (no access road), or have poor security conditions. Extension of grid lines to these municipalities, in fact, lowers their technical efficiency due to higher system losses.

67. The 2nd level Screening takes into account the potential size of municipal market packages. Based on this screening process, the 259 municipalities are trimmed down to 163 municipalities and the breakdown is as follows:
    - Region 2 : 15 Municipalities
    - Region 5 : 32 Municipalities
    - Region 6 : 25 Municipalities
    - Region 8 : 50 Municipalities
    - Region 9 : 41 Municipalities

68. The common sizes of municipal market packages that are shortlisted are in the range of 10 -15 non-electrified barangays (count: 77 municipalities). There are about 39 municipalities which have about 16 - 20 non-electrified barangays still waiting to be served. Municipalities with 21 - 25 non-electrified barangays are about 22 municipalities. The bigger potential market packages, on the other hand, numbered about 25 municipalities (having more than 25 non-electrified barangays in the market package) with Sindangan, Zamboanga del Norte having the biggest size (coverage barangays of 52, electrified 1 barangay and 51 barangays scheduled for electrification during the period 2001 - 2004.

69. The number of non-electrified barangays in the market packages may still be reduced due to some energization activities to be carried in the current year. However, no substantial reduction in the market package size is expected due to very scarce resources available for such undertaking.

70. The 163 short-listed municipal market packages can be loosely considered as potentially attractive market packages to the private sector investors based on the market size.

71. The result of the 3rd level screening is the long list of market packages which numbered about 87 market packages. Annex A-1 presents the basic information and process in carrying out the municipal screening and short-listing. It also identifies the 87 market packages, the long list of market packages as required by the Terms of the Reference for Task 3.

72. Annex A-2 presents the basic statistics of the short-listed 87 market packages. Briefly discussed below are observations on the 87 market packages:

Region 2

- The ECs that cover the nine municipality market packages are CAGELCO I, ISELCO II and NUVELCO;
- The levels of energization in the coverage areas of the ECs are in the range of 70% - 75%;
- The number of non-electrified barangays in the candidate market packages are between 11 - 25 barangays;
- The level of energization in each of the municipalities is very low compared to the ECs overall level of energization, i.e., between 8% - 56%;

Region 5

- The ECs that cover the twenty-one (21) municipality market packages are CASURECO I, CASURECO IV, ALECO, MASELCO, and SORECO II;
- The levels of energization in the coverage areas of the ECs are in the range of 32% - 88%;
- The number of non-electrified barangays in the market packages are between 11 - 31 barangays;
- The levels of energization in the municipality market packages are in the ranges of 3% - 73%;

Region 6

- The ECs that cover the 18 candidate municipality market packages are AKELCO, ANTECO, CAPELCO, ILECO I, ILECO II, ILECO III and VRESCO;
- The levels of energization in the coverage areas of the ECs are in the range of 64% - 85%;
- The number of non-electrified barangays in the candidate market packages are between 10 - 46 barangays;
- The levels of energization in the municipality market packages are in the ranges of 12% - 75%;

Region 8

- The ECs that cover the 28 municipality market packages are LEYECO I, NORSAMELCO, ESAMELCO, SAMELCO I, SAMELCO II, and SOLECO;
- The levels of energization in the coverage areas of the ECs are in the range of 44% - 78%;
- The number of non-electrified barangays in the candidate market packages are between 10 - 49 barangays;
- The levels of energization in the municipality market packages are in the ranges of 8% - 71%;

Region 9

- The ECs that cover the eleven (11) municipality market packages are ZANECO, ZAMSURECO I, and ZAMSURECO II;
- The levels of energization in the coverage areas of the ECs are in the range of 49% - 60%;
- The number of non-electrified barangays in the candidate market packages are between 10 - 34 barangays;
- The levels of energization in the municipality market packages are in the ranges of 7% - 67%;

Prioritization of Market Packages

73. The 87 screened and short-listed municipal market packages are subjected to further characterization from which the 25 prioritized NRE-based market packages will be identified. Annex A-3 provides an overview of the prioritization process and identifies the top 25 market packages.

74. The 25 prioritized market packages are shown in Table 4. The regional breakdown of the 25 market packages is as follows:
    - Region 2 : 3 Municipal Market Packages
    - Region 5 : 11 Municipal Market Packages
    - Region 6 : 3 Municipal Market Packages
    - Region 8 : 6 Municipal Market Packages
    - Region 9 : 2 Municipal Market Packages

75. Annex A-4 summarizes the relevant characteristics of the 25 prioritized market packages. Briefly, below is the profile of the 25 prioritized market packages:

    Number of Households
    - The minimum number of households in the non-electrified barangays in the prioritized market packages is 2,110 households found in Dueñas, Iloilo while the municipal market package with the biggest size is the Calatrava, Negros Occidental which numbered about 5,810 households.
    - The median household size is about 3 - 4 persons.
    - This is a comfortable market size for private sector investors not to mention other consuming sectors, such as the local industry, commercial and service establishments.

    Average Annual Household Income
    - Sergio Osmeña, Zamboanga Norte has the lowest average annual household income of about PhP 22,529.00 while Baggao, Cagayan reported the highest average annual household income of PhP 76,270.00.

- There are three municipality market packages with average annual household income below PhP 30,000.00 and these are Calatrava, Negros Occidental (PhP 28,892.82), Cataingan, Masbate (PhP 29,504.50) and Sergio Osmeña, Zamboanga Norte.
- The median average annual household income is about PhP 39,000.00.

Table 4. 25 Prioritized NRE-Based Market Packages

M.P. #	Region	Province	Municipality	Electric Cooperative
1	2	Cagayan	Baggao	CAGELCO I
2		Isabela	Benito Soliven	ISELCO II
3			San Mariano	
4	5	Albay	Bacacay	ALECO
5			Libon	
6			Oas	
7			Rapu-Rapu	
8		Masbate	Balud	MASELCO
9			Cataingan	
10			Esperanza	
11			Mandaon	
12			Masbate	
13			Milagros	
14			Palanas	
15	6	Capiz	Dumarao	CAPELCO
16		Iloilo	Dueñas	ILECO II
17		Negros Occ	Calatrava	VRESCO
18	8	N. Samar	Catubig	NORSAMELCO
19			Las Nanas	
20			Laoang	
21		W. Samar	Tarangnan	SAMELCO I
22			Daram	SAMELCO II
23		E. Samar	Guiuan	ESAMELCO
24	9	Zamboanga Norte	Sergio Osmeña	ZANECO
25			Sibuco	ZAMSURECO II

Average Household Energy Expenditures

- The average monthly household energy expenditures range from a minimum of PhP 53.64 (Sergio Osmeña, Zamboanga Norte) to a maximum of PhP 251.54 (Esperanza, Masbate).
- The median average monthly household energy expenditures is roughly PhP 148.00.

Average Annual Household Disposable Income

- Surprisingly, data from the Market Assessment survey showed that households have savings which can be spent to cover additional cost for improved supply and services of electricity. The minimum HH disposable income recorded is PhP 1,122.84 (Cataingan, Masbate) and the highest HH disposable income gathered is PhP 31,976.36 (Benito Soliven, Isabela).
- The median is about PhP 10,000.00 per annum.

Household Population Density (HPD)

- Baggao, Cagayan is relatively the least dense among the 25 priority market packages. There are about four households for every square kilometer.
- Guiuan, Eastern Samar is comparatively the most dense with a HPD of 65 households per square kilometer.

Municipal Financial Capacity (Class)

- Almost half of the priority market packages are classified as fourth class municipality (Annual Income of PhP 8M or more but less than PhP 12M);
- Baggao, Cagayan and San Mariano, Isabela are first class municipalities and based on DOF classification, these municipalities have an average annual income of more than PhP 20M.
- Calatrava, Negros Occidental and Masbate, Masbate are second class municipalities (Annual Income of PhP 16M or more but less than PhP 20M).
- There are five municipalities that are classified as third class municipalities (annual income PhP 12M or more but less than Php 16M);
- The remaining five muncipalities are classified as fifth class municipalities (annual income PhP 4M or more but less than PhP 8M).

CHAPTER 4

76. This chapter presents the individual market briefs/info kits for the 25 prioritized market packages.

77. The market briefs are presented by province. The twenty-five municipal market packages are in eleven provinces namely:
    - Cagayan
    - Isabela
    - Albay
    - Masbate
    - Capiz
    - Iloilo
    - Negros Occidental
    - Northern Samar
    - Western samar
    - Eastern Samar
    - Zamboanga Norte

78. The information included in the kit are:
    - Provincial map showing the municipality/ies identified among the 25 prioritized market packages
    - Provincial renewable energy resource maps which include solar, wind and hydro
    - Municipal maps showing the energized and non-energized barangays
    - Municipal Market Brief template which contain basic geo-physical and socio-economic characteristics of the municipal market packages

79. Below are some explanations on the information found in the market briefs:
    - Under the Demographic Profile, the household population (1995) and the projected household population (2000) are data specific to the non-energized barangays. The other information, on the other hand, are municipal data
    - Under the Macro-economic Indicators, the information are taken from the Market Assessment Survey.
    - Under the Natural Resources, Renewable Energy Resources and the Economic Activities, all data provided are municipal data.
    - Under Infrastructure and Utilities, the energization status is at the municipal level while the power tariff rates are provincial data.

MARKET PACKAGES
Cagayan

M.P. # 1 : Baggao

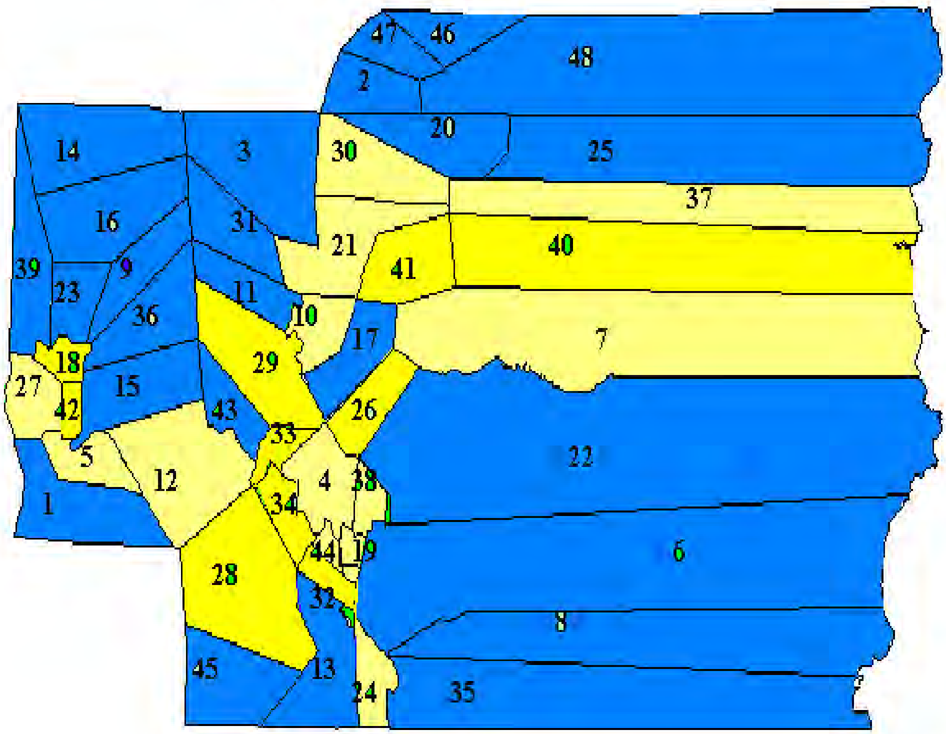
Cagayan


KALAYAAN
APPARI
Claveria
Santa Praxedes
Sanchez-mira
Pamplona
Abulug
Aparri
Santa Ana
Ballesteros
Calamaniugan
Santa Teresita
Allacapan
Lal-lo
Lasam
Gattaran
Baggao
Santo Nino
Alcala
Rizal
Amulong
Piat
Iguig
Tuao
Penablanca
Solana
Tuguegarao
Enrile

BAGGAO, CAGAYAN Market Package No. 1	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Forty-eight (48) barangays Twenty-three (23)barangays Twenty-five (25) barangays and these are: ✓ Adaoag ✓ Agaman Proper ✓ Agaman Norte ✓ Agaman Sur ✓ Alba ✓ Asinga Via ✓ Bacagan ✓ Bagunot ✓ Barsat West ✓ Bitag Pequeno ✓ Bunugan ✓ Canagatan ✓ Carupian ✓ Catugay ✓ C. Versoza ✓ Dalin ✓ Hacienda Intal ✓ Ibulo ✓ J. Pallagao ✓ Mabini ✓ San Antonio ✓ San Miguel ✓ San Vicente ✓ Taguing ✓ Taytay
Demographic Profile	
Household Population (1995)	▪ 3,750 Households
Projected HH Population (2000)	▪ 4,080 Households
Ave. Annual Pop'n Growth Rate	▪ 1.7 (1990 - 1995)
Population Density (1995)	▪ 4.07 HH/km^2
Ave. HH Size	▪ 5.03 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 76,270.00
Ave. Annual HH Expenditures	▪ PhP 49,211.11
Ave. Annual HH Disp. Income	▪ PhP 27,058.89
Ave. HH Energy Expenditures	▪ PhP 128.84/month
Municipality Income Class	▪ First Class
Natural Resources	
Land Area (DILG)	▪ 920 km^2
Land Capability Slope Distribution (Topography)	▪ Inland and relatively flat lands

BAGGAO, CAGAYAN Market Package No. 1		2of 2
Renewable Energy Resources		
Solar Energy	▪ 5 kWhr/m^2/day	
Wind Energy ✓ Wind power density	▪ 200 W/m^2 (predominant) ▪ 600 W/m^2 (pocket areas)	
Hydro Power	▪ 50 Watts (predominant ▪ 300 - 1,500 Watts (pocket areas)	
Economic Activities		
Predominant Economic Activities	▪ Farming	
Other Livelihood Activities	▪ Furniture making	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ CAGELCO I ▪ 48 % ▪ PhP 47.58 for first 15 kWhr PhP 3.1720/kWhr (in excess of 15 kWhr) ▪ PhP 64.44 for first 20 kWhr PhP 3.222/kWhr (in excess of 20 kWhr) ▪ PhP 15.00/kW ▪ PhP 3.1720/kWhr ▪ PhP 30,404,172.00	
Social Services		
Education (Schools)	At least 25 elementary schools	

BAGGAO, CAGAYAN



1. Adaoag
2. Agaman (Proper)
3. Alba
4. Annatayan
5. Asassi
6. Asinga-Via
7. Awalan
8. Bacagan
9. Bagunot
10. Barsat East
11. Barsat West
12. Bitag Grande
13. Bitag Pequeno
14. Bunugan
15. Canagatan
16. Carupian
17. Catugay
18. Poblacion
19. Dabac Grande
20. Dalin
21. Dalla
22. Hacienda Intal
23. Ibulo
24. Imurong
25. J. Pallago
26. Lasilat
27. Masical
28. Mocag
29. Nangalinan
30. Remus
31. San Antonio
32. San Francisco
33. San Isidro
34. San Jose
35. San Miguel
36. San Vicente
37. Santa Margarita
38. Santor
39. Taguing
40. Taguntongan
41. Tallang
42. Temblique
43. Taytay
44. Tungel
45. Mabini
46. Agaman Norte
47. Agaman Sur
48. C. Versosa

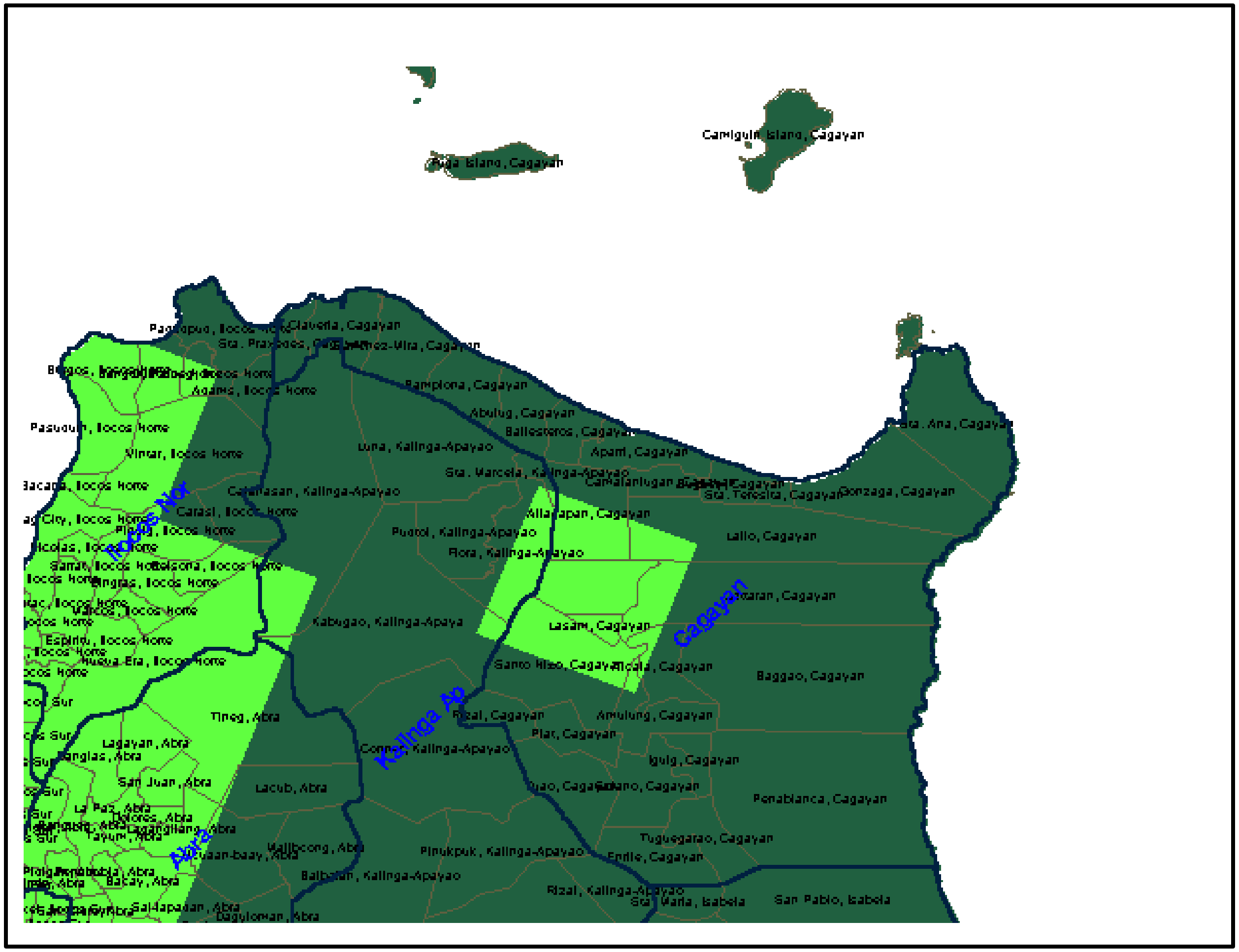
LEGEND

ENERGIZED

UNENERGIZED

ESRI ArcExplorer 2.0

SOLAR POWER (CAGAYAN)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (ABANN)

5

6

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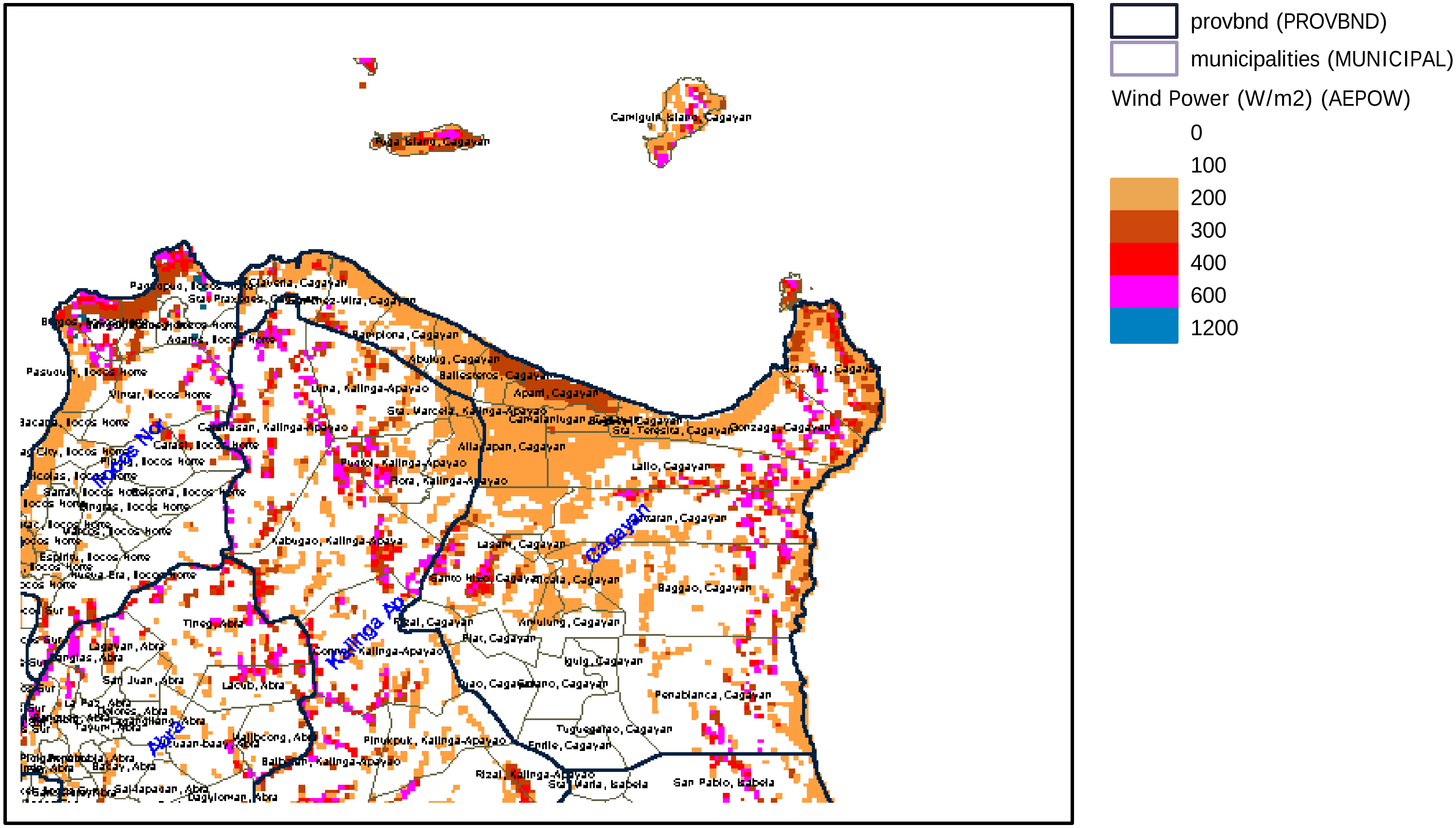
Friday, Jul 13 2001

ESRI ArcExplorer 2.0

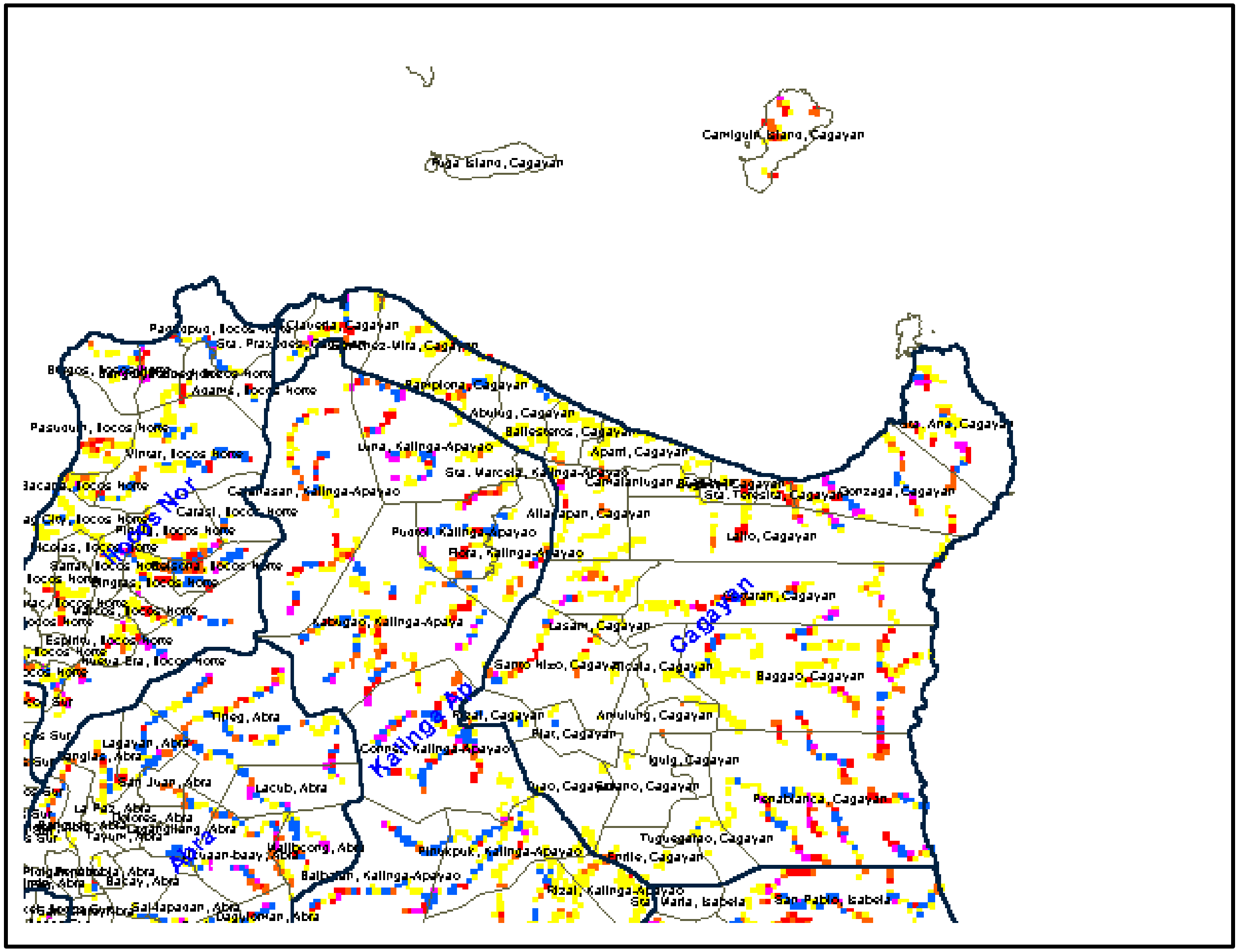
WIND POWER POTENTIAL (CAGAYAN)



Friday, Jul 13 2001

ESRI ArcExplorer 2.0

HYDRO POWER POTENTIAL (CAGAYAN)



provbnd (PROVBND)
municipalities (MUNICIPAL)
Hydro Potential 100% Efficiency (AE)
0
50
100
300
500
1500

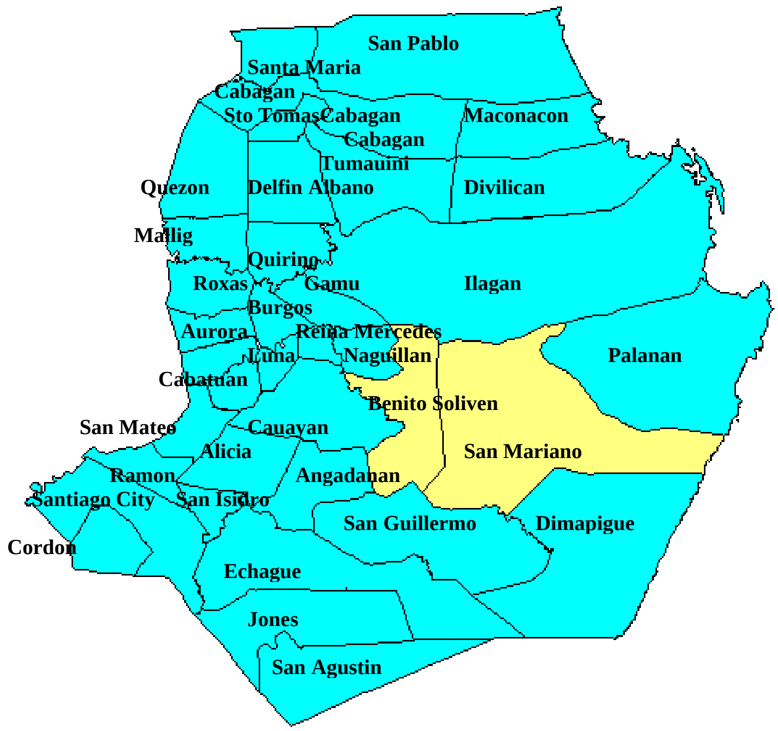
N

Friday, Jul 13 2001

MARKET PACKAGES
Isabela

M.P. # 2: Benito Soliven
M.P. # 3: San Mariano

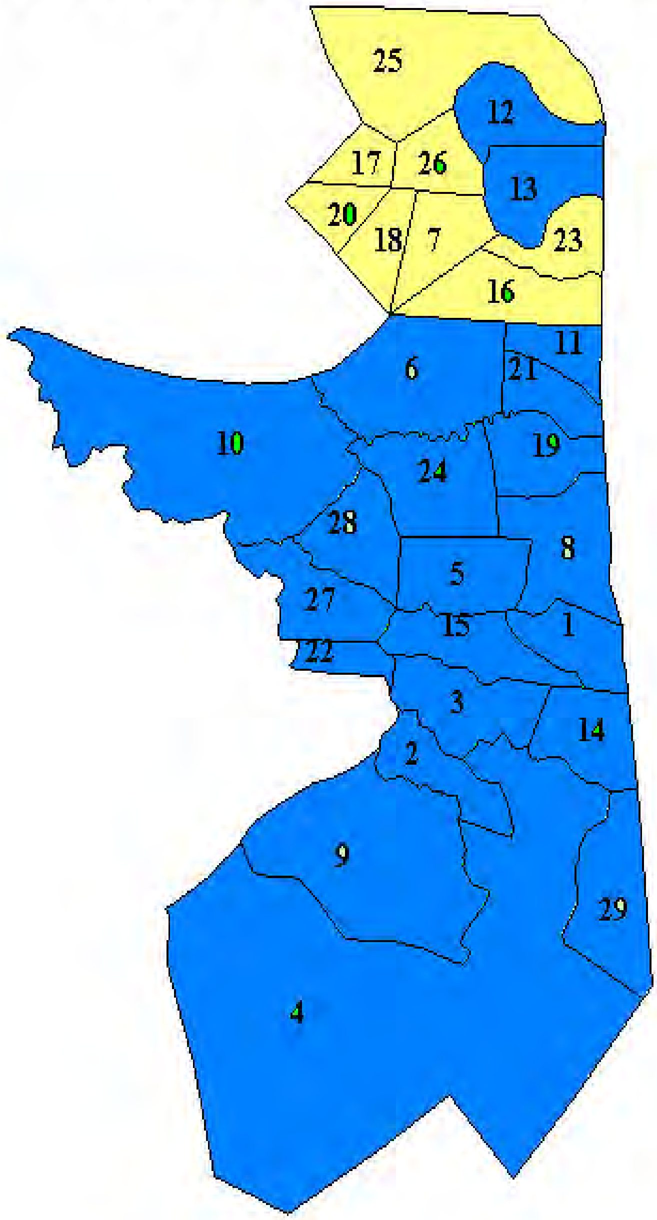
ISABELA


San Pablo
Santa Maria
Cabagan
Sto Tomas
Cabagan
Maconacon
Cabagan
Tumauini
Quezon
Delfin Albano
Divilican
Mallig
Quirino
Roxas
Gamu
Ilagan
Burgos
Aurora
Reina Mercedes
Luna
Naguillan
Palanan
Cabatuan
Benito Soliven
San Mateo
Cauayan
Alicia
San Mariano
Ramon
Angadanan
Santiago City
San Isidro
San Guillermo
Dimapigue
Cordon
Echague
Jones
San Agustin

BENITO SOLIVEN, ISABELA Market Package No. 2	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Twenty-nine (29) barangays Eight (8) barangays Twenty-one (21) barangays and these are: ✓ Andabuen ✓ Ara ✓ Balliao ✓ Binogtongan ✓ Capuseran ✓ Dagupan ✓ Danipa ✓ Gomez ✓ Guilingan ✓ La Salette ✓ Makindol ✓ Maluno Norte ✓ Maluno Sur ✓ Nacalma ✓ New Magsaysay ✓ Placer ✓ San Francisco ✓ Santiago ✓ Sevillana ✓ Sinipit ✓ Villa Luz
Demographic Profile	
Household Population (1995)	▪ 2,267 Households
Projected HH Population (2000)	▪ 2,317 Households
Ave. Annual Pop'n Growth Rate	▪ 0.44 (1990 - 1995)
Population Density (1995)	▪ 13.59 HH/km^2
Ave. HH Size	▪ 4.94 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 58,991.31
Ave. Annual HH Expenditures	▪ PhP 27,014.95
Ave. Annual HH Disp. Income	▪ PhP 31,976.36
Ave. HH Energy Expenditures	▪ PhP 119.05/month
Municipality Income Class	▪ Fifth Class
Natural Resources	
Land Area (DENR, 1998)	▪ 166.8 km^2
Land Capability Slope Distribution (Topography)	▪ Upland
Renewable Energy Resources	
Solar Energy	▪ 5 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 200 W/m^2
Hydro Power	▪ 50 Watts

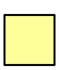
BENITO SOLIVEN, ISABELA Market Package No. 2		2 of 2
Economic Activities		
Predominant Economic Activities	▪ Farming	
Other Livelihood Activities	▪ Food processing (banana chips) ▪ Furniture making/narra parquet	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ✓ Estimated Cost of Grid Extension	 ▪ ISELCO II ▪ 28 % ▪ PhP 45.02 for first 12 kWhr PhP 3.7513/kWhr (in excess of 12 kWhr) ▪ PhP 76.026 for first 20 kWhr PhP 3.8013/kWhr (in excess of 20 kWhr) ▪ PhP 380.13/kW ▪ PhP 3.8013/kWhr ▪ PhP 17,162,632.00	
Social Services		
Education (Schools)	▪ at least 21 elementary schools	

BENITO SOLIVEN, ISABELA

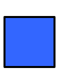


1. Andabuen
2. Ara
3. Binogtungan
4. Capuseran
5. Dagupan
6. Danipa
7. Distric II
8. Gomez
9. Guilingan
10. La Salette
11. Makindol
12. Maluno Norte
13. Maluno Sur
14. Nacalma
15. New Magsaysay
16. District I
17. Punit
18. San Carlos
19. San Francisco
20. Santa Cruz
21. Sevillana
22. Sinipit
23. Lucban
24. Villaluz
25. Yeban Norte
26. Yeban Sur
27. Santiago
28. Placer
29. Balliao

LEGEND :



ENERGIZED

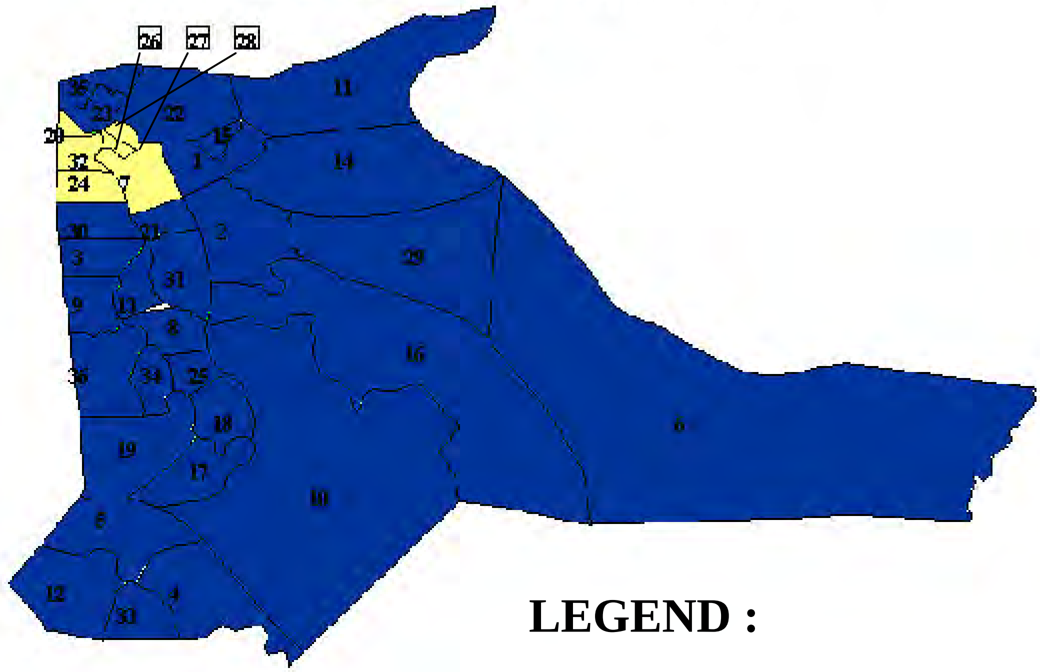


UNENERGIZED

SAN MARIANO, ISABELA Market Package No. 3	
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Thirty-six (36) barangays Twelve (12) barangays Twenty-four (24) barangays and these are ✓ Alibadabad ✓ Balagan ✓ Buyasan ✓ Cadsalan ✓ Casala ✓ Daragutan east ✓ Daragutan West ✓ Del Pilar ✓ Dicamay ✓ Dibuluan ✓ Dipusu ✓ Disulap ✓ Gangalan ✓ Ibujan ✓ Libertad ✓ Marannao ✓ Macayucayu ✓ Old San Mariano ✓ Panninan ✓ San Jose ✓ San Pedro ✓ Tappa ✓ Ueg ✓ Zamora
Demographic Profile	
Household Population (1995)	▪ 3,133 Households
Projected HH Population (2000)	▪ 3,273 Households
Ave. Annual Pop'n Growth Rate	▪ 0.88 (1990 - 1995)
Population Density (1995)	▪ 2.13 HH/km^2
Ave. HH Size	▪ 5.2 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 63,622.67
Ave. Annual HH Expenditures	▪ PhP 33,217.84
Ave. Annual HH Disp. Income	▪ PhP 30,404.83
Ave. HH Energy Expenditures	▪ PhP 155.46/month
Municipality Income Class	▪ First Class
Natural Resources	
Land Area (DILG)	▪ 1,469.50 km^2
Land Capability Slope Distribution (Topography)	▪ Upland
Renewable Energy Resources	
Solar Energy	▪ 5 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 200 W/m^2 ▪ 600 W/m^2
Hydro Power	▪ 50 - 1,500 Watts

SAN MARIANO, ISABELA Market Package No. 3	2of 2
Economic Activities	
Predominant Economic Activities	▪ farming
Other Livelihood Activities	▪ Food processing (banana chips) ▪ Furniture making
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ ISELCO II ▪ 33 % ▪ PhP 45.02 for first 12 kWhr PhP 3.7513/kWhr (in excess of 12 kWhr) ▪ PhP 76.026 for first 20 kWhr PhP 3.8013/kWhr (in excess of 20 kWhr) ▪ PhP 380.13/kW ▪ PhP 3.8013/kWhr ▪ PhP 36,233,550.00
Social Services	
Education (Schools)	▪ At least 24 elementary schools

SAN MARIANO, ISABELA



LEGEND :

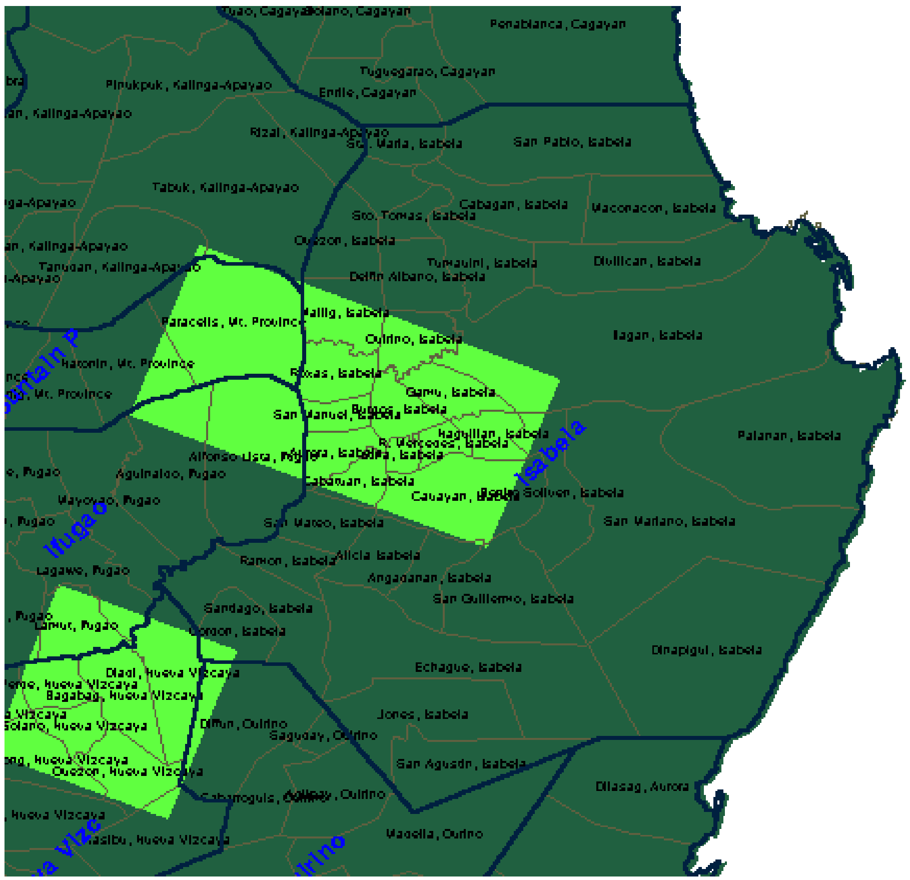
ENERGIZED

UNENERGIZED

1. Alibadabad	19. Macayucayu
2. Binatug	20. Mallabo
3. Bitabian	21. Marannao
4. Buyasan	22. Minanga
5. Cadsalan	23. Old San Mariano
6. Casala	24. Palutan
7. Cataguing	25. Panninan
8. Daragutan East	26. Zone I
9. Daragutan West	27. Zone II
10. Del Pilar	28. Zone III
11. Dibuluan	29. San Jose
12. Dicamay	30. San Pablo
13. Dipuso	31. San Pedro
14. Disulap	32. Sta. Felomena
15. Disusuan	33. Tappa
16. Gangalan	34. Ueg
17. Ibujan	35. Zamora
18. Libertad	36. Balagan

ESRI ArcExplorer 2.0

SOLAR POWER POTENTIAL (ISABELA)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (ABANN)

5

6

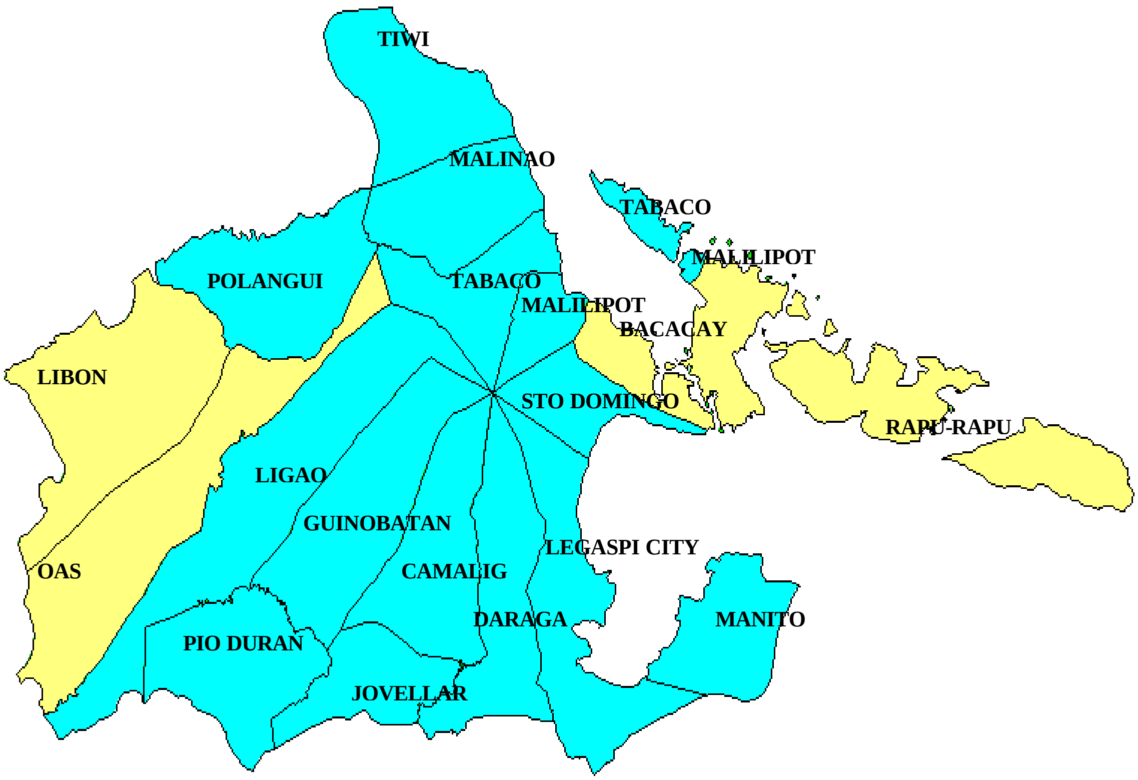
N

Friday, Jul 13 2001

MARKET PACKAGES
Albay

M.P. # 4 : Bacacay
M.P. # 5 : Libon
M.P. # 6 : Oas
M.P. # 7 : Rapu-Rapu

Albay


TIWI
MALINAO
TABACO
MALILIPOT
POLANGUI
TABACO
MALILIPOT
BACACAY
LIBON
STO DOMINGO
RAPU-RAPU
LIGAO
GUINOBATAN
LEGASPI CITY
OAS
CAMALIG
DARAGA
MANITO
PIO DURAN
JOVELLAR

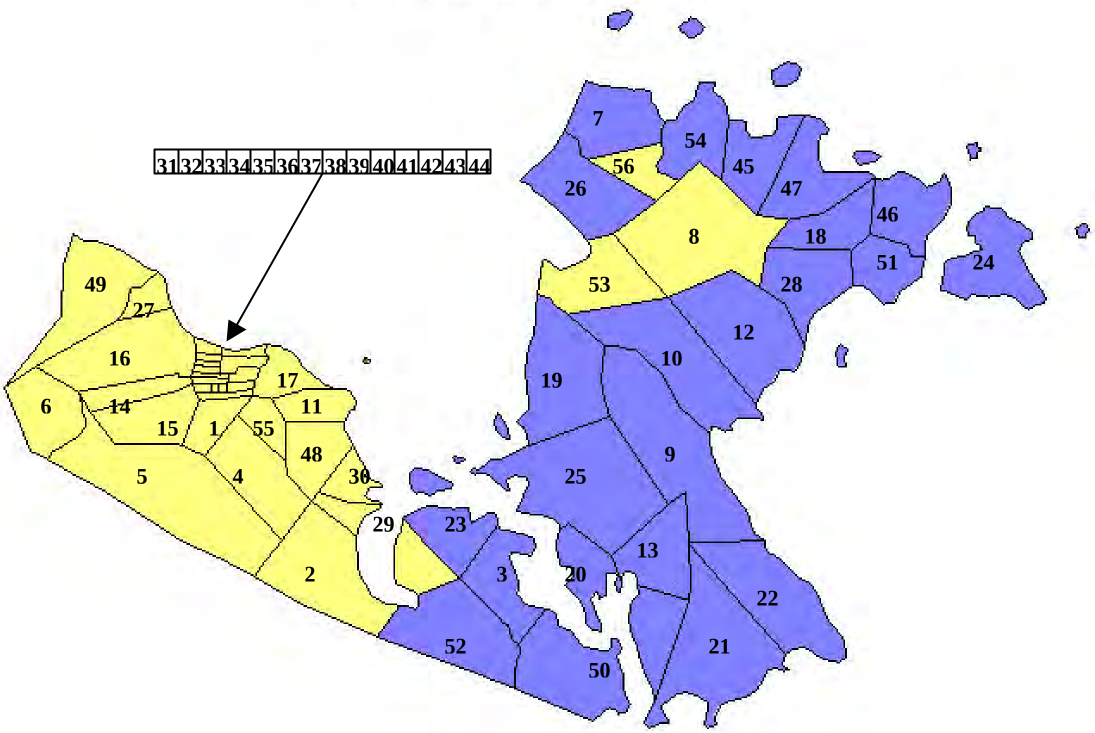
<table>
<tr><td colspan="2">BACACAY, ALBAY
Market Package No. 4</td><td>1of 2</td></tr>
<tr><td colspan="3">General Information</td></tr>
<tr><td>Political Subdivisions
▪ Number of barangays
▪ Number of energized barangays
▪ Number of unenergized barangays</td><td colspan="2">Fifty-six (56) barangays
Thirty-four (34) barangays

Twenty-two (22) barangays and these are

✓ Bariw ✓ Misibis
✓ Buang ✓ Namanday
✓ Busdac ✓ Nahapunan
✓ Cagraray ✓ Namantao
✓ Cagbulacao ✓ Pigcobohan
✓ Cawayan ✓ Ponco
✓ Damacan ✓ San Pablo
✓ Langaton ✓ Sula
✓ Manaet ✓ Tambungan
✓ Mapulangdaga ✓ Tambilagao
✓ Mataas ✓ Uson</td></tr>
<tr><td>Climate</td><td colspan="2">▪ Two pronounced seasons - the rainy and dry seasons
▪ Rainy season: June - December
Dry season : January - May</td></tr>
<tr><td colspan="3">Demographic Profile</td></tr>
<tr><td>Household Population (1995)</td><td colspan="2">▪ 3,537 Households</td></tr>
<tr><td>Projected HH Population (2000)</td><td colspan="2">▪ 4,077 Households</td></tr>
<tr><td>Ave. Annual Pop'n Growth Rate</td><td colspan="2">▪ 2.88 %</td></tr>
<tr><td>Population Density (1995)</td><td colspan="2">▪ 31.52 HH/km^2</td></tr>
<tr><td>Ave. HH Size</td><td colspan="2">▪ 5.48</td></tr>
<tr><td colspan="3">Macro-economic Indicators</td></tr>
<tr><td>Ave. Annual HH Income</td><td colspan="2">▪ PhP 40,320.18</td></tr>
<tr><td>Ave. Annual HH Expenditures</td><td colspan="2">▪ PhP 35,315.87</td></tr>
<tr><td>Ave. Annual HH Disp. Income</td><td colspan="2">▪ PhP 5,004.31</td></tr>
<tr><td>Ave. HH Energy Expenditures</td><td colspan="2">▪ PhP 193.00/month</td></tr>
<tr><td>Municipality Income Class</td><td colspan="2">▪ Fourth (4^{th}) Class</td></tr>
<tr><td colspan="3">Natural Resources</td></tr>
<tr><td>Land Area (DILG)</td><td colspan="2">▪ 112.2 km^2</td></tr>
<tr><td>Land Use (DILG)</td><td colspan="2">▪ Built-up Area : 4.92 km^2 (4.4%)
▪ Agriculture : 68.93 km^2 (61.4%)
▪ Forest : 28.17 km^2 (25.1%)
▪ Swamps/Marches : 10.18 km^2 (9.1%)</td></tr>
</table>

BACACAY, ALBAY Market Package No. 4	2of 2
Renewable Energy Resources	
Solar Energy	▪ 5 kWhr/m^2/day
Hydro Power	▪ 100 Watts
Economic Activities	
Predominant Economic Activities	▪ Fishing and farming
Other Livelihood Activities	▪ Mat & basket weaving ▪ Marble craft ▪ Animal raising
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	▪ ALECO ▪ 61 % ▪ PhP 52.37 for first 15 kWhr PhP 3.4913/kWhr (in excess of 15 kWhr) ▪ PhP 70.43 for first 20 kWhr PhP 3.5213/kWhr (in excess of 20 kWhr) ▪ PhP 18.00/kW ▪ PhP 3.4813/kWhr ▪ PhP 23,770,012.01
Social Services	
Education (Schools)	▪ At least 22 elementary schools

BACACAY, ALBAY



1. Baclayon
2. Banao
3. Bariw
4. Basud
5. Bayandong
6. Bonga (upper)
7. Buang
8. Cabasan
9. Cagbulacao
10. Cagraray
11. Cajogutan
12. Cawayan
13. Damacan
14. Gubat Ilawod
15. Gubat Iraya
16. Hindi
17. Igang
18. Langaton
19. Manaet
20. Mapulang Daga
21. Mataas
22. Misibis
23. Nahapunan
24. Namanday
25. Namantao
26. Napao
27. Panrayon
28. Pigcobohan
29. Pili Ilawod
30. Pili Ilaya
31. Barangay 1
32. Barangay 10
33. Barangay 11
34. Barangay 12
35. Barangay 13
36. Barangay 14
37. Barangay 2
38. Barangay 3
39. Barangay 4
40. Barangay 5
41. Barangay 6
42. Barangay 7
43. Barangay 8
44. Barangay 9
45. Ponco (Lower Bonga)
46. Busdac (San Jose)
47. San Pablo
48. San Pedro
49. Sogod
50. Sula
51. Tambilagao (Tambognon)
52. Tambongon (Tambilagao)
53. Tanagan
54. Uson
55. Vinisitahan (Mainland)
56. Vinisitahan (Island)

LEGEND :

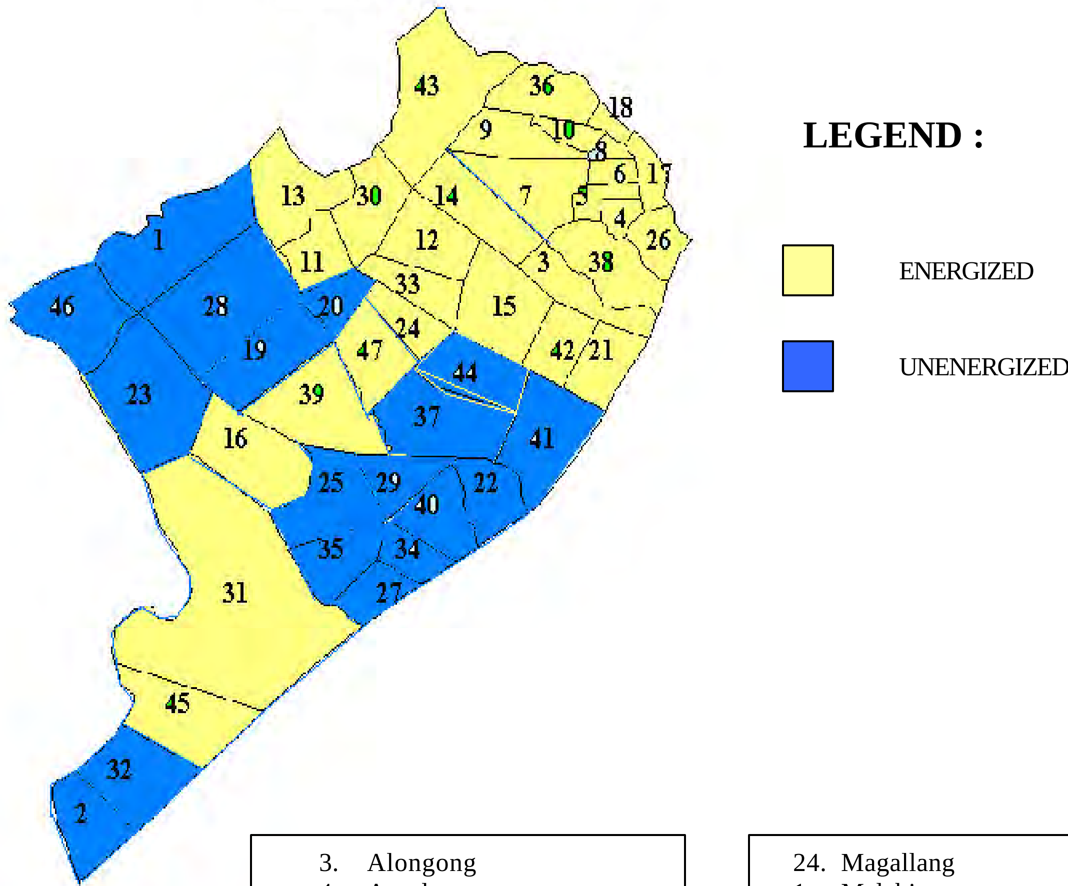
ENERGIZED

UNENERGIZED

LIBON, ALBAY Market Package No. 5	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Forty-seven (47) barangays Twenty-nine (29) barangays Eighteen (18) barangays and these are ✓ Alongon ✓ Natasan ✓ Apud ✓ Rawis ✓ Harigue ✓ Salvacion ✓ Libtong ✓ Sampongan ✓ Mabayawas ✓ San Antonio ✓ Macabugos ✓ San Pascual ✓ Malabiga ✓ San Ramon ✓ Matara ✓ Sto. Niño ✓ Molosbolos ✓ Tambo
Climate	▪ Wet and dry season ▪ Rainy season: May to November Dry season : December to April ▪ Climatological Data ✓ Total rainfall : 2.218 mm (annual) ✓ Ave. Temperature : 27.3^{0}C
Demographic Profile	
Household Population (1995)	▪ 3,230 Households
Projected HH Population (2000)	▪ 3,410 Households
Ave. Annual Pop'n Growth Rate	▪ 1.09 %
Population Density (1995)	▪ 12.56 HH/km^2
Ave. HH Size	▪ 5.46 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 32,850.14
Ave. Annual HH Expenditures	▪ PhP 27,145.00
Ave. Annual HH Disp. Income	▪ PhP 5,705.14
Ave. HH Energy Expenditures	▪ PhP 108.30/month
Municipality Internal Allotment (in Philippine pesos)	▪ Total Income ✓ PhP 37,118,146.19 (1999) ✓ PhP 33,147,513.22 (1998) ▪ IRA ✓ PhP 32,709,864.00 (1999) ✓ PhP 26,231,415.00 (1998)
Municipality Income Class	Third (3rd) Class

LIBON, ALBAY Market Package No. 5	2of 2
Natural Resources	
Land Area (DILG)	▪ 257.08 km^2
Land Capability Slope Distribution (Topography)	▪ Characterized by complex geographical features with mountains of various ranges and shapes; ▪ Two thirds of land area are low lying mountain ranges and rugged terrains which spread over the entire landscape of the western portion; ▪ Eastern part is a rich and fertile lowlands with creeks and inland rivers from southern Albay and are drained to Libon Bato Lake
Land Use (DENR, 1997)	▪ Residential : 16.38 km^2 ▪ Commercial : 0.07 km^2 ▪ Industrial : 0.02 km^2 ▪ Agricultural :193.56 km^2 ▪ Educational : 0.64 km^2
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Hydro Power	▪ 50 Watts
Economic Activities	
Predominant Economic Activities	▪ The area's economy is basically agricultural with rice and coconut as the predominant crops. It has rich volcanic soil.
Utilities	
Power	
▪ Electric Cooperative	▪ ALECO
▪ Municipal Energ'n Status	▪ 62 %
▪ Power Tariff (Basic Rates as of December 2000)	
✓ Residential	▪ PhP 52.37 for first 15 kWhr PhP 3.4913/kWhr (in excess of 15 kWhr)
✓ Commercial	▪ PhP 70.43 for first 20 kWhr PhP 3.5213/kWhr (in excess of 20 kWhr)
✓ Industry	
- Demand Charge	▪ PhP 18.00/kW
- Energy Charge	▪ PhP 3.4813/kWhr
▪ Estimated Cost of Grid Extension	▪ PhP 22,600,622.00

LIBON, ALBAY



3. Alongong
4. Apud
5. Bacolod
6. Zone I (Pob)
7. Zone II (Pob)
8. Zone III (Pob)
9. Zone IV (Pob)
10. Zone V (Pob)
11. Zone VI (Pob)
12. Zone VII (Pob)
13. Bariw
14. Bonbon
15. Buga
16. Bulusan
17. Burabod
18. Caguscos
19. East Carisac
20. West CArisac
21. Harique
22. Libtong
23. Linao
24. Mabayawas
25. Macabugos

24. Magallang
1. Malabiga
2. Marayag
27. Matara
28. Molosbolos
29. Natasan
30. Nogpo
31. Pantao
32. Rawis
33. Sagrada Familia
34. Salvacion
35. Sampongan
36. San Agustin
37. San Antonio
38. San Isidro
39. San Jose
40. San Pascual
41. San Ramon
42. San Vicente
43. Santa Cruz
44. Nini Jesus (Sto Nino Jesus)
45. Talin-Talin
46. Tambo
47. Villa Petrona

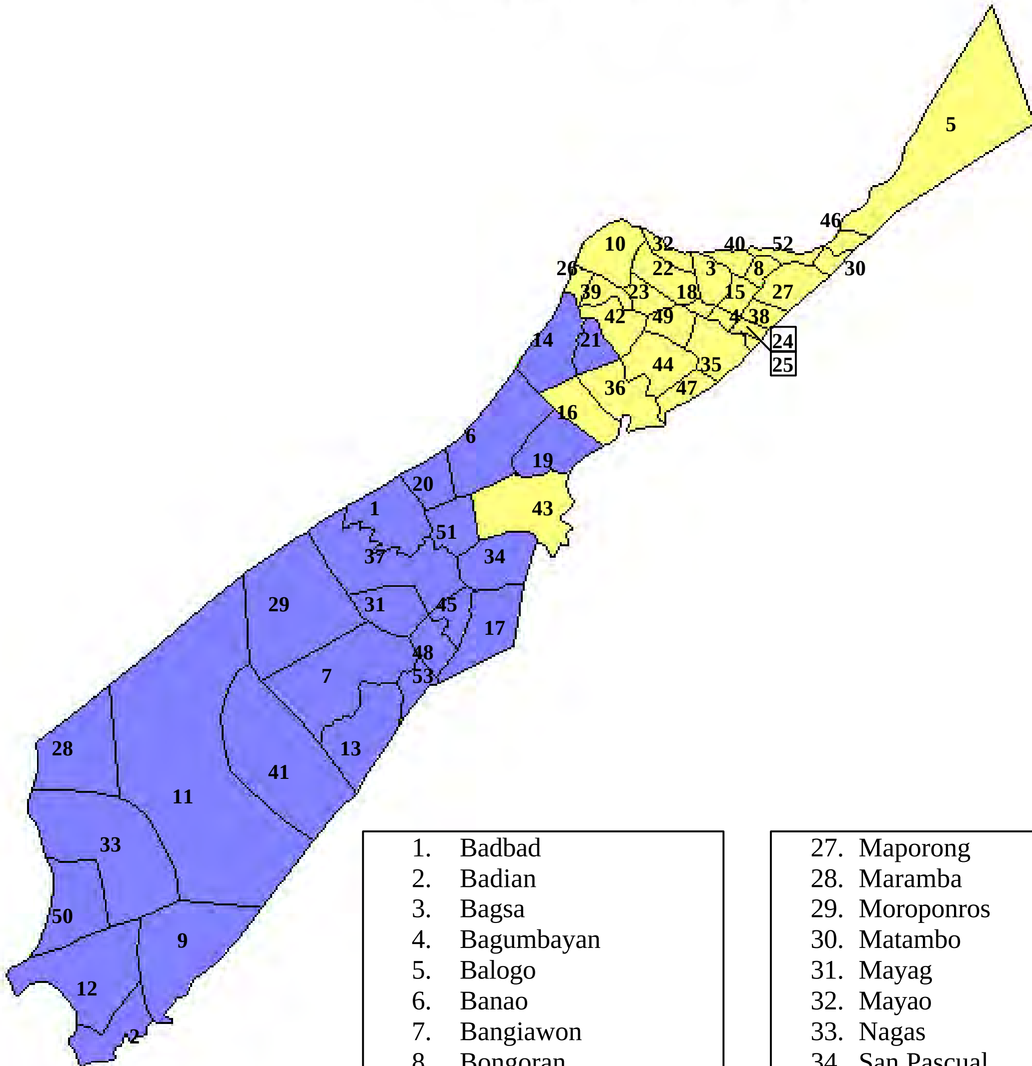
OAS, ALBAY Market Package No. 6	1of 3

General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Fifty-three (53) barangays Twenty-nine (28) barangays Twenty-four (25) barangays and these are ✓ Badbad ✓ Badian ✓ Banao ✓ Banglawon ✓ Bogtong ✓ Cadawag ✓ Cagmanaba ✓ Calaguimit ✓ Calpi ✓ Casinagan ✓ Culiat ✓ Del Rosario ✓ Gumabao ✓ Maramba ✓ Mayag ✓ Moroponros ✓ Nagas ✓ Ramay ✓ San Antonio ✓ San Miguel ✓ San Pascual ✓ Tablon ✓ Talisay ✓ Tapel ✓ Tobgon
Climate	▪ Two pronounced seasons: wet and dry seasons ▪ Rainy season: June - December Dry season : January - May
Demographic Profile	
Household Population (1995)	▪ 4,226 Households
Projected HH Population (2000)	▪ 4,508 Households
Ave. Annual Pop'n Growth Rate	▪ 1.3 %
Population Density (1995)	▪ 14.85HH/km^2
Ave. HH Size	▪ 5.24 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 34,743.15
Ave. Annual HH Expenditures	▪ PhP 25,172.32
Ave. Annual HH Disp. Income	▪ PhP 9,570.83
Ave. HH Energy Expenditures	▪ PhP 114.35/month
Municipality Internal Allotment (in Philippine pesos)	▪ Total Income ✓ PhP 33,859,241.46 (1999) ✓ PhP 27,549,978.99 (1998)
Municipality Income Class	Third (3rd) Class

OAS, ALBAY Market Package No. 6	2of 3
Natural Resources	
Land Area (DILG, Annual Report)	▪ 284.5 km^2
Land Capability Slope Distribution (Topography)	▪ 0 - 3% : 22 % (level to nearly level) ▪ 3 - 8% : 16 % (very gently sloping) ▪ 8 - 15% : 15 % (Gently sloping) ▪ 15 - 30% : 6 % (Moderately sloping) ▪ above 30% : 41 % (Strongly sloping)
Land Use	▪ 265 km^2 devoted for agriculture ✓ 210 km^2 for commercial crops (coconut, citrus, abaca, and other fruit bearing trees) ✓ 55 km^2 for rice, corn, vegetables and rootcrops
Water Bodies	Oas has fresh and sea water bodies. The west coast district lies along the Burias Pass. Fresh water bodies emanate from the Mayon Volcano and pass through the fertile plains of Oas, enabling farmers and planters to have adequate supply of irrigated water.
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Hydro Power	▪ 50 Watts
Economic Activities	
Predominant Economic Activities	▪ Farming ▪ Production of leading agricultural crops (annual) ✓ Rice : 22,542 MT ✓ Corn : 3,875 MT ✓ Coconut : 438,704 MT ✓ Rootcrops : 1,620 MT ✓ Vegetables : 264 MT ▪ Livestocks & Poultry/# of Heads ✓ Swine : 4,460 ✓ Chicken : 7,123 ✓ Ducks : 5,400 ✓ Carabao : 2,840 ✓ Others : 499

OAS, ALBAY Market Package No. 6		3of 3
Other Livelihood Activities	▪ Cottage industry primarily agas handicraft ▪ Village level fish processing ▪ Sea weed production ▪ Furniture making ▪ Coconut processing (vinegar)	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ ALECO ▪ 53 % ▪ PhP 52.37 for first 15 kWhr PhP 3.4913/kWhr (in excess of 15 kWhr) ▪ PhP 70.43 for first 20 kWhr PhP 3.5213/kWhr (in excess of 20 kWhr) ▪ PhP 18.00/kW ▪ PhP 3.4813/kWhr ▪ PhP 33,274,420.00 (excluding Tobgon)	
Social Services		
Education (Schools) ▪ Elementary ▪ Secondary	 ▪ 41 elementary schools (38 are in the rural areas) ▪ 7 secondary schools (4 are located in rural areas)	

OAS, ALBAY



LEGEND :

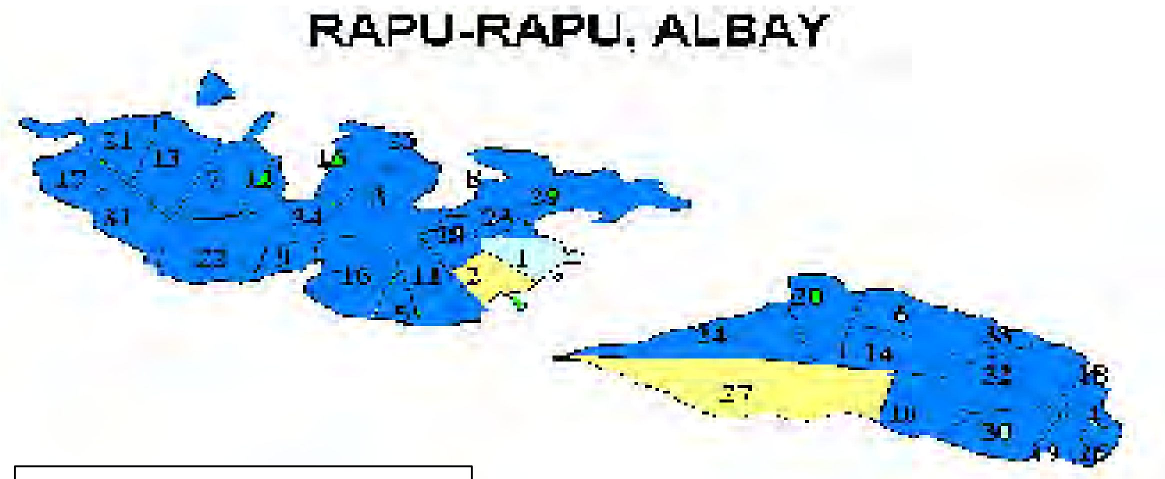
ENERGIZED

UNENERGIZED

1. Badbad
2. Badian
3. Bagsa
4. Bagumbayan
5. Balogo
6. Banao
7. Bangiawon
8. Bongoran
9. Bogtong
10. Busac
11. Cadawag
12. Cagmanaba
13. Calaguimit
14. Calpi
15. Calzada
16. Camagong
17. Casinagan
18. Centro Poblacion
19. Coliat
20. Del Rosario
21. Gumabao
22. Ilaor Norte
23. Ilaor Sur
24. Iraya Norte
25. Iraya Sur
26. Manga
27. Maporong
28. Maramba
29. Moroponros
30. Matambo
31. Mayag
32. Mayao
33. Nagas
34. San Pascual
35. Obaliw-Rinas
36. Pistola
37. Ramay
38. Rizal
39. Saban
40. San Agustin
41. San Antonio
42. San Isidro
43. San Jose
44. San Juan
45. San Miguel
46. San Ramon
47. San Vicente (Suca)
48. Talisay
49. Talongog
50. Tapel
51. Tobgon
52. Tobog
53. Tablon

RAPU-RAPU , ALBAY Market Package No. 7	
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Thirty-four (34) barangays Three (3) barangays Thrity-one (31) barangays and these are ✓ Bilbao ✓ Binosawan ✓ Bogtong ✓ Buenavista ✓ Buhatan ✓ Calanaga ✓ Caracaran ✓ Carogcog ✓ Dapdap ✓ Gaba ✓ Galicia ✓ Guadalupe ✓ Hamorawon ✓ Lagundi ✓ Liguan ✓ Linao ✓ Malobago ✓ Mananao ✓ Mancao ✓ Manila ✓ Masaga ✓ Morocborocan ✓ Nagcalsot ✓ Pagcolbon ✓ Sagrada ✓ Santa Barbara ✓ San Ramon ✓ Tinocawan ✓ Tinopan ✓ Viga ✓ VillaHermosa
Climate	▪ No definite dry season but very pronounced rainy season ▪ Rainy season: November - January Dry season : no data
Demographic Profile	
Household Population (1995)	▪ 4,181 Households
Projected HH Population (2000)	▪ 4,607 Households
Ave. Annual Pop'n Growth Rate	▪ 1.96 %
Population Density (1995)	▪ 25.84 HH/km^2
Ave. HH Size	▪ 5.40 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 37,846.15
Ave. Annual HH Expenditures	▪ PhP 33,479.46
Ave. Annual HH Disp. Income	▪ PhP 4,366.69
Ave. HH Energy Expenditures	▪ PhP 151.54/month

RAPU-RAPU , ALBAY Market Package No. 7	2of 2
Municipality Internal Allotment (in Philippine pesos)	▪ Total Income ✓ PhP 19,956,287.91 (1999) ✓ PhP 16,199,501.40 (1998) ▪ IRA ✓ PhP 19,476,561.00 (1999) ✓ PhP 15,730,172.00 (1998)
Municipality Income Class	▪ Fourth (4^{th}) Class
Natural Resources	
Land Area (DILG)	▪ 161.8 km^2
Land Capability Slope Distribution (Topography)	▪ relatively lowlands and coastal
Renewable Energy Resources	
Solar Energy	▪ 5 $kWhr/m^2/day$
Hydro Power	▪ 50 Watts
Economic Activities	
Predominant Economic Activities	▪ The primary source of income of the people depends on agriculture; about 50% are farmers, 35% fishermen, and 15% employed in the government and private sectors
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	▪ ALECO ▪ 9 % ▪ PhP 52.37 for first 15 kWhr PhP 3.4913/kWhr (in excess of 15 kWhr) ▪ PhP 70.43 for first 20 kWhr PhP 3.5213/kWhr (in excess of 20 kWhr) ▪ PhP 18.00/kW ▪ PhP 3.4813/kWhr ▪ PhP 51,754,506.00 (excluding Sta. Barbara, Tinocawan, Tinopan)
Social Services	
Education (Schools)	▪ At least 31 elementary schools



1. Bagaobawan
2. Batan
3. Bilbao
4. Binosawan
5. Bogtong
6. Buenavista
7. Buhatan
8. Calanaga
9. Caracaran
10. Carogcog
11. Dapdap
12. Gaba
13. Galicia
14. Guadalupe
15. Hamorawon
16. Lagundi
17. Liguan
18. Linao
19. Malobago
20. Mananao
21. Mancao
22. Manila
23. Masaga
24. Morocborocan
25. Nagcalsot
26. Pagcolbon
27. Poblacion
28. Sagrada
29. San Ramon
30. Santa Barbara
31. Tinocawan
32. Tinopan
33. Viga
34. Villahermosa

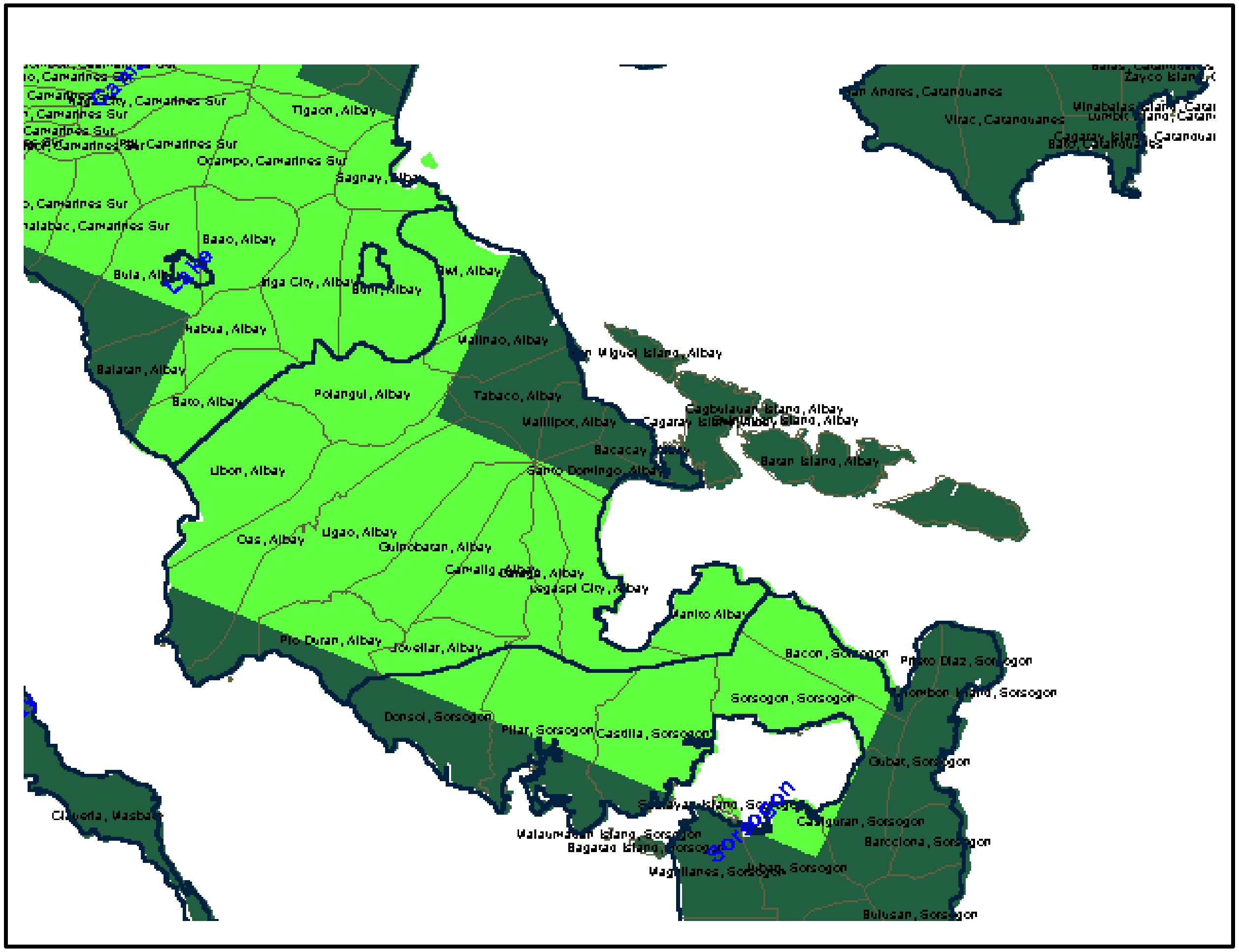
LEGEND :

ENERGIZED

UNENERGIZED

ESRI ArcExplorer 2.0

SOLAR POWER POTENTIAL (ALBAY)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (ABANN)

5

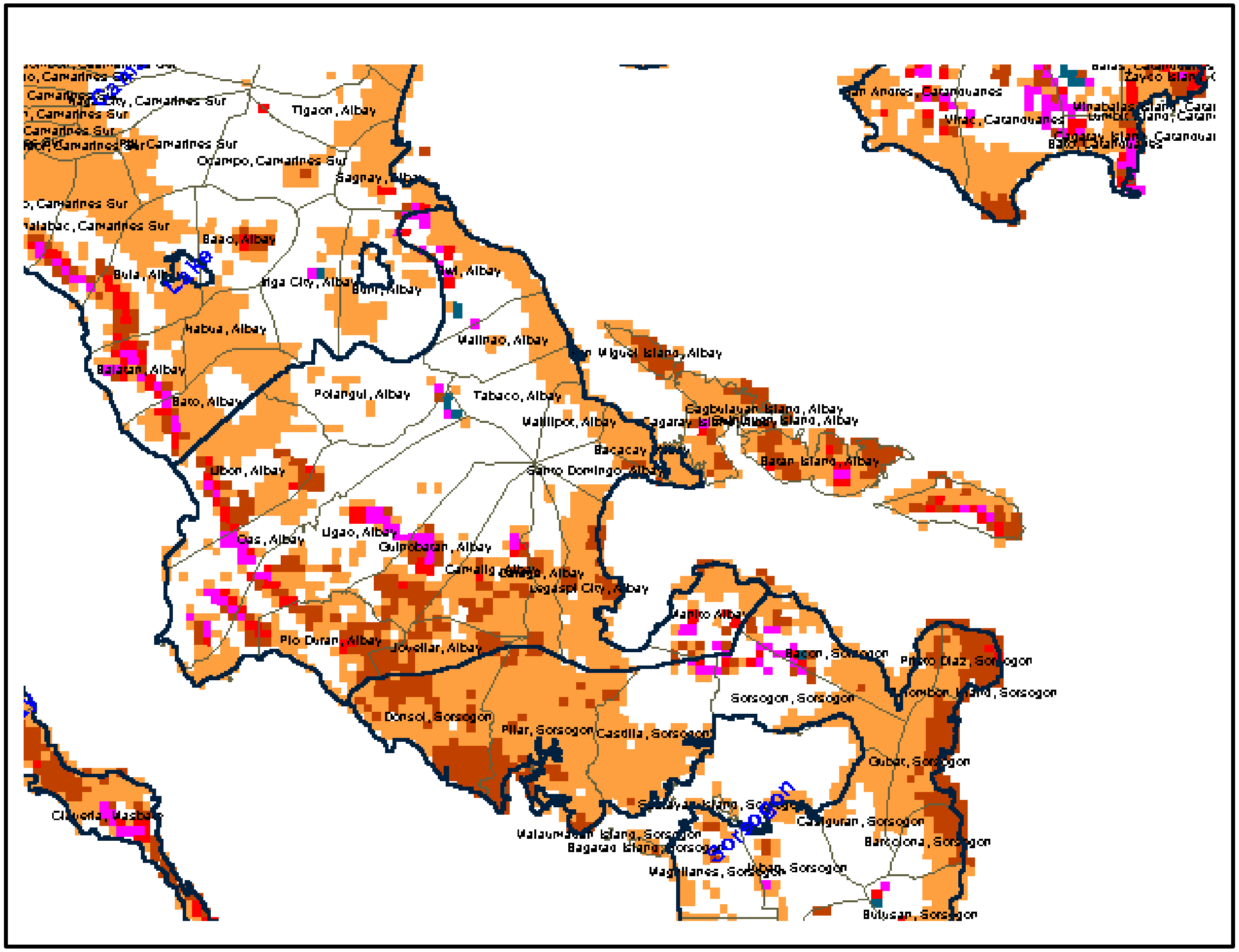
6

N

Friday, Jul 13 2001

ESRI ArcExplorer 2.0

WIND POWER POTENTIAL (ALBAY)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

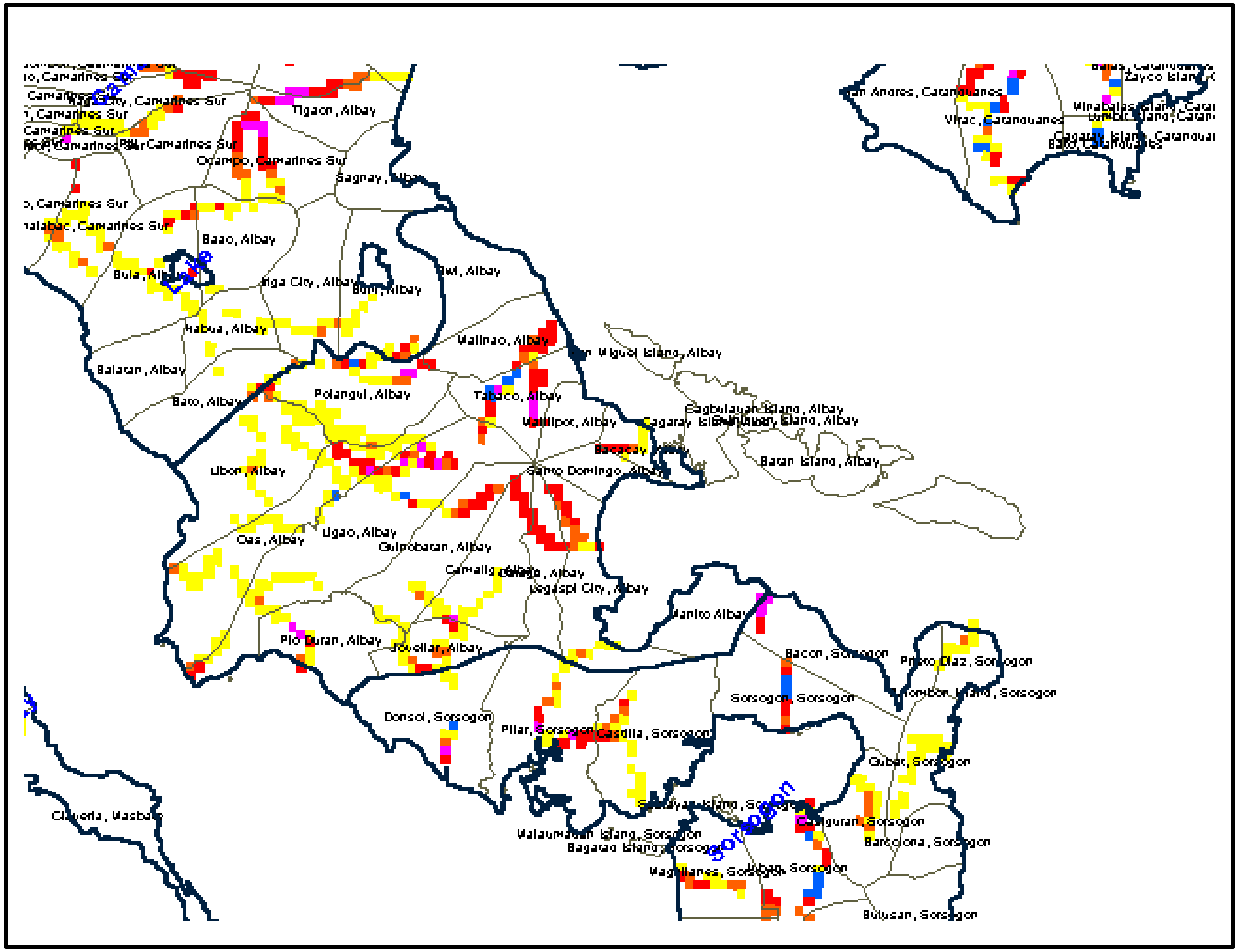
- 0
- 100
- 200
- 300
- 400
- 600
- 1200

N

Friday, Jul 13 2001

ESRI ArcExplorer 2.0

HYDRO POWER POTENTIAL (ALBAY)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Hydro Potential 100% Efficiency (AE)

0

50

100

300

500

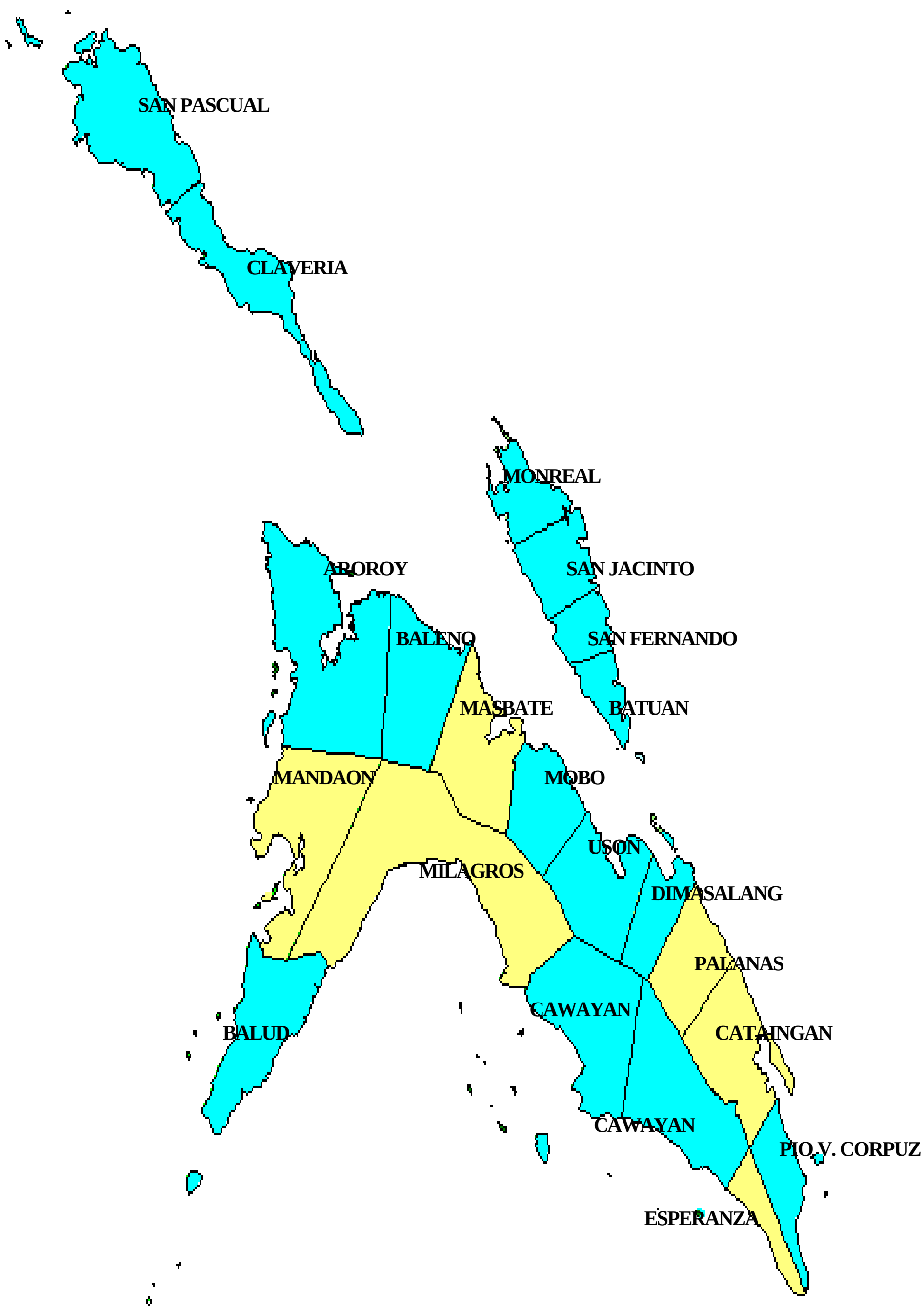
1500

Friday, Jul 13 2001

MARKET PACKAGES
Masbate

M.P. # 8 : Balud
M.P. # 9 : Cataingan
M.P. # 10 : Esperanza
M.P. # 11 : Mandaon
M.P. # 12 : Masbate
M.P. # 13 : Milagros
M.P. # 14 : Palanas

Masbate



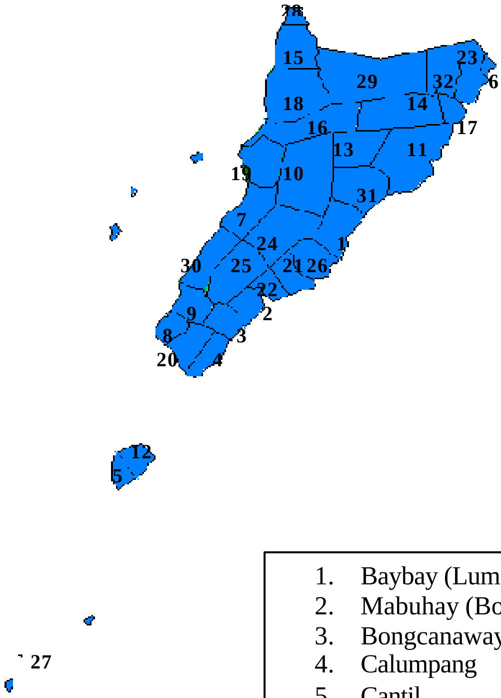
SAN PASCUAL
CLAVERIA
MONREAL
AROROY
SAN JACINTO
BALENO
SAN FERNANDO
MASBATE
BATUAN
MANDAON
MOBO
USON
MILAGROS
DIMASALANG
PALANAS
CAWAYAN
BALUD
CATAINGAN
CAWAYAN
PIO V. CORPUZ
ESPERANZA

BALUD, MASBATE Market Package No. 8	1 of 3
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Thirty - two (32) barangays One (1) barangay Thirty - one (31) barangays and these are ✓ Baybay ✓ Bungcanaway ✓ Calumpang ✓ Cantil ✓ Casamongan ✓ Dau ✓ Danao ✓ Ilaya ✓ Jangan ✓ Jintotolo ✓ Guinbanwahan ✓ Mabuhay ✓ Mapili ✓ Mapitogo ✓ Panguiranan ✓ Paho ✓ Palani ✓ Panubigan ✓ Pulangduta ✓ Quinyangan Diot ✓ Quinyangan Tunga ✓ Salvacion ✓ Sampad ✓ San Andres ✓ San Antonio ✓ Sapatos Island ✓ Talisay ✓ Tonga ✓ Ubo ✓ Victoria ✓ Villa Alvarez
Climate	▪ No very pronounced maximum rain period, with a short dry season ▪ Climatological Data (1998) ✓ Total rainfall : 1462.7 mm ✓ No. of rainy days : 147 days ✓ Ave. Temperature : 29.6^{0}C
Demographic Profile	
Household Population (1995)	▪ 5,377 Households
Projected HH Population (2000)	▪ 5,693 Households
Ave. Annual Pop'n Growth Rate	▪ 1.3 (1990 - 1995)
Ave. HH Size	▪ 5.2 persons
HH Population Density	▪ 22.76 HH/km^2
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 40,974.30
Ave. Annual HH Expenditures	▪ PhP 29,058.72
Ave. Annual HH Disp.Income	▪ PhP 11,915.58
Ave. HH Energy Expenditures	▪ PhP 186.08/month
Municipality Income Class	▪ Fourth

BALUD, MASBATE Market Package No. 8	2 of 3
Natural Resources	
Land Area	▪ 203.10 km^2
Land Capability Slope Distribution	▪ 0 - 3% : 21.40% (level to nearly level) ▪ 3 - 5% : 9.76% (very gently sloping) ▪ 5 - 8% : 3.25% (Gently sloping) ▪ 8 - 15% : 2.44% (Moderately sloping) ▪ 15 - 25% : 63.42% (Strongly sloping)
Land Use	▪ Pasture land : 160 km^2 ▪ Irrigated land : 2.03km^2 ▪ Fishponds : 11km^2
Renewable Energy Resources	
Solar Energy	▪ 5kWhr/m^2/day
Wind Energy ✓ Wind power density ✓ Wind Speed	 ▪ 200-300 W/m^2 ▪ 5.6 - 6.4 m/s
Hydro Power	▪ 50 Watts
Economic Activities	
Predominant Economic Activities	▪ Farming and fishing
Livestock	▪ Cattle Population ✓ 190 (backyard) ✓ 330 (semi-commercial) ✓ 5,200 (commercial)
Coconut ▪ Total Number of trees ▪ Ave. nut prod/tree/year ▪ Number of coco farms ▪ Average farm size	 ▪ 63,163 ▪ 20 ▪ 264 ▪ 1.17 hectares
Trade ▪ Industry Sector ▪ Services Sector	No. of establishments ▪ 36 ▪ 3
Other Livelihood Activities	▪ Fish processing ▪ Sea weed production

BALUD, MASBATE Market Package No. 8	3of 3
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge	 ▪ MASELCO ▪ 3% ▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr) ▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr) ▪ No data ▪ PhP 3.8154/kWhr
Social Services	
Education (Schools)	▪ at least 31 schools

BALUD, MASBATE



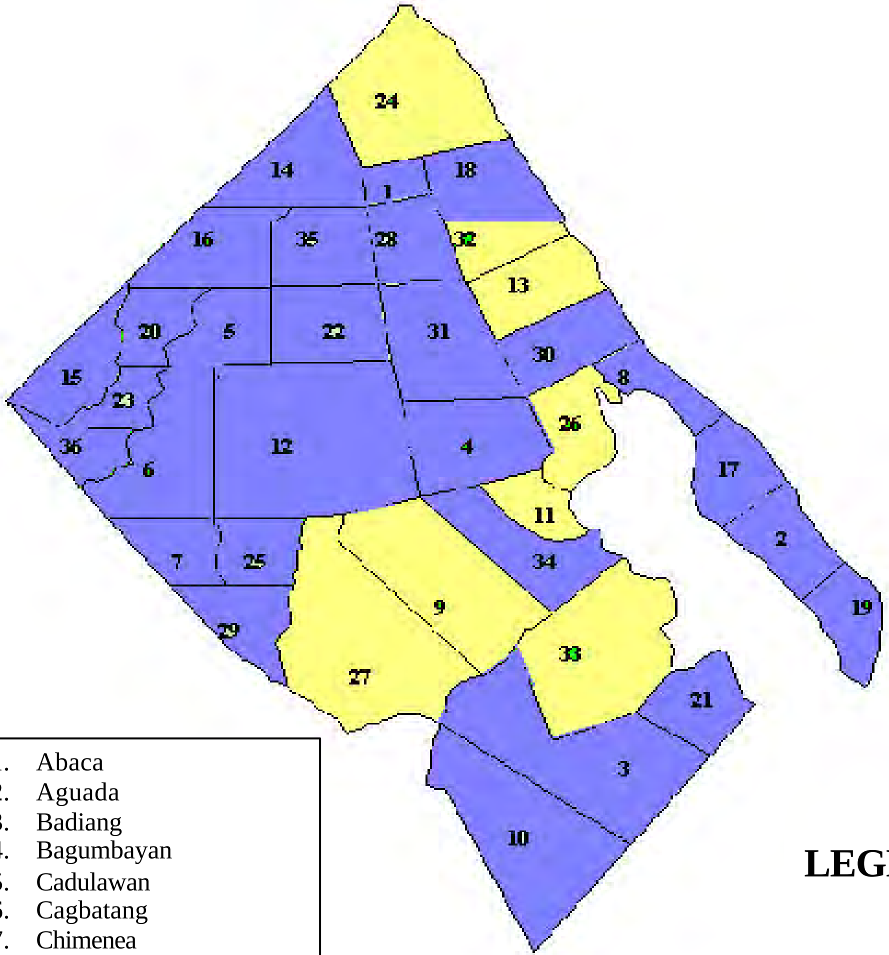
1. Baybay (Lumacab)
2. Mabuhay (Bongcanaway)
3. Bongcanaway III (Mabuhay)
4. Calumpang
5. Cantil
6. Casamongan
7. Dao
8. Danao
9. Guinbanwahan
10. Ilaya
11. Jangan
12. Jintotolo
13. Mapili
14. Mapitogo
15. Pajo
16. Palane
17. Panguiranan
18. Panubigan
19. Poblacion
20. Pulanduta
21. Quinangan Diotay
22. Quinangan Tonga
23. Salvacion
24. Sampad
25. San Andres
26. San Antonio
27. Sapatos
28. Talisay
29. Tonga
30. Ubo
31. Victory (Vivtoria)
32. Villa Alvarez

CATAINGAN, MASBATE Market Package No. 9	1of 3
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Thirty - six (36) barangays Eight (8) barangay Twenty-eight (28) barangays and these are ✓ Abaca ✓ Malobago ✓ Aguada ✓ Matayum ✓ Badiang ✓ Matubinao ✓ Bagumbayan ✓ Mintac ✓ Chimnea ✓ Nadawisan ✓ Cadulawan ✓ Osmeña ✓ Cagbatang ✓ Pitogo ✓ Concepcion ✓ San Isidro ✓ Divisoria ✓ San Jose ✓ Estampar ✓ San Pedro ✓ Leong ✓ San Rafael ✓ Libtong ✓ Tagboan ✓ Maanahao ✓ Toybo ✓ Madamba ✓ Villa Pogado
Climate	▪ No very pronounced maximum rain period, with a short dry season ▪ Climatological Data (1998) ✓ Total rainfall : 1462.7 mm ✓ No. of rainy days : 147 days ✓ Ave. Temperature : 29.6^{0}C
Demographic Profile	
Household Population (1995)	▪ 5,170 Households
Projected HH Population (2000)	▪ 5,488 HH
Ave. Annual Pop'n Growth Rate	▪ 1.2 (1990 - 1995)
Ave. HH Size	▪ 4.8 persons
HH Population Density	▪ 25.29 HH/km^2
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 29,504.50
Ave. Annual HH Expenditures	▪ PhP 28,381.66
Ave. Annual HH Disp.Income	▪ PhP 1,122.84
Ave. HH Energy Expenditures	▪ PhP 102.85/month
Municipality Income Class	▪ Fourth

CATAINGAN, MASBATE Market Package No. 9	2of 3
Natural Resources	
Land Area	▪ 204.40 km^2
Land Capability Slope Distribution	▪ 0 - 3% : 10.00% (level to nearly level) ▪ 3 - 5% : 20.67% (very gently sloping) ▪ 5 - 8% : 30.67% (Gently sloping) ▪ 8 - 15% : 8.67% (Moderately sloping) ▪ 15 - 25% : 30.00% (Strongly sloping)
Land Use	▪ Cultivated Croplands : 121 km^2 ▪ Irrigated land : 1.45km^2 ▪ Fishponds : 1km^2
Renewable Energy Resources	
Solar Energy	▪ 5kWhr/m^2/day
Wind Energy ✓ Wind power density ✓ Wind Speed	 ▪ 200-400 W/m^2 ▪ 5.6 - 7.0 m/s
Hydro Power	▪ 50 watts
Economic Activities	
Predominant Economic Activities	▪ Farming
Livestock	▪ Cattle Population ✓ 2,001 (backyard) ✓ 200 (semi-commercial)
Coconut ▪ Total Number of trees ▪ Ave. nut prod/tree/year ▪ Number of coco farms ▪ Average farm size	 ▪ 886,426 ▪ 24 ▪ 264 ▪ 3.00 hectares
Trade ▪ Industry Sector ▪ Services Sector	No. of establishments ▪ 33 ▪ 12
Other Livelihood Activities	▪ Mat weaving ▪ Fish culture/drying ▪ Coconut processing

CATAINGAN, MASBATE Market Package No. 9	3of 3
Utilities	
Power ▪ Electric Cooperative ▪ Municipality Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge	▪ MASELCO ▪ 22% ▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr) ▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr) ▪ No data ▪ PhP 3.8154/kWhr
Social Services	
Education (Schools)	▪ at least 28 schools

CATAINGAN, MASBATE



1. Abaca
2. Aguada
3. Badiang
4. Bagumbayan
5. Cadulawan
6. Cagbatang
7. Chimenea
8. Concepcion
9. Curvada
10. Divisoria
11. Domorog
12. Estampar
13. Gahit
14. Libtong
15. Liong
16. Maanahao
17. Madamba
18. Malobago
19. Matayum
20. Matubinao
21. Mintac
22. Nadawisan
23. Osmena
24. Pawican
25. Pitogo
26. Poblacion
27. Quezon
28. San Isidro
29. San Jose
30. San Pedro
31. San Rafael
32. Santa Teresita
33. Santo Nino
34. Tagboan
35. Tuybo
36. Villa Pogado

LEGEND :

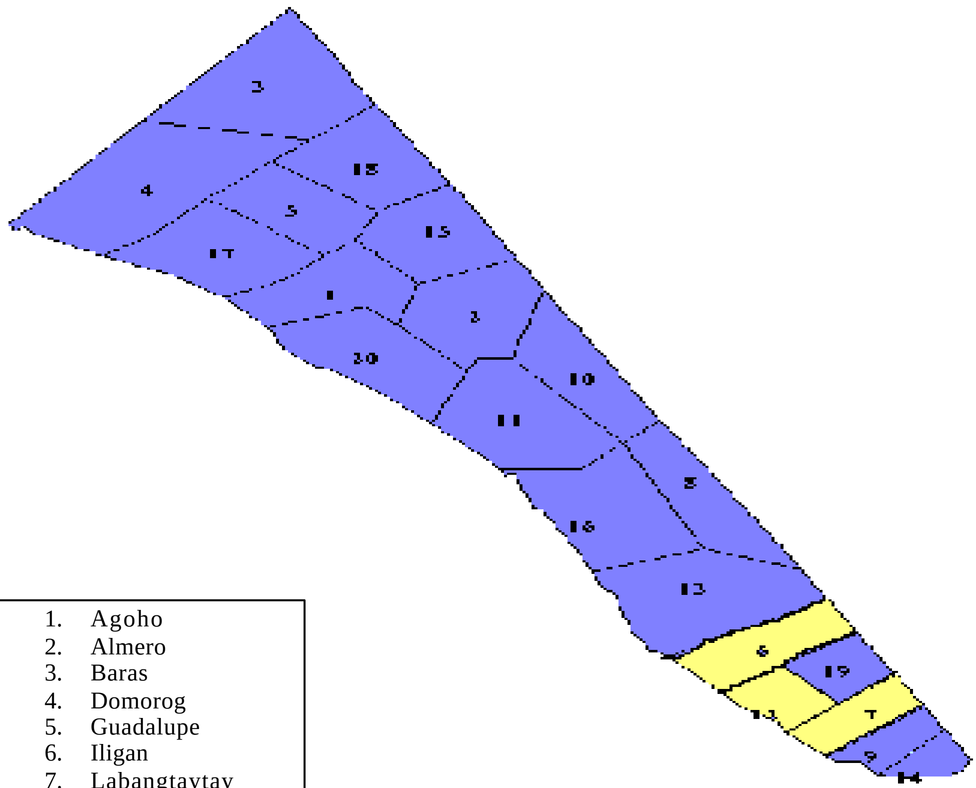
ENERGIZED

UNENERGIZED

ESPERANZA, MASBATE Market Package No. 10	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	 Twenty (20) barangays Three (3) barangay Seventeen (17) barangays and these are: ✓ Agoho ✓ Almero ✓ Baras ✓ Domorog ✓ Guadalupe ✓ Labrador ✓ Libertad ✓ Magsaysay ✓ Masbaranon ✓ Putting Bato ✓ Rizal ✓ San Roque ✓ Santiago ✓ Serosimbajan ✓ Tawad ✓ Tunga ✓ Villa
Climate	▪ No very pronounced maximum rain period, with a short dry season ▪ Climatological Data (1998) ✓ Total rainfall : 1462.7 mm ✓ No. of rainy days : 147 days ✓ Ave. Temperature : 29.6^{0}C
Demographic Profile	
Household Population (1995)	▪ 3,085 HH
Projected HH Population (2000)	▪ 3,542 HH
Ave. Annual Pop'n Growth Rate	▪ 2.8 (1990 - 1995)
Ave. HH Size	▪ 5.13 persons
Population Density	▪ 38.23 HH/km^2
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 30,582.78
Ave. Annual HH Expenditures	▪ PhP 26,066.27
Ave. Annual HH Disp.Income	▪ PhP 4,516.51
Ave. HH Energy Expenditures	▪ PhP 251.54/month
Municipality Income Class	▪ 5th

ESPERANZA, MASBATE Market Package No. 10		
Natural Resources		
Land Area	▪ 80.70 km^2	
Land Capability Slope Distribution	▪ 0 - 3% : 45.76% (level to nearly level) ▪ 3 - 5% : 25.42% (very gently sloping) ▪ 5 - 8% : 10.17% (Gently sloping) ▪ 8 - 15% : 5.08% (Moderately sloping) ▪ 15 - 25% : 13.56% (Strongly sloping)	
Land Use	▪ Coconut Plantations : 58 km^2	
Renewable Energy Resources		
Solar Energy	▪ 5kWhr/m^2/day	
Wind Energy ✓ Wind power density ✓ Wind Speed	 ▪ 200-300 W/m^2 ▪ 5.6 - 6.4 m/s	
Economic Activities		
Predominant Economic Activities	▪ Farming	
Coconut ▪ Total Number of trees ▪ Ave. nut prod/tree/year ▪ Number of coco farms ▪ Average farm size	 ▪ 370,440 ▪ 26 ▪ 4943 ▪ 1.65 hectares	
Trade ▪ Industry Sector ▪ Services Sector	No. of establishments ▪ 4 ▪ 1	
Other Livehood Activities	▪ Animal dispersal	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge	 ▪ MASELCO ▪ 15% ▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr) ▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr) ▪ No data ▪ PhP 3.8154/kWhr	
Social Services		
Education (Schools)	at least 16 schools	

ESPERANZA, MASBATE



1. Agoho
2. Almero
3. Baras
4. Domorog
5. Guadalupe
6. Iligan
7. Labangtaytay
8. Labrador
9. Libertad
10. Magsaysay
11. Masbaranon
12. Poblacion
13. Potingbato
14. Rizal
15. San Roque
16. Santiago
17. Sorosimbahan
18. Tawad
19. Tunga
20. Villa

LEGEND :

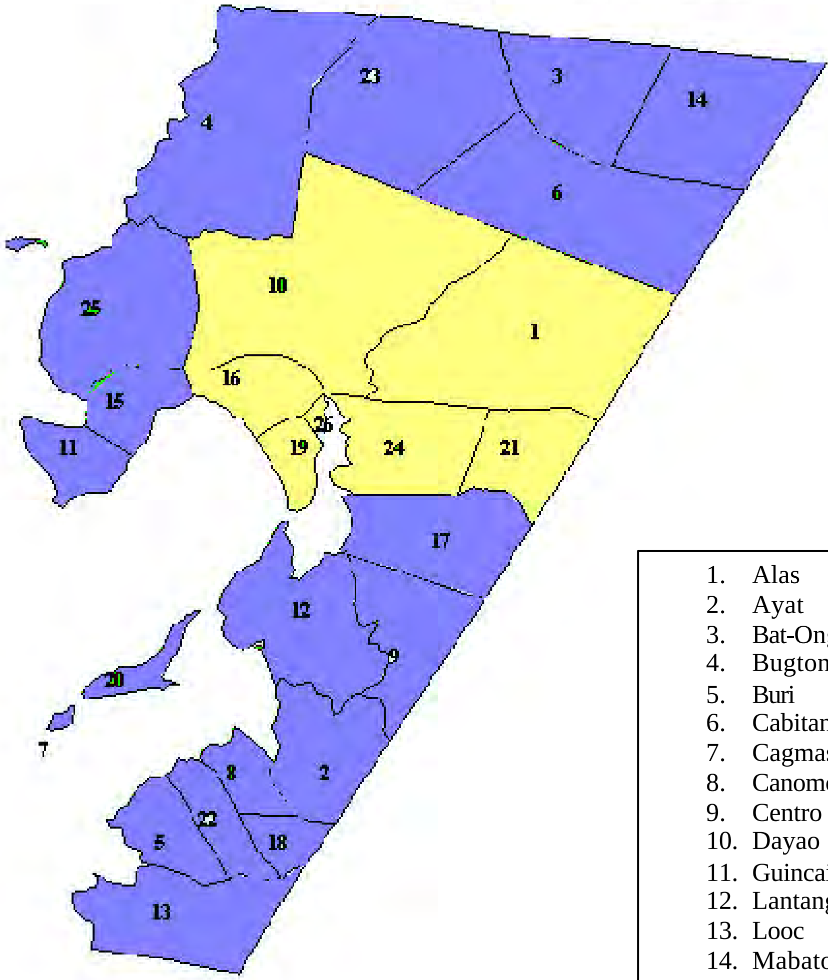
ENERGIZED

UNENERGIZED

MANDAON, MASBATE Market Package No. 11	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Twenty-six (26) barangays Seven (7) barangay Nineteen (19) barangays and these are ✓ Ayat ✓ Bat-ungan ✓ Bugtong ✓ Buri ✓ Cabitan ✓ Cagmasoso Is. ✓ Canomoy ✓ Centro ✓ Guincaiptan ✓ Lantangan ✓ Looc ✓ Mabatobato ✓ Maolingon ✓ Nanipsan ✓ Pinamangcaan ✓ Polo Dacu ✓ San Pablo ✓ Sta. Fe ✓ Tumalaytay
Climate	▪ No very pronounced maximum rain period, with a short dry season ▪ Climatological Data (1998) ✓ Total rainfall : 1462.7 mm ✓ No. of rainy days : 147 days ✓ Ave. Temperature : 29.6^{0}C
Demographic Profile (1995)	
Household Population (1995)	▪ 3,145 Households
Projected HH Population (2000)	▪ 3,489 Households
Ave. Annual Pop'n Growth Rate	▪ 2.1 (1990 - 1995)
Ave. HH Size	▪ 5.3 persons
Population Density (1995)	▪ 11.2 persons/km^2
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 39,613.64
Ave. Annual HH Expenditures	▪ PhP 35,802.65
Ave. Annual HH Disp.Income	▪ PhP 3,810.99
Ave. HH Energy Expenditures	▪ PhP 188.86/month
Municipality Income Class	▪ Fourth Class
Natural Resources	
Land Area	▪ 280.90 km^2
Land Capability Slope Distribution	▪ 0 - 3% : 1.55% (level to nearly level) ▪ 3 - 5% : 3.87% (very gently sloping) ▪ 5 - 8% : 46.57% (Gently sloping) ▪ 8 - 15% : 12.40% (Moderately sloping) ▪ 15 - 25% : 7.52% (Strongly sloping)

MANDAON, MASBATE Market Package No. 11		2 of 2
Land Use	▪ Pasture lands : 161 km^2 ▪ Fishponds : $8km^2$	
Renewable Energy Resources		
Solar Energy	▪ $5kWhr/m^2/day$	
Wind Energy ✓ Wind power density ✓ Wind Speed	 ▪ 200-300 W/m^2 ▪ 5.6 - 6.4 m/s	
Hydro Power	▪ 50 Watts	
Economic Activities		
Predominant Economic Activities	▪ Farming	
Coconut ▪ Total Number of trees ▪ Ave. nut prod/tree/year ▪ Number of coco farms ▪ Average farm size	 ▪ 443,900 ▪ 25 ▪ 2219 ▪ 2.00 hectares	
Trade ▪ Industry Sector ▪ Services Sector	No. of establishments ▪ 10 ▪ 1	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge	 ▪ MASELCO ▪ 27 % ▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr) ▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr) ▪ No data ▪ PhP 3.8154/kWhr	
Social Services		
Education (Schools)	▪ at least 18 schools	

MANDAON, MASBATE



LEGEND :

ENERGIZED

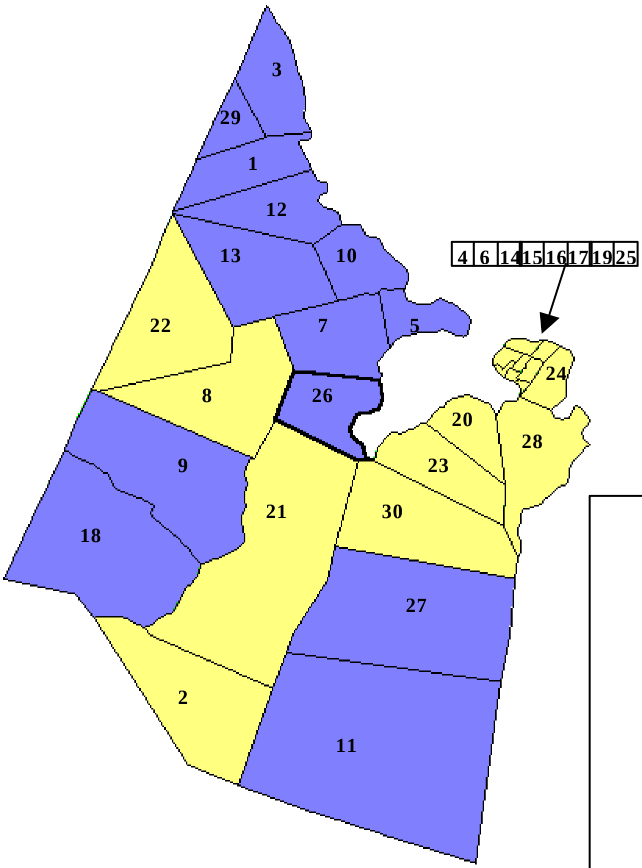
UNENERGIZED

1. Alas
2. Ayat
3. Bat-Ongan
4. Bugtong
5. Buri
6. Cabitan
7. Cagmasoso
8. Canomoy (Canomay)
9. Centro
10. Dayao
11. Guincaiptan
12. Lantangan
13. Looc
14. Mabatobato
15. Maolingon
16. Nailaban
17. Nanipsan
18. Pinamangcaan
19. Poblacion
20. Pulo Dacu
21. San Juan
22. San Pablo
23. Santa Fe
24. Tagbu
25. Tumalaytay
26. Laguinbanwa

MASBATE, MASBATE Market Package No. 12	1 of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Thirty (30) barangays Seventeen (17) barangay Thirteen (13) barangays and these are: ✓ Anas ✓ Bantigue ✓ Batuhan ✓ Biyong ✓ B. Titong ✓ Bolo ✓ Cagay ✓ Cawayan Exterior ✓ Cawayan Interior ✓ Igang ✓ Obongan Dacu ✓ Pawa ✓ Sinalongan
Climate	▪ No very pronounced maximum rain period, with a short dry season ▪ Climatological Data (1998) ✓ Total rainfall : 1462.7 mm ✓ No. of rainy days : 147 days ✓ Ave. Temperature : 29.6^{0}C
Demographic Profile (1995)	
Household Population (1995)	▪ 2,711 Households
Projected HH Population (2000)	▪ 3,023 Households
Ave. Annual Pop'n Growth Rate	▪ 2.2 (1990 - 1995)
Ave. HH Size	▪ 5.3 persons
Population Density (1995)	▪ 15.09 HH/km^2
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 40,280.62
Ave. Annual HH Expenditures	▪ PhP 32,532.06
Ave. Annual HH Disp.Income	▪ PhP 7,748.56
Ave. HH Energy Expenditures	▪ PhP 90.77/month
Municipality Income Class	▪ Second (2nd) Class
Natural Resources	
Land Area	▪ 179.70 km^2
Land Capability Slope Distribution	▪ 0 - 3% : 2.56% (level to nearly level) ▪ 3 - 5% : 4.27% (very gently sloping) ▪ 5 - 8% : 6.847% (Gently sloping) ▪ 8 - 15% : 5.18% (Moderately sloping) ▪ 15 - 25% : 81.20% (Strongly sloping)
Land Use	▪ Pasture lands : 83 km^2

MASBATE, MASBATE Market Package No. 12	2 of 2
Renewable Energy Resources	
Solar Energy	▪ 6 $kWhr/m^2/day$
Wind Energy ✓ Wind power density ✓ Wind Speed	 ▪ 200-300 W/m^2 ▪ 5.6 - 6.4 m/s
Economic Activities	
Predominant Economic Activities	▪ Farming
Coconut ▪ Total Number of trees ▪ Ave. nut prod/tree/year ▪ Number of coco farms ▪ Average farm size	 ▪ 986,647 ▪ 25 ▪ 2281 ▪ 1.06 hectares
Trade ▪ Industry Sector ▪ Services Sector	No. of establishments ▪ 281 ▪ 253
Other Livelihood Activities	▪ Marble industry ▪ Guano processing ▪ Weaving industry
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge	 ▪ MASELCO ▪ 57% ▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr) ▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr) ▪ No data ▪ PhP 3.8154/kWhr
Social Services	
Education (Schools)	▪ at least 13 schools

MASBATE, MASBATE



LEGEND :

ENERGIZED

UNENERGIZED

1. Anas
2. Asid
3. B. Titong
4. Bagumbayan
5. Bantique
6. Bapor
7. Batuhan
8. Bayombon
9. Biyong
10. Bolo
11. Cagay
12. Cawayan Exterior
13. Cawayan Interior
14. Centro
15. Espinosa
16. F. Magallanes
17. Ibingay
18. Igang
19. Kalipay
20. Kinamaligan
21. Malinta
22. Mapina
23. Mayngaran
24. Nursery
25. Pating
26. Pawa
27. Sinalongan
28. Tugbo
29. Ubongan Dacu
30. Usab

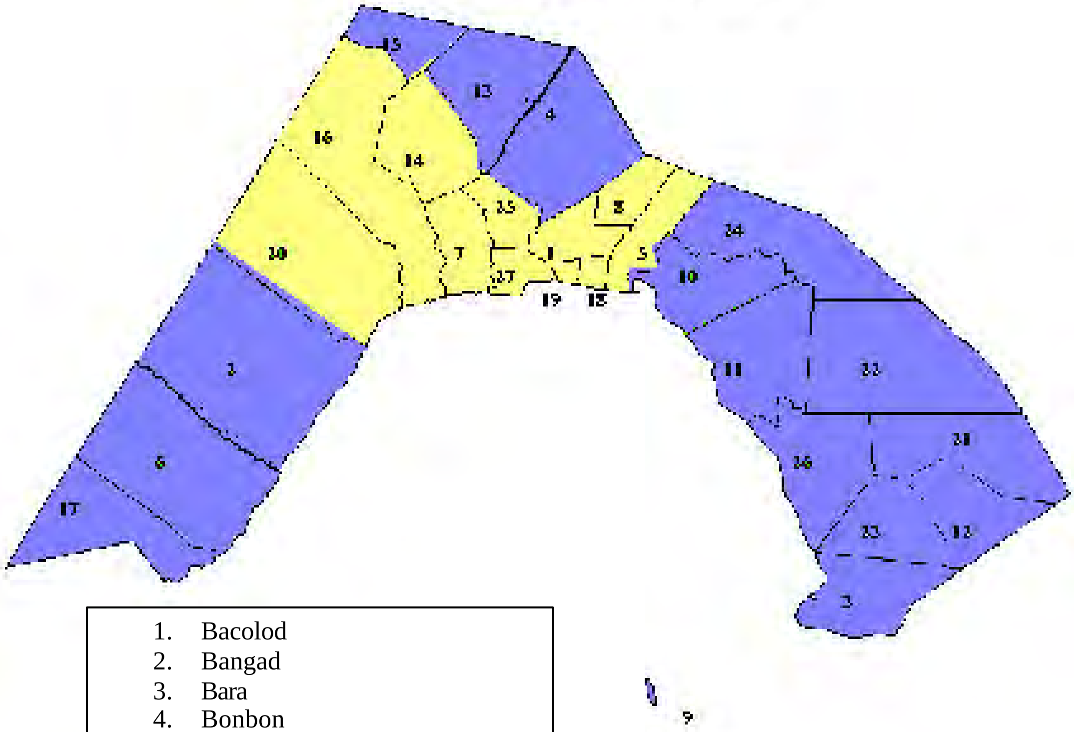
<table>
<tr><td colspan="2">MILAGROS, MASBATE
Market Package No. 13</td><td>1 of 2</td></tr>
<tr><td colspan="3">General Information</td></tr>
<tr><td colspan="2">Political Subdivisions
▪ Number of barangays
▪ Number of energized barangays
▪ Number of unenergized barangays</td><td>Twenty-seven (27) barangays
Eleven (11) barangay

Sixteen (16) barangays and these are

✓ Bangad
✓ Bara
✓ Bonbon
✓ Calumpang
✓ Guinlothangan Is.
✓ Jamorawon
✓ Magsalangi
✓ Matagbac
✓ Matanglad
✓ Mr. Espinosa
✓ Pamangpangon
✓ San Antonio
✓ San Carlos
✓ Sawmill
✓ Tagbon
✓ Tigbao</td></tr>
<tr><td colspan="2">Climate</td><td>▪ No very pronounced maximum rain period, with a short dry season
▪ Climatological Data (1998)
✓ Total rainfall : 1462.7 mm
✓ No. of rainy days : 147 days
✓ Ave. Temperature : 29.6 ^{0}C</td></tr>
<tr><td colspan="3">Demographic Profile</td></tr>
<tr><td colspan="2">Household Population (1995)</td><td>▪ 3,298 Households</td></tr>
<tr><td colspan="2">Projected HH Population (2000)</td><td>▪ 3,823 Households</td></tr>
<tr><td colspan="2">Ave. Annual Pop'n Growth Rate</td><td>▪ 3.0 (1990 - 1995)</td></tr>
<tr><td colspan="2">Ave. HH Size</td><td>▪ 5.3 persons</td></tr>
<tr><td colspan="2">Population Density (1995)</td><td>▪ 7.48 HH/km^2</td></tr>
<tr><td colspan="3">Macro-economic Indicators</td></tr>
<tr><td colspan="2">Ave. Annual HH Income</td><td>▪ PhP 46,835.97</td></tr>
<tr><td colspan="2">Ave. Annual HH Expenditures</td><td>▪ PhP 33,682.81</td></tr>
<tr><td colspan="2">Ave. Annual HH Disp.Income</td><td>▪ PhP 13,153.16</td></tr>
<tr><td colspan="2">Ave. HH Energy Expenditures</td><td>▪ PhP 147.38/month</td></tr>
<tr><td colspan="2">Municipality Income Class</td><td>▪ Third Class</td></tr>
<tr><td colspan="3">Natural Resources</td></tr>
<tr><td colspan="2">Land Area</td><td>▪ 565.40 km^2</td></tr>
<tr><td colspan="2">Land Capability Slope Distribution (Topography)</td><td>▪ 0 - 3% : 44.72% (level to nearly level)
▪ 3 - 5% : 17.07% (very gently sloping)
▪ 5 - 8% : 17.07% (Gently sloping)
▪ 8 - 15% : 17.11% (Moderately sloping)
▪ 15 - 25% : 11.07% (Strongly sloping)</td></tr>
</table>

MILAGROS, MASBATE Market Package No. 13		2 of 2
Land Use	▪ Pasture lands : 402 km^2 ▪ Irrigated Lands : 15.3 km^2	
Renewable Energy Resources		
Solar Energy	▪ 6 $kWhr/m^2/day$	
Wind Energy ✓ Wind power density ✓ Wind Speed	 ▪ 200-300 W/m^2 ▪ 5.6 - 6.4 m/s	
Hydro Power	▪ 50 Watts	
Economic Activities		
Predominant Economic Activities	▪ Farming	
Coconut ▪ Total Number of trees ▪ Ave. nut prod/tree/year ▪ Number of coco farms ▪ Average farm size	 ▪ 422,291 ▪ 20 ▪ 1127 ▪ 3.20 hectares	
Trade ▪ Industry Sector ▪ Services Sector	No. of establishments ▪ 35 ▪ 7	
Other Livelihood Activities	▪ Copra processing ▪ Ginger production ▪ Fish processing (drying)	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge	 ▪ MASELCO ▪ 41% ▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr) ▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr) ▪ No data ▪ PhP 3.8154/kWhr	
Social Services		
Education (Schools)	at least 15 schools	

MILAGROS, MASBATE



1. Bacolod
2. Bangad
3. Bara
4. Bonbon
5. Calasuche
6. Calumpang
7. Capaculan
8. Cayabon
9. Guinluthangan
10. Jamorawon
11. Magsalangi
12. Matagbac
13. Matanglad
14. Matiporon
15. Moises R. Espinosa
16. Narangasan
17. Pamangpangon
18. Poblacion East
19. Poblacion West
20. Paraiso (Potot)
21. San Antonio
22. San Carlos
23. Sawmill
24. Tagbon
25. Tawad
26. Tigbao
27. Tinaclipan

LEGEND :

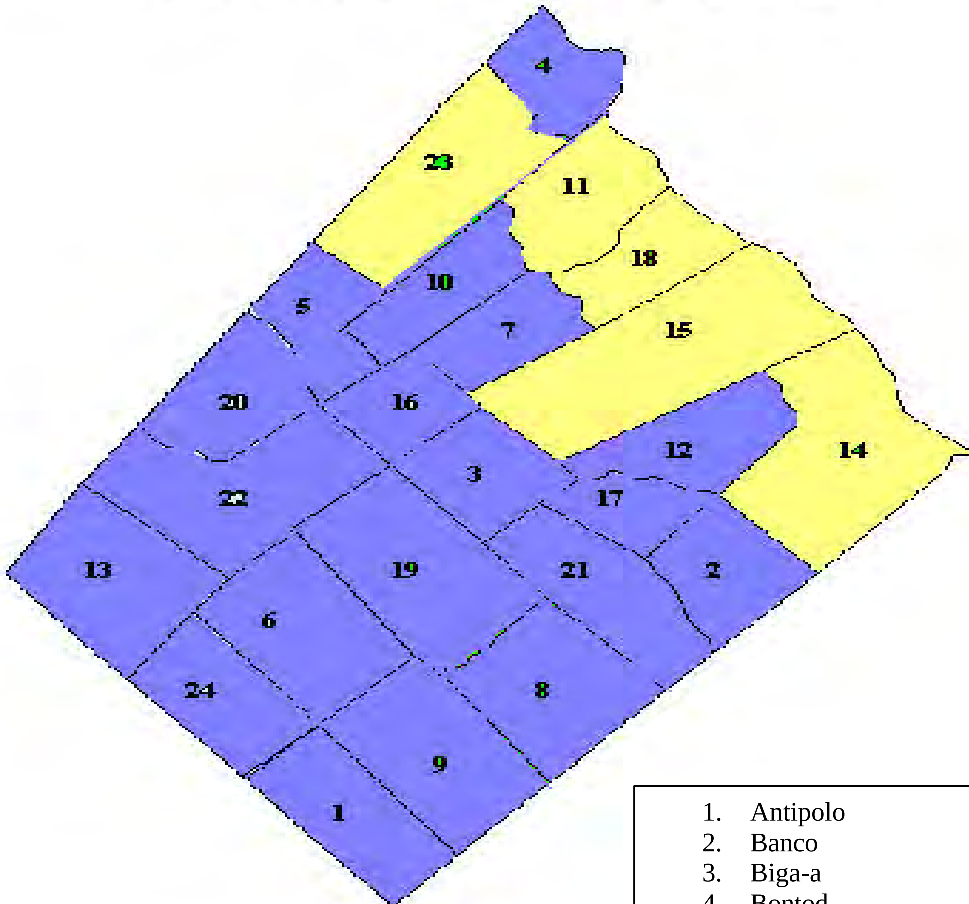
ENERGIZED

UNENERGIZED

PALANAS, MASBATE Market Package No. 14	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Twenty-four (24) barangays Six (6) barangays Eighteen (18) barangays and these are ✓ Antipolo ✓ Malatawan ✓ Banco ✓ Matugnao ✓ Bigaa ✓ Miyabas ✓ Bontod ✓ Parina ✓ Buenasuerte ✓ Pina ✓ Intosan ✓ Salvacion ✓ Maanahao ✓ San Antonio ✓ Libtong ✓ San Carlos ✓ Mabini ✓ San Isidro
Climate	▪ No very pronounced maximum rain period, with a short dry season ▪ Climatological Data (1998) ✓ Total rainfall : 1462.7 mm ✓ No. of rainy days : 147 days ✓ Ave. Temperature : 29.6^{0}C
Demographic Profile	
Household Population (1995)	▪ 2,630 Households
Projected HH Population (2000)	▪ 2,833 Households
Ave. Annual Pop'n Growth Rate	▪ 1.5 (1990 - 1995)
Ave. HH Size	▪ 4.8 persons
Population Density	▪ 15.37 HH/km^2
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 43,913.09
Ave. Annual HH Expenditures	▪ PhP 38,167.39
Ave. Annual HH Disp.Income	▪ PhP 5,745.70
Ave. HH Energy Expenditures	▪ PhP 157.59/month
Municipality Income Class	▪ Fifth Class
Natural Resources	
Land Area	▪ 171.10 km^2
Land Capability Slope Distribution	▪ 0 - 3% : --- ▪ 3 - 5% : 49.00% (very gently sloping) ▪ 5 - 8% : 29.00% (Gently sloping) ▪ 8 - 15% : 18.00% (Moderately sloping) ▪ 15 - 25% : 4.00% (Strongly sloping)

PALANAS, MASBATE Market Package No. 14		2of 2
Renewable Energy Resources		
Solar Energy	▪ 6 kWhr/m^2/day	
Wind Energy ✓ Wind power density ✓ Wind Speed	 ▪ 200-400 W/m^2 ▪ 5.6 - 7.0 m/s	
Hydro Power	▪ 50 - 100 Watts	
Economic Activities		
Predominant Economic Activities	▪ Farming	
Coconut ▪ Total Number of trees ▪ Ave. nut prod/tree/year ▪ Number of coco farms ▪ Average farm size	 ▪ 1,201,750 ▪ 20 ▪ 5,205 ▪ 2.00 hectares	
Trade ▪ Industry Sector ▪ Services Sector	No. of establishments ▪ 15 ▪ 4	
Other Livelihood Activities	▪ Mat weaving ▪ Bamboo furniture making ▪ Livestock	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge	 ▪ MASELCO ▪ 25 % ▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr) ▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr) ▪ No data ▪ PhP 3.8154/kWhr	
Social Services		
Education (Schools)	▪ at least 31 schools	

PALANAS, MASBATE



1. Antipolo
2. Banco
3. Biga-a
4. Bontod
5. Buenasuerte
6. Intusan
7. Jose A. Abenir Sr. (Libtong)
8. Maanahao
9. Mabini
10. Malibas
11. Marvilla
12. Matugnao
13. Miabas
14. Nabangig
15. Nipa
16. Parina
17. Pina
18. Poblacion
19. Salvacion
20. San Antonio
21. San Carlos
22. San Isidro
23. Santa Cruz
24. Malatawan

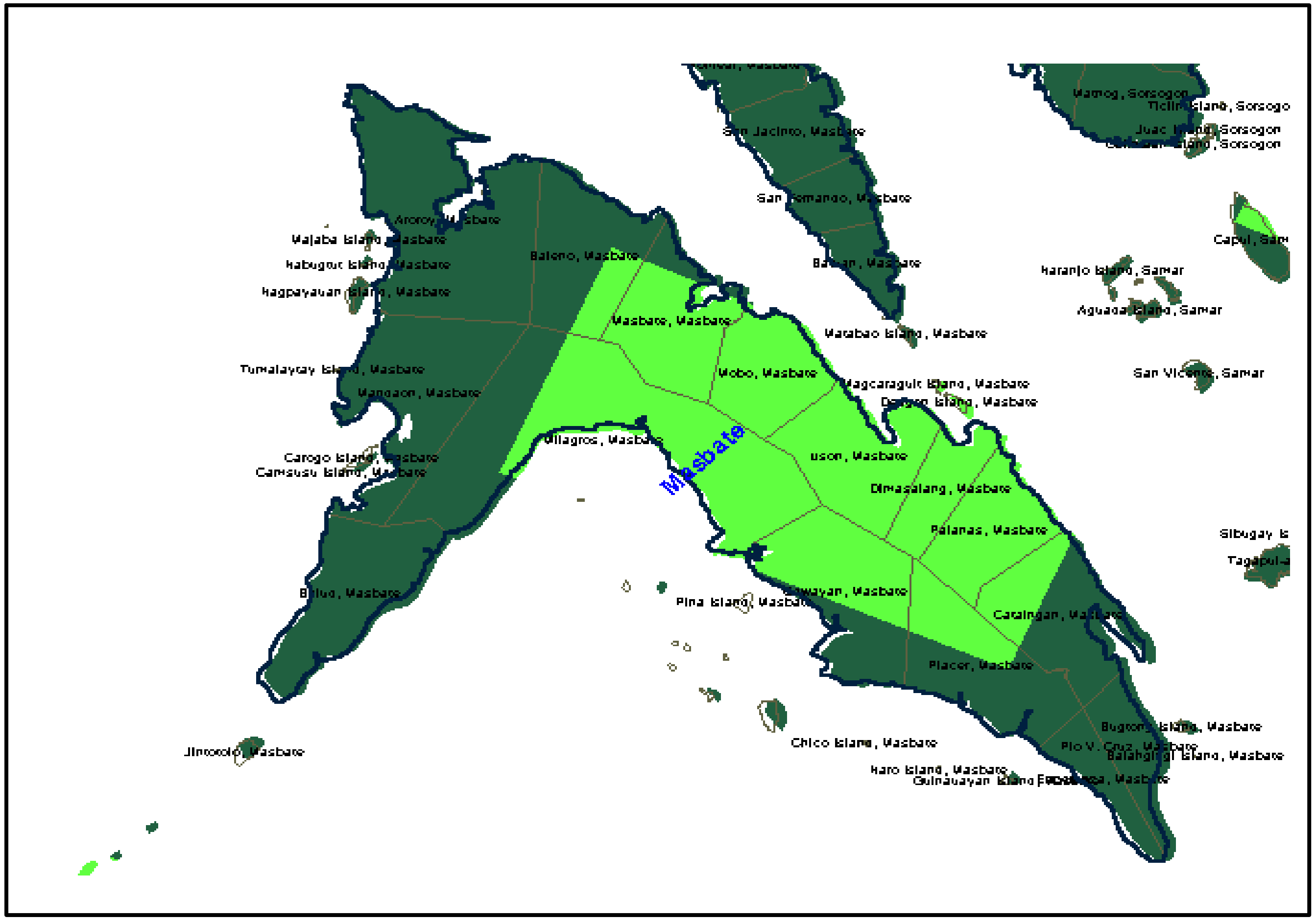
LEGEND

ENERGIZED

UNENERGIZED

ESRI ArcExplorer 2.0

Solar Energy Potential (Masbate)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

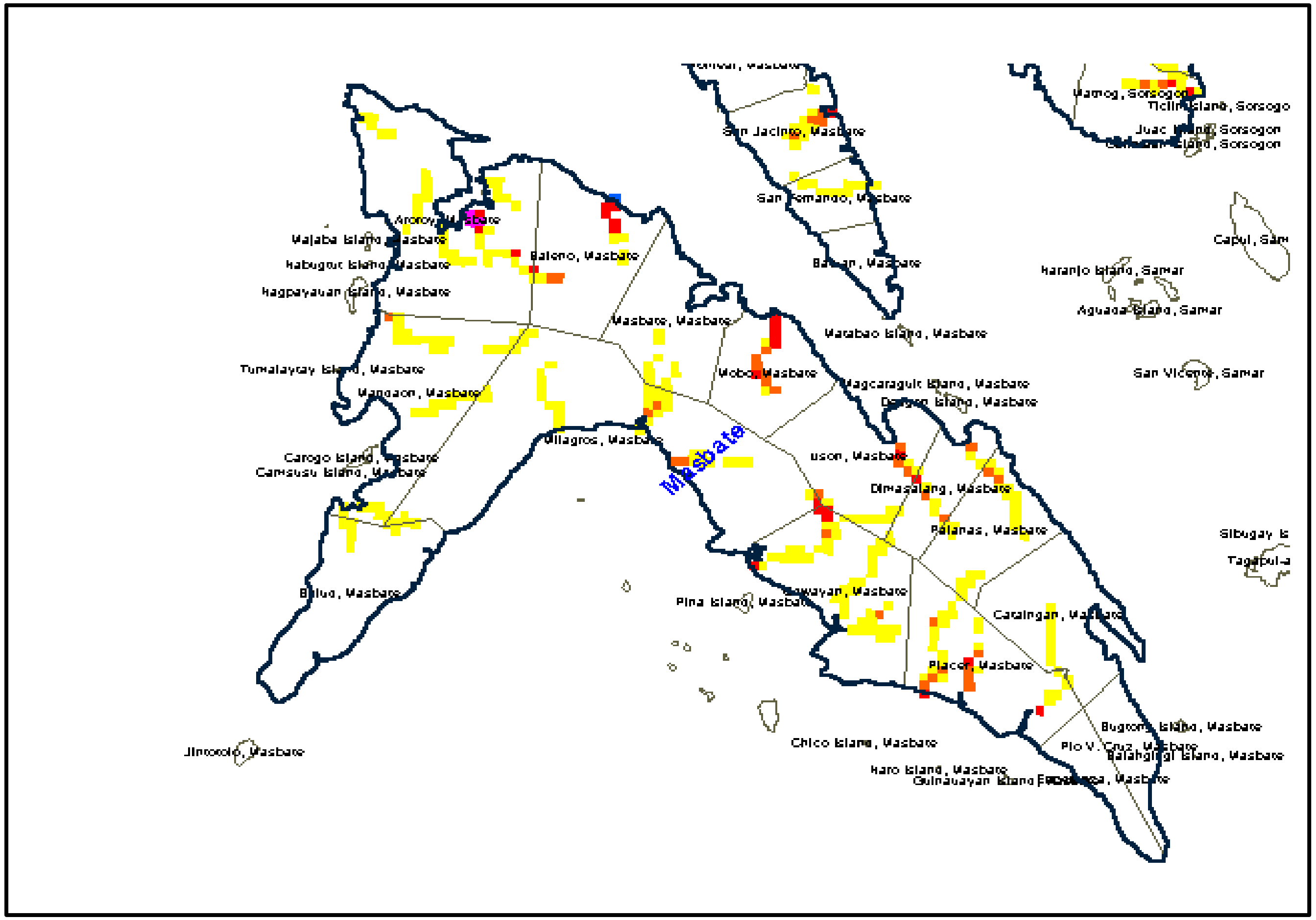
5

6

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Hydro Potential (Masbate)



	provbnd (PROVBND)
	municipalities (MUNICIPAL)

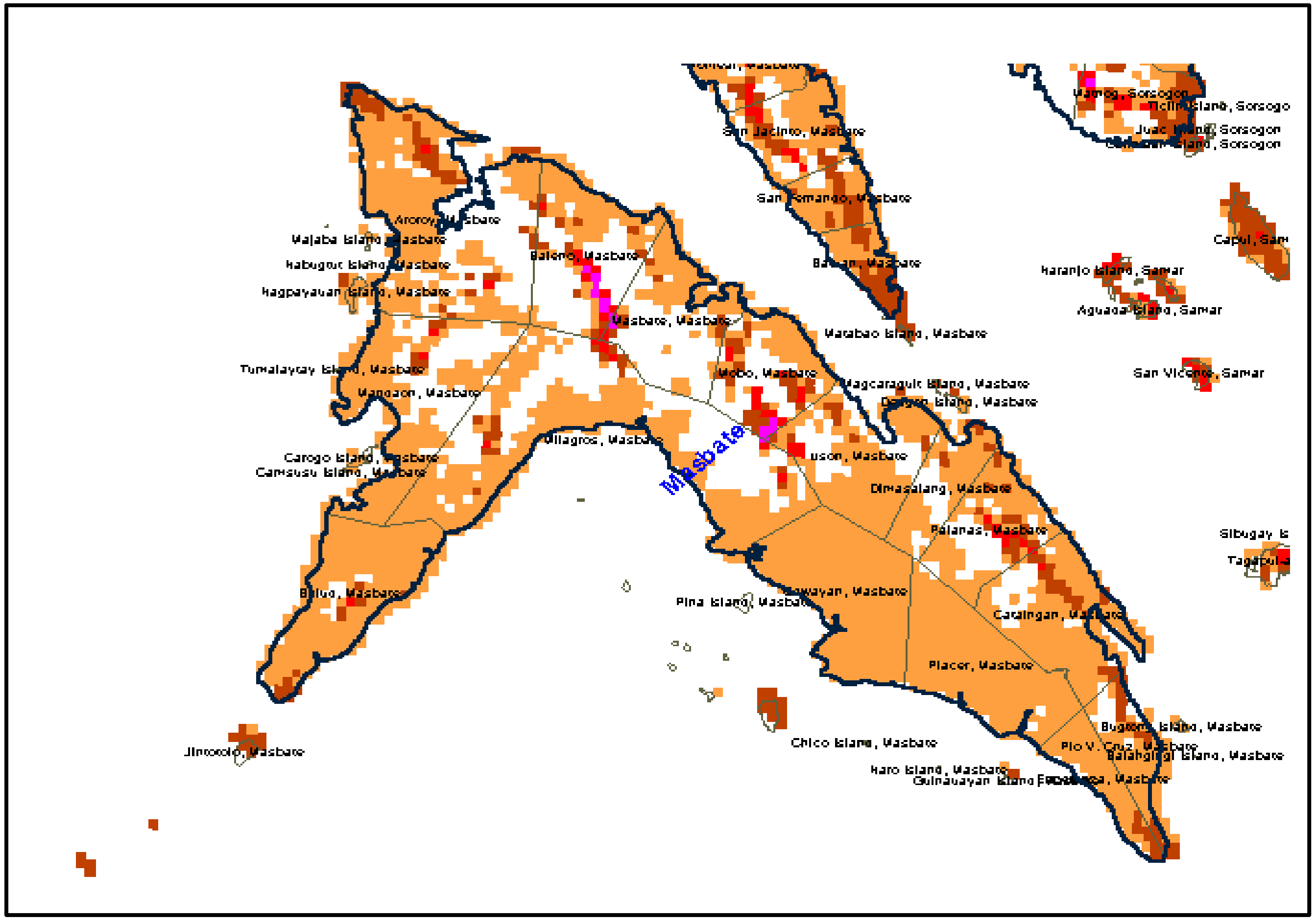
Hydro Potential 100% Efficiency (AE)

- 0
- 50
- 100
- 300
- 500
- 1500

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Wind energy Potential (Masbate)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

0
100
200
300
400
600
1200

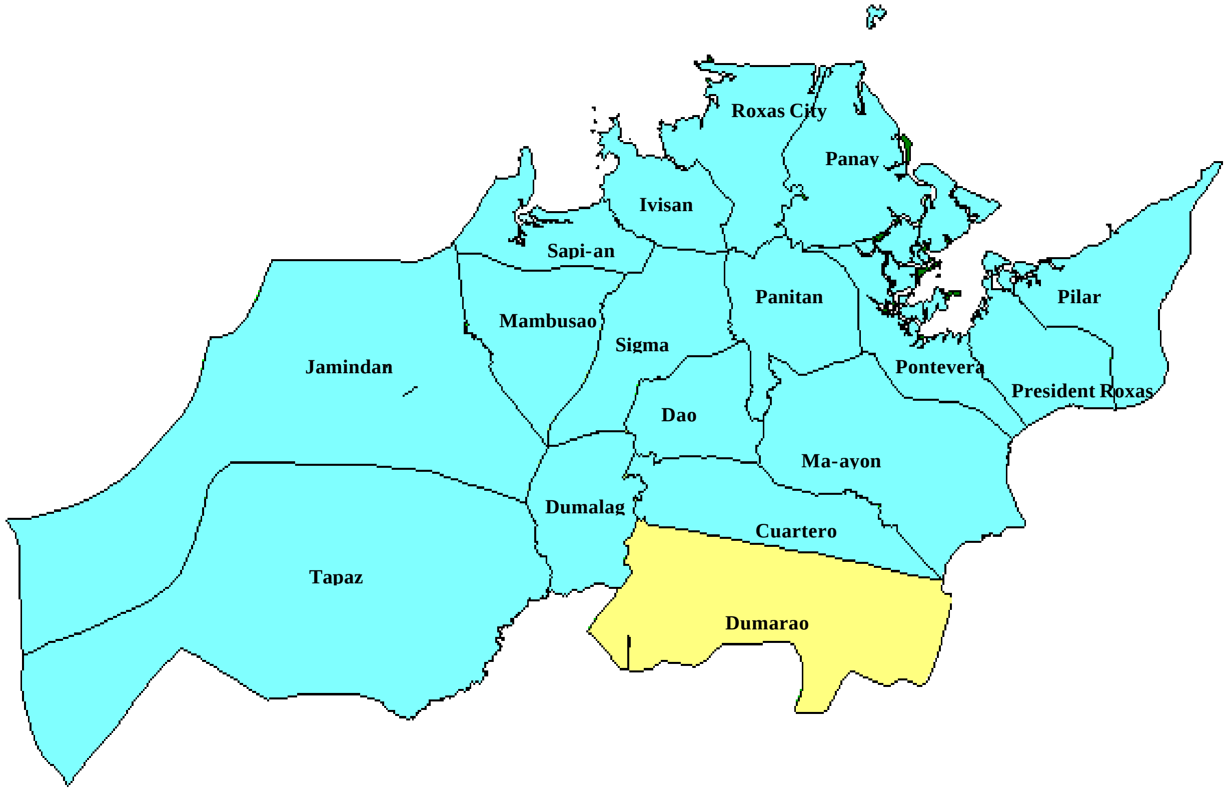
N

Tuesday, Jul 17 2001

MARKET PACKAGES
Capiz

M.P. # 15 : Dumarao

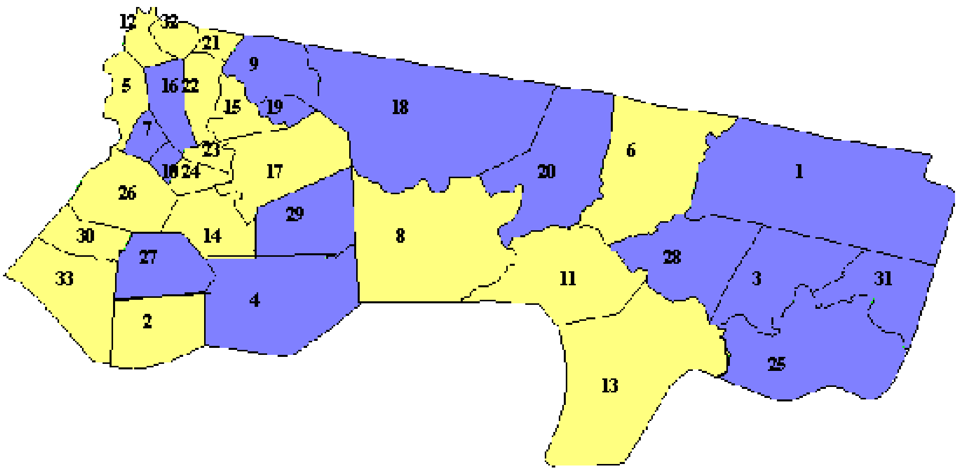
Capiz


Roxas City
Panay
Ivisan
Sapi-an
Pilar
Panitan
Mambusao
Sigma
Jamindan
Pontevera
President Roxas
Dao
Ma-ayon
Dumalag
Cuartero
Tapaz
Dumarao

DUMARAO, CAPIZ Market Package No. 15	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Thrity-three (33) barangays Eighteen (18) barangays Fifteen (15) barangays and these are ✓ Agbatuan ✓ Aglanot ✓ Agsirab ✓ Bayog ✓ Calapawan ✓ Cubi ✓ Jambad ✓ Lawaan ✓ Maloloy ✓ Nagsulang ✓ Sagrada Familia ✓ San Juan ✓ Sibariwan ✓ Tina ✓ Tumalalud
Demographic Profile	
Household Population (1995)	▪ 2,547 Households
Projected HH Population (2000)	▪ 2,633 Households
Ave. Annual Pop'n Growth Rate	▪ 0.67%
Population Density (1995)	▪ 10.88 HH/km^2
Ave. HH Size	▪ 5.00 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 42,811.50
Ave. Annual HH Expenditures	▪ PhP 25,424.10
Ave. Annual HH Disp. Income	▪ PhP17,387.40
Ave. HH Energy Expenditures	▪ PhP 115.46/month
Municipality Income Class	▪ Fourth (4^{th}) Class
Natural Resources	
Land Area (DILG)	▪ 234.2 km^2
Land Capability Slope Distribution (Topography)	▪ Upland
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 200 - 300 W/m^2
Hydro Power Potential	50 - 100 Watts

DUMARAO, CAPIZ Market Package No. 15		2 of 2
Economic Activities		
Predominant Economic Activities	▪ Farming	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ CAPELCO ▪ 55 % ▪ PhP 45.96 for first 13 kWhr PhP 3.5354/kWhr (in excess of 13 kWhr) ▪ PhP 107.56 for first 30 kWhr PhP 3.5854/kWhr (in excess of 30 kWhr) ▪ PhP 14.00/kW ▪ PhP 3.4854/kWhr ▪ PhP 16,461,929.00 (excluding Sagrada Familia)	
Social Services		
Education (Schools)	▪ At least 15 schools	

DUMARAO, CAPIZ



1. Agbatuan
2. Aglalana
3. Aglanot
4. Agsirat
5. Alipasiawan
6. Astorga
7. Bayog
8. Bungsuan
9. Calapawan
10. Cubi
11. Dacuton
12. Dangula
13. Gibato
14. Codingle
15. Guinotos
16. Jambad
17. Janguslob
18. Lawaan
19. Malonoy
20. Nagsulang
21. Ongol Ilawod
22. Ongol Ilaya
23. Poblacion Ilawod
24. Poblacion Ilaya
25. Sagrada Familia
26. Salcedo
27. San Juan
28. Sibariwan
29. Tamulalud
30. Taslan
31. Tina
32. Tinaytayan
33. Traciano

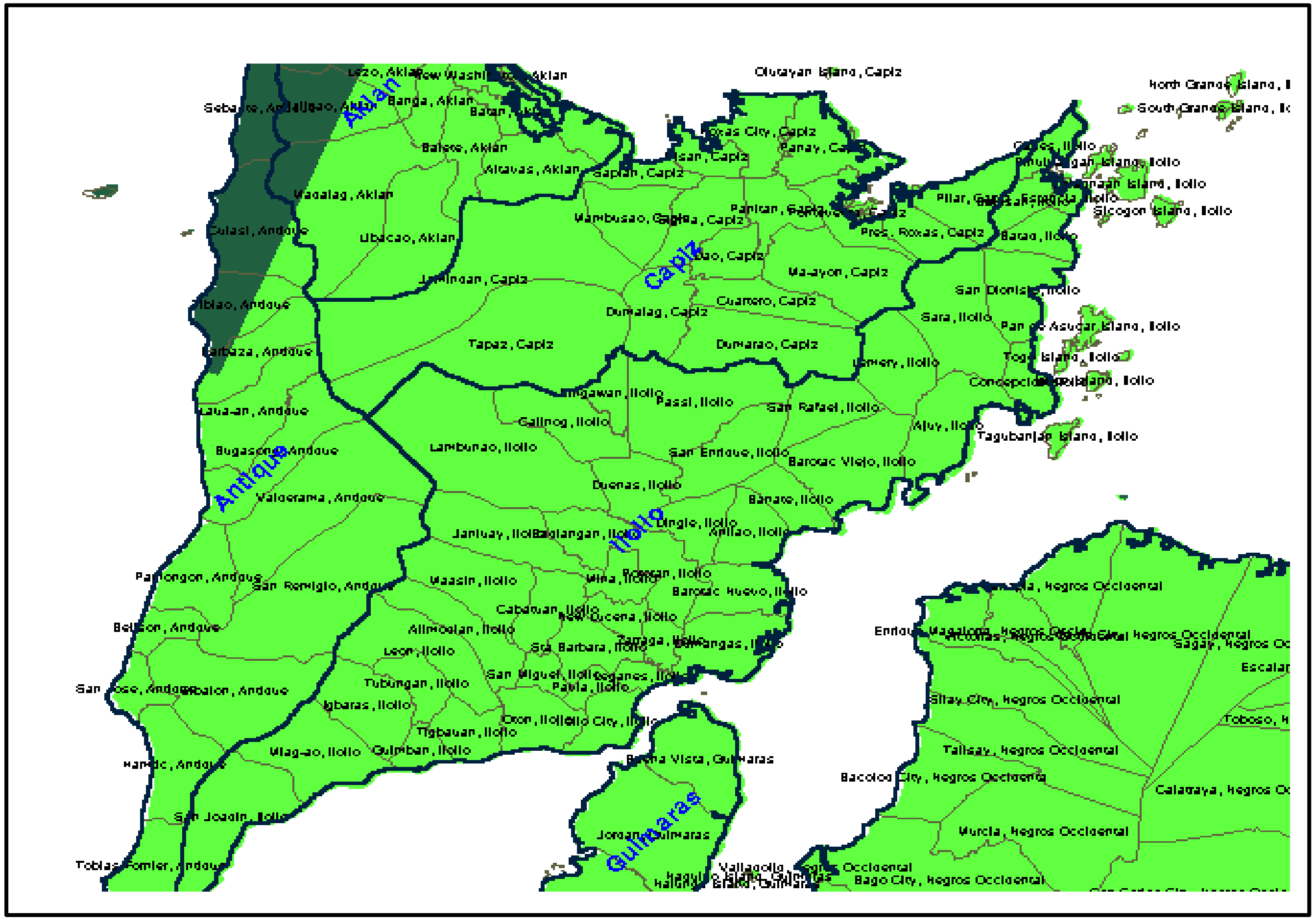
LEGEND :

ENERGIZED

UNENERGIZED

ESRI ArcExplorer 2.0

Solar Energy Potential (Capiz, Iloilo)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

5

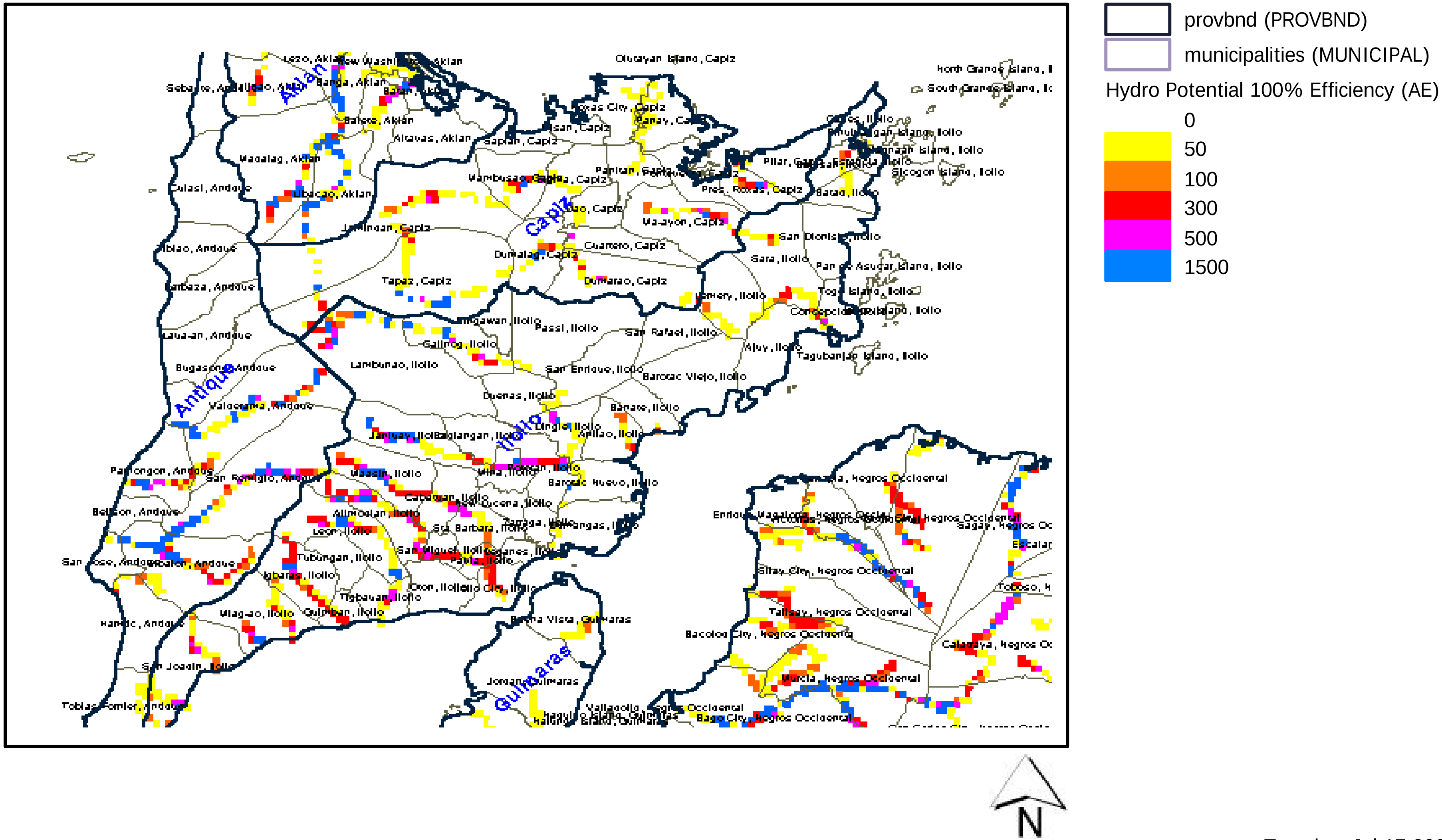
6

N

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

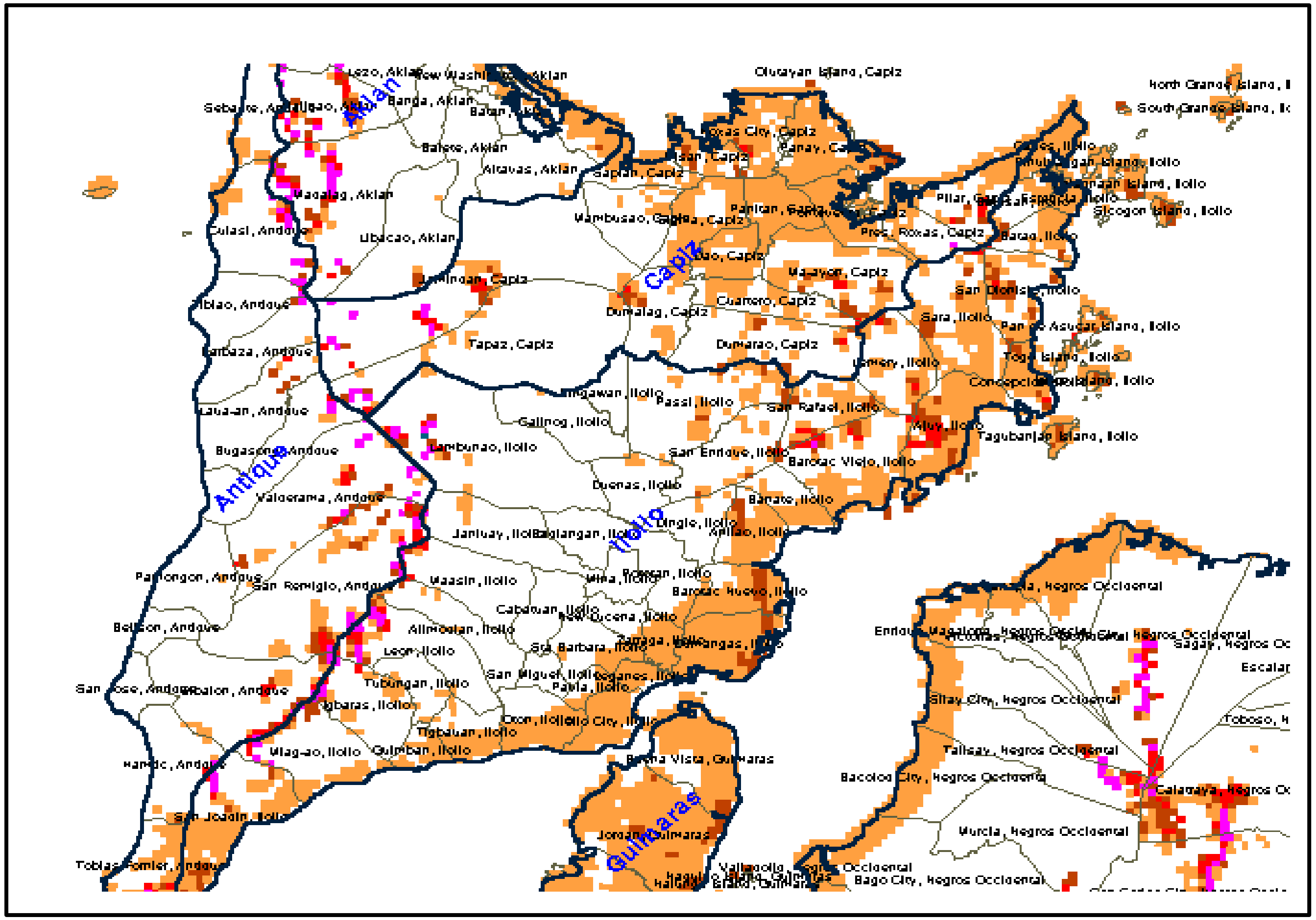
Hydro Potential (Capiz, Iloilo)



Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Wind Potential (Capiz, Iloilo)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

0
100
200
300
400
600
1200

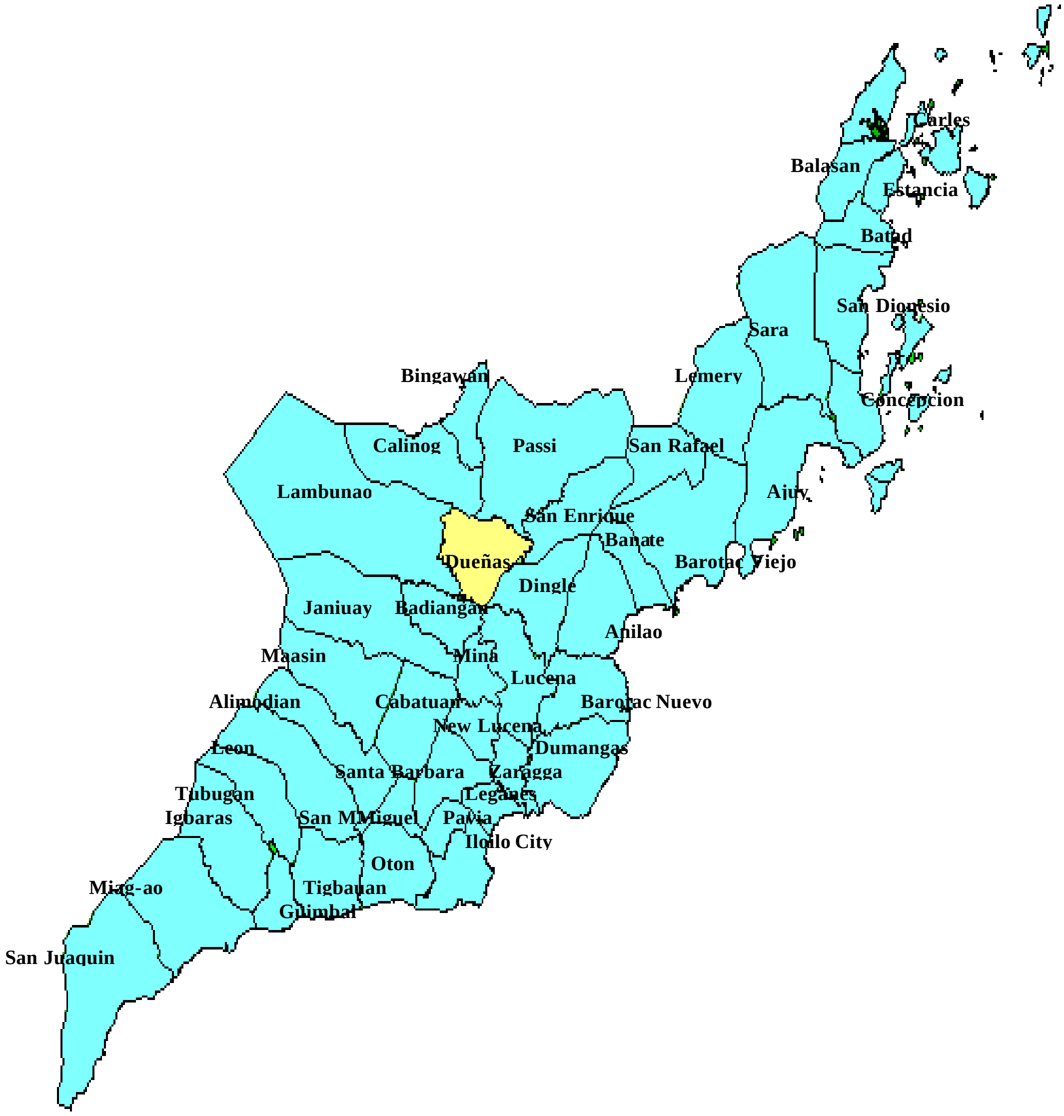
N

Tuesday, Jul 17 2001

MARKET PACKAGES
Iloilo

M.P. # 16 : Dueñas

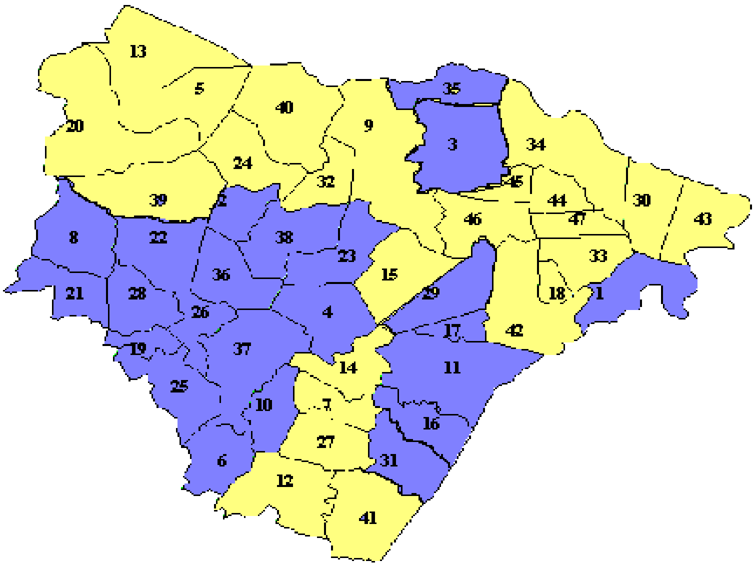
Iloilo


Carles
Balasan
Estancia
Batad
San Dionesio
Sara
Bingawan
Lemery
Concepcion
Calinog
Passi
San Rafael
Lambunao
Ajuy
San Enrique
Banate
Dueñas
Barotac Viejo
Dingle
Janiuay
Badiangan
Anilao
Maasin
Mina
Lucena
Alimodian
Cabatuan
Barotac Nuevo
New Lucena
Leon
Dumangas
Santa Barbara
Zaragga
Tubugan
Leganes
Igbaras
San MMiguel
Pavia
Iloilo City
Oton
Miag-ao
Tigbauan
Guimbal
San Juaquin

DUEÑAS, ILOILO Market Package No. 16	
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Forty-seven (47) barangays Twenty-four (24) barangays Twenty-three (23) barangays and these are ✓ Agutayan ✓ Angare ✓ Anjawan ✓ Baac ✓ Balangigan ✓ Banugan ✓ Bita ✓ Buenavista ✓ Calawinan ✓ Capay-capay ✓ Catig ✓ Fundacion ✓ Inadlawan ✓ Jagdon ✓ Lacadon ✓ Luag ✓ Maribuyong ✓ Minanga ✓ Navalas ✓ Punung P. ✓ Purog ✓ Romblon ✓ San Isidro
Demographic Profile	
Household Population (1995)	▪ 2,110 Households
Projected HH Population (2000)	▪ 2,151 Households
Ave. Annual Pop'n Growth Rate	▪ 0.34 %
Population Density (1995)	▪ 23.31HH/km^2
Ave. HH Size	▪ 5.29 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 39,839.05
Ave. Annual HH Expenditures	▪ PhP 29,349.95
Ave. Annual HH Disp. Income	▪ PhP 10,489.10
Ave. HH Energy Expenditures	▪ PhP 80.88/month
Municipality Income Class	▪ Fourth(4th) Class
Natural Resources	
Land Area (DILG)	▪ 90.5 km^2
Land Capability Slope Distribution (Topography)	▪ Inland
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 200 W/m^2
Hydro Power	no data

DUEÑAS, ILOILO Market Package No. 16		2of 2
Economic Activities		
▪ Predominant Economic Activities	▪ Farming	
▪ Other Livelihood Activities	▪ Bamboo furniture making	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ ILECO II ▪ 51 % ▪ PhP 58.87 for first 15 kWhr PhP 3.9249/kWhr (in excess of 15 kWhr) ▪ PhP 59.62 for first 15 kWhr PhP 3.9749/kWhr (in excess of 15 kWhr) ▪ PhP 10.00/kW ▪ PhP 3.9409/kWhr ▪ PhP 20,671,549.00	
Social Services		
Education (Schools)	▪ At least 23 schools	

DUENAS, ILOILO



1. Agutayan
2. Angare
3. Anjawan
4. Baac
5. Bagonbong
6. Balangigan
7. Balingasag
8. Banugan
9. Batuan
10. Bita
11. Buenavista
12. Bugtungan
13. Cabudian
14. Calaca-an
15. Calang
16. Calawinan
17. Capaycapay
18. Capuling
19. Catig
20. Dilaan
21. Fundacion
22. Inadlawan
23. Jagdong
24. Jaguimit
25. Lacadon
26. Lu-ag
27. Malusgod
28. Maribuyong
29. Minanga
30. Monpon
31. Navalas
32. Pader
33. Pandan
34. Punong Grande
35. Punong Pequeno
36. Purog
37. Romblon
38. San Isidro
39. Santo Nino
40. Sawe
41. Taminla
42. Tinocuan
43. Tipolo
44. Poblacion A
45. Poblacion B
46. Poblacion C
47. Poblacion D

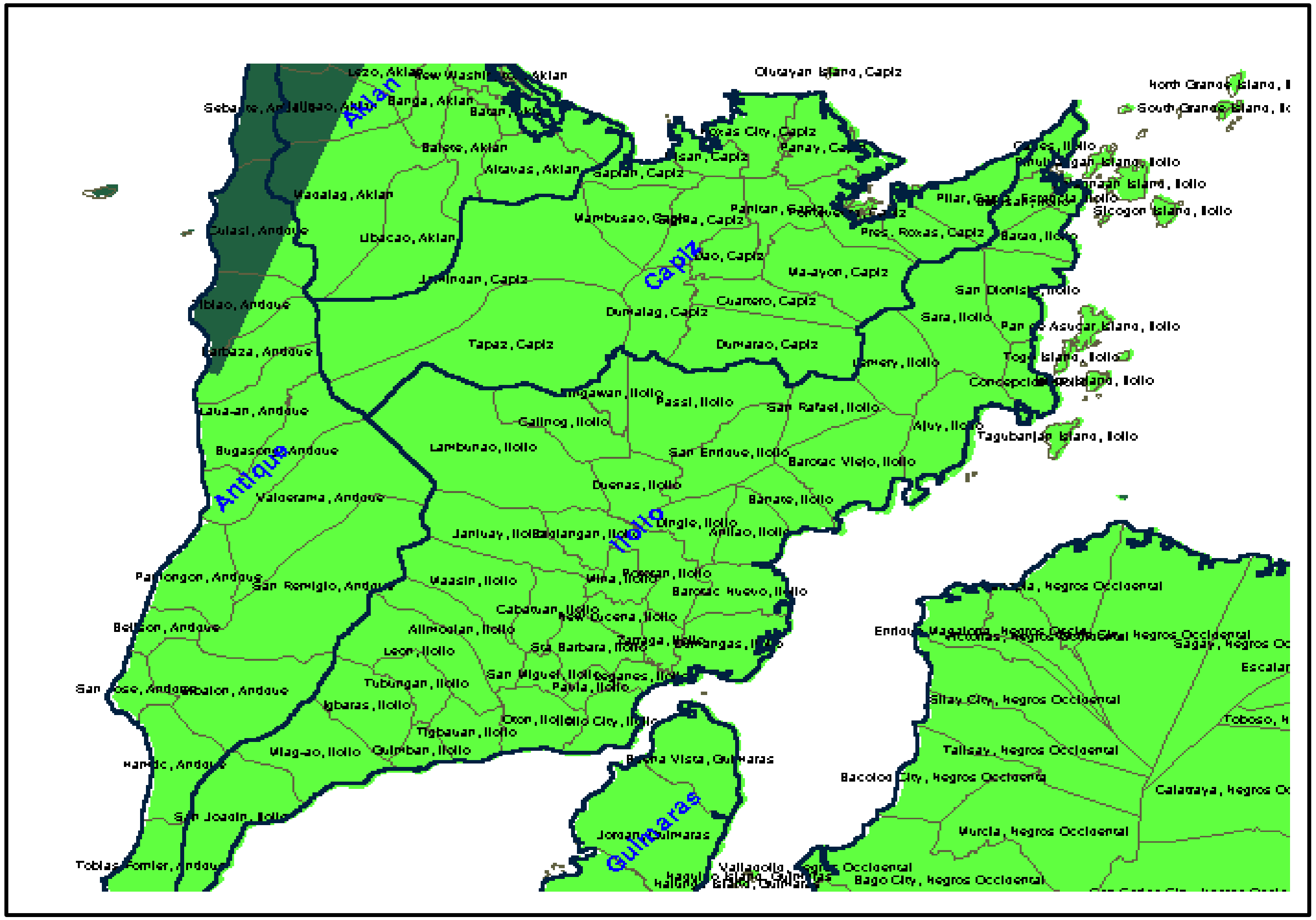
LEGEND :

ENERGIZED

UNENERGIZED

ESRI ArcExplorer 2.0

Solar Energy Potential (Capiz, Iloilo)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

5

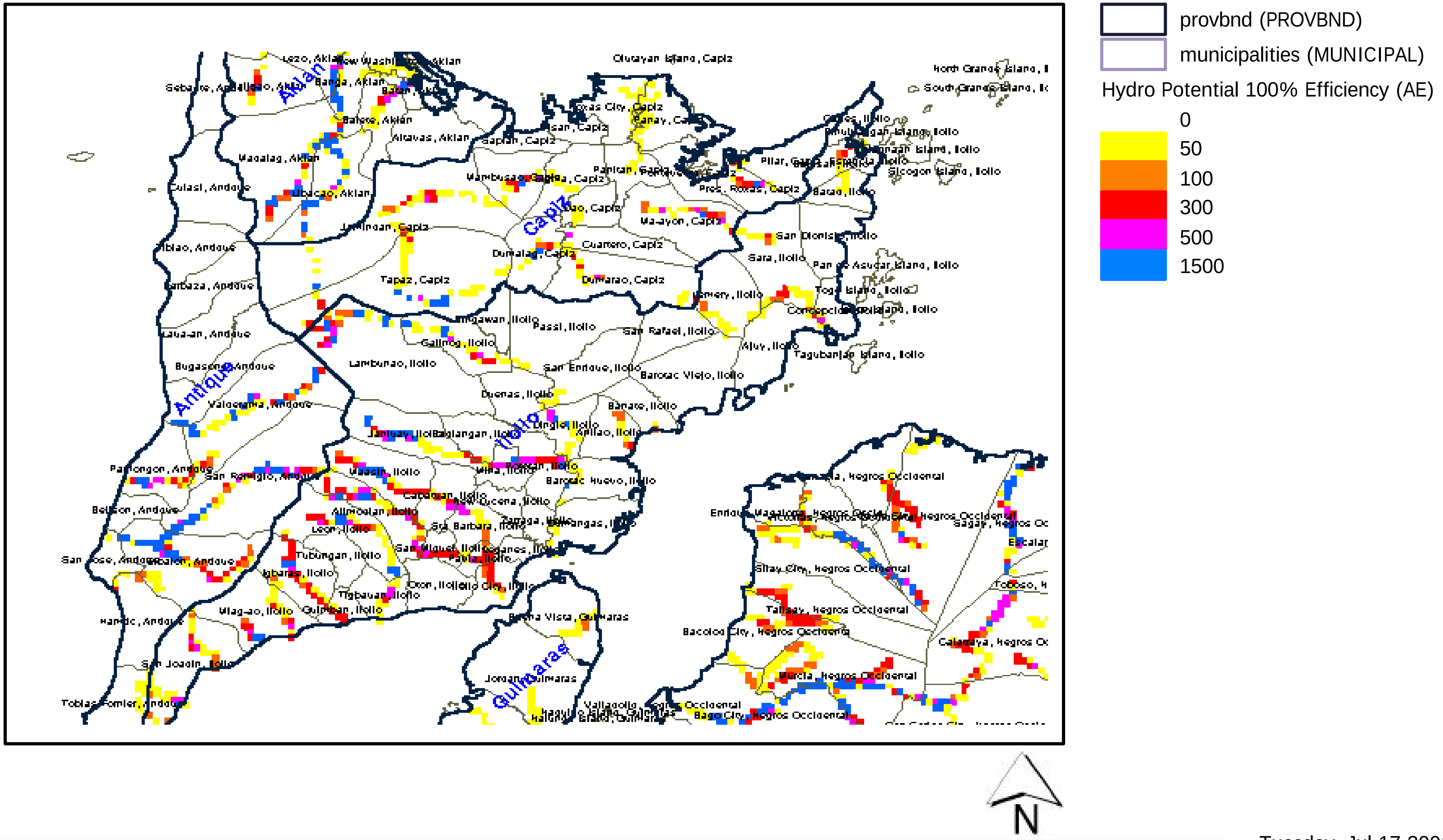
6

N

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

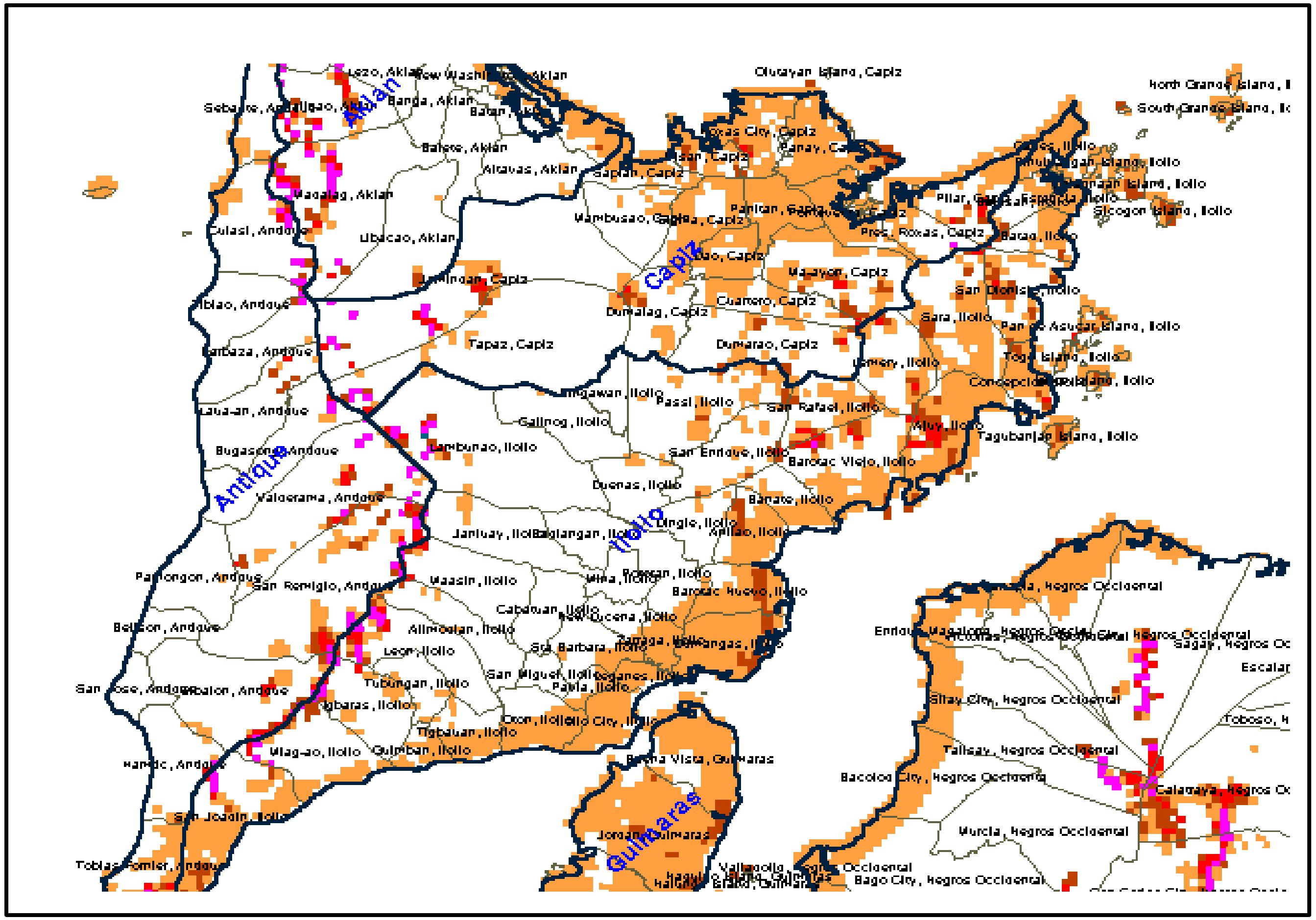
Hydro Potential (Capiz, Iloilo)



Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Wind Potential (Capiz, Iloilo)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

- 0
- 100
- 200
- 300
- 400
- 600
- 1200

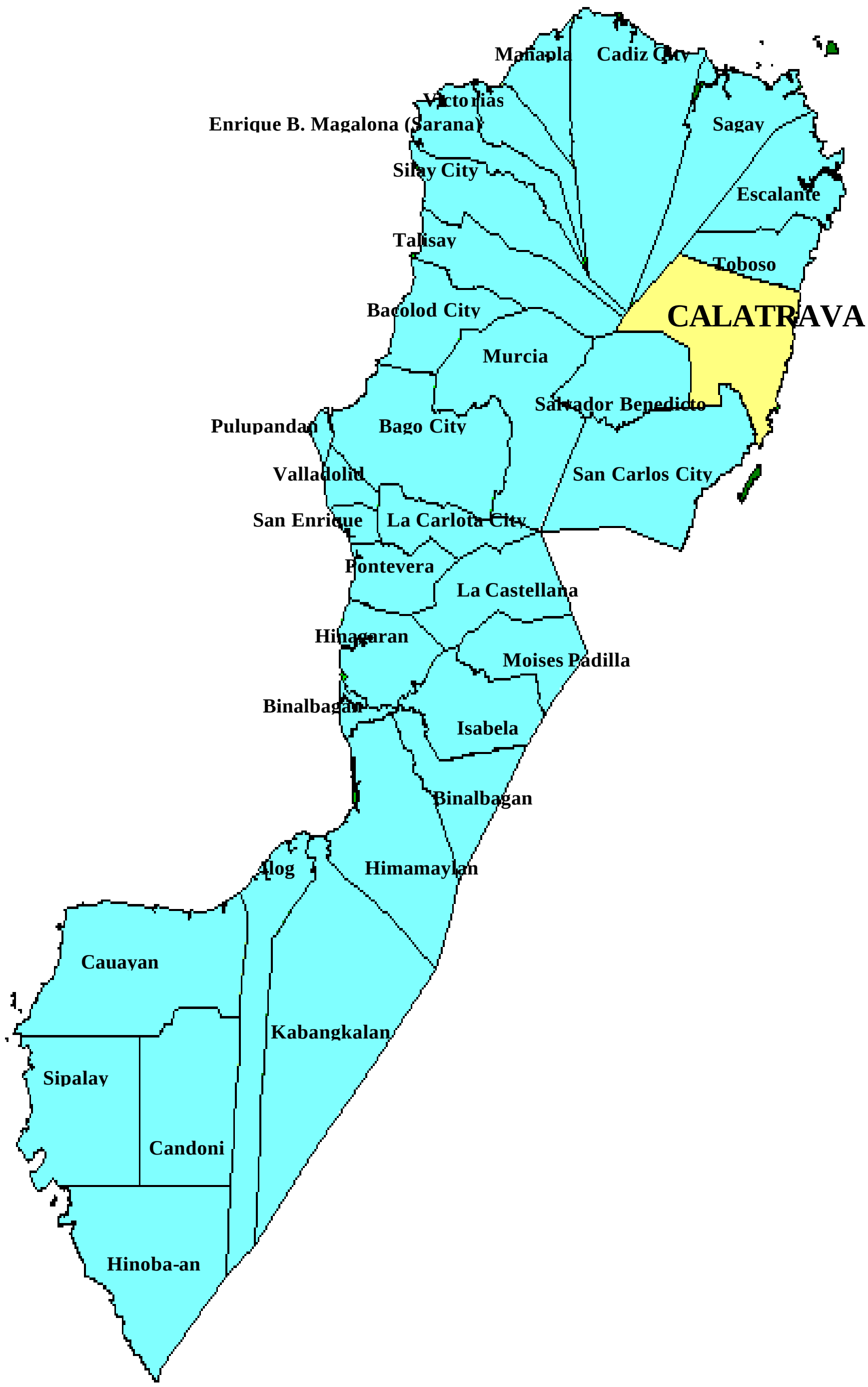
N

Tuesday, Jul 17 2001

MARKET PACKAGES
Negros Occidental

M.P. # 17 : Calatrava

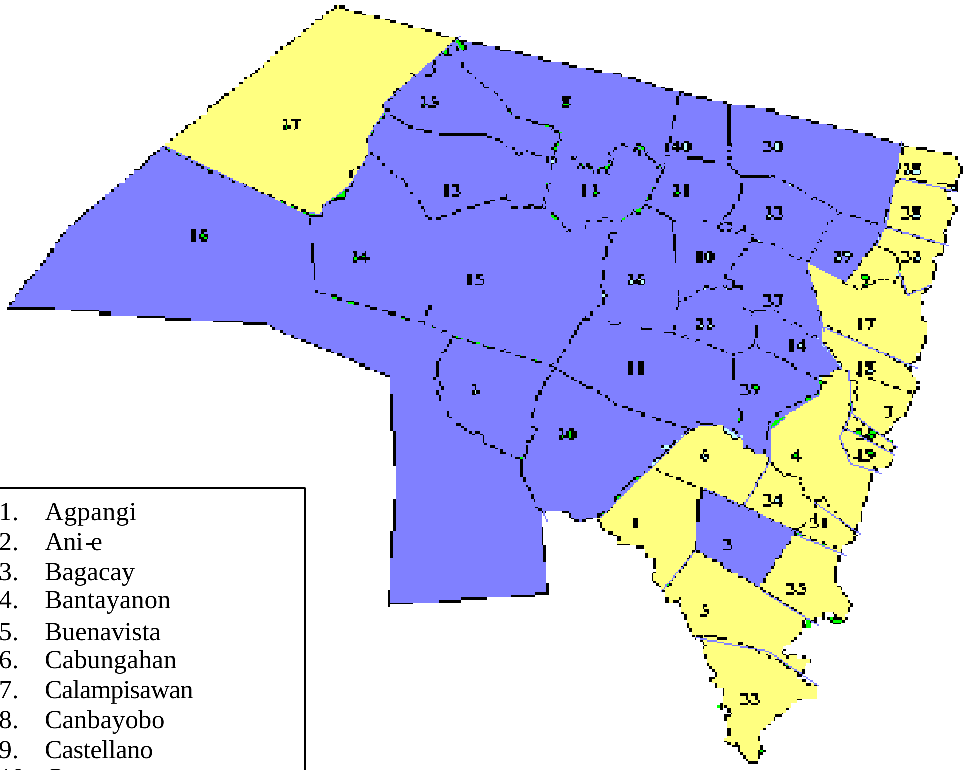
Negros Occidental



CALATRAVA, NEGROS OCCIDENTAL Market Package No. 17	
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Forty (40) barangays Twenty-two (22) barangays Eighteen (18) barangays and these are ✓ Ani-e ✓ Bagacay ✓ Cambayobo ✓ Cruz ✓ Dolis ✓ Hilub-ang ✓ Hinab-ungan ✓ Ilaya ✓ Lagaan ✓ Lalong ✓ Maaslob ✓ Malanog ✓ Mechaca ✓ Mina-utok ✓ Pantao ✓ Telim ✓ Tigbon ✓ Winaswasan
Demographic Profile	
Household Population (1995)	▪ 5,810 Households
Projected HH Population (2000)	▪ 6,804 Households
Ave. Annual Pop'n Growth Rate	▪ 3.21 %
Population Density (1995)	▪ 11.52 HH/km^2
Ave. HH Size	▪ 4.93 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 28,892.82
Ave. Annual HH Expenditures	▪ PhP 18,672.50
Ave. Annual HH Disp. Income	▪ PhP 10,220.32
Ave. HH Energy Expenditures	▪ PhP 107.51/month
Municipality Income Class	▪ Second (2nd) Class
Natural Resources	
Land Area (DILG)	▪ 504.5 km^2
Land Capability Slope Distribution (Topography)	▪ Mixed terrain - lowlands and uplands
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 100 - 600 W/m^2
Hydro Power	▪ 50 - 500 Watts

CALATRAVA, NEGROS OCCIDENTAL Market Package No. 17	2of 2
Economic Activities	
Predominant Economic Activities	▪ Farming and fishing
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ VRESCO ▪ 55 % ▪ PhP 37.36 for first 10 kWhr PhP 3.7356/kWhr (in excess of 10 kWhr) ▪ PhP 37.66 for first 10 kWhr PhP 3.7656/kWhr (in excess of 10 kWhr) ▪ PhP 15.00/kW ▪ PhP 3.7156/kWhr ▪ PhP 22,166,701.00
Social Services	
Education (Schools)	▪ At least 18 schools

CALATRAVA, NEGROS OCCIDENTAL



1. Agpangi
2. Ani-e
3. Bagacay
4. Bantayanon
5. Buenavista
6. Cabungahan
7. Calampisawan
8. Canbayobo
9. Castellano
10. Cruz
11. Dolis
12. Hilub-ang
13. Hinab-ongan
14. Ilaya
15. Laga-an
16. Lalong
17. Lemery
18. Lipat-on
19. Lo-ok
20. Ma-aslob
21. Macasilao
22. Malanog
23. Malatas
24. Marcelo
25. Mina-utok
26. Menchaca
27. Minapasok
28. Mahilum
29. Paghumayan
30. Pantao
31. Patun-an
32. Pinocutan
33. Refugio
34. San Benito
35. San Isidro
36. Suba (Poblacion)
37. Telim
38. Tigbao
39. Tigbon
40. Winaswasan

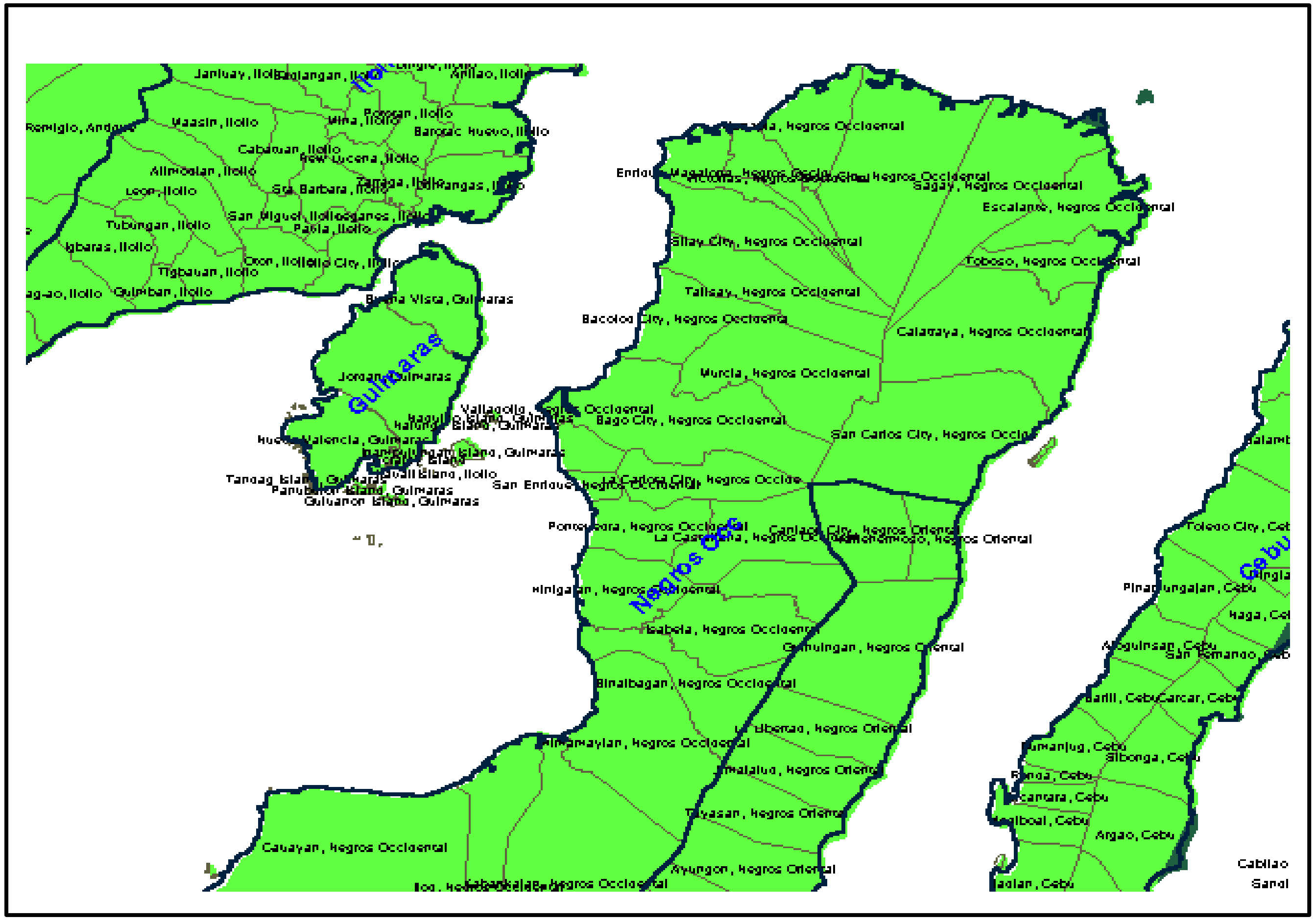
LEGEND :

ENERGIZED

UNENERGIZED

ESRI ArcExplorer 2.0

Solar Energy Potential (Negros Occidental)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

5

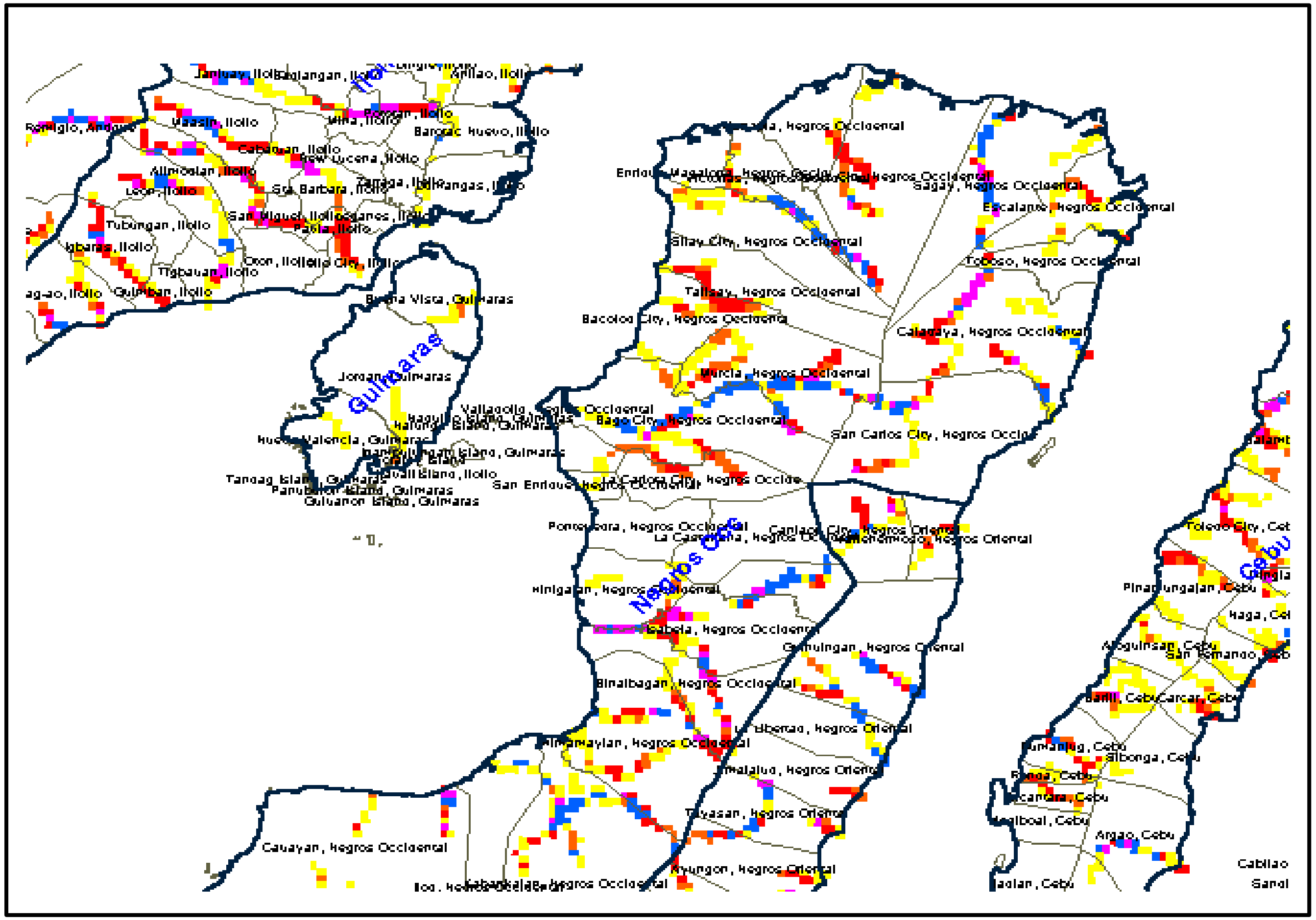
6

N

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Hydro Potential (Negros Occidental)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Hydro Potential 100% Efficiency (AE)

0

50

100

300

500

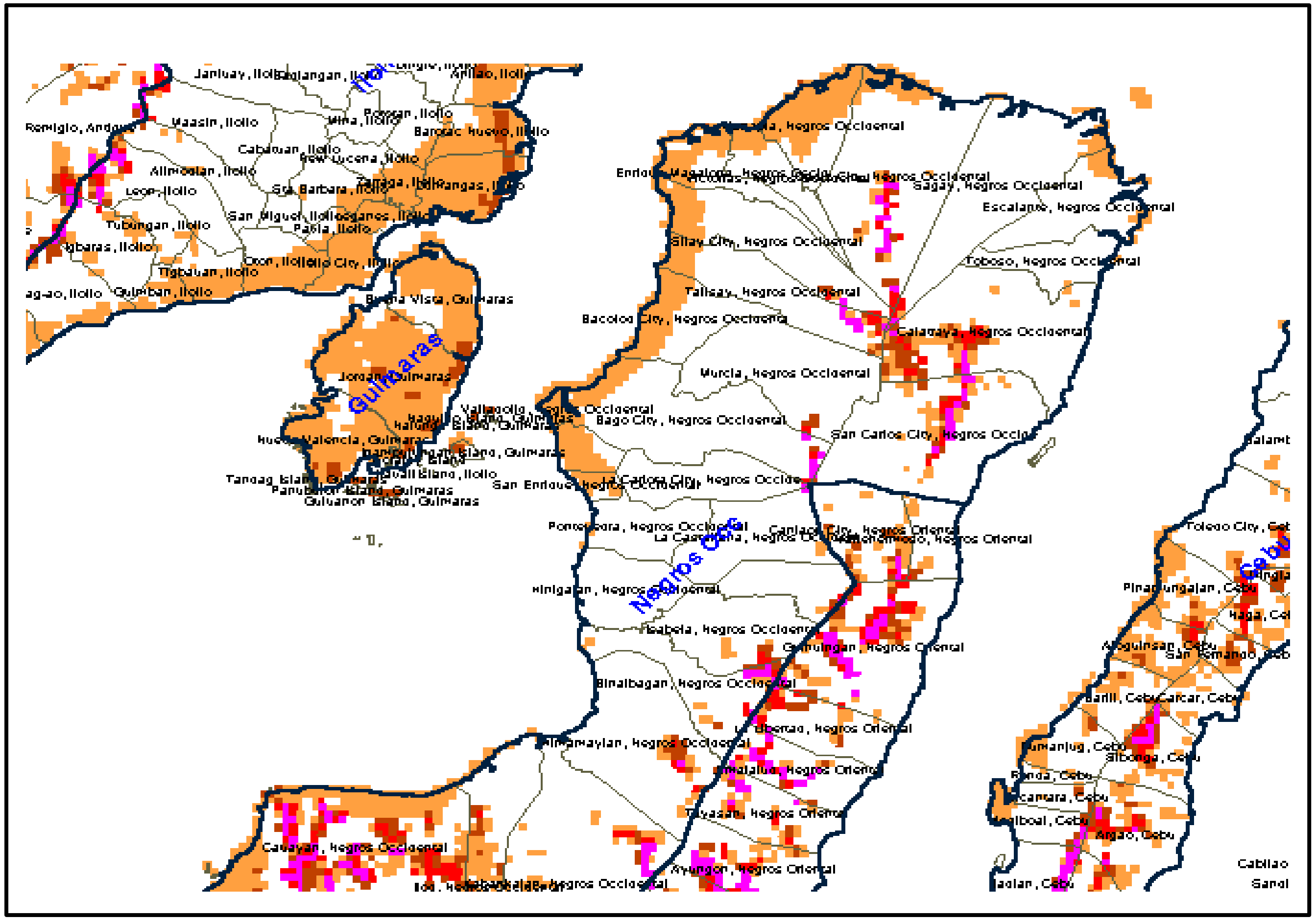
1500

N

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Wind Potential (Negros Occidental)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

0
100
200
300
400
600
1200

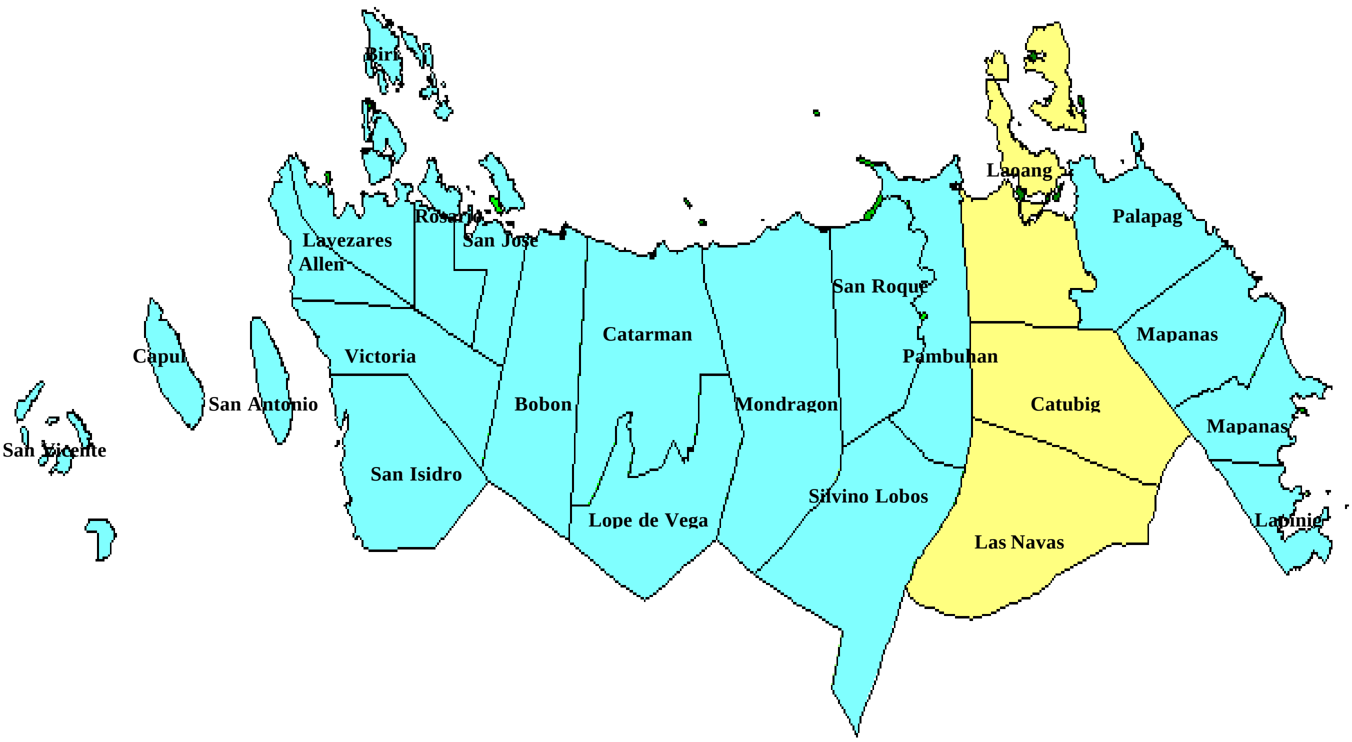
N

Tuesday, Jul 17 2001

MARKET PACKAGES
Northern Samar

M.P. # 18 : Catubig
M.P. # 19 : Las Navas
M.P. # 20 : Laoang

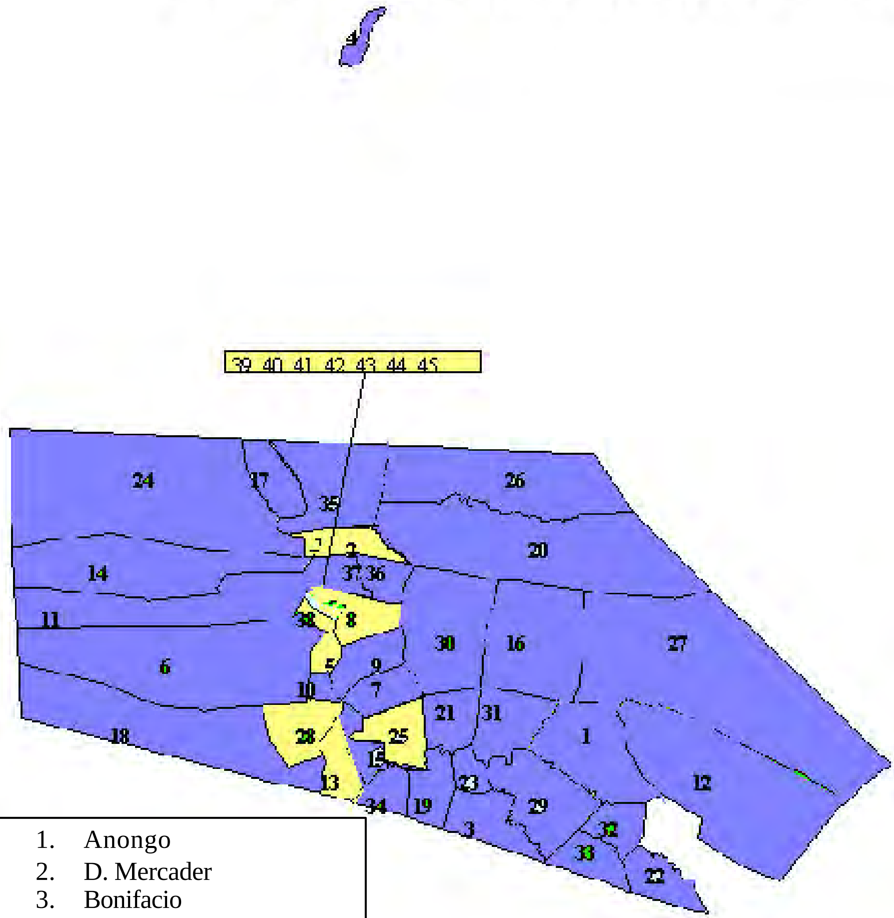
Northern Samar



CATUBIG, NORTHERN SAMAR Market Package No. 18	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	 Forty-seven (47) barangays Sixteen (16) barangays Thirty-one (31) barangays and these are ✓ Anongo ✓ Nabulo ✓ Bonifacio ✓ Nagoocan ✓ Boring ✓ Nahulid ✓ Cagogobngan ✓ Osang ✓ Canuctan ✓ P. Rebadulla ✓ C.M. Recto ✓ Roxas ✓ Guibuangan ✓ San Antonio ✓ Hinagonoyan ✓ San Francisco ✓ Hiparayan ✓ San Jose ✓ Hitapi-an ✓ San Vicente ✓ Irawahan ✓ Santa Fe ✓ Libon ✓ Sulitan ✓ Lenoy-ahan ✓ Tangbo ✓ Magongon ✓ Tungodnon ✓ Magtuad ✓ Vienna Maria ✓ Manering
Demographic Profile	
Household Population (1995)	▪ 3,407 Households
Projected HH Population (2000)	▪ 3,911 Households
Ave. Annual Pop'n Growth Rate	▪ 2.8 (1990 - 1995)
Population Density (1995)	▪ 12.33 HH/km^2
Ave. HH Size	▪ 5.2 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 38,635.00
Ave. Annual HH Expenditures	▪ PhP 29,574.90
Ave. Annual HH Disp. Income	▪ PhP 9,060.10
Ave. HH Energy Expenditures	▪ PhP 150.18/month
Municipality Income Class	▪ Fourth Class
Natural Resources	
Land Area (DILG)	▪ 276.3 km^2
Land Capability Slope Distribution (Topography)	▪ mixed terrain - lowlands and uplands
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Wind Energy ▪ Wind power density	 ▪ 200 -300 W/m^2

CATUBIG, NORTHERN SAMAR Market Package No. 18	2of 2
Hydro Power	▪ 50 Watts
Economic Activities	
Predominant Economic Activities	▪ Farming and fishing
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ NORSAMELCO ▪ 34 % ▪ PhP 43.62 for first 10 kWhr PhP 4.362/kWhr (in excess of 10 kWhr) ▪ PhP 43.62 for first 10 kWhr PhP 4.362/kWhr (in excess of 10 kWhr) ▪ No data ▪ No data ▪ PhP 18,926,308.00
Social Services	
Education (Schools)	▪ At least 31 schools

CATUBIG, NORTHERN SAMAR



1. Anongo
2. D. Mercader
3. Bonifacio
4. Boring
5. Cagbugna
6. Cagmanaba
7. Cagogobngan
8. Calingnan
9. Canuctan
10. Guibwangan
11. Hiparayan
12. Hitapi-an
13. Inoburan
14. Irawahan
15. Libon
16. Claro M. Recto
17. Lenoy-ahan
18. Mag-ongon
19. Magtuad
20. Manering
21. Nabulo
22. Nago-ocan
23. Nahulid
24. Opong
25. Osmena
26. P. Rebadulla
27. Roxas
28. Sagudsuron
29. San Antonio
30. San Francisco
31. San Jose
32. San Vicente
33. Santa Fe
34. Sulitan
35. Tangbo
36. Tungodnon
37. Vienna Maria
38. Barangay 1
39. Barangay 2
40. Barangay 3
41. Barangay 4
42. Barangay 5
43. Barangay 6
44. Barangay 7
45. Barangay 8

LEGEND :

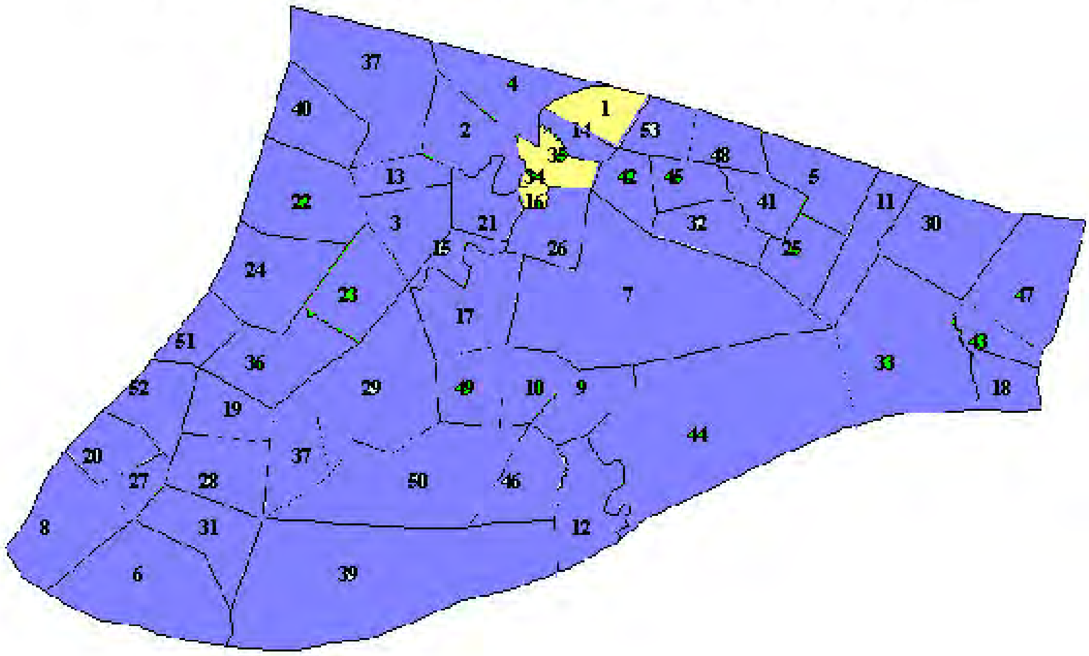
ENERGIZED

UNENERGIZED

LAS NAVAS, NORTHERN SAMAR Market Package No. 19	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Fifty-three (53) barangays Nine (9) barangays Forty-four (44) barangays and these are ✓ Bag-od ✓ Osmeña ✓ Bugay ✓ Paco ✓ Bugtusan ✓ Palanas ✓ Bukid ✓ Perez ✓ Bulao ✓ Pio del Pilar ✓ Caputoan ✓ Poponton ✓ Catoto-ogan ✓ Quezon ✓ Cuenco ✓ Quirino ✓ Dapdap ✓ Rizal ✓ Dolores ✓ Roxas ✓ Hangi ✓ Rufino ✓ Geguinta ✓ San Antonio ✓ Gerardo ✓ San Andres ✓ Imelda ✓ San Fernando ✓ Epaw ✓ San Francisco ✓ Jole-jole ✓ San Jose ✓ Lakandula ✓ San Isidro ✓ Lourdes ✓ Santo Tomas ✓ Mabini ✓ Tagan-ayan ✓ Magsaysay ✓ Tagab-iran ✓ Matiralag ✓ Taylor ✓ Mc Arthur ✓ Victory
Demographic Profile	
Household Population (1995)	▪ 4,357 Households
Projected HH Population (2000)	▪ 4,978 Households
Ave. Annual Pop'n Growth Rate	▪ 2.7 (1990 - 1995)
Population Density (1995)	▪ 20.67 HH/km^2
Ave. HH Size	▪ 5.0 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 37,764.84
Ave. Annual HH Expenditures	▪ PhP 28,206.16
Ave. Annual HH Disp. Income	▪ PhP 9,558.68
Ave. HH Energy Expenditures	▪ PhP 213.15/month
Municipality Income Class	▪ Fifth Class

LAS NAVAS, NORTHERN SAMAR Market Package No. 19		2of 2
Natural Resources		
Land Area (DILG)	▪ 210.8 km^2	
Land Capability Slope Distribution (Topography)	▪ mixed terrain - lowlands and uplands	
Renewable Energy Resources		
Solar Energy	▪ 6 $kWhr/m^2/day$	
Wind Energy ✓ Wind power density	 ▪ 200 W/m^2	
Hydro Power	▪ 50 Watts	
Economic Activities		
Predominant Economic Activities	▪ Farming and fishing	
Other Livelihood Activities	▪ Abaca weaving ▪ Bamboo and wood furniture ▪ Mushroom production ▪ Soap making	
Utilities		
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ NORSAMELCO ▪ 17 % ▪ PhP 43.62 for first 10 kWhr PhP 4.362/kWhr (in excess of 10 kWhr) ▪ PhP 43.62 for first 10 kWhr PhP 4.362/kWhr (in excess of 10 kWhr) ▪ No data ▪ No data ▪ PhP 29,990,441.00	
Social Services		
Education (Schools)	▪ At least 44 schools	

LAS NAVAS, NORTHERN SAMAR



1. Balugo
2. Bugay
3. Bugtosan
4. Bukid
5. Bulao
6. Caputoan
7. Catoto-ogan
8. Cuenco
9. Dapdap
10. Del Pilar
11. Dolores
12. Epaw
13. Geguinta
14. Geracdo
15. Guyo
16. H. Jolejole District
17. Hangi
18. Imelda
19. L. Empon
20. Lakandula
21. Lumala-og
22. Lourdes
23. Mabini
24. Macarthur
25. Magsaysay
26. Matelarag
27. Osmena
28. Paco
29. Palanas
30. Perez
31. Poponton
32. Quezon
33. Quirino
34. Quirino District
35. Rebong
36. Rizal
37. Roxas
38. Rufino
39. Sag-od
40. San Andres
41. San Antonio
42. San Fernando
43. San Francisco
44. San Isidro
45. San Jorge
46. San Jose
47. San Miguel
48. Santo Tomas
49. Tagab-iran
50. Tagan-ayan
51. Taylor
52. Victory
53. H. Jolejole

LEGEND :

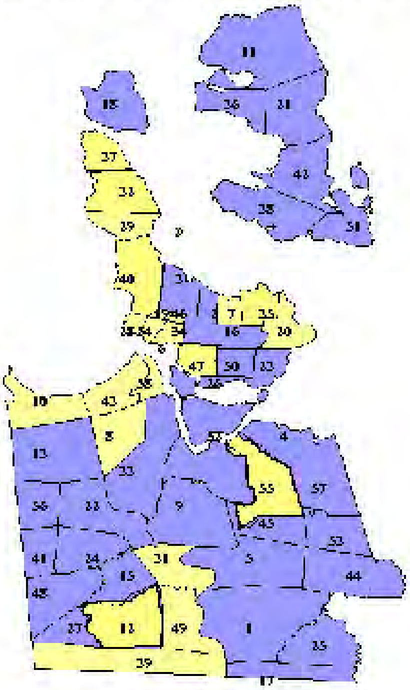
ENERGIZED

UNENERGIZED

LAOANG, NORTHERN SAMAR Market Package No. 20	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Fifty-six (56) barangays Twenty-two (22) barangays Thirty-four (34) barangays and these are ✓ Abaton ✓ Aguadahan ✓ Antipolo ✓ Arongaga ✓ Bawang ✓ Bongliw ✓ Cabadyangan ✓ Cabago-an ✓ Cabagngan ✓ Cabulaloan ✓ Caga-asan ✓ Cagdarao ✓ Cahayagan ✓ Candawid ✓ Cangcahipos ✓ Canyomanao ✓ Catigbian ✓ E.J. Dulay ✓ G.B. Tan ✓ Gibatangan ✓ Lawaan ✓ Marubay ✓ Napiotocan ✓ Palmera ✓ Pangdan ✓ Rombang ✓ San Antonio ✓ Sibunot ✓ Suba ✓ Tanawan ✓ Tarusan ✓ Tinoblan ✓ Yabas ✓ Yabyaban
Demographic Profile	
Household Population (1995)	▪ 3,466 Households
Projected HH Population (2000)	▪ 3,921 Households
Ave. Annual Pop'n Growth Rate	▪ 2.5 (1990 - 1995)
Population Density (1995)	▪ 16.14 HH/km^2
Ave. HH Size	▪ 5.3 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 39,577.64
Ave. Annual HH Expenditures	▪ PhP 28,478.72
Ave. Annual HH Disp. Income	▪ PhP 11,098.92
Ave. HH Energy Expenditures	▪ PhP 171.47/month
Municipality Annual Income	▪ PhP 24,145,516.55 (1998) ▪ PhP 29,693,316.54 (1999) ▪ PhP 35,596,523.36 (2000)
Municipality Income Class	▪ Fourth Class

LAOANG, NORTHERN SAMAR Market Package No. 20	2of 2
Natural Resources	
Land Area (DILG)	▪ 214.7 km^2
Land Capability Slope Distribution (Topography)	▪ Mixed terrain - lowlands and uplands
Renewable Energy Resources	
Solar Energy	▪ 6 $kWhr/m^2/day$
Wind Energy ✓ Wind power density	 ▪ 200 W/m^2
Hydro Power	▪ 50 - 300 Watts
Economic Activities	
Predominant Economic Activities	▪ Farming and fishing
Other Livelihood Activities	▪ Coconut processing ▪ Fish processing ▪ Bamboo furniture
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ NORSAMELCO ▪ 39 % ▪ PhP 43.62 for first 10 kWhr PhP 4.362/kWhr (in excess of 10 kWhr) ▪ PhP 43.62 for first 10 kWhr PhP 4.362/kWhr (in excess of 10 kWhr) ▪ No data ▪ No data ▪ PhP 20,458,024.00
Social Services	
Education (Schools)	▪ At least 34 schools

LAOANG, NORTHERN SAMAR



LEGEND :

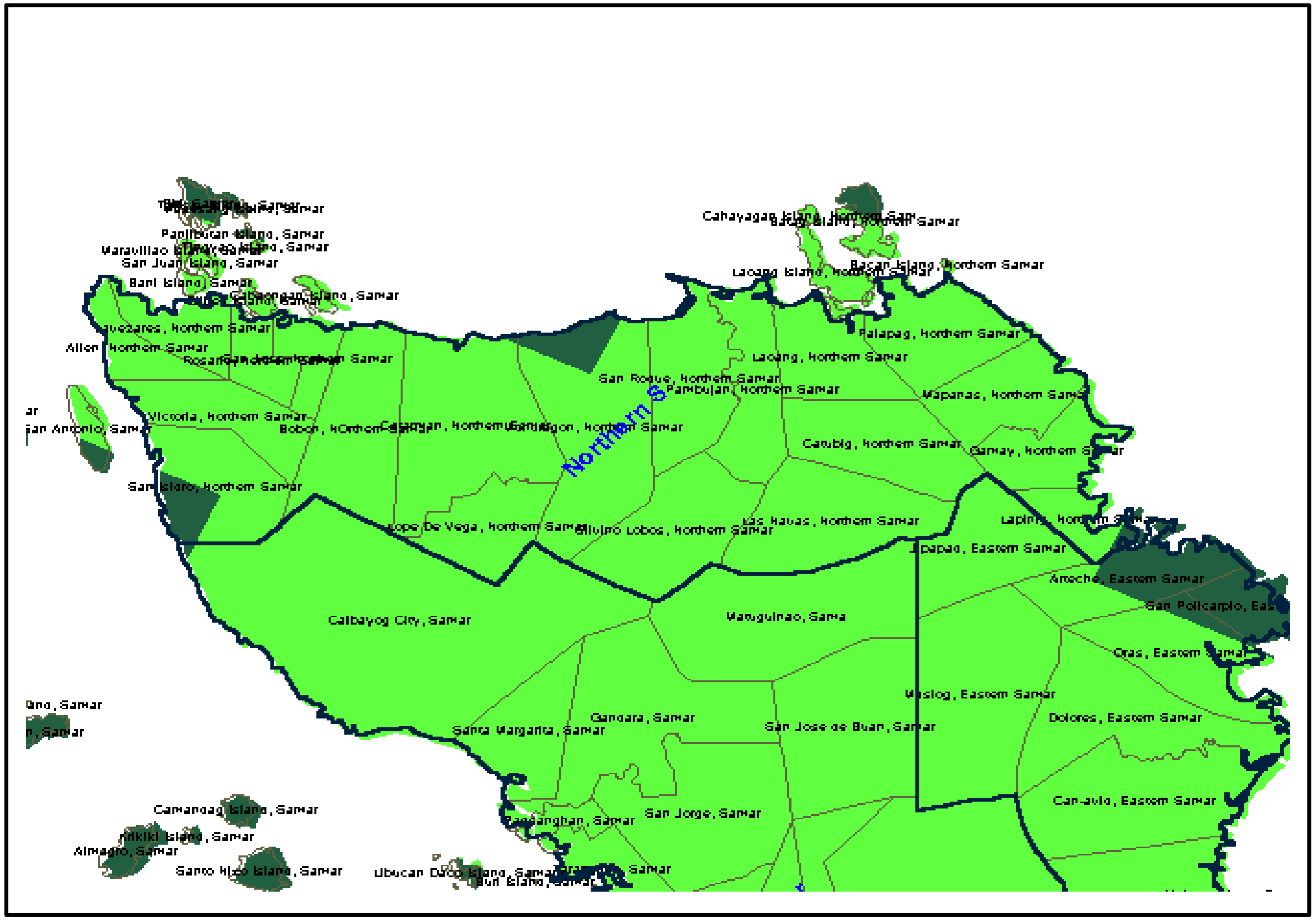
ENERGIZED

UNENERGIZED

1. Abaton
2. Aguadahan
3. Aroganga
4. Atipolo
5. Bawang
6. Baybay
7. Binatiklan
8. Bobolosan
9. Bongliw
10. Burabud
11. Cabadiangan
12. Cabagngan
13. Cabago-an
14. Hinagonoyan(not in the Map)
15. Cabulaloan
16. Cagaasan
17. Cagdara-o
18. Cahayagan
19. Calintaan
20. Calomotan
21. Candawid
22. Cangcahipos
23. Canyomanao
24. Catigbian
25. E.J. Dulay
26. G.B. Tan
27. Gibatangan
28. Guilaoagi
29. Inamlan
30. Osang(not in the Map)
31. La Perla
32. Langob
33. Lawaan
34. Little Vanice
35. Magsaysay
36. Marubay
37. Mualbual
38. Napotiocan
39. Oleras
40. Onay (Dona Luisa)
41. Palmera
42. Pangdan
43. Rawis
44. Rombang
45. San Antonio
46. San Miguel Heights
47. Sangcol
48. Sibunot
49. Simora
50. Suba
51. Tan-awan
52. Tarusan
53. Tinoblan
54. Tumaguinting
55. Vigo
56. Yabyaban
57. Yapas
58. Talisay

ESRI ArcExplorer 2.0

Solar Energy Potential (Northern Samar)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

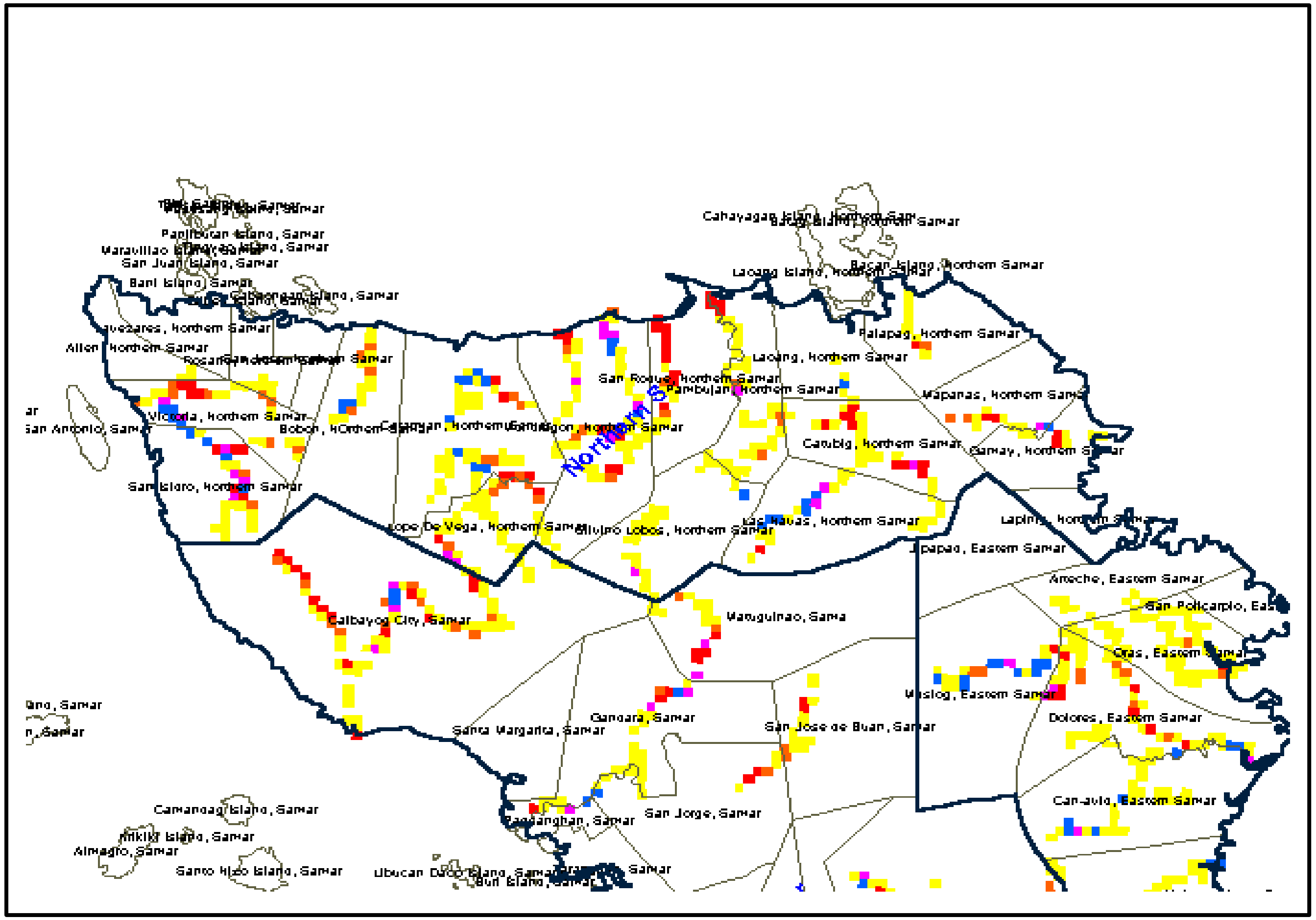
5

6

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Hydro Potential (Northern Samar)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Hydro Potential 100% Efficiency (AE)

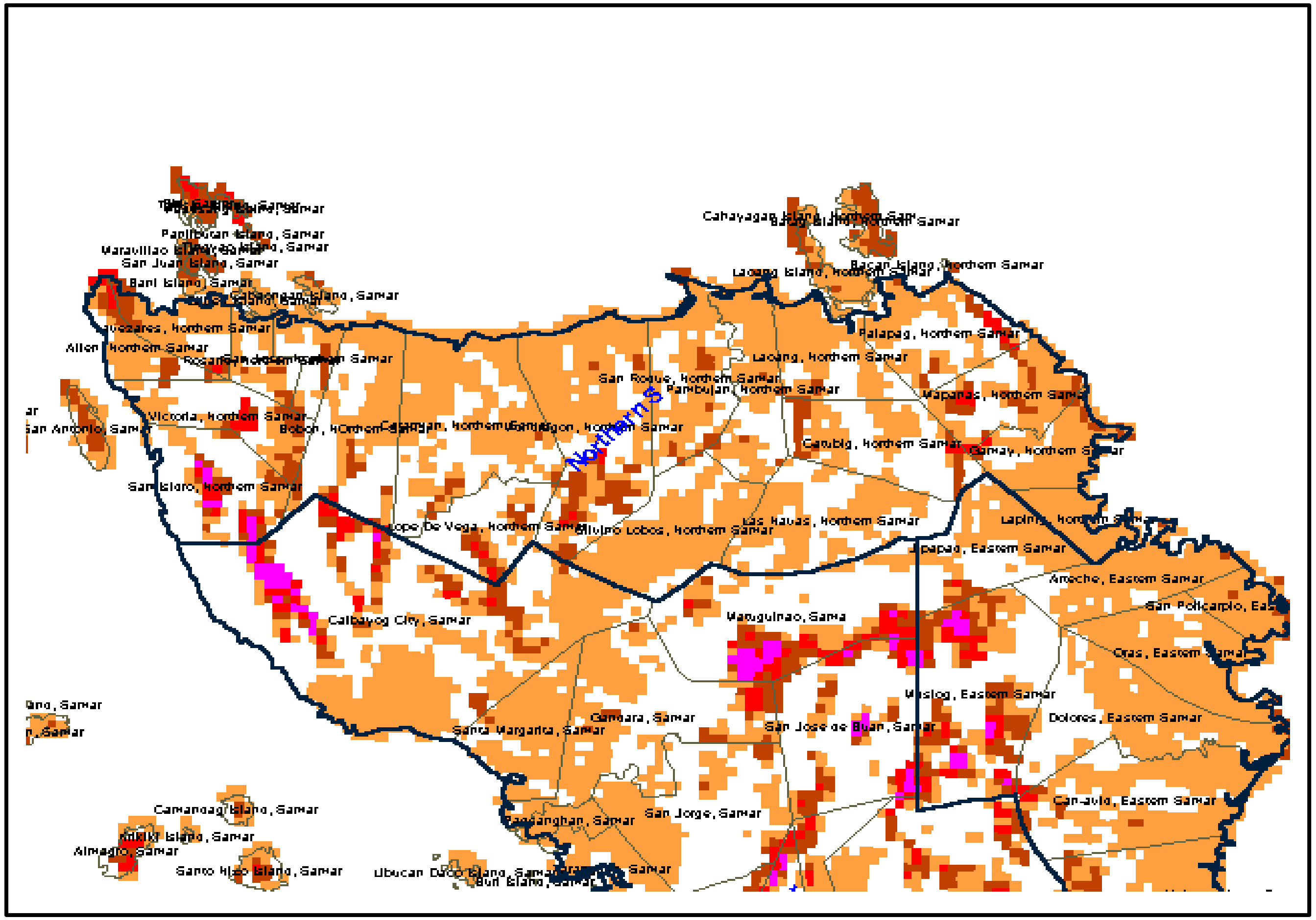
0
50
100
300
500
1500

N

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Wind Potential (Northern Samar)



	provbnd (PROVBND)
	municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

- 0
- 100
- 200
- 300
- 400
- 600
- 1200

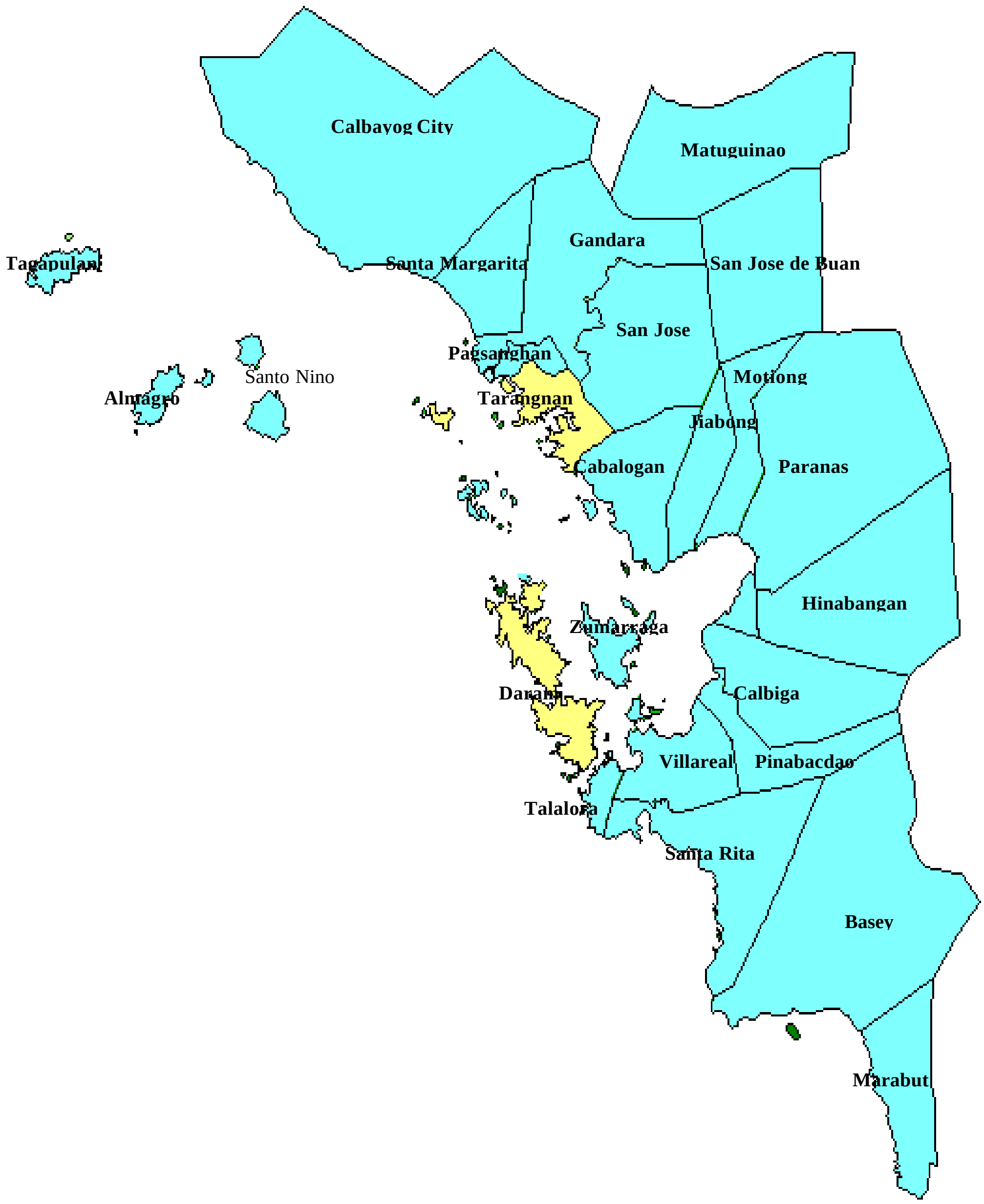
N

Tuesday, Jul 17 2001

MARKET PACKAGES
Western Samar

M.P. # 21 : Tarangnan
M.P. # 22 : Daram

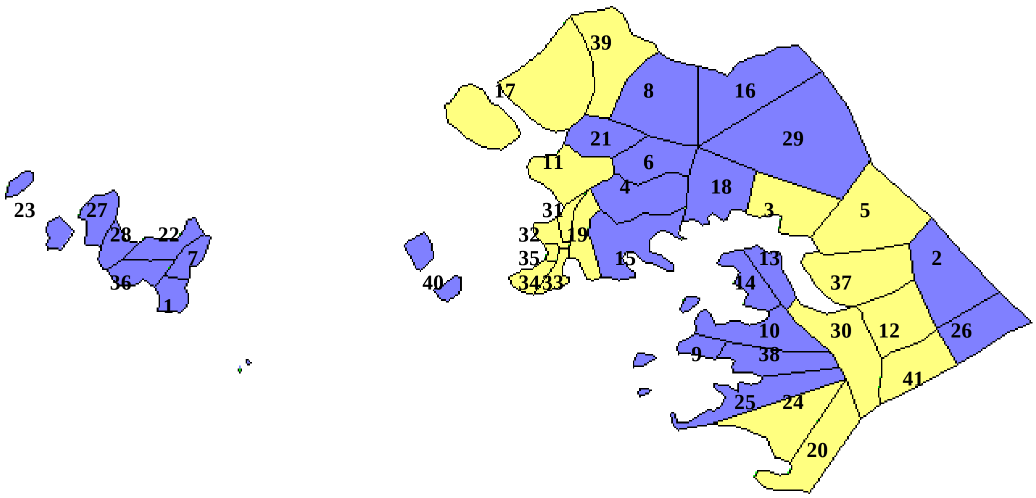
Western Samar



TARANGNAN, WESTERN SAMAR Market Package No. 21	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Forty-one (41) barangays Twenty-one (21) barangays Twenty (20) barangays and these are ✓ Alcazar ✓ Awang ✓ Balonga-as ✓ Bangon Gote ✓ Baras ✓ Bunga ✓ Cambatutay Nuevo ✓ Cambatutay Viejo ✓ Canunghan ✓ Catan-agan ✓ Gallego ✓ Lahong ✓ Libucan Daco ✓ Libucan Gote ✓ Mancares ✓ Marabut ✓ Oeste B ✓ Pajo ✓ San Vicente ✓ Sugod
Demographic Profile	
Household Population (1995)	▪ 2,165 Households
Projected HH Population (2000)	▪ 2,589 Households
Ave. Annual Pop'n Growth Rate	▪ 3.64 %
Population Density (1995)	▪ 16.78 HH/km^2
Ave. HH Size	▪ 5.09 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 33,449.63
Ave. Annual HH Expenditures	▪ PhP 23,428.35
Ave. Annual HH Disp. Income	▪ PhP 10,021.28
Ave. HH Energy Expenditures	▪ PhP 151.40/month
Municipality Income Class	▪ Fifth (5th) Class
Natural Resources	
Land Area (DILG)	▪ 129 km^2
Land Capability Slope Distribution (Topography)	▪ relatively flat lands and coastal
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 200 W/m^2

TARANGNAN, WESTERN SAMAR Market Package No. 21	2of 2
Economic Activities	
Predominant Economic Activities	▪ Farming and fishing
Other Livelihood activities	▪ Fish processing (drying)
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ SAMELCO I ▪ % ▪ PhP 43.65 for first 10 kWhr PhP 4.3654/kWhr (in excess of 10 kWhr) ▪ PhP 88.10 for first 20 kWhr PhP 4.4054/kWhr (in excess of 20 kWhr) ▪ PhP 20.00/kW ▪ PhP 4.4074/kWhr ▪ PhP 11,664,087.00
Social Services	
Education (Schools)	▪ At least 20 schools

TARANGNAN, WESTERN SAMAR



1. Alcazar	37. Sta. Cruz
2. Awang	38. Sugod
3. Bahay	39. Talinga
4. Balonga-as	40. Tigdaranao
5. Balugo	41. Tizon
6. Bangon Gote	
7. Baras	
8. Binalayan	
9. Bisitahan	
10. Bonga	
11. Cabunga-an	
12. Cagtutulo	
13. Cambatutay Nuevo	
14. Cambatutay Viejo	
15. Canunghan	
16. Catan-agan	
17. Dapdap	
18. Gallego	
19. Imelda	
20. Lucerdoni	
21. Lahong	
22. Libucan Dacu	
23. Libucan Gote	
24. Majacob	
25. Mancares	
26. Marabut	
27. Oeste-A	
28. Oeste-B	
29. Pajo	
30. Palencia	
31. Poblacion A	
32. Poblacion B	
33. Poblacion C	
34. Poblacion D	
35. Poblacion E	
36. San Vicente	

LEGEND :

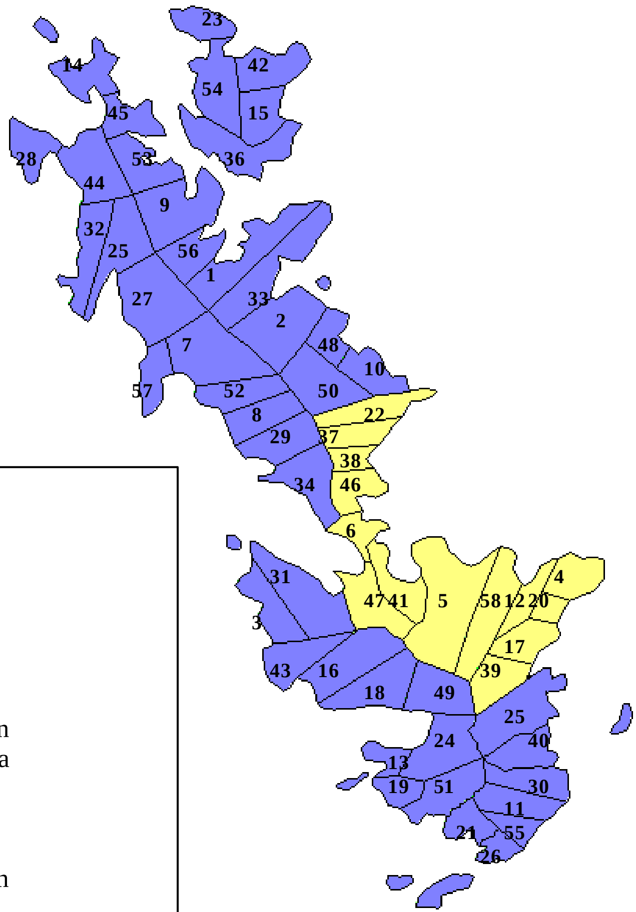
ENERGIZED

UNENERGIZED

DARAM, WESTERN SAMAR Market Package No. 22	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Fifty-eight (58) barangays Sixteen (16) barangays Forty-two (42) barangays and these are ✓ Arawane ✓ Astorga ✓ Bachao ✓ Betang ✓ Birawan ✓ Bono-anon ✓ Burgos ✓ Cabil-isan ✓ Cabiton-an ✓ Cabugao ✓ Cagboboto ✓ Calawan-an ✓ Canduque ✓ Canloloy ✓ Cansaganay ✓ Casab-ahan ✓ Guindaponan ✓ Guintampilan ✓ Iquiran ✓ Jacopon ✓ Locoblocob ✓ Losa ✓ Macalpe ✓ Mandoyucan ✓ Marupangdan ✓ Mayabay ✓ Mongolbongol ✓ Nipa ✓ Parasan ✓ Poso ✓ Rizal ✓ San Antonio ✓ San Jose ✓ San Miguel ✓ San Vicente ✓ So-ong ✓ Sua ✓ Sugod ✓ Talisay ✓ Tugas ✓ Ubo ✓ Valles-vello
Demographic Profile	
Household Population (1995)	▪ 4,637 Households
Projected HH Population (2000)	▪ 5,005 Households
Ave. Annual Pop'n Growth Rate	▪ 1.54 %
Population Density (1995)	▪ 44.85 HH/km^2
Ave. HH Size	▪ 5.36 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 39,938.37
Ave. Annual HH Expenditures	▪ PhP 34,935.84
Ave. Annual HH Disp. Income	▪ PhP 5,002.53
Ave. HH Energy Expenditures	▪ PhP 148.11/month
Municipality Income Class	▪ Second (2nd) Class
Natural Resources	
Land Area (DENR, 1998)	▪ 103.4 km^2
Topography	▪ Lowlands and coastal

DARAM, WESTERN SAMAR Market Package No. 22	2of 2
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Wind Energy ✓ Wind power density	 ▪ 200 - 300 W/m^2
Economic Activities	
Predominant Economic Activities	▪ Fishing
Other Livelihood Activities	▪ Fish culture processing ▪ Vegetable gardening ▪ Shellcraft
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge - Estimated Cost of Grid Extension	 ▪ SAMELCO II ▪ 28 % ▪ PhP 66.01 for first 15 kWhr PhP 4.4009/kWhr (in excess of 15 kWhr) ▪ PhP 88.62 for first 20 kWhr PhP 4.4309/kWhr (in excess of 20 kWhr) ▪ PhP 15.00/kW ▪ PhP 4.4609/kWhr ▪ PhP 44,143,292.00
Social Services	
Education (Schools)	▪ At least 42 schools

DARAM, WESTERN SAMAR



1. Arawane
2. Astorga
3. Bachao
4. Baclayan
5. Bagacay
6. Bayog
7. Birawan
8. Betaug
9. Bono-anon
10. Buenavista
11. Burgos
12. Cabac
13. Cabil-isan
14. Cabiton-an
15. Cabugao
16. Calawanan
17. Cambuhay
18. Candugue
19. Canloloy
20. Campelipa
21. Cansaganay
22. Poblacion 3
23. Casab-ahan
24. Guindapunan
25. Guintampilan
26. Iquiran
27. Jacopon
28. Losa
29. Mabini
30. Macalpe
31. Mandoyucan
32. Mongolbongol
33. Marupangdan
34. Mayabay
35. Nipa
36. Parasan
37. Poblacion 1
38. Poblacion 2
39. Pondang
40. Poso
41. Real
42. Rizal
43. San Antonio
44. San Jose
45. San Miguel
46. San Roque
47. Saugan
48. So-ong
49. Sua
50. Talisay
51. Tugas
52. Ubo
53. Valles-Bello
54. Cagboboto
55. Lucob-lucob
56. San Vicente
57. Sugod
58. Yangta

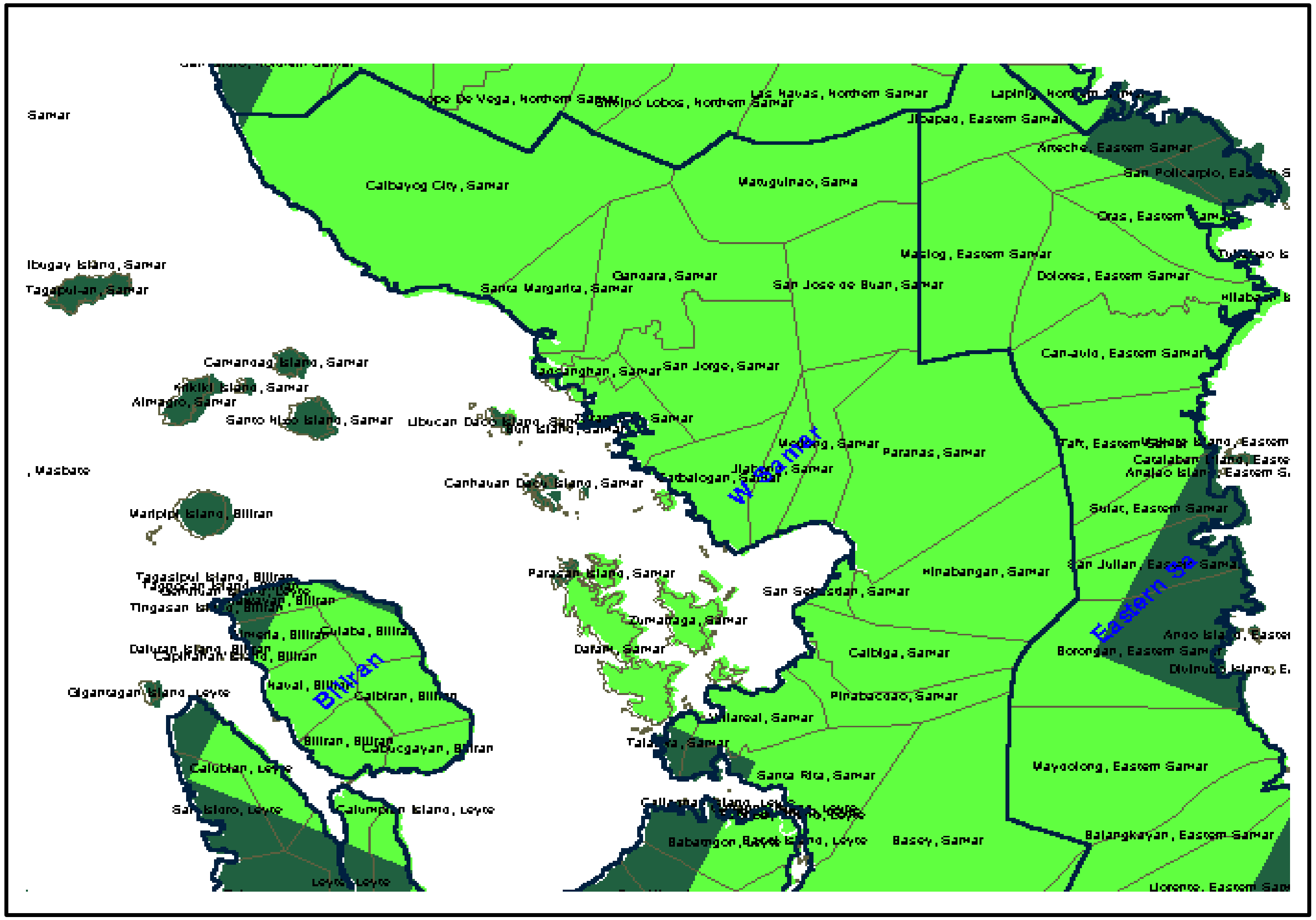
LEGEND :

ENERGIZED

UNENERGIZED

ESRI ArcExplorer 2.0

Solar Energy Potential (Western Samar)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

5

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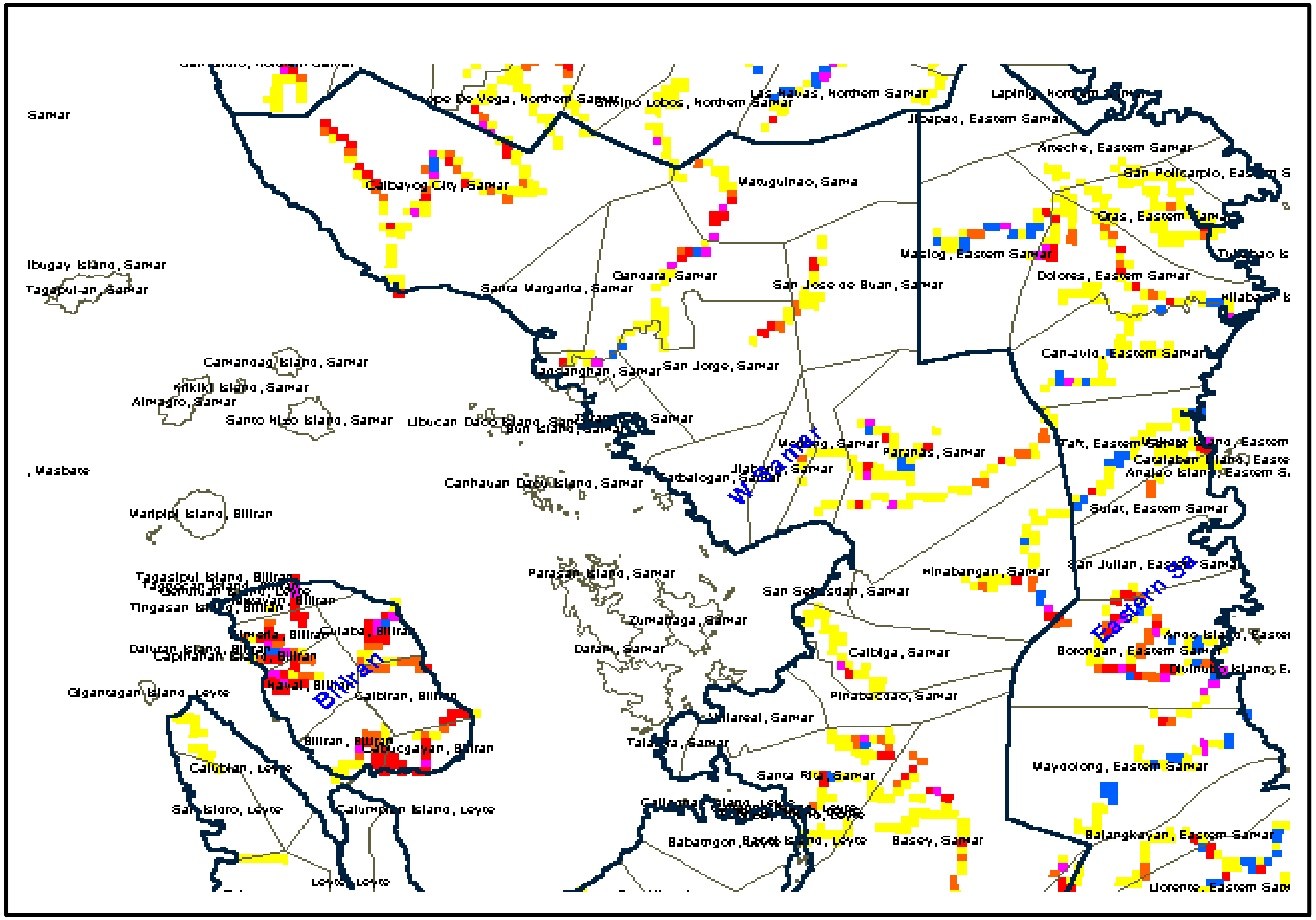
Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Hydro Potential (Western Samar)



provbnd (PROVBND)
municipalities (MUNICIPAL)

Hydro Potential 100% Efficiency (AE)

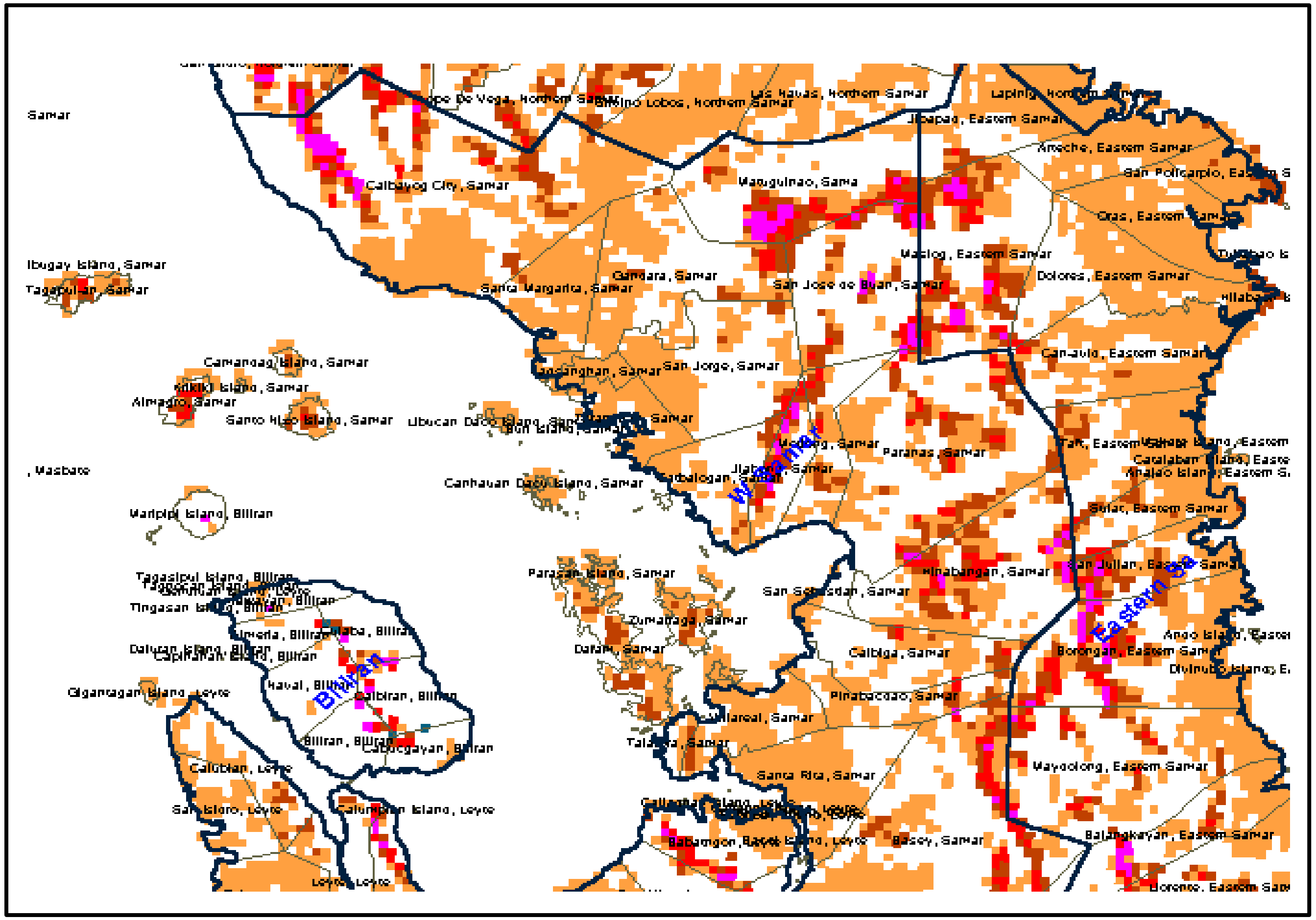
- 0
- 50
- 100
- 300
- 500
- 1500

N

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Wind Potential (Western Samar)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

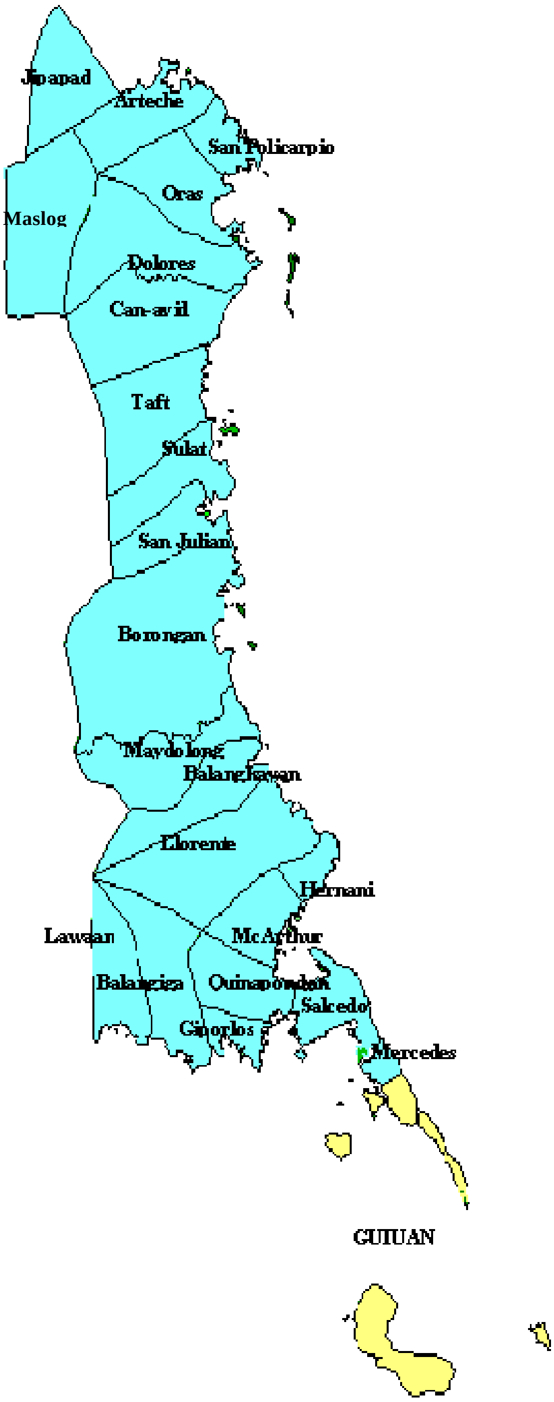
0
100
200
300
400
600
1200

Tuesday, Jul 17 2001

MARKET PACKAGES
Eastern Samar

M.P. # 23 : Guiuan

Eastern Samar

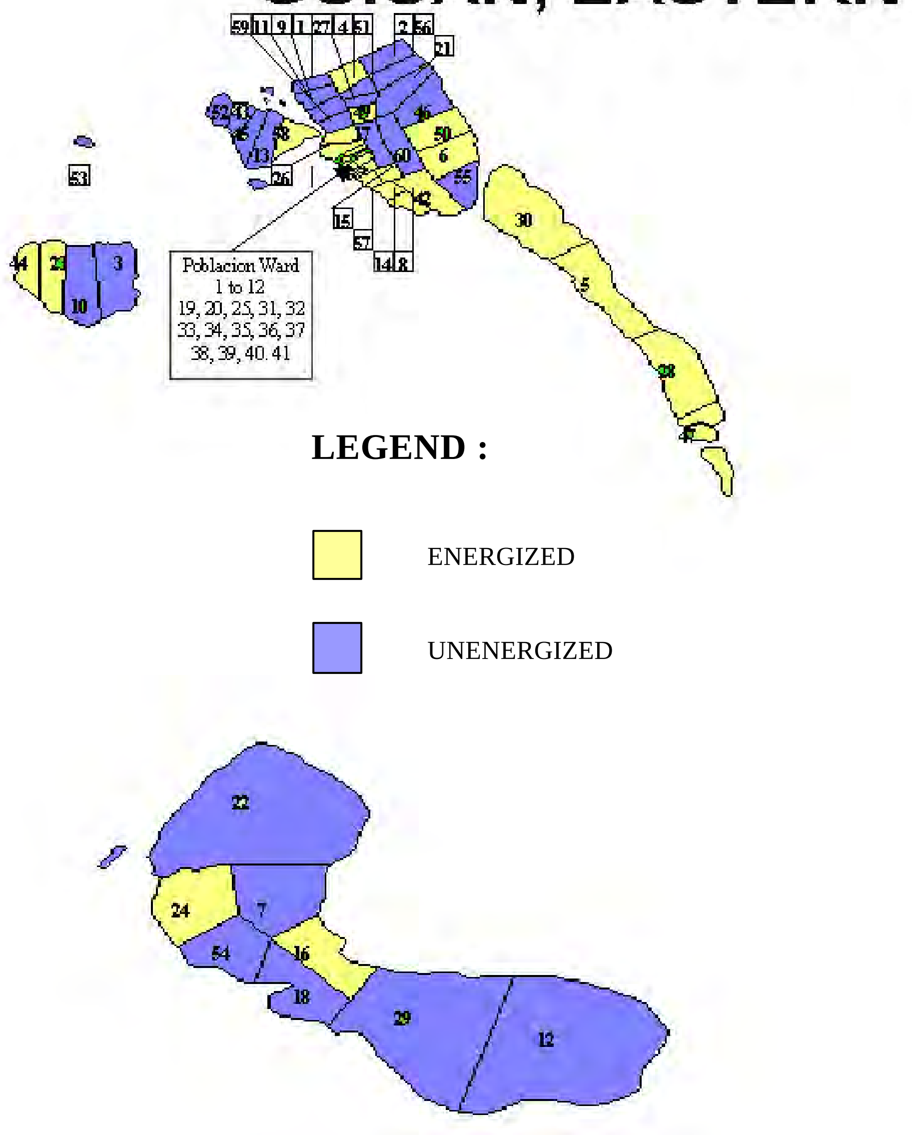


GUIUAN, EASTERN SAMAR Market Package No. 23	1of 3
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Sixty (60) barangays Thirty-four (34) barangays Twenty-six (26) barangays and these are ✓ Alingarog ✓ Bagua ✓ Bana-ag ✓ Bituagan ✓ Bucao ✓ Buenavista ✓ Cagdarao ✓ Cagusu-an ✓ Camparang ✓ Canawayon ✓ Cogon ✓ Culasi ✓ Dalaragan ✓ Gahoy ✓ Habag ✓ Hagna ✓ Mayana ✓ San Antonio ✓ San Pedro ✓ Sapao ✓ Sto. Niño ✓ Suluan ✓ Tagporo ✓ Timala ✓ Trinidad ✓ Victory (Tubabao)
Climate	▪ Marked seasonal period of heavy precipitation at all months of the year ▪ Rainy season: November to January Dry season : July to September ▪ Climatological Data (1998) ✓ Total rainfall : 3146.6 mm (whole prov) ✓ No. of rainy days : 192 days ✓ Ave. Temperature : 26.8^{0}C
Demographic Profile	
Household Population (1995)	▪ 2,755 HH
Projected HH Population (2000)	▪ 2,867 HH
Ave. Annual Pop'n Growth Rate	▪ 0.8 (1990 - 1995)
Average Household Size	▪ 5.02 persons
Population Density (1995)	▪ 7.9 HH/km^2
Macro-economic Indicators	
Ave. Annual HH Income (FIES)	▪ PhP 60,634.00 (whole province)
Ave. HH Expenditures (FIES)	▪ PhP 39,433.00 (whole province)
Ave. Annual HH Income (MA)	▪ PhP 49,365.85
Ave. HH Expenditures (MA)	▪ PhP 36,200.37
Ave. HH Energy Expenditures	▪ PhP 174.42/month

GUIUAN, EASTERN SAMAR Market Package No. 23	2of 3
Municipality Internal Allotment (in Philippine pesos)	▪ 11,971,501.00 (1995) ▪ 12,959,467.00 (1996) ▪ 15,955,527.00 (1997)
Municipality Income Class	▪ Fourth
Natural Resources	
Land Area (DILG)	▪ 160.00 km^2
Land Capability Slope Distribution (Topography)	▪ 0 - 3% : 14.35% (level to nearly level) ▪ 3 - 8% : 5.46% (very gently sloping) ▪ 8 - 18% : 18.84% (Gently sloping) ▪ 18 - 30% : 24.32% (Moderately sloping) ▪ above 30% : 37.03% (Strongly sloping)
Land Use (DENR, 1997)	▪ Forest lands : 130.05km^2 ▪ A&D lands : 43.40km^2
Renewable Energy Resources	
Solar Energy	▪ 5 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 200 - 300 W/m^2
Economic Activities	
Predominant economic activity	▪ Farming
Coconut ▪ Total Area Planted to Coconut ▪ Total Number of trees ▪ Number of coco farmers	▪ 5,610 hectares ▪ 841,500 ▪ 4,780
Trade and Industry ▪ Trading ▪ Manufacturing ▪ Services ▪ Others	No. of establishments ▪ 173 ▪ 19 ▪ 40 ▪ 7

GUIUAN, EASTERN SAMAR Market Package No. 23	3of 3
Infrastructure and Utilities	
Road Network	The main road network of the province of Eastern Samar runs through the major settlements and along the coastal areas from Arteche to barangay Buenavista in Quinapondan where it branches west to Lawaan and south to Guiuan.
Air Transportation	Guiuan Airport, built by the US Navy during the WW II period (no commercial flights)
Port Facilities	Guiuan Port, Brgy. Tulay (causeway/pier)
Infrastructure and Utilities (continuation)	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ ESAMELCO ▪ 57% ▪ PhP 44.01 for first 10 kWhr PhP 4.4009/kWhr (in excess of 10 kWhr) ▪ PhP 54.01 for first 12 kWhr PhP 4.5009/kWhr (in excess of 12 kWhr) ▪ PhP 15.00/kW ▪ PhP 4.4009/kWhr ▪ PhP 15,852,716.00
Social Services	
Health ▪ Government ▪ Private	▪ Southern Samar General Hospital, Guiuan ▪ Josue S. Agpalo Hospital, Guiuan ▪ Immaculate Concepcion Clinic, Guiuan
Education (Schools) ▪ Elementary ▪ Secondary	 ▪ 40 ▪ 5

GUIUAN, EASTERN SAMAR



LEGEND :

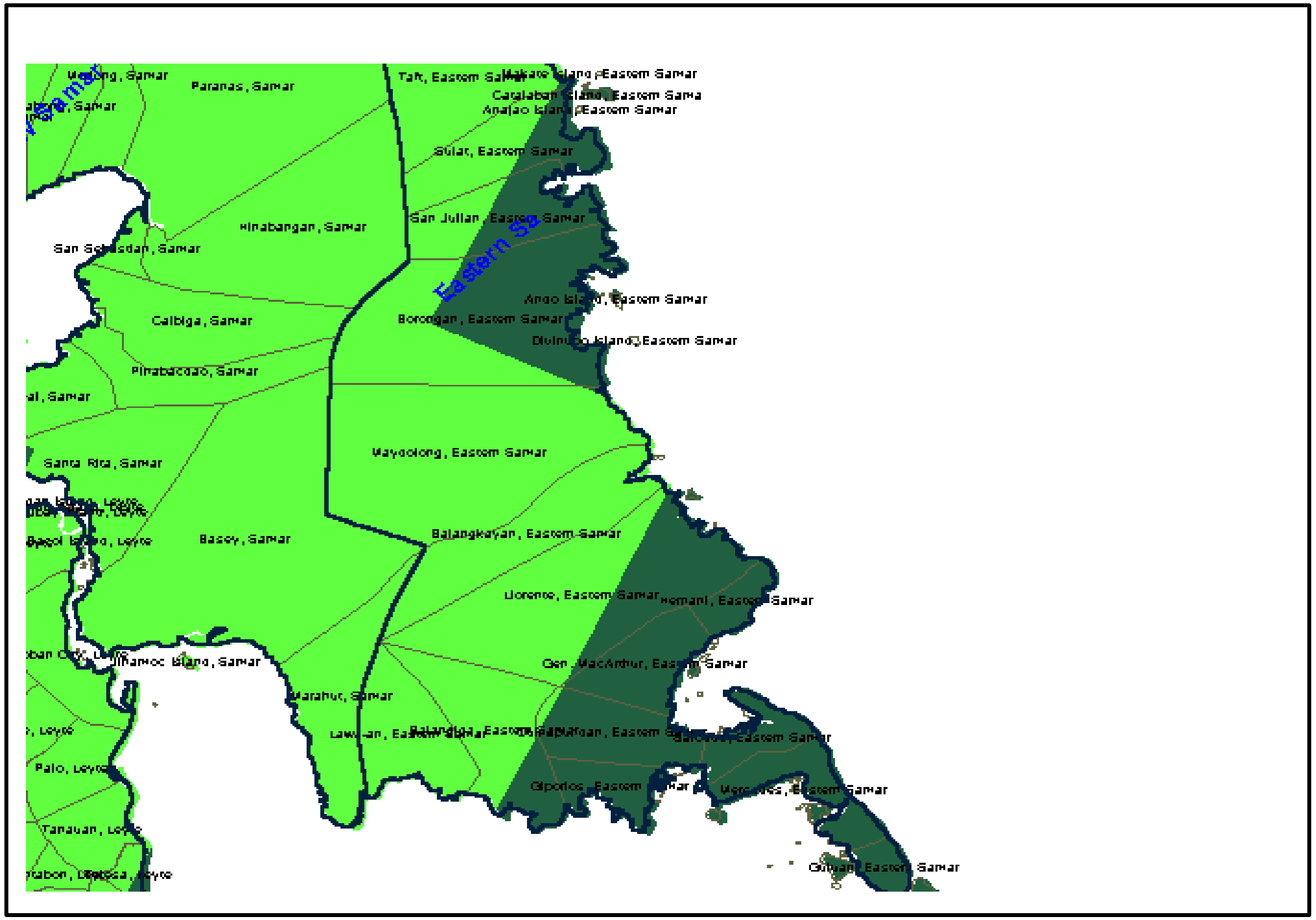
ENERGIZED

UNENERGIZED

1. Alingarog
2. Bagua
3. Banaag
4. Banahao
5. Baras
6. Barbo
7. Bitaugan
8. Bungtod
9. Bucao
10. Buenavista
11. Cagdara-o
12. Cagusuan
13. Camparang
14. Campoyong
15. Cantahay
16. Casuguran
17. Cogon
18. Culasi
19. Pob Ward 10
20. Pob Ward 9-A
21. Gahoy
22. Habag
23. Hamorawon
24. Inapulangan
25. Pob Ward 4-A
26. Lupok
27. Mayana
28. Ngolos
29. Pagbabangnan
30. Pagnamitan
31. Pob Ward 1
32. Pob Ward 2
33. Pob Ward 11
34. Pob Ward 12
35. Pob Ward 3
36. Pob Ward 4
37. Pob Ward 5
38. Pob Ward 6
39. Pob Ward 7
40. Pob Ward 8
41. Pob Ward 9
42. Salug
43. San Antonio
44. San Jose
45. San Pedro
46. Sapao
47. Sulangan
48. Suluan
49. Surok
50. Taytay
51. Timala
52. Trinidad
53. Victory Island
54. Canawayon
55. Dalarangan
56. Hagna
57. Hollywood
58. San Juan
59. Sto. Nino
60. Tagporo

ESRI ArcExplorer 2.0

Solar Energy Potential (Eastern Samar)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

5

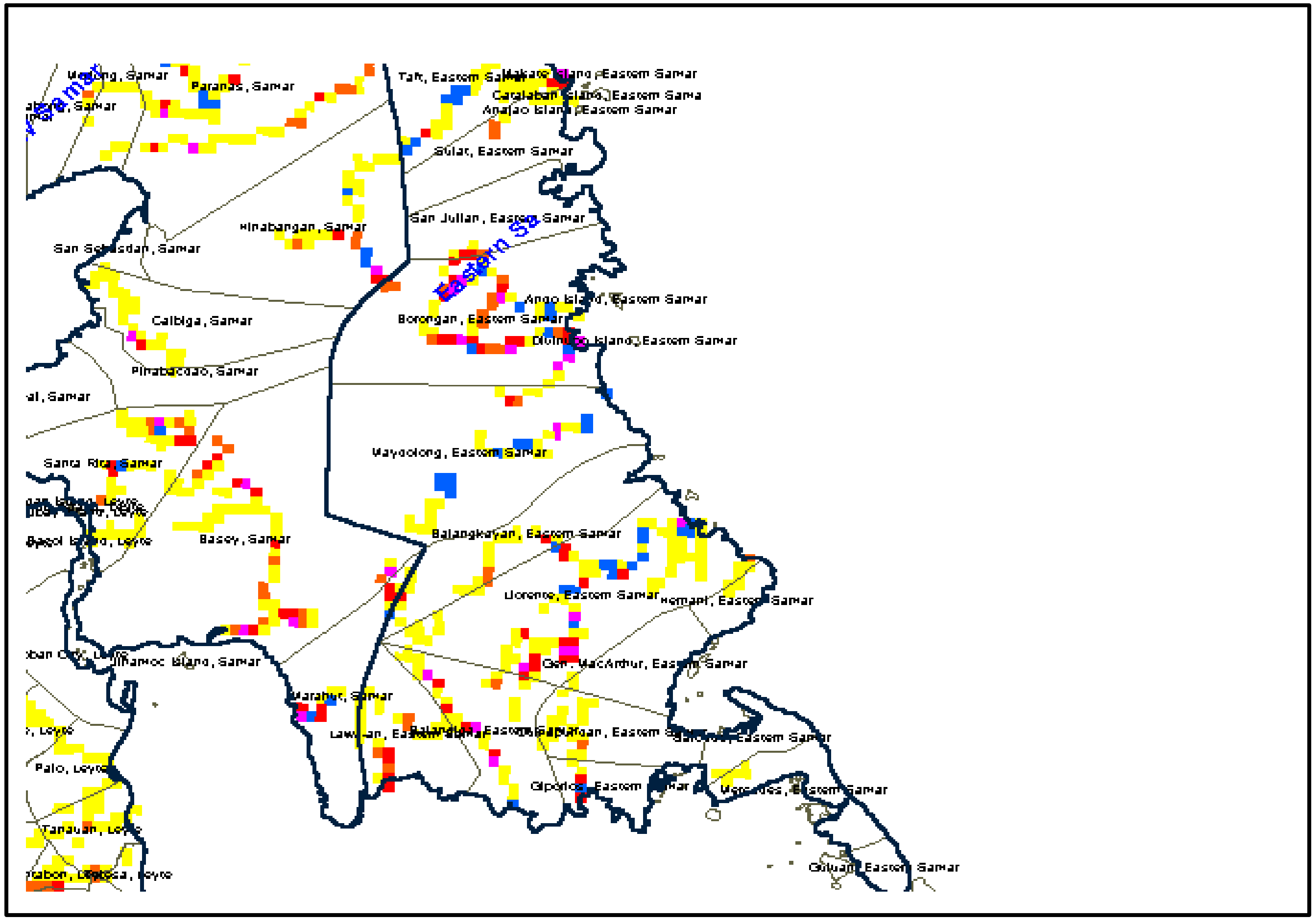
6

N

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Hydro Potential (Eastern Samar)



provbnd (PROVBND)

municipalities (MUNICIPAL)

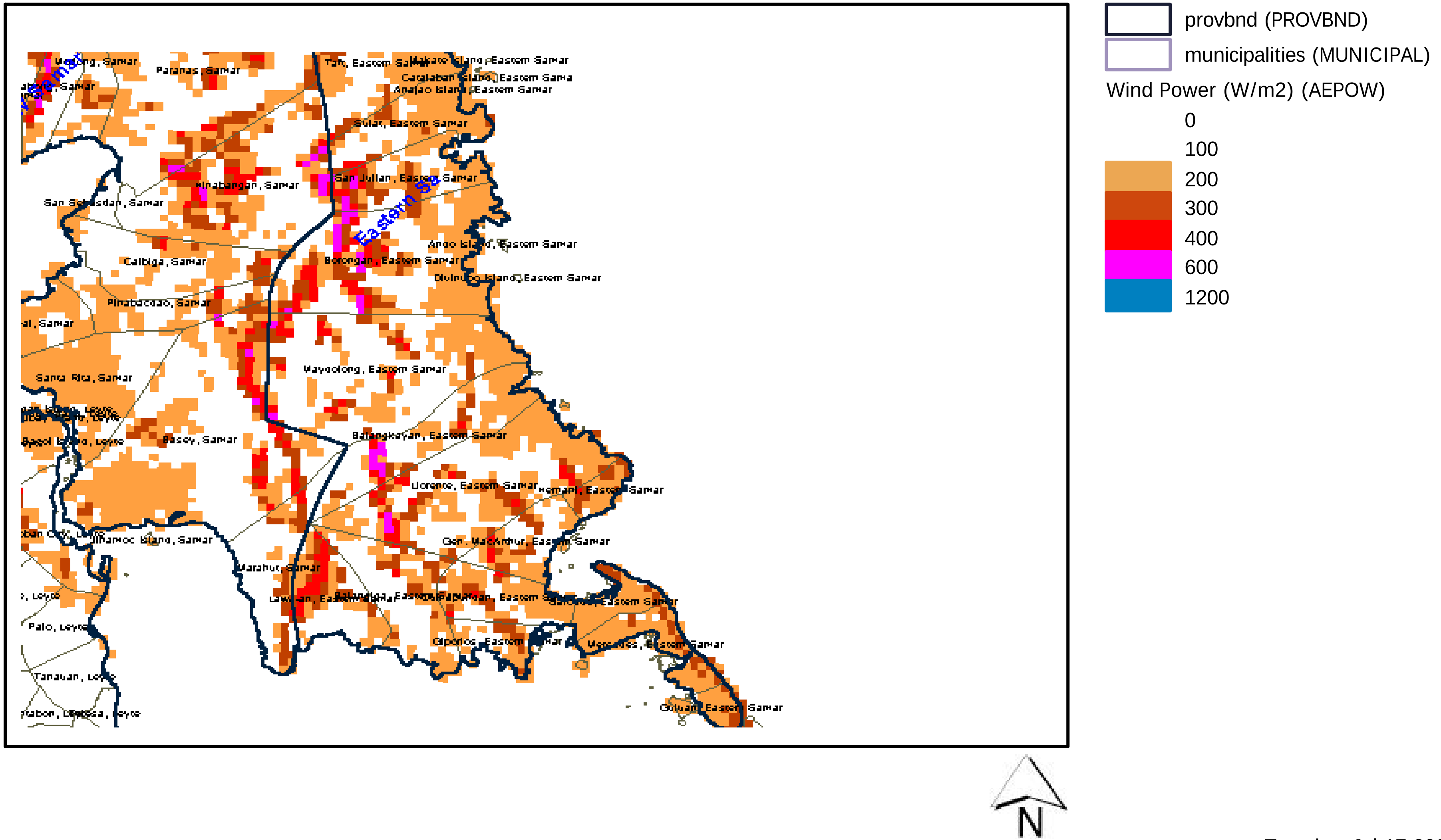
Hydro Potential 100% Efficiency (AE)

0
50
100
300
500
1500

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Wind Potential (Eastern Samar)

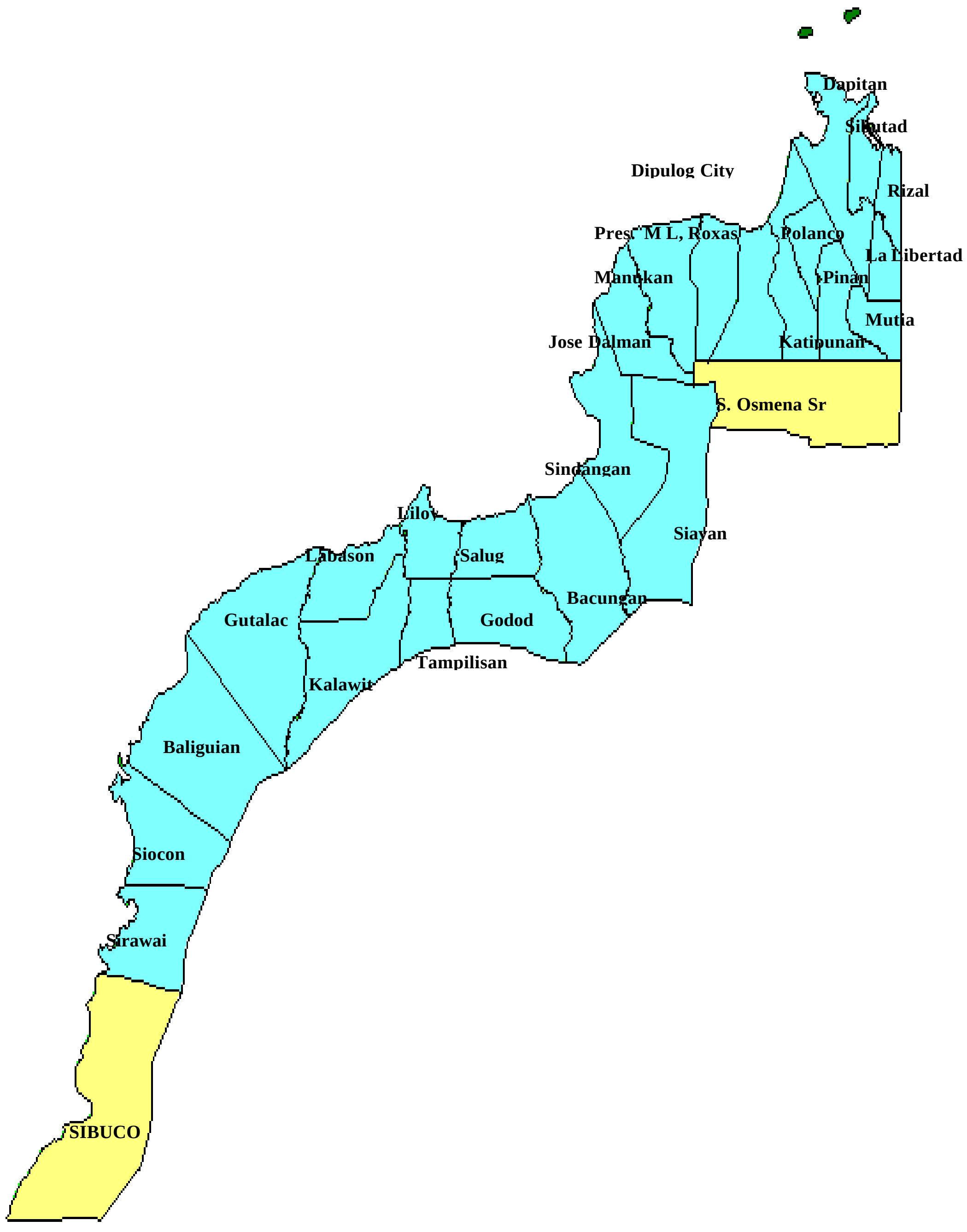


Tuesday, Jul 17 2001

MARKET PACKAGES
Zamboanga Norte

M.P. # 24 : Sergio Osmeña
M.P. # 25 : Sibuco

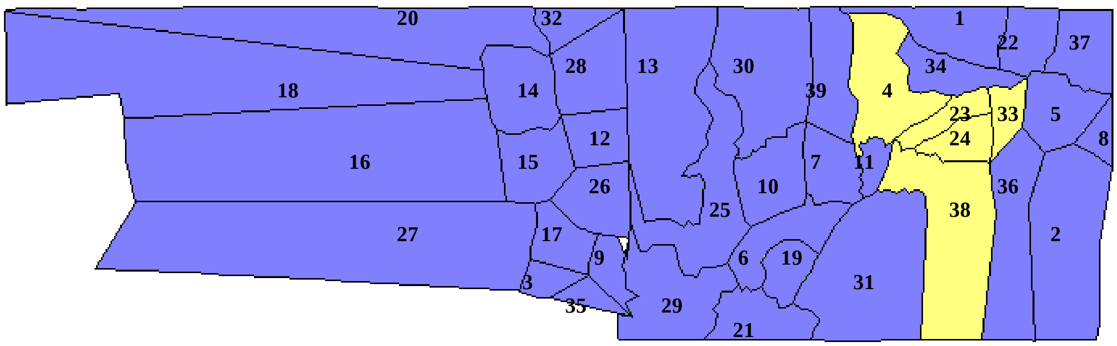
Zamboanga Norte



SERGIO OSMEÑA, ZAMBOANGA NORTE Market Package No. 24	1of 2
General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Thirty-nine (39) barangays Five (5) barangays Thirty-four (34) barangays and these are ✓ Antonino ✓ New Tangub ✓ Bagumbayan ✓ Nueva Vista ✓ Bagong Baguio ✓ Pedangan ✓ Buenavista ✓ Penacio ✓ Dampalan ✓ Princesa Freshia ✓ Danao ✓ Princesa Lamaya ✓ Don Eleno ✓ San Antonio ✓ Kauswagan ✓ San Francisco ✓ Labiray ✓ San Isidro ✓ Liwanag ✓ San Jose ✓ Mabuhay ✓ San Juan ✓ Macalibre ✓ Sinaad ✓ Mahayahay ✓ Situbo ✓ Marapong ✓ Tinago ✓ Nazareth ✓ Tinidungan ✓ Nebo ✓ Tuburan ✓ New Rizal ✓ Wilben
Demographic Profile	
Household Population (1995)	▪ 4,020 Households
Projected HH Population (2000)	▪ 4,699 Households
Ave. Annual Pop'n Growth Rate	▪ 3.17 %
Population Density (1995)	▪ 7.41 HH/km^2
Ave. HH Size	▪ 5.07 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 22,529.00
Ave. Annual HH Expenditures	▪ PhP 9,005.80
Ave. Annual HH Disp. Income	▪ PhP 13,523.20
Ave. HH Energy Expenditures	▪ PhP 53.64/month
Municipality Income Class	▪ Fourth (4th) Class
Natural Resources	
Land Area (DENR, 1998)	▪ 542.9 km^2
Land Capability Slope Distribution (Topography)	▪ Upland

SERGIO OSMEÑA, ZAMBOANGA NORTE Market Package No. 24	2of 2
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m²/day
Wind Energy ✓ Wind power density	 ▪ 200 - 300 W/m²
Hydro Power	▪ 50 - 500 watts
Economic Activities	
Predominant Economic Activities	▪ Farming
Other Livelihood Activities	▪ Bamboo furniture making ▪ Mat weaving
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ ZANECO ▪ 13 % ▪ PhP 42.67 for first 15 kWhr PhP 2.8446/kWhr (in excess of 15 kWhr) ▪ PhP 57.89 for first 20 kWhr PhP 2.8946/kWhr (in excess of 20 kWhr) ▪ PhP 18.00/kW ▪ PhP 2.8446/kWhr ▪ PhP 52,563,810.00
Social Services	
Education (Schools)	▪ At least 34 schools

S. OSMENA SR., ZAMBOANGA DEL NORTE



1. Antonino
2. Bagong-Baguio
3. Bagumbayan
4. Biayon
5. Buenavista
6. Dampalan
7. Danao
8. Don Eleno
9. Kauswagan
10. Labiray
11. Liwanag
12. Mabuhay
13. Macalibre
14. Mahayahay
15. Marapong
16. Nazareth
17. Nebo
18. New Rizal
19. New Tangub
20. Nuevavista
21. Pedagan
22. Penacio
23. Poblacion Alto
24. Poblacion Bajo
25. Princesa Lamaya
26. Princesa Freshia
27. San Antonio
28. San Francisco
29. San Isidro
30. San Jose
31. San Juan
32. Sinaad
33. Sinai
34. Situbo
35. Tinago
36. Tinindugan
37. Tuburan
38. Venus
39. Wilben

LEGEND :

ENERGIZED

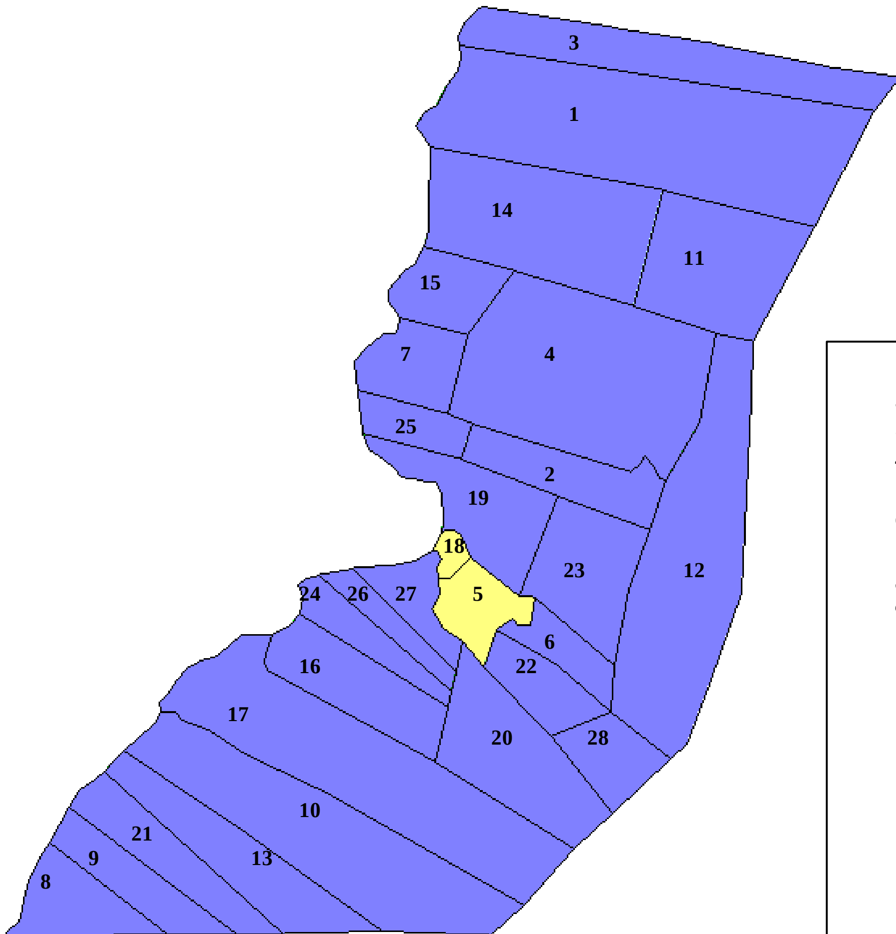
UNENERGIZED

SIBUCO, ZAMBOANGA NORTE Market Package No. 25	1of 2

General Information	
Political Subdivisions ▪ Number of barangays ▪ Number of energized barangays ▪ Number of unenergized barangays	Twenty-eight (28) barangays Two (2) barangays Twenty-six (26) barangays and these are ✓ Anongan ✓ Basak ✓ Bungalao ✓ Cabbunan ✓ Cawit-cawit ✓ Culagoan ✓ Cusipan ✓ Dinulan ✓ Kamarangan ✓ Lakiki ✓ Lambagoan ✓ Limpapa ✓ Lingayon ✓ Lintangan ✓ Litawan ✓ Lunday ✓ Malayal ✓ Mantivo ✓ Nala ✓ Panganuran ✓ Pangian ✓ Paniran ✓ Pasilnabut ✓ Puliran ✓ Santo Niño ✓ Tangarak
Demographic Profile	
Household Population (1995)	▪ 3,905 Households
Projected HH Population (2000)	▪ 4,375 Households
Ave. Annual Pop'n Growth Rate	▪ 2.3 %
Population Density (1995)	▪ 5.1 HH/km^2
Ave. HH Size	▪ 5.12 persons
Macro-economic Indicators	
Ave. Annual HH Income	▪ PhP 61,617.05
Ave. Annual HH Expenditures	▪ PhP 33,222.41
Ave. Annual HH Disp. Income	▪ PhP 28,394.64
Ave. HH Energy Expenditures	▪ PhP 116.26/month
Municipality Income Class	▪ Second (2nd) Class
Natural Resources	
Land Area (DENR, 1998)	▪ 766.4 km^2
Land Capability Slope Distribution (Topography)	▪ Lowlands - coastal
Renewable Energy Resources	
Solar Energy	▪ 6 kWhr/m^2/day
Wind Energy ✓ Wind power density	▪ 200 W/m^2

SIBUCO, ZAMBOANGA NORTE Market Package No. 25	2of 2
Hydro Power	▪ 50 Watts
Economic Activities	
Predominant Economic Activities	▪ Fishing
Other Livelihood Activities	▪ Furniture making
Utilities	
Power ▪ Electric Cooperative ▪ Municipal Energ'n Status ▪ Power Tariff (Basic Rates as of December 2000) ✓ Residential ✓ Commercial ✓ Industry - Demand Charge - Energy Charge ▪ Estimated Cost of Grid Extension	 ▪ ZAMSURECO II ▪ 7 % ▪ PhP 40.57 for first 15 kWhr PhP 2.7046/kWhr (in excess of 15 kWhr) ▪ PhP 55.09 for first 20 kWhr PhP 2.7546/kWhr (in excess of 20 kWhr) ▪ PhP 15.00/kW ▪ PhP 2.7146/kWhr ▪ PhP 30,091,429.00
Social Services	
Education (Schools)	▪ At least 26 schools

SIBUCO, ZAMBOANGA DEL NORTE



LEGEND :

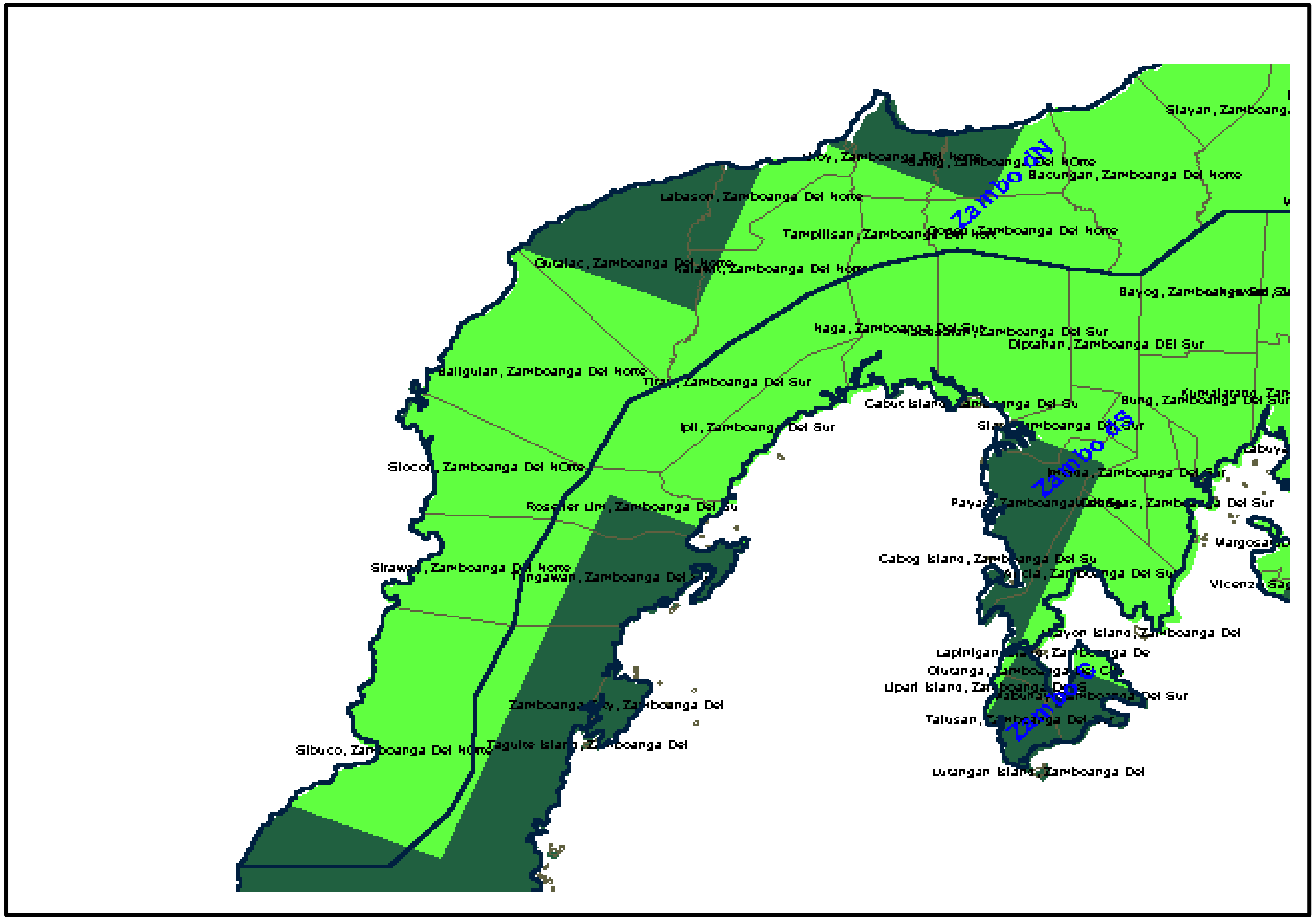
ENERGIZED

UNENERGIZED

1. Anongan
2. Basak
3. Cawit-cawit
4. Dinulan
5. Jatian
6. Lakiki
7. Lambagoan
8. Limpapa
9. Lingayon
10. Lintangan
11. Litawan
12. Lunday
13. Malayal
14. Mantivo
15. Panganuran
16. Pangian
17. Paniran
18. Poblacion
19. Puliran
20. Santo Nino
21. Bongalao
22. Cabbunan
23. Culaguan
24. Cusipan
25. Kamarangan
26. Nala
27. Pasilnahut
28. Tangarak

ESRI ArcExplorer 2.0

Solar Energy Potential (Zaboanga del Norte)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Annual (kWhr/m2/day) Global Horizontal (AEANN)

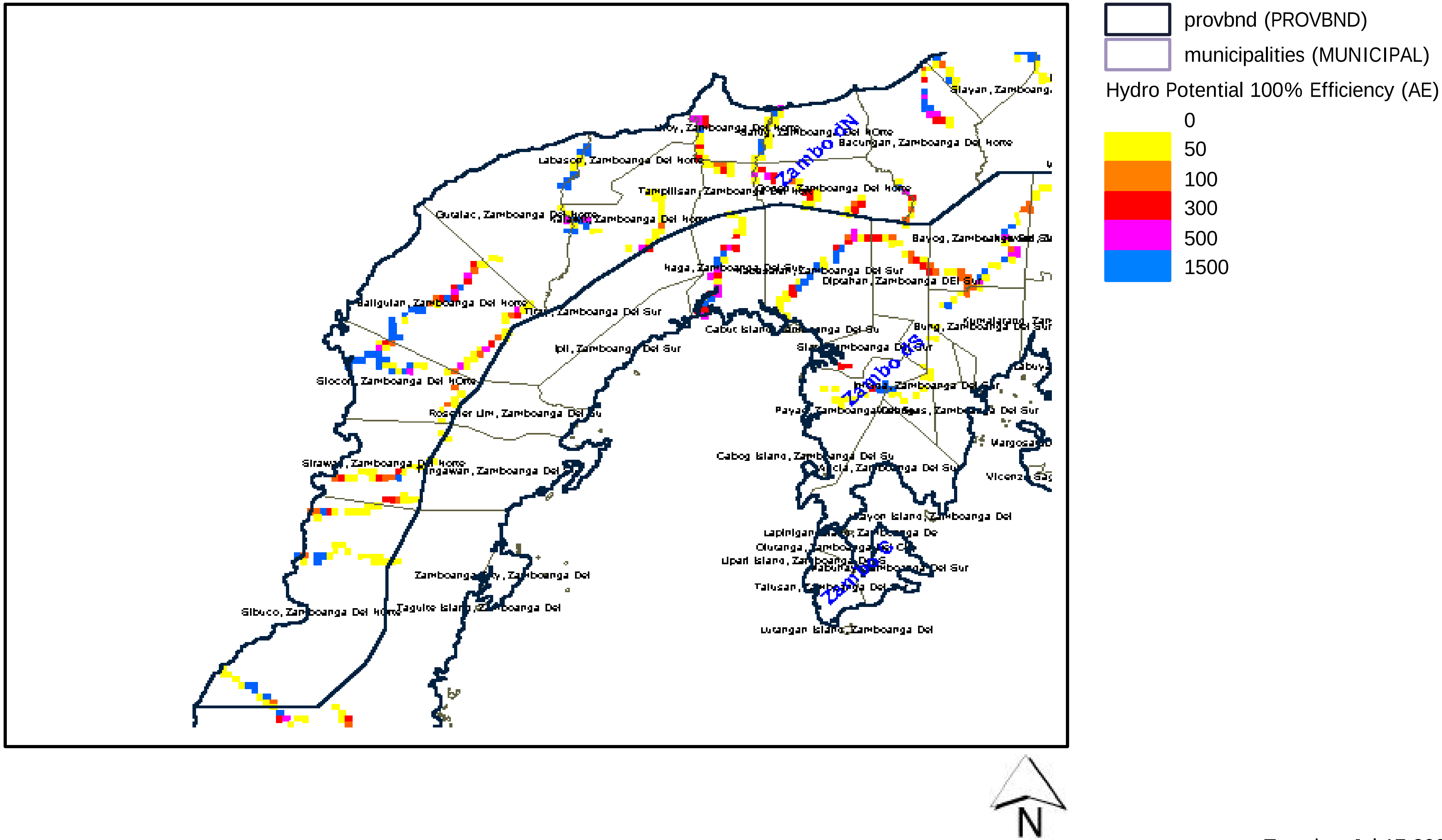
5

6

Tuesday, Jul 17 2001

ESRI ArcExplorer 2.0

Hydro Potential (Zamboanga del Norte)



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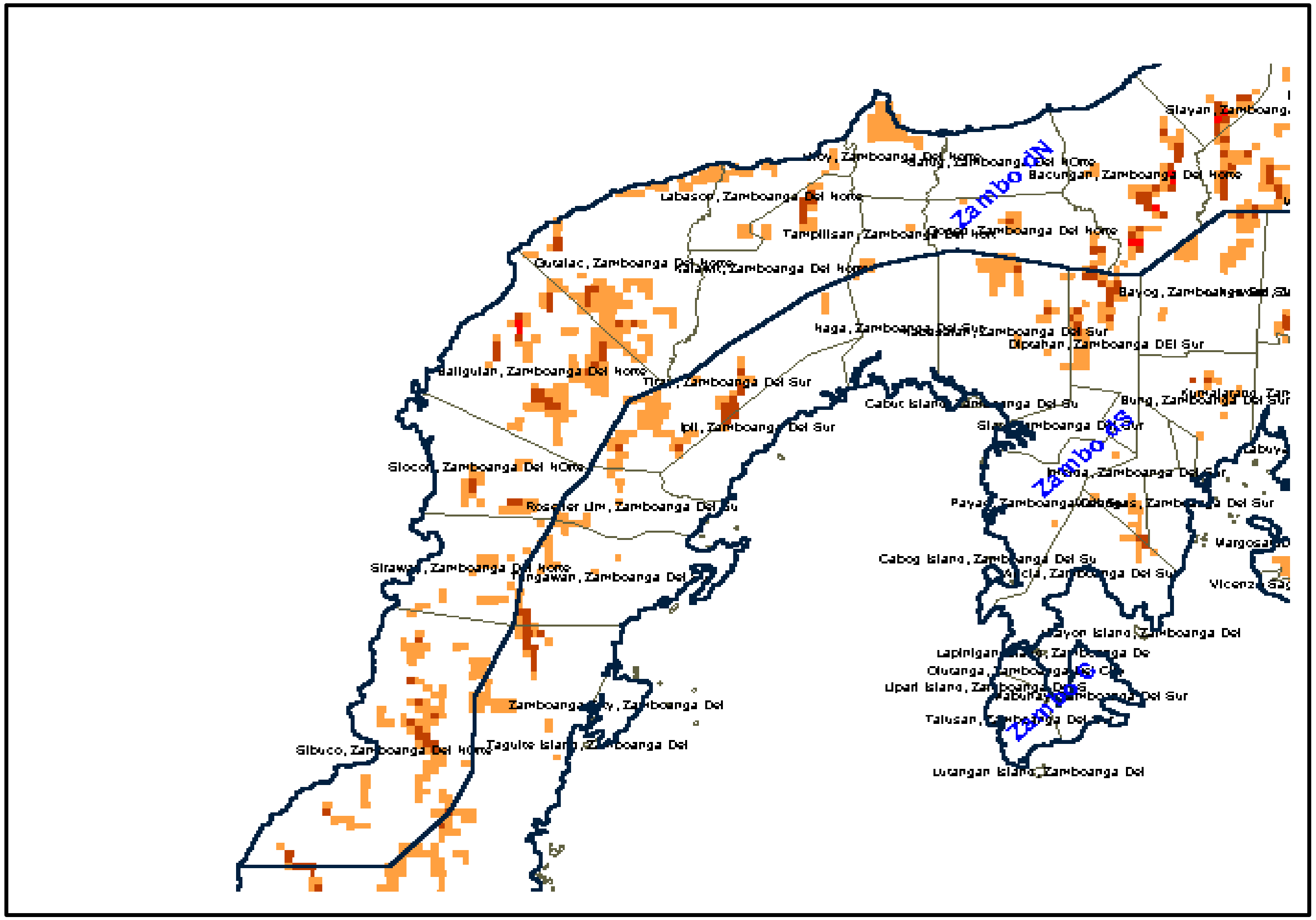
ESRI ArcExplorer 2.0

Wind Potential (Zaboanga del Norte)



provbnd (PROVBND)

municipalities (MUNICIPAL)

Wind Power (W/m2) (AEPOW)

0

100

200

300

400

600

1200

N

Tuesday, Jul 17 2001

CHAPTER 5

Rural Electrification Market Packaging: Skills Transfer (Mentoring of DOE Staff)

80. One of the deliverables of Task 3 is the mentoring of a DOE-EUMB/NCED staff in identifying rural electrification market packages.

81. Specifically, Task 3 focuses on five regions and there are still a large number of non-electrified barangays that need to be clustered together to be attractive to the private sector. Thus, the intent of this deliverable is to provide a DOE staff adequate appreciation and skills in handling/processing vast information to continue with the rural electrification market packaging.

82. Rodel Padrique was assigned to work with the consultant. He participated in most of the meetings and consultations and particularly in processing the information.

83. To facilitate systematic use of the information gathered, a database program was developed. Mr. Padrique provided vital inputs in developing the program.

The Database Development for the Market Packages

84. A special database system for the conduct of the market package identification and prioritization was developed. The computer database program based on Microsoft ACCESS 97 contained all the secondary data used in the identification and analysis of the market packages. Aptly called "Market Package (MKTPACK) for Off-grid Electrification", the program was used to conduct the prioritization of the 25 market packages.

85. Below is a brief description of the database:

- **Structure of the Database**

  The database consists of three (3) major tables, namely, Barangay Table, the Municipality Table, and the EC (Electric Cooperative) Table. Considering that the system is only intended for preliminary database development, there are other data fields which have been included in the system but was not actually used. Likewise, important information on each of the market packages but not directly needed in the screening and ranking of the market packages have also been included in the said tables. Future activities may involve the completion of some blank data fields in the three tables as well as the addition of additional fields to store other information.

a. The Barangay Table

The Barangay Table contains the records of all unelectrified barangays in the country reported by NEA as of May 2000. Fields for each barangay include the municipality, the covering EC, the number of households based on 1995 census conducted by the National Survey Office, the default NEA schedule and option for electrification and the NEA's estimated cost of electrification. There are 8,000 barangays recorded in this table. Listing of datafields for the barangay table is given in Table 5**.**

Table 5. The Data Entries for the Barangay Table

Data Field	Description	Data Type/ Units	Data Source	Remarks
Barangay ID	Entry Number	Auto No.	N/A	N/A
Barangay	Name of Barangay	Text	NEA (2000)	
Municipality	Name of Municipality	Text	NEA (2000)	
EC	Name of Covering EC	Text	NEA (2000)	
HHs '95	Number of Households Per Barangay	Number	NSO (1995)	Census 2000 not available at the time of study
Schedule	Energization Schedule by NEA	Year	NEA (2000)	
Option	Default Electrification Option by NEA	Text	NEA (2000)	
NEA Cost	Cost of Electrification	Pesos	NEA (2000)	
Area	Total Land Area	Hectares	DILG (2000)	
Grid Distance	Ave. Distance from Nearest Post	Kilometers	NEA (2000)	
WTP	Willingness to Pay by Households	Pesos per month	WB MA Study (2000)	Data only for 300 bgys.
CTP	Capacity to Pay by Households	Pesos per month	WB MA Study (2000)	Data only for 300 bgys.

b. Municipality Table

The Municipality Tables contains records of all municipalities with unelectrified barangays. Important fields used to characterize the municipalities include the covering EC, land area, number of barangays, total households, number of unenergized barangays scheduled for electrification by 2001-2004, income classification, among others. A separate field was also included to indicate whether the municipality was covered or not by the Market Assessment Study by the World Bank. Such information were used in the 3-stage screening of municipalities and in the identification of the 25 priority market packages as required by USAID Technical Assistance. More than 400 municipalities have been stored in the table. Table 6 shows the listing of data fields for this table.

Table 6. The Data Entries for the Municipality Table. Raw Data.

Data Field	Description	Data Type/ Units	Data Source
Municipality ID	Entry Number	Autonumber	N/A

Municipality Name	Name of the Municipality	Text	NEA (2000)
Province	Name of Province	Text	NEA (2000)
EC ID	Name of Franchising EC	Text	NEA (2000)
Region	Region of Location	Text	NEA (2000)
DOF Classification	Classification of municipality as per 6-tier system provided by DOF Circular No. ___	Number (1-6)	DOF
Total Bgys	Total No. of Barangays in the municipality	Count of bgys/ Integer	NEA (2000)
Energized Bgys	No. of energized bgys in the municipality	Count of bgys/ Integer	NEA (2000)
Unenergized Bgys	No. of unenergized bgys in the municipality	Count of bgys/Integer	NEA (2000)
Tot Hhs	Sum of households of the barangays in the municipality	Count of hhs/ Integer	NSO (1995)
Total Unenergized Hhs	Sum of unenergized households of the bgys in the municipality	Count of hhs/ Integer	NEA (2000)
WTP	Average Willingness to Pay by the households in the municipality	Pesos per month	WB MA Study (2000)
Total Land Area	Total land area of the municipality	Hectares	DILG (2000)
PercentElecEC	Percentage of electrification by the EC covering the area	Percent	NEA (2000)
PercentElecMun	Percentage of electrification in the municipality	Percent	NEA (2000)

Meanwhile, several data fields have also been provided for those important values that will be derived from the raw data. Said derived or calculated values are summarized in Table 7.

Table 7. The Data Entries for the Municipality Table. Calculated Values

Data Field	Description	Data Type/ Units	Remarks
Pop Density	Density of unelectrified hhs per municipality	Unenergized hhs per ha.,	Obtained by dividing unelectrified hhs in the municipality by its land area.
Ave HH Income	Ave. Household Income	Pesos/year	Ave values for the households in the municipality surveyed by WB MA Study.
Ave HH Tot Expenditure	Ave. Household Total Expediture	Pesos/year	Ave values for the households in the municipality surveyed by WB MA Study.
Ave Disp Income	Ave. disposable income per Household	Pesos/year	Ave values for the households in the municipality surveyed by WB MA Study.
AveHHEgyExpenditure	Ave. Houehold energy expenditure	Pesos/year	Ave values for the households in the municipality surveyed by WB MA Study.

To store the values of the results of the four screenings conducted for the study, a set of special data fields have also been provided in the

Municipality Table. Table 8 lists all the special fields used in storing the results of the analysis in this study.

Table 8. The Data Entries for the Municipality Table. Data for Screening Results

Data Field	Description
PassScreening1	Indicator if the municipality passed Screening level 1 (Yes/No)
PassScreening2	Indicator if the municipality passed Screening level 2 (Yes/No)
PassScreening3	Indicator if the municipality passed Screening level 3 (Yes/No)
Pass123	Indicator if the municipality passed all screenings 1, 2 and 3(Yes/No)
PointsHHs	Score received for household criterion during Screening4
PointsDOFClass	Score received the criterion “DOF Classfiication” on screening level 4
PointsDispIncome	Score garnered for the criterion “Disposable Household Income” during Screening level 4
PointsEExpen	Score garnered for the criterion “Household Energy Expenditure” during Screening level 4
PointsPopDensity	Score garnered for the criterion “Density of Unelectrified Households” during Screening 4
Sum	Total scores received during Screening level 4
RankScreening4	Ranking of market packages based on the “sum” of scores in Screening 4

The Municipality Table is the largest table in the database system. Future enhancement of the database systems may separate these tables according to the three groupings made in these sections.

c. EC Table

The EC Table, on the other hand, contains the records of the electric cooperatives covering the unelectrified barangays in the Barangay Table. Important information such as EC’s franchise coverage in terms of number of barangays, the number of barangays reported energized, the percent energization, among others, have been used to characterize each EC. Said information were used during the preliminary screening of the municipality. Table 9 lists the data fields included in the EC table.

There are indeed other relevant information regarding the electric cooperatives covering the municipalities which can be included in the future work. These include, among others, the prevailing electricity consumption of the average EC customers (residential, commercial, industrial) as well as the performance indicators of the operation of the ECs in the rural areas which may be useful when the processes for screening the market packages will become more complicated later.

Table 9. The Data Entries for the EC Table.

Data Field	Description	Data Type/ Units	Data Source
EC ID	EC Entry Number	Autonumber	
EC Name	Name of the electric cooperative	Text	NEA
EC Bgys	No. of barangays covered by the franchise of the EC	Count of bgys/ Integer	NEA (2000)

EC Bgys Energized	No of barangays energized by EC within its franchise area	Count of bgys/ Integers	NEA (2000)
EC Pot Hhs	No. of households covered by the franchise of the EC	Count of hhs/ Integer	NSO (1995)
EC HH Conn	No. of households already served by the EC in its franchise area	Count of hhs/ Integer	NEA (2000)
Percent HH Elec EC	Percent electrification at household level by the EC in its franchise area	Percent	Derived
Percent Bgy Elec EC	Percent electrification at barangay level by the EC in its franchise area	Percent	Derived

d. The Database Organization

A switchboard manager has also been created to guide the potential users of the database program. A start-up form was also included to introduce the purpose of the database. Indeed, the said database is by no means complete. Other information included in the three tables which are not yet filled up due to lack of time by the consultants. Nevertheless, these information, though necessary to fully complete the characterizations of the market packages, are not necessary in the conduct of the screening and the final selection of the market package. It is expected that the Department of Energy, which is target user of the said database, may complete the said database or may reduce the data requirements of the system according to its own needs in the future.

- **Data Manipulation and other Related Calculations**

Various data entry/editing forms have also been prepared for easy inputting and editing of the necessary data. Furthermore, several queries have also been prepared to extract relevant information from the tables. Some of these queries have been utilized to calculate additional data entries to the said tables.

The most important part of the database program is the form named as "**Screening 4**" which was used to calculate the rating of the various market packages identified after the conduct of the 3-tier screening process. A special routine written in Visual Basic programming language was prepared to automatically calculate the rating points for each municipality-market package. The calculations used in the said routine have been based on the criteria previously made for the ranking of the market packages. The "Screening 4" Form has also the capability to store the calculation results done by the Visual Basic routine. Further, a separate query has been made to rank the 87 market packages according to the total rating points received based on the criteria. The table generated by the query can easily be extracted to MS Excel spreadsheet file.

In general, the rating system for the prioritization 87 market packages uses the a linearized ranking criteria, which means that the score given for each package in each criterion is based on the linear proportions among the attribute values of all the packages being rated. Thus, the following procedures have been adopted in the preparation of the Visual Basic routine for said rating system. First, the maximum and the minimum rating points are defined for each criterion. This serves as the rating limit for each criterion. Said points can be represented as P1 (X1, Y1) and P2 (X2, Y2), respectively. The abscissa (x axis) is the measure or the attribute value of a particular criterion while the ordinate (y axis) represents the rating points or scores which will be calculated in the process. If there is no maximum and minimum rating points that can easily be identified with sense, the median of the available data were used to identify them. Based on the two said points, the rating equation is constructed mathematically by the simple linear equation in the form of:

$$\boldsymbol{Y_i = m * X_i + b}$$

Where:

$m = (Y_2 - Y_1) / (X_2 - X_1)$; and,
$b = Y_1 - M*X_1 = Y_2 - M*X_2$.
i = index number for each market package.

The program routine is based on the above equation. The assignment of values uses the rules shown in Table 10. Thus, each of the six criteria in the ranking of the market packages has its own set of equation consistent with the said rules.

Table 10. General Rule for the Rating Equation

Interval	Point
Below Range	Y = Minimum point
Within the range (Between or equal to X1 and X2)	$\boldsymbol{Y_i = m * X_i + b}$
Above the range	Y = Maximum point

CHAPTER 6

Conclusions

86. Preliminary review and assessment of relevant statistics show that non-electrified barangays can be clustered and grouped into market packages that may be potentially attractive to private investors.

87. Due to the very large service area coverage of certain electric cooperatives, there are municipalities with very high economic growth potentials that have remained poorly energized. Examples of these municipalities are Baggao, Cagayan and San Mariano, Isabela.

88. Targeted and coordinated efforts to address rural off-grid electrification may lead to the expeditious provision of electricity services to the non-electrified barangays. A consultation with officials of concerned electric cooperatives revealed their willingness to waive or better yet, to collaborate with a third party to facilitate the energization of the remaining non-electrified barangays in their area coverage.

Recommendations:

89. A market package is redefined in this paper as a municipality-based grouping of all non-electrified barangays in that municipality. If a waiver can be successfully secured from the concerned EC, the municipality will then be under two service providers, the EC and the new private investor.

    Hypothetically, it will be more efficient to put a service area (a municipality) under one management. Municipalities which have been electrified by the ECs (one barangay electrified) simply to comply with the thrust of 100% energization at the municipal level may see the prospects of service expansion as dim.

    It is viewed, therefore, that there is merit in certain municipalities for the EC to waive its rights over the whole municipality. Asset disposal/turn over, among other concerns, may be a barrier.

    It is recommended that a policy study be done to look into the legal and operational aspect of turning over the whole municipality to the new energy delivery partner.

90. There are 163 short-listed municipal market packages that may be potentially attractive to private sector investors. However, due to time limitations and the availability of salient information, only 87 (out of the 163 market packages) were further characterized.

It is recommended that a characterization of the remaining 76 municipal market packages be done. This can be done two ways:

- *Using the NSO FIES data sets but data extracted to the barangay and municipal levels;*
- *Conduct of a mini- survey that can be done by the Affilliated Noncon Energy Centers.*

91. *It is recommended that methodology of identifying market packages be also applied to the other regions that have not been covered by this Task.*

Annex A

STATISTICS

Annex A-2. Basic Statistics on the 87 Municipal Market Packages

Market Package Number	Region	Province	Electric Cooperative	Level of Energization	Municipality	Coverage Barangays	Barangays Energized	Barangays Unenergized	% Energized
1	2	Cagayan	CAGELCO I	74%	Baggao	48	23	25	48%
2					Sto. Niño (Faire)	29	13	16	45%
3		Isabela	ISELCO II	75%	Benito Soliven	29	8	21	28%
4					Divilican	12	1	11	8%
5					Naguilian	25	14	11	56%
6					Palanan	17	5	12	29%
7					San Mariano	36	12	24	33%
8		Nueva Vizcaya	NUVELCO	70%	Kasibu	30	12	18	40%
9					Kayapa	30	10	20	33%
10	5	Camarines Sur	CASURECO I	79%	Ragay	38	27	11	71%
11			CASURECO IV	83%	Caramoan	49	33	16	67%
12		Albay	ALECO	73%	Bacacay	56	35	21	63%
13					Guinobatan	44	32	12	73%
14					Jovellar	23	10	13	43%
15					Libon	47	29	18	62%
16					Oas	53	29	24	55%
17					Rapu-Rapu	34	4	30	12%
18		Sosogon	SORECO II	88%	Donsol	51	34	17	67%
19		Masbate	MASELCO	32%	Baleno	24	10	14	42%
20					Balud	32	1	31	3%
21					Cataingan	36	8	28	22%
22					Dimasalang	20	7	13	35%
23					Esperanza	20	4	16	20%
24					Mandaon	26	8	18	31%
25					Masbate	30	17	13	57%
26					Milagros	27	12	15	44%
27					Mobo	29	16	13	55%
28					Palanas	24	8	16	33%
29					Pio V. Corpuz	18	7	11	39%
30					Uson	35	16	19	46%

Annex A-2. Basic Statistics on the 87 Municipal Market Packages

Market Package Number	Region	Province	Electric Cooperative	Level of Energization	Municipality	Coverage Barangays	Barangays Energized	Barangays Unenergized	% Energized
31	6	Aklan	AKELCO	76%	Madalag	25	3	22	12%
32		Antique	ANTECO	64%	Barbaza	39	17	22	44%
33					Culasi	44	31	13	70%
34					Patnongon	36	17	19	47%
35					San Remigio	45	18	27	40%
36					Sibalom	76	54	22	71%
37					T. Fornier	50	28	22	56%
38					Valderrama	22	8	14	36%
39		Capiz	CAPELCO	82%	Dumarao	33	18	15	55%
40					Tapaz	58	26	32	45%
41		Iloilo	ILECO I	80%	Leon	85	62	23	73%
42					Maasin	50	34	16	68%
43					San Joaquin	85	39	46	46%
44					Tubungan	48	31	17	65%
45			ILECO II	77%	Dueñas	47	25	22	53%
46					Passi	51	38	13	75%
47			ILECO III	80%	Lemery	31	21	10	68%
48		Negros Occ	VRESCO	85%	Calatrava	40	22	18	55%
49	8	Leyte	LEYECO I	78%	Abuyog	63	32	31	51%
50					Burauen	76	38	38	50%
51					La Paz	35	25	10	71%
52		Southern Leyte	SOLECO	76%	Bontoc	40	27	13	68%
53					Tomas Oppus	29	18	11	62%
54		Northern Samar	NORSAMELCO	44%	Catarman	55	31	24	56%
55					Catubig	47	15	32	32%
56					Gamay	26	11	15	42%
57					Laoang	56	21	35	38%
58					Las navas	53	4	49	8%
59					Lavezares	26	14	12	54%
60					Lope de Vega	22	2	20	9%
61					Mondragon	24	13	11	54%
62					Palapag	32	14	18	44%
63					Pambujan	26	12	14	46%

Annex A-2. Basic Statistics on the 87 Municipal Market Packages

Market Package Number	Region	Province	Electric Cooperative	Level of Energization	Municipality	Coverage Barangays	Barangays Energized	Barangays Unelectrified	% Energized
64	8	Samar	SAMELCO I	51%	Calbayog City	87	45	42	52%
65					Gandara	69	32	37	46%
66					San Jorge	41	18	23	44%
67					Tarangnan	41	21	20	51%
68			SAMELCO II	63%	Calbiga	41	27	14	66%
69					Daram	58	16	42	28%
70					Hinabangan	21	10	11	48%
71					Zumarraga	25	14	11	56%
72		Eastern Samar	ESAMELCO	58%	Arteche	20	7	13	35%
73					Borongnan	61	42	19	69%
74					Can-Avid	28	17	11	61%
75					Guiuan	60	34	26	57%
76					Salcedo	41	20	21	49%
77	9	Zamboanga Norte	ZANECO	60%	Katipunan	30	16	14	53%
78					Sergio Osmeña	39	5	34	13%
79		Zamboanga Sur	ZAMSURECO I	56%	Aurora	42	28	14	67%
80					Midsalip	33	13	20	39%
81					Sominot (D.M. Marcos)	18	7	11	39%
82					Tambulig	31	20	11	65%
83					Tigbao	18	8	10	44%
84			ZAMSURECO II	49%	Bayog	28	9	19	32%
85					Tungawan	25	12	13	48%
86					Titay	29	15	14	52%
87					Sibuco, Zamb. Norte	28	2	26	7%

Annex A-3. Prioritization of 87 Municipal Market Packages

M.P. #	Municipality	No. of HH in unenergized Barangays	Points	HH Income	Points	HH Energy Expenditures	Points	HH Disposable Income	Points	Population Density	Points	Municipality Class	Points	Total Points	Ranking
1	Baggao	3750	23.10	76,270.00	10.00	128.84	9.63	27,058.89	15.00	4.07	2.90	1st	20	80.63	5
2	Sto. Niño (Faire)	1630	8.17	37,862.50	7.83	87.74	4.23	11,468.25	12.26	3.18	2.25	4th	12	46.74	48
3	Benito Soliven	2267	12.65	58,991.31	10.00	119.05	8.34	31,976.36	15.00	13.59	9.85	5th	9	64.85	18
4	Divilican	426	2.50	32,130.78	5.77	144.52	11.69	10,067.55	10.40	2.15	1.50	5th	9	40.85	59
5	Naguilian	961	3.46	26,347.50	3.69	120.72	8.56	6,618.25	5.80	5.66	4.06	5th	9	34.57	73
6	Palanan	1607	8.01	31,943.50	5.70	131.04	9.92	10,486.75	10.95	1.83	1.50	3rd	15	51.08	40
7	San Mariano	3133	18.75	63,622.67	10.00	155.46	13.12	30,404.83	15.00	2.13	1.50	1st	20	78.38	7
8	Kasibu	2083	11.36	25,437.24	3.36	127.05	9.39	4,951.45	3.58	5.81	4.17	4th	12	43.87	55
9	Kayapa	2243	12.49	43,260.25	9.77	92.40	4.85	9,406.25	9.51	4.66	3.33	4th	12	51.94	38
10	Ragay	1056	4.13	38,816.79	8.17	119.25	8.37	7,505.89	6.98	3.86	2.75	3rd	15	45.40	51
11	Caramoan	0	0.00	43,480.40	9.84	114.35	7.73	12,802.96	14.04	0.00	0.00	4th	12	43.61	56
12	Bacacay	3537	21.60	40,320.18	8.71	193.00	15.00	5,004.31	3.65	31.52	15.00	4th	12	75.96	9
13	Guinobatan	2272	12.69	41,545.73	9.15	135.76	10.54	7,184.43	6.55	11.19	8.10	2nd	18	65.03	---
14	Jovellar	1988	10.69	32,585.00	5.93	124.03	9.00	5,361.58	4.12	18.86	13.70	5th	5	48.44	45
15	Libon	3230	19.44	32,850.41	6.03	108.30	6.93	5,705.14	4.58	17.42	12.65	3rd	15	64.63	19
16	Oas	4226	25.00	34,743.15	6.71	114.35	7.73	9,570.83	9.73	15.58	11.30	3rd	15	75.47	11
17	Rapu-Rapu	4181	25.00	37,846.15	7.82	151.54	12.61	4,366.69	2.80	25.84	15.00	4th	12	75.23	12
18	Donsol	1160	4.86	32,556.65	5.92	106.03	6.64	6,568.05	5.73	3.22	2.28	4th	12	37.43	70
19	Baleno	1160	4.86	29,946.76	4.98	126.57	9.33	7,481.74	6.95	6.86	4.94	5th	9	40.06	61
20	Balud	4622	25.00	40,974.30	8.94	186.08	15.00	11,915.58	12.86	22.76	15.00	4th	12	88.80	1
21	Cataingan	5170	25.00	29,504.50	4.83	102.25	6.14	1,122.84	1.50	25.29	15.00	4th	12	64.46	20
22	Dimasalang	1771	9.16	42,313.03	9.43	122.50	8.80	8,998.63	8.97	14.76	10.70	5th	9	56.06	30
23	Esperanza	3085	18.42	30,582.78	5.21	251.54	15.00	4,516.51	3.00	38.23	15.00	5th	9	65.63	16
24	Mandaon	3145	18.84	39,613.64	8.46	188.86	15.00	3,810.99	2.06	11.20	8.11	4th	12	64.46	21
25	Masbate	2711	15.78	40,280.62	8.70	90.77	4.63	7,748.56	7.31	15.09	10.95	2nd	18	65.36	17
26	Milagros	3298	19.92	46,835.97	10.00	147.38	12.06	13,153.16	14.51	5.83	4.19	3rd	15	75.67	10
27	Mobo	1110	4.51	33,339.20	6.20	100.77	5.94	3,824.58	2.08	7.48	5.39	5th	9	33.12	75
28	Palanas	2630	15.21	43,913.09	10.00	157.59	13.40	5,745.70	4.64	15.37	11.15	5th	9	63.40	23
29	Pio V. Corpuz	2015	10.88	33,066.27	6.10	149.00	12.27	1,022.88	1.50	19.10	13.87	5th	9	53.63	35
30	Uson	3292	19.87	23,448.87	2.65	79.38	3.14	6,042.31	5.03	20.17	14.65	4th	12	57.35	28

Annex A-3. Prioritization of 87 Municipal Market Packages

M.P. #	Municipality	No. of HH in unenergized Barangays	Points	HH Income	Points	HH Energy Expenditures	Points	HH Disposable Income	Points	Population Density	Points	Municipality Class	Points	Total Points	Ranking
31	Madalag	2161	11.91	30,940.85	5.34	90.20	4.56	7,668.10	7.20	9.22	6.66	5th	9	44.67	53
32	Barbaza	710	2.50	9,972.17	1.00	71.48	2.10	799.37	1.50	5.95	4.27	5th	9	20.37	84
33	Culasi	1149	4.78	15,401.60	1.00	77.22	2.85	3,790.50	2.03	5.98	4.30	4th	12	26.96	80
34	Patnongon	1670	8.45	18,980.33	1.05	71.95	2.16	5,780.45	4.68	13.24	9.59	4th	12	37.94	65
35	San Remigio	2202	12.20	14,190.20	1.00	43.43	1.50	7,202.35	6.58	7.56	5.45	4th	12	38.72	64
36	Sibalom	1451	6.91	25,167.15	3.27	91.79	4.77	7,876.38	7.48	5.88	4.22	3rd	15	41.64	57
37	T. Fornier	1515	7.36	19,649.96	1.29	94.93	5.18	4,635.01	3.16	13.56	9.83	5th	9	35.81	72
38	Valderrama	1482	7.13	7,678.75	1.00	75.14	2.58	552.00	1.50	5.05	3.62	5th	9	24.82	81
39	Dumarao	2547	14.63	42,811.50	9.60	115.46	7.87	17,387.40	15.00	10.88	7.87	4th	12	66.98	15
40	Tapaz	4298	25.00	16,792.65	1.00	53.52	1.50	2,911.40	1.50	12.81	9.28	3rd	15	53.28	36
41	Leon	1102	4.45	28,207.60	4.36	147.70	12.10	8,634.50	8.49	7.86	5.67	4th	12	47.07	46
42	Maasin	1939	10.35	27,267.25	4.02	80.64	3.30	911.05	1.50	12.38	8.97	4th	12	40.14	60
43	San Joaquin	2061	11.20	16,278.99	1.00	98.72	5.68	3,360.82	1.50	8.91	6.43	4th	12	37.81	67
44	Tubungan	516	2.50	15,603.25	1.00	68.67	1.73	4,495.90	2.97	15.04	10.91	5th	9	28.11	79
45	Dueñas	2110	11.55	39,839.05	8.54	80.88	3.33	10,489.10	10.96	23.31	15.00	4th	12	61.38	25
46	Passi	4350	25.00	51,137.90	10.00	215.90	15.00	18,558.06	15.00	17.35	12.59	2nd	18	95.59	---
47	Lemery	915	3.13	35,574.36	7.01	96.95	5.44	15,049.10	15.00	7.63	5.50	5th	9	45.08	52
48	Calatrava	5810	25.00	28,892.82	4.61	107.51	6.83	10,220.32	10.60	11.52	8.34	2nd	18	73.37	13
49	Abuyog	1936	10.32	27,969.18	4.27	95.06	5.20	3,482.23	1.62	6.57	4.73	2nd	18	44.14	54
50	Burauen	2915	17.22	27,615.76	4.15	74.19	2.46	3,971.98	2.27	16.38	11.89	3rd	15	52.98	37
51	La Paz	77	2.50	26,177.30	3.63	146.89	12.00	11,696.63	12.57	0.45	1.50	5th	9	41.19	58
52	Bontoc	545	2.50	18,852.65	1.00	78.74	3.05	4,541.55	3.03	5.34	3.83	5th	9	22.41	82
53	Tomas Oppus	918	3.15	31,374.04	5.50	43.41	1.50	10,247.68	10.64	10.80	7.81	5th	9	37.60	69
54	Catarman	2615	15.11	28,747.75	4.55	103.50	6.30	3,405.69	1.52	4.63	3.31	2nd	18	48.79	44
55	Catubig	3407	20.68	38,635.00	8.10	150.18	12.43	9,060.10	9.05	12.33	8.93	4th	12	71.20	14
56	Gamay	1755	9.05	37,003.70	7.52	153.56	12.87	8,117.70	7.80	15.25	11.06	5th	9	57.30	29
57	Laoang	3466	21.10	39,577.64	8.44	171.47	15.00	11,098.92	11.77	16.14	11.71	3rd	15	83.02	2
58	Las navas	4357	25.00	37,764.84	7.79	213.15	15.00	9,558.68	9.72	20.67	15.00	5th	9	81.51	4
59	Lavezares	1114	4.54	37,412.70	7.67	91.87	4.78	6,039.35	5.03	9.32	6.73	5th	9	37.74	68
60	Lope de Vega	1386	6.45	28,624.87	4.51	110.97	7.28	5,162.52	3.86	7.93	5.72	6th	5	32.82	76
61	Mondragon	961	3.46	40,033.95	8.61	169.72	14.99	12,366.67	13.46	3.33	2.36	4th	12	54.88	32
62	Palapag	1693	8.61	33,357.61	6.21	135.10	10.45	10,043.78	10.36	9.43	6.81	5th	9	51.45	39
63	Pambujan	1561	7.68	43,004.32	9.67	128.07	9.53	10,115.16	10.46	10.08	7.29	5th	9	53.63	34

Annex A-3. Prioritization of 87 Municipal Market Packages

M.P. #	Municipality	No. of HH in unenergized Barangays	Points	HH Income	Points	HH Energy Expenditures	Points	HH Disposable Income	Points	Population Density	Points	Municipality Class	Points	Total Points	Ranking
64	Calbayog City	2481	14.16	20,703.25	1.66	76.57	2.77	4,813.15	3.39	2.75	1.94	3rd	15	38.93	62
65	Gandara	2218	12.31	21,910.40	2.10	84.24	3.78	4,769.75	3.34	5.12	3.67	4th	12	37.19	71
66	San Jorge	973	3.54	18,556.90	1.00	79.68	3.18	2,256.81	1.50	4.03	2.87	5th	9	21.09	83
67	Tarangnan	2165	11.94	33,449.63	6.24	151.40	12.59	10,021.28	10.33	16.78	12.18	5th	9	62.28	24
68	Calbiga	825	2.50	32,292.35	5.83	86.45	4.07	5,049.10	3.71	2.91	2.05	4th	12	30.16	77
69	Daram	4637	25.00	39,938.37	8.57	148.11	12.16	5,002.53	3.65	44.85	15.00	4th	12	76.38	8
70	Hinabangan	726	2.50	20,081.65	1.44	66.57	1.50	3,391.55	1.50	1.95	1.35	4th	12	20.30	85
71	Zumarraga	1385	6.44	34,164.42	6.50	163.54	14.18	4,422.24	2.87	36.84	15.00	5th	9	54.00	32
72	Arteche	1232	5.37	41,675.44	9.20	150.47	12.47	15,085.78	15.00	6.76	4.86	5th	9	55.89	31
73	Borongnan	1523	7.42	28,102.05	4.32	124.21	9.02	5,626.00	4.48	3.37	2.39	2nd	18	45.63	50
74	Can-Avid	1271	5.64	43,170.56	9.73	181.45	15.00	5,364.72	4.13	4.64	3.32	5th	9	46.82	47
75	Guiuan	2755	16.09	49,365.85	10.00	174.42	15.00	13,165.48	14.52	65.13	15.00	4th	12	82.61	3
76	Salcedo	1842	9.66	28,136.70	4.33	130.00	9.78	3,846.58	2.11	15.80	11.46	5th	9	46.35	49
77	Katipunan	3002	17.83	25,792.35	3.49	73.05	2.31	12,210.63	13.25	15.29	11.09	4th	12	59.97	26
78	Sergio Osmeña	4020	25.00	22,529.00	2.32	53.64	1.50	13,523.20	15.00	7.40	5.33	3rd	15	64.15	22
79	Aurora	0	0.00	20,614.68	1.63	58.02	1.50	10,621.80	11.13	0.00	0.00	3rd	15	29.27	78
80	Midsalip	2250	12.54	26,998.43	3.93	74.09	2.44	13,025.33	14.34	12.13	8.78	5th	9	51.03	41
81	Sominot (D.M. Marcos)	1203	5.16	26,961.36	3.91	62.83	1.50	13,328.89	14.74	0.00	0.00	5th	9	34.32	74
82	Tambulig	1260	5.56	29,200.30	4.72	99.22	5.74	12,786.68	14.02	9.40	6.79	4th	12	48.83	43
83	Tigbao	1093	4.39	38,281.63	7.98	66.90	1.50	19,351.39	15.00	0.00	0.00	5th	9	37.86	66
84	Bayog	1830	9.58	21,595.95	1.99	42.90	1.50	8,656.55	8.52	7.14	5.14	4th	12	38.72	63
85	Tungawan	2238	12.45	25,584.55	3.42	99.79	5.82	11,258.95	11.98	10.29	7.44	5th	9	50.11	42
86	Titay	2395	13.56	35,915.38	7.13	97.50	5.52	12,315.03	13.39	9.25	6.68	4th	12	58.27	27
87	Sibuco, Zamb. Norte	3905	24.19	61,617.05	16.36	116.26	7.98	28,394.64	15.00	5.10	3.65	4th	12	79.18	6

Annex A-4. The 25 Prioritized NRE Municipal Market Packages

M.P. #	Province	Municipality	% Energized	No. of HH	HH Income	HH Energy Exp'ditures	HH Disposable Income	Population Density	Municipality Class
1	Cagayan	Baggao	48%	3750	76,270.00	128.84	27,058.89	4.07	1st
2	Isabela	Benito Soliven	28%	2267	58,991.31	119.05	31,976.36	13.59	5th
3		San Mariano	33%	3133	63,622.67	155.46	30,404.83	2.13	1st
4	Albay	Bacacay	63%	3537	40,320.18	193.00	5,004.31	31.52	4th
5		Libon	62%	3230	32,850.41	108.30	5,705.14	17.42	3rd
6		Oas	55%	4226	34,743.15	114.35	9,570.83	15.58	3rd
7		Rapu-Rapu	12%	4181	37,846.15	151.54	4,366.69	25.84	4th
8	Masbate	Balud	3%	4622	40,974.30	186.08	11,915.58	22.76	4th
9		Cataingan	22%	5170	29,504.50	102.25	1,122.84	25.29	4th
10		Esperanza	20%	3085	30,582.78	251.54	4,516.51	38.23	5th
11		Mandaon	31%	3145	39,613.64	188.86	3,810.99	11.20	4th
12		Masbate	57%	2711	40,280.62	90.77	7,748.56	15.09	2nd
13		Milagros	44%	3298	46,835.97	147.38	13,153.16	5.83	3rd
14		Palanas	33%	2630	43,913.09	157.59	5,745.70	15.37	5th
15	Capiz	Dumarao	55%	2547	42,811.50	115.46	17,387.40	10.88	4th
16	Iloilo	Dueñas	53%	2110	39,839.05	80.88	10,489.10	23.31	4th
17	Negros Occ	Calatrava	55%	5810	28,892.82	107.51	10,220.32	11.52	2nd
18	N. Samar	Catubig	32%	3407	38,635.00	150.18	9,060.10	12.33	4th
19		Laoang	38%	3466	39,577.64	171.47	11,098.92	16.14	3rd
20		Las navas	8%	4357	37,764.84	213.15	9,558.68	20.67	5th
21	Samar	Tarangnan	51%	2165	33,449.63	151.40	10,021.28	16.78	5th
22		Daram	28%	4637	39,938.37	148.11	5,002.53	44.85	4th
23	E. Samar	Guiuan	57%	2755	49,365.85	174.42	13,165.48	65.13	4th
24	Zamb. Norte	Sergio Osmeña	13%	4020	22,529.00	53.64	13,523.20	7.40	3rd
25		Sibuco	7%	3905	61,617.05	116.26	28,394.64	5.10	4th

Annex B

CHRONICLE OF CONSULTATIONS AND MEETINGS

CHRONICLE OF CONSULTATIONS AND MEETINGS HELD

Date		Attendees	Subject	Discussions/Agreements
1	March 7, 2001	R. T. Quejas	Criteria and	▪ Brainstorming on relevant considerations/criteria
		F. V. Arriola	Methodology	▪ Identification of data requirements and sources of information
		R. T. Padrique		
		G. C. Zamudio		▪ General approach/methodology
2	March 9, 2001	R. Abergas	SPUG Activities	▪ On-going and planned electrification activities
		R. Barruela	Criteria	▪ Criteria used in PV projects
				▪ Other related matters
3	March 13, 2001	N. Irorita	NEA Data and Plans	▪ Level of data available at NEA
		M. Soriano		▪ O-Ilaw Program (Status and Plans)
				▪ General information on the ECs
4	March 13, 2001	DILG	Provincial , municipal	▪ Basic statistics
			information	▪ Projects and plans
5	March 16, 2001	M. Soriano	Preliminary methodology	▪ Special considerations to be given to barangays
		NEA-Planning Staff		scheduled for electrification on 2003 - 2004
				▪ Recognition of presence of informal electricity
				Providers in declared non-electrified barangays
6	March 23, 2001	R. T. Quejas	DPEM Consultation	▪ Methodology on identifying market packages
		F. V. Arriola	in Northern Samar	▪ Preliminary results on market packages
		R. T. Padrique		▪ DPEM presentation materials
		A. Pamintuan	Market Packages	▪ Arrangements on the LGU consultations
		DPEM Team		
7	March 26 - 30	DPEM Team	LGU Consultation in	▪ Rural Electrification Program and Activities
		R. T. Padrique	Northern Samar (Provincial)	▪ Market Packages
		M. Celi	Laoang, N. Samar (Municipal)	▪ Technical and Financial Assistance
				▪ Feedback from the LGU officials
				▪ Level of acceptance of LGU officials

CHRONICLE OF CONSULTATIONS AND MEETINGS HELD

Date		Attendees	Subject	Discussions/Agreements
8	April 18, 2001	G. Yeneza (Task 1)	Standard Franchise Waiver Agreement	▪ SFWA presented by G. Yeneza
		W. Ballesteros (PHILRECA)		▪ General sentiment by ECs that agreement will be interim in nature
		L. Natividad (MASELCO)		
		L. Lim (ANTECO)	Methodology in identifying Market Packages	▪ Clarifications made on obligations of private sector to the EC while SFWA is effective
		D. Davila (VRESCO)		
		F. Savellano (ISELCO II)		▪ The methodology/criteria used in identifying
		P. Rosales (SAMELCO II)	Market packages identified	the market packages is generally acceptable
		O. Pueblos (SAMELCO I)		▪ For most of the preliminary municipal market
		R. Merro (DORELCO)		packages identified, the concerned ECs present
		P. Flores (NUVELCO)		during the consultation are willing to waive the
		E. Bassig (CAGELCO I)		their rights over the areaa
		W. Billena (ILECO I)		▪ Specific to Baggao, Cagayan, the EC Manager
		G. Altamira (ILECO III)		expressed refusal to waive their franchise over
		G. Tordesillas (CAGELCO II)		the area. Baggao is a growth area.
		E. Castor (ZANECO)		▪ ECs cited additional areas recommended for
				private sector operations
9	May 4, 2001	A. Mercado	Methodology	▪ General acceptance and concurrence on the
		M. Soriano	Market Packages identified	Methodology and the criteria used
10	June 14, 2001	D. A. E. Bueno (NEA)	Evaluation Meeting for all the TA tasks	▪ Clarification on the use of the Municipal
		C. Calderon (USAID)		Energization Index
		C. Tatlonghari (USAID)		▪ Redefinition of market packages from cluster of
		F. A. Benito (DOE)		barangays to municipal-based grouping
		A. Pamintuan (PA)		▪ Intent of the regional prioritization
		M. Celi (PA)		▪ Clarification on the non-inclusion of ARMM
		R. T. Padrique (DOE-NCED)		as a prioritized region in the identification of
		TA Consultants		market packages

Annex C

WEEKLY STATUS REPOTS

<table>
<tr><td>Project Title</td><td colspan="3">TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification</td></tr>
<tr><td>Task No</td><td colspan="3">#3 - Identifying The Market Packages</td></tr>
<tr><td>Donor Agency</td><td>USAID</td><td>Contractor</td><td>Renato T. Goco
Chief of Party
PA Government Services, Inc.</td></tr>
<tr><td>Weekly Status Report No.</td><td>1</td><td>Date of Submission</td><td>12 March 2001</td></tr>
<tr><td>Subcontractor / Consultant</td><td colspan="3">Arlene S.M. Lafrades</td></tr>
</table>

A. Programmed Activity/ies

Establishing criteria and methodology for determining a market package

- Draft report End of week 2
- Final Report End of week 3

B. Activities Undertaken

- Recruitment and mobilization of research assistant/s

- Meetings and initial discussions with DOE-EUMB-NCED and NPC

  Meetings and discussions with various officials of DOE-EUMB-NCED were done. The salient discussions points during the meetings are: (1) status of the O-Ilaw Program, (2) relevant insights of the Market Assessment and the Barangay Profiling and (3) clarifications on the task. A database on the status of the barangay electrification was gathered from NCED.

  A meeting with R. Abergas and R. Barruela of NPC was also held during the week. Current and planned undertakings of NPC on the barangay electrification and small island power development are the main items discussed. Likewise, some basic information on wind energy potential sites were gathered.

- Data/Information research and review

  The major documents and information being reviewed are (1) O-Ilaw Program Database, (2) Market Assessment for Rural Electrification, (3) Identification of Appropriate NRE Systems in Unelectrified Off-grid Barangays, (4) NEA Chronicle, (5) RE Market Assessment (UNDP-GEF DOE-ICEE PDF-B Project document), (6) Market Analysis for Off-Grid renewable Energy: An Approach to Better Analysis by Ron D. White

  Preliminary data processing and analyses

C. Next Activity/ies

- Meetings and consultations with NEA, NGO (Sibat), FIs (LBP), others
- Continue data processing and analyses
- Draft report on Criteria and Methodology for determining market packages

Project Title	**TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification**		
Task No	**#3 - Identifying The Market Packages**		
Donor Agency	**USAID**	Contractor	**Renato T. Goco** **Chief of Party** **PA Government Services, Inc.**
Weekly Status Report No.	2	Date of Submission	18 March 2001
Subcontractor/ Consultant	**Arlene S.M. Lafrades**		

A. Programmed Activity/ies

Establishing criteria and methodology for determining a market package

- Draft report End of week 2 (March 17, 2001)
- Final Report End of week 3 (March 23, 2001)

B. Activities Undertaken

- Review of Literatures

The major literatures reviewed are: (1) NEA Red Book, (2) REC Investment Analysis, (3) Market Assessment for Rural Electrification, (4) Identification of Appropriate NRE Systems in Unlectrified Off-grid Barangays, (5) the O-Ilaw Program, (6) MSIP acivities and accomplishments, (7) SPOTS Project, and (8) ER 1-94 Benefits to Energy Projects Host Communities.

The NEA Proposed Barangay Energization Schedule (2000-2004), commonly referred to as the Red Book (as of May 2000)[1] is a vital documents. Some of the salient information and insights gathered are:

- The original rural electrification plan covering 8 years to completely electrify the country has been revised and compressed to year 2004.
- The task of rural electrification is now shared by NEA with the other members of the energy family (DOE, NPC, and PNOC). The private sector, specifically the IPPs and some private individuals and entities extend financial support to the program.
- Only about 16% of unenergized barangays are candidates for NRE-based electrification systems per EC assessment
- High NRE-based electrification potential seen in Regions 2, 4, 6, 8, 12, 11 ARMM, and CAR

[1] A revised/updated version of the NEA Red Book is forthcoming.

- As validated by discussions with NEA officials, barangays that are candidate for NRE-based electrification are those barangays that have not been surveyed by the concerned ECs primarily due to remoteness and the rough terrain. In the Red Book, no Kilometers of Transmission/Distribution Line (1-Phase, Open secondary and Under-Built) is indicated.
- For barangays programmed to be connected to the grid, the ranges of kilometers of line to the nearest tapping point are as follows:
  - ✓ 1-Phase : 0.72kms - 19.00kms
  - ✓ Open Secondary Line : 0.09kms - 9.00kms
  - ✓ Under-built Line : 0.00kms - 15.00kms

Likewise, the REC Investment Analysis for each of the ECs provide very relevant information such as, grid expansion and rehabilitation plan, cost requirement and sources, energy sales and demand forecast by customer type, financial and economic evaluation, willingness to pay, among others.

The DOE/NCED-MEMSI Market Assessment for Rural Electrification and Barangay Profiling (Identification of Appropriate NRES in Unelectrified Off-Grid Barangays present wealth of information at the barangay level that are critical and useful to the activity.

Program/project documents of O-Ilaw, MSIP, SPOTS and ER 1-94 give good inputs on various NRE related activities in the country which are also vital to the identification of market packages.

- The activity covered 302 barangays systematically selected and surveyed 6,000 households

➢ Meetings and consultations with DOE-EUMB-NCED, NEA, DILG

Meetings and consultations with various officials of DOE-EUMB-NCED and MAD were done. The salient discussions points during the meetings are: (1) status of the O-Ilaw Program, (2) overview of MSIP and SPOTS projects and (3) status of the ER 1-94. Continous interfacing with NCED staff is ensured to achieve step - by - step transfer of skills.

Several visits and meetings with NEA Planning Department were done to gather information and validate insights and observations relevant to the task. On-site field practical information critical to the identification of criteria and methodology for developing market packages were shared.

Initial visit to DILG office was also made.

➢ Formulation of conceptual framework for identifying market packages

Initial processing of information gathered led to the formulation of the conceptual framework. A draft report is submitted for discussion and consultation.

- Preliminary simulation run of the criteria and methodology

  The regions prioritized are Regions 2, 4, 5, 6, 8, and 9. Likewise, there are about 63 municipalities shortlisted and will be subjected to further screening.

- Processing and generation of maps of 63 shortlisted municipalities
- To aid analysis, maps of the 63 municipalities are being prepared. This is particularly critical with regards to the criteria of contiguousness of barangays in a market package.

C. Next Activity/ies

- Consultations re: Draft Criteria and Methodology for Identifying Off-Grid Rural Electrification Market Packages
- Secondary data research and analysis
- Data processing and analyses
- Preparation of Final Report on Criteria and Methodology for Determining Market Packages

<table>
<tr><td>Project Title</td><td colspan="3">TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification</td></tr>
<tr><td>Task No</td><td colspan="3">#3 - Identifying The Market Packages</td></tr>
<tr><td>Donor Agency</td><td>USAID</td><td>Contractor</td><td>Renato T. Goco
Chief of Party
PA Government Services, Inc.</td></tr>
<tr><td>Weekly Status Report No.</td><td>3</td><td>Date of Submission</td><td>31 March 2001</td></tr>
<tr><td>Subcontractor/ Consultant</td><td colspan="3">Arlene S.M. Lafrades</td></tr>
</table>

A. Programmed Activity/ies

Establishing criteria and methodology for determining a market package

- Draft report — End of week 2 (March 18, 2001)
- Final Report — End of week 3 (March 24, 2001)

B. Activities Undertaken

- Consultation with key offices

The draft framework on 'Criteria and Methodology for Identifying Market Packages for Off-Grid Rural Electrification" was presented with the DOE, NEA and TA project team (i.e., USAID, PA, TA consultants).

The major comments gathered during the consultations are:

- Inclusion of unenergized barangays that are scheduled for electrificiation by year 2002 in the screening process;
- The final shortlisted regions are Regions 2, 5, 6, 8, and 9. Region 4 is classified among the least priority regions recognizing the many on-going efforts in the area.
- Further review of shortlisted municipalities in Region 2. Initially, Isabela is the lone province cited where potential market packages are located. Based on past experiences, candidate packages can be found in Cagayan and Nueva Ecija.
- Inclusion of the least-cost/benefit cost item in the criteria for ranking market packages identified. Recognizing the inadequacy of salient information to undertake a good least-cost/benefit cost analysis and through the representation of Mr. Quejas, the least-cost/benefit cost analysis is a bonus exercise. If at all possible, the result of the analysis may be used among other criteria for ranking the identified market packages.
- Inclusion of barangays reported by ECs as unenergized though field visits showed that they are energized through privately owned diesel gensets. These are observations shared by NEA and DOE-EUMB-NCED.

- Data Gathering

  - Continuation of gathering of secondary data relevant to the next step, i.e. identification of candidate market packages from Regions 2, 5, 6, 8, and 9.
  - Offices visited are DILG, NEA, DOF and NPC.

- Development of Computer-Aided Program for the Identification of Market Packages

  - A Microsoft Access Program is being developed which will be used in identifying the market packages. Salient parameters/criteria relevant to the screening and prioritization process are being inputted in the program.
  - Data entry in the program has been initiated and continuing as the data are gathered.

- Processing and generation of maps of 63 shortlisted municipalities

  - Processing and generation of maps of 63 shortlisted municipalities were continued. As a result of simulation runs, new municipalities are being identified and maps are likewise being generated.

C. Next Activities

- Secondary data research
- Data processing and analyses
- Participation in the LGU Consultations at Northern Samar, March 26 - 30, 2001

D. Concerns

- **Revision of Schedule of Deliverables.** The following changes on the schedule of deliverables are requested:
  - Long list of Market Packages : End of Wk 6 (vis-à-vis Mid Week 5)
  - Priority list of Market Packages : End of Wk 6 (vis-à-vis End of Wk 5)
  - Draft Document Market Brief : End of Wk 8 (vis-à-vis End of Wk 6)
  - Final Document Market Brief : End of Wk 9 (vis-à-vis End of Wk 7)
  - Terminal Report : End of Wk 10 (vis-à-vis End of Wk 8)

  The slide of one week on the original schedule for submission of output/s for Long list and priority list is due to the participation in the LGU Consultation in Northern Samar, March 26 - 30, 2001. The participation of the consultant was requested by DPEM and DOE.

  Likewise, during the field visit at Northern Samar, it was realized that gathering secondary socio-economic profiles of candidate municipalities is not an easy task. Thus, ample time is being requested to prepare the market brief of the 25 prioritized market packages.

Project Title	**TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification**		
Task No	**#3 - Identifying The Market Packages**		
Donor Agency	**USAID**	Contractor	**Renato T. Goco** **Chief of Party** **PA Government Services, Inc.**
Weekly Status Report No.	4	Date of Submission	2 April 2001
Subcontractor/ Consultant	**Arlene S.M. Lafrades**		

A. Programmed Activity/ies

Establishing criteria and methodology for determining a market package

- Final Report End of week 4 (March 31, 2001)

Processing of data for Long List of Market Packages

B. Activities Undertaken

- Participation to the LGU Consultation at Northern Samar, March 26 - 30, 2001

  During the LGU consultation, the undersigned acted as resource person for the "market packages" and other pertinent matters during the consultation. Administrative support was likewise provided.

- Data Gathering

  Socio-economic profiles and other pertinent information were gathered at the provincial and municipal levels. Visits to the provincial capitol, the municipal offices of Laoang and the provincial office of the DILG were made.

- Data Processing and Analyses

  Based on insights gathered during the consultation and the field visits to several offices, data processing and analyses were done to further fine-tune the criteria and methodology.

C. Next Activities

- Secondary data research
- Data processing and analyses
- Preparation of final report on Criteria and Methodology

D. Concerns

Refinements on the draft report on Criteria and Methodology will be done to take into consideration results of various consultations done including that of the LGU consultation in Northern Samar. These refinements will be discussed with DOE-EUMB-NCED.

The final report of the Criteria and Methodology will be submitted towards the end of week 5.

Project Title	**TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification**		
Task No	**#3 - Identifying The Market Packages**		
Donor Agency	**USAID**	Contractor	**Renato T. Goco** **Chief of Party** **PA Government Services, Inc.**
Weekly Status Report No.	5 & 6	Date of Submission	18 April 2001
Subcontractor/ Consultant	**Arlene S.M. Lafrades**		

A. Programmed Activity/ies

Establishing criteria and methodology for determining a market package

- Final Report — End of week 5 (April 7, 2001)
- Long List of Market Packages (MPs) — End of week 6 (April 12, 2001)
- Prioritized 25 NRE-based MPs — End of week 6 (April 12, 2001)

B. Activities Undertaken

- Continuing consultations/discussions with NEA and DOE on criteria and methodology

  Several consultations/discussions were held during the period and relevant insights and agreements were reached. These will be further elaborated in the final report of the "Criteria and Methodology for Identifying Market Packages".

- Data Processing and Analyses

  Updated reports on electrification status from NEA are now available and appropriate works were done on the databases. These information provided clearer picture on identification of candidate market packages that will be recommended for further investigation.

- Report Preparation

  The final write-up of the report on "Criteria and Methodology for Identifying Market Packages" was started during the period. Some items were not finished because in the course of data analysis, it was observed that certain agreements on criteria were not possible. Meeting with NEA and DOE will have to be done.

  (Note: Very few activities were undertaken during week 6 due to 3 holidays)

C. Next Activities

- Secondary data research for market briefs
- Data processing and analyses for prioritization of market packages
- Consultative Meeting with ECs

Project Title	**TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification**		
Task No	**#3 - Identifying The Market Packages**		
Donor Agency	**USAID**	Contractor	**Renato T. Goco** **Chief of Party** **PA Government Services, Inc.**
Weekly Status Report No.	8	Date of Submission	30 April 2001
Subcontractor/ Consultant	**Arlene S.M. Lafrades**		

A. Programmed Activity/ies

- Prioritization of Market Packages — End of Week 8 (April 29, 2001)
- Preparation of Draft Market Briefs — End of Week 9 (May 5, 2001)
- Final Draft of Market Briefs — End of Week 10 (May 12, 2001)
- Terminal Report — May 15, 2001

B. Activities Undertaken

- Data Processing and Analyses

Various simulation runs were done to come up with the prioritized 25 NRE-Based Market Packages. This activity further fine tune the methodology developed in identifying/prioritizing the market packages.

- Data Gathering for the Market Briefs

Based on other criteria that are already available, such as aggregate number of household, municipality classification (based on average annual income) and the household population density, a tentative prioritization can be done. The initial list of prioritized market packages will be the basis for secondary data gathering.

A template on the market brief/info kits will be prepared together with DOE to serve as the general format for the documents to be prepared.

C. Next Activities

- Data processing and analyses for prioritization of market packages
- Continuation of secondary data research for market briefs
- Preparation of market brief template
- Initial draft on the market packages

<table>
<tr><td>Project Title</td><td colspan="3">TA for Enhancing Private Sector Participation in RE Investments for Off-Grid Rural Electrification</td></tr>
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<tr><td>Donor Agency</td><td>USAID</td><td>Contractor</td><td>Renato T. Goco
Chief of Party
PA Government Services, Inc.</td></tr>
<tr><td>Weekly Status Report No.</td><td>9</td><td>Date of Submission</td><td>7 May 2001</td></tr>
<tr><td>Subcontractor/ Consultant</td><td colspan="3">Arlene S.M. Lafrades</td></tr>
</table>

A. Programmed Activity/ies

- Preparation of Draft Market Briefs — End of Week 9 (May 5, 2001)
- Final Draft of Market Briefs — End of Week 10 (May 12, 2001)
- Terminal Report — May 15, 2001

B. Activities Undertaken

- Data Gathering and Processing for the Market Briefs

  Materials and information gathered from DILG were reviewed. A visit to DPEM was also made to get relevant information on areas where consultations were done. Initial coordination with Dr. Capareda, project leader of MA, was also made to borrow municipal profiles gathered during the conduct of the survey. Selected ANECs are also involved in gathering information relevant to the market briefs.

- Preparation of the Draft Market Briefs

  A template has been prepared and about ten market briefs have been prepared. Provincial and municipal maps will be included in the market briefs.

C. Next Activities

- Continuation of secondary data research for market briefs
- Preparation of 25 market briefs/info kits

Annex D

PRESENTATION MATERIALS

Philippines Climate Change Mitigation Program

A Joint Program of the

Philippines Department of Energy | US Agency for International Development

Technical Assistance to DOE

Enhancing Private Sector Participation in Renewable Energy Investments for Off-Grid Rural Electrification

TASK 3

IDENTIFYING MARKET PACKAGES

TASK 3 DELIVERABLES

- Methodology for determining a market package
- Classification of market packages
  - Long-list of market packages (50 market packages)
  - 25 Prioritized RE-Based Off-grid Market Packages
- Market Briefs for 25 Prioritized Off-grid Market Packages
- Mentoring of DOE-EUMB staff on market packaging methodology

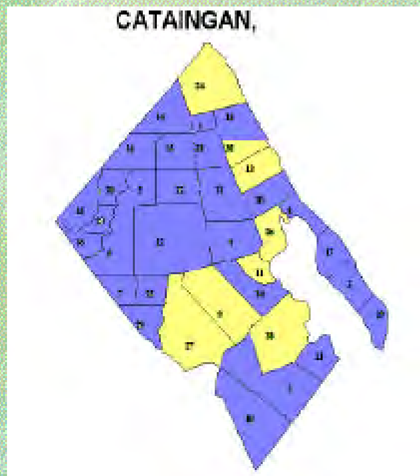
GUIDING PRINCIPLES IN DETERMINING A MARKET PACKAGE

- Social equity to access to electricity services
- Maximization of opportunities for private sector entry
- Efficiency in rural electrification

MARKET PACKAGES REDEFINED

- Initial Definition : “Cluster of ten or more non-electrified barangays with adequate number of base customers”

- Proposed Definition : “All non-electrified barangays in selected municipalities with adequate number of base customers”



1.Abaca	1.Matayum
2.Aguada	2.Matubinao
3.Badiang	3.Mintac
4.Bagumbayan	4.Nadawisan
5.Cadulawan	5.Osmena
6.Cagbatang	6.Pawican
7.Chimenea	7.Pitogo
8.Concepcion	8.Poblacion
9.Curvada	9.Quezon
10.Divisoria	10.San Isidro
11.Domorog	11.San Jose
12.Estampar	30.San Pedro
13.Gahit	31.San Rafael
14.Libtong	32.Santa Teresita
15.Liong	33.Santo Nino
16.Maanahao	34.Tagboan
17.Madamba	35.Tuybo
18.Malobago	36.Villa Pogado

LEGEND :

ENERGIZED

UNENERGIZED

Basic Statistics:

No. of electrified barangays: 8 Barangays

No. of non-electrified barangays: 28 Barangays

No. of HHs in non-electrified barangays : 5,488 HHs

Ave. No. of HHs in a non-electrified barangay: 196 HHs

REDEFINED MARKET PACKAGES Merits

- **Greater chances of achieving electrification targets**
- **Economy of scale of operation for private sector/ civil society cum LGU partnership**
- **Assist EC in achieving greater efficiency in providing electricity services to its customers**

METHODOLOGY
FOR IDENTIFYING MARKET PACKAGES

- Screening of non-electrified barangays
- Prioritization of shortlisted market packages

SCREENING OF NON-ELECTRIFIED BARANGAYS

Stages	Population/Sample	Criteria	Result/s
1 : Regional Shortlisting	Whole Philippines	Reg'l Energization Status; Security	Regions 2, 5, 6, 8 and 9
2 : Municipal Shortlisting			
- 1st Level	565 Municipalities/ Cities	MEI	259 Municipalities
- 2nd Level	259 Municipalities	10 or more non-electrified barangays	163 Municipalities
- 3rd Level	163 Municipalities	MA sample municipality	87 Municipalities

LONG LIST OF MP : 87 MUNICIPALITIES

MUNICIPAL ENERGIZATION INDEX (MEI)

- ratio of the municipal energization status to that of the national energization status measured at the barangay level
- indicator used to identify candidate off-grid municipalities
- Eg. Cataingan, Masbate

Municipal Energization Status : 22%
National Energization Status : 77%
MEI : 0.29

PROFILE OF 163 CANDIDATE OFF-GRID MUNICIPALITIIES

- **Geographical Distribution**
  - Region 2 : 15 municipalities
  - Region 5 : 32 municipalities
  - Region 6 : 25 municipalities
  - Region 8 : 50 municipalities
  - Region 9 : 41 municipalities
- **Electric Cooperatives**
  - Region 2 : Five ECs (CAGELCO I/II, ISELCO I/II, NUVELCO)
  - Region 5 : Eight ECs (CANORECO, CASURECO I/III/IV, ALECO, MASELCO, SORECO II,TISELCO)
  - Region 6 : Seven ECs (AKELCO, ANTECO, CAPELCO, ILECO I/II/III and VRESCO
  - Region 8 : Seven ECs (LEYECO I, NORSAMELCO, ESAMELCO, SAMELCO I/II, SOLECO
  - Region 9 : Four ECs (ZANECO, ZAMSURECO I/II, BASELCO)

PROFILE OF 163 CANDIDATE OFF-GRID MUNICIPALITIES

- **Level of Energization**
  - **< 20 % : 19 municipalities**
  - **21 % - 40 % : 46 municipalities**
  - **41 % - 60 % : 61 municipalities**
  - **61 % - 76% : 37 municipalities**
- **Number of Non-Electrified Barangays**
  - **10 - 15 non-electrified barangays : 77 municipalities**
  - **16 - 20 non-electrified barangays : 39 municipalities**
  - **21 - 25 non-electrified barangays : 22 municipalities**
  - **26 - 30 non-electrified barangays : 10 municipalities**
  - **> 30 non-electrified barangays : 15 municipalities**

PRIORITIZATION OF MARKET PACKAGES

Parameters	Weights/Points
No. of HHs in non-electrified barangays	25 points
HH energy expenditures	15 points
HH disposable income	15 points
HH total income	10 points
HH population density	15 points
Municipal financial capacity	20 points

25 PRIORITIZED MARKET PACKAGES

Region 2: Baggao, Cagayan
Benito Soliven, Isabela
San Mariano, Isabela

Region 5: Bacacay, Albay
Libon, Albay
Oas, Albay
Rapu-Rapu, Albay
Balud, Masbate
Cataingan, Masbate
Esperanza, Masbate
Masbate, Masbate
Mandaon, Masbate
Milagros, Masbate
Palanas, Masbate

Region 6: Dumarao, Capiz
Dueñas, Iloilo
Calatrava, Negros Occ.

Region 8: Catubig, N. Samar
Las Navas, N. Samar
Laoang, N. Samar
Tarangnan, W. Samar
Daram, W. Samar
Guiuan, E. Samar

Region 9: S.Osmeña Sr., Zamb. Norte
Sibuco, Zamb. Norte

PROFILE OF 25 PRIORITIZED MARKET PACKAGES

Geographical Distribution

- **Region 2 : Three (3) municipalities**
- **Region 5 : Eleven (11) municipalities**
- **Region 6 : Three (3) municipalities**
- **Region 8 : Six (6) municipalities**
- **Region 9 : Two (2) municipalities**

Electric Cooperatives

- **Region 2 : Two (2) ECs (CAGELCO I, ISELCO II)**
- **Region 5 : Two (2) ECs (ALECO, MASELCO)**
- **Region 6 : Three (3) ECs (CAPELCO, ILECO II and VRESCO)**
- **Region 8 : Four (4) ECs (NORSAMELCO, ESAMELCO, SAMELCO I/II)**
- **Region 9 : Two (2) ECs (ZANECO, ZAMSURECO II)**

PROFILE OF 25 PRIORITIZED MARKET PACKAGES

- **Level of Energization**
  - < 20 % : Six (6) municipalities
  - 21 % - 40 % : Eight (8) municipalities
  - 41 % - 60 % : Nine (9) municipalities
  - 61 % - 76% : Two (2) municipalities
- **Number of Non-Electrified Barangays**
  - 10 - 15 non-electrified barangays : Three (3) municipalities
  - 16 - 20 non-electrified barangays : Six (6) municipalities
  - 21 - 25 non-electrified barangays : Six (6) municipalities
  - 26 - 30 non-electrified barangays : Four (4) municipalities
  - > 30 non-electrified barangays : Six (6) municipalities

PROFILE OF 25 PRIORITIZED MARKET PACKAGES

- **Aggregate Number of HHs in Non-Electrified Barangays**
  - 2,000 - 2,500 HHs : Three (3) municipalities
  - 2,501 - 3,000 HHs : Four (4) municipalities
  - 3,001 - 3,500 HHs : Seven (7) municipalities
  - > 3,500 HHs : Eleven (11) municipalities
- **Classsification of Municipality by DOF**
  - 1st Class Municipality : Two (2) municipalities
  - 2nd Class Municipality : Two (2) municipalities
  - 3rd Class Municipality : Five (5) municipalities
  - 4th Class Municipality : Eleven (11) municipalities
  - 5th Class Municipality : Five (5) municipalities

PROFILE OF 25 PRIORITIZED MARKET PACKAGES

Average Annual Household Income

- PhP 20,000 - PhP 30,000 : Three (3) municipalities
- PhP 30,001 - PhP 40,000 : Eleven (11) municipalities
- PhP 40,001 - PhP 50,000 : Seven (7) municipalities
- PhP 50,001 - PhP 60,000 : One (1) municipalities
- > PhP 60,000 : Three (3) municipalities

Average Monthly Household Energy Expenditures

- <PhP 100.00 : Three (3) municipalities
- PhP 100.00 - PhP 150.00 : Ten (10) municipalities
- PhP 150.01 - PhP 200.00 : Ten (10) municipalities
- PhP 200.01 - PhP 250.00 : One (1) municipalities
- > PhP 250.00 : One (1) municipalities

PROFILE OF 25 PRIORITIZED MARKET PACKAGES

Average Annual Household Disposable Income

- < PhP 5,000 : Four (4) municipalities
- PhP 5,000 - PhP 10,000 : Eight (8) municipalities
- PhP 10,001 - PhP 15,000 : Eight (8) municipalities
- PhP 15,001 - PhP 20,000 : One (1) municipalities
- PhP 20,001 - PhP 25,000 : None (0) municipalities
- > PhP 25,000 : Four (4) municipalities

25 PRIORITIZED MARKET PACKAGES World Bank Criteria

Municipalities to Qualify

- Baggao, Cagayan
  - 1st Class Municipality
  - 3,750 HHs
- San Mariano, Isabela
  - 1st Class Municipality
  - 3,133 HHs
- Masbate, Masbate
  - 2nd Class Municipality
  - 2,711 HHs
- Calatrava, Negros Occidental
  - 2nd Class Municipality
  - 5,810 HHs

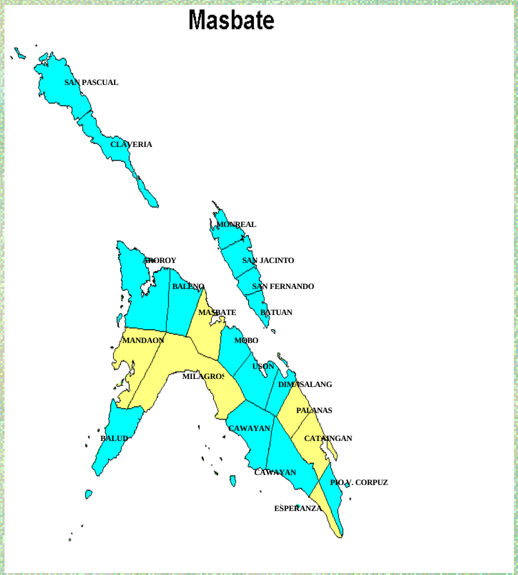
SAMPLE MARKET BRIEF OF MARKET PACKAGES (MP)

- Provincial map showing the municipal market packages
- Individual market brief template per MP
- Municipal map showing the electrified and non-electrified barangays
- RE resource maps (solar, wind, hydro)

MARKET PACKAGES

Masbate

M.P. # 8 : Balud
M.P. # 9 : Cataingan
M.P. # 10 : Esperanza
M.P. # 11 : Mandaon
M.P. # 12 : Masbate
M.P. # 13 : Milagros
M.P. # 14 : Palanas



DOE - USAID/PA Technical Assistance "Enhancing Private Sector Participation in renewable Energy Investments for Off-grid Rural Electrification"

Task 3 - Identifying Market Packages

CATAINGAN, MASBATE
Market Package No. 9

General Information

Political Subdivisions

- Number of barangays — Thirty - six (36) barangays
- Number of energized barangays — Eight (8) barangay
- Number of unenergized barangays — Twenty-eight (28) barangays and these are

✓ Abaca	✓ Malobago
✓ Aguada	✓ Matayum
✓ Badiang	✓ Matubinao
✓ Bagumbayan	✓ Mintac
✓ Chimnea	✓ Nadawisan
✓ Cadulawan	✓ Osmeña
✓ Cagbatang	✓ Pitogo
✓ Concepcion	✓ San Isidro
✓ Divisoria	✓ San Jose
✓ Estampar	✓ San Pedro
✓ Leong	✓ San Rafael
✓ Libtong	✓ Tagboan
✓ Maanahao	✓ Toybo
✓ Madamba	✓ Villa Pogado

Climate

- No very pronounced maximum rain period, with a short dry season
- Climatological Data (1998)
  - ✓ Total rainfall : 1462.7 mm
  - ✓ No. of rainy days : 147 days
  - ✓ Ave. Temperature : 29.6^{0}C

Demographic Profile

Household Population (1995)	5,170 Households
Projected HH Population (2000)	5,488 HH
Ave. Annual Pop'n Growth Rate	1.2 (1990 - 1995)
Ave. HH Size	4.8 persons
HH Population Density	25.29 HH/km^2

Macro-economic Indicators

Ave. Annual HH Income	PhP 29,504.50
Ave. Annual HH Expenditures	PhP 28,381.66
Ave. Annual HH Disp.Income	PhP 1,122.84
Ave. HH Energy Expenditures	PhP 102.85/month
Municipality Income Class	Fourth

CATAINGAN, MASBATE
Market Package No. 9

Natural Resources

Land Area	204.40 km^2
Land Capability Slope Distribution	0 - 3% : 10.00% (level to nearly level)
	3 - 5% : 20.67% (very gently sloping)
	5 - 8% : 30.67% (Gently sloping)
	8 - 15% : 8.67% (Moderately sloping)
	15 - 25% : 30.00% (Strongly sloping)
Land Use	Cultivated Croplands : 121 km^2
	Irrigated land : 1.45km^2
	Fishponds : 1km^2

Renewable Energy Resources

Solar Energy	5kWhr/m^2/day
Wind Energy	
✓ Wind power density	200-400 W/m^2
✓ Wind Speed	5.6 - 7.0 m/s
Hydro Power	50 watts

Economic Activities

Predominant Economic Activities	Farming
Livestock	Cattle Population ✓ 2,001 (backyard) ✓ 200 (semi-commercial)
Coconut	
▪ Total Number of trees	886,426
▪ Ave. nut prod/tree/year	24
▪ Number of coco farms	264
▪ Average farm size	3.00 hectares
Trade	No. of establishments
▪ Industry Sector	33
▪ Services Sector	12
Other Livelihood Activities	Mat weaving Fish culture/drying Coconut processing

CATAINGAN, MASBATE

Market Package No. 9

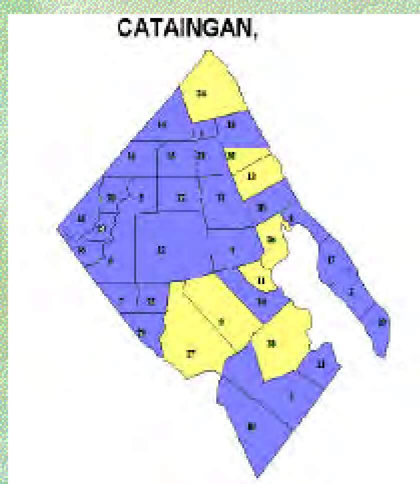
Utilities

Power

▪ Electric Cooperative	▪ MASELCO
▪ Municipality Energ'n Status	▪ 22%
▪ Power Tariff (Basic Rates as of December 2000)	
✓ Residential	▪ PhP 22.83 for first 6 kWhr PhP 3.8054/kWhr (in excess of 6 kWhr)
✓ Commercial	▪ PhP 38.15 for first 10 kWhr PhP 3.8154/kWhr (in excess of 10 kWhr)
✓ Industry	
- Demand Charge	▪ No data
- Energy Charge	▪ PhP 3.8154/kWhr

Social Services

Education (Schools)	▪ at least 28 schools



1.Abaca
2.Aguada
3.Badiang
4.Bagumbayan
5.Cadulawan
6.Cagbatang
7.Chimenea
8.Concepcion
9.Curvada
10.Divisoria
11.Domorog
12.Estampar
13.Gahit
14.Libtong
15.Liong
16.Maanahao
17.Madamba
18.Malobago

1.Matayum
2.Matubinao
3.Mintac
4.Nadawisan
5.Osmena
6.Pawican
7.Pitogo
8.Poblacion
9.Quezon
10.San Isidro
11.San Jose
30.San Pedro
31.San Rafael
32.Santa Teresita
33.Santo Nino
34.Tagboan
35.Tuybo
36.Villa Pogado

LEGEND :

ENERGIZED

UNENERGIZED

MARKET PACKAGES FOR OFF - GRID RURAL ELECTRIFICATION

a presentation by:

Arlene S.M. Lafrades

Private Sector Consultation Workshop

Horizon Edsa Hotel

June 28, 2001

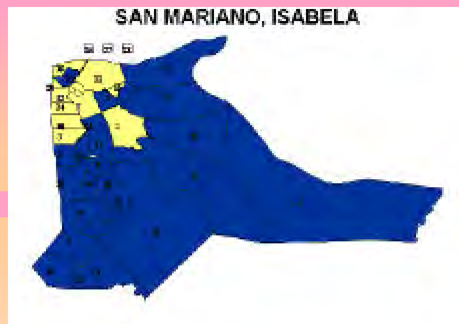
MARKET PACKAGES REDEFINED

Initial Definition :

“Cluster of ten or more non-electrified barangays with adequate number of base customers”

Proposed Definition :

“All non-electrified barangays in selected municipalities with adequate number of base customers”



LEGEND :

ENERGIZED

UNENERGIZED

Basic Statistics:

Total no. of barangays	:	36 barangays
No. of electrified barangays	:	12 Barangays
No. of non-electrified barangays	:	24 Barangays
No. of HHs in non-electrified barangays	:	3,133 HHs
Ave. No. of HHs in a non-electrified barangay	:	131 HHs

REDEFINED MARKET PACKAGES
Merits

- Greater chances of achieving electrification targets
- Economy of scale of operation for private sector/ civil society cum LGU partnership
- Assist EC in achieving greater efficiency in providing electricity services to its customers

25 PRIORITIZED MARKET PACKAGES

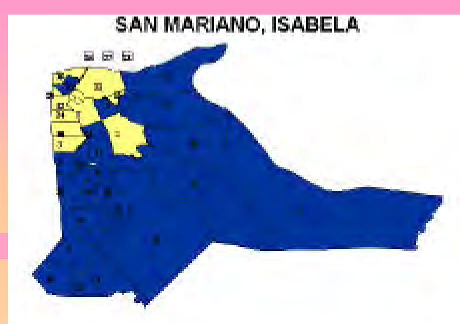
Region 2: Baggao, Cagayan
Benito Soliven, Isabela
San Mariano, Isabela

Region 5: Bacacay, Albay
Libon, Albay
Oas, Albay
Rapu-Rapu, Albay
Balud, Masbate
Cataingan, Masbate
Esperanza, Masbate
Mandaon, Masbate
Milagros, Masbate
Palanas, Masbate

Region 6: Dumarao, Capiz
Dueñas, Iloilo
Calatrava, Negros Occ.

Region 8: Catubig, N. Samar
Las Navas, N. Samar
Laoang, N. Samar
Tarangnan, W. Samar
Daram, W. Samar
Guiuan, E. Samar

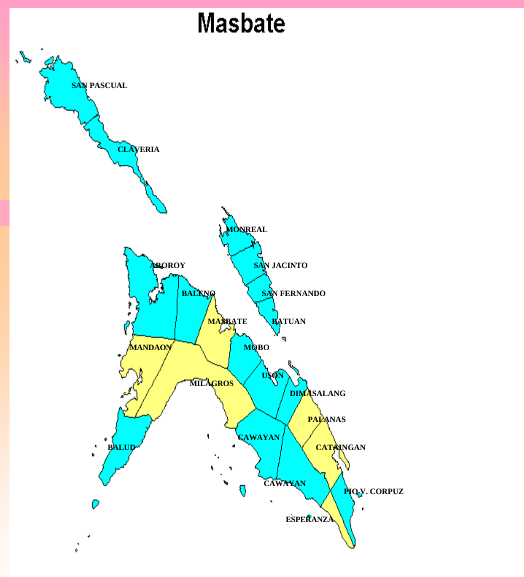
Region 9: S.Osmeña Sr., Zamb. Norte
Sibuco, Zamb. Norte

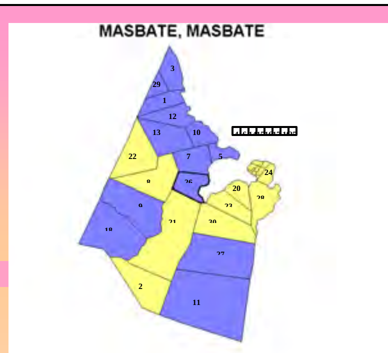


LEGEND :
ENERGIZED
UNENERGIZED

Basic Statistics:

Total No. of Barangays	: 36 barangays
No. of Electrified Barangays	: 12 Barangays
No. of Non-electrified Barangays	: 24 Barangays
No. of HHs in Non-electrified Barangays	: 3,133 HHs (1995)
	: 3,273 HHs (2000)
Municipality Land Area	: 1,469 km^2
Topography	: Upland
Municipality Classification	: First Class
Average Annual HH Income	: PhP 63,622.67
Average Monthly HH Energy Expenditures	: PhP 155.46
Average Annual HH Disposable Income	: PhP 30,404.83
Electric Cooperative	: ISELCO II





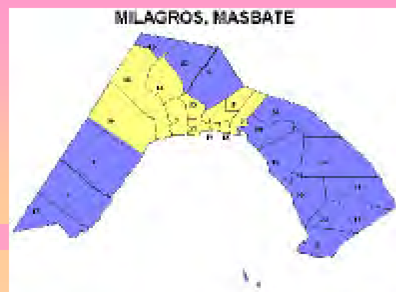
LEGEND :

ENERGIZED

UNENERGIZED

Basic Statistics:

Total No. of Barangays	:	30 barangays
No. of Electrified Barangays	:	17 Barangays
No. of Non-electrified Barangays	:	13 Barangays
No. of HHs in Non-electrified Barangays	:	2,711 HHs (1995)
	:	3,023 HHs (2000)
Municipality Land Area	:	179.70 km^2
Topography	:	Upland
Municipality Classification	:	Second Class
Average Annual HH Income	:	PhP 40,280.62
Average Monthly HH Energy Expenditures	:	PhP 90.77
Average Annual HH Disposable Income	:	PhP 7,748.56
Electric Cooperative	:	MASELCO



LEGEND :

ENERGIZED

UNENERGIZED

Basic Statistics:

Total No. of Barangays	:	**27 barangays**
No. of Electrified Barangays	:	**12 Barangays**
No. of Non-electrified Barangays	:	**15 Barangays**
No. of HHs in Non-electrified Barangays	:	**3,298 HHs (1995)**
	:	**3,823 HHs (2000)**
Municipality Land Area	:	**565.40 km^2**
Topography	:	**Lowland - Upland**
Municipality Classification	:	**Third Class**
Average Annual HH Income	:	**PhP 46,835.97**
Average Monthly HH Energy Expenditures	:	**PhP 147.38**
Average Annual HH Disposable Income	:	**PhP 13153.16**
Electric Cooperative	:	**MASELCO**

PHILIPPINES CLIMATE CHANGE MITIGATION PROGRAM

A Joint Program of the

Philippines Department of Energy

US Agency for International Development

TERMINAL REPORT

Technical Assistance to DOE for Enhancing Private Sector Participation in New and Renewable Energy Investments for Off-Grid Rural Electrification)
(TASK 4 – Project Evaluation and Prioritization)

Submitted to the:

United States Agency for International Development (USAID)

and the

Department of Energy
Manila, Philippines

By:

ROSVID SUNICO

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This report was prepared under the terms and conditions of Contract No. 492-C-00-97-00063.

Task 4 - **PROJECT EVALUATION AND PRIORITIZATION**
TERMINAL REPORT

Introduction.

The subject of Task 4 is "Evaluation and Prioritization of Project Proposals". The specific activities of the task are:

(a) Compilation, listing, and pre-screening of project proposals on rural off-grid electrification in the pipeline of the DOE, NPC-SPUG, PNOC, NEA, Development Bank of the Philippines, and the Land Bank of the Philippines;

(b) Review and comparison of the existing guidelines (criteria and methodology) of the DOE-EUMB, NEDA, LBP, and DBP for evaluating the viability of project/investment proposals, as bases, among others, for the development and documentation of a formalized and standard set of guidelines to be adopted by the DOE-EUMB for evaluating the viability of off-grid rural electrification projects; and

(c) Implementation of the project evaluation guidelines on the project proposals that are included in the list developed in (a);

(d) Preparation of criteria for project prioritization and implementation thereof on viable projects from (c); and

(e) On a best effort basis, assistance to at least two (2) project proponents (1 LGU and 1 private sector) from the priority list in item (d) in obtaining a financing agreement with either the DBP and LBP, on a best effort basis.

The objectives are 1) to provide the DOE with a report on the status of projects in the pipeline of LBP and DBP, 2) provide DOE with guidelines in providing assistance to NRE projects proponents in packaging their proposals and 3) actually assist to two projects in obtaining financing from the banks.

A summary of the specific deliverables and the actual accomplishments are as follows:

Item of Deliverable	Comments/Remarks
1. Long List of Pipeline Projects	Delivered
2. Guidelines for project evaluation & prioritization – for use of DOE	
(a) Draft Document	Delivered
(b) Final Document	Delivered
3. Guidelines for use of NRE project proponent	Delivered. This is a new deliverable that arouse during the meeting at PA Consulting on April 5, 2001 when the draft proposed guidelines was presented to the members of PPT
4. Implementation of Project Evaluation & Prioritization Guidelines	
(a) Full project evaluation report for 2 priority item proposals from item (1)	The deliverable could not be submitted due to the absence of documents and information on pipeline projects of the banks. The "principle of confidentiality" does not allow the banks to disclose information and documents entrusted by a proponent.

	In lieu of this deliverable, the consultant was required to submit a white paper on "How to overcome the hesitancy of banks to provide loans to NRE projects."
(b) Project Evaluation training for 2 EUMB staff	Delivered. Lesson Plan and Training materials were submitted. More than 10 staff of DOE were given lectures on project assessment and management. To maximize the opportunity, EUMB invite staff in other units of DOE who are involved in projects.
(c) Prioritized list of 25 viable projects and summaries/ project briefs	Prioritized list could not be delivered for similar reason as 3.a. The deliverable has been replaced by a white paper.
5. Commitment from DBP/LBP to pursue project financing approval for 2 projects/ proponents	The deliverable has been replaced for similar reason mentioned in item 3. (a) The deliverable has been replaced by a white paper.
6. White Paper of delivery of financing for NRE in areas avoided by the banks	Delivered
7. Draft of Letter requesting DOF for the inclusion of NRE projects	Delivered. This was an additional deliverable that arose during the presentation of outputs at USAID on June 14, 2001.

Assessment of Bank Regulations and Policies in Financing Projects and Approving Credit Proposals.

There are two entities that comprise the private sector when reckoning private sector participation. These are the private investors and the banks. The private investors infuse their money into projects because of profit potential. The banks, on the other hand, infuse their money into projects by way of loans because the risk involved is not high enough that they anticipate no problem in recovering the principal and earnings of the amount they lend.

Banks are necessary components in the financing of projects because in most cases, provide the bulk of financing in pursuing a project. The proponent possess assets but the banks hold the cash needed to pursue a given project.

In the effort to catalize private sector participation in NRE, the DOE staff should understand how the banks operate and the parameters in their lending operations. The specific matters that should be appreciated are:

1. How banks evaluate request for loans
2. Regulations .

How Banks Evaluate Request for Loans

In evaluating request for loans, banks take into consideration two major items 1) the bankability of the proponent and 2) the viability of the project that will be financed by the proceeds of the loan. Bankability of the proponent includes the proponent's track record of business performance, credit record and asset base. Project viability involves those factors that affect the overall business performance that include marketing, production, operations and financial aspects. A schematic diagram of the matters looked into by a bank when evaluating a project is marked as Annex "A".

It is only when there is a viable project presented by a bankable proponent that a bank acts favorably on a request for loan financing. A favorable credit decision is grounded on an assessment that the risks relative to a specific credit transaction is within the level acceptable to the banks.

Banking Rules and Regulations

Banks are by nature regulated entities as they have to contend with so many regulations in their credit decisions. Among the rules and regulations that affect credit decisions are the following:

1. General Banking Law of 2000 (R.A. No. 8791) – Section 34 to 49 of the law governs the lending operations. The essence of the provisions is for the banks to exercise caution in their credit decisions.
2. Circulars issued by the Bangko Sentral ng Pilipinas (BSP) – BSP Circulars cover specific subjects that results in restriction of relaxation of the lending guidelines of the banks.

As a result of the financial crisis that affected Asia, including the Philippines, since 1997, the banks have been saddled with non-performing loans. Numerous BSP rulings were issued on non-performing loans resulting into a restrictive lending environment. In a restrictive lending environment, the banks have the tendency to lend short term loans only to the most bankable clients. Banks use pricing as an instrument to discourage non-target clients or may just give outright denial for loan applications. Developmental loans (which include loans to NRE) characterized by long tenor loans and non-prime borrowers are avoided .

Case Study: Assessment of the DBP's Financing of NRE Projects

Because of FINESSE, DBP is the only bank with the capability to assess NRE projects for purposes of providing financing. Because of Window III, DBP may be the only bank that has the kind of money that matches the requirements of NRE projects.

The level of DBP's portfolio in NRE projects, however, is lower than expectations. Among the factors identified are:

1. Absence of Bankable proponents - Like any other Philippine bank, the DBP practices "balance sheet" financing in its lending operations. Under a "balance sheet" financing concept, the bank's major consideration in a credit decision is the level of asset that the proponent can contribute which include the assets that can be submitted

as collateral and viability of the project becomes a secondary consideration. This is contrasted to a project financing concept where the viability of the project becomes a primary consideration in a credit decision.

2. Concern for information – To justify NRE proposal to the approving authorities of the Bank, the following information should be made available to DBP:
   a. Market identification and validation of market assumptions. DOE will make an report about the existence of a market, the characteristic of the market and other basic market data. It should also 1) prove the assumption on the population and its growth, 2) provide estimates on tariff rates and 3) provide estimates on cost of delivery of electricity.
   b. Technical validation and verification of the viability of the technology. DOE will pre-screen the technology and will indicate in a report that would include information 1) if the technology has been pilot tested and the results of the pilot test, 2) if there existing projects in the Philippines using the technology and the performance of the project and 3) if there are of similar projects in other countries and their performance.
   c. Institutional evaluation including assessment of the readiness of the community and the livelihood component.
   d. Verification of "cost of service delivery" calculation/pricing or tariff formula

In a countryside environment, there are a very few entities that can meet the criteria of the bank for bankability. As such, there is a need to arrange for a joint venture or similar imports between the proponent at the site and a stronger entities.

For the information requirements, it was agreed during the meeting on April 5, 2001 that DOE, as part of its role in catalizing private sector participation in NRE, will provide the information.

White Paper on Addressing the Strict Requirements of Banks on NRE Projects.

The white paper examined the hesitancy of banks to lend to NRE. The areas examined include the following:

1. Creditworthiness of LGU as proponent of NRE
2. The support given to NRE and to the LGU and
3. Readiness of the banks to lend to NRE

Finding from the analysis are the following:

1. NRE has all the attributes of a profitable and viable enterprise that include existence of a market, availability of a proven technology and available financing.
2. There are two categories of proponents, the first round proponents and the second round proponents. The first round proponent take a higher of risk because they infuse equity before the project can create a track record. For NRE, the LGUs are the

appropriate first round proponents of NRE projects. There is a need, however, to strengthen them by arranging for strategic partners and venture capitalists

3. Newness of NRE in a business environment makes investors and banks apprehensive about business and credit risks. To allay the apprehensions, guarantees, special funds, incentives, flexibilities on rulings and other forms of support should be given to projects as well as the first round proponents and the banks willing to bet their loanable funds into NRE projects.

Specifically, the following actions are being recommended:

1. Setting up of a guarantee facility for NRE to cover credit risks especially for the first round proponents that are not LGUs. The LGUGC only guarantees loans obtained by the LGUs.
2. Setting up of a group that will provide assistance to NRE proponents in walking through the documentary maze of setting up a business enterprise, in complying with loan requirements and in availing grants and incentives. The group should have the capability to assist the LGUs in dealing with banks, venture capitalists, foreign funders and potential strategic partners.
3. Inclusion of loans to NRE as alternative compliance to the Agri-Agra Law as incentive for banks to lend to NRE projects
4. Issuance of a BSP Circular to classify NRE among projects with long gestation periods. This will provide banks greater flexibilities in their loan terms to NRE projects without the risk of getting audit exceptions.
5. Setting up of a special with tenor of more than 10 years such that there is a fund that can be used by the banks in lending to NRE
6. Renegotiate with the World Bank for the inclusion of NRE in the list of projects that qualify for MDF funding
7. Training given to DBP personnel under the FINESSE projects should be echoed to loan officers of other banks to further disperse the potential source of loans
8. Negotiate with foreign governments for possible sources of grant funds that will be provided to first round proponents as a kick starter.
9. Negotiate with the Bureau of Customs to reduce hassles in the entry of foreign made equipment and components to be used in NRE projects

A tabulation of the recommendations and proposed actions is marked as Annex "B".

***Proposed Guidelines on NRE Project Evaluation and Prioritization*.**

The proposed guidelines on project evaluation was meant to be a tool for the staff of DOE that are involved in providing assistance to NRE proponents. By using the guidelines, DOE staff will be able to help proponents in properly packaging project proposals and in presenting proposals that contains all the elements needed by the banks in coming up with a credit decision. The proposed guidelines is a consolidation of the lending guidelines of DBP and LBP as well as of the DOE, PNOC-EDC and NPC-SPUG. The following are hoped to be accomplished trough the proposed guidelines

- Improve the approval rating of loan applications of NRE projects

- Enhance acceptability of projects to prospective investors and
- Come up with policies to strengthen weaknesses encountered during the course of the evaluation
- Set up a system in preparation to a bigger fund for NRE projects that will be obtained from the international funding agencies.

The proposed guidelines has three major sections which are:
1. Introduction – It discusses the content and objectives of the guidelines as well as the framework within which the guidelines were made.
2. The Process – It discusses the process flow involved and
3. Evaluation – This constitutes the bulk of the document. It discusses in detail the suggested steps in assessing the credit record of the proponent, financial evaluation of the proposed project, marketing, organization and management, risk/key success factors, collateral, second way out, pricing and socio-economic, environmental and other issues.

The proposed guidelines was presented to the members of the PPT on April 5, 2001 for consultation. The suggested changes which were incorporated in the Introduction section of the final version of the guidelines are:
1. Inclusion of the definition of the role of DOE as catalyst
2. A statement that the guidelines will not attempt to duplicate the efforts of the banks but will only enhance the acceptability of the project proposals and
3. A statement that there is no attempt to violate the confidentiality of relationships between the bank and the proponent.

The proposed guideline was designed to cover wide range of applications including possible joint venture arrangements between LGU and the private investors.

Assistance to Enhance Technical Capability of NRE Sector to Prepare NRE Project Proposals.

To enhance the technical capability of the NRE Sector to prepare NRE Project Proposals, trained over 10 staff of DOE who are involved in projects. The training has two major sections, the discussion portion and the practical application. A lesson plan, two sets of reading materials and a case problem were given to EUMB. The training was conducted on May 24, 2001.

The training has imparted into the participants the correct perspective when looking at a project. Extensive knowledge of the participants on technical and marketing aspects is a good starting point and it is suggested that follow up training should be given to broaden their perspective on project evaluation. The end of the training program should be to enable the participants to eventually help NRE proponents in properly packaging their project proposals.

Conclusions and Recommendations.

There are a lot of opportunities for NRE to become a viable enterprise and to become an area of interest of the private sector, particularly the private investors and the banks. The opportunity can become a reality only if there is support to prop a developing industry which is NRE until it reaches a stage where it can stand on its own. Previous efforts of the DOE to nurse NRE to commercialization has moved the industry forward to a stage that is almost commercialization. There are, however, a number of elements still missing towards the end and these are the following:

1. The active participation of banks – The white paper identified the reasons why banks are hesitant in lending to NRE. Likewise, recommendations were made to further boost their confidence in lending to NRE
2. Strengthening further the capability of DOE to catalize NRE – Arranging and project packaging functions are necessary component in the development on entities comp rising the NRE industry. It was noted that there is an absence of entities willing to arrange (that is to match potential investors for example an LGU with private investors) and assist in packaging NRE projects. By compulsion, DOE may have to handle the tasks of arranging and assistance in packaging, as well as other tasks mentioned in previous sections, for the NRE industry to move forward. DOE has to perform these tasks until such time that a private entity that emerges to handle such tasks.

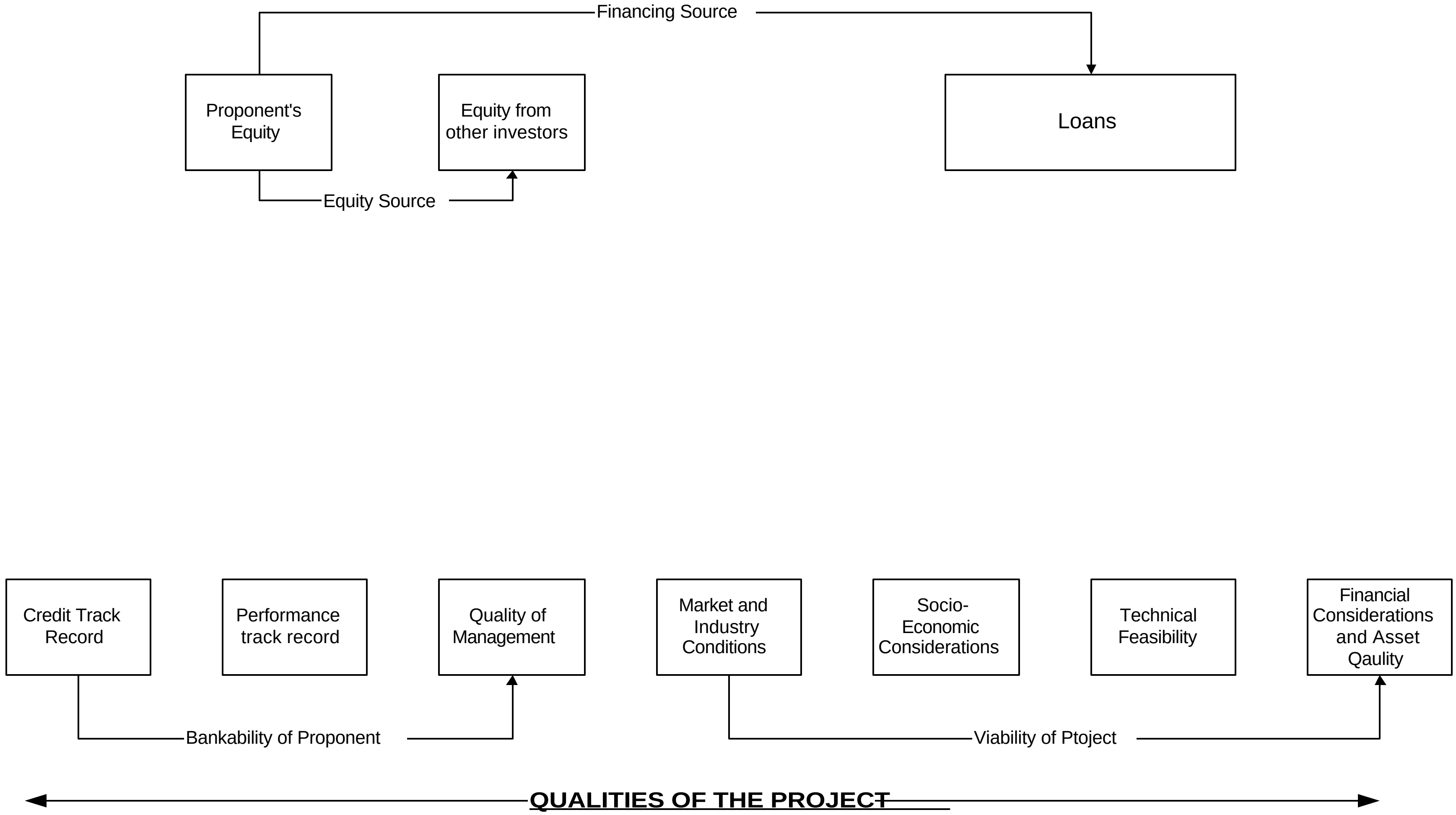
***Appendices*.**

A - White Paper
B - Draft of Memo to DOF on inclusion of NRE in MDF Qualified Projects
C - Proposed Guidelines on Project Evaluation
D - Proposed guidelines for NRE Proponents
E - Proposed Prioritization Scheme for Pipeline Projects
F - Training Kit
G - Minutes of Meeting

ANNEX “A”

Annex "A"

FINANCING FRAMEWORK



ANNEX “B”

Table of Recommendations

Recommendation	Ultimate Objective	Responsible Agency	Subsequent Actions
1. Setting of a Guarantee Facility	Set up guarantee facility for NRE	Dept. of Energy	• Ascertain possible sources of funds for seed capital. Funding will most likely come from foreign sources • Coordinate with DOF for compliance with documentary requirements to obtain seed fund • Negotiate with GFSME and SBGFC for the implementation of the guarantee facility and in coming up with the guidelines for the issuance of the guarantee • Consult with the Banks to get feedback on acceptability and doability of guidelines in the issuance of guarantee • Formalize all agreements
2. Assistance Desk	Help proponents properly package and present their proposals	Dept. of Energy	• Create a team within DOE that will specialize in providing assistance to proponents • Identify and accredit groups with the capability to package NRE projects • Training of team members by trainors from countries successful in NRE as business enterprises • Training of team members with the banks on project evaluation and packaging
3. Loans to NRE Agri-Agra Compliant	Banks to be more NRE friendly	Dept. of Energy	• Make representations with the BSP re plans to include NRE as alternative compliance with Agri-Agra Law • Prepare appropriate documents necessary for the issuance of an appropriate executive order • Make representations with the Office of the President for the issuance of the executive order
4. NRE classified as long gestating project	Banks to be more NRE friendly	Dept. of Energy	• Make representations with the BSP re plans to classify NRE as long gestating project • Prepare appropriate documents necessary for the issuance of an appropriate BSP Circular • Request the Monetary Board for the issuance of the appropriate BSP Circular

Recommendation	Ultimate Objective	Responsible Agency	Subsequent Actions
5. Special funds for loans to NRE	Banks to be more NRE friendly	Dept. of Energy	• Negotiate with NRE Friendly funders for them to make available by way of a loan or any other form of liability a fund that can be given to NRE project proponents. The tenor should be long term, with low interest rate and if possible untied • Obtain the assistance of DOF in complying with the requirement of the lender as the National Government is most likely to become the borrower • Negotiate for the Detailed terms and conditions of the facility • Negotiate with the local banks that will handle the funds. Included in the negotiations is the terms and conditions with which the funds will be relent • Documentation of Agreements
6. Renegotiate with WB on MDF	Provide additional loanable funds for NRE projects	Dept. of Energy and Dept. of Finance	• Obtain from DOF the requirements for the amendment of the Loan Agreement with World Bank regarding the MDF Facility • Prepare the necessary justifications and other requirements for the amendment of the loan agreement • Request the DOF to make the necessary representations with World Bank
7. Training of bank account officers on NRE	Diffuse expertise on assessment of NRE projects	Dept. of Energy and Development Bank of the Phil.	• Design a training program that takes into consideration the realities of banking in the Philippines, previous experience and the objectives for NRE • Consult with the Training Departments of the Banks to get inputs on the training program • Obtain funding for the program • Implementation • Monitoring and reporting

Recommendation	Ultimate Objective	Responsible Agency	Subsequent Actions
8. Networking for grants to support first round proponents	Enhance available financial support for first round proponents	Dept. of Energy	• Come up with a grand plan that would incorporate private sector participation and possible grants and soft loans to proponents • Identify NRE friendly countries and determine acceptable schemes that they can fund by was of grant or soft loan or a combination of the two • Come up with various schemes to be presented to the embassies of the countries identified • Make a formal request through the DFA
9. Bureau of Customs to reduce hassles on NRE importation	Facilitate entry of imported equipment and spare parts	Dept. of Energy and Dept. of Finance	• Come up with appropriate document identifying among others the specific items covered and the suggested procedure to facilitate release of imported items and documents thereof • Consultation with Bureau of Customs people regarding the documents • Formally request approval of the DOF Secretary

Appendix A

White Paper

White Paper on NRE

EXECUTIVE SUMMARY

NRE has all the elements of a viable project but could not obtain loans from the banks because of barriers related to the newness of the enterprise. In examining the hesitancy of banks to lend to NRE, the following were examined in addition to an analysis of the viability of the NRE:

1. Creditworthiness of LGU as proponent of NRE
2. The support given to NRE and to the LGU and
3. Readiness of the banks to lend to NRE

The analysis addresses a problem which is defined as follows:

How to overcome the hesitancy of banks to provide loans to NRE Projects?

The analysis revealed the following:

1. Although there are no documentary evidences attesting the profitability and viability of NRE projects as business enterprises, NRE possesses all the attributes of a profitable and viable enterprise
2. The LGUs are the appropriate first round proponents of NRE projects. There is a need, however, to strengthen them by arranging for strategic partners and venture capitalists
3. Newness of NRE in a business environment makes investors and banks apprehensive about business and credit risks. To allay the apprehensions, guarantees, special funds, incentives, flexibilities on rulings and other forms of support should be given to projects as well as the first round proponents and the banks willing to bet their loanable funds into NRE projects.

Specifically, the following actions are being recommended:

1. Setting up of a guarantee facility for NRE to cover credit risks especially for the first round proponents that are not LGUs. The LGUGC only guarantees loans obtained by the LGUs.
2. Setting up of a group that will provide assistance to NRE proponents in walking through the documentary maze of setting up a business enterprise, in complying with loan requirements and in availing grants and incentives. The group should have the capability to assist the LGUs in dealing with banks, venture capitalists, foreign funders and potential strategic partners.
3. Inclusion of loans to NRE as alternative compliance to the Agri-Agra Law as incentive for banks to lend to NRE projects

4. Issuance of a BSP Circular to classify NRE among projects with long gestation periods. This will provide banks greater flexibilities in their loan terms to NRE projects without the risk of getting audit exceptions.
5. Setting up of a special with tenor of more than 10 years such that there is a fund that can be used by the banks in lending to NRE
6. Renegotiate with the World Bank for the inclusion of NRE in the list of projects that qualify for MDF funding
7. Training given to DBP personnel under the FINESSE projects should be echoed to loan officers of other banks to further disperse the potential source of loans
8. Negotiate with foreign governments for possible sources of grant funds that will be provided to first round proponents as a kick starter.
9. Negotiate with the Bureau of Customs to reduce hassles in the entry of foreign made equipment and components to be used in NRE projects

TEXT OF THE REPORT

Introduction

Efforts to develop, promote and commercialize New and Renewable Energy (NRE) sources was first launched in 1977. NRE development has surpassed experimental stage and commercialization of NRE has been the focus of efforts in recent years. Foremost among the efforts to commercialize NRE are:

1. Setting up of NRE database at DOE be available to interested proponents. Among the database is the NRE resource map and technical information on specific NRE technology
2. Setting up of NCED at DOE to provide direction to the development of NRE
3. Setting up of various NGOs to assist in the development of NRE
4. Setting up of FINESSE where bank people were trained on assessment of NRE projects
5. Setting up of ANEC as extension arm for NRE in the countryside
6. Setting up of REAP to encourage private sector participation in NRE projects
7. Conduct of various researches that addresses on the various components for the commercialization of NRE

The direction of these efforts is the setting up of a critical mass of NRE enterprises such that NRE moves forward from emerging stage to development stage. As an enterprise consisting of many individual business projects, NRE goes through a stage of development which is conceptually presented as Annex “A”. Concerted effort from the government and the private sector is needed to move from one stage of development to the next.

A conceptual diagram of the desired development direction of NRE is presented as Annex “B”.

Despite the efforts mentioned, the growth of NRE projects has been below expectation. Among the major reasons cited is the hesitancy of banks to provide loans to NRE projects and this hesitance limits the amount of funds available for setting up project. Banks, particularly the GFIs, asserts that they have the funding and the willingness to lend to NRE but this statement seems to be short from being a commitment. The absence of loans from the banks is limiting the growth of NRE projects.

Among the possible reasons for the slow growth of NRE are the following:

1. The efforts may not be properly focused the factors contributing to the success of NRE
2. The efforts may not be sufficient

Since the banks are in the best perspective in judging the viability of projects considering that they take on an actual risk once they decide to lend to a project, it was deemed proper to state the problem with the favorable consideration of the bank as the main focus.

While it is true that there are efforts to promote NRE, it is helpful also to make an assessment of existing efforts to determine if:

1. The efforts are focused in areas that are critical to the success of NRE and
2. The efforts are sufficient

Statement of the Problem

The problem is, therefore, stated as follows:

How to overcome the hesitancy of banks to provide loans to NRE Projects?

In addressing the problem, the intention is to bring electric energy to the over 8,000 unelectrified barangays.

The Approach

For purposes of the foregoing discussions, NRE projects shall mean projects that are operated to deliver electric energy to a number of potential buyers for a fee. NRE for individual use like solar home systems shall be discussed in a separate section.

To appropriately address the problem requires an examination of the issues relative to the hesitance of the banks to grant loans to NRE. The hesitancy to lend to NRE will be examined not only from the viewpoint of the project proponent but also from the viewpoint of the Bank.

To address the stated problem, therefore, there is a need to break the problem into more manageable component issues or problems. These components, which are the critical success areas of NRE, are as follows:

1. Viability - Is NRE really viable as a business project in the Philippines?
2. Proponents - Are there creditworthy proponents of NRE projects?
3. Support - Are the required support for NRE present?
4. Funding - Are Banks really ready to lend to NRE?

Addressing the issues mentioned will subsequently result into addressing the barriers that make banks hesitant to provide loans to NRE.

A conceptual presentation of the methodology in addressing the problem is marked as Annex "C".

The specific direction is the setting up of viable NRE projects to provide electric energy to the remaining unelectrified barangays in the Philippines. It is premised that NRE is the appropriate technology and the least cost alternative to provide electric energy to these barangays.

Viability of NRE as a business project

NRE is an emerging business enterprise in the Philippines. As such, its viability as a business activity is yet to be proven. Success stories are still in the making as it was only recently that NRE projects were being operated as business entities. Although these projects are operating smoothly, it is too early to judge their viability using standards of a viable business entity like Internal Rate of Return, Payback Period, Profitability ratios and liquidity ratios, among others. Success stories of NRE as business entities, however, are numerous in other countries, among them India.

Project viability goes hand in hand with the bankability of the proponent and these two items are the basic foundations of a financing framework. A conceptual presentation of the framework is marked as Annex "D". For purposes of focus in the discussions, however, issues on the viability of NRE projects has been separated from the issues on bankability of proponents.

An alternative method to ascertain the viability of NRE is to assess the presents of the components that determine the viability of a business entity. These components are:

1. Market – DOE has divided the whole NRE market into various market packages. Each market package, composed of an average of 10 barangay, possesses the necessary attributes to support NRE business enterprise. Using the market package approach, there is a viable market for NRE.

2. Technical Feasibility – DOE has complete studies of the locations of resources that can support NRE projects. NRE is technically feasible in areas specifically identified by DOE using a specified NRE technology.

3. Socio-Economic Considerations – There is economic and social justification in providing energy in unelectrified barangays because of the findings that electricity is a catalyst of economic development

4. Financing – There is a viable financing scheme for NRE. This is discussed in detail in a separate section.

5. Packaging – The chances of a project getting a loan is improved if the project is properly presented. Proper presentation highlights the critical decision areas and allows both the bank and the proponent to discuss critical areas. Private consultants can prepare project packages but at a high cost. The setting up of a unit at DOE to perform packaging function at reasonable cost to the proponent would be desirable.

It can be concluded at this point that NRE has the elements to be a viable business enterprise. The existence of a market and a viable technology is a good starting point.

Given adequate financing, operating and management support, NRE enterprise can be operated viably and profitably.

Proponents of NRE projects

The potential proponents of NRE are the following:

1. Individual Households – The predominant type would be solar home systems (SHS). Financing for acquisition of SHS by households shall be discussed separately.
2. Investors
3. Existing Business Entities – For own use of NRE
4. Electric Cooperatives
5. Non-Government Organizations
6. Local Government Units

There are two categories of proponents/investors in a developing enterprise and these are:

1. The first round proponents who are willing to provide the equity to an enterprise at the early stage of development
2. The second round proponents who will provide equity to the enterprise on the basis of historical performance of projects. These type of proponents may opt to purchase the equity holdings of the first round proponents or provide equity to projects with characteristics similar to those where the first round proponents have an equity position.

It is therefore, important the first round investor are successful otherwise continuous development of NRE will not be sustained.

The First Round Proponent

From among the prospective investors mentioned above, the LGU is the most appropriate entity to be the first round investors because of the following:

1. It is part of their mandate to bring development to the citizens
2. They have the borrowing capacity
3. It has the necessary political clout to support and push the project
4. It has the capability to tap funds from various sources

The potential location of NRE projects, however, are the lower class municipalities whose revenues are low and the LGU's equity contribution and borrowings may not fully cover the funding needed to pursue the NRE project. Further, LGUs are not in the business of power generation and are likely to lose money if they were to handle the operation and management of the NRE project. There is a need, therefore, to look for parties or entities that will cover for the gap. Among the options are equity from a strategic partner to form a joint venture and from venture capital institutions

Joint Venture Option (with Strategic Partnership)

A conceptual presentation of a Joint Venture option is presented as Annex "E".

Entities go into strategic partnership with another entity to enhance their capabilities in certain undertakings with joint venture agreement as the legal instrument. In the case of the LGUs, they have to look for a strategic partner in NRE projects to compensate for perceived weaknesses that include management capability and technical and operational expertise in managing NRE projects. Potential strategic partners of an LGU are:

1. Electric cooperatives – The coops can contribute accumulated business knowledge in making the NRE project operate profitably
2. Equipment suppliers – The equipment suppliers may be willing to retain portion of the equipment cost as equity into the project as a proof of their confidence that the project will deliver the service under local conditions and to transfer the required technical and management knowledge in the profitable operation of the project.
3. Entities under the DOE may have funds that can be used for joint venture. If such funds are available and are infused as contribution in a joint venture, the DOE has the moral as well as the legal bases in leading the enterprise in making appropriate decisions.

To make a successful joint venture, a skilled arranger is needed. The service of arranging may be provided by banks, consultancy firms or by trained staff of DOE. It is suggested that DOE staff be given the training in deal arrangement to reduce the cost to the proponent. Likewise, there is a higher chances of success for a DOE staff to do the arranging compared to a passive consultant.

Equity from Venture Capitalist

GFIs have subsidiaries engaged in venture capital business. The DOE can make arrangement with the GFI management such that part of the venture capital funds are earmarked for NRE projects.

Barriers to the First Round Investors

The first round proponent, in the conduct of due diligence process prior to a decision to invest into NRE project, is likely to encounter the following barriers:

1. High Project Development and Investment Cost – The high level of fixed investment required on NRE project may frighten the proponent and is likely to ignore the presence of a business opportunity knowing that its capital base is limited.
   There is a need to come up with options to reduce the initial investment cost of the proponent and among the possibilities are:
   a. Grants from foreign sources – Countries supplying the equipment may be able to provide grants to reduce the cost of the project. In addition, low cost funds may be available for the loan portion of the project cost.

   b. Subsidy from the government – The government may be able to come up with funds as subsidy to reduce the investment cost to the proponent.
   c. Waiver of duties and taxes on imported equipment and components thereof – This can result in substantial reduction in the cost of the project.

2. Documentary Requirement – Setting up a business, complying with registration requirements and applying for a loan requires a lot of documentary requirements that turns off the interest of countryside investors. LGU staff may not have the patience and the needed knowledge to properly comply with documentation, hence lose patience.
   The banks and regulatory bodies may have to be requested to simplify their documentary requirements and lessen the burden of compliance on the part of the project proponents. Assistance must be provided to proponents where the documentation can not be simplified as in the case of the bank.

3. Feasibility Study Requirements – Banks require feasibility studies especially for projects with more than one year repayment terms. LGUs may not have the capability to prepare nor have the funds to cover the cost of preparing feasibility studies.
   The Coordinating Council for Private Sector Participation (CCPSP) can provide funding for preparation of feasibility studies. The LGUs, however, need assistance and guidance to be able to access the funds because their distance from Metro Manila makes compliance difficult for them. Appropriate guidelines of CCPSP is marked as Annex "F"

4. No track record – LGUs do not have business track record. In the eyes of the lender, absence of track record aggravates the credit risk.
   LGUGC provides guarantees to borrowings of the LGUs up to the extent of their borrowing capacity. Potential problems with respect to the guarantee of LGUGC are:
   a. The implementation of the NRE project will have to be suspended if the borrowing capacity of the LGU is lower than the cost of the project. As such, other alternative schemes must be explored.
   b. NRE is not among the qualified projects that can be the subject of guarantee. Negotiations should be made with LGUGC to include NRE among the projects that can qualify for a guarantee.

   Appropriate guidelines of LGUGC is marked as Annex "G"

5. Poorly capitalized – Majority of the LGUs with unlectrified barangays are considered poor in terms of revenue generation and have limited capability to raise funds to capitalize NRE project. It should be stressed at this point that borrowings of the LGU to partially finance project cost will be recognized as liabilities and not equity of the LGU into the project. This is because the major consideration in a credit decision is the capability of the project to generate funds to service the obligations to be incurred.
   To strengthen the capitalization of the project, there should be a group that will assist and guide the LGU in seeking for investors. Potential investors include equipment suppliers, entities concerned with the environment and venture capitalist.

The Second Round Proponents

The second round proponents are not risk-takers and will invest because the first round investors have proven that NRE is a viable enterprise. The first round investors have identified and successfully the business problems that NRE is now considered less risky project.

Second round investors do not have funding limitations and may opt to buy out the equity of the first round proponents or may set up similar NRE projects.

The role of the first round proponents is very critical to the growth and the setting up of more NRE project. As such, it is necessary that the first line proponents are given the necessary support such that they will succeed. Care should be taken, however, such that assistance and financial schemes are not used as justification for project that are not viable and should not be pursued at all.

Support for NRE Projects

NRE, being an emerging enterprise and is expected to operate in a countryside environment especially areas not yet reached by electricity. The presence of electric power in target areas of the countryside is expected to brings forth both beneficial effect to the rural economy and the environment. As such, NRE deserves support from both the government and the private sector. The forms of support that can be given to NRE projects and to the LGU, being the first round proponent should include the following:

- Incentives
- Special funding
- Assistance on feasibility studies preparation
- Grants and subsidies
- Arranging assistance
- BSP rules considerate of the peculiarities of NRE

INCENTIVE

From the government sector, the enterprise should be entitled of the following:

1. Tax Incentives – Under BOI rules, pioneering enterprises (which include NRE) is entitled for 5-year tax holiday. NRE projects should be entitled for a longer period (possibly 12 years) of tax holiday as a premium to the first round proponents because of the following:
   a. Target project site is the countryside. Premiums are given to investors that decide to invest their money in countryside enterprises
   b. It will catalyze economic activity leading to the improvement of the income of the people. What the government will lose from the foregone taxes will be more than recovered from the business and income taxes from businesses to be set up from because of the availability of power.
   c. The project is developmental in nature

2. Waiver of customs duties from imported NRE equipment and components – Duties on imported NRE equipment and components are waived but the importers are not getting the said benefit because of conflicting interpretations from the examiners from the Bureau of Customs. Further, Customs people sometimes take time to resolve issues to the disadvantage of the proponent.
   The government should, therefore, make a clearer policy on customs duties, one that is not subject to conflicting interpretations. Through clearer policies, proponents can avoid unnecessary cost from delays in the release of equipment and from paying additional cost which they should not have paid in the first place.

3. Preferential benefits – NRE projects can achieve certain benefits if
   - Loans of banks to NRE projects can qualify as alternative compliance to the Agri-Agra Law and
   - If there is a BSP circular that includes NRE among projects with long gestation periods.

   Representations should be made with the appropriate government body for purposes of having issuances favorable to NRE.

Special Funding

The Municipal Development Fund (MDF) which is being administered by the DOF can be a source of funding for NRE projects with LGU as proponent. The MDF is an appropriate funding because of the following attributes:
- Availment is a combination of a loan component and a grant component. Grant component can reach as high as 70% and is given to projects of 5th and 6th class LGUs
- Loan portion has a maximum term of 15 years and a 3-year grace period.
- It does not require collateral in addition to the IRA of the LGU

Funding for the MDF is sourced from the World Bank. Under the loan agreement between the Philippine Government and the World Bank, NRE was not among the qualified projects that can be financed by MDF.
For NRE projects of LGUs to qualify for MDF funding, the Philippine Government should renegotiate with the World Bank for the inclusion of NRE among qualified projects. Further, NRE should be entitles to the maximum 70% grant portion.

The MDF guidelines is marked as Annex "H"

Grants and Subsidies

Grants and subsidies for projects may come from local as well as foreign sources. Local sources of grants are budget appropriations and budget savings of the line agencies as well as from a number of foundations. Sources of foreign grants include foreign governments and private foundations.

The 5th and 6th class LGUs may neither have the data base nor the knowledge on the procedure of availing the grants and subsidies for NRE projects that they intend to pursue. There has to be a group to assist and guide the LGUs such that they can avail of the money from grants and subsidies.

Arranging Function

The deal arranging function is a very important component of the whole set up. The DOE is in the best position to perform the arranging because it has the best intentions to push for the commercialization of NRE. As such, it is suggested that DOE staff should be able to acquire the skills in arranging business deals.

Readiness of banks to lend to NRE Projects

The readiness of banks to lend to NRE projects can be assessed in terms of

- Perception of the banks on the risks involved in lending to NRE
- Internal Policies of the Bank
- BSP Rules and
- Sources of loanable funds

To place the analysis in a proper perspective, it is necessary first understand the processes going on in their lending operations. Banks face conflicting issues when making a decision to lend to NRE. These conflicting issues are:

- The developmental role of banks as catalyst of the economy of the areas where they operate
- Soundness of the credit decision to NRE and

BANK'S DEVELOPMENTAL ROLE

Banks have the responsibility of contributing to the economic development of the areas where they operate. As such, banks are required to lend to the local community a certain percentage of the deposit they generate from their area.

Because of the critical role of credit in the economic development , the economic status of an area has usually a direct relation to the level of credit given to the business entities and the residents.

SOUNDNESS OF CREDIT DECISION

Banks are institutions of trust. People deposit money with the banks because they feel confident that they can get their money back on demand or at a certain determinable time in the future. Money generated from deposits constitute the bulk of the funds given as loans to qualified borrowers.

Banks are regulated institutions. Regulations are imposed on banks to make sure that they exercise prudence and make good business judgment. There are regulations that banks observe covering almost all aspects of its operations. Among the rules and regulations that banks are bound to observe are those included in its corporate charter, circulars of the Bangko Sentral ng Pilipinas, provisions of existing laws, Generally Accepted Accounting Principles, international laws and practices and internal policies of the bank. Regulations are necessary component in the of operation of a bank because trust and confidence of the public is its most important asset.

Criteria for lending

Banks do not avoid risk but rather manage risk relative to their lending operations. Management of risk requires identification of the sources of risks and the exercise of appropriate measures to mitigate the effect of the risks.

Loans are the primary source of income for the banks. Loans are also the principal source of risk as credit decisions can make or break a bank. The risks involved in the lending process are:

1. Credit risk – This is the probability that the bank will not be able to fully recover the principal and interest earnings of the amount loaned to borrowers.
2. Liquidity risk – The probability that the bank will not be able to service demand for deposit withdrawals because of inability to generate cash from collection of loans.

On credit risk - To mitigate risk of losses arising from credit risk, banks need to exercise care and due diligence in their lending operations. This requires a continuing process of evaluation that commences at the time the borrower files for an application for loan and only ends once the principal and interest earnings on the loan is collected in full.

A bank account officer focuses on two areas in the process of evaluating a request for a loan. These are:

1) bankability of the proponent and
2) viability of the project.

The account officer relates the two areas with the possible sources of credit risk which are the following:

1. The Borrower – The borrower may possess qualities that can either increase or decrease the credit risk.
2. The Project – The nature and characteristics of the project in terms of stability of income, cash flows, investment levels, operating costs and seasonability can either increase or decrease the level of credit risk
3. The Economic environment – The prevailing conditions of the economic environment affects the performance of the project

4. Fortuitous events – Fortuitous events adversely affect performance. The critical thing to look into is the resilient of the proponent and the project to recover in case a fortuitous event occurs.

The process of assessment has as its bottom line the bank being able to eventually recover the principal amount and the earnings of whatever they lend to the proponents. Banks take the necessary precautions prior to granting loans and one of the precautions taken is a careful evaluation of the proponent and the project before arriving at a decision to lend money.

RISKINESS OF NRE PROJECTS

The level of loans in a given enterprise or industry is indirectly related to the level of perceived risks involved. If an enterprise or industry is perceived to he high risk, banks are likely to avoid lending or limit their loan exposures in said industry of enterprise.

Despite the claims of the GFIs that they have the funds and the technical capability to evaluate NRE projects, the issue remains that there is no substantial lending to NRE project. The reasons identified for the low level of exposure in NRE projects are:

1. Absence of local fund source that would match the nature and characteristics of loans for NRE Projects. NRE projects require a 10 to 15-year loan tenor and an average of two (2) years grace period in amortization payments. Bulk of the funds being used by banks in their lending operations come from savings deposit. Saving Deposit is considered a short term fund source because the depositor can withdraw his/her deposit on demand.
   No local fund is available to match the kind of money required by NRE and this serves as a major barrier for banks from earmarking or committing loanable money for NRE projects.
   There is a need, therefore, to look for funds from local and international sources to be used by banks in lending to NRE projects. The availability of said type of money mitigates risks from having liquidity problems when they lend substantially to NRE.

2. Lack of track record of performance of NRE projects - NRE business projects are fairly new as these were previously funded as stand-alone demonstration projects implemented by international development and bilateral aid programs. Particular areas of concern of the banks are the following:
   - ✓ Presence of successful projects that can serve as model for financing
   - ✓ Profitability – Banks have doubts on the capability of NRE projects to operate at a profit in a countryside environment where the disposable income of the clients are low and the demand is low
   - ✓ How reliable is the technology in delivering the power

   To mitigate the risk from absence of track record, there is a need for proponents to provide collaterals or to obtain a guarantee from guarantee institutions.

3. High transaction cost – There is high transactions cost associated with the marketing, service, and credit collection in rural areas. Long distances, poor transport infrastructure, impassable roads during monsoon, low literacy rates, cash-and-barter transactions, and lack of technical skills mean high transaction cost. Costs and staff time needed for marketing, credit or fee collection, service, establishing business infrastructure, and training staff can be high.
4. Unfamiliarity of NRE Technology - NRE technologies are considered high risk as they are unproven. This unfamiliarity with the technologies can deter lenders from making an investment. It is critical to ensure that NRE projects involve technologies that have a proven track record and that the terms and conditions of the contracts are well understood (e.g. product guarantees, warranties and service). The perception that NRE technologies are unproven and unreliable is pervasive within the investment community.
5. Absence of Second way out – Most NRE projects are site specific meaning that they were designed for a particular area. As such, the equipment has not value if transferred to another area. In the event of a foreclosure, therefore, the bank's recovery on the equipment is nil. Attempt to establish a secondary market for NRE equipment has been unsuccessful as even suppliers refuse to buy NRE equipment, if foreclosed by the banks.
6. Weak Cash Flow – Non-grid connected NRE projects are not covered by enforceable power supply agreement that can become a guarantee of cash inflows. Further, NRE business projects in a countryside environment are providing power to a sector with a questionable capability to pay for power deliveries.
7. Absence of Creditworthy Proponents – Philippine banks place heavy emphasis on the balance sheet of the proponent. Countryside entrepreneurs may have the real estate assets but values thereof are low because of their location. As such, they are considered poorly capitalized and are considered high risk borrowers.

BSP Rules

Banks are regulated institutions and bulk of the regulations that the banks are supposed to observe are those of the Bangko Sentral ng Pilipinas (BSP). The regulations are mean to guard banks from getting into speculative transactions. Loans that are deemed high risks are considered speculative and hence prohibited act.

BSP examiners audit the banks from time to time to determine their compliance to regulations. Violation of BSP rulings result into penalties, sanctions and suspension of certain privileges of the banks.

Newness of NRE as a new enterprise explains why NRE is considered high risk.

Internal Policies of the bank

Internal credit policies of the bank are most of the time more restrictive than what the BSP ruling stipulates to allow for a margin of error. The situation makes it more difficult for loans to NRE as stand alone project to get application for loans approved by the bank management.

Funding Sources

As discussed above, the mismatch between the kind of money required by NRE and the kind of money that banks can use for lending is a major problem if banks were to lend to NRE.

HOUSEHOLDS AS BORROWERS FOR NRE

Households may avail of loans from micro credit sources to partially finance the acquisition cost of SHS and other NRE suitable for household use. The high interest costs of loans obtained from micro credit sources, however, serves as barrier to the number of households than are willing to buy NRE.

CONCLUSIONS AND RECOMMENDATIONS

Viability

Although NRE enterprises are yet to make a documentary evidence of business success, NRE projects possess the qualities to make a viable business enterprise.

Proponents

The LGU is a worthy first round proponent but should be supported by strategic partners and venture capitalists

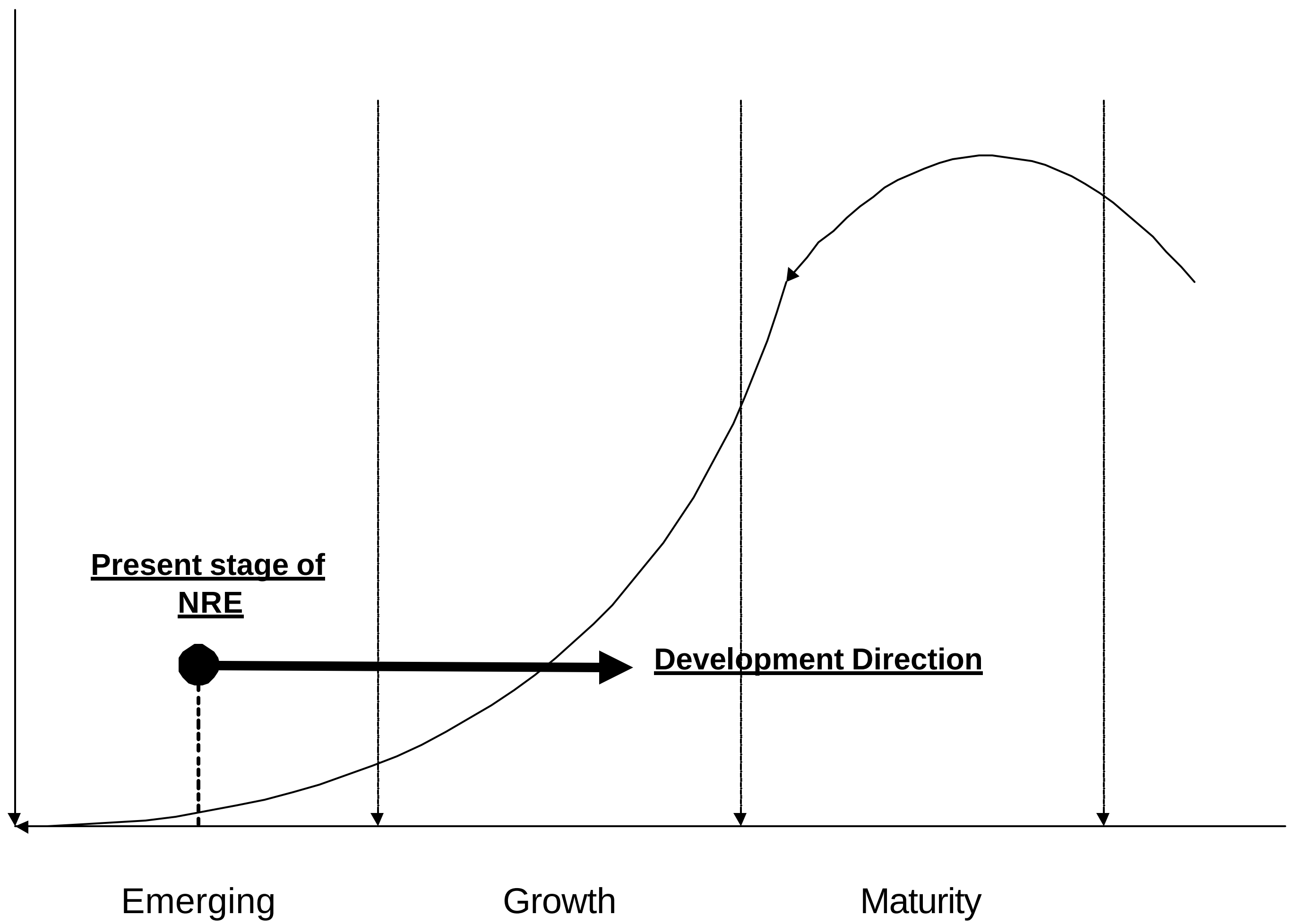
Support

There are still areas that need to improved as discussed above.

Funding

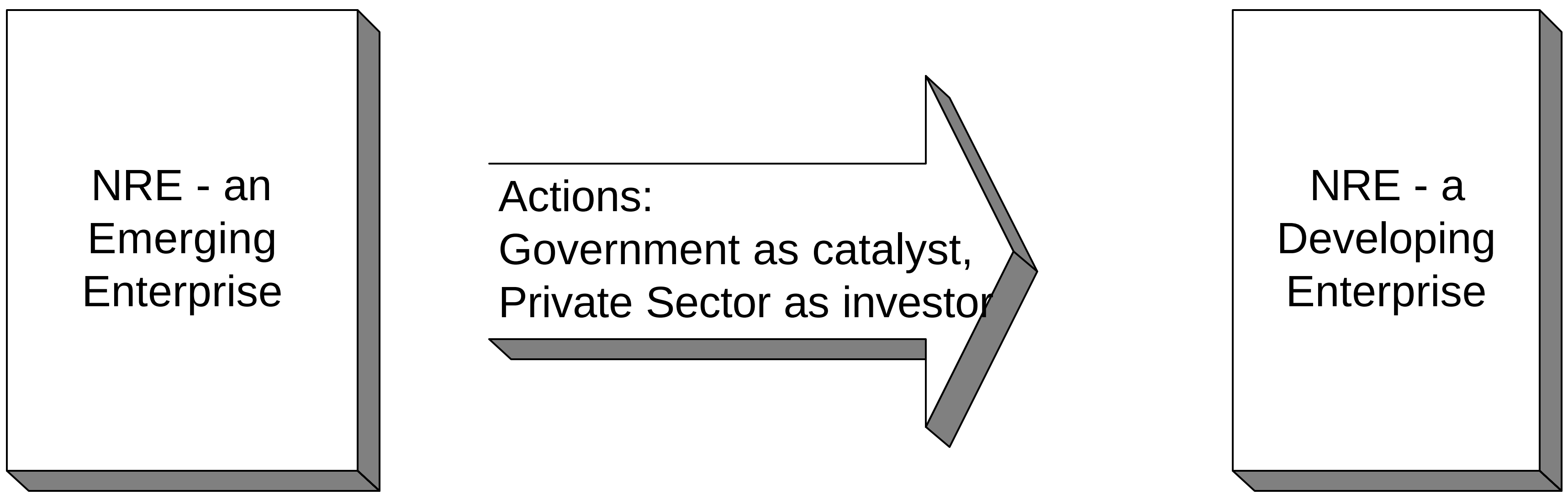
Only DBP is ready to lend to NRE. There are, however, a number of areas that need to be done to lessen the credit and liquidity risk to the lender.

Annex “F” is a tabulation of the conclusions and the recommendations discussed in the texts of this paper.



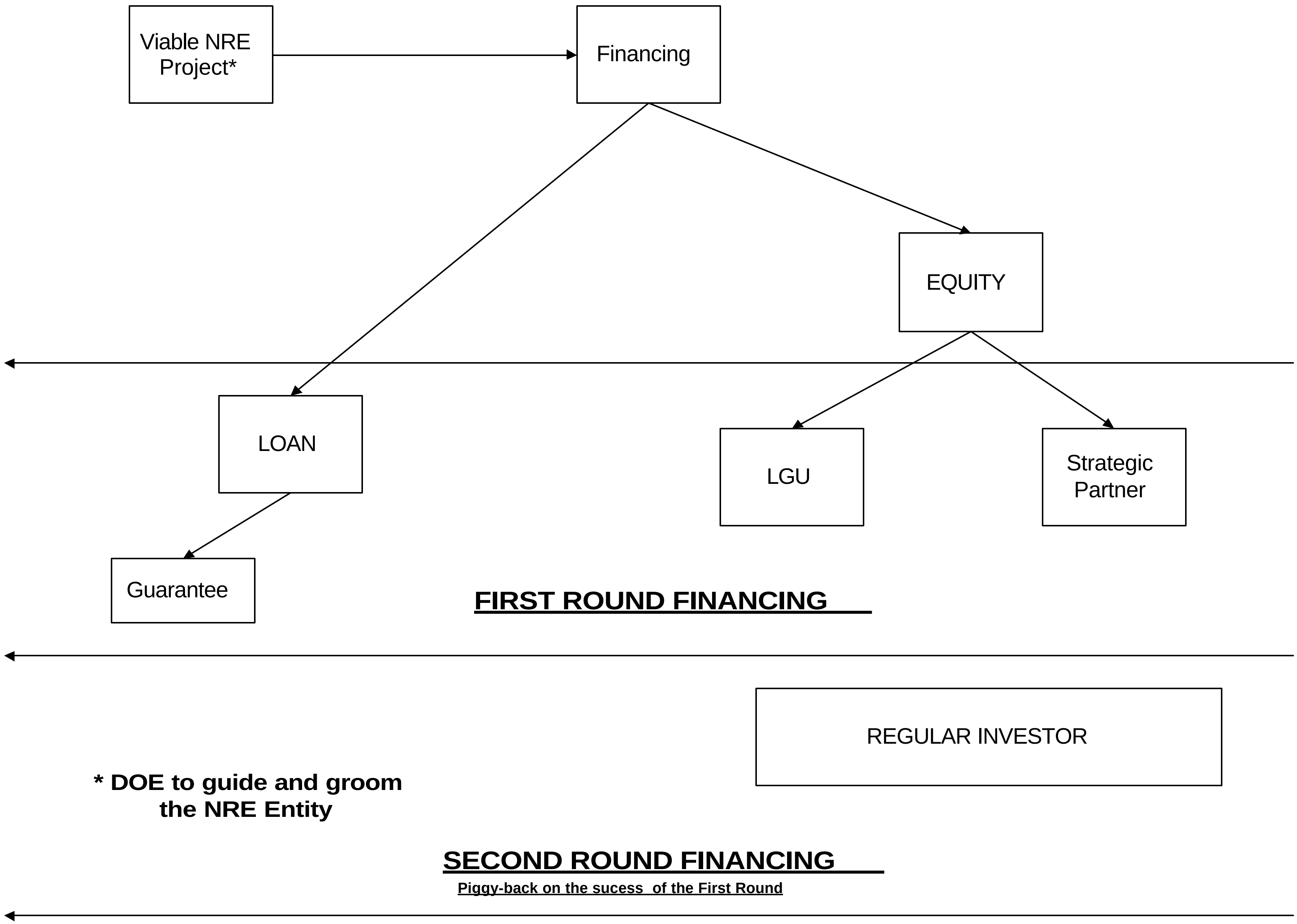
ANNEX "A"
NRE Development Stages

ANNEX "B"

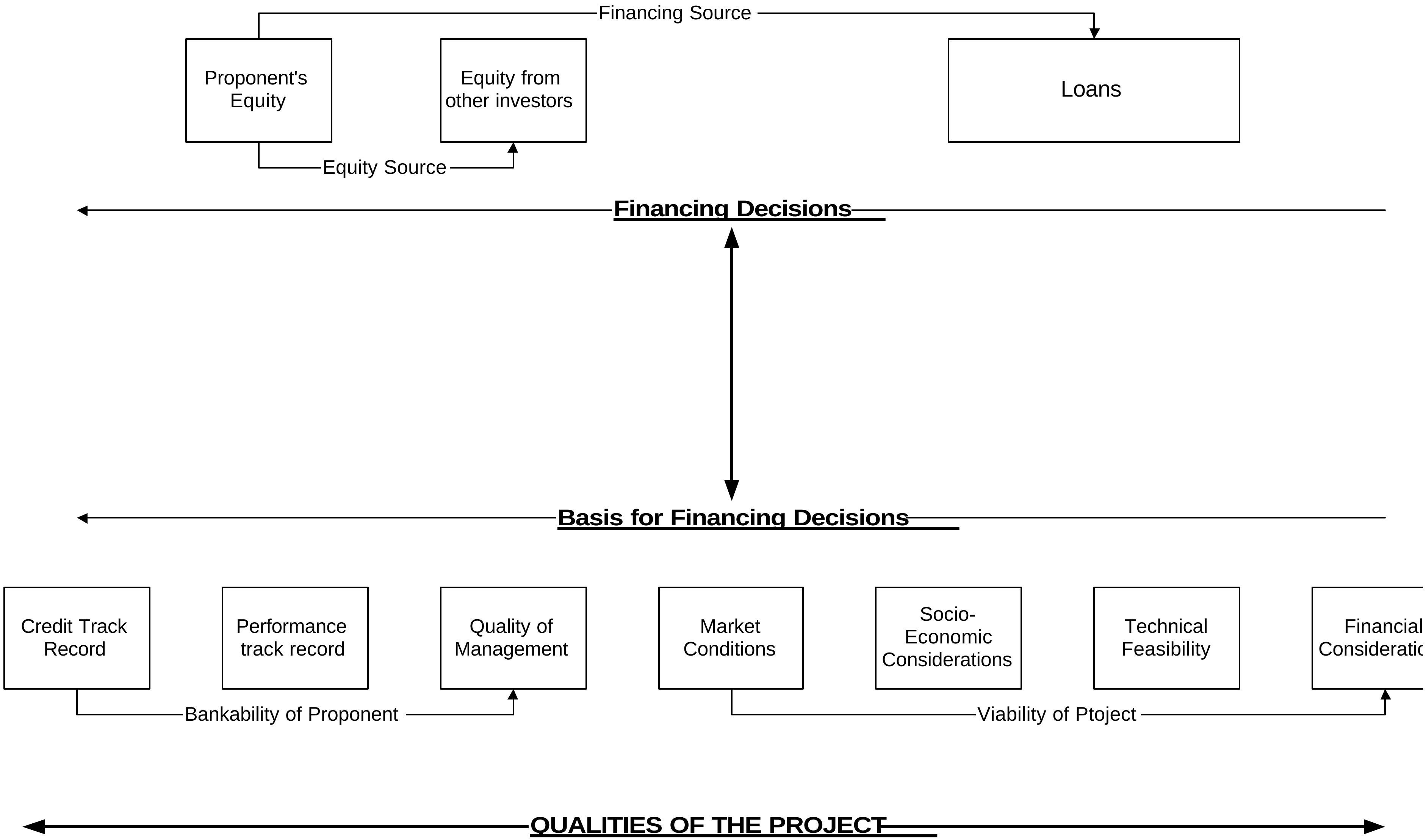


NRE - an Emerging Enterprise
Actions:
Government as catalyst,
Private Sector as investor
NRE - a Developing Enterprise

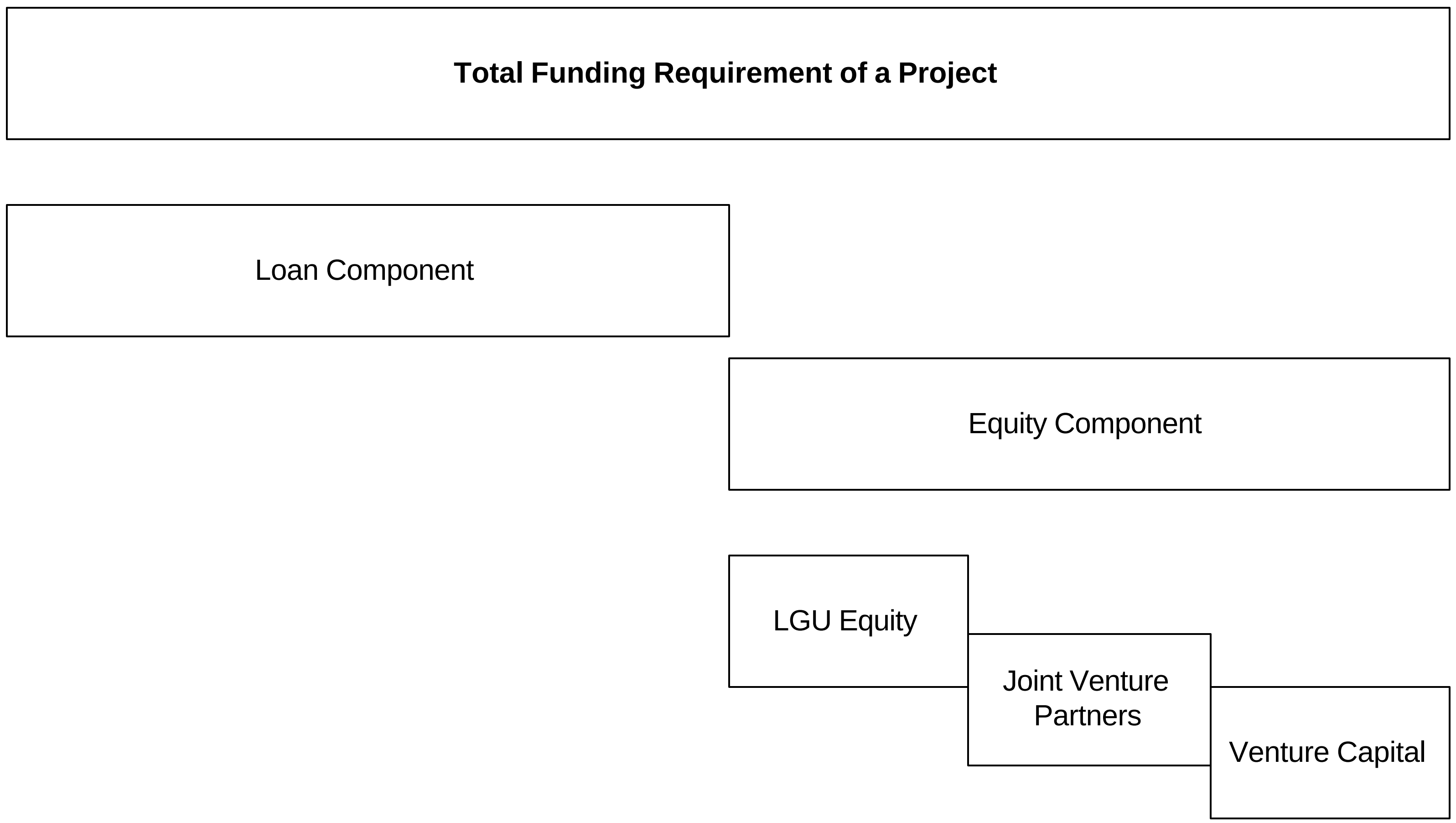
ANNEX "C"


Viable NRE Project*
Financing
EQUITY
LOAN
LGU
Strategic Partner
Guarantee
FIRST ROUND FINANCING
REGULAR INVESTOR
* DOE to guide and groom the NRE Entity
SECOND ROUND FINANCING
Piggy-back on the sucess of the First Round

Annex "D"
Financing Framework



ANNEX "E"



Total Funding Requirement of a Project
Loan Component
Equity Component
LGU Equity
Joint Venture Partners
Venture Capital

ANNEX "I"

	Status/Condition			
Criteria	**Ideal**	**Actual**	**Deficiency**	**Proposed Action**

SUMMARY

Viability of NRE				
Market Feasibility	Market size big enough for project to be profitable	Market packages are big enough to support viable NRE projects	n.a.	n.a.
Technical Feasibility	Project technically feasible in target site; cost to produce power low	Cost of producing power lower compared to power source currently used by market	n.a.	n.a.
Socio-Economic	Project to enhance earnings of users	Presence of power source to perk up existing economic activities and will create new ones	n.a.	n.a.
Financing	Available under terms that matches peculiarities of NRE	Financing terms do not match the peculiarities of NRE	Financing will be discussed separately	To be discussed separately
Packaging	Project properly packaged and presented	No entity helping proponents package proposals	A government or a private entity that understands and can package renewable energy projects	DOE to set up a unit focused on assisting proponents in packaging NRE projects

ANNEX "I"

	Status/Condition			
Criteria	**Ideal**	**Actual**	**Deficiency**	**Proposed Action**
Creditworthiness of Proponents				
First Round proponent				
LGUs	LGU can comply with the bank criteria	Lower category LGUs may lack the revenue levels to qualify for a loan that is high enough to finance total project cost	A party that can cover both the financial and other limitations of the LGU	An entity that can identify possible entities that are willing to contribute initial equity into NRE projects
Strategic Partners	Ready to provide additional capital and strengthen operational capability of project	Equipment suppliers, DOE and engineering firms can be strategic partners	An entity to broker a deal between the LGU and the strategic partner	An entity to act as intermediary to broker a deal between LGU and a strategic partner
Venture Capitalist	Provide additional capital under acceptable terms	The GFIs have subsidiaries engaged in venture capital business	GFI subsidiaries to include NRE in their list of priority investments	An appropriate deal with the GFI subsidiaries
Barriers of first round investors – the LGU				
High Project Cost	Total Project cost should match the	Cost of project too high that it discourages proponent despite benefits	Subsidy or a grant that will reduce the project cost from the proponent's viewpoint	Negotiate for grants to NRE projects with international funding institutions like DANIDA, NORAD and JBIC
Documentary Requirement	Documentary requirements for setting up of project and in obtaining a loan are designed such that proponents can comply	Low tolerance to numerous documents required	Simplification of the documentary requirements; assistance in compliance	Set up a group that will provide assistance and guidance to LGUs and other first round investors
Feasibility Study requirement	Feasibility study funding accessible to LGU and other first round proponents	Unable to access funds to pay for the cost of feasibility study preparation	Assistance to help qualify for feasibility study funds from CCPSP	A group that will provide assistance and guidance to LGUs and other first round investors
Track record	First round investors with track record in other business projects to vouch capability to run project	LGUs and other first round proponents with no business track record and are new to NRE	Alternative track record	Setting up of a guarantee facility for NRE project

ANNEX "I"

	Status/Condition			
Criteria	**Ideal**	**Actual**	**Deficiency**	**Proposed Action**
	viably			
Capitalization	First round investors having the necessary level of capitalization to pursue NRE projects	LGUs and other first round proponents with no adequate capitalization	Source of additional capitalization for NRE projects	A group that will negotiate with potential investors
Second Round proponent Electric Coops Households Local investors NGOs Existing businesses	Entities to spontaneously invest into NRE because it is perceived to be viable and can generate acceptable profit level	Not applicable	Business framework that will encourage entry of the second round investors	A group that will study the needs and prepare for the entry of the second round NRE proponents

ANNEX "I"

Criteria	Status/Condition: Ideal	Status/Condition: Actual	Deficiency	Proposed Action
Support from the Government				
Incentives				
Funding from MDF	NRE projects to qualify for long term loans from MDF program	NRE Projects not included in the list of projects qualified under MDF	MDF to include NRE in the list of qualified projects	The government to renegotiate the loan agreement with World Bank to include NRE among qualified projects
Agri-Agra Law	Loans to NRE included as alternative compliance with the Agri-Agra law	n.a.	n.a.	Issuance of an appropriate BSP circular
Assistance on Studies	• Sources of funds for studies are identified • Assistance to first round proponents in complying with requirements to access funds for studies preparation	CCPSP has funds for feasibility studies. There are also foreign donors that provide funds for feasibility studies	Assistance to first round proponents in having access to these funds	A group that will provide assistance and guidance to LGUs and other first round investors
Grants and Subsidies	• Sources of grants and subsidies are identified • Assistance to first round proponents in complying with requirements to access of these grants and subsidies	Grants and subsidies are available but first round proponents could not access	Assistance to LGUs and other first round proponents	A group that will provide assistance and guidance to LGUs and other first round investors
Arranging function	An entity that will put together the first round investors, the potential strategic partners, the venture capitalists and the GFIs to set up the NRE project	n.a.	n.a.	A group that will provide assistance and guidance to LGUs and other first round investors
BSP Rules on NRE	BSP to issue guidelines in lending to NRE	n.a.	n.a.	A group to formulate and propose BSP guidelines for NRE

<u>ANNEX "I"</u>

	Status/Condition			
Criteria	**Ideal**	**Actual**	**Deficiency**	**Proposed Action**
				NRE
Readiness of banks to lend to NRE				
Project Risks arising from • High project cost • Lack of track record • High transaction cost • Unfamiliarity with technology • Weak cash flow • Absence of a second way out	Project risks are mitigated. Risks to be mitigated include: • Credit risk • Liquidity risk	No specific scheme to mitigate the risks of the banks when lending to NRE	Risk mitigation schemes	• Setting up of a guarantee scheme for NRE • Setting up of a special fund that banks can use in lending to NRE
Funding Source	Funds that the GFIs can access to be able to finance NRE projects	Not existing		Setting up of a special fund that will match the peculiarities of NRE
BSP Rules	BSP rules considerate of the realities in financing NRE	Rules are formulated such that they have general applicability		A group to formulate and propose BSP guidelines for NRE
Internal policies	Internal policies of the bank considerate of the realities in financing NRE	Internal policies are formulated such that they have general applicability		A group to formulate and propose Banks guidelines for NRE

Appendix B

Draft Memo to DOF on Inclusion of NRE in MDF Qualified Projects

MEMORANDUM:

FOR : The Secretary, Department of Finance

FROM : The Secretary, Department of Energy

SUBJECT : Request for inclusion of NRE among qualified projects to be financed by the MDF Facility

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1.0 The Request

We wish to request the Department of Finance to make representations with the World Bank for the inclusion of New and Renewable Energy Projects among the qualified projects to be financed.

2.0 Background Information

2.1 One of the thrust of the Department of Energy (DOE) is poverty alleviation and rural development to provide greater opportunities and benefits to underprivileged Filipinos in remote and rural areas. Towards this end, the DOE aims to bring electricity to 8,000 barangays in ___ municipalities. All of the municipalities belong to 6^{th} class category and are in no means qualified for financing from the regular financing windows of GFIs and commercial banks.

2.2 ___ of the unelectrified barangay mentioned can be reached by the grid within the next 2 years. The remaining, however, can be electrified using generators that consume fossil-based fuel or using New and Renewable Energy (NRE) sources like generator powered by solar energy, wind energy and hydro power. The DOE opts for NRE sources because they are environment-friendly in that there is no CO2 emission. Further, NRE is least cost alternative in the long run because they are powered by resources that are free and are replenished by nature. (A briefer on NRE is attached as Annex "A")

2.3 In its attempt to bring electricity to the countryside, the DOE intends to make electrification a community based project. Studies show that project where the active participation of the community is sought are more likely to be sustainable. Considering that the target market is marginalized group, the enterprise of bringing electricity shall focus on full cost recovery plus profit. The level of expected profit, however, is not expected to reach a level that is attractive to the private investor. As such, the municipal LGU is the appropriate proponent for such project as it would be in pursuance of LGU's mandate of spurring development. Such projects are viable because there is a market which are the residents of unenergized barangays and the technology has been proven.

2.4 Funding, however, becomes a problem because the banks and GFIs shun away from 6^{th} class LGUs. It is for this reason that the DOE looks at the MDF as the possible source of funding for LGU electrification projects. There is a need, however, for DOF to make representations with World Bank for the inclusion of NRE among the projects that qualify for MDF financing. If the municipal

LGUs were to pursue NRE projects, it would not only fulfill their social mandate but would also improve the standards of living of the less privileged sectors of society. Likewise, it is in consonance with the policy of the State of local autonomy that will enable the LGUs to attain their fullest development as self-reliant communities and make them more effective partners in the attainment of national goals.

2.5 The estimated average cost of NRE project per municipal LGU is P10 Million. If all the ___ municipal LGU were to pursue NRE projects, the total project cost would be _____ Million.

2.6 Considering that NRE projects are environment friendly and that proponents are among the least privileged municipal LGUs, the DOE will work with NEDA for the possible 70% subsidy portion for such projects.

3.0 Justification: The DOE is endorsing favorably the proposed inclusion because of the following:

a. The project would benefit the least privileged sectors of society
b. It will spur economic development in the countryside

For consideration

VICENTE PEREZ
Secretary, Department of Energy

Appendix C

Proposed Guidelines on Project Evaluation

PART 1
PROPOSED GUIDELINES ON PROJECT EVALUATION FOR
NEW AND RENEWABLE ENERGY PROJECTS
DEPARTMENT OF ENERGY

I. INTRODUCTION

The proposed guidelines consists of two parts as follows:

Part 1 – This is the "PROPOSED GUIDELINES ON PROJECT EVALUATION FOR NEW AND RENEWABLE ENERGY PROJECTS." This set of guidelines is intended for the use of DOE. This is the subject of the foregoing discussions.

Part 2 – This is the "PROPOSED GUIDELINES FOR PROPONENTS OF NEW AND RENEWABLE ENERGY PROJECTS". This set of guidelines is intended for the use of proponents of NRE. This is the subject of another set of documents, which is appropriately captioned.

1.1 Content and Objectives of the Guidelines

1.1.1 Prior to the foregoing proposed guidelines, the Department of Energy used fragmented references in the evaluation of NRE projects. Although the staff of DOE tried their best to provide assistance to NRE projects, the fragmented source of guidelines is an obstacle to effective delivery of the assistance.

1.1.2 The foregoing guidelines, therefore, sets into a single source documents the standards used by DBP and LBP as well as of the DOE, NEA, PNOC-EDC, NPC-SPUG and NEDA in the evaluation of projects. The guidelines were written from the viewpoint of DOE with the end of providing assistance to NRE proponents in obtaining financing from the Banks as well as in raising equity from prospective investors. It does not attempt to duplicate the processes performed by the DBP, LBP, NEA, PNOC-EDC, NPC-SPUG and NEDA but draws lessons from them.

1.1.3 The proposed guidelines were formulated within the framework that DOE's role in NRE projects is that of a catalyst and not as an investor or a lender. As a catalyst, DOE's specific objectives in coming up with guidelines are as follows:

- To improve the approval rating of loan applications of NRE projects
- To enhance acceptability of projects to prospective investors and
- To come up with policies to strengthen weaknesses encountered during the course of the evaluation
- To set up a system in preparation to a bigger fund for NRE projects that will be obtained from the international funding agencies.

1.1.4 Proposed guidelines are useful to DOE especially to the staff that will be specifically tasked to provide assistance to NRE project proponents in obtaining financing.

1.1.5 Perceived assistance is in the form of endorsement of project as well as effecting necessary changes in any aspect of the proposal to increase its chances of getting approval for a loan.

Role of DOE

1.2 DOE plays the role of a Catalyst for Private Sector Participation of NRE Projects. As a catalyst, it would provide assistance to proponents of NRE. The proponent, however, remains primarily responsible for the project. DOE will assist the proponent in dealing with the banks but will not encroach into the credit decision-making processes of the banks. In the performance of its role as catalyst, it should not duplicate the efforts of the banks. It is important, however, that the staff of DOE understand what the banks are doing such that they can provide appropriate advice to the proponent and can intelligently discuss with the account officers of the banks where the need arises.

1.2.1 It is only when DOE is requested by the client or by the bank that it provides assistance. This is to avoid infringing into the "confidentiality of relationship" between the bank and the proponent/borrower. The assistance of DOE is optional and should not be a preliminary requirement for loan application filed with the Banks. Banks should accept NRE projects even in the absence of preliminary evaluation of the DOE.

1.2.2 The nature of assistance requested by a proponent may include the following:

a. Market identification and validation of market assumptions. DOE will make an assessment of the existence of the market and will present to the banks a document stating the existence of a market, the characteristic of the market and other basic market data. It should also 1) prove the assumption on the population and its growth, 2) provide estimates on tariff rates and 3) provide estimates on cost of delivery of electricity.
b. Technical validation and verification of the viability of the technology. As some banks do not have the capability to evaluate technical aspects of NRE projects, DOE will pre-screen the technology. It will indicate in a report that would include information 1) if the technology has been pilot tested and the results of the pilot test, 2) if there existing projects in the Philippines using the technology and the performance of the project and 3) if there are of similar projects in other countries and their performance. The technology has bearing project cost and operating costs. The two costs will, in turn, affect the financial viability of the project.
c. Institutional evaluation including assessment of the readiness of the community and the livelihood component.

d. Verification of "cost of service delivery" calculation/pricing or tariff formula

1.2.3 DOE can likewise provide information on the areas where NRE are appropriate as well as the appropriate matching technology. DOE has an existing NRE resource map that can be made available to the banks and to proponents upon request.

1.2.4 Where requested by Banks, DOE shall provide assistance on areas of institutional strengthening, identification of possible joint venture partners and evaluation of technical feasibility. DOE, however, would not like to make the assistance as a preliminary requirement for loan application filed by proponents with the Banks.

1.3 What it takes to enhance public participation in NRE Projects

1.3.1 The potential investors/proponents and bank/lenders are the two target sectors whose participation is being sought for NRE projects. DOE could catalyze flow of investment and loan funds into NRE projects by understanding the expectations of both and through helping them in achieving these expectations.

1.3.2 Expectation of investors/proponents – The investors/proponents are the risk takers who commit their resources to the project with the expectation that their money would earn a rate higher compared to placing their money into securities. The bottom line of equity investors is the level of earnings that they expect to generate from the project and that they have a reasonable degree of assurance that they can recover their investments as well as their earnings.

1.3.3 Expectations of the Banks – Banks place their money into the projects based on 1) the representation by the proponent/borrower about the project and 2) the confidence of the Bank onto the capability of the proponent/borrower. Banks are concerned about the bankability of the borrower and the viability of the project that is presented to the bank for purposes of funding. The bottom line of the banks is recovery of the principal amount and the earnings of whatever they lend to the proponents. Banks take the necessary precautions prior to granting loans. They focus their evaluation in two areas: 1) the viability of the project and 2) the bankability of the proponent.

1.4 Methodology

1.4.1 The proposed guidelines took into consideration the lending guidelines of DBP, LBP and PNOC-EDC and the project guidelines of DOE, NEDA and

NPC-SPUG. The guidelines, however, were written under the viewpoint that DOE takes the position of a Catalyst.

1.4.2 The proposed guidelines has the DOE Assistant as a centerpiece. A proponent is assigned to a specific DOE Assistant who will not only provide assistance described in this document but also to communicate with other units of DOE where necessary.

1.4.3 The output of the DOE Assistant is an Action Sheet marked as Annex "A". The Action Sheet specifies, among other things, the subsequent action recommended by the DOE Assistant taking into consideration the findings he had from the evaluation of the project.

2. THE PROCESS

2.1 The Process flow within which this proposed guidelines has been formulated is as follows:

2.1.1 The proponent requests DOE for assistance in the packaging of a project. This is after the technical group of DOE has completed assessment of the project and found the same technically feasible.
2.1.2 The DOE Assistant requests the proponent to submit documents indicated in item 3.2
2.1.3 If documents are sufficient, the DOE Assistant conducts an evaluation. Upon completion of the evaluation, an Action Sheet is prepared.
2.1.4 The findings of the DOE assistant on matters pertaining to item nos. 1.2.2 (a) to (e) will be summarized in a report form and will be presented to the PPT or any other body to be defined later on.

2.2. Where a DOE unit or any of its attached agencies prepared the project feasibility study, the DOE Assistant will perform items 2.1.2 and 2.1.3. In addition, he/she will
2.2.1. Come up with a financing model to be presented to prospective investors
2.2.2. Where requested, will present the project to the prospective investor and
2.2.3. Will provide assistance to the prospective investor in doing the groundwork for the investment.

3. EVALUATION

3.1 The purpose of evaluation is to consider all the elements that have bearing to the success and failure of the project and to make a sound judgment on issues arising from each of these elements. Present judgment has bearing on future results, which are usually expressed in financial terms through the projected financial statements.

3.2 Project documents presented to the DOE Assistant for purposes of the evaluation should contain at least the following:

a. Organizational Papers - Articles of Incorporation and By-laws, if the proponent is a corporation or cooperative, Articles of Partnership if a partnership, or Bureau of Domestic Trade Registration if a sole proprietorship
b. If the proponent is an LGU, a resolution from the Municipal/City/Provincial council approving the project, authorizing the LGU to borrow and authorizing for the encumbering of LGU assets including its Internal Revenue Allotment
c. Bio-data of Principal officers and directors of the business
d. Feasibility Study usually prepared by proponent's consultant. Attached to the feasibility study is a statement from the appropriate unit of DOE stating that the technical assumptions in the feasibility study were validated and found substantially correct. If the feasibility study was prepared by a unit of the DOE upon the request of the proponent, the study will be accepted as is.
e. Transfer Certificate of Title and other forms of certificate of ownership on assets proposed to be mortgaged to secure the proposed loan
f. Financial Statement of the proponent for the last three years
g. If the proponent organization is new, Balance Sheet as of a given date and the Financial Statement of the Principal Stockholders for the last three years. If the financial statements are not available, an audited statement of Assets and Liabilities may be submitted.
h. Statement from the proponent and principal officers and directors about cases filed against them in courts.

3.3 The evaluation process starts with an assessment of the proponent. It addresses the question "How bankable is the proponent?" Are the banks willing to place their money into the proponent knowing the circumstances of the proponent?

3.4 Next to be evaluated is the viability of the Project. It focuses on the following issues:
a. Will the proposed project inure incremental benefits to the proponent
b. What are the risks involved and
c. What are the risk mitigation measures necessary

3.5 The Evaluation address risks and profitability in the loan transaction, which are the primary concern of the bank. The banks invest only after conducting an extensive due diligence process and such practice is worthy of replication to increase chances of projects getting approval for a loan. The said process is conceptually presented in Annex "B". A discussion of the process is marked as Annex "C".

3.6 The product of the evaluation is the financial package that will be presented to the Banks and prospective investors. If the proponent presented a financial package, the task of the DOE Assistant is to affirm the financial package or to suggest amendments to make package more acceptable. The Financial Package shall have the following components:
a. The amount of Equity needed in addition to equity contribution of proponent

b. Performance Measures on proposed project that include FIRR, BEP, Payback Period and NPV
c. Terms of the loan to be obtained from the bank include
   1) Amount – Amount of loan is a function of the project cost and the level of equity contributed by the proponent. Elements of project cost is discussed in a separate section of this guideline
   2) Tenor – Tenor is the number of years within which the borrower is to effect full payment of the loan. It is dependent on the projected cash flow. Grace period is allowed for the gestation period but not to exceed two years. Gestation period is the time from started of project up to the time that the project starts to generate revenues. A shorter grace period is allowed in payment of interest portion.
   3) Purpose of Loan – Purpose of loan is to partially finance proposed project.
   4) Interest Rate – Discussed in foregoing section
   5) Drawdown – Most terms loans are released according to stages of completion of project. The initial release is usually made after reaching a certain percentage of project completion using funds from equity contribution from proponent. Subsequent releases are made after the appraiser has verified that proponent has spent a specified amount for the project or after reaching a certain stage of completion.
   6) Repayment – Quarterly payment is convenient to both the proponent and the bank. When cash flows are tight, a maximum of 2-year grace period on principal and 6 months grace on interest.
   7) Collateral/Security – Discussed in foregoing section
   8) Insurance – Collateral should be insured with reputable insurance company.
   9) Compensating Business – Banks prefer that proponent maintains deposit account with them

   Detailed discussion of the above is the subject of Annex "C"

3.7 The evaluation shall highlight on the concerns of the banks particularly the following:

a. Credit Record of proponent
b. Financial Aspects – Historical Financial Performance of proponent and Projected performance
c. Marketing aspect
d. Operations and Technical Aspects
e. Organizational Aspect
f. Risk involved in the credit transaction
g. Pricing
h. Collateral/Security and Second Way out
i. Socio-economic considerations

CREDIT RECORD OF THE PROPONENT

3.8 Proponents may be hesitant to discuss credit record especially where there is adverse record on the proponent. The DOE Assistant, however, has to extract from the proponent the nature of adverse findings, if any, such that remedial measures can be effected before the application is filed with the bank. Bank uses exhaustive procedures in the conduct of credit investigation and it is likely that it will find out the adverse finding.

3.9 Bank obtains credit record of the proponent/borrower through the process called credit investigation. The Credit Investigator (CI) sends queries about the level of loans, the status and payment record with the other banks in the area and nearby area as well as with its branch offices. The CI likewise looks into the records of the court for the existence of court cases against the proponent and of the principal officers and stockholders, if proponent is a corporation or cooperative. The CI, likewise make a random interview of the neighbors of the proponent and certain suppliers to assess the character of the proponent.

3.10 Adverse findings from the credit investigation may result in the disapproval of loan application of a good project. If the proponent is honest enough to disclose any unfavorable findings, if any, the DOE Assistant can suggest measures to correct the weakness before the loan application is filed with the bank. It should be noted that it is very difficult to correct the initial impression of the account officer of a bank once there are adverse findings.

FINANCIAL EVALUATION OF HISTORICAL PERFORMANCE

3.11 Evaluation of historical financial performance is applicable where the proponent is an existing entity. Historical performance is assessed separately from the projected performance of proposed project. The proposed project is evaluated separately based on its incremental effects, that is, increases in revenues and costs become the basis of the evaluation.

3.12 Financial Statements consist of three statements, 1) Income Statement, 2) Balance Sheet and 3) Cash Flow Statement or the Statement of Sources and Uses of Funds. Income statement shows the results of operations over a certain span of time, usually one-year. The Balance Sheet shows what the business entity owns and what it owes as of the date indicated in the statement. The Cash Flow Statement shows the sources of funds that came into the entity and where the funds went over a certain time span, usually one-year.

3.13 Financial Statements to be useful for analysis, should be prepared in accordance with generally accepted accounting principles and is the duly certified by a Certified Public Accountant (CPA). The DOE Assistant should read the audit report and that the CPA expressed an Unqualified Opinion of the Auditor on the Statements.

3.14 Tool for financial evaluation is a "Financial Spread Sheet" which places in a single document the items in the financial statement that needs to be analyzed. Financial SpreadSheet is included as Annex "D". Electronic copy is included in this proposed manual.

3.15 The evaluation of the financial statements using the spreadsheet gives an indication of the financial health of the proponent. Guidelines in the Analysis of Financial Statements is contained in Annex "E"

FINANACIAL EVALUATION OF PROPOSED PROJECT

3.16 Where the proponent is a recently organized entity with no previous track record of performance, focus of evaluation is proposed project.

3.17 Statements that are subjected to evaluation are the Projected Income Statement, the Projected Balance Sheet and the Projected Cash Flow. Sample format is marked as Annex "F" which is an electronic worksheet. The electronic worksheet is part of this manual.

3.18 If proposed project is an expansion of existing business activity, the expansion project should be analyzed as a project that is separate and distinct from an existing project. This is to be able to assess the add-on value of the new project to the existing operation. Only the incremental revenues and costs will be considered.

3.19 Sunk cost, or cost of assets that has already been paid, will not be considered even if these assets are used in the expansion projects.

Project Cost and Financing

3.20 Since evaluation of proposed project pivots on project cost, it is important that this item should be given initial attention. Project performance is gauged against the total cost of the project.

3.21 The components of projects of project costs should be examined to determine their appropriateness and sufficiency. Components of project cost are:

a. Cost of Preparing the feasibility study
b. Cost of Land
c. Cost of Land Improvements
d. Cost of Equipment including installation and supervision cost
e. Pre-operating expense which include cost of securing business permits, licenses, cost in organizing the entity, personnel cost and such other costs incurred prior to start of commercial operations
f. Allowance for Contingencies – This is a provision for possible increases in cost resulting from the depreciation of the peso and such other unforeseen events resulting into an escalation in the total cost of the project. Allowance for Contingencies is usually set at 15% of total projected cost.

g. Working Capital - This represents the minimum level of balance maintained in the cash vault, receivables, and inventories in spare parts and prepaid expense necessary for a continuous and unhampered operation of the entity.

3.22 The total project cost, once determined and validated, should have a matching fund sourcing which may be either loan or equity. Some rules of thumb to determine the appropriate mix between loan and equity are as follows:

a. Banks do not ordinarily finance the cost of acquiring land. Land should be part of the equity contribution of the proponent
b. Working capital – There are should be available financing for the initial working capital requirement of the entity. Some banks allow initial working capital requirement to be financed by a medium to long term credit product while other banks allow only short term loan products of the bank to finance working capital needs.
c. Except for Working Capital, all of components **a to e** in item 3.15 qualify for long term funding which is either equity or medium to long term loan. A medium term loan has a tenor of 5 to 7 years while a long-term loan has a tenor of 7 to 10 years.
d. In the presence of collateral with loan value that can fully cover a given amount of loan, the bank can provide the proponent a loan equivalent to 75% of total project cost, that is items a to f of item 3.15. Part of the 75% is the Working Capital loan discussed in item 3.16.a.

Annex "G" discusses the various loan products of the Bank and their appropriate uses. The Annex guides the DOE Assistant in providing the appropriate advice to proponents on the kind of loan product to be used.

3.23 If the proponent does not have the necessary resources to cover the portion of project cost that could not be covered by a loan, there may be a need to assist the proponent to obtain equity from various sources. Potential sources of equity funding are:

a. Equipment Suppliers – Some Equipment Suppliers are willing to infuse as equity into the project portion of the purchase price of the equipment. Suppliers, however, are concerned with the full collection of their money and as such, the projected financial statements must consider soonest redemption of equity of suppliers as the cash flows may warrant. Further, suppliers may want assured revenues in which case, a Non-Participating Preferred Shares may be issued to such suppliers
b. Local Companies – Big companies with operations near the project site may be willing to infuse equity especially if the said companies are known supporters of environment friendly technologies.
c. Investment Companies – Some banks and insurance companies have subsidiaries that invest in developmental projects especially those with good potential
d. Local Investors – There may be people in the project locality who may be willing to contribute equity into the project. As in the case of the suppliers,

they may want assured income and a specific schedule for the redemption of their investment. In such case issuance of preferred shares may be appropriate.

e. Local Government Unit (LGU) – The LGU may be the proponent or may be interested to place equity into a project especially where there is a tremendous socio-economic benefit from the project.
f. NGO – Some NGOs may have funding for equity investment. To maintain the nature of the firm as a private entity, it is suggested that the NGOs should only take a minority interest in the undertaking or else take Preferred Non-Participating shares.

3.24 The timing of disbursement of cost for project should be in accordance with a schedule presented in a PERT/CPM or a Gantt Chart. The DOE Assistant should see to it that the funds are made available when needed. If there is a risk for a cost overrun, the DOE Assistant should recommend for the setting up of a contingency allowance as the occurrence of a fund shortfall during the implementation of the project hurts both the bank and the proponent in the following manner:

- Banks accrue interest on the loan despite non-completion of the project that generates cash to service the loan. The obligations of the borrower continue to mount even in the absence of the capability to pay.
- The bank cannot collect despite the existence of the claim against the borrower. If it could not collect after a certain period, the bank may be required to provide allowance for bad debts, which may hurt the financial picture of the bank.

Financial Projections

3.25 Financial Projections are the expectations of management about business performance within a given span of time into the future. The starting point is now and the bridge to the future is the project, which is being funded jointly by internally generated funds and equity on the one hand and by a loan on the other hand. The underlying assumptions must be understood because it tells much about the feasibility of an expansion project. Projections, if placed side by side with historical performance and, if connected with management analysis would indicate whether the decision to pursue a given project is a sound financial judgment.

3.26 In evaluating projections, see to it that expansion portion is a stand-alone project and can generate the required cash flows to pay off the loan as scheduled. Cash generated from existing capacity should not subsidize the payment of loan amortization from the loans incurred to finance expansion. In worse scenario, it should only serve as a buffer just in case the expansion project miscarries. Analyze assumptions of the proponent as basis for preparing the projections, as well as the environmental issues like pending bills, long term bulk orders, new contracts;

these developments can affect company performance. Likewise, identify and analyze for possibilities of a drop in selling price and other sensitivities.

Projected Income Statement

3.27 The first statement is the Projected Income Statement, which shows in financial terms how the project is expected to perform. The Income Statement has two major items, 1) Revenue or Income Items and 2) Expense items. The difference between Revenues and Expenses is the Projected Net Income

Expenses

3.28 Expense items should be examined first. It is in this area where delays occur in the evaluation of the project by the bank because the supporting schedules are not available in the documents submitted.

3.29 Items of Expenses should be examined to determine accuracy and appropriateness of figures. Supporting schedule will enable the bank to validate if a specific expense item is overstated or understated. Each item of cost should be supported by schedule. This is to minimize the processing period of the loan application that results from queries of the Account Officer on how the proponent arrived at the figure presented in the projections. A list of major of the items of cost and the appropriate supporting schedules are presented below:

Cost Item	Supporting Schedule
Salaries and Wages	Payroll schedule
Depreciation Expense	Depreciation Schedule
Cost of Goods Sold	Detailed Cost of Goods Statement
Maintenance Expense	Detailed assumptions provided by equipment supplier
Other Expense	Assumptions computed based on percent or Sales Revenue or Cost of Goods Sold
Interest Expense	Schedule of loan amortization

3.30 The DOE Assistant should be able to establish that the items of expense are reasonable and are within acceptable limits.

Revenues

3.31 The basis for computing revenues should be indicated in projected statements. It is helpful to present revenues in the following manner:

	Year 1	Year 2	Year 3 & After
No. of Households in coverage area			
Target no. of households			
Consumption per household			

Total Projected Demand			
Plant Capacity			
% Capacity Utilization			
Selling Price per kilowatt			
Total Revenue			

3.32 The projection on revenue should be related to the marketing strategy, which is discussed in the marketing assessment.

3.33 Suggested Format of projected financial statement as well as supporting schedules are included in Annex "F" which is an electronic worksheet.

Projected Cash Flow

3.34 Projected Cash Flow reflects the sources and uses of cash for the project. For the first two years of operations, Projected Cash Flow is usually prepared on a monthly basis to detect months where shortage in cash can possibly occur. In subsequent years, yearly cash flow projections are sufficient.

3.35 It is helpful to see that temporary need for cash are supported by cash generated from existing operations.

3.36 Projected cash flow reflects whether the project is in a position to generate cash to be able to service a specific loan amortization. With provisions for deviation included, Cash Flow Projection becomes the basis for a decision as to whether to lengthen or to shorten the grace period for the payment of a loan. It is also an indication of the capability of the project to effect payment of dividends.

3.37 Suggested format for Projected Cash Flow is included in Annex "F". Such format facilitates the computation of FIRR, Payback period, Break even point and such other performance ratios on projects.

Projected Balance Sheet

3.38 Projected Balance Sheet shows the financial position of the project. It shows the gradual build up of equity position and the decline in the level of long term liabilities.

3.39 The Projected Income Statement and Projected Cash Flow are tied to the Projected Balance Sheet. For example, the projected level of Account Receivable is related to Sales and the policy on giving credit. The level of inventories is related to the projected level of Cost of Goods Sold and the level of inventory in which the entity finds it comfortable.

3.40 Suggested format for Projected Balance Sheet is included in Annex "F"

Performance Assessment

3.41 Three situations should be presented 1) projections without the project, that is, expected performance of existing operation 2) Projections on the project, that is, the expansion project as a stand-alone and 3) combined projections on existing and expansion. Such an exercise is necessary to enhance the comfort zone of the Bank Account Officer in endorsing the proposed loan for management approval.

3.42 It is helpful to place the figures in the projected financial statements into a worksheet. This will allow for vertical and horizontal comparison of figures and comparison with projects of similar nature. If the project is an expansion of an existing business operation, the spreadsheet on the projection can be compared with the spreadsheet on historical operations as basis for determining consistency of assumptions.

3.43 Performance measures are Financial Internal Rate of Return (FIRR), Net Present Value (NPV) of projects, Payback Period and Break Even Point (BEP). These performance are discussed in Annex "F", an electronic copy of which is also attached.

3.44 In doing sensitivity analyses of project, revenues are adjusted downward and costs adjusted upward to determine the capacity of the project to absorb results of negative events in the environment.

MARKETING ASSESSMENT

3.45 Marketing assessment describes the target market in terms of capacity to pay for the service both for the present and foreseeable future. In describing the future movement of demand, it should identify the basis why demand is expected to improve at a given percentage within the foreseeable future.

3.46 It should identify the barriers in the marketing of services that include direct and generic competition, culture, and hesitancy for the use of the product and such other constraints.

3.47 To address these barriers is a marketing strategy. Strategy covers such areas like pricing, promotion, packaging and product delivery. Along with this strategy is a proposed marketing budget to assure the implementation of the strategy.

ORGANIZATION AND MANAGEMENT

3.48 People run organizations and it is for this reason that the proponent must posses the credibility necessary to run the project as a business. Credibility means that the proponents, the lenders and prospective investors have the confidence that proponent can deliver his/her end in the commitments.

3.49 In examining the organization structure of the proponent, the DOE Assistant should examine the tasks and sub-tasks in running the project as a business enterprise. Examination of the resume of key officers submitted, may reveal weak point that require appropriate recommendations from the DOE Assistant.

3.50 In the assessment of the organization, the following should be looked into:

a. Company Background
   1) Brief History of the Company
   2) Pertinent Details on its operations
   3) Other information on the company's operations (i.e. market, product lines, etc.)

   Include in this section a brief chronological account of how the business started and how it grew to what it is now. Details on operations should cover the scope of market, whether international, local or covers a certain region; as to what portion of production output is done in house and what portion by sub-cons; extent of utilization of production capacity.

b. Products/Service - Include peso amount and the percentage of contribution to total revenue of the main product/services and secondary product/services

c. Ownership Structure - Indicate if proponent is a sole proprietor, partnership or corporation or cooperative. If corporation, indicate whether it is a domestic corporation or a fully owned subsidiary of a foreign corporation. If the proponent is a joint venture (JV) company, indicate the parties in the JV as well as their role and the advantages they can bring into the arrangement.

d. Equity Participation - Indicate the authorized capitalization, the number of shares and the par value per share. List in tabular form the names of the stockholders, their citizenship, the amount subscribed and the amount paid by each and their share to total paid up. This section will tell whether proponent qualifies under the minimum ownership by Filipinos in the corporation.

e. Management/Officers
   1) Board of Directors
   2) Key Officers/Personnel - The Management Team, usually composed or controlled by the controlling stockholder/s, is the prime mover of the business organization. Its outlook, plans, attitudes, beliefs and style of handling human, financial and other resources shape the culture of the organization and it has much to do with the continued success or the decadence of the organization. Look into the quality and depth of the management team because this is where

Character of the borrower, which is the first C of Credit, will be judged.

3) Monitor presence of the following in the proponent:
- Adequacy of internal control systems
- Degree of professionalization of managers
- Adequacy of their training
- Management caliber, depth and succession plans
- Credit record and integrity of principal officers
- Management and/or ownership changes and their effect on the business

f. Related business/interest - Include information on the other businesses and sources of income of the proponents. These are looked upon as secondary sources of cash for servicing obligations.

g. Plant and Facilities - Include a brief description of the facilities and indicate if water, power and transport facilities are available. Indicate the estimated production capacity and the extent of its utilization. Indicate the number of employees.

RISKS/KEY SUCCESS FACTORS

3.51 The strengths and weaknesses of a proponent should be analyzed in relation to industry conditions, competition, labor situations, government regulations affecting the business and political and economic climate.

3.52 There are always risks involved in pursuing the expansion project and these should be identified. Identify potential risks that may adversely affect the project and why you think the proponent has the capability to weather off these risk and remain viable. Discuss the factors that adversely affected the proponent in the past, how it managed to survive the adversities and stayed viable. Mention the strengths of the proponent like existence of a captive market, stable raw material source, investment incentives, favorable laws, market share dominance, etc. Mention also other factors, which have positive impact on company's operations.

3.53 Risks in Business include the following:

a. Depreciation of the Peso against other currencies – If there is peso depreciation, peso denominated liabilities may bloat
b. Succession Issues – The project may discontinue if the key proponent dies or becomes incapacitated
c. Failure to reach target revenues – Proponent may have difficulty of paying amortization if volume targets are not reached.

3.54 Business risks are often raised in the discussions among lending authorities. As such, it is necessary to address these business risks outright by discussing options of the company should the anticipated risks occurs. For example, on the issue of Peso Depreciation, the proponent may opt to book peso denominated loans to avoid said risk. With respect to succession issues, there should be a line up of possible successors just in case the key proponent dies.

COLLATERALS

3.55 Collaterals and guarantees serve as "fall back" if projected earnings and cash flow fall below expectations to support repayment commitments of the proponent. A collateral is defined as money or property put up by a proponent/borrower to back up a loan. In case of default, the collateral may be liquidated to pay off the loan. Term loans should be structured such that cash for the loan repayment is generated from the business and that it is not depending on the liquidation of collateral.

3.56 There are two types of collateral: the primary and the secondary collateral. A collateral is primary if there is a specific set of cash, near cash items and hard assets identified to cover for whatever exposure that the bank has in the proponent/borrower; a collateral is secondary if there is none. A primary collateral can be given a valuation while a secondary collateral cannot be given a valuation.

The common forms of primary collateral are as follows:

a. Real Estate Mortgage (REM) - a piece of real estate property covered by a Title including existing and proposed improvements thereon is as security for the payment of a loan. Real estate assets other than the site of the project being financed may be used as collateral. Untitled property or pieces of Real Estate covered by Tax Declaration only are not acceptable ac collateral. Real estate asset in the name of a third party may be acceptable as collateral provided that the registered owner is the signatory of the REM. Special Power of Attorney (SPA) issued by the registered owner allowing the borrower to mortgage the real estate assets in not acceptable because of a high incidence of fraud in the issuance of the SPA.
b. Chattel Mortgage (CM) - machinery, equipment and/or personal property are used as security for a loan.
c. Hold-out on Deposits - a specific amount of Saving or time deposit is being held by the back as collateral under as Deed of Assignment. Like in the case of REM, the depositor may not be the same as the proponent/borrower, in which case the depositor should sign the deed of assignment.
d. Mortgage Trust Indenture - the bank is given a Certificate of Participation indicating issued by a trustee who was appointed custodian to a property of enormous value. The certificate indicates the extent or percentage of the property, which secure the loan of the bank. This type of collateral is encountered where the loan given to a proponent/borrower is syndicated or where more than one bank have loaned money to the proponent using same collateral.

The following are secondary collateral:

a. Joint and Several Signatures (JSS) or Suretyship – Under a JSS or Suretyship, the surety (signatory of the JSS document) binds him/herself solidarily with the principal debtor and there is a JSS in almost all loan contracts. If the borrower is a corporation, the JSS encumbers the personal assets of the surety to the liabilities of the corporation. In JSS, the surety is not liable unless and until the principal proponent/borrower is held liable. A number on conventions on JSS are as follows:
   - if the proprietor/proponent/borrower is the husband, the wife executes a JSS & vice-versa. A third party other than the spouse may also execute a JSS;
   - if the proponent/borrower is a corporation, the principal directors and stockholders execute the JSS
b. Cross Guaranty - a person or corporation guarantees the loan of another that likewise guarantees the loan of the former.
c. Negative Pledge - an undertaking of the proponent/borrower not to mortgage, encumber, transfer or dispose of his fixed assets without the consent of the Bank. This is usually encountered where the proponent/borrower is prime and has a good track record

3.57 A proponent cannot borrow to the extent of full market value of assets submitted as collateral. The banks use the terminology “Appraised Value” and “Loan Value.

3.58 Appraised Value is the valuation given by a bank on specific assets. In the case of land, valuation given is usually based on the averages of zonal value, last sales transaction of a piece of land that is near the property and the market value as quoted by real estate agents. The value may be increased because of the location or may not be given any value at all because of the absence of a right of way. If the land is agricultural, the maximum value is the price given by DAR for such property. Valuation is likewise given to improvements introduced on the land.
If the proposed collateral is equipment, the value given is the estimated replacement cost of the equipment net of depreciation; if the equipment is new, it is based on the purchase price of the equipment.

3.59 “Loan Value” is the amount of loan that that the proponent/borrower can obtain from the bank which is a percentage of the Appraised Value. Loan Value schedule is as follows:

Collateral	Loan Value
Land	60%
Building and Land Improvements	60%
Chattels	50%
Deposit Hold-Out	100%

3.60 Collateral can be valuable in term lending, but relying on it as the main justification of support is not the right attitude. Historical performance is still the best gauge in viewing the proponent's ability to service future debts. It is essential to look into the ability of the proponent/borrower to repay from the earnings generated in the normal course of the business.

3.61 Where the proponent is a start up, there is no business history to indicate what their future earnings power will be. Projections may be a good indicator but should be substantiated by evaluation of market, management, technical matters, etc. Collateral becomes important consideration.

3.62 In case of guarantee, it is good psychological help but does not automatically ensure that the guarantor will immediately repay a debt or that the lender will have access to the assets of the guarantor without strong legal action.

3.63 The DOE Assistant should be able to advise proponent of unacceptable collateral that include:

a. Collateral previously mortgaged to another bank. Second mortgages are not acceptable
b. Real estate assets without right of way
c. Real estate assets with lis pendense, adverse claim and other limitations annotated at the back of the title

SECOND WAY OUT

3.64 Risk of lower than expected level of performance is always present and it would enhance the comfort zone of the bank if the other sources of payment short of disposing assets can be identified.

3.65 The presence of collateral mitigates the risk and increases the comfort zone of a bank with respect to collecting its exposure into the proponent/borrower

PRICING

3.66 The Costs that should be considered by the Proponent/borrower consists of the following:

a. Interest on the loan
b. Service Fee which is a fee collected by the bank per transaction. The amount is supposed to reimburse the bank of its cost in processing the transaction
c. Handling fee, which represents the cost of the bank evaluating the loan transaction. Handling fee is a one-time expense and is usually 1% of approved loan amount
d. Commitment Fee – This is a fee for the inability of the proponent/borrower to draw on the approved loan within the drawdown period as defined under the loan agreement. By imposing a commitment fee, the bank is recovering the opportunity cost from allotting funds to service the loan drawdown. Commitment Fee is usually 1% or lower per annum based on the undrawn balance of the loan.

e. Documentary Stamp Tax (DST) – This paid to the Government. Amount paid, which is usually deducted from the proceeds of loan is P0.20 per P300.00 value indicated in the document. Loan agreements and promissory notes are subject to DST.
f. Penalty Charge – The amount collected by the bank if borrower cannot promptly pay loan amortization schedule.

3.67 The Interest rate of a loan depends on a number of factors. The primary determinant of interest rate is the Interest rate on Treasury bills(T-Bills). Interest rate on T-Bills becomes the base rate as it is the type of investment that banks would opt if they decide not to lend their money. As such, quotations on interest rate are usually stated in "91-day T-Bills Rate plus ____% spread" at the time of availment. The interest rate is usually adjusted or "repriced" every 90 days to take into consideration of the changing cost of money to the banks. T-Bills rate is published in the newspapers.

3.68 The other benchmark used by banks is the "Prime Rate" or the best rate that it can give to its best proponents. Prime Rate is a market established rate and may be higher or lower than the T-Bills rate. Some banks publish their prime rates in the newspapers.

3.69 The "plus ___% spread" is a factor that takes into consideration the following:

a. Business Risk - This is the risk that the loan will not be repaid in full with interest within the time frame agreed upon. The higher the perceived risk, the higher is the spread of the bank.
b. The level of compensating business - If the proponent has other business deals with the bank, the situation may merit for the scaling down of the spread. Likewise, presence of substantial amount of deposit will merit a reduction of the spread of the bank.
c. Potential change in the cost of funds in the future. This is especially important when interest rates are fixed.
d. Financial risk - This is the risk that loan funds will be tied up and not be available as other opportunities present themselves to the bank (opportunity loss).
e. Demand Deposits - those deposits that each loan will bring to the bank or each loan will retain for the bank (free balances after activity charges).
f. Time Deposits - while these may have some influence, if the bank is paying a market rate, then time deposits add little in compensation for a favorable rate
g. Competition - those rates that are actually available from other lenders.
h. Timing of interest payment - whether discounted, paid at maturity, paid monthly or paid quarterly, etc.

SOCIO-ECONOMIC, ENVIRONMENTAL & OTHER ISSUES

3.70 Presence of socio-economic impact helps justify a project although it could not serve as a primary justification. Possible multiplier effect of the project should be described in qualitative terms

3.71 On account of the growing environmental awareness, banks now require that projects obtain an environmental clearance certificate (ECC) from DENR. If the ECC is yet to be obtained, the status of getting the ECC should be mentioned in the study.

3.72 Peace and Order – Where the project is placed in remote areas, statement on the peace and order problem should be made in the studies such that the bank account officers and the passive investors would not be guessing of the status.

AMENDMENTS TO THE GUIDELINES

4.0 The provisions of the foregoing guidelines shall be amended, updated or revised or additional provisions shall be incorporated to take into consideration changing realities of NRE as an industry. The foregoing set of guidelines was initially prepared in April 2001.

PROPOSED PROJECT EVALUATION SHEET	
1. Proponent Name	**2. Address**
3. Brief Description of Project	
3. Project Cost **Land** **Improvements** **Equipment** **Pre-Operating Cost** **Working Capital** **Total**	**4. Project Funding** **Equity of Proponent** **Equity of other investors** **Grants** **Loans** **Total**
5. Concerns for the Project Proposal as presented (Please be specific) **a.** **b.** **c.**	**6. Proposed Actions: (Please be specific)** **a.** **b.** **c.**
7. Schedule of consultation meeting with proponent	**8. Completion Report: Proponent has successfully hurdled the pre-qualifications for loan and for the raising of equity from other investors. The project may now be submitted to the Bank for purposes of obtaining loan or to a group of potential investor for the possible infusion of additional equity.** **Signed: DOE Assistant**

DETAILED PROJECT ASSESSMENT

1. Financials

Historical Financial Performance

Financial Highlights - Historical Performance:
(Amount in Million Pesos)

	2000	1999	1998	1997	1996
Gross Revenues					
Net Operating Income					
Interest Expense					
Net Income After Tax					
Total Assets					
Total Fixed Assets					
Total Current Assets					
Total Liabilities					
Total Current Liabilities					
Total Long Term Liabilities					
Net Equity					
Debt/Equity Ratio					
Current Ratio					
Interest Expense Coverage					
Debt Service Coverage					
Net Income/Net Worth (%)					

Comments and Recommendations:
1.
2.

Projected Financial Performance

Financial Highlights of Projected Financial Statement on Proposed Project
(Only Incremental effect of Proposed Project is Reflected)
(Amount in Million Pesos)

	Year 1	Year 2	Year 3	Year 4	Ave. Yr. 5 & beyond
Gross Revenues					
Net Operating Income					
Interest Expense					
Net Income After Tax					
Total Assets					
Total Fixed Assets					
Total Current Assets					

Total Liabilities					
Total Current Liabilities					
Total Long Term Liabilities					
Net Equity					
Debt/Equity Ratio					
Current Ratio					
Interest Expense Coverage					
Debt Service Coverage					
On Proposed Project					
Project Cost					
Equity Component	Amount:		Percent:		
Loan Component	Amount:		Percent:		
FIRR	Based on Proj. Cost:		Based on Equity:		
NPV at __% (cost of Money)	Based on Proj. Cost:		Based on Equity:		
Break Even Point	Peso:		Volume:		
Payback Period					

Comments and Recommendations:
1.
2.

2. Technical

a. Validation of Costs:
b. Validation of the technical assumptions:
c.

3. Credit Record

4. Marketing

5. Organization and Management

6. Risk in the Credit Transaction

7. Second Way out

8. Pricing

9. SOCIAL, ENVIRONMENTAL AND OTHER CONSIDERATIONS

ANNEX "C"
THE PROJECT EVALUATION PROCESS

The project evaluation process is both a screening process and a matching process. It is a screening process because by understanding the business of the borrower and its basic fundamentals, as an evaluator, you have to decide whether to recommend the request for credit facility or to deny the request.

It is a matching process because after validating that the client is qualified to obtain the credit facility requested and really needs a credit facility, you have match the following elements:

1. The amount of the loan matches with the amount needed after taking into consideration the equity share of the client;

2. The loan tenor and repayment matches with the amount and characteristics of the cash flows;

3. The conditions required of the client is commensurate to the level of exposure of the Bank into the client and

4. The conditions required of the client can cover the bank against perceived credit risk and are commensurate to the level of perceived risk.

Bulk of the process is meant to identify and assess the nature and extent of risk at all phases of the borrower's business. If possible revenues are cited in the report of recommendation, the revenue estimate serves only as an additional justification but not the pivot point of the recommendation. No amount of potential revenues can justify for an undue level of risk exposure because it has been proven that you can never recover your loss in principal from your earnings in interest.

The model for evaluation is marked as Annex B. The foregoing discussions will revolve around the various elements contained in the annex.

BASIS FOR GRANTING CREDIT

Although there are an established set of Project Criteria, the project proponent, in most cases, relies much on the judgment of the evaluator on the individual elements of the business and how each element complement each other to form a total business picture. He has to make a judgment on the individual components of the client's business. He has to help identify weakness of project proposals such that these can be corrected before the project is presented to the banks and potential investors for funding. A complete and properly presented project proposal facilitates the decision of the Banks and investors with respect to request for funding.

Analysis and evaluation involves the following process:

1. Break down the borrowing entity into its business functional components and assess its strengths and weaknesses in each of the components. This is referred to as the "Analysis" phase.
2. Determine environmental threats and opportunities and make an assessment as to how can the business entity effectively capitalize on the opportunities and/or weather the threat. This is referred to as the "Interpretation" phase.
3. Make a credit judgment. This is the "Decision" phase.

When analyzing a project, compare attributes of an entity against a set of attributes that the borrower should possess to be bankable. These predetermined attributes or standards are found in industry norms and from many other sources. Generally, however, there is a list of characteristics of a good borrower and these are:

1. The basic fundamentals of the business indicate that it is sound
2. There is a stable business environment and the business can absorb predictable fluctuations
3. There are no legal constraints with respect to the purpose of the loan and on the continued operation of the business.

What Analysis is all about

Evaluation is a set of predetermined steps performed by an account officer to determine the bankability of a borrower and the project or activity that entity wants to finance. In analysis, we want to:

1. Assess the risks involved in giving a loan to a particular borrower;
2. Estimate possible income that can be derived from the loan relationship and
3. Determine the conditions that the borrower ought to comply to mitigate the risks involved.
4. Attributes of the borrower meet the benchmark or the minimum criteria acceptable to the Bank.

The obvious focus of evaluation is Credit risk or the possibility that the borrower will not be able to liquidate the obligation, principal and accrued interest thereon, in the due course of the business. Sources of Credit Risk, which are the focal point of analysis, are the following:

1. Business condition: This may be a possible downward trend in demand, interest and foreign exchange (forex) fluctuations, and other environmental and economic shifts that may adversely affect the client's viability or competitive position.

2. Financial Condition: The capacity of the firm to remain viable given the present level of liabilities as well as the capacity of the company to absorb a higher level

of liabilities.

3. Management capability: The capacity of existing management to manage the company viably, to cope with existing and potential problems, for the continuity of viable operations and the capacity of the company to attract new talents.

4. Credit record: This is concerned with the repayment history of the company, level of availments on existing credit facility and the propensity to be in default if there are business shocks.

5. Purpose of financing: Part of the task of a Bank is providing advisory services to a client. The bank should know the real purpose of financing such that the AO can give the appropriate credit product and so that loan terms and conditions are appropriate for the circumstances of the client.

The above elements are discussed in the guidelines and in the other annexes.

LOAN TERMS AND CONDITIONS

The DOE Assistant should be aware that loan terms and conditions are meant as hedge of the bank against possible events, which may increase credit risks. They are imposed and should be observed by client because they serve as self-policing mechanism for the account relationship. They are formulated in consultation with the proponent since the proponent will be obliged to comply with the conditions. The consultation will reveal if:

- all conditions are acceptable
- some conditions are not practical and could not be implemented

Terms and conditions usually cover the following areas:

- Tenor
- Pricing & fund sourcing
- Availment/Drawdown schedule
- mode of payment
- miscellaneous conditions - insurance, commitment as to foreign currency transaction coursed through the bank and ADB on deposits

A list of standard terms and conditions imposed on all loan accommodations, where applicable, are enumerated below:

1. Loans are subject to periodic review by the bank and the bank has the discretion to refuse further loan drawdown in cases of violation of the loan covenants.

2. The Bank is held free and harmless from any and all consequences as a result of inability to make funds available.

3. Insurable collateral shall be insured for full-appraised value with an insurance company accredited by the Bank.

4. Credit extension is subject to presentation of proof that all taxes due on collateral are updated.

5. The registered owner/s of the collateral, if other than the borrower, shall sign on the mortgage contract as third party mortgagor/s.

6. Collateral mortgage must be registered.

7. All collateral must be free from all liens and encumbrances, prior to loan release.

8. Unless otherwise specified, rates refer to prevailing and negotiable rates.

9. The borrower should maintain an ADB of deposits to meet the minimum ARE/APR required.

______________ COMPANY
INCOME STATEMENT

	AUDITED							VERTICAL ANALYSIS			HORIZONTAL ANALYSIS			
	2000	1999	1998	1997	1996	2000	1999	1998	1997	1996	2000-99	1999-98	1998-97	1997-96
Net Sales	1,000	1,000	1,000	1,000	1,000	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Cost of Goods Sold	600	600	600	600	600	60.00%	60.00%	60.00%	60.00%	60.00%	0.00%	0.00%	0.00%	0.00%
Gross Profit	400	400	400	400	400	40.00%	40.00%	40.00%	40.00%	40.00%	0.00%	0.00%	0.00%	0.00%
Operating Expenses	120	120	120	120	120	12.00%	12.00%	12.00%	12.00%	12.00%	0.00%	0.00%	0.00%	0.00%
Income (Loss from Operations)	280	280	280	280	280	28.00%	28.00%	28.00%	28.00%	28.00%	0.00%	0.00%	0.00%	0.00%
Other Income (Charges)														
Interest	100	100	100	100	100	10.00%	10.00%	10.00%	10.00%	10.00%	0.00%	0.00%	0.00%	0.00%
Net Income before Tax	180	180	180	180	180	18.00%	18.00%	18.00%	18.00%	18.00%	0.00%	0.00%	0.00%	0.00%
Less: Tax Provision	58	58	58	58	58	5.76%	5.76%	5.76%	5.76%	5.76%	0.00%	0.00%	0.00%	0.00%
Net Income (Loss) After Tax	122	122	122	122	122	12.24%	12.24%	12.24%	12.24%	12.24%	0.00%	0.00%	0.00%	0.00%

RATIOS

PROFITABILITY RATIOS					
NIAT/Sales	12.24%	12.24%	12.24%	12.24%	12.24%
NIAT/Total Assets	13.45%	13.45%	13.45%	13.45%	13.45%
NIAT/Net St. Equity	61.20%	61.20%	61.20%	61.20%	61.20%
NIAT/Fixed Assets	24.48%	24.48%	24.48%	24.48%	24.48%
NIBIT/Interest Expense	280.00%	280.00%	280.00%	280.00%	280.00%
Gross Profit Margin	40.00%	40.00%	40.00%	40.00%	40.00%
LIQUIDITY RATIOS					
Current Ratio	3.636	3.636	3.636	3.636	3.636
Quick Assets Ratio	1.818	1.818	1.818	1.818	1.818
Receivable Turnover	10.000	10.000	10.000	10.000	10.000
Inventory Turnover	10.000	10.000	10.000	10.000	10.000
No. of Days Receivables	36.000	36.000	36.000	36.000	36.000
No. of Days Inventory	36.000	36.000	36.000	36.000	36.000
SOLVENCY RATIO					
Debt/Equity Ratio					
Debt	78%	78%	78%	78%	78%
Equity	22%	22%	22%	22%	22%

ANNEX "E"
GUIDELINES IN FINANCIAL STATEMENTS ANALYSIS

The Financial Statements of a business entity. Financial Statements, especially if audited by a reputable Certified Public Accountant, can say much about the company. It can be an indicator of how successful is its management in running the business and subsequently, the risks that the bank expects to assume if the decision is to give a credit facility to the business entity.

DISCUSSION FRAMEWORK

The discussion on the subject matter of Financial Analysis shall be as follows:

1. The Spread Sheet, various ratios and explanations thereof

2. Usefulness of financial statement analysis and

3. Understanding the financial statements - This section is intended for readers who do not have any accounting background

Financial Statement Analysis is one of the most important it focuses on the statement which summarizes in financial terms the status of the business entity as of a given date and its operating performance over a given period usually one year. Through an analysis of Financial Statements over three years or more, assessment can be made on the following:

1. If the client's financial performance can justify for the granting of a credit accommodation and meets the standard requirements of the bank

2. To determine how much the client needs and how much the bank is comfortable in giving and

3. If the historical performance of the client can support what he claims he can accomplish.

THE FINANCIAL SPREADSHEET

The financial statements are attached to a credit proposal as supporting documents. There is, however, a separate sheet that presents the contents of the financial statements in a predefined and condensed format; this is referred to as "Spread Sheet". The text of the credit facilities proposal include an interpretation of the Account Officer of what the ratios try to tell the Credit Decision makers especially in areas critical to the decision.

SPREADSHEET

To effectively analyze financial statements, we have to simplify or reduce the data into to more understandable terms. Financial statement figures are meaningless; they are mere summaries of what the books of accounts show at the end of the year. We have to organize the data to make them more meaningful such that we can draw conclusions from the figures.

We can derive meaning in financial statement figures if we can relate or compare specific items with other items or group of items in the financial statements. By relating, for example, Net Income and Sales or Net Income and Capital within the same year as against those of previous years, we can deduce conclusions as to what is happening with the profitability of the enterprise.

To facilitate the process of analysis, bankers designed an electronic worksheet written in Lotus 123 or Excel format. The worksheet is more popularly known as "Spread Sheet." If the Account Officer fills up the relevant worksheet cells, the ratios are automatically computed. This relieves the Account Officer of the tedious process of computing and proving computations, thus allowing him/her to focus his/her efforts to more important items that include analysis, interpretation, confirmation of information and other tasks.

The spreadsheet presents the financial statements of an entity in a condensed format over a period of three years. Through simplification and rearrangement of the accounts in the financial statements, accounting data become concise, informative and focused on those element that a credit decision maker want to look into in assessing. It contains the income statement, the balance sheet and the cash flow presented in the prescribed format as well as the various rations and percentages.

PLERIMINARY PROCEDURES

Before entering the items in the financial statements into the spreadsheet, there is a need to assess the statements taking note of the following:

1. The Auditor/s - The Certified public Accountant expressing an opinion on the financial statements must be reputable if the Bank is considering a loan of substantial amount to the prospective borrower.

2. Audit Report - Auditor's opinion should be "unqualified" or "clean". Explanatory notations and supplementary information should be analyzed thoroughly.

3. If presentation is complicated or are yearly comparison is not possible because or change in accounting treatment, recast the Financial Statement by:

    a. Combining similar items - This will reduce the number of items for study and will allow you to focus on the important ones.

    b. Classifying and arranging the items in the format of the spread sheet.

4. Round off each account as a whole number representing thousands or millions.

In addition, it is helpful to visit the company's head office to have an idea on the following:

1. Manner in which prospective client maintains its books of accounts

2. How wide is the variance between the recorded asset values and the possible liquidation values of the assets and

3. Are there possibilities that the figures in the financial statements, especially asset and revenue accounts, manipulated upward or downward?

RATIOS & PERCENTAGES

HORIZONTAL PERCENTAGES

Our primary concern as Account Officer is to determine the ability of an entity to service its obligation. This information cannot be derived directly but can be gleaned from historical trend of net earnings, the historical replacement and/or build up of fixed assets, and the historical trend in the reinvestment or ploughing back of current earnings back into operations.

To the Account Officer, the real Value of the assets is not its book value but the earning power that it inures to the business. The real value to a going concern of assets such as inventories, plant and equipment and prepaid expense depend on the amount realized on them in the course of future operations. If the account officer is evaluating for a short term credit, he looks at the historical earnings on a year to year basis to determine if the operating earnings can cover for the interest expense on new or additional credit accommodation and the level of his margin of safety. Although it is assumed that servicing of the principal takes place within the normal economic cycle, the AO must look into trends of asset build up because there may be indications of an unsound financial practice such as

1. Using working capital to finance capital equipment acquisition

2. Being liberal with sales on account to get more sales but at the risk of difficulty in collecting the receivables

3. Over-investment in certain asset accounts like inventories

If, on the other hand, the AO is evaluating for a medium to long term loan to finance capital expenditures, the loan applicant has to submit financial projections in addition to historical financial statements. We have to evaluate financial projections because we want to determine the value that we are trying to finance in terms of future earnings and not the resale value of the capital asset. Asset value depends primarily on future earnings of the assets and not on its liquidation value as of statement date.

We place heavy emphasis on historical performance in validating financial projections because future earnings has a high correlation with

1. The historical level of earnings in previous years

2. The level of asset build up as a result of income reinvestment and infusion of additional equity and

3. The trust of the owners in the enterprise as evidenced by additional equity infusion and continuing reinvestments in income.

By analyzing specific items or groupings in the financial statements in previous years, the account officer can find hints as to whether or not the enterprise growing and performing well and will continue to do so.

VERTICAL PERCENTAGES

In vertical percentages, the significance of an account to the totality is looked upon. For the Balance sheet for example, the relationship of cash and other individual balance sheet accounts to total assets is being looked into over the three year span. For the income statement, the individual items of expenses and other income accounts are related to the Net Sales figure.

THE FINANCIAL RATIOS

The relationship of one financial statement item to another expressed in a mathematical format is called a financial ratio or ratio for short. It is important to supplement absolute data with ratios in order to establish relationships between related items.

A ratio by itself is meaningless and does not depict any financial picture unless there is a basis for comparison. Ratios derived from the financial statements of an entity may be compared with

1. Those of previous years to detect trends
2. Industry averages and with those of closest competitors to determine relative performance and
3. Mental picture based on accumulated experience of the Account Officer as to what the ratios are of a healthy company.
4. Derivation by the Account Officer from formalized business plan of what the management of the firm believes to be an ideal financial picture of a healthy company.

It is ideal that firm's ratios should be compared with those of the industry and with the closest competitors. Available industry data and competitor statements, however, are two years delayed and that they have little relevance to decision making. It is for this reason that the experience and training of the account officer count a lot in the decision making process.

When correctly chosen and properly interpreted, ratios serve as guide in determining the solvency, adequacy of earning power, and the relative efficiency of the management operations of a firm. Ratios provide a common denominator for comparing the operations of one firm to another, or the performance of one firm to that of the industry as a whole.

PRINCIPLES OF RATIO ANALYSIS

1. Objectives of financial analysis - Facilitation of financial statement interpretation by reducing the large numbers of financial statement items to smaller set of ratios. Ratios are symptoms of firm's economic condition intended to guide the analyst in his financial investigation.

2. Ratio formation - There are 3 types of ratio relationship

   a. Ratio should relate matching components such as earnings to investments base. Test for matching is whether an economic relationship exists between the two values

   b. Ratios should be formed only from elements based on common values

   c. Ratios should be formed only if the functions are functionally related, that is, if they vary in some definable manner.

3. Ratio Interpretation

   a. The good-bad ratio interpretation and

   b. The comparison with industry standard averages or the industry central tendency. Cautions in using standards are:

      1. Is the industry framework appropriate for the ratio analysis?

      2. Why should the industry average be regarded as optimal target with which an examined ration should be compared?

      3. Should inferences be based on the absolute or relative differences from standard?

      4. What measure of central tendency - the mean, mode, median - should serve as standard;

      5. Which industry is most appropriate and what degree of homogeneity should be chosen.

PRESCRIBED RATIOS AND FIGURES

SOLVENCY

These sets of rations indicate the extent of contribution or financial sourcing by the owners compared with that provided by outside financiers or creditors. These ratios give a picture of the business borne by two main source of financing - owners and creditors. If a larger part of the contribution comes from the owners, the risks are borne mainly by them. If the owners raised most of the funds from debt, the owners benefit or have the advantage of maintaining control of the business with limited exposure. This is otherwise known as "Trading on the Equity." The advantage is more if the earnings from the borrowed funds (return on invested borrowed money) are more than the price of borrowings (interest).

Focus: Structure of finance source - debt & equity: fixed charges and earnings.

Ratios and figures prescribed by the spreadsheet are as follows:

Total Net Worth
Tangible Net Worth
Debt:Equity Ratio
Leverage
Long Term Leverage

Name of Ratio: Debt to Equity

Computation: Total Debt / Net Worth

Significance: Relates the exposure of the creditors to that of the owners; normally 100% is considered moderate. Creditors prefer low percentage while owners prefer high.

LIQUIDITY

Liquidity Ratios serve as indicators of how efficient is the management of a firm managing its working capital. Standards for efficient working capital management are:

1. The company can promptly pay current debts and maturing portions of long term obligations;

2. There is sufficient level of working capital to allow for uninterrupted flow of operations and for the implementation of a sound and balanced marketing strategy

3. There are no over-investments in certain items like inventory and receivables that would result into a high carrying cost.

LIQUIDITY RATIOS:

Purpose : To measure the capability of an entity to meet its currently maturing obligations and its principal needs for current operations.

Focus : Liquid resources, that is current assets, particularly cash, marketable securities and money placements; receivables, (net) inventory and prepaid expenses, and the current liabilities.

Ratios and Figures prescribed by the spreadsheet are as follows:

Net Working Capital
Current Ratio
Acid Test Ratio
Receivables Turnover
Days Receivables Outstanding
Inventory Turnover
Average Days Sales Inventory

Name of Ratio: Current Ratio or Working Capital Ratio or Banker's Ratio

Computation: Current Assets / Current Liabilities

Significance : It indicates the degree of safety with which short term credit may be extended to the firm as it signifies the ability or the inability of a firm to meet its currently maturing obligations using its current resources. Likewise, it gives an indication of the possible tolerable shrinkage in current resources without threat to the claim of current creditors.

Rule of thumb: 2:1 meaning that for every peso of current debt, the firm has P2.00 current resources to answer for the debt.

Name of Ratio: Acid-Test or Liquid Ratio

Computation : Acid and near Cash items / Current liabilities

Acid Assets = Marketable securities, money market placements (short term) and the like.

Significance: This measures the immediate solvency. It measures more conservatively how liquid the firm is by using the most liquid form of current assets and discarding the less liquid items which are more susceptible to loss or shrinkage before or upon cash conversion.

Name of Ratio: Trade Receivables Turnover

Computation: Net Credit Sales / Average Trade Receivables

Significance : Approximate the number of times receivables have been collected during the period

Name of Ratio: Average Collection Period or No. of days in receivable

Computation: 365 / Trade Receivables Turnover

or Trade Receivables x 365 / Net Credit Sales

or Trade Receivables / Ave. Sales per day

Significance : Gives the number of days sales remained uncollected or the number of days sales receivables remained tied up, This can be used by trend or compared with industry and company's credit terms.

Name of Ratio: Inventory Turnover

Computation: Cost of Goods Sold / Average Inventory

Significance : Indicates the activeness or movement of inventory. It approximates the number of times inventory has been moved that is sold and replaced during the period. The rate can be compared with the industry norm, past experience and competitors.

Name of Ratio: Average Days per inventory turnover

Computation: 365 / Inventory turnover

Significance : Reflects the average age of inventory. Related ratios are as follows:

PROFITABILITY

PROFITABILITY RATIOS: Reflects the earnings capacity of a firm by showing the total revenue and its distribution to or absorption by various costs and expenses leaving finally the position available to the investors. It, likewise, gauges the worthiness and soundness of the investment by determining the returns on the relevant invested resources.

Net Income/Net Worth
Net Income/Net Sales
Asset Turnover
Sales Growth Rate
Net Income Growth Rate

Name of Ratio: Assets Turnover

Computation: Net Sales / Total Assets

Significance : Indicates low or high "Trading of Assets" - meaning the extent of revenue generated by the total resources of the firm. Low ratio means possible excessive investment in idle assets or poor revenue generation

USEFULNESS OF FINANCIAL STATEMENT ANALYSIS

With Financial Statement Analysis as tool, one can study relationships and trends to determine whether or not the financial position and results of operations and the financial progress of the company are acceptable to the bank to warrant a certain level of credit accommodation. His interpretation should be validated by the figures and relationships lifted from the spreadsheet.

Analytical methods and techniques are used to ascertain or measure the relationships among financial statement items of a single set of statements and the changes that have taken place in these items as reflected by successive financial statements.

In financial analysis, we try to assess the financial strength of an entity. Financial strength refers to the ability of a business to

1. meet the claims of creditors not only under current economic and business conditions but also under unfavorable situation that may occur in the future

2. take advantage of business dealings or expansion that require internally generated funds, external funding, additional equity infusion and favorable credit rating and

3. continue dividend and interest payments without interruption.

Predictive capability of Financial Statement Analysis is enhanced through the following:

1. Time-Series (intra-firm Analysis) - It is to predict future values of ratios. The approach is to search for systematic patterns in the historic behavior of the series; knowledge of such patterns can then be used in the prediction pattern. Assumption is that the underlying process generating the ratio series is stable over time, i.e. the process continues to operate as it did in the past.

2. Cross-sectional (inter-firm) Analysis - To derive information needed for financial decision by comparing the investigated ratio with exogenous norms or standards. Standard ratio techniques use industry-wide measures. Comparability is enhanced if the firms:

    a. Belong to the same industry
    b. Are of similar size
    c. Use similar accounting methods
    d. Are located in the same geographical region

    Evidence regarding the firm-size affects on ratio:

    a. Short-term liquidity ratios are related to size of firm in positive parabolic manner. That is the relationship is positive for smaller firms and negative for larger firms.

    b. Long-term solvency are also related to size of firm in a positive parabolic manner

    c. Capital turnover ratios vary inversely with size of the firm

    d. Profit margin ratios vary directly with size of the firm

    e. Return on investments rations also vary directly with the size of the firm.

3. Combination of Time-Series and Cross Section Analysis; the Residual Method:

    Basic Premise - If the investigated variable (e.g. stock prices) is cross-sectionally correlated, its variability can be decomposed into 2 parts; general factors affecting all firms and caused by specific factors affecting only the firm under study.

4. CONCEPT OF HOMEOSTASIS, which means equilibrium maintained by self-regulatory mechanism, is a major characteristic of all living organisms. If equilibrium is disturbed, forces are set to motion to restore it. The concept applies to business organizations. Optimal Equilibrium relationship among various inputs and outputs are determined by organization and efforts are made to maintain them in the face of disturbances. Equilibrium is derived from economic optimality criteria designed to enhance operational efficiency. For any given level of

activity, there exists optimal relationship between labor and capital inputs, inventory and sales, cash and short term securities, debts and capital inputs and so forth. Actual relationships among inputs and outputs, which may deviate from the optimal ones, are presented in the firm's financial statements. Changes may result from:

a) Planned actions by management such as increase in ratio of short term securities to cash induced by increase in market rates and

b) Unplanned changes resulting from unexpected events, such as change in the firm's capital structure caused by general decrease in stock prices.

Analysis is horizontal if the financial statements for a number of years are reviewed. Analysis is vertical if period covered is one date or for one accounting period.

Review of changes is important because they give an indication of the direction in which the business and its financial characteristics are developing. They indicate direction of movement with respect to financial position and operating results.

UNDERSTANDING THE FINANCIAL STATEMENTS

BACKGROUND

To fully appreciate financial analysis, one must have an in-depth understanding of the object of analysis, which are the financial statements. As a backgrounder, one should understand the following:

1. The Balance Sheet, Income Statement, Cash Flow Statement (or Statement in Changes in Working Capital), and Statement in Changes in Retained Earnings comprise the Financial Statements of a business entity. These statements are usually prepared at the end of the year such that the stakeholders of the company as well as the government regulatory authorities would know how much profit the entity earned for the year as well as the financial status of the company as of the end of the year.

2. Figures indicated in the Financial Statements are summaries of figures recorded in the Books of Accounts. The Books of Accounts consists of the General Ledger and The Subsidiary Ledgers. The debit and credit components of each Business Transactions, expressed in terms of Pesos, are recorded in the Books of Original Entry and then into the General Ledger, usually at the end of the month. Every transaction recorded in the Books of Original Entry is likewise recorded in the Subsidiary ledgers such that the details of the transaction can be monitored.

3. The recording of the transactions in the Books of Accounts and the subsequent preparation of the financial statements are governed by a rule known as the Generally Accepted Accounting Principles or GAAP and by the Statement of Financial Accounting Standards.

4. To assure the stakeholders and other potential users that what is reflected in the financial statements are accurate, the statements are subjected to an external audit. The auditors examine the accuracy of the figures indicated in the statements as well as the records from which the statements were prepared. The examination is based on accounting standards discussed in No. 3.

AUDITED FINANCIAL STATEMENTS

We will focus our discussion on audited financial statements which is the one submitted to us for evaluation. Audited Financial Statement consists of the following:

1. The Auditor's Certificate
2. Balance Sheet
3. Income Statement
4. Statement of Sources and Uses of Funds and
5. Notes to Financial Statements

AUDITOR'S CERTIFICATE

The certified public accounting firm is an independent entity that examines financial statements prepared by the client and renders an informed opinion as to whether they fairly present the client's financial condition. Since the accountant's opinion is relied on by a wide variety of interested parties, he can incur professional liability. The standard auditor's certificate, written in letterform and addressed to the board of directors of the examined company, is composed of two sections, ordinarily contained in two paragraphs:

1. An indication of the scope of the work performed
2. A professional opinion as to whether the financial statements fairly present the client's financial condition.

In the auditor's opinion is unqualified (also called a clean certificate), it means to say that the auditing firm has performed all the tests necessary to perform a complete examination and has found nothing material in the presentation to which it takes exceptions.

If the auditor has reservations about a particular aspect of the client's financial statements, he may issue a qualified certificate. This has the effect of alerting the reader to some irregularity in the scope of the examination or the method of presentation and serves to modify the accountant's professional liability concerning that item. The certificate is altered in two ways:

1. A separate paragraph is included explaining the item(s) to which the auditor takes exception.
2. The phrase beginning with "subject to" or "except for" in the opinion paragraph to notify the readers about the reservations of the auditor on the statements.

There may be occasions when the terms of the engagement do not permit sufficient examination to satisfy the minimum requirements of "generally accepted accounting principles" or when the CPA believes that management's financial statements do not present the company's condition fairly. In this case the accountant will issue a disclaimer letter indicating the objections he has to the presentation and removing all professional responsibility to any reader who might take action based on the statements in question.

In certain cases, the auditor is requested to merely assemble an unaudited financial statement in the proper format for presentation to creditors or other interested parties. The auditor in this case issues a compilation letter which states that his only responsibility was to prepare the statements in acceptable format from the client's books and records and no outside verification was done.

If the accountant should follow-up on any irregularities that become apparent during the casual examination of the supporting data and try to resolve them while preparing the statements, a review letter accompanies the finished product (note that once again, the CPA plainly states that no formal auditing procedure was performed).

THE BALANCE SHEET

The basic accounting statement is Assets = Liabilities + capital. This means that funds used to acquire a company's assets came from two sources - capital invested by the owners and debt owed to the creditors. The balance sheet is a numerical representation of this equation.

The Balance sheet reflects the financial condition of a business at a particular point in time usually the close of the business day indicated by the date of the statement. The statement reflects the basic accounting equation, which is

Assets = Liabilities + capital

There are three major accounts in the Balance Sheet are assets, liabilities and capital accounts. Assets are resources or rights incontestable controlled by an entity at accounting date that is expected to yield it future economic benefits. Liabilities are obligations of an entity at the accounting date to make future transfers of assets or services (sometimes uncertain as to timing and amount) to other entities. Capital or Equity is the residual interest in the assets of an entity that remains after deducting its liabilities, that is the interest of the owners in a business enterprise.

Amounts indicated therein represent remaining balances of the accounts after the adjusting and closing process in the General Ledger has been completed.

Grouping is usually included in the Balance sheet to make the statement more meaningful to the reader. Assets and liabilities may be grouped by several characteristics:

1. By Liquidity, which can be current and non-current. Current Assets can be sold or transformed

into cash within one operating cycle or one year in the normal course of operations; non-current assets are those which could not be transformed into cash within one year. Current liabilities can be satisfied within one year while non-current liabilities are those falling due after one year.

2. By physical form which can be tangible and intangible. Tangible Assets are those with physical existence while intangibles are characterized by legal rights on assets with no physical existence.

3. Valuation, which can be monetary and non-monetary. A monetary asset or liability has a fixed value in terms of cash; examples are accounts receivable or payable. A non-monetary asset or liability has no fixed exchange value, the amount of cash to be received or paid is dependent upon economic conditions. Examples are plant and equipment and inventory.

Because liquidity, the ability to transform assets into cash, is such an important factor in decision making by readers of financial statements, balance sheet conventionally reflects current versus non-current classification.

There are groupings and sub-groupings in the major accounts which are not frequently found in the books of accounts such as "Current Assets", "Fixed Assets" and "Current Liabilities";

INCOME STATEMENT

The Income Statement shows the revenues realized from the business operations and the cost incurred in the process or earning the revenue over a given period. The Income Statement reveals the net income or loss resulting from the operation of the business during the period covered which is usually one year. Seen from a different perspective, an Income Statement indicates the changes in owner's equity (and changes in net assets) over a period of time resulting from the operations of the business, excluding contributions or withdrawals on the part of the owners (which is indicated in the statement of changes in owners' equity).

Two major items are found in the Income Statement: Revenues and Expenses. Revenues are inflows or other enhancements of assets of an entity or settlement of its liabilities (or a combination of both) from delivering or producing goods, rendering services, or other activities that constitute the entity's ongoing major or central operations. It is derived from sale of products or services, or realized from interest on loans to third parties, dividends received from stock investments, interest received from commercial papers held, rental received from properties owned, or royalties earned from patents or licenses.

Expenses, on the other hand, are outflows or other using up of assets or incur of liabilities (or a combination of both) from delivering or producing goods, rendering services, or carrying out activities that constitute the entity's ongoing major or central operation. They are a measure of the effort of the enterprise in its pursuit for revenues.

Gains and losses that are unlikely to recur and are not related to ongoing activities of the enterprise are classified as extra-ordinary items.

Presentation in financial statements depends on the nature of business operations. Trading and Manufacturing concerns present Sales first followed by cost of goods sold to get gross profit, then present operating expenses to get operating income. Other statements combine all revenues regardless of nature first and then present expenses.

STATEMENT OF CASH FLOW

Statement of cash flows is a summary of cash receipts and cash disbursements - all of the transactions that affect cash account. It reports changes in cash position during a period of time. It tells how the entity acquired cash and how it utilized the cash. Major groupings in the statement are:

1. Operating activities: It includes firm's production, selling and administrative activities. In some statements, Net Income is reflected with non-cash expenses added back and non-cash income deducted.

2. Investing activities: It covers purchase and sale of marketable securities, plant and equipment, and the payment and collection of loans to others.

3. Financing activities: This covers issuance and retirement of stocks and bonds and the payment of dividends.

STATEMENT OF CHANGES IN RETAINED EARNING

This statement links the income statement and the balance sheet. Owners' equity is equal to capital contribution plus retained earnings. Retained Earnings are the sum of the earnings of the accounting periods that the company has been in existence less the amounts paid for dividends to stockholders. The statement follows the following format:

Retained Earnings at beginning of the year

Plus: Income for that period per income statement

Less: Dividends declared

Equals: Retained Earnings End of the Year

The statement is sometimes incorporated in the balance sheet under the equity portion.

STATEMENT IN CHANGES OF OTHER OWNER'S EQUITY ACCOUNTS

The statement reports the changes in the firm's capital structure as a result of issuance of new shares or retirement of outstanding shares. It reconciles changes in owner's equity. This statement is often incorporated in the equity portion of the balance sheet.

NOTES TO FINANCIAL STATEMENTS

Numerical representations on the financial statements or of the transactions that created them are frequently insufficient to give the reader a clear picture of what has taken place. Expository material is needed to anticipate some of the questions an analyst might have. Typical kinds of information contained in the notes to financial statements are:

1. Accounting methods used (to calculate depreciation, inventory, taxes, reserves, etc.)
2. Details of fixed assets, investments, Sales and cost of goods sold; details of long term liabilities, including interest rates, collateral and tenor; and details of extraordinary gain or loss.
3. Contingent liabilities, such as pending litigation, lease obligations, or guarantees of the debts of others.
4. Explanatory details (schedules of term debts, fixed assets)
5. Developments, which took place between the date of the financial statement and completion of the audit that, change materially the financial picture of the entity.

An entry further explained by a note contains reference to the note in the body of the financial statement. The notes are not addendum to the statements; they are an integral part. They are considered necessary for full comprehension of the Financial Statements.

The Account Officer should make it a point to read the Notes to Financial Statements because it may contain information that is critical to the Credit Decision.

RELIABILITY OF THE FINANCIAL STATEMENTS AS BASIS FOR DECISION

Financial statements, especially if audited by a reputable Certified Public Accountant, can be used as basis for decision by interested parties because they are prepared within the framework of generally accepted accounting principles or GAAP. The GAAP is a sent of guidelines observed by practitioners of the accounting profession. GAAP is observed to assure a desirable degree of consistency in accumulating financial and operating data; to provide comparability of accounting data that are presented to management, creditors, investors, the public, and governmental bodies; and to provide a basis for decision making and formulation of solutions to the many complex accounting problems encountered.

The GAAP revolves on the fundamental accounting concepts, which are the following:

1. Business entity concept. The assumption is that a business activity shall be accounted for separately from its owners.

2. Going concern concept. A going concern represents an established business being conducted with the expectation of continuing indefinitely; that is, when a business is organized, the going-concern concept of accounting assumes a continuity of existence for the accounting entity longer than that of any of its components.

3. Unit of measurement concept - Accounting is based on the assumption that for accounting purposes, money is the unit of measurement to be used in recording, classifying, summarizing, and reporting business transactions and the results thereof. This concept provides a common denominator for which all transactions, whether past, present, or future, may be accounted for.

4. Cost concept - Accounting data are recorded at cost as of the date of acquisition, and these costs are maintained on the records and statements unless there is a write-down to recognize a loss.

5. Realization concept - Revenue is realized when the earnings process is virtually completed and the selling price is assured; that is, when bona fide sale, or exchange of economic values takes place between the business and an outside firm or individual.

6. Time period concept - While business activity is a continuous flow, the reporting process breaks up that flow into periods. A year, calendar or fiscal, usually serves as the basic accounting period.

7. Stable monetary concept - The primary statements of financial condition, fluctuations in the monetary values must not be permitted to affect the amount shown.

8. Objective evidence concept - An important reason for the confidence placed in the financial statements of a business is the fact that auditors require verifiable, objective evidence to support the accounting transaction that are recorded in the accounting records.

9. Disclosure concept - It is imperative that all material facts bearing on the financial condition and operating prospects of the company, whether of a monetary nature or not, be disclosed.

10. Consistency concept - Where there are several accepted methods of accounting for transactions, the accountant should apply the best suited for each particular case consistently from year to year. Method being used should be disclosed. Disclosure on the changes in methods should also be made.

11. Conservatism concept - Losses that can be anticipated and estimated should be charged against income, whereas, income should not be recorded until there is objective evidence that it is bona fide.

12. Matching of revenue and cost concept - periodic matching of cost incurred during the year.

LIMITATIONS OF FINANCIAL STATEMENTS

1. They do not reflect factors that affect financial condition and operating results because these factors cannot be expressed in monetary terms. Among these factors are reputation and

prestige of the company with the public; credit rating of the company; efficiency, loyalty and integrity of management and the employees; and sources and commitments for materials and supplies.

2. Financial statement values are not liquidation values. Patents, trademarks and organizational costs may have a book value of P1.00 but may be liquidated at a very substantial amount. Fixed Assets are reflected at cost less accumulated depreciation and not at replacement cost or at amounts that they can be disposed.

SUPPLEMENTAL NOTES ABOUT FINANCIAL STATEMENTS

BALANCE SHEET - A statement of the Assets, Liabilities and Owners' Equity of the business as of a certain date, usually end of the year.

ASSETS - The Resources of a business

LIABILITIES - Claims on business resources by non-owners such as suppliers, government, bankers, etc.

OWNERS'/STOCKHOLDERS' EQUITY - Claim by Owners on the assets or resources of a business.

Formula:

Resources = Claims on resources

Assets = Liabilities + Owners' Equity

INCOME STATEMENT - A statement of revenues and expenses of a business over a time period (for example, one quarter, one semester, one year)

REVENUES - Resources earned by the business

EXPENSES - Resources used up by the business to produce the revenues

NET INCOME - Revenues less expenses

ASSET COMPONENTS

INVESTMENT - needed by the business to operate

CASH - needed to meet expense, pay bills, do financial transactions

RECEIVABLES - needed to encourage sales

RAW MATERIALS INVENTORY - needed to support production

FINISHED GOODS/MERCHANDISE INVENTORY - needed to support sales

FIXED ASSETS - needed for production, increase productivity

Assets should not be too little, otherwise sales and production may suffer. It should not be too much, otherwise, it is costly.

LIABILITIES/DEBT

Should not be too little, otherwise, business may not take advantage of cheap funds for growth

Should not be too much, otherwise, business becomes financially risky, unstable, unable to pay obligations, strained relations.

BASIC FINANCING SOURCES

LIABILITY - Payable to suppliers, short-term loans, long term loans

OWNERS' EQUITY - Paid-in capital, Retained Earnings

FINANCIAL OBJECTIVES

1. Business is profitable and gives good return to owners
2. Business can pay the bills on time
3. Resources are used effectively and efficiently
4. Business is financially stable, able to pay banks
5. Business can grow.

______________ Company
PROJECTED BALANCE SHEET

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ASSETS										
Current Assets										
Cash										
Receivables										
Inventories										
Total Current Assets										
Investments										
Fixed Assets										
Less: Accumulated Depreciation										
Net Fixed Assets										
Other Assets										
TOTAL ASSETS										
LIABILITIES & STOCKHOLDERS EQUITY										
Current Liabilities										
Accounts Payable										
Taxes Payable										
Notes Payable										
Current Portion of Long Term Debt										
Other Payables										
Total Current Liabilities										
Long Term Liabilities										
TOTAL LIABILITIES										
STOCKHOLDERS EQUITY										
Capital Stock										
Issued and Subscribed										
Paid up										
Retained Earnings Ending										
TOTAL STOCKHOLDERS EQUITY										
TOTAL LIABILITIES & STOCKHOLDERS EQUITY										

______________ Company

CASH FLOW PROJECTIONS

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CASH FLOW FROM OPERATIONS										
Sources of Funds										
Sales Revenues										
Uses of Funds										
Cost of Sales										
Operating and Marketing Expense										
General and Administrative Expense										
Sub-Total										
Cash Flow before tax										
Less: Taxes										
Cash Flow from Operations										
CASH FLOW FROM INVESTING & FINANCING ACTIVITY										
Sources of Funds										
Equity Infusion										
Proceeds from Loans										
Total		0	0	0	0	0	0	0	0	0
Uses of Funds										
Capital Expenditures										
Project Development										
Working Capital Requirement										
Payment of Loan										
Working Capital Loan										
Stock Retirement/Redemtion										
Interest Expense										
Total										
Cash Flow from Investing and Financing Activity										
NET CASH FLOW										
Opening Cash Balance										
Less: Debt Reserve										
Expansion Reserve										
Distributable Cash Flow										
Less: Dividends										
Preferred Shares										
ENDING CASH BALANCE										

______________ Company
INCOME STATEMENT

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
SALES REVENUE										
LESS										
OPERATING AND SELLING										
GEN. AND ADMINISTRATION										
NET INCOME FROM OPERATION										
LESS: INTEREST EXPENSE										
NET INCOME BEFORE TAX										
LESS: PROVISION FOR INCOME TAX										
NET INCOME AFTER TAX										
RETAINED EARNINGS BEGINNING										
ADD (DEDUCT)										
RESERVE										
BALANCE										
Less: Dividends										
RETAINED EARNINGS										

ANNEX "G"
BANK CREDIT PRODUCTS

In order that the DOE Assistant can provide appropriate advice to NRE project proponent, he must be aware and conversant about the credit products of the banks.

Traditionally, there are two basic credit products of a Bank, the working capital loans and term loans. A third kind which has gained popularity if previous years are consumer loans. We will discuss the nature, features and the purpose of each type.

WORKING CAPITAL LOANS

Working capital loans have been the traditional credit products of the Banks. These types of loans are meant to finance the cyclical increases in the level of Receivables and Inventories and are liquidated in the normal course of the business. In certain instances, the borrower is expected for an annual clean up of borrowings especially where there are unutilized funds during off-seasons.

Working capital loans are considered much safer than terms loans because the Bank is given the opportunity to review its relationship with the borrower over a short span of time. It is being preferred because it matches the nature the major funding source, savings deposit that can be withdrawn by the depositor on short notice.

The various short term loans and their uses and applications are as follows:

SHORT TERM LOAN LINE -

Nature/Purpose: Short Term Loan Line (STLL) is a credit facility given to a client intended to provide additional operating capital to finance seasonal or cyclical requirements of a client.

Term: One year and is reviewed before maturity to determine if it is renewed at the same amount, at an increased amount or at a reduced amount.

Availment: Via 90-day PN or for a longer term that parallels one operating cycle (the period it takes to convert inventories to sales to receivables and finally to cash)

Amount of Line: Theoretically equivalent to the sum of Accounts Receivable and inventories during peak production season less estimated level of internally generated funds. In actual situation, the level of line exceeds the theoretically determined level for the company to be able to handle unexpected orders from clients.

Other Info: Other terms used to refer to this type of facility are Working Capital Loan, Revolving Credit Line and Discounting Line.

LC/TR LINE

A Letter of Credit (LC) is a written undertaking by a bank to the seller, in accordance with the instruction of the buyer, to effect payment up to a prescribed amount within prescribed time period against prescribed documents, provided these are correct and in order, i.e., they conform with the instructions of the applicant (buyer). It serves as an instrument for payment and of goods and services under a specific contract for both domestic and foreign trade transactions. It assures the seller or exporter that money is available once there is delivery or fulfillment of the terms of any kind of underlying contract or agreement within the period specified by the LC and is the most popular instrument in foreign trade.

A Trust Receipt (TR) is an instrument wherein the bank retains ownership on the imported goods but allows the same to be released in favor of the client to allow client to operate uninterruptedly meantime that he is generating funds to pay for the full amount of the negotiation.

An LC/TR line is a facility is given to client to allow them to import their equipment and raw materials requirements. Some reminders with respect to this facility are as follows:

1. Indicate in the CFP the term of TR Availment. The usual term is 90 days renewable for another 90 days. If there is not restriction on the TR term, goods held under TR may have a term of 360 days.
2. Goods released under TR must be insured, and insurance endorsed in favor of the bank.
4. If client intends to avail of a Deferred and Standby LC, a separate line should be set up for the purpose as LC and TR lines are ordinarily intended for the importation of raw materials for goods to be sold for export or for local sales.

DEFERRED LETTERS OF CREDIT

Deferred L/Cs are import L/Cs payable in installments over a period of usually 3 to 5 years. It is usually opened for the importation of machinery, equipment or other capital goods. Considering the nature of the transaction, the evaluation of a request by a client for a deferred letter of credit should be similar to that of the evaluation of a term loan. The reason for this approach is that the bank will be held contingently liable mean time that the LC remains operative. The client shall deposit the peso equivalent corresponding to every drawing to be made against the letter of credit 30 days before each drawing is due, and upon failure to make the deposit so required herein the Bank may, at its option, enforce collection on the full amount of the letter of credit and institute the necessary legal action to protect its interest

A deferred LC Line, if ever granted, is given only to few valuable clients of the bank.

STAND-BY LETTERS OF CREDIT

Standby Letters of Credit are usually those opened to guarantee payment of foreign loans or performance of an agreed service over a certain period of time in case of failure of designated party/beneficiary to comply with original LC agreement.

TERM LOAN

A term loan is a credit facility with a term of more than one year and payable in a series of pre-determined amortization. The purpose of the loan is usually to finance the expansion of existing production capacity, for the replacement of exiting equipment or to finance the capital expenditures for a business different from the current business of the applicant. Some of the conventions in the packaging of a term loan are:

1. Where loan proceeds will be used to pay for equipment importation, include in the loan terms a provision allowing the client to use the approved term loan as a LC line for purposes of equipment importation. The availment will be converted into a term loan once there is negotiation on the LC.

2. The components of the capital expenditure for which financing is being requested and the estimated amount to be spent per component should be defined. In addition, the mode of financing per component, whether from equity or from loan proceeds, should be defined.
3. Analysis of expansion should be on incremental basis, that is, the expansion should be looked into as a stand-alone project. The expansion portion should be able to generate the cashflows to service loan amortization and that cash generated from existing operation serves as buffer in the event that the expansion miscarries.

Appendix D

Proposed Guidelines for NRE Proponents

PART 2
PROPOSED GUIDELINES FOR PROPONENTS OF
NEW AND RENEWABLE ENERGY PROJECTS
DEPARTMENT OF ENERGY

I. INTRODUCTION

Part 2 of the guidelines is for the use proponents of New and Renewable Energy Projects (NRE). It intends to provide focus to the effort of proponents towards areas relevant to the project, more particularly towards compliance with the requirements of banks and other lenders that provide loans for NRE projects. It serves as a guide to proponents in accomplishing documents and studies such that they address matters that the banks deem important. It likewise helps the proponent identify weak points at early stages such that remedies can be formulated before request for funding is filed with the banks.

1.1 Content and Objectives

1.1.1 The guidelines were formulated with the specific objective of improving the approval rating of loan applications.

1.1.2 You, the proponent, should be aware that DOE provides assistance as this is part of its task of catalyzing private sector participation in NRE. You, however, remain primarily responsible for the project proposal and can overrule any recommendation of DOE that does not fit your business plans.

1.2 Assistance from DOE

1.2.1 DOE shall provide assistance only if you have a written request. The nature of assistance given include:

a. Market identification and validation of market assumptions. DOE can help make an assessment of the existence of the market, characterize the market and provide basic market data. It can help on such areas like 1) proof on the assumption on the population and its growth, 2) estimates on tariff rates 3) cost of delivery of electricity (it varies depending on the location and the technology to be used) 4) technical feasibility.
b. Technical validation and verification of the viability of the technology. DOE can provide inputs about the technology of the project such as 1) if the technology has been pilot tested 2) existing projects in the Philippines using the technology and the performance of the project and 3) existence of similar projects in other countries and their performance. Such information is relevant to the banks.
c. Institutional strengthening - DOE can provide assistance in identification of possible joint venture partners.
d. Verification of “cost of service delivery” calculation/pricing or tariff formula

1.3 Framework – The guidelines focuses on how to comply with the requirements of the Banks. Banks place their money into the projects only if their assessment shows that there is reasonable assurance that they get back what they lend plus earnings thereon. Their assessments narrow down to two areas 1) your bankability which focuses on your credit recrd and 2) the viability of the project that is presented to the bank for purposes of funding.

1.3 Methodology

The guidelines took into consideration the lending guidelines of DBP, LBP and PNOC-EDC and the project guidelines of DOE, NEDA and NPC-SPUG.

2. EVALUATION

The foregoing set of guidelines is useful if you are willing to undertake an honest to goodness self-assessment. A self-evaluation is helpful if done prior to presentation of a request for a loan from a bank. The self-evaluation shall focus on two areas: 1) completeness of the documents and 2) the chances of the project proposal getting the approval of the bank.

<u>Completeness of Documents</u>

2.1 See to it that the following documents are included in the materials presented to the bank:

a. Organizational Papers - Articles of Incorporation and By-laws, if the proponent is a corporation or cooperative, Articles of Partnership if a partnership, or Bureau of Domestic Trade Registration if a sole proprietorship
b. If the proponent is an LGU, a resolution from the Municipal/City/Provincial council approving the project, authorizing the LGU to borrow and authorizing for the encumbering of LGU assets including its Internal Revenue Allotment
c. Bio-data of Principal officers and directors of the business
d. Feasibility Study usually prepared by proponent's consultant. Attached to the feasibility study is a statement from the appropriate unit of DOE stating that the technical assumptions in the feasibility study were validated and found substantially correct. If the feasibility study was prepared by a unit of the DOE upon the request of the proponent, the study will be accepted as is.
e. Transfer Certificate of Title and other forms of certificate of ownership on assets proposed to be mortgaged to secure the proposed loan
f. Financial Statement of the proponent for the last three years
g. If the proponent organization is new, Balance Sheet as of a given date and the Financial Statement of the Principal Stockholders for the last three years. If the financial statements are not available, an audited statement of Assets and Liabilities may be submitted.
h. Statement from the proponent and principal officers and directors about cases filed against them in courts.

Chances of the Proposal Getting Approved

Understand and appreciate the procedures performed by the bank as described below such that you can properly present your project proposal.

2.2 The bank evaluation process starts with the question "How bankable is the proponent?" Are the banks willing to place their money into the your project taking into consideration your present status? You should understand that banks have a way of finding out information critical to your request for a loan.

2.3 Next to be evaluated is the viability of the Project. It focuses on the following issues:
   a. Will the proposed project inure incremental benefits to your business?
   b. What are the risks involved and
   c. What are the risk mitigation measures necessary

2.4 The banks invest only after conducting an extensive due diligence process and such practice is worthy of replication to increase chances of projects getting approval for a loan. The said process is conceptually presented in Annex "A". A discussion of the process is marked as Annex "B".

2.5 When you request for a loan, you are actually presenting a financial package to a bank for its consideration. The Financial Package has the following components:
   a. The amount of Equity needed in addition to equity contribution of proponent
   b. Performance Measures on proposed project that include FIRR, BEP, Payback Period and NPV
   c. Terms of the loan to be obtained from the bank include
      1) Amount – Amount of loan is a function of the project cost and the level of equity contributed by the proponent. Elements of project cost is discussed in a separate section of this guideline
      2) Tenor – Tenor is the number of years within which the borrower is to effect full payment of the loan. It is dependent on the projected cash flow. Grace period is allowed for the gestation period but not to exceed two years. Gestation period is the time from started of project up to the time that the project starts to generate revenues. A shorter grace period is allowed in payment of interest portion.
      3) Purpose of Loan – Purpose of loan is to partially finance proposed project.
      4) Interest Rate – Discussed in foregoing section
      5) Drawdown – Most terms loans are released according to stages of completion of project. The initial release is usually made after reaching a certain percentage of project completion using funds from equity contribution from proponent. Subsequent releases are made after the appraiser has verified that proponent has spent a specified amount for the project or after reaching a certain stage of completion.

6) Repayment – Quarterly payment is convenient to both the proponent and the bank. When cash flows are tight, a maximum of 2 year grace period on principal and 6 months grace on interest.
7) Collateral/Security – Discussed in foregoing section
8) Insurance – Collateral should be insured with reputable insurance company.
9) Compensating Business – Banks prefer that proponent maintains deposit account with them

2.6 Banks are particularly concerned about the following:

a. Your Credit Record
b. Financial Aspects – Your Historical Financial Performance and Projected performance
c. Marketing aspect – How will you market your services/products
d. Operations and Technical Aspects – How will you operate
e. Organizational Aspect
f. Risk involved in the credit transaction
g. Pricing
h. Collateral/Security and Second Way out
i. Socio-economic considerations

CREDIT RECORD

2.7 If you have requested for DOE assistance, you should be honest enough to disclose any adverse record about the business, the officers or the stockholders. Banks are exhaustive in the conduct of credit investigation and it is likely that they will find out the adverse finding.

2.8 Bank obtains credit record of the proponent/borrower through the process called credit investigation. The Credit Investigator (CI) sends queries about the level of loans, the status and payment record with the other banks in the area and nearby area as well as with its branch offices. The CI likewise looks into the records of the court for the existence of court cases against the proponent and of the principal officers and stockholders, if proponent is a corporation or cooperative. The CI, likewise make a random interview of the neighbors of the proponent and certain suppliers to assess the character of the proponent.

2.9 Adverse findings from the credit investigation may result in the disapproval of your loan application of a good project. If you are honest enough to disclose any unfavorable information, DOE can suggest measures to correct the weakness before the loan application is filed with the bank. Note that it is very difficult to correct the initial impression of the bank once there are adverse findings.

FINANCIAL EVALUATION OF HISTORICAL PERFORMANCE

2.10 Evaluation of historical financial performance is applicable where have an existing business. Your historical performance is assessed separately from the projected performance of proposed project. The proposed project is evaluated separately based on its incremental effects, that is, increases in revenues and costs become the basis of the evaluation.

2.11 Financial Statements consist of three statements, 1) Income Statement, 2) Balance Sheet and 3) Cash Flow Statement or the Statement of Sources and Uses of Funds. Income statement shows the results of operations over a certain span of time, usually one-year. The Balance Sheet shows what the business entity owns and what it owes as of the date indicated in the statement. The Cash Flow Statement shows the sources of funds that came into the entity and where the funds went over a certain time span, usually one-year.

2.12 Financial Statements to be useful for analysis, should be prepared in accordance with generally accepted accounting principles and is the duly certified by a Certified Public Accountant (CPA). Make sure that the CPA expressed an Unqualified Opinion on the Statements.

2.13 Analyze your financial statements for purposes of getting indication as to how the banks perceive your financial health. Guidelines in the Analysis of Financial Statements is contained in Annex "C"

FINANACIAL EVALUATION OF PROPOSED PROJECT

2.14 Where you are a recently organized entity with no previous track record of performance, focus of evaluation is proposed project.

2.15 Statements that are subjected to evaluation are the Projected Income Statement, the Projected Balance Sheet and the Projected Cash Flow.

2.16 If proposed project is an expansion of existing business activity, the expansion project should be analyzed as a project that is separate and distinct from an existing project. This is to be able to assess the add-on value of the new project to the existing operation. Only the incremental revenues and costs will be considered.

2.17 Sunk cost, or cost of assets that has already been paid, will not be considered even if these assets are used in the expansion projects.

Project Cost and Financing

2.18 Since evaluation of proposed project pivots on project cost, it is important that this item should be given initial attention. Project performance is gauged against the total cost of the project.

2.19 The components of projects of project costs should be examined to determine their appropriateness and sufficiency. Components of project cost are:

a. Cost of Preparing the feasibility study
b. Cost of Land
c. Cost of Land Improvements
d. Cost of Equipment including installation and supervision cost
e. Pre-operating expense which include cost of securing business permits, licenses, cost in organizing the entity, personnel cost and such other costs incurred prior to start of commercial operations
f. Allowance for Contingencies – This is a provision for possible increases in cost resulting from the depreciation of the peso and such other unforeseen events resulting into an escalation in the total cost of the project. Allowance for Contingencies is usually set at 15% of total projected cost.
g. Working Capital - This represents the minimum level of balance maintained in the cash vault, receivables, inventories in spare parts and prepaid expense necessary for a continuous and unhampered operation of the entity.

2.20 The total project cost, once determined and validated, should have a matching fund sourcing which may be either loan or equity. Some rules of thumb to determine the appropriate mix between loan and equity are as follows:

a. Banks do not ordinarily finance the cost of acquiring land. Land should be part of the equity contribution of the proponent
b. Working capital – There are should be available financing for the initial working capital requirement of the entity. Some banks allow initial working capital requirement to be financed by a medium to long term credit product while other banks allow only short term loan products of the bank to finance working capital needs.
c. Except for Working Capital, all of components **a to e** in item 2.19 qualify for long term funding which is either equity or medium to long term loan. A medium term loan has a tenor of 5 to 7 years while a long term loan has a tenor of 7 to 10 years.
d. In the presence of collateral with loan value that can fully cover a given amount of loan, the bank can provide the proponent a loan equivalent to 75% of total project cost.

Annex “D” discusses the various loan products of the Bank and their appropriate uses.

2.21 Banks offer various financing options. DBP and LBP are the two banks that show keen interest in providing loans to NRE projects. Various product options and other relevant information are contained in Annex “E”.

2.22 If you do not have the necessary resources to cover the portion of project cost that could not be covered by a loan, you may be need to obtain equity from various sources. Potential sources of equity funding are:

a. Equipment Suppliers – Some Equipment Suppliers are willing to infuse as equity into the project portion of the purchase price of the equipment. Suppliers, however, are concerned with the full collection of their money and as such, the projected financial statements must consider soonest redemption of equity of suppliers as the cash flows may warrant. Further, suppliers may want assured revenues in which case, a Non-Participating Preferred Shares may be issued to such suppliers
b. Local Companies – Big companies with operations near the project site may be willing to infuse equity especially if the said companies are known supporters of environment friendly technologies.
c. Investment Companies – Some banks and insurance companies have subsidiaries that invest in developmental projects especially those with good potential
d. Local Investors – There may be people in the project locality who may be willing to contribute equity into the project. As in the case of the suppliers, they may want assured income and a specific schedule for the redemption of their investment. In such case issuance of preferred shares may be appropriate.
e. Local Government Unit (LGU) – The LGU may be the proponent or may be interested to place equity into a project especially where there is a tremendous socio-economic benefit from the project.
f. NGO – Some NGOs may have funding for equity investment. To maintain the nature of the firm as a private entity, it is suggested that the NGOs should only take a minority interest in the undertaking or else take Preferred Non-Participating shares.

2.23 The timing of disbursement of cost for project should be in accordance with a schedule presented in a PERT/CPM or a Gantt Chart. See to it that the funds are made available when needed. If there is a risk for a cost overrun, set up of a contingency allowance as the occurrence of a fund shortfall during the implementation of the project hurts both of you and the bank in the following manner:

- Banks accrue interest on the loan despite non-completion of the project that generates cash to service the loan. Your obligations continue to mount even in the absence of your capability to pay.
- The bank cannot collect despite the existence of the claim against you. If it could not collect after a certain period, the bank may be required to provide allowance for bad debts that may hurt the financial picture of the bank.

Financial Projections

2.24 Financial Projections are the expectations of management about business performance within a given span of time into the future. The starting point is now and the bridge to the future is the project funded jointly by internally generated funds and equity on the one hand and by a loan on the other hand. Understand the assumptions because these are subject of validation during your interview with the bank. Place your projects and historical performance in a single document so as to facilitate the work of the bank.

2.25 The project, may be considered an expansion portion, should stand-alone project and can generate the required cash flows to pay off the loan amortization. Cash generated from existing capacity should not subsidize the payment of loan amortization from the loans incurred to finance expansion. Cash from existing capacity should only serve as a buffer just in case the expansion project miscarries. Consider such environmental issues like pending bills, long term bulk orders, new contracts; these developments can affect performance. Likewise, identify and analyze for possibilities of a drop in selling price and other sensitivities.

Projected Income Statement

2.26 The first statement is the Projected Income Statement which shows in financial terms how the project is expected to perform. The Income Statement has two major items, 1) Revenue or Income Items and 2) Expense items. The difference between Revenues and Expenses is the Projected Net Income

Expenses

2.27 Check for supporting schedules and computations for each item of expense. Absence of schedules often result in delays in the evaluation of your request.

2.28 Examine the accuracy and appropriateness of each expense item. Make sure supporting schedules and computations are available to enable the bank to validate if a specific expense item is overstated or understated. A list of major of the items of cost and the appropriate supporting schedules are presented below:

Cost Item	Supporting Schedule
Salaries and Wages	Payroll schedule
Depreciation Expense	Depreciation Schedule
Cost of Goods Sold	Detailed Cost of Goods Statement
Maintenance Expense	Detailed assumptions provided by equipment supplier
Other Expense	Assumptions computed based on percent or Sales Revenue or Cost of Goods Sold
Interest Expense	Schedule of loan amortization

Revenues

2.29 The basis for computing revenues should be indicated in projected statements. It is helpful to present revenues in the following manner:

	Year 1	Year 2	Year 3 & After

No. of Households in coverage area			
Target no. of households			
Consumption per household			
Total Projected Demand			
Plant Capacity			
% Capacity Utilization			
Selling Price per kilowatt			
Total Revenue			

2.30 The projection on revenue should be related to the marketing strategy which is discussed in the marketing assessment.

Projected Cash Flow

2.31 Projected Cash Flow reflects the sources and uses of cash for the project. For the first two years of operations, prepare a monthly cash flow projection to detect months where shortage in cash can possibly occur. In subsequent years, yearly cash flow projections are sufficient.

2.32 It is helpful to see that temporary need for cash are supported by cash generated from existing operations.

2.33 Projected cash flow reflects whether the project is in a position to generate cash to be able to service a specific loan amortization. With provisions for deviation included, Cash Flow Projection becomes the basis for a decision as to whether to lengthen or to shorten the grace period for the payment of a loan. It is also an indication of the capability of the project to effect payment of dividends.

Projected Balance Sheet

2.34 Projected Balance Sheet shows the financial position of the project. It shows the gradual build up of equity position and the decline in the level of long term liabilities.

2.35 The Projected Income Statement and Projected Cash Flow are tied to the Projected Balance Sheet. For example, the projected level of Account Receivable is related to Sales and the policy on giving credit. The level of inventories is related to the projected level of Cost of Goods Sold and the level of inventory in which the entity finds it comfortable.

Performance Assessment

2.36 Three scenarios should be presented 1) projections without the project, that is, expected performance of existing operation 2) Projections on the project, that is, the expansion project as a stand-alone and 3) combined projections on existing and expansion. Such an exercise is necessary to enhance the comfort zone of the Bank Account Officer in endorsing the proposed loan for management approval.

2.37 It is helpful to place the figures in the projected financial statements into a worksheet. This will allow for vertical and horizontal comparison of figures and comparison with projects of similar nature. If the project is an expansion of an existing business operation, the spread sheet on the projection can be compared with the spread sheet on historical operations as basis for determining consistency of assumptions.

2.38 Performance measures are Financial Internal Rate of Return (FIRR), Net Present Value (NPV) of projects, Payback Period and Break Even Point (BEP). Include a computation of these figures in the documents you submit to the banks.

2.39 In doing sensitivity analyses of project, revenues are adjusted downward and costs adjusted upward to determine the capacity of the project to absorb results of negative events in the environment.

MARKETING ASSESSMENT

2.40 Marketing assessment describes the target market in terms of capacity to pay for the service both for the present and foreseeable future. In describing the future movement of demand, identify the basis why demand is expected to improve at a given percentage within the forceable future.

2.41 It should identify the barriers in the marketing of services that include direct and generic competition, culture, hesitancy for the use of the product and such other constraints.

2.42 To address these barriers is a marketing strategy. Strategy covers such areas like pricing, promotion, packaging and product delivery. Along with this strategy is a proposed marketing budget to assure the implementation of the strategy.

ORGANIZATION AND MANAGEMENT

2.43 People run organizations and it is for this reason that the proponent must posses the credibility necessary to run the project as a business. Credibility means that the bans have the confidence you can deliver your payment commitments.

2.44 Examine the tasks and sub-tasks in running the project as a business enterprise. Examine the resume of key officers; this may reveal weak point.

2.45 Scrutinize the following documents:

a. Company Background

1) Brief History of your Company/Business

2) Details on its operations

Include a brief chronological account of how the business started and how it grew to what it is now. Details on operations should cover the scope of market, whether international, local or covers a certain region; as to what portion of production output is done in house and what portion by sub-cons; extent of utilization of production capacity.

b. Products/Service - Include peso amount and the percentage of contribution to total revenue of the main product/services and secondary product/services

c. Ownership Structure - Indicate if you are a sole proprietor, partnership or corporation or cooperative. If corporation, indicate whether it is a domestic corporation or a fully owned subsidiary of a foreign corporation. If a joint venture (JV) company, indicate the parties in the JV as well as their role and the advantages they can bring into the arrangement.

d. Equity Participation - Indicate the authorized capitalization, the number of shares and the par value per share. List in tabular form the names of the stockholders, their citizenship, the amount subscribed and the amount paid by each and their share to total paid up. This section will tell whether proponent qualifies under the minimum ownership by Filipinos in the corporation.

e. Management/Officers

1) Board of Directors

2) Key Officers/Personnel - The Management Team, usually composed or controlled by the controlling stockholder/s, is the prime mover of the business organization. Its outlook, plans, attitudes, beliefs and style of handling human, financial and other resources shape the culture of the organization and it has much to do with the continued success or the decadence of the organization. Look into the quality and depth of the management team because this is where Character of the borrower which is the first C of Credit will be judged.

3) Monitor presence of the following in the proponent:

- Adequacy of internal control systems
- Degree of professionalization of managers
- Adequacy of their training
- Management calibre, depth and succession plans
- Credit record and integrity of principal officers
- Management and/or ownership changes and their effect on the business

f. Related business/interest - Include information on the other businesses and sources of income of the proponents. These are looked upon as secondary sources of cash for servicing obligations.

g. Plant and Facilities - Include a brief description of the facilities and indicate if water, power and transport facilitites are available. Indicate the estimated production capacity and the extent of its utilization. Indicate the number of employees.

SUCCESS FACTORS

2.46 Analyze your strengths and weaknesses in relation to industry conditions, competition, labor situations, government regulations affecting the business and political and economic climate.

2.47 Identify potential risks that may adversely affect the project and why you think you have the capability to weather off these risk and remain viable. Discuss the factors that adversely affected your business in the past, how you managed to survive the adversities and stayed viable. Mention the your strengths like existence of a captive market, stable raw material source, investment incentives, favorable laws, market share dominance, etc. Mention also other factors which have positive impact on company's operations.

2.48 Risks in Business include the following:

a. Depreciation of the Peso against other currencies – If there is peso depreciation, peso denominated liabilities may bloat
b. Succession Issues – The project may discontinue if the key proponent dies or becomes incapacitated
c. Failure to reach target revenues – Proponent may have difficulty of paying amortization if volume targets are not reached.

2.49 Address business risks outright by discussing options of the company should the anticipated risks occurs. For example, on the issue of Peso Depreciation, you may opt to book peso denominated loans to avoid said risk. On succession issues, there should be a line up of possible successors just in case the key people in the organization become incapacitated.

COLLATERAL

2.50 Collateral and guarantees serve as "fall back" if projected earnings and cash flow fall below expectations. Collateral is defined as money or property put up by a proponent/borrower to back up a loan. In case of default, the collateral may be liquidated to pay off the loan. Term loans should be structured such that cash for the loan repayment is generated from the business and that it is not depending on the liquidation of collateral.

2.51 There are two types of collateral: the primary and the secondary collateral. A collateral is primary if there is a specific set of cash, near cash items and hard assets identified to cover for whatever exposure that the bank has in the proponent/borrower; a collateral is secondary if there is none. A primary collateral can be given a valuation while a secondary collateral cannot be given a valuation.

The common forms of primary collateral are as follows:

a. Real Estate Mortgage (REM) - a piece of real estate property covered by a Title including existing and proposed improvements thereon is as security for the payment of a loan. Real estate assets other than the site of the project being financed may be used as collateral. Untitled property or pieces of Real Estate covered by Tax Declaration only are not acceptable ac collateral. Real estate asset in the name of a third party may be acceptable as collateral provided that the registered owner is the signatory of the REM. Special Power of Attorney (SPA) issued by the registered owner allowing the borrower to mortgage the real estate assets in not acceptable because of a high incidence of fraud in the issuance of the SPA.
b. Chattel Mortgage (CM) - machinery, equipment and/or personal property are used as security for a loan.
c. Hold-out on Deposits - a specific amount of Saving or time deposit is being held by the back as collateral under as Deed of Assignment. Like in the case of REM, the depositor may not be the same as the proponent/borrower, in which case the depositor should sign the deed of assignment.
d. Mortgage Trust Indenture - the bank is given a Certificate of Participation indicating issued by a trustee who was appointed custodian to a property of enormous value. The certificate indicates the extent or percentage of the property which secure the loan of the bank. This type of collateral is encountered where the loan given to a proponent/borrower is syndicated or where more than one bank have loaned money to the proponent using same collateral.

The following are secondary collateral:

a. Joint and Several Signatures (JSS) or Suretyship – Under a JSS or Suretyship, the surety (signatory of the JSS document) binds him/herself solidarily with the principal debtor and there is a JSS in almost all loan contracts. If the borrower is a corporation, the JSS encumbers the personal assets of the surety to the liabilities of the corporation. In JSS, the surety is not liable unless and until the principal proponent/borrower is held liable. A number on conventions on JSS are as follows:

- if the proprietor/proponent/borrower is the husband, the wife executes a JSS & vice-versa. A third party other than the spouse may also execute a JSS;
- if the proponent/borrower is a corporation, the principal directors and stockholders execute the JSS

b. Cross Guaranty - a person or corporation guarantees the loan of another who likewise guarantees the loan of the former.

c. Negative Pledge - an undertaking of the proponent/borrower not to mortgage, encumber, transfer or dispose of his fixed assets without the consent of the Bank. This is usually encountered where the proponent/borrower is prime and has a good track record

2.52 You cannot borrow to the extent of full market value of assets submitted as collateral. The banks use the terminology "Appraised Value" and "Loan Value.

2.53 Appraised Value is the valuation given by a bank on specific assets. In the case of land, valuation given is usually based on the averages of zonal value, last sales transaction of a piece of land that is near the property and the market value as quoted by real estate agents. The value may be increased because of the location or may not be given any value at all because of the absence of a right of way. If the land is agricultural, the maximum value is the price given by DAR for such property. Valuation is likewise given to improvements introduced on the land.

If the proposed collateral is equipment, the value given is the estimated replacement cost of the equipment net of depreciation; if the equipment is new, it is based on the purchase price of the equipment.

2.54 "Loan Value" is the amount of loan that that the proponent/borrower can obtain from the bank which is a percentage of the Appraised Value. Loan Value schedule is as follows:

Collateral	Loan Value
Land	60%
Building and Land Improvements	60%
Chattels	50%
Deposit Hold-Out	100%

2.55 Collateral can be valuable in term lending, but relying on it as the main justification of support is not the right attitude. Historical performance is still the best gauge in viewing the proponent's ability to service future debts. It is essential to look into the ability of the proponent/borrower to repay from the earnings generated in the normal course of the business.

2.56 Unacceptable collateral that include:

a. Collateral previously mortgaged to another bank. Second mortgages are not acceptable
b. Real estate assets without right of way
c. Real estate assets with lis pendense, adverse claim and other limitations annotated at the back of the title

PRICING

2.57 The Costs of borrowing include:
a. Interest on the loan
b. Service Fee which is a fee collected by the bank per transaction. The amount is supposed to reimburse the bank of its cost in processing the transaction
c. Handling fee which represents the cost of the bank evaluating the loan transaction. Handling fee is a one-time expense and is usually 1% of approved loan amount
d. Commitment Fee – This is a fee for the inability of the proponent/borrower to draw on the approved loan within the drawdown period as defined under the loan agreement. By imposing a commitment fee, the bank is recovering the opportunity cost from allotting funds to service the loan drawdown. Commitment Fee is usually 1% or lower per annum based on the undrawn balance of the loan.
e. Documentary Stamp Tax (DST) – This paid to the Government. Amount paid, which is usually deducted from the proceeds of loan is P0.20 per P300.00 value indicated in the document. Loan agreements and promissory notes are subject to DST.
f. Penalty Charge – The amount collected by the bank if borrower cannot promptly pay loan amortization schedule.

2.58 The Interest rate of a loan depends on a number of factors. The primary determinant of interest rate is the Interest rate on Treasury bills(T-Bills). Interest rate on T-Bills becomes the base rate as it is the type of investment that banks would opt if they decide not to lend their money. As such, quotations on interest rate are usually stated in “91-day T-Bills Rate plus ____% spread” at the time of availment. The interest rate is usually adjusted or “repriced” every 90 days to take into consideration of the changing cost of money to the banks. T-Bills rate is published in the newspapers.

2.59 The other benchmark used by banks is the “Prime Rate” or the best rate that it can give to its best proponents. Prime Rate is a market established rate and may be higher or lower than the T-Bills rate. Some banks publish their prime rates in the newspapers.

2.60 The “plus ___% spread” is a factor that takes into consideration the following:
a. Business Risk - This is the risk that the loan will not be repaid in full with interest within the time frame agreed upon.The higher the perceived risk, the higher is the spread of the bank.

b. The level of compensating business - If the proponent has other business deals with the bank, the situation may merit for the scaling down of the spread. Likewise, presence of substantial amount of deposit will merit a reduction of the spread of the bank.
c. Potential change in the cost of funds in the future. This is especially important when interest rates are fixed.
d. Financial risk - This is the risk that loan funds will be tied up and not be available as other opportunities present themselves to the bank (opportunity loss).
e. Demand Deposits - those deposits that each loan will bring to the bank or each loan will retain for the bank (free balances after activity charges).
f. Time Deposits - while these may have some influence, if the bank is paying a market rate, then time deposits add little in compensation for a favorable rate
g. Competition - those rates that are actually available from other lenders.
h. Timing of interest payment - whether discounted, paid at maturity, paid monthly or paid quarterly, etc.

SOCIO-ECONOMIC, ENVIRONMENTAL & OTHER ISSUES

2.61 Presence of socio-economic impact helps justify a project although it could not serve as a primary justification. Possible multiplier effect of the project should be described in qualitative terms

2.62 On account of the growing environmental awareness, banks now require that projects obtain an environmental clearance certificate (ECC) from DENR. If the ECC is yet to be obtained, the status of getting the ECC should be mentioned.

2.63 Peace and Order – Where the project is placed in remote areas, statement on the peace and order problem should be made in the studies such that the bank account officers and the passive investors would not be guessing of the status.

Appendix E

Proposed Prioritization Scheme for Pipeline Projects

PROPOSED GUIDELINES PRIORITIZATION OF
NEW AND RENEWABLE ENERGY PROJECTS
DEPARTMENT OF ENERGY

BACKGROUND

New and Renewable Energy (NRE) projects originate not only from the Department of Energy but also from the following:

- Private sector that include electric service companies and cooperatives
- Local Government Units
- NPC-SPUG
- NPC-EDC and
- National Electrification Administration

Some private sector NRE projects are forwarded directly to the banks for funding without passing through the DOE. Information about these projects do not register in the records of DOE the principle of "Confidentiality of Relationship" between the bank and the proponent is a constraint.

There is a need for DOE to conduct an inventory of pipeline NRE projects and for the inventory of pipeline project updated at least twice a year. The proposed process is as follows:

1. DOE will get a list of pipeline NRE projects from the banks and with the agencies identified above. The inventory will constitute the long list of projects. The list given by the banks may not identify the proponent but should have a reference number to facilitate account identification later on.
2. From the long list of pipeline projects, will come up with a short list of projects as defined below.

The inventory of pipeline projects to be useful, must be action oriented. The proposed report contains and defines the following elements:

- Priority status
- Criteria for classifying a project under such priority status
- Expected action of DOE where proponent requests for assistance

Priority status of pipeline projects is divided into 5 and is presented in the following schedule. Ranking of pipeline NRE projects serves as guide of what actions to take to further fast track projects.

PRIORITIZATION SCHEME

For purposes of prioritization, the following will be the categories:

Priority Category	Criteria	Possible Scenarios	Action of DOE
Category 1	Project proposals with banks that have the following attributes: • Proponent passes the risk assets acceptance criteria of the banks • Proponent has substantially complied with the requirements of the bank • The bank as made substantial evaluation of the project and the proponent • The bank is expected to come up with a decision within 3 months	The Account Officer of the Bank could not endorse approval of requested loan because: • There are certain technical matters that need to be clarified • The proponent does not have sufficient collateral and/or equity to merit favorable action of the decision makers • The management capability of proponent is questionable	If requested by the bank, DOE will: • Provide clarifications on certain technical matters If requested by the proponent, the DOE will: • Assist in looking for potential investors to cover for equity shortfall and for guaranty facility to collateral shortfall • Assist proponent in strengthening the organizational and its management
Category 2	Project proposals with banks that have the following attributes: • Hurdled the risk asset acceptance criteria of banks • Proponent has not fully submitted the documents required by the bank	• The bank account officer may encounter difficulty in assessing technical feasibility of project • Proponent may have difficulty in complying with the requirements of the bank like additional equity, additional collateral, etc.	DOE will provide the bank or the proponent assistance on technical matters if requested. It can, likewise, assist proponent in complying with the other requirements of the bank. If proponent has insufficient capitalization, DOE can identify sources of additional equity investment.

Category 3	Those proponents whose request for loan are about to be denied because: • Proponent could not comply with additional equity or collateral required by the bank • The bank account officer noted certain problems in the marketing and financial aspect of the project	Proponent may not have been given appropriate advise prior to presentation of request for financing by the bank.	If requested by the borrower, DOE will review the project proposal and will strengthen the identified weak points of the project.
Category 4	Those projects the evaluations of which have been completed by DOE, NPC-SPUG, NEA and PNOC-EDC but have not yet been forwarded to the banks for financing. The proponent, which has already been identified, is in the process of complying with the requirements of the banks.		It is desirable that at this stage, the evaluation procedure as contained in proposed guidelines be used. This will enable the DOE to identify weaknesses of the proposal such that these weaknesses are corrected before they are presented to the bank for purposes of obtaining loan financing.
Category 5	Bank previously denied the proponent's request for a loan because of the following reasons: • Proponent's equity is not sufficient to reach the level required by the banks' • Value of proposed collateral is insufficient • There is unfavorable credit findings about proponent	Projects previously denied may be feasible if properly packaged and appropriate support were given.	Through the guidelines, the DOE can make a quick assessment of the merits of the project. If the DOE Assistant finds that the project is feasible, the DOE Assistant can perform a more thorough evaluation of the project.

DEPARTMENT OF ENERGY
PRIORITY LIST OF PROJECTS

Proponent	Project Site	Project Description	Project Cost	Project Loan	Project Status	Possible Action of DOE
CATEGORY 1						
Provincial LGU & Paleco	Palawan	400 stand-alone Solar home system		10.70	Loan approved but delayed in implementation because of change in Administration DBP sent termination letter	DOE to provide assistance if requested by the Prov. Gov't of Palawan.
Edward Marcs		Inventory Financing		50.00	Approved Dec. 2000 and being implemented	
PLDT	Murcia, Bacolod	PV for Relay Station		9.60	Awaiting PLDT Management approval	
Municipal LGU	Loreto, Surigao del Norte	500 kW mini-hydro		48.00	For DBP Management Approval	
ROMELCO	Sibuyan, Romblon	Detailed FS for a 900 kW Mini-hydro		1.00	Approved and documented but implementation is delayed because of difficulty in getting NEA endorsement	

DEPARTMENT OF ENERGY
PRIORITY LIST OF PROJECTS

Proponent	Project Site	Project Description	Project Cost	Project Loan	Project Status	Possible Action of DOE
CATEGORY 2						
Provincial LGU & Smith Bell Resco	Dapitan, Zamboanga Del Norte	11.8 MW Mini-hydro		To be determine	Final details still being discussed	
Agusan Power	Agusan del Sur			$35.00	Final Details still being discussed	
Tawi-Tawi LGU	Panglima Sugala & Bongao, Tawi-Tawi			45.00	Final Details still being discussed	

DEPARTMENT OF ENERGY
PRIORITY LIST OF PROJECTS

Proponent	Project Site	Project Description	Project Cost	Project Loan	Project Status	Possible Action of DOE
CATEGORY 4						
Catanduanes LGU & Spie-Trans	Virac, Catanduanes	2.5 MW Mini-Hydro			Feasibility Study level	
Loreto LGU	Loreto, Dinagat Is. Surigao del Norte	.55 MW Mini-hydro	48.50		Proponent applying for hydro operating contract	
Catanduanes LGU & Spie-Trans	Virac, Catanduanes	6.9 MW Mini-hydro			Feasibility Study level	
Palawan LGU	Narra, Palawan	7.0 MW Mini-Hydro			Feasibility Study level	
ANECO & Cumming C. Ltd	Butuan City, Agusan del Norte	7.0 MW Mini-Hydro	231.61		Feasibility Completed. On hold because of excess power capacity	
Gingoog Power & Gingoog LGU	Gingoog City, Misamis Oriental	10 MW Mini-Hydro	690.77		FS Completed. Developer yet to submit requirements for a contract	
Eastern Samar LGU	Lawa-an, Eastern Samar	4.0 MW Mini-Hydro	191.43		Desk Study Level	
Iloilo Electric Coop	Igbaras, Iloilo	3.6 MW Mini-Hydro	57.35		Pre-FS Completed. For complete FS	
Zamboanga del Norte LGU	La Libertad, Zamboanga D N	3.75 MW Mini-Hydro	202.00		Pre-FS Level	

DEPARTMENT OF ENERGY
PRIORITY LIST OF PROJECTS

Proponent	Project Site	Project Description	Project Cost	Project Loan	Project Status	Possible Action of DOE
NAPOCOR	Kicharo, Agusan del Norte	6.8 MW Mini-Hydro	$13.46		FS Completed. No interested Developer	
SORECO I	Sorsogon, Sorsogon	2.5 MW Mini-Hydro	66.08		FS Level	
Samar LGU	Calbayog, Western Samar	1.05 MW Mini-Hydro	48.75		FS Completed. No interested Developer	
NAPOCOR	Puerto Princesa Palawan	6.8 MW Mini-Hydro	$15.60		FS Completed. No interested Developer	
Phil-Can Power & CCL	Culaman, Bukidnon	10 MW Mini-Hydro	603.20		FS Completed. CEPALCO did not pursue project	
NAPOCOR	Siaton, Negros Oriental	5.4 MW Mini-Hydro	$16.67		FS Completed. No interested Developer	
ROMELCO	San Fernando, Sibuyan Island, Romblon	.9 MW Mini-Hydro	62.71		Pre-FS Level	

NOTES TO PIPELINE
NEW AND RENEWABLE ENERGY PROJECTS
IN THE PRIORITY LIST

Process In Coming Up With The Priority Long List

1. Gathered from the DOE-Hydro Division a list of pipeline projects and feasibility studies prepared for the pipeline projects. A review of the feasibility studies revealed the following:
   a. Most of the studies need updating. Technical and economic data contained in the feasibility studies need to be revalidated as these are more than two (2) years old
   b. The project proposals were not appropriately packaged. It was noted that there were no financial information about the proponent. Likewise, authority to borrow on the part of the proponent were not included in the studies
   c. Issues like equity of the proponent, the portion to be funded by the banks and security of the loans to be obtained were not discussed in the studies. The proponent should be able to address issues before presenting a proposal to the bank.

   Because of the shortcomings mentioned above, projects with DOE-Hydro Division cannot be included in the priority list, that is, projects that can be provided with assistance in getting financing from the banks.

2. On March 12, 2001, I called on VP Mendoza of DBP to obtain background information on pipeline NRE projects of DBP. I was informed that information about the project and the borrower are confidential in nature and cannot be revealed unless there is a formal request.
3. I also met FVP Selespara of LBP on March 28, 2001. He informed me that the Provincial Government of Tawi-Tawi has a request for a loan to finance NRE project. He instructed his people to obtain information of pipeline projects filed with the branches. I was asked to go back to his office after a week.
4. I prepared a request to DBP and LBP through DOE for a profile of pipeline projects (copy of requests attached). Also requested NPC-SPUG, PNOC-EDC and NEA by telephone for a profile of projects.
5. DBP provided a schedule of pipeline projects (copy of the schedule attached). The information contained in the schedule are the only information that the DBP can reveal without violating the rule on confidentiality. As a rule, banks are not supposed to reveal or share to any party information to about the proponent or the project without the written approval of the proponent. This principle was reiterated during the meeting at PA Consulting on April 5, 2001.
6. I gathered that LBP is still in the process of packaging the NRE projects of the Province of Tawi-Tawi. The LGU has already submitted the appropriate financial statements and LGU resolutions. The LGU, however, has yet to submit the feasibility studies.
7. NPC-SPUG, PNOC-EDC and NEA have pipeline projects and this was confirmed likewise during the meeting on April 5, 2001.

On The Long List Of Projects

1. The long list of projects was therefore based from the inventory list provided by the DBP and LBP and from an examination of the feasibility studies on file with the DOE-Hydro Division.
2. Although projects already filed with the bank are included in Category 1, no one among the projects can be provided with the assistance defined under the TOR because of the limitations from "confidentiality principle" mentioned above.

Appendix F

Training Kit

TRAINING FOR DOE ASSISTANTS
EVALUATION OF NEW AND RENEWABLE ENERGY PROJECTS

Objectives

This training manual is designed for the use of DOE staff who will be assigned to provide assistance to proponents of New and Renewable Energy (NRE) projects. The materials included herein are extensive and are meant to become reference material of the DOE staff for possible scenarios to be encountered in the performance of their work.

The training will take 5 days and on the 6th day, there will be a lecture to be attended by DOE people about project evaluation.

Lesson Plans for the 5-day period and the 6th day are presented below.

Day 1

Objectives:
1. Provide trainees with an overview of the tasks to be accomplished as catalyst of NRE
2. Discuss details of the guidelines on Project Evaluation and Proposed Guidelines for Proponents of NRE
3. Discuss mechanics in the evaluation of projects

Methodology: Lecture

Outline of Discussions:
1. The specific tasks of DOE as Catalyst of NRE Project
2. The importance of the Guidelines for both DOE and Proponent
3. The form to be accomplished – Annex A
4. The Framework of Evaluation – Annex B
5. Details of the Evaluation Process

Day 2

Objectives:
1. Teach trainees in judging a good project proposal from one that is not
2. Teach trainees in dealing with proponents

Methodology: Lecture and discussion of a sample proposal

Outline of Discussions:
1. Discussion of a sample proposal and identifying its attributes
2. Discussion of the attributes of a good proposal

Day 3

Objectives:
1. Expose trainees to a possible situation in project evaluation
2. Teach trainees how to analyze and synthesize

Methodology: Case Method

Outline of Discussions:
1. Presentation of the facts of the case
2. Definition of what is expected at the end of the case

Day 4

Trainees will be given the whole day to prepare what is expected from them

Day 5

Objectives:
1. Teach trainees the correct approach in actual projects
2. Teach trainees on proper presentation of projects

Methodology: Case method

Detailed Outline of Discussions:
1. Trainees to be asked to present their output
2. Discussion of their output and pointers to further strengthen the output

Day 6

Objective: Provide background on project evaluation

Methodology: Lecture

Outline of Discussions:
1. The tasks relative to the role of DOE as catalyst
2. The framework of project proposal
3. Attributes of a good project proposal
4. Closing

Introduction to Project Appraisal

How you as DOE officer help proponents in presenting their projects to bankers and investors

Introduction

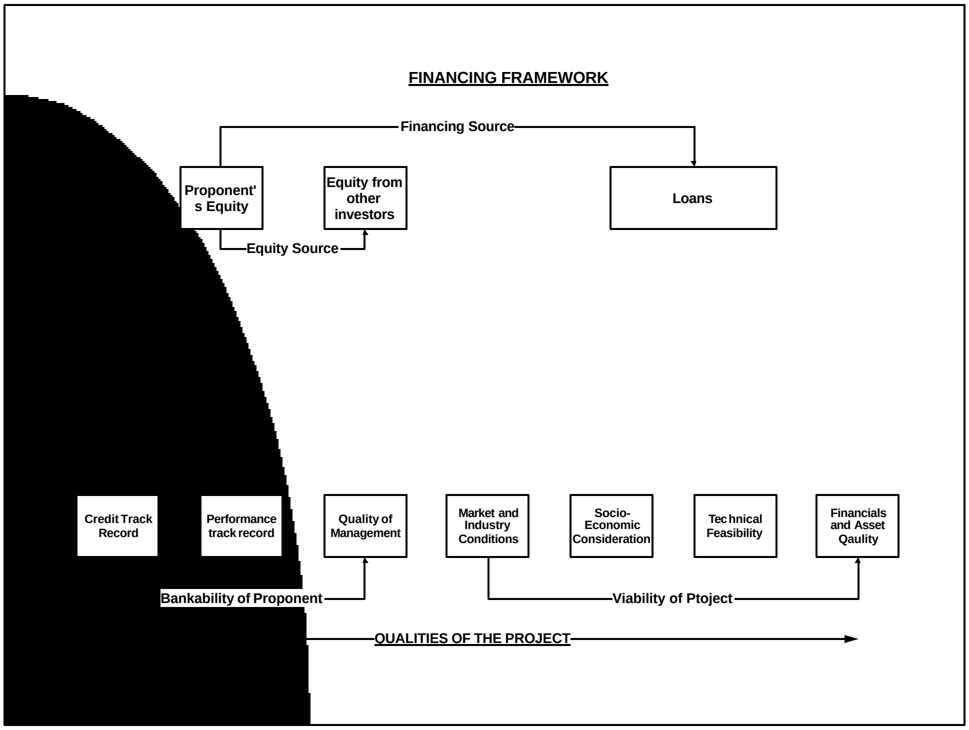
- Within the next 2 hours, we will discuss how banks evaluate project.
- Think like a banker or an investor
- A presentation of project can mean success or failure

Financing Components

- Loan
- Equity

Due Diligence Process

- Not all technically feasible projects are commercially viable
- Viability should be analyzed from the point of view of the funders
- Think like a banker or investor
- Examine studies so proponents can present an adequate report and in acceptable format



Viability of a Project

- Cost of Project
- Existence of a market
- Technically feasible
- Socio-Economic Impact
- Financially Viable

Bankability of Proponent

- No adverse credit finding
- Adequate capital
- Can manage project profitable

Financial Statements

- Basics of Financial Statements
- Historical
- Projected
- Analysis of Financial Statements

Integration

- Project
- Financing

TEXT OF LECTURE

Slide 1 - Introduction

Director Benito, Mr. Quejas, Mr. Arrila, distinguished officers and staff of the Department of Energy, Good Morning.

During one of my meetings with Director Benito two months ago about NRE projects, he mentioned about transfer of technology on the evaluation of projects to the DOE. In my subsequent discussions with Reuben Quejas relative to a task that I was engaged to accomplish, it became apparent that there is a need to familiarize the officers and staff of DOE who deal on projects. This transfer of technology is compelling because the DOE is promoting New and Renewable Energy which is an emerging enterprise. As you may have read in management books, an emerging industry practically confronts all the problems you can think of as a business enterprise.

There are so many approaches in handling the problems of NRE ranging from strategic to operating, top-down approach to bottom-up approach. These are the approaches that you as energy professionals can handle expertly.

What I believe is missing, therefore, is the capability to present what you know to another set of experts, the bankers and the investors. As the saying goes, HE WHO HAS THE MONEY MAKES THE RULES.

Our task in today's lecture, therefore, is to transfer to you the technology of presenting a proposal for a project to bankers and prospective investors.

Slide 2

Role of DOE – Assist the proponents by guiding them of the proper way of preparing their proposals. Think like an investor or a banker with the following specific objectives:

- To improve the approval rating of loan applications of NRE projects
- To enhance acceptability of projects to prospective investors and

The above can be accomplished if the proponent can be guided to present his/her proposal properly. A proposal is proper if it addresses all the concerns of the bank and it is presented in a proper format.

Slide 3

Our ultimate objective is to help the proponent obtain a loan from the bank and to solicit equity contributions from other entities.

At this point, the following should be made clear

1. The proponent which is the private sector is primarily responsible for the project. You are there to guide and assist but do not assume responsibility
2. He who has the money makes the rules. The investor and the banks are the principal players
3. As catalyst, it is helpful that you understand the language of the banks so you can discuss with the client more intelligently. You should expect the proponents to ask for your assistance in dealing with the banks.
4. Proponent should solicit your serves, otherwise the banks will ignore you. Banks observe "confidentiality principle".
5. The nature of assistance expected from you by the banks are
   a. Market identification and validation of market assumptions. Is there a market and what are its characteristics? Are there data available about the market?
   b. Technical validation and verification of the viability of the technology.
   c. Institutional evaluation including assessment of the readiness of the community and the livelihood component.
   d. Verification of "cost of service delivery" calculation/pricing or tariff formula

Slide 4

In order that guidance and assistance can be given, the proponent must be willing to undergo a self examination.

In making a self-examination, consider all the elements of the business enterprise. In other words, we perform a due diligence process. Due diligence process means undertaking the necessary measures to see to it that the investment decision or the credit decision will not result into losses.

There are certain pointers to be remembered and these are:

- Not all technically feasible projects are commercially viable
- Viability should be analyzed from the point of view of the funders
- Think like a banker or investor
- Examine studies so proponents can present an adequate report and in acceptable format

Slide 5

What are the areas that need to examined? It is broken down into two categories: the viability of the project and the bankability of the proponent.

The evaluation shall highlight on the concerns of the banks particularly the following:

a. Credit Record of proponent
b. Financial Aspects – Historical Financial Performance of proponent and Projected performance
c. Marketing aspect
d. Operations and Technical Aspects
e. Organizational Aspect
f. Risk involved in the credit transaction
g. Pricing
h. Collateral/Security and Second Way out
i. Socio-economic considerations

CREDIT RECORD OF THE PROPONENT

3.1 Proponents may be hesitant to discuss credit record especially where there is adverse record on the proponent. The DOE Assistant, however, has to extract from the proponent the nature of adverse findings, if any, such that remedial measures can be effected before the application is filed with the bank. Bank uses exhaustive procedures in the conduct of credit investigation and it is likely that it will find out the adverse finding.

3.2 Bank obtains credit record of the proponent/borrower through the process called credit investigation. The Credit Investigator (CI) sends queries about the level of loans, the status and payment record with the other banks in the area and nearby area as well as with its branch offices. The CI likewise looks into the records of the court for the existence of court cases against the proponent and of the principal officers and stockholders, if proponent is a corporation or cooperative. The CI, likewise make a random interview of the neighbors of the proponent and certain suppliers to assess the character of the proponent.

3.3 Adverse findings from the credit investigation may result in the disapproval of loan application of a good project. If the proponent is honest enough to disclose any unfavorable findings, if any, the DOE Assistant can suggest measures to correct the weakness before the loan application is filed with the bank. It should be noted that it is very difficult to correct the initial impression of the account officer of a bank once there are adverse findings.

FINANCIAL EVALUATION OF HISTORICAL PERFORMANCE

3.4 Evaluation of historical financial performance is applicable where the proponent is an existing entity. Historical performance is assessed separately from the projected performance of proposed project. The proposed project is evaluated separately based on its incremental effects, that is, increases in revenues and costs become the basis of the evaluation.

3.5 Financial Statements consist of three statements, 1) Income Statement, 2) Balance Sheet and 3) Cash Flow Statement or the Statement of Sources and Uses of Funds. Income statement shows the results of operations over a certain span of time, usually one-year. The Balance Sheet shows what the business entity owns and what it owes as of the date indicated in the statement. The Cash Flow Statement shows the sources of funds that came into the entity and where the funds went over a certain time span, usually one-year.

3.6 Financial Statements to be useful for analysis, should be prepared in accordance with generally accepted accounting principles and is the duly certified by a Certified Public Accountant (CPA). The DOE Assistant should read the audit report and that the CPA expressed an Unqualified Opinion of the Auditor on the Statements.

3.7 Tool for financial evaluation is a "Financial Spread Sheet" which places in a single document the items in the financial statement that needs to be analyzed. Financial SpreadSheet is included as Annex "D". Electronic copy is included in this proposed manual.

3.8 The evaluation of the financial statements using the spreadsheet gives an indication of the financial health of the proponent. Guidelines in the Analysis of Financial Statements is contained in Annex "E"

FINANACIAL EVALUATION OF PROPOSED PROJECT

3.9 Where the proponent is a recently organized entity with no previous track record of performance, focus of evaluation is proposed project.

3.10 Statements that are subjected to evaluation are the Projected Income Statement, the Projected Balance Sheet and the Projected Cash Flow. Sample format is marked as Annex “F” which is an electronic worksheet. The electronic worksheet is part of this manual.

3.11 If proposed project is an expansion of existing business activity, the expansion project should be analyzed as a project that is separate and distinct from an existing project. This is to be able to assess the add-on value of the new project to the existing operation. Only the incremental revenues and costs will be considered.

3.12 Sunk cost, or cost of assets that has already been paid, will not be considered even if these assets are used in the expansion projects.

Project Cost and Financing

3.13 Since evaluation of proposed project pivots on project cost, it is important that this item should be given initial attention. Project performance is gauged against the total cost of the project.

3.14 The components of projects of project costs should be examined to determine their appropriateness and sufficiency. Components of project cost are:

a. Cost of Preparing the feasibility study
b. Cost of Land
c. Cost of Land Improvements
d. Cost of Equipment including installation and supervision cost
e. Pre-operating expense which include cost of securing business permits, licenses, cost in organizing the entity, personnel cost and such other costs incurred prior to start of commercial operations
f. Allowance for Contingencies – This is a provision for possible increases in cost resulting from the depreciation of the peso and such other unforeseen events resulting into an escalation in the total cost of the project. Allowance for Contingencies is usually set at 15% of total projected cost.
g. Working Capital - This represents the minimum level of balance maintained in the cash vault, receivables, and inventories in spare parts and prepaid expense necessary for a continuous and unhampered operation of the entity.

3.15 The total project cost, once determined and validated, should have a matching fund sourcing which may be either loan or equity. Some rules of thumb to determine the appropriate mix between loan and equity are as follows:

a. Banks do not ordinarily finance the cost of acquiring land. Land should be part of the equity contribution of the proponent
b. Working capital – There are should be available financing for the initial working capital requirement of the entity. Some banks allow initial working capital requirement to be financed by a medium to long term credit product while other banks allow only short term loan products of the bank to finance working capital needs.
c. Except for Working Capital, all of components **a to e** in item 3.15 qualify for long term funding which is either equity or medium to long term loan. A medium term loan has a tenor of 5 to 7 years while a long-term loan has a tenor of 7 to 10 years.
d. In the presence of collateral with loan value that can fully cover a given amount of loan, the bank can provide the proponent a loan equivalent to 75% of total project cost, that is items a to f of item 3.15. Part of the 75% is the Working Capital loan discussed in item 3.16.a.

3.16 The timing of disbursement of cost for project should be in accordance with a schedule presented in a PERT/CPM or a Gantt Chart. The DOE Assistant should see to it that the funds are made available when needed. If there is a risk for a cost overrun, the DOE Assistant should recommend for the setting up of a contingency allowance as the occurrence of a fund shortfall during the implementation of the project hurts both the bank and the proponent in the following manner:

- Banks accrue interest on the loan despite non-completion of the project that generates cash to service the loan. The obligations of the borrower continue to mount even in the absence of the capability to pay.
- The bank cannot collect despite the existence of the claim against the borrower. If it could not collect after a certain period, the bank may be required to provide allowance for bad debts, which may hurt the financial picture of the bank.

Financial Projections

3.17 Financial Projections are the expectations of management about business performance within a given span of time into the future. The starting point is now and the bridge to the future is the project, which is being funded jointly by internally generated funds and equity on the one hand and by a loan on the other hand. The underlying assumptions must be understood because it tells much about the feasibility of an expansion project. Projections, if placed side by side with historical performance and, if connected with management analysis would indicate whether the decision to pursue a given project is a sound financial judgment.

3.18 In evaluating projections, see to it that expansion portion is a stand-alone project and can generate the required cash flows to pay off the loan as scheduled. Cash generated from existing capacity should not subsidize the payment of loan amortization from the loans incurred to finance expansion. In worse scenario, it should only serve as a buffer just in case the expansion project miscarries. Analyze assumptions of the proponent as basis for preparing the projections, as well as the environmental issues like pending bills, long term bulk orders, new contracts; these developments can affect company performance. Likewise, identify and analyze for possibilities of a drop in selling price and other sensitivities.

Projected Income Statement

3.19 The first statement is the Projected Income Statement, which shows in financial terms how the project is expected to perform. The Income Statement has two major items, 1) Revenue or Income Items and 2) Expense items. The difference between Revenues and Expenses is the Projected Net Income

Expenses

3.20 Expense items should be examined first. It is in this area where delays occur in the evaluation of the project by the bank because the supporting schedules are not available in the documents submitted.

3.21 Items of Expenses should be examined to determine accuracy and appropriateness of figures. Supporting schedule will enable the bank to validate if a specific expense item is overstated or understated. Each item of cost should be supported by schedule.

Revenues

3.22 The basis for computing revenues should be indicated in projected statements.

3.23 The projection on revenue should be related to the marketing strategy, which is discussed in the marketing assessment.

3.24 Suggested Format of projected financial statement as well as supporting schedules are included in Annex “F” which is an electronic worksheet.

Projected Cash Flow

3.25 Projected Cash Flow reflects the sources and uses of cash for the project. For the first two years of operations, Projected Cash Flow is usually prepared on a monthly basis to detect months where shortage in cash can possibly occur. In subsequent years, yearly cash flow projections are sufficient.

3.26 It is helpful to see that temporary need for cash are supported by cash generated from existing operations.

3.27 Projected cash flow reflects whether the project is in a position to generate cash to be able to service a specific loan amortization. With provisions for deviation included, Cash Flow Projection becomes the basis for a decision as to whether to lengthen or to shorten the grace period for the payment of a loan. It is also an indication of the capability of the project to effect payment of dividends.

Projected Balance Sheet

3.28 Projected Balance Sheet shows the financial position of the project. It shows the gradual build up of equity position and the decline in the level of long term liabilities.

Performance Assessment

3.29 Three situations should be presented 1) projections without the project, that is, expected performance of existing operation 2) Projections on the project, that is, the expansion project as a stand-alone and 3) combined projections on existing and expansion. Such an exercise is necessary to enhance the comfort zone of the Bank Account Officer in endorsing the proposed loan for management approval.

3.30 In doing sensitivity analyses of project, revenues are adjusted downward and costs adjusted upward to determine the capacity of the project to absorb results of negative events in the environment.

MARKETING ASSESSMENT

3.31 Marketing assessment describes the target market in terms of capacity to pay for the service both for the present and foreseeable future. In describing the future movement of demand, it should identify the basis why demand is expected to improve at a given percentage within the foreseeable future.

3.32 It should identify the barriers in the marketing of services that include direct and generic competition, culture, and hesitancy for the use of the product and such other constraints.

3.33 To address these barriers is a marketing strategy. Strategy covers such areas like pricing, promotion, packaging and product delivery. Along with this strategy is a proposed marketing budget to assure the implementation of the strategy.

ORGANIZATION AND MANAGEMENT

3.34 People run organizations and it is for this reason that the proponent must posses the credibility necessary to run the project as a business. Credibility means that the proponents, the lenders and prospective investors have the confidence that proponent can deliver his/her end in the commitments.

3.35 In examining the organization structure of the proponent, the DOE Assistant should examine the tasks and sub-tasks in running the project as a business enterprise. Examination of the resume of key officers submitted, may reveal weak point that require appropriate recommendations

3.36 In the assessment of the organization, the following should be looked into:

a. Company Background
   1) Brief History of the Company
   2) Pertinent Details on its operations
   3) Other information on the company's operations (i.e. market, product lines, etc.)

b. Ownership Structure - Indicate if proponent is a sole proprietor, partnership or corporation or cooperative. If corporation, indicate whether it is a domestic corporation or a fully owned subsidiary of a foreign corporation. If the proponent is a joint venture (JV) company, indicate the parties in the JV as well as their role and the advantages they can bring into the arrangement.

c. Equity Participation - Indicate the authorized capitalization, the number of shares and the par value per share.

d. Management/Officers
   1) Board of Directors
   2) Key Officers/Personnel - The Management Team, usually composed or controlled by the controlling stockholder/s, is the prime mover of the business organization. Its outlook, plans, attitudes, beliefs and style of handling human, financial and other resources shape the culture of the organization and it has much to do with the continued success or the decadence of the organization. Look into the quality and depth of the management team because this is where Character of the borrower, which is the first C of Credit, will be judged.
   3) Monitor presence of the following in the proponent:
      - Adequacy of internal control systems
      - Degree of professionalization of managers
      - Adequacy of their training
      - Management caliber, depth and succession plans
      - Credit record and integrity of principal officers
      - Management and/or ownership changes and their effect on the business

e. Related business/interest - Include information on the other businesses and sources of income of the proponents. These are looked upon as secondary sources of cash for servicing obligations.

f. Plant and Facilities - Include a brief description of the facilities and indicate if water, power and transport facilities are available. Indicate the estimated production capacity and the extent of its utilization. Indicate the number of employees.

RISKS/KEY SUCCESS FACTORS

3.37 The strengths and weaknesses of a proponent should be analyzed in relation to industry conditions, competition, labor situations, government regulations affecting the business and political and economic climate.

3.38 There are always risks involved in pursuing the expansion project and these should be identified. Identify potential risks that may adversely affect the project and why you think the proponent has the capability to weather off these risk and remain viable. Discuss the factors that adversely affected the proponent in the past, how it managed to survive the adversities and stayed viable. Mention the strengths of the proponent like existence of a captive market, stable raw material source, investment incentives, favorable laws, market share dominance, etc. Mention also other factors, which have positive impact on company's operations.

3.39 Risks in Business include the following:

a. Depreciation of the Peso against other currencies – If there is peso depreciation, peso denominated liabilities may bloat
b. Succession Issues – The project may discontinue if the key proponent dies or becomes incapacitated
c. Failure to reach target revenues – Proponent may have difficulty of paying amortization if volume targets are not reached.

3.40 Business risks are often raised in the discussions among lending authorities. As such, it is necessary to address these business risks outright by discussing options of the company should the anticipated risks occurs. For example, on the issue of Peso Depreciation, the proponent may opt to book peso denominated loans to avoid said risk. With respect to succession issues, there should be a line up of possible successors just in case the key proponent dies.

COLLATERALS

3.41 Collaterals and guarantees serve as "fall back" if projected earnings and cash flow fall below expectations to support repayment commitments of the proponent. A collateral is defined as money or property put up by a proponent/borrower to back up a loan. In case of default, the collateral may be liquidated to pay off the loan. Term loans should be structured such that cash for the loan repayment is generated from the business and that it is not depending on the liquidation of collateral.

3.42 There are two types of collateral: the primary and the secondary collateral. A collateral is primary if there is a specific set of cash, near cash items and hard assets identified to cover for whatever exposure that the bank has in the proponent/borrower; a collateral is secondary if there is none. A primary collateral can be given a valuation while a secondary collateral cannot be given a valuation.

The common forms of primary collateral are as follows:

a. Real Estate Mortgage (REM) - a piece of real estate property covered by a Title including existing and proposed improvements thereon is as security for the payment of a loan. Real estate assets other than the site of the project being financed may be used as collateral. Untitled property or pieces of Real Estate covered by Tax Declaration only are not acceptable ac collateral. Real estate asset in the name of a third party may be acceptable as collateral provided that the registered owner is the signatory of the REM. Special Power of Attorney (SPA) issued by the registered owner allowing the borrower to mortgage the real estate assets in not acceptable because of a high incidence of fraud in the issuance of the SPA.
b. Chattel Mortgage (CM) - machinery, equipment and/or personal property are used as security for a loan.
c. Hold-out on Deposits - a specific amount of Saving or time deposit is being held by the back as collateral under as Deed of Assignment. Like in the case of REM, the depositor may not be the same as the proponent/borrower, in which case the depositor should sign the deed of assignment.
d. Mortgage Trust Indenture - the bank is given a Certificate of Participation indicating issued by a trustee who was appointed custodian to a property of enormous value. The certificate indicates the extent or percentage of the property, which secure the loan of the bank. This type of collateral is encountered where the loan given to a proponent/borrower is syndicated or where more than one bank have loaned money to the proponent using same collateral.

The following are secondary collateral:

a. Joint and Several Signatures (JSS) or Suretyship – Under a JSS or Suretyship, the surety (signatory of the JSS document) binds him/herself solidarily with the principal debtor and there is a JSS in almost all loan contracts. If the borrower is a corporation, the JSS encumbers the personal assets of the surety to the liabilities of the corporation. In JSS, the surety is not liable unless and until the principal proponent/borrower is held liable. A number on conventions on JSS are as follows:
    - if the proprietor/proponent/borrower is the husband, the wife executes a JSS & vice-versa. A third party other than the spouse may also execute a JSS;
    - if the proponent/borrower is a corporation, the principal directors and stockholders execute the JSS
b. Cross Guaranty - a person or corporation guarantees the loan of another that likewise guarantees the loan of the former.
c. Negative Pledge - an undertaking of the proponent/borrower not to mortgage, encumber, transfer or dispose of his fixed assets without the consent of the

Bank. This is usually encountered where the proponent/borrower is prime and has a good track record

3.43 A proponent cannot borrow to the extent of full market value of assets submitted as collateral. The banks use the terminology “Appraised Value” and “Loan Value.

3.44 Appraised Value is the valuation given by a bank on specific assets. In the case of land, valuation given is usually based on the averages of zonal value, last sales transaction of a piece of land that is near the property and the market value as quoted by real estate agents. The value may be increased because of the location or may not be given any value at all because of the absence of a right of way. If the land is agricultural, the maximum value is the price given by DAR for such property. Valuation is likewise given to improvements introduced on the land.
If the proposed collateral is equipment, the value given is the estimated replacement cost of the equipment net of depreciation; if the equipment is new, it is based on the purchase price of the equipment.

3.45 “Loan Value” is the amount of loan that that the proponent/borrower can obtain from the bank which is a percentage of the Appraised Value. Loan Value schedule is as follows:

Collateral	Loan Value
Land	60%
Building and Land Improvements	60%
Chattels	50%
Deposit Hold-Out	100%

3.46 Collateral can be valuable in term lending, but relying on it as the main justification of support is not the right attitude. Historical performance is still the best gauge in viewing the proponent’s ability to service future debts. It is essential to look into the ability of the proponent/borrower to repay from the earnings generated in the normal course of the business.

3.47 Where the proponent is a start up, there is no business history to indicate what their future earnings power will be. Projections may be a good indicator but should be substantiated by evaluation of market, management, technical matters, etc. Collateral becomes important consideration.

3.48 In case of guarantee, it is good psychological help but does not automatically ensure that the guarantor will immediately repay a debt or that the lender will have access to the assets of the guarantor without strong legal action.

3.49 The DOE Assistant should be able to advise proponent of unacceptable collateral that include:

a. Collateral previously mortgaged to another bank. Second mortgages are not acceptable
b. Real estate assets without right of way
c. Real estate assets with lis pendense, adverse claim and other limitations annotated at the back of the title

SECOND WAY OUT

3.50 Risk of lower than expected level of performance is always present and it would enhance the comfort zone of the bank if the other sources of payment short of disposing assets can be identified.

3.51 The presence of collateral mitigates the risk and increases the comfort zone of a bank with respect to collecting its exposure into the proponent/borrower

PRICING

3.52 The Costs that should be considered by the Proponent/borrower consists of the following:

a. Interest on the loan
b. Service Fee which is a fee collected by the bank per transaction. The amount is supposed to reimburse the bank of its cost in processing the transaction
c. Handling fee, which represents the cost of the bank evaluating the loan transaction. Handling fee is a one-time expense and is usually 1% of approved loan amount
d. Commitment Fee – This is a fee for the inability of the proponent/borrower to draw on the approved loan within the drawdown period as defined under the loan agreement. By imposing a commitment fee, the bank is recovering the opportunity cost from allotting funds to service the loan drawdown. Commitment Fee is usually 1% or lower per annum based on the undrawn balance of the loan.
e. Documentary Stamp Tax (DST) – This paid to the Government. Amount paid, which is usually deducted from the proceeds of loan is P0.20 per P300.00 value indicated in the document. Loan agreements and promissory notes are subject to DST.
f. Penalty Charge – The amount collected by the bank if borrower cannot promptly pay loan amortization schedule.

3.53 The Interest rate of a loan depends on a number of factors. The primary determinant of interest rate is the Interest rate on Treasury bills(T-Bills). Interest rate on T-Bills becomes the base rate as it is the type of investment that banks would opt if they decide not to lend their money. As such, quotations on interest rate are usually stated in "91-day T-Bills Rate plus ____% spread" at the time of availment. The interest rate is usually adjusted or "repriced" every 90 days to take into consideration of the changing cost of money to the banks. T-Bills rate is published in the newspapers.

3.54 The other benchmark used by banks is the "Prime Rate" or the best rate that it can give to its best proponents. Prime Rate is a market established rate and may be higher or lower than the T-Bills rate. Some banks publish their prime rates in the newspapers.

3.55 The "plus ___% spread" is a factor that takes into consideration the following:

a. Business Risk - This is the risk that the loan will not be repaid in full with interest within the time frame agreed upon. The higher the perceived risk, the higher is the spread of the bank.
b. The level of compensating business - If the proponent has other business deals with the bank, the situation may merit for the scaling down of the spread. Likewise, presence of substantial amount of deposit will merit a reduction of the spread of the bank.
c. Potential change in the cost of funds in the future. This is especially important when interest rates are fixed.
d. Financial risk - This is the risk that loan funds will be tied up and not be available as other opportunities present themselves to the bank (opportunity loss).
e. Demand Deposits - those deposits that each loan will bring to the bank or each loan will retain for the bank (free balances after activity charges).
f. Time Deposits - while these may have some influence, if the bank is paying a market rate, then time deposits add little in compensation for a favorable rate
g. Competition - those rates that are actually available from other lenders.
h. Timing of interest payment - whether discounted, paid at maturity, paid monthly or paid quarterly, etc.

SOCIO-ECONOMIC, ENVIRONMENTAL & OTHER ISSUES

3.56 Presence of socio-economic impact helps justify a project although it could not serve as a primary justification. Possible multiplier effect of the project should be described in qualitative terms

3.57 On account of the growing environmental awareness, banks now require that projects obtain an environmental clearance certificate (ECC) from DENR. If the ECC is yet to be obtained, the status of getting the ECC should be mentioned in the study.

3.58 Peace and Order – Where the project is placed in remote areas, statement on the peace and order problem should be made in the studies such that the bank account officers and the passive investors would not be guessing of the status.

Slide 6

To recap, the viability of the project is dependent on the following:

- Cost of Project
- Existence of a market
- Technically feasible
- Socio-Economic Impact
- Financially Viable

Slide 7

The bankability of the proponent is dependent on the following:

- No adverse credit finding
- Adequate capital
- Can manage project profitable

Slide 8

Financial Statements are best windows in looking at the current and projected picture of the business enterprise.

- Basics of Financial Statements
- Historical
- Projected
- Analysis of Financial Statements

Slide 9

As recap, a project will not be pursued if the people that should be providing the support are not there. The proponent should be provided assistance but caution should be taken.

CLOSING

I would like to inform the DOE at this point that I would be willing to provide assistance even after the expiration of my TOR. I will be discussing details with Ruben regarding thematter.

Appendix G

Minutes of Meeting

Consultation Meeting on
PROPOSED GUIDELINES ON PROJECT EVALUATION FOR
NEW AND RENEWABLE ENERGY PROJECTS
2:00 p.m. on April 5, 2001
Venue: PA Consulting Conference Room

Present:

Arlene Pamintuan	-	PA Consulting
Boy Dulce	-	USAID
Junn Domingo	-	Land Bank of the Philippines
Offie Mendoza	-	Development Bank of the Philippines
Jet Salvatierra	-	Development Bank of the Philippines
Val Infante	-	National Electrification Administration
Fely Arreola	-	Department of Energy
Ruben Quejas	-	Department of Energy
Grace Yeneza	-	Preferred Energy Inc.

SUMMARY OF DISCUSSIONS

1. DBP's concern is the organizational readiness of DOE to handle the tasks as defined under the guidelines. DOE does not have the capability to handle such tasks as evaluation of collateral, conduct of a CI and analysis of Financial Statements. It became apparent in subsequent discussions that there are parts of the whole tasks that can be appropriately performed by the banks. As a catalyst, however, DOE should be aware what the banks are doing such that it can effectively provide assistance to proponent. DOE staff need to understand the language of the banks such that they can discuss intelligently with the loan officers of the banks.

2. DBP suggested for the creation of an Inter-Agency Committee similar to that of DOST. The IAC, to be composed by representatives of agencies that can contribute inputs to the project, will have the effect of increasing the comfort zone of the banks on project requiring loan.

3. The process flow being proposed with IAC in the picture is as follows:
   a. Upon receipt of application, DBP will conduct CI and appraise proposed collateral meantime that proponent is in the process of preparing documents required by the bank
   b. The DOE will simultaneously validate the assumptions pertaining to the technology and the market.
   c. The proponent will then, thereafter present the project proposal to the IAC for deliberation

4. USAID wanted for a clearer definition of DOE's Role in the entire process. DOE pointed out that its role is purely that of a catalyst and would provide assistance

consistent to this role. The proponent remains primarily responsible for the project proposal while the bank is primary responsible for the decision to grant a loan to the proponent.

5. In the subsequent discussions, a more specific definition of DOE's role as catalyst in Off-Grid RE Based Electrification Projects was agreed upon and they are as follows:
   a. Market identification and validation of market assumptions. DOE will make an assessment of the existence of the market and will present to the banks a document stating the existence of a market, the characteristic of the market and other basic market data. It should also 1) prove the assumption on the population and its growth, 2) provide estimates on tariff rates and 3) provide estimates on cost of delivery of electricity.
   b. Technical validation and verification of the viability of the technology. As some banks do not have the capability to evaluate technical aspects of NRE projects, DOE will pre-screen the technology. It will indicate in a report that would include information 1) if the technology has been pilot tested and the results of the pilot test, 2) if there existing projects in the Philippines using the technology and the performance of the project and 3) if there are of similar projects in other countries and their performance. The technology has bearing project cost and operating costs. The two costs will, in turn, affect the financial viability of the project.
   c. Institutional evaluation including assessment of the readiness of the community and the livelihood component.
   d. Verification of "cost of service delivery" calculation/pricing or tariff formula

6. DOE should likewise identify the areas where NRE are appropriate as well as the appropriate matching technology. DOE mentioned that it has an existing NRE resource map that can be made available to the banks and to proponents.

7. LBP and USAID inquired as to who will be the user of the proposed guidelines. It was pointed out that the guidelines were prepared for the use of DOE. The guidelines will be for the use of the Assistance Desk. When requested by the proponent, it will determine completeness of documents and if studies fit the requirement of the Banks. DOE performs the tasks of a Catalyst but the Proponent remains primarily responsible to the proposal.

8. It appeared in subsequent discussions of the absence of a guideline for proponents. The guidelines for use of proponents should serve as a guide of the different documents that must be submitted as well as various financial packages and the advantages of each. Each proponent has its own preference of banks and the proponents should be aware of the various financial packages offered by the banks.

9. Per DBP experience, mini-hydro projects must comply with 50% equity requirement to be viable. The equity requirement for mini-hydro should be higher.

10. In the definition of the role of DOE, there should be no duplication of work. DOE shall not perform the tasks of the banks, neither will it take on the role of the proponent.

11. LBP acknowledged the absence of staff that have technical competence to evaluate NRE project and may have to rely on DOE on matters pertaining to the evaluation of the technical aspects of projects. LBP would like to develop the competence as it recognizes that energy is a necessary component in the development of livelihood projects in a countryside environment.

12. The banks wants to be advised on such matters like probability that areas intended to be served by NRE project will be connected to the grid. NRE project will not prosper in an area that will be eventually be connected to the grid. NEA can provide the information requested by the banks.

13. The banks suggested that there should be a consolidation of information on all initiatives on NRE. The issue was raised because of a case in Palawan. DBP had to stop implementation of a previously approved project because another entity established a competing project that was funded by a grant. DOE is aware of the NRE initiatives in Palawan. DOE, however, does not have jurisdiction on the NRE projects because these are funded by the private funds and because DOE has no fund exposure in the projects.

14. While DOE is promoting the use of NRE, NEA is mandated to electrify the rural areas regardless of the type of technology. Seemingly, there is a conflict of roles of the two agencies. DOE, however, in its desire of to fast track the attainment of 100% electrification, took an innovative approach without necessarily encroaching into NEA's mandate. DOE's initiatives intend to complement NEA's effort and the seemingly conflict of roles is actually complementation of efforts.

15. In the past, NEA depended on congressional allotment for its projects. Sustainability of projects is an issue because of the difficulty of getting replenishment.

16. For a project to be sustainable should have livelihood component which in turn affect the household's capacity to pay. Households should be the reference point and electrification should result into additional income for them. Discussions on livelihood component will be included in the guidelines.

17. Rural electrification is appropriate for the LGUs and the Electric Coops. If Electric coops cannot pursue projects, the private sector are invited to participate by way of a joint venture together with the LGU.

18. There is a need to come up with a model per technology to serve as guide for the banks. Likewise, there is a need to categorize the market into different segments to allow for possible scenario analysis.

19. The credit decision is the call of the banks, after all, it is their money that is being employed into the project. What the banks want is an information that will enhance their confidence level on both the borrower and the project. Banks practice balance sheet financing. Project financing is not done locally.

20. NEA's concern is the cost that would be spent by a proponent in doing a feasibility study without any assurance that the proposal will be approved. Pre-feasibility study was suggested as alternative. The suggestion, however, would only increase the cost as there is more or less a standard set of requirements by the banks.

21. DBP and LBP stated that they could not provide two projects that can be assisted by DOE for purposes of getting approval under this project.

Prepared by:

ROSVID SUNICO

Meeting with DOE on Amendments to the
Proposed Guidelines On Project Evaluation For
New And Renewable Energy Projects
10:00 a.m. on April 10, 2001
Venue: DOE-NCED Conference Room

Present:

Ruben Quejas
Fely Arreola

SUMMARY OF DISCUSSIONS

1. DBP's concern on organizational readiness of DOE – The DOE appreciates the concern and is taking actions to be able to perform the role of a catalyst. The setting up of the guideline and the training of the DOE staff on the use of the guidelines is an initial step towards this effort.

2. Proposed Inter-Agency Committee(IAC) – DOE recognizes the merits of having an interagency committee. To avoid creating another committee, DOE will examine if the existing Project Preparatory Team (PPT) can perform the task of the IAC. The DOE thinks that the PPT is appropriate for the purpose as DBP, LBP, NEA, PNOC-EDC, DOE, NEDA and DOF are represented. The proposed guidelines will be amended to take into consideration the existence of the PPT in the project evaluation process.

3. Role of DOE – The specific definition of the role of DOE as agreed during the meeting on April 5, 2001 shall be incorporated in the guidelines.

4. On matters of "verification of cost of delivery", however, DOE can determine the upper limits of the figure and not the exact figures.

5. Areas where NRE are appropriate – DOE has an existing NRE resource map which is regularly updated. The banks will be provided with these maps.

6. Interaction with Proponents – USAID, NEA and LBP raised the issue on the absence of a guideline that will be distributed to the proponents such that they can properly present NRE projects. DOE recognizes the need to provide proponent with guidelines on project proposals to guide them of the steps to undertake and the things to look into when preparing a project proposal. Guidelines for proponents, however, is not among the sub-tasks of Task 4. Since the subtask "On a best effort basis, assistance to at least two (2) project proponents (1 LGU and 1 private sector) from the priority list in item (d) in obtaining a financing agreement with either the DBP and LBP, on a best effort basis" could not be delivered, the guidelines for proponents may

be delivered in lieu of the subtask mentioned. The matter will be discussed with PA Consulting.

7. 50% Equity Requirement for Mini-hydro – DOE considers critical the information from DBP on the 50% equity requirement for hydro projects as it has impact on future mini-hydro projects. DOE will make a subsequent verification on the matter.

8. Livelihood Component – The guidelines will include a provision on the livelihood component of NRE projects.

9. Financial Model per NRE technology – One of the intentions of DOE is to set up financial models per type of NRE technology. The presence of a model will greatly help DOE in its role as catalyst. The process, however, will take time as there is a need to build a data base to support such models. NRE is site specific and there would be many variations to be considered.

10. One-Stop Shop – The Market Support Center (MSC), one of the recommendations under the GEF project, may perform the role of a one stop shop. The MSC will serve on an advisory capacity and will not perform tasks for the proponent like obtaining permits and registrations.

11. Other Matters:

    - Transfer of Technology – Mr. Quejas designated two of his staff to have extensive training on project evaluation using the proposed guidelines. Case method shall be used for the training. Schedule, which will take two weeks, will start on April 19.
    - In the first week of May, there will be a half day discussion with DOE staff about project evaluation and assessment.
    - Adjustments on the contract will be discussed with PA Consulting. DBP and LBP disclosed during the meeting on April 5 that both banks cannot provide two projects that can be provided with assistance under the TA.

Prepared by:

ROSVID SUNICO

MEMORANDUM:

FOR : The Secretary, Department of Finance

FROM : The Secretary, Department of Energy

SUBJECT : Request for inclusion of NRE among qualified projects to be financed by the MDF Facility

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1.0 The Request

We wish to request the Department of Finance to make representations with the World Bank for the inclusion of New and Renewable Energy Projects among the qualified projects to be financed.

2.0 Background Information

2.1 One of the thrust of the Department of Energy (DOE) is poverty alleviation and rural development to provide greater opportunities and benefits to underprivileged Filipinos in remote and rural areas. Towards this end, the DOE aims to bring electricity to 8,000 barangays in ___ municipalities. All of the municipalities belong to 6th class category and are in no means qualified for financing from the regular financing windows of GFIs and commercial banks.

2.2 ___ of the unelectrified barangay mentioned can be reached by the grid within the next 2 years. The remaining, however, can be electrified using generators that consume fossil-based fuel or using New and Renewable Energy (NRE) sources like generator powered by solar energy, wind energy and hydro power. The DOE opts for NRE sources because they are environment-friendly in that there is no CO2 emission. Further, NRE is least cost alternative in the long run because they are powered by resources that are free and are replenished by nature. (A briefer on NRE is attached as Annex "A")

2.3 In its attempt to bring electricity to the countryside, the DOE intends to make electrification a community based project. Studies show that project where the active participation of the community is sought are more likely to be sustainable. Considering that the target market is marginalized group, the enterprise of bringing electricity shall focus on full cost recovery plus profit. The level of expected profit, however, is not expected to reach a level that is attractive to the private investor. As such, the municipal LGU is the appropriate proponent for such project as it would be in pursuance of LGU's mandate of spurring development. Such projects are viable because there is a market which are the residents of unenergized barangays and the technology has been proven.

2.4 Funding, however, becomes a problem because the banks and GFIs shun away from 6th class LGUs. It is for this reason that the DOE looks at the MDF as the possible source of funding for LGU electrification projects. There is a need, however, for DOF to make representations with World Bank for the inclusion of NRE among the projects that qualify for MDF financing. If the municipal

LGUs were to pursue NRE projects, it would not only fulfill their social mandate but would also improve the standards of living of the less privileged sectors of society. Likewise, it is in consonance with the policy of the State of local autonomy that will enable the LGUs to attain their fullest development as self-reliant communities and make them more effective partners in the attainment of national goals.

2.5 The estimated average cost of NRE project per municipal LGU is P10 Million. If all the ___ municipal LGU were to pursue NRE projects, the total project cost would be _____ Million.

2.6 Considering that NRE projects are environment friendly and that proponents are among the least privileged municipal LGUs, the DOE will work with NEDA for the possible 70% subsidy portion for such projects.

3.0 Justification: The DOE is endorsing favorably the proposed inclusion because of the following:

a. The project would benefit the least privileged sectors of society
b. It will spur economic development in the countryside

For consideration

VICENTE PEREZ
Secretary, Department of Energy

PHILIPPINES CLIMATE CHANGE MITIGATION PROGRAM

A Joint Program of the

Philippines Department of Energy US Agency for International Development

TERMINAL REPORT

Technical Assistance to DOE for Enhancing Private Sector Participation in New and Renewable Energy Investments for Off-Grid Rural Electrification) *(TASK 5 – Coordination and Consultation with Private Sector Investors)*

Submitted to the:

United States Agency for International Development (USAID)

and the

Department of Energy
Manila, Philippines

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This report was prepared under the terms and conditions of Contract No. 492-C-00-97-00063.
The opinions expressed herein are those of the authors and do not necessarily reflect the views of the USAID.

EXECUTIVE SUMMARY

This report consist of two parts. **Part I on NRE Standard Market Brief for the Private Sector** provides the basic information for potential investors, service providers and project developers. These information provide the context for policy formulations or recommendations presented in **Part II on the Private Sector Policy Paper.**

These two parts consist the main deliverables under Task 5 to do coordination and consultation with potential private sector investors.

The **NRE Market Brief** is intended to encourage the entry of the private corporate sector into the MRE market arena, and help top civil society service providers and CBOs, incorporate the market approach by entities in their development mission. The Brief also aims to provide the corporate private sector and civil society groups with the description of their individual market participation.

The Market Brief provides important definitions, market characterization, critical element or feature of the market that should lead to identifying targets by delivery mechanisms. The elements of the RESCO and the community-based approaches are dealt with in separate chapters. Finally, the market view is made completely by a list of conditions in policy and market environment that should encourage business propositions by investors.

> **Definitions.** Most important definitions made are on the delivery mechanisms (i.e., the RESCO and community-based approach), that contain their similarities and distinctions in carrying out the common objective of expanding the NRE-based market off-grid areas. The definition of “smart subsidies” has been compiled from ideas of many authors that basically show a common agreement to the role of this type of investment assistance.
>
> **Market Characterization**. Key features of the off-grid market are herewith presented from the findings of the DOE-WB Profiling Project, while underscoring the critical elements such as market segmentation. It is the income segmentation that provides an investment map for investors and service providers. The paper provides brief examples which demonstrate that matching has indeed been done or has transpired in all service delivery initiatives.
>
> **The RESCO and the Community-Based Delivery Mechanisms.** Their specific features, target markets, some case experiences, the government policy framework to enable them ,critical success and risk factors, the market investment package that will provide the incentives to dynamically venture into the NRE arena – all are discussed here

The **Private sector Policy Paper** attempts to compile the results of earlier studies on the market development, and to provide specific mechanisms to previous recommendations. In addition, the framework and specific mechanisms to previous recommendations written here have been enriched and fine-tuned by a better understanding of the characteristics of the off-grid electrification market, provided too by recently completed market profiling and studies, and some amount of familiarity of the off-grid consumer itself.

The following subjects and issues for policy development have been dealt with in this paper.

> **Institutional oversight.** The recommendations here contain the conceptual and organizational framework for the proposed oversight function for a RESCO. These basically consist of identifying the specific targets of RESCO operation and the nature of government oversight for each, and the clarification of the various areas or spheres of oversight.
>
> **Subsidy.** "Smart subsidies" are defined here (basically as front-end assistance to encourage the RESCO to be developed as a sustainable enterprise) and are provided with some principles to guide to specific policy formulations.
>
> **Competitive bidding guidelines.** Discussed here are the elements of the bidding guidelines for financial assistance to RESCOs, via a competitive, fair and transparent process. These include the framework, solicitation criteria and process, concession area market packages, required proposal contents, and the selection criteria and process.
>
> **Fiscal incentives.** It is mainly recommended that RESCOs be included in the BOI Investment Priorities Plan as a preferred area of investment.
>
> **Minimum viable market size.** Presented here are several variables that determine viable market size, and some local and international experience in estimating the viable market size given the NRE resource and the level of cost recovery.
>
> **Pricing.** RESCO pricing should be market-based and unregulated. The government recognizes that it should balance the need for affordable rates with the necessity for the RESCO to earn a proper return of equity.

Part 1. Standard Briefing Kit for the Private Sector

STANDARD BRIEFING KIT
FOR THE PRIVATE SECTOR

CONTENTS **Page**

ACKNOWLEDGMENT

The author wishes to acknowledge the expert ideas of all authors of important NRE research work, from where much of that has been done here is based.

They are all listed in the ***Literature Consulted*** *found in the last portion of this paper.*

Chapter I.
INTRODUCTION

The Department of Energy (DOE) considers barangay electrification as a priority program, and has set a target of 100 % electrification by year 2004. To date, there are still over 8,000 barangays around the country that are still un-energized. Some of these barangays are planned to be energized through grid extension. More than half, however, are found in remote areas far removed from the grid system. It has been shown that NRE-based stand-alone electricity facilities consist a less costly and thus a more viable option for these areas.

The extension of private sector involvement in the provision of electricity services to remote areas off the grid, is seen as critical in achieving the stated goal. The Philippine Rural Electrification Program has outlined provisions for enhancing policy environment for greater private sector participation and the nurturance of the NRE market. It is being assisted by the Philippine Rural Power Off-Grid Electrification Program (PRPOEP), which is an initiative of the USAID to help the Government of the Philippines (GOP) formulate a program to encourage the private sector to invest in projects that will extend electric service to unserved areas.

The PRPOEP sees as a challenge for investments to go where isolated systems are costly to install and customers belong to the lowest income groups. While the electric distribution utilities and the National Power Corporation are active in the on-grid developments, the private sector is encouraged to use its inherent enterprise flexibility and innovation to serve this challenging off-grid market.

To encourage the private sector into this endeavor, the DOE is providing this briefing kit to promote awareness of the NRE business proposition. This kit provides the basic information on the NRE market, the main players, and the support being given to NRE market development.

Objectives of the Briefing Kit

1. Provide the potential corporate private sector and civil society entities with the basic understanding of the background, characteristics of and opportunities in NRE market development for rural electrification -- to encourage their related yet distinct interests to participate in this; and,

2. Provide the potential corporate private sector and civil society entities with the description of the scope of their individual market participation.

Criteria for Private Sector Consultation Participants

Audiences for the briefing kit material are preferably:

1. Investors who may be private individuals (e.g., owners of rural enterprises), or corporate entities (e.g., power plant operating companies in unserved areas), as well as electric cooperatives or utilities – preferably those with little or no previous exposure to NRE, and who are interested to learn and explore NRE as potential investment area on a RESCO type of investment.

2. National and local NGOs with direct grassroots links (area coverage) and with acceptable and legitimate track record in rural development or community support work, interested to learn and explore RE as potential community-based project area.

3. Community or peoples' organizations (farmer groups, cooperatives, local federations, associations, or organizations at the primary level) with interest and openness to develop RE in their respective areas, and preferably with a history of community planned and owned development initiatives.

Methodology

The Briefing Kit is intended for use as material in individual or group consultations. The individual parts on *RESCO* and on *Community-based Mechanism* can each be used as information handout for target readers.

1. The modules can be effectively delivered through lecture, to be given by resource persons using appropriate presentation techniques (overhead, powerpoint, etc.) complemented by illustrations and case studies. The modules have to be customized according to the specific situations of sectoral participants. Simplification and delivery in vernacular is advised, as well as the use of examples specific to the localities where participants largely come from.

2. For more effective presentation, the lecture may be complemented by photo and systems exhibit.

3. The **Briefing Kit** is organized to be used as follows:

Chapter 2. MARKET DESCRIPTION

Provides the user with the background, characteristics, and opportunities for NRE market development in rural electrification; proposes a structure in looking at the off-grid market.

Chapter 3. Briefing Kit for the RESCO DELIVERY MECHANISM

Presents a list of topics (in question-and-answer form) solely for private sector presentation.

Chapter 4. Briefing Kit for the COMMUNITY-BASED DELIVERY MECHANISM

Presents a list of topics (in question-and-answer form) solely for community-based sector presentation.

Chapter 5. NATIONAL SUPPORT FOR NRE MARKET DEVELOPMENT

Provides answers to most important questions on government support to market development for NRE in rural electrification.

Chapter II.
MARKET DESCRIPTION

1. Where are the off-grid areas (i.e., the target market) found, and what are their biophysical characteristics?

(a) ***Off-grid targets***. As of December 2000, there are about 8,000 barangays in the Philippines with a demand for electric power service. These comprise about 25% of barangays in the country, populated by about 1.67 million households. About 5,242 of these have been targeted for off-grid electrification.

(b) ***Regional distribution***. The highest levels of unelectrified barangays are found in regions V, VI, VII,VIII, IX, XII and the ARMM. Meanwhile, there are 1.67 million projected number of potential households for electrification, with the highest densities in regions V, VIII, VII, VI, XI and II.

(c) ***Resource availability***: Off-grid areas are generally mountainous areas (slopes 18^{o} above), with abundance of water resources and typically stronger wind regimes that are suitable for wind and small hydro systems. These are also agricultural and forest areas that have typically rich biomass resources.[1]

(d) ***Geographical location***. Off-grid barangays are mostly located in areas far from the center of municipal commerce and administration. They are generally expensive to hook up to the electric power grid.[2]

(e) ***Demography and settlement pattern***. These barangays are peopled by farming, fishing and even forest-gathering population – inhabiting the remote uplands and lowlands, the coastal areas and small islands of the country. They are either indigenous peoples, settlers from the lowlands, or typical inhabitants of the areas. Dispersion and contiguity patterns of *v*illages and households vary according to biophysical resources and culture (being most dispersed in the indigenous uplands). Lowland settlement patterns are generally clustered and with higher densities than in the uplands.

(d) ***Biophysical conditions***. Unelectrified households are found in upland communities or mountainous areas (54.4%), inland or lowland areas (24.9%), coastal areas (18.3%) and island-barangays (2.4%). The resources available in these rural communities determine their production work, and to a large extent, their socio-economic lives.

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[1] *Refer to Renewable Energy Atlas of the Philippines (Wind, Solar and Hydro Resources).*
[2] *According to NEA estimates, a circuit-kilometer of line will cost about PHP 465,000.*

2. What are the socio-economic conditions in off-grid barangays?

(c) ***Poverty demography***. Off-grid barangays are generally found in 4th to 6th class municipalities. The populations in these areas are typically low-income groups whose main sources of income are farming, fishing and animal raising. It is indicated that at least 80% are found below the poverty threshold level of PHP 55,470 average annual income.[3]

(b) ***Agro-based subsistence-to-cash economy***. Households in upland barangays are typically subsistence farmers (i.e., growing for food consumption), growing one-crop unirrigated staple crops (rice and corn) supplemented by swiddening or slash-and-burn agriculture. Lowland or inland farmers typically grow cash crops (coconut, abaca, bananas, sugarcane, etc) in addition to subsistence crops and are generally integrated in rural economic trading. Income of households in coastal and island barangays rely on seasonal fishing and farming activities.

TABLE 1. Various Livelihood and Income Sources in Rural Economy

Livelihood/ Income Source	*Description*
Crop Production	☑ Subsistence crop production predominates in upland localities (rice, corn, tubers, vegetables, fruit bearing trees)
	☑ Cash crop production (coconut, bananas, coffee) is small-scale, in backyards or swidden farms
Livestock Production	☑ Backyard livestock raising for food and cash
Fishing	☑ Mostly open sea fishing using small fishing vessels; seasonal and subject to unpredictable weather patterns
Entrepreneural Activities	☑ Small vending and trading activities
	☑ Small businesses at the municipal center
Salaries and Wages	☑ Regular employment as teachers and as employees in the municipal offices
	☑ Wage earners in farms (paid farm work) and construction jobs during off-farming seasons
Remittances	☑ Remittances from OCW relatives

Source: Market Assessment for Rural Electrification, MADECOR, January 2001.

[3] *The Phil. Poverty Statistics Data (NCSB, 2000), indicate that per capita threshold amounts to P 10,178 per annum. The household size for the sample is about 5 members. This would make the poverty threshold for the sample population in the survey, to about P55,470, "Market Assessment for Rural Electrification", p. 3-5.*

(c) ***Income segmentation***. The population in off-grid areas can be generally divided into three economic segments, following the poverty classification scheme presented in the DOE-WB Resource Study (January 2001).[4] These are:

① the lowest income group or the poorest (below PHP 30,000 per annum);
② the middle income group or the poor (between PHP 30,000 to PHP 45,000); and
③ the higher income group or the less poor (above PHP 45,000).

Statistical survey distributes them at 50%, 30% and 20%, respectively.

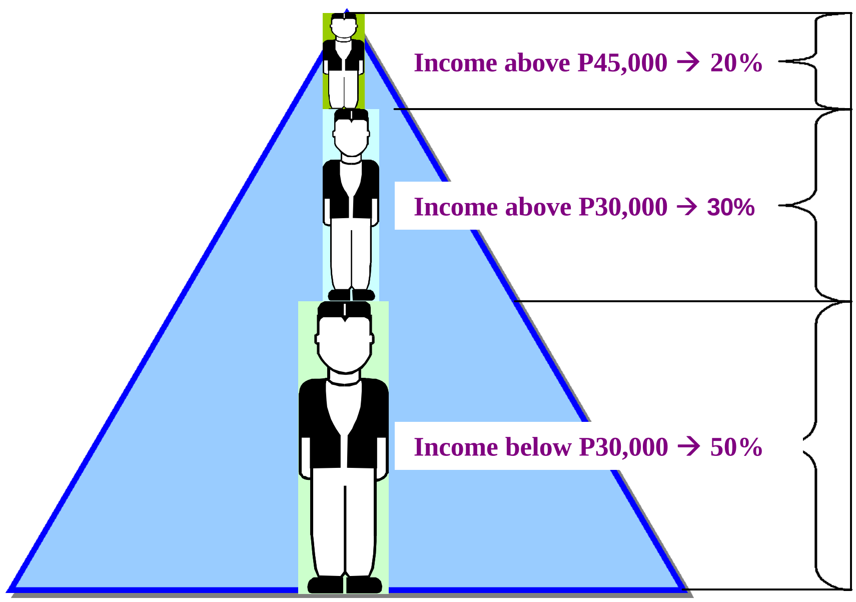

FIGURE 1. **Income Segmentation in Off-Grid Areas**

[4] *Based on the classification indicated by The Phil. Poverty Statistics Data (NCSB, 2000).*

(d) ***Correlation of poverty and unelectrified condition.*** While these three (3) economic segments are found in all unelectrified areas, statistics yield that the lowest income group (or poorest) has the highest densities where there are the most number of electrified households, i.e., in regions V, VI, VIII and VIII.

Further, average incomes of households in these regions categorize their barangays within the poorest and poor barangay categories, confirming that there is indeed the greatest concentration of households here below the poverty level.

Majority of farmers in the poorest and poor segments have little or no land to till, and mostly rely on rain fed agriculture. There is food and cash deficit among the poorest and the poor segments, as well as debt-ridden conditions. This is generally due to low yields, low value of crops sold to traders, and the debt pattern that is hooked to the farmer-middlemen tradition in rural economy.

(e) ***Generally strained spending***. Household spending patterns show a scrimping for basic food items and production activities, and only about 5.8% to energy (fuel for lighting) expenditures.

(f) ***Comparatively low effective demand for energy***. There is also generally found a much lower effective demand density in these areas (typically below 16 kWh per connection per month), or less than 1 kWh per day, compared to the considered commercially viable rural load density of ______ kWh.

3. What then is the market for off-grid electric service, and what are the qualities of this market?

(a) ***Development imperative exists***. There is need or potential demand for energy in off-grid areas by virtue of obtaining conditions of rural underdevelopment and resulting poverty. The highest densities of unelectrified households are found in the poorest and poor barangays (V, VI, VII and VIII).

(b) ***Service and not mere technology as critical measure of energification***. *These areas need to be served – but on a meaning beyond technology… What matters most is the need that the poor communities have for energy. Hence it is not so much the reliability of the technology option, but the ability of the energy technology to provide sufficient energy in the right place and in the right time to achieve the required quality of output. Hence, the targets for energy planning are not structured in terms of kilowatt-hours supplied, or number of houses with the technology installed, but in terms of the service provided.* [5]

(c) There are ***two (2) types of energy demand*** that should be recognized.

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[5] *Rural Energy Services, a Handbook for Sustainable Energy development, p. 5.*

(i) The *effective energy demand* is indicated by figures on mean annual consumption of fuel per household in off-grid areas. Findings on a sampling of off-grid communities and households, reveal that the consumption varies according to income level; the less poor consume the most amount of fuel and avail services of gensets and battery charging stations among income groups.

TABLE 2. Expenditures for Fuel – for a Sampling of Barangays

Type of fuel	Income Classification		
	Poorest	Poor	Less Poor
Kerosene, liter	51.0	64.2	74.5
Charcoal, kg	42.1	63.0	61.7
Power generator, kWh (subscribers)	63.7	58.3	64.8
Power generator, kWh (operators)	5195.5	4512.0	5157.3
Grid electricity	329.9	648.7	650.5
Car battery, kWh	4.7	11.2	6.9

Source: Market Assessment for Rural Electrification, MADECOR, January 2001.

(ii) The *potential demand*, meanwhile, are far greater than what consumption figures reveal. They can be broken down into several socio-economic sectors: household, livelihood (subsistence and cash farming, agriculture, livestock), industry, commerce, transportation and services such as schools and health clinics. These needs vary between different social groups and between locations. *There is a need thus, to closely determine energy service needs, how energy is to be used, and in what technology and socio-economic conditions the services will be required.*

(d) ***Effective and potential demands indicate the immediate and long-term targets of energy service provision***. Hence while current demand or consumption density may be low, the potential demand can become relatively higher (borne out of aspirations to improve and develop socio-economically) and can be generated or spurred by developmental factors that include appropriate energy services. *The potential demand can be best determined by participative processes that involve the target community*.

(e) ***Indicative capacity to pay***. The amount a household spends for energy or fuel is indicative or a benchmark of a household's capacity to pay or CTP in order to shift to a new energy service.

TABLE 3. Expenses for Fuel Across Income Segments for a Sampling of Barangays

Type of fuel	Income Classification		
	Poorest	Poor	Less Poor
Kerosene	54.35	65.20	78.71
Dry cell battery	49.17	67.59	62.48
Candles	17.98	14.09	28.32
Charcoal	2.70	4.22	8.64

LPG	115.00	207.50	24.00
Car (storage) battery	83.78	97.89	106.27
Power generator (subscribers)	74.70	111.99	149.68
Power generator (operators)	3,114.03	2,691.00	3,298.26
NRE	82.50	0.00	40.00
Grid electricity	109.62	180.08	185.13
Others (diesel)	76.12	38.36	36.38
TOTAL MONTHLY EXPENDITURE	149.55	285.00	647.88

Source: Market Assessment for Rural Electrification, MADECOR, January 2001.

(i) *Monthly averages using traditional energy sources*. The DOE-WB Resource Study indicates from findings, that the total monthly expenditures on fuel averages at about P180/month. The poorest group spends P150/month, the poor income groups spends P285/month, and the less poor group spends P650/month, on the average.[6]

(ii) *Varied capacities to shift to new energy sources*. Findings reveal that the monthly fuel expenditure is dictated by the income of the households. Often a change in energy source will involve an investment by the user, which may either be within or beyond the means of the user, and in the latter's case may place a substantial strain on the user's income.

- ☑ There is found a level of *capacity to pay, though varied, most especially in the middle (poor) and higher (less poor) income market segments*.

- ☑ There is found a more strained capacity to pay in the poorest segment (i.e., there is constant competing between spending for food and others), especially in areas where there are months of privation and hunger due to severely inadequate food produce. *Here, innovative approaches to providing affordable energy services may have to be sought.*

(f) ***Willingness to pay***. There is willingness to pay (same or lower amount than what is currently being spent for the fuel), or basically as long as products/systems are affordable for the households. Findings from sampling of households in the DOE-WB Resource Profiling, reveal that the less poor (higher income segment), comprising 22% of respondents, are expressly willing to pay above their average capacity to pay for fuels.

(g) ***The CTP and the WTP of higher (poor and less poor) income segments reveal their potential to shoulder part to full costs of systems.*** For instance, the higher

[6] *Market Assessment for Rural Electrification, p. 5-19.*

income groups in regions IV, V and VIII have more than P 1,000 monthly expenditures for lighting, or they can afford to pay for electric services when electricity becomes available. A sampling of off-grid barangays in high un-energized density regions reveal the following:

TABLE 4. CTP and WTP in Poorest Regions

Region	*Poorest*		*Poor*		*Less Poor*	
	CTP	*WTP*	*CTP*	*WTP*	*CTP*	*WTP*
V	201.45	116.13	590.87	257.17	1,950.14	611.47
VI	133.95	98.60	202.48	176.43	300.19	270.07
VII	120.21	65.94	117.19	121.85	219.80	130.60
VIII	145.20	102.23	473.08	234.43	1,039.57	303.09
IX	83.88	56.76	90.71	53.74	96.70	67.90
XII	137.43	124.43	247.84	169.26	230.91	197.61

Source: Market Assessment for Rural Electrification

(h) ***Capacity to render labor and material equity***. There is also found a capacity by all segments of the population to render non-cash (labor and available material) contributions.

4. How do traditional fuel costs in unserved areas compare with some NRE-based services? Or, are NRE-based services affordable to the rural poor?

(a) Current figures on costs of some RE-based services can be compared with those of traditional energy sources in off-grid areas. These can be correlated with paying capacities (from household energy expenditures) mentioned in the previous sections, to show:

(i) PV-based home lighting services appear to be within capacity of the middle and higher income segments;
(ii) MHP-based services (monthly service fee) appear to come within paying capacity of the poorest income segment.

TABLE 5. Monthly Fuel Expenses and Cost of NRE-based Services for Lighting (PHP)

Conventional Energy	☑ 150.00 (average monthly expenses by poorest segment) ☑ 285.00 (average monthly expenses by poor segment) ☑ 650.00 (average monthly expenses by less poor segment)
MHP	☑ 30.00 to 85.00 (for household electrification tariff only)
PV	☑ 200.00 (monthly amortization with dealers)

5. What are the current and tested private sector-led delivery mechanisms for NRE?

(a) ***Direct sale***. Several private entrepreneurial firms (that could be supplier-determined franchises or simply independent businesses) are active in the ***direct sale*** or dealership of NRE systems, which they basically sell on credit and are paid in installments over a defined period, with the appropriate interest tacked on the original cost.

(b) ***Provision of Energy Service for a fee***. A new approach to get private sector investment into rural electrification is the fee-based approach by a renewable energy service company or **RESCO** – which may be either a registered corporation or a local non-corporate entity wishing to engage in the provision of a service for rural electrification. i.e., lighting and electric power, using alternative energy sources.

Unlike the conventional power utility which sells kilowatt-hours, a professional RESCO provides a fee-based service. The RESCO thus owns the system and provides energy services (maybe called energy service units) such as lighting and powering small appliances, sized according to the needs of the household and community, for a fixed prepaid fee.

(c) The ***community-based approach*** is initiated by the potential users themselves, or by NGOs that relate with communities. Often with the help of a service provider, the communities plan and develop the project, install the infrastructure, formulate the policies, thus eventually owning and self-sustaining the project. The household pays a monthly service fee to their local organization which manages the project through delegated authority.

6. Owing to the generally poor conditions in off-grid areas, what approach shall suit a given market segment?

(a) The private dealer is presently developing its market niche among the higher income section of the barangay. *The buyers show a relatively adequate CTP and a high WTP*.

(b) A RESCO or a private dealer may have the capital and the technology to go to all segments, but the market characteristics will urge the RESCO to study its *preferences for the less poor (higher income) and poor (middle income) segments with desirable CTP and WTP.*

(c) The community-based approach meanwhile is better suited to meeting the development needs of the poor and poorest income segments with *very low CTP and WTP*.

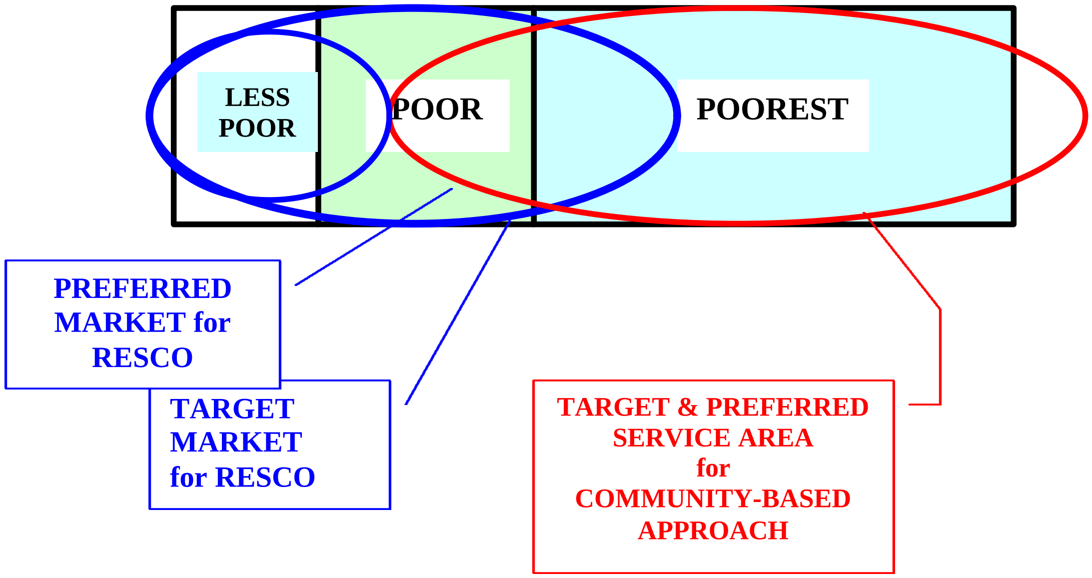

FIGURE 2. Target and Preferred Markets for RESCO and Community-based Delivery Mechanisms

TABLE 6. Market Segment Matches for Delivery Mechanisms

Less Poor (<20%)	*Poor (>30%)*	*Poorest (>50%)*
Relatively high WTP and CTP	Lower WTP and CTP	Very low CTP and WTP
Private Dealer (dealership/leasing)/ Professional RESCO (fee for service)	Private Dealer (dealership or leasing)/ Professional RESCO (fee for service)/ Community RESCO (fee for service)	Community -based (fee for service)
Full loan financing	Loan financing w/ some partial subsidy & w/ local equity or counterpart	Soft loan w/ bigger partial subsidy & w/ local equity or counterpart

7. What are good examples of a good segment-mechanism match in NRE development?

(a) *Private Dealership:* Solar Electric Company, for example, has been selling solar PV systems for over 20 years, and now includes windpower systems. *The company targets the more affluent members of the communities it serves.*

(b) *Fee-based professional RESCO*:

(i) Shell Renewables-CPC is currently in a demonstration phase of its RESCO in Aklan Province, and targets concentrations of accessible and unelectrified communities with high growth potential, and with homes and businesses willing and able to pay market rates for energy. These communities would easily fall *above the poorest barangays* in Aklan Province.

(ii) SOLUZ Inc. is a business and technology development company, which operates as a RESCO in Latin America. SOLUZ provides "wireless power on demand" by means of solar PV rentals and fee-for-service. *It targets the upper half of the population of rural households and micro-enterprises*. Its business model uses existing outlets such as local stores, as collection agents. SOLUZ also offers expanded service through common public facilities.

(c) Community-based: Ngibat is a very poor upland community in the highlands of Kalinga Province in northern Philippines. There is little cash source here, except for some vegetable sold to the main town center of Tinglayan, and occasional sale of tools manually fabricated by the barangay's traditional blacksmiths. Its 5-kW MHP was installed through a local PO (Ngibat Farmers' Association), local and national NGOs (MRDC and SIBAT respectively) in 1995. It operates up to the present through NFA management. Monthly tariff paid for service is PHP 30.00.

8. What is the policy framework for private sector participation in NRE market development?

(a) The government policy framework is based on the premise that the *market for private sector participation exists*, given the specific market characteristics of the rural poor consumers that populate off-grid areas. Said characteristics make it imperative to designate a map for private sector operation.

(b) *The overall market framework of rural electrification realizes that commercial viability is directly proportional to the rural population's capacity to pay, and the role of public support similarly increases proportionately to the degree of poverty condition that obtains.*

(c) Government policy encourages *innovations*, as it presents preferred areas of operation for each delivery mechanism. It supports these mechanisms to enable them to reach the widest off-grid target for rural electrification.

(d) Government policy also recognizes that, by virtue of the nature of the off-grid electrification market – *leveraging, buy-downs and "smart subsidies" become necessary for market tools to operate*. Market segmentation herewith serves as a socio-economic guidebook of market application.

9. How can the off-grid market be further delineated to suit private sector delivery mechanisms?

The off-grid electrification target can be subdivided into two: the areas for commercial operation and the basic service areas.

(a) ***Areas for commercial operation*** are immediately found within economic segments of the rural poor that possess the relative capacity to pay. RESCO-based operations are encouraged here.

(i) *The exclusive concession area.* Exclusive concession areas are areas granted with exclusive rights to a professional RESCO to deliver service for a given period of time. Because of the nature of the off-grid market, providing concessional rights is expected to stimulate RESCO interest in making entry into the rural electrification market.

The concessional terms serve to minimize RESCO potential market risk by some government fund leveraging and buy-down through subsidies, on a viably sized contiguous target market where EC concurrence and LGU support have been secured. The larger committed size of operations and number of target beneficiaries would merit, from government, a specific package of assistance to qualified project developers. Here, a bidding process will suitably identify the qualified or best bids.

(ii) *The non-exclusive service areas.* Areas outside declared concession areas are free entry areas for dealers, RESCO and community-based initiatives. They may be allowed entry where a waiver from or innovative transaction with the EC can be secured.

(b) ***Basic service areas*** are where the poorest barangays are found. These areas consist the bulk of the off-grid market. They cannot be rigidly treated as targets for commercial operation – but do require amounts of public support and developmental intervention by community-based organizations or CBOs. It is expected that energy demand density and capacity to pay will be lowest in these areas (penetration rate below 20%); households are rendered incapable to pay beyond a low CTP benchmark by comparatively harsh economic conditions.

These, therefore, are easily the target and preferred service areas for community-based delivery mechanism, being veritably risk areas for initial operations by a RESCO.

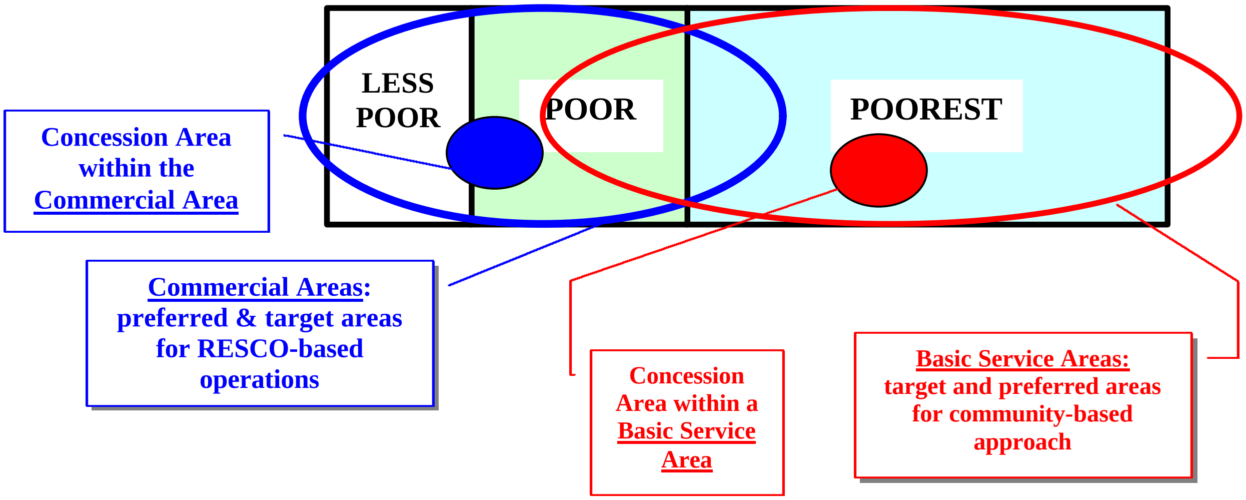

Figure 3. *Commercial and Basic Service Areas*

10. What are the important considerations for making a NRE market transaction in off-grid areas?

(a) There should be *affordability* to users or consumers (in all economic segments but most especially from the poorest segments);

(b) There should be *quality and dependability* of NRE systems over the long-term. There should thus be consumer protection concretized in the transaction (e.g., guarantees, after-sales service).

(c) There should be a long-term prospect for the *sustainability* of the market. All transactions or programs should aim for financial sustainability, capital recovery, debt service, operational margins and an adequate return, to be able to sustain viable operations.

(d) There should be *cost-effectiveness*, where real benefit by user can be derived from the investment. Because off-grid areas are generally poor areas, the energy system should be an enabler or a tool for developing socio-economic capacities, and not as an additional burden or liability to the rural poor.

(e) There should be local stakeholders' *participation* (by all consumers, including those in private RESCO transaction). For community-based projects, the participation and inclusion of intended beneficiaries in the process gives them a stake and a sense of ownership of a NRE project. In all cases, local stakeholder participation factors into the sustainability of the system.

Chapter 3.
Briefing Kit for the
RESCO-BASED DELIVERY MECHANISM

1. What is a RESCO-based delivery mechanism?

Most simply stated, it is basically the provision of NRE-based energy services for an agreed fee-for-service -- by an *external* agent or company that owns, operates, and maintains the system.

2. What is a Renewable Energy Service Company?

A potential professional RESCO may be a corporate entity wishing to engage in the provision of energy service for rural electrification using NRE-based sources[7]. It is a registered corporation, Filipino or foreign, willing to invest and make viable commercial operation in the rural electrification market.

3. What are the basic features of a RESCO-based delivery mechanism?

(a) ***Fee-for-service***. A RESCO (whether corporate or non-corporate) basically intends to make private investments in energy supply systems. Unlike, however, the conventional power utility which sells kilowatt-hours on a price-regulated basis, a RESCO provides a fee-based service at a mutually agreed-to rate. It typically consists of providing a system (maybe called an energy service unit) that provides lights and a few electric convenience outlets, sized according to the needs of the household and community, for a fixed prepaid fee.

(b) ***Private Ownership***. The RESCO owns, operates and maintains the systems, effectively taking away the technology and capital risk from consumers. The RESCO may share and ultimately transfer ownership to a partner EC, community organization or NGO service provider, as warranted by circumstances.

[7] *NRE-based sources may imply pure or a mix of NRE and conventional sources with NRE as main component in the mix.*

4. What are the features and requirements for viable business by a professional RESCO?

(a) *Area of operation.* RESCOS require a sizeable area to operate. They do not necessarily operate in a protected franchise area, as do electric cooperatives or independently owned utilities, but providing a franchise area can encourage the establishment of a RESCO. RESCOs would best operate with and thus require the agreement or concurrence of a host utility, which has the legal right and obligation to serve the area. RESCOs could even strike a joint venture arrangement with an EC, or an EC may grant a sub-concession to a RESCO.

(b) *Non-exclusivity.* RESCOs must welcome competitive and joint venture operations in its area with other service providers and delivery mechanisms.

(c) *Need-driven services*. A RESCO should base its energy services plan on a good assessment of the current and potential needs of the community. A participative involvement of the community is required.

(d) *Varied or multi-disciplinary capabilities.* To be successful, a RESCO must have multidisciplinary capabilities in technology, finance, project development and community participation. RESCOs need to get the ground experience in project development and implementation in the target locality, in order for the RESCOs to find the appropriate modalities for the particular areas they wish to serve. An example is the pilot/demonstration of the IRES model of the Shell Renewable-CPC RESCO in Aklan Province.

(c) *Criteria for viable investment must be present*. The target area must provide adequate bases for a good return of investment, such as:

- ☑ sizeable concentration of un-energized communities to realize a high load density and demand growth potential;
- ☑ high value-added productive uses that can be exploited locally through the application of electrical and/or thermal energy;
- ☑ locally available and sustainable sources of renewable energy;
- ☑ adequate number of homes and enterprises willing and able to pay market rates for energy (high market penetrability); and,
- ☑ with EC and LGU concurrence and support

(d) *Quality service*. A RESCO must provide services that are of better quality than what people currently use (i.e., cleaner, safer, healthier, more convenient, available 24 hours a day, and reliable).

(e) *Appropriate technologies*. A RESCO must provide systems that: are properly sized (neither undersized or oversized) to meet the households' needs, and capacity to pay and operate the system; are environment friendly; will ease the energy-related burden from vulnerable sectors; and will genuinely incur savings and economic benefits.

In many instances, the local community will have little knowledge of NRE systems. An information-education activity must be conducted to prepare the community and address potential concerns.

(f) *Reasonable fee-for-service*. A RESCO should charge a fee based on the level of customers' willingness and capacity to pay (i.e., affordability).

(g) *Good relations with the communities*. A RESCO should develop and maintain mutual trust and good relation with the community.

(h) *Support the improvement of rural economy*. A RESCO must support productive opportunities to improve the economy using the energy services it can provide.

The provision of the service must enable the community to increase both income and standards of living. Without the link to income generation or productivity, an energy service becomes another strain in rural resources.

An astute project developer will look for ways to provide needed additional services (expressed by the community) that will bring additional revenues, such as a mobile telephone service which will allow the village to get in touch with their relatives working abroad, or an ice-making facility for a fishing village.

(i) *Service terms with customers*. A RESCO must allow easy termination of services one's customers' expectations are not met.

5. What is a fee-for-service?

(a) The cornerstone of a RESCO model is said to be the fee-for-service. It is a market-derived fee set by the buyer (customer's desire and affordability) and seller (adequate return of investment to sustain the business). The fee-for-service means that the RESCO owns and operates the power-producing equipment and provides electrical and thermal energy for the services that people need. The model was developed in the Dominican Republic in the early 1980's and applied initially to solar home systems. Families that could not afford to buy a solar system for cash were given the opportunity to pay a small amount each week to receive enough energy to light their homes and run a radio and TV for several hours a day.

(b) An example is the fee-for-service scheme by Shell Renewables, Inc.

(i) The Service Unit is defined as the energy required to operate a 10W fluorescent light for one hour. The people will purchase energy services based on a number of units (or hours) they wish to use the light (or appliance) and not on the number of kWh.

(ii) A comparison of fees-for-service paid to RESCO and the (for the minimum 10 SUs and maximum 50 SUs allowed) previous conventional sources, showing marked savings, is shown as follows:

TABLE 7. Comparison of Service Fees

RESCO/System	10 SU	50 SU
SR-CPC RESCO	P 59/week	P 163/week
Conventional battery charging (diesel)	P 99/week	
650W genset		P 300/week

(iii) The RESCO also uses a prepaid meter system. A special prepaid meter is installed in the customer's premises to record the consumption of "service units". Each service unit is roughly equal to 10 kilowatt-hours (kWh). The customer will specify his daily consumption every week and will pay the weekly fee to the RESCO which assigns a technician to program the meter weekly. The meter will limit energy use to the daily-programmed consumption level. If the customer wants to exceed his daily consumption, he can ask the technician to reprogram the meter for that day. In doing so, he will be charged a reprogramming fee. The customer forfeits unconsumed service units on a daily basis.

The above system encourages customers to manage their consumption and to convey their expected energy usage to the utility in advance. This system appears to be fair and appropriate for the NRE system being employed.

6. What are the viable features of a specific NRE market investment package for an exclusive RESCO concession area?

(a) A *municipal market package* is located in a region with one of the highest numbers of un-energized barangays ranging from 10 to about 30. Market characteristics should further show:

(i) a high level of demand (number of households in the un-energized barangays);
(ii) some clustering density and contiguousness of barangays;
(iii) high load density and demand growth;
(iv) market penetrability (WTP and CTP) at 35% where CTP is indicated by household energy expenditure and level of income;
(v) maximum support by LGU and financial capacity by municipality; and,
(vi) waiver of EC franchise right/s.

7. What is an example of a corporate RESCO investment?

The Shell Renewable-CPC RESCO in Aklan Province

Shell Renewable-CPC established a RESCO pilot/demonstration project in Aklan Province in 1999. Aklan as seen as an ideal location for introducing the IRES (Integrated Renewable Energy Service Model) for rural electrification, intended to support the socio-economic development of rural target communities. This model combines a number of renewable energy-based technologies to provide services to the maximum number of customers in the target region. It delivers a combination of AC and DC electricity and thermal energy, through stand-alone and central power systems that are carefully sized to meet the social and economic energy demands of rural enterprises, communities and even scattered homes of customers.

Its primary objective is to demonstrate how the maximum number of unelectrified customers in a target area can be served in the most economical manner using the most appropriate RE-based power systems. It aims to demonstrate that even without reliance on government subsidies and the like, the business will be able to sustain itself, on a commercial basis using private investment capital. The IRES model is a market-driven approach, i.e., the energy service must be delivered at a cost that is affordable to the customers and also provide enough revenues to provide an acceptable financial return to the investors.

SR-CPC owns, operates and maintains the systems and provides energy on a fee-for-service basis.

The RESCO is in its phase 2 of demonstration, past the initial phase of setting up the business requirements, and initial operation for the first set of customers for the PV/LPG hybrid (15 kWe), the 40W SHS, and the AC energy dispenser.

It launched the demonstration project in the municipality of Madlag, Aklan Province. Madlag has 21 unelectrified barangays with 2,121 households.

The technologies provided included a 15 to 25 kW small modular bio-power (SMB) system to operate a small coconut oil mill in the barangay of Alaminos, which is the center of coconut production in the municipality. Through such, coconut farmers are expected to receive a much higher value of their coconut harvest (rather than sell raw copra to traders).

The project enjoys the support of the governor, the mayor of Madlag, the Phil. Coconut Authority, and the coconut farmers and cooperatives.

8. Given the capital, technology and benign/supportive policy environment, what are the other critical success factors for a corporate RESCO investment?

(a) Good feasibility study. An NRE investment is just like any other investment. The investor has to have the proper feasibility study which will establish the technical, market and financial viability of the project.

(b) *Resilience and determination.* The project team must have the capability and experience to implement the project. They must have the commitment to nurture the project through inevitable difficulties and stay on for the duration of project life. One can have a checklist of success factors but the fundamentals of viable project and capable project team still apply and will dominate any other consideration.

(c) *Flexibility and innovativeness.* A capable project team will be able to structure the project to manage risks and maximize benefits from whatever incentives are available. It can identify the need for project changes and fine-tuning and execute the corrections in timely fashion. The project team can gain the support of stakeholders and avoid confrontation and deadlocks.

9. What are the risk factors for a corporate RESCO investment?

(a) Among the significant risks a RESCO faces are: long term payback, currency exchange risks, logistics of operating in isolated areas, uncertainty of when the EC decides to extend the grid to the barangays.

(b) The biggest risk for a RESCO, certainly, is the failure to collect from the target market, probably due to customer income fluctuation based on commodity price changes. But this can be avoided by a good market characterization and projections.

(c) Serving the low-income bracket is always a challenge and there are no failsafe methodologies. A true market will have successes and failures, and a good investor has the ability to recoil and learn the lessons from failures – within a reasonable degree of assurance that investments and earnings can be recovered.

Chapter 4.
Briefing Kit for the
COMMUNITY-BASED DELIVERY MECHANISM

1. What is a community-based delivery mechanism?

(a) The ***community-based delivery mechanism*** is one that is developed *endogenously*, or by the community or the consumer group itself (under the leadership of its organization or representatives). The NGO service providers that provide project support become part of the endogenous process.

(b) Hence, it is the community or the consumer group itself, through its organization that builds, operates, maintains and owns the system.

2. What is a community-based RE system (CBRES) and what are its basic features?

(a) ***Self-development***. It is a system that was built through collective efforts of the proponent community and NGO service providers.

(i) The proponent community may be a primary local association (farmers, tribal, cooperative, church-based, project-based), with a track record in community mobilization and organization; and,

(ii) The NGO service provider may be a local or national support (or secondary and intermediary type of) organization, with track record in rural community support work in various fields (economic, social services, technical).

(c) ***Self-governance***. It is a system where policies are developed and enforced by the proponent community itself (led by its organization). Said policies include those that govern the usage of energy, fees and tariff structure, usage of and benefit from earnings, operation of the system, and development of applications.

(d) ***Self-management***. It is a system where management resides on the proponent community (through its organization). A committee may be appointed by the organization to manage the energy project through delegated authority. Further on, the specific project structure may evolve into a local energy cooperative.

3. Where are some of these found?

There are specific systems that have been largely developed as CBRES.

(a) ***Community-based MHP systems*** comprise around 66 in the country today, with the majority having a capacity less than 50 kW each. These systems have been generating an aggregate of less than 200 kW nationwide benefiting 6,000 households in about 40 barangays. The potential capacity however can reach up to 28 MW.

(b) There are at least 128 ***PVP community-managed systems*** installed for water pumping with an aggregate capacity of about 187 kWp. They provide the least site-specific power alternative for remote, small island communities and hinterlands.

4. For what rural income segments have these projects been served?

(a) Community-based projects have been installed in communities belonging to 4th and 6th class municipalities, in generally upland sites of varied agro-economic typologies. These projects have been made as 'forward links' of development projects undertaken by civil society organizations in rural communities.

(b) These communities and households belong to 50% of some 1.76 million households found in off-grid communities – categorized as 'poorest of the poor'. These are largely found in *basic service areas*.

5. What have been some observed outcomes or benefits for communities by NRE projects?

(a) The decrease if not complete replacement of traditional kerosene wicklamps, pith wood (in many mountainous areas), and batteries and genset use – by NRE-powered systems;
(b) The decrease if not complete elimination of manual rice pounding with the use of the NRE-powered mechanized rice mill;
(c) The shifting from manual bench tools to power tools; and
(d) The creation of ***new livelihood opportunities***. These include:

- (i) The provision of electricity improves household and street lighting, better access to news and information, and lighted condition for nighttime work and study;
- (ii) Cash savings with the shift to NRE-powered processing;
- (iii) Productive applications for some NRE (e.g., MHD) have resulted in: time saved for increased time for farm work or for other income generation work, and some relief from manual work traditionally undertaken by women and children;

(iv) Farm tool production from blacksmithing had registered impact in increase in crop production.

6. How are community needs (scope and sizing) met by CBRES?

(a) ***Scope of electrification***. CBRES targets and achieves 100% electrification owing to the community-based character and processes.

(b) ***Systems sizing***. For NRE community projects, sizing is determined both by needs and resource capacity. Decentralized systems can be designed to meet requirements of small to medium population sizes and dispersed rural settlement patterns.

7. What have been some effects of NRE on environmental well-being of rural communities/households and their resources?

(a) Localized environmental pollution is removed in all NRE systems.
(b) Watershed management is being fulfilled as a requirement for sustaining operation for MHDs (ensuring water supply) and is therefore a crucial contribution to forest regeneration in upland areas.
(c) Waste management through biogas affords cleaner living condition for the livestock grower and neighborhood surroundings, and saves the air, ground and water channels from pollution and contamination.
(d) The energy capacity provided by NRES is equivalent to amounts of CO_2 and methane emissions avoided.[8]

8. How are these systems financed and paid for?

(a) A ***mix of funds*** has generally supported the establishment of these systems.

(i) Grants from donor agencies to fund the systems cost;
(ii) Local counterpart contribution amounting to about 20 to 25% of the total cost;
(iii) Soft loan secured from a revolving fund of the NGOs; and,
(iv) Some contribution from the LGU (e.g., for civil works).

(b) ***Monthly service fee*** is collected from the household to pay for the service, enough to cover maintenance costs, parts replacement (sink-in) costs, and savings for community development projects.

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[8] *If we assume 10 kW capacity (produced by required amount of diesel in a generator operating for 6 hours), 15.65 kg. Of CO2 is avoided.*

9. Are these systems affordable to the rural poorest?

(a) What is the ***service fee*** for a community-based energy system?

The household pays a monthly service fee for energy usage based on a *fixed capacity basis* (capacity-based tariff), where the consumer is charged a fixed monthly fee (according to the agreed load limit) irrespective of the total amount of energy consumed; or a *usage capacity basis* (which can be determined by pre-payment metering). Current load limiters or 'load economy devices'[9] are helpful devices in preventing over-usage.

(b) What is the community's ***capacity and willingness to pay*** the service fee?

(i) *Threshold capacity to pay* CTP can be indicated by the household monthly cash income and annual income pattern, the monthly expenses for energy and fuel use pattern, and the debt cycle or pattern. These data are gathered by household socio-economic survey and are validated with the members of the community through consultation process.

(ii) *Willingness to pay (WTP)* is normally processed by the community organization among its members.

10. What is the framework of revenue generation in CBRES?

(a) ***Project financial design*** incorporates: generation of revenues for operating and maintaining the system, generation of savings for sink-in funds (replacement of main system components), and generation of funds for community-based production, services and enterprise projects. It is from the socio-economic projects where household savings and real income will be derived.

(b) ***Net Revenues.*** For a community-based project, any income is re-invested income – plowed back into the development work or projects of the community and its organizational needs. Household revenue through dividends may also be an innovation. Unlike with private profit-making business entities, revenues (excess of income over expenditure) are not distributed for private gain, but for developmental purposes.

11. How does a CBRES achieve a least cost option?

(a) ***Local resources and counterpart***. In a CBRES, projects development costs are entailed on the following items, with some reductions due to availability of local resources and local counterpart contributions (i.e., local equity):

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[9] *A device which automatically discontinues supply once the current is exceeded, i.e., overload, which may be reset manually, or automatically resets when overload is removed.*

(i) Social preparation costs (reduced where local resources can be used);
(ii) Feasibility study preparation costs (reduced by local mobilization and counterpart);
(iii) Material and hauling costs (reduced where there are local resources available);
(iv) Technical supervision costs (reduced by local mobilization and counterpart, e.g., food and accommodation);

(b) ***Some costs excluded.*** In a CBRES, some conventional market costs may <u>not</u> be necessary (e.g., market entry costs).

(c) ***Locally fabricated equipment***. In specific CBRES, local fabrication substantially lowers equipment upfront costs (e.g., MHP).

12. How does a CBRES achieve financial and system sustainability?

(a) ***System sustainability*** is achieved through effective management of the system's operation and maintenance, and adequate savings to replace main parts or components of the system.
(b) ***Financial sustainability*** is achieved through efficient collection of service fees, and productive applications that generate concrete benefits to the community and households. Effective overall management that will ensure smooth and continuous operations is key to realizing financial sustainability.

13. Knowing the 'poorest of the poor' context of community-based projects, what is the most important thing to consider in designing financing schemes for communities?

The designing of financing schemes for poor communities must be ***process intensive***. The community must be informed of and consulted on the proposed scheme and the community's responsibilities; their agreement is required before any official transaction is initiated.

14. What are the critical requirements and processes in developing a community-based project?

(a) ***Basic requirements***. The initial requisites for a CBRES include: a validated request by the community that indicates the demand for the energy project; the presence of an organization; availability of adequate resource/s; and technical viability of an option. Said information are established through a pre-feasibility study.

(b) ***Organizational requirement***. The CBRES project requires an organization with acceptable organizational and project track record.

(c) ***Participatory process***. Community consultation is a critical tool in initiating, implementing and sustaining a community-based project, i.e., in all project phases.

(d) ***Competent service provider***. There should be a trusted and competent service provider that could render the necessary full technological and other support assistance to the community.

(e) ***Project development process***. The development process should follow the standard flow of project preparation, implementation and post-project activities.

(i) *Project preparation* requires the development of a full feasibility study that will appraise and recommend on the financial, organizational, socio-economic components and technical design of a project.

(ii) *Project implementation* is done according to a work plan that includes all steps that lead to the project commissioning, and completion of all management capacity building activities.

(iii) *Post-implementation* activities include continuing capability building activities and monitoring.

15. What is an example of a successful community-based project?

NGIBAT is situated in the southernmost portion of Tinglayan municipality in the province of Kalinga, belonging to the Butbut Tribe of the Kalinga, one of the major ethnolinguistic groups in the Cordillera Administrative Region.

Ngibat was an unelectrified village, 60 kilometers far from the last grid point at Pinukpuk, Kalinga. Villagers traditionally used kerosene wicklamps and pine pithwood for lighting. On a monthly average, kerosene consumption varied from P30.00 toP 60.00 (during rainy months without pithwood).

Ngibat is a very poor village by NEDA classification. Terraced rice farming is the main economic activity for 32 households of Ngibat which experience lean months usually during March, April, May, June and November. To meet cash and food shortage, most men seek seasonal jobs such as farm labor or riprapping work in irrigation canals and roads.

Cash sources were selling crops like white beans are sold in Bontoc, Tinglayan and Tabuk markets, and selling farm implements produced from crude blacksmith shops (Ngibat villagers are skilled blacksmiths by tradition).

The project was conceptualized by the Ngibat Farmers Association (NFA) and a local NGO, the Montanosa Research and Development Center (MRDC), a member of the SIBAT network. SIBAT provided the feasibility study and design assistance to MRDC, in the utilization of the Sulong Creek.

The installation took more than 6 months and was completed in late 1993. The turbine was fabricated and installed by SIBAT-MRDC engineers, with a generated output of 5 kilowatts, adequate to meet total consumption of 558 kWh for domestic lighting and provision of single outlet per household.

The MHP capacity includes rice milling operating 6 hours a day and 8 days of operation each month on the average. Milling cost is P 7.00 per can, where operators collect P2 per can of milled rice. The village blacksmiths currently work at an average of 8 hours per day and at least 10 days a month, providing 492 kWh/month to an electric grinder, hand drill, drill press and portable grinder.

The project cost was at P 310,000.00, and was partially funded by MRDC through an interest-free loan of P190,000.00 payable within 5 years. P 130,000 was provided by MRDC as grant, while labor and some materials were provided by NFA as counterpart.

A monthly rate of P22 per household set by community consensus, was computed based on previous energy expenses. An additional of P5.00 per household is charged monthly for the maintenance of 15 lamp posts.

The MHP has since then operated with minimal technical problems during its lifetime.

Policies on power usage, optimization, project management were formulated by NFA and MRDC. NFA meetings and community consultations are conducted regularly to monitor the enforcement and effectiveness of these policies.

Overall management has been provided by the NFA; MRDC has provided trainings on management and SIBAT conduct necessary monitoring. NFA members were grouped into committees to oversee various management aspects of the project, including finance, electrification and projects.

Chapter 5.
NATIONAL SUPPORT FOR NRE MARKET DEVELOPMENT

1. What are the favorable legislation and programs for private sector operations for NRE-based off-grid electrification in the Philippines?

(a) The Philippine Energy Plan has conducted studies and made ***NRE demand and supply projections*** for the period until 2010[10], that provide favorable resource basis for developing the NRE sector. These demand and supply projections are derived to suit national economic growth targets by the Philippine government.

(b) One ***system-specific governing law***, i.e., the Mini-hydro Law, has already been put in place (RA7156: Mini-hydroelectric Power Incentives Act or the Mini-hydro Law which grants tax incentives to mini-hydro power developers, among others).

(c) The ***RE Bill*** which stipulates provision of incentives for NRE power producers, the establishment of a green pricing mechanism and NRE Trust Fund, among others, is pending action by the legislative body.

(d) ***Barrier removal programs*** through capacity building in the areas of have already been studied and are due for implementation:

(i) Capacity building of government agencies to formulate RE policies;
(ii) Information dissemination and public awareness building;
(iii) Institutional strengthening to increase coordination among organizations;
(iv) Development of market strategies for RE;
(v) Support program for RE development mechanisms;
(vi) Innovative financing schemes; and
(vii) Development of standards, specifications, testing and certification for the NRE industry in the Philippines.

(e) The generation of ***baseline information*** on socio-economic assessment and profiling are completed for a number of target barangays. Detailed resource assessment meanwhile has been completed for the biomass system, while inventory and assessment for hydro resources and site-specific wind measurements are being conducted.

[10] *At the current level, NRE contribution registers a 29.8% share in the national total energy mix. Biomass energy resources remain to be the largest contributor with 74.1 MMBFOE (.91%).*

(f) ***Supply and distribution supply network*** for PV and wind systems have already been locally established.

(g) There are ***NRE associations and network*** (led by the Renewable Energy Association of the Philippines and its four (4) associations, and the Renewable Energy Network) that could provide information, advisory and support assistance to projects.

2. What support can the LGU provide for NRE projects?

(a) The LGU should first and foremost serve as facilitator for the entry of private sector and civil society;
(b) The LGU can become part-owner of the system with the community;
(c) The LGU can become full owner of the system with the service provider leasing the assets or bid an operating contract;
(d) The LGU can share equity through its IRA;
(e) The LGU can become an on-lender of debt finance from the GFIs;
(f) The LGU can also own some of the assets, for example, the mini-grids that are leased to the private operator, with the latter operator owning the generation facilities.

3. What are the "smart" subsidies that can be availed through a competitive bidding process for market packages on exclusive concession areas?

"Smart subsidies" have been referred to as transparent, time-bound, selective and focused front-end assistance to encourage the RESCO to develop as a sustainable enterprise, and to help community-based proponents to minimize the financial limitations in rural electrification engagement, in terms of *minimizing the capacity gap* inherent with the poor proponent communities.

A one-time subsidy placed at the front-end is viable for NRE systems because these have no significant operating and maintenance costs once the systems are put in place. These may be incremental non-recurring business and market development costs (e.g., business planning, feasibility study, consumer awareness), or limited grants applied to buy down the high upfront costs of equipment, expand the market and reduce the cost of supply.

- END OF WRITE-UP -

Part 2. Private Sector Policy Paper

RESCO POLICY PAPER

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Chapter 1.
INTRODUCTION

Overall framework

Recent policy studies have successfully established the general characteristics of the off-grid electrification market. The information on the existing economic segmentation is most basic because it places all other information (e.g., capacity and willingness to pay, energy expenditures) in context. Such is further developed here, through a more specific matching between these economic segments and the proposed delivery mechanisms.

Hence it has been established that the private sector market for rural electrification exists, and is immediately found within the upper economic segments of the rural poor that possess the relative capacity to pay. Further, we need to resolutely establish that the poorest sectors could not be treated as areas of purely commercial opportunity, but rather as basic service areas that require amounts of public support – and developmental intervention by NGOs that fittingly address community interest and growth.

The overall market framework of rural electrification thus realizes that commercial viability is directly proportional to the rural population's capacity to pay (the costs of RE systems), and that the role of public support similarly increases proportionately to the degree of poverty condition that obtains. We propose that the basic strategy, especially for poorest areas, should be to implement an intermediation that will basically increase these communities' capacity to pay.

This reconciles with the proposal made by previous studies, making as necessary-- the use of leveraging, buy-downs and/or "smart subsidies" for all market segments – adjusting to capacity gaps that need to be filled. Such support is not meant to distort the market, but to address the imperfections or gaps that are inherent therein.

Private Sector Policy Paper. The stimulation of private sector entry into rural electrification, i.e., to engage in the provision of energy supply services to off-grid households and communities, is seen to need support via the construction of favorable 'market and policy instruments' exclusively or specific for RESCOs and civil society. These are enabling rather than regulatory mechanisms, allowing initiatives and innovations to flourish with fair amount of oversight.

The development of market packages for municipal 'concession areas' is a specific strategy to improve the market arena for the private sector. Many oversight functions contributed in this paper are thus related to developing this strategy (e.g., "smart' subsidies, fiscal incentives, minimum viable market size, pricing of RE-based services, and competitive tenders for private generation for decentralized power supply).

This Private Sector Policy Paper therefore, intends to help encourage a more dynamic entry and participation of the private sector in the rural off-grid scene, through specific measures.

RESCO Delivery Mechanism

Most simply stated, the RESCO delivery mechanism is basically the provision of NRE-based energy services for an agreed fee-for-service -- by an external agent or company that owns, operates, and maintains the system.

A potential professional RESCO may be a corporate entity wishing to engage in the provision of energy service for rural electrification using NRE-based sources. It is a registered corporation, Filipino or foreign, willing to invest and make viable commercial operation in the rural electrification market. The features of this delivery mechanism are:

(a) *Fee-for-service*. A professional RESCO basically intends to make private investments in energy supply systems. Unlike, however, the conventional power utility which sells kilowatt-hours on a price-regulated basis, a RESCO provides a fee-based service at a mutually agreed-to rate. It typically consists of providing a system (maybe called an energy service unit) that provides lights and a few electric convenience outlets, sized according to the needs of the household and community, for a fixed prepaid fee.

(b) *Private Ownership*. The RESCO owns, operates and maintains the systems, effectively taking away the technology and capital risk from consumers. The RESCO may share and ultimately transfer ownership to a partner EC, community organization or NGO service provider, as warranted by circumstances.

The Community-based Delivery Mechanism

The community-based delivery mechanism is one that is developed *endogenously*, or by the community or the consumer group itself (under the leadership of its organization or representatives). The NGO service providers that provide project support become part of the endogenous process. Hence, it is the community or the consumer group itself, through its organization that builds, operates, maintains and owns the system. Its has the following features:

(a) *Self-development*. It is a system that was built through collective efforts of the proponent community and NGO service providers. The proponent community may be a primary local association (farmers, tribal, cooperative, church-based, project-based), with a track record in community mobilization and organization. The NGO service provider may be a local or national support (or secondary and intermediary type of) organization, with track record in rural community support work in various fields (economic, social services, technical).

(b) *Self-governance and self-management*. It is a system where policies are developed and enforced by the proponent community itself (led by its organization). Said policies include those that govern the usage of energy, fees and tariff structure, usage of and benefit from earnings, operation of the system, and development of applications. It is a system where management resides on the proponent community (through its organization). A committee may be appointed by the organization to manage the energy project through delegated authority. Further on, the specific project structure may evolve into a local energy cooperative.

(c) *Plowed-back Net Revenues***.** For a community-based project, any income is re-invested income – plowed back into the development work or projects of the community and its organizational needs. Household revenue through dividends may also be an innovation. Unlike with private profit-making business entities, revenues (excess of income over expenditure) are not distributed for private gain, but for developmental purposes.

Chapter 2.
INSTITUTIONAL OVERSIGHT FOR PRIVATE SECTOR PARTICIPATION

2.1 Framework

Oversight of the private sector participation in providing direct energy services to off-grid communities, is herein placed by government in the context of creating an 'enabling environment' through proper complementation between functions of government and the private sector for energy supply delivery. The state as overall overseer and administrator of public good does primarily provide the 'enabling environment' through legislation, market and policy instruments -- or the rules of the game under which the private sector will complement the role of the state.

This 'enabling environment' includes the delineation or definition already done, of the off-grid market playing field for private sector entry, i.e., the areas for grid extension and for decentralized electrification.

The following may consist some of the oversight spheres for the private sector:

1. Competitive awarding of contracts for the supply of energy to particular areas, in order for government to fittingly oversee the planning process for market development;

2. Registration of RESCOs, and authorization to sell energy services on a market basis, to off-grid end users of decentralized electrification;

3. Establishing guidelines for setting service fee levels and a means to revise them over time (service fee revision);

4. Defining minimum standard levels of services, such as specific performance standards for the delivery of service (type, availability, reach, environmental quality), and revised safety standards for poorer sections of communities;

5. Monitoring the compliance by the private sector to meet consumer satisfaction;

6. Monitoring the compliance by the private sector pertaining to environmental impact; and,

7. Monitoring the observance by the private sector of local community (e.g., tribal, clan, farmer organization) regulations that govern issues on resources and energy.

3.1.1 Organizational Framework

The institutional oversight for private sector participation should possess, firstly, the mandate to implement the separate spheres of private sector oversight for off-grid delivery service. Hence, such could be an inter-agency body that could ably implement tasks at their level and coordinate policy development matters with the higher coordinating body (which chairs the inter-agency body). Standard management principles offer a clear delineation between policy and implementation roles.

Needless to say, the management style by such body should be predisposed to sweep and efficiency, its regulatory work imbued with receptiveness to new ideas and innovations. The professional competency and back-up staff should be multidisciplinary, with competencies in rural energy technology, energy planning and market development. It is even equally important for the regulatory body to have clear understanding of the socio-economic issues around rural electrification, and the peculiar characteristics of the off-grid market.

Monitoring is a basic tool to fine-tune the oversight process.

3.1.2 Area Modalities

It is imperative for the institutional oversight to welcome various modalities or innovations to access the market, or that project developers may employ in their operations. There can be two (2) area modalities for the private sector, namely: (a) the *areas for commercial* and (b) the *basic service areas.* There could be either an (i) exclusive concession area and a (ii) non-exclusive service area in each of the two main modalities. Shown against these modalities are the proposed delivery mechanisms and the expansion strategies, in Table 1 (next page).

TABLE 1. Area Modalities

	Modality	*Mechanism*	*Expansion Strategy*
Areas for Commercial Operation	Exclusive Concession Area (35% penetration rate) Non-exclusive Service Area	RESCO (through RESCOs)	Operation to grow from a critical mass in the upper economic segment, to expand to poorest areas within the operation area
Basic Service Areas	Exclusive Concession Area (100% penetration rate) Non-exclusive Service Area	Community-based (through CBOs)	Operation to begin from poorest areas, to move by either or both contiguous or leap expansion

3.2.1 <u>Areas for Commercial Operation</u>

Areas for commercial operation are immediately found within economic segments of the rural poor that possess the relative capacity to pay. *RESCO-based operations are encouraged here.*

3.2.1.1 <u>Exclusive Concession Area</u>

Defining exclusive concession areas (or areas granted with exclusive rights to a service provider to service for a given period of time) may prove viable in expanding the rural electrification market, in terms of minimizing potential market risk to confront the RESCO by some government fund leveraging and buy-down through subsidies, on a viably sized contiguous target market where EC concurrence and LGU support have been secured. The larger committed size of operations and number of target beneficiaries would merit, from government, a specific package of assistance to qualified project developers. Here, a bidding process will suitably identify the qualified or best bids.

Concession contracts may be awarded based on the lowest service fee at a given subsidy level (or alternatively, the lowest subsidy given a targeted service fee level, e.g., the "lifeline rate"). The contract shall contain specific performance standards for the delivery of service, as well as maximum length of market operation and related conditions.

The commercial concession package may consist of:

1. ‘Smart subsidies’ or grant money that makes the difference between RESCO revenue and costs of service delivery;
2. Soft loan to ease the equity share of the investor, and where financing will be difficult to obtain;
3. Exclusive permit to serve a specific area, through formal clearances to be obtained from the utility and the NEA with the assistance by the oversight body; and,
4. Fiscal incentives that will lower market entry and development costs.

3.2.1.2 Non-exclusive Service Area

A RESCO may be allowed entry outside the concession-granting process, or in those areas outside defined concessions and where a waiver from or innovative transaction with the EC can be secured. There is wisdom to opening up the greatest number of unelectrified areas to interested private sector, where and when there is a potential for recovering costs and a reasonable profit for the RESCO, and the concurrence by the households/community is secured and desired results for them are guaranteed.

A simple registration process would issue the service permit, and enable the oversight body to record the entry, monitor the operations and be informed of forms of assistance that are required. Monitoring the practices of a direct market access RESCO can reap important learnings to improve the market and policy instruments for RESCO viability.

At the minimum, the oversight body should acquire the following information from a direct market access RESCO.

1. Name, address, contact person and organizational information on RESCO;
2. Location of RESCO operation, general description, and details on how to get there;
3. Number of households and individuals served, number of community centers served;
4. Technologies employed, general description of energy system;
5. Description of payment system; and,
6. Any financial information on the RESCO to determine sustainability.

A RESCO going directly to the dispersed market may be eligible for certain support in the form of information, technical and project development assistance. Further, this RESCO may avail of fiscal incentives if the number of household beneficiaries exceeds a certain limit to be set by the oversight body.

Finally, should the ECs decide to cover the RESCO service area, ample time shall be given to the RESCO to relocate. There should also be a set of guidelines on how to deal with residual value of assets (e.g., eventual transfer of such assets from the service provider to the ECs).

3.2.2 Basic Service Area

Basic service areas are the poorest areas outside those selected for commercial operations; these can also be found within the exclusive concession and non-exclusive service areas. These comprise a huge portion of the off-grid market, where demand density is expected to be very low (penetration rate below 20%), and where households are rendered incapable to pay beyond a low CTP benchmark by comparatively harsh economic conditions.

These are veritably risk areas for initial operations by RESCOs, as well as where new services or technologies may not attract consumers. *Civil society organizations are encouraged to develop the community-based systems in these areas.*

3.2.2.1 Exclusive Concession Area

Defining exclusive concession areas (or areas granted with exclusive rights to a service provider to service for a given period of time) in basic service areas will encourage the expansion of initiatives by civil society through the community-based delivery mechanism. This will help minimize the financial limitations in rural electrification engagement, in terms of *minimizing the capacity gap* inherent with the poor proponent communities. The larger committed size of operations and the target 100% penetration rate should merit, from government, a specific package of assistance to qualified project developers. Here, a bidding process will suitably identify the qualified or best bids.

As with the RESCO concession applications, concession contracts for basic service areas may be awarded based on the lowest service fee at a given subsidy level (or alternatively, the lowest subsidy given a targeted service fee level). The contract shall contain specific performance standards for the delivery of service, as well as maximum length of market operation and related conditions.

The basic service area concession package may consist of:

1. ‘Smart subsidies’ or grant money that makes the difference between revenue and costs of system development and service delivery;
2. Valuation of ‘sweat’ and other local equities;
3. Local incentives from the LGU (tax incentives and IRA allocation);
4. Soft loan to the proponent through proposed micro-financing mechanism (possibly through rural banks) and non-bank mechanisms such as the Village

Power Fund, and similar facility;
5. Grant money for capacity building activities (e.g., through GEF);
6. Exclusive permit to serve a specific area, through formal clearances to be obtained from the utility and the NEA with the assistance by the oversight body; and,
7. Fiscal incentives that will lower development costs.

Equity contribution by community. 'Contributions in kind' (called 'sweat equity') by the community should be recognized and encouraged by policy; such would lower the cost of providing an electricity supply, which could result in significant cost reductions. This would also materialize sense of 'ownership' and induce social pressure against negative individual or group social tendencies.

3.2.2.2 Non-exclusive Service Area

A civil society entity (i.e., service provider) may be allowed entry outside the concession-granting process, or in those areas outside defined concessions and where a waiver from or innovative transaction with the EC can be secured. There is wisdom to opening up the greatest number of un-energized areas to interested private sector, where and when there is expressed demand, and the concurrence by the households/community is secured and desired results for them are guaranteed.

The issuance by EC of concurrence to operate should not be difficult, given that areas for civil society operation are the poorest and remotest ones, with no prospect for grid extension within the next 5 to 10 years.

A simple registration process would issue the service permit, and enable the oversight body to record the entry, monitor the operations and be informed of forms of assistance that are required.

At the minimum, the oversight body should acquire the following information from a direct market access service provider.

1. Name, address, contact person and organizational information;
2. Location of operation, general description, and details on how to get there;
3. Number of households and individuals served, number of community centers served;
4. Technologies employed, general description of energy system;
5. Description of payment system.

A service provider going directly to the dispersed market may be eligible for certain support in the form of information, technical and project development assistance. Further, this service provider may avail of fiscal incentives if the number of household beneficiaries exceeds a certain limit to be set by the oversight body.

Chapter 3.
COMPETITIVE BIDDING GUIDELINES FOR EXCLUSIVE CONCESSION AREA

3.1 Framework

The right to deliver energy service in exclusive concession areas shall be bidded out to RESCOs (in areas for commercial operation) and to civil society groups or community-based organizations or CBOs (in basic service areas). They shall be formally invited to submit their own proposals presenting particular schemes for said energy service delivery. These proposals are to be evaluated on the soundness of the proposed methodology (strategy and commercial viability), costs (financial), and the experience of the company (institutional and managerial). This assumes that *market characterization* of specific areas has been done and that information has been offered to the private sector entities that may be interested in their development. This also assumes that the minimum service requirements have been defined, for each customer category in the identified areas.

Bidding principle. The development of competitive solicitation for market packages to serve un-energized barangays aims to promote competition to minimize project costs and encourage innovation (among project proposals and among services providers) and is based on the principle that the best off-grid service offerings are those that will minimize the need for external support.

Solicitation criteria. That is, a competitive solicitation is conducted in which the winning bidder is the one with the *lowest subsidy* (per connection or per kWh) needed to meet the requirements specified in the market packages; or, the *lowest cost* to provide a particular level of service. Bidders would have to show how they would minimize costs and maximize revenues so as to minimize the need for subsidies.

Another important consideration used to decide between companies tendering for the supply service contract could be the strategy of sustainability of the service. Aside from costs minimization strategy, sustainability can be ensured taking into account local issues and information that can be determined at the community level only in a participatory manner.

Technical requirements for bidders may include the level of contribution of NRE energy sources to total energy generation (e.g., at least 51%), and the type of technology to be used (e.g., only successfully proven technologies in the local and foreign context).

3.2 Solicitation Process

The bidding process should be transparent, beginning from a Request for Proposal (RFP) to be issued by the oversight body. The guidelines and rules for award of service areas must specify how this can be done.

The success of the solicitation in minimizing the need for subsidies depends on the extent to which it attracts interest from multiple bidders. Consequently, it will be important to market the RFP broadly among potential service providers.

Eligible bidders. The following non-government entities are eligible to participate in the solicitation:

1. Local and foreign private corporations, including: investor-owned electric distribution companies; those that have experience in operating public services such as water, telecommunications or electricity supplies; equipment dealer networks; manufacturers and suppliers of diesel generators and RE equipment; contractors with experience of installing diesel, hydro or energy supply equipment; providers of other infrastructural services; and local entrepreneurs providing related services;
2. Filipino partnerships and individuals;
3. Rural electric cooperatives under the jurisdiction of the National Electrification Administration; and
4. Community-based organizations (CBOs that include NGOs, POs, rural cooperatives) that have formally organized themselves to undertake the proposal.

Eligibility criteria for a RESCO. There should be clear-cut eligibility criteria for prospective bidders, to include but not be limited to: (1) financial capability; (2) institutional, technical and managerial competence, and (3) commercial viability and sustainability of the project.

Eligibility criteria for a CBO. There should be clear-cut eligibility criteria for prospective bidders, to include but not be limited to: (1) rural community service track record; (2) institutional, technical and managerial competence; and (3) service viability and sustainability of the project.

3.3 Information about Concession Area Packages

The RFP will also contain information about market and resource characteristics, as well as other information designed to help developers determine types of electricity services to be proposed, such as:

1. Least cost analysis of basic service options (mini-grid, individual generators, or grid extension);
2. Indicative level of demand for household, community, and productive applications;
3. Sources of energy locally available (mini-hydro, solar, wind, geothermal, biomass);
4. Potential opportunities for productive applications that enhance users' ability to pay;
5. Present level of electricity use;
6. Level of energy used for applications that electricity could supply; and
7. Possible tariff parameters; and
8. Forms and nature of assistance to be provided, such as:

    (a) improvement of the business plan submitted in the proposal;
    (b) certain types of technical support (possibly through ANECs);
    (c) waiver of franchise for the area to be served (if the winning bidder is not the REC itself);
    (d) nature of LGU support; and
    (e) training in project development and implementation.

3.4 Information to be Included in the Proposal

Each proposal must contain the elements of a business plan or information such as:

1. Needs assessment process to determine level and nature of services to be provided;
2. Level and nature of services to be provided;
3. Description of model of system to be implemented;
4. Timeframe for extending service;
5. Description of target service area: income segment; target size; mix of household, community and productive (livelihood applications), covering at least one barangay;
6. Role of community or organization, if any, in designing, implementing and improving scheme;
7. Appraisal of sustainability;
8. Appraisal of model replicability;
9. Estimated total cost of providing service, estimated revenues from users, and financial or in-kind contribution (sweat equity) to be made by participants, if any;
10. User credit schemes, leasing, or other approaches, if any, to overcome capital cost constraints;
11. Assessment of competition and systems reliability;
12. Relationship with equipment suppliers, if any;

13. Bases for setting fee-for-service (CTP and WTP) of the locality;
14. Form of billing and revenue collection;
15. Proposal for assessing the success of the scheme; and
16. Type and amount of ‘smart subsidy’ applied for.

The RFP will be invited to include other provisions that will enhance its attractiveness as a business opportunity, i.e., innovations. For instance, the RFP could allow maximum flexibility or a wide range of services offered to promote sustainability (e.g., financing of equipment for productive uses of electricity).

3.5 Selection Process

A Technical Committee within the oversight body (e.g., Board) will be assigned to receive and review proposals. It will follow a transparent procedure such as the following:

1. The TC will pre-qualify all proposals to ensure that each fulfils *minimum requirements* for any or all of the following:

   (a) *For the RESCO bidder*: (i) quality of management and financial structure; (ii) technical approach; (iii) use of indigenous resources; and (iv) replicability of service delivery model being proposed.

   (b) *For the CBO bidder*: (i) quality of management and financial structure; (ii) technical approach; (iii) participatory approach; (iv) use of indigenous resources; and (v) replicability of service delivery model being proposed.

2. The TC will review all pre-qualified proposals and determine which requires the minimum level of subsidy for the level of service specified in the RFP.

Selection criteria for RESCO competitive bidding. The winning proposal (determined by the TC to meet all technical requirements and to possess requisite technical and financial capability) must present the following: (1) the lowest level of subsidy applied for the biggest number of connected households; (2) the longest hours and highest quality of service in a given area; and (3) a development strategy and plan that is most practicable and most satisfies the area’s larger socio-economic development goals via rural electrification.

Selection criteria for CBO competitive bidding. The winning proposal (determined by the TC to meet all technical requirements and to possess requisite technical and institutional capability and community service track record), must present the following:

(1) the lowest level of subsidy applied for the biggest number of connected households; (2) the longest hours and highest quality of service in a given area; and (3) a development strategy and plan that is most practicable and most satisfies the area's larger socio-economic development goals via rural electrification.

Chapter 4.
SMART SUBSIDIES

Rationale

While direct subsidies are common in development programs, and present concrete benefits to the recipient, such benefits do not have multiplier effects or are weak in generating sustainability of any program. "Smart subsidies" and not direct subsidies, are being developed and encouraged for rural electrification.

"Smart subsidies" have been referred to as transparent, time-bound, selective and focused front-end assistance to encourage the RESCO to develop as a sustainable enterprise. A one-time subsidy placed at the front-end is viable for NRE systems because these have no significant operating and maintenance costs once the systems are put in place. These may be incremental non-recurring business and market development costs (e.g., business planning, feasibility study, consumer awareness), or limited grants applied to buy down the high upfront costs of equipment, expand the market and reduce the cost of supply.

"Smart subsidies" may also come in the form of a special-purpose fund with concessional terms, to provide RESCOs with alternative source of funding which is otherwise difficult to procure from a bank. Hence, "smart subsidies", in whatever form, are desired to meet the requirements for rendering quality service to consumers and sustaining the service facility with reasonable returns.

The appropriate body may find the following principles useful in formulating policies on subsidy development for rural electrification.

1. It is important for the policy body to set the development goals of subsidy for the target market, identify the specific market segments to be served and the minimum level of service for each, and subsequently choose the effective levels of support for each target.

2. Set limits on computed rates of return, identifying the specific methodology and assumptions for making such a determination.

3. Before granting subsidy, it is important that specific commitments by the private sector be made beforehand.

4. Subsidy should be expected to create effects (e.g., number of households enabled to have electricity per amount subsidy) and impact (increase in household's capacity to pay).

5. An appropriate oversight body must be assigned to ensure that important issues on subsidy are addressed.

6. Subsidies should be managed with transparency along clear development goals.

Chapter 5.
FISCAL INCENTIVES FOR THE ENTRY AND DEVELOPMENT OF THE PRIVATE SECTOR

Tax incentives, in principle, must be linked to market performance and the reduction of RE costs.

Some applicable fiscal incentives on business operations available in the country are contained in the Omnibus Investments Code (E.O. 226) of 1987, administered by the Board of Investments (BOI) which regularly identifies priority areas of investment and publishes these in the Investment Priorities Plan (BOI-IPP). To obtain such incentives, RESCO operations need to be included in the BOI Investment Priorities Plan and projects registered as pioneer enterprises.

For energy projects, the fiscal incentives that apply under the BOI are the following:

1. Waiver or full exemption from any import duties or taxes for imported capital equipment and spare parts used for rural energy supply services (in the generation, provision, distribution or sale of these services);
2. Tax credit on domestic capital equipment;
3. Income tax holidays (ITH) on income generated by RE schemes for a period of at least 10 years from commencement of commercial operation of each separate and distinct energy services project/location; the following are offered under the BOI:

• Pioneer	6 years
• Non-pioneer	4 years
• Expansion	3 years
• Less developed areas	6 years

4. Additional deduction for labor expenses;
5. Deduction from taxable income of expenses on infrastructure; and,
6. Tax and duty-free importation of capital equipment.

Other fiscal incentives include:

1. Waiver or full exemption from VAT, sales tax or other taxes on the generation, provision, distribution or sale of energy services, or any universal levy arising from the privatization of NAPOCOR;
2. Differential rates for RE equipment to reduce the cost relative the equipment for fossil fuel burning equipment, to encourage reduction of dependence on the latter;

3. Tax on depreciation of RE equipment for rural energy purposes; this would offset the high upfront costs for RE development;
4. Environmental impact taxing structure (e.g., carbon tax, use of emission trading schemes such as the Clean Development Mechanism proposed at the Kyoto Summit) could become an inverted tax break for RE development);
5. Targeted subsidies such as those that would reduce RE prices; and
6. Subsidized credit facilities for poor households for start-up costs, e.g., for equipment, installation or system connection, and house wiring.

Chapter 6.
MINIMUM VIABLE MARKET SIZE

6.1 Variables in Determining Viable Market Size

Policy development should expect the minimum viable market size (the limit of clientele units that would return a desired equity percentage and guarantee sustainability of the system) for a RESCO, to vary according to a good number of variables. Levels of willingness and capacity to pay, livelihood opportunities, costs, and subsidy infusion would all factor into the cost-revenue equation for each technology type. Incentives that would lower costs (market entry, capital, O&M) and allowable subsidy range would also influence the determination of minimum viable market sizes. Costs also vary greatly with site characteristics. For instance, accessibility of site to an existing plant is important in lowering costs (realizing economies of scope) for an interested plant owner.

A full cost recovery mechanism (without subsidy) will always cost more for the project investor and hence increase viable market size, than a partial cost recovery mechanism (with some subsidy) -- as in the Argentina case where government provided the bridge funds necessary for private investors to meet their target rates of return.

RESCOs need to define their own minimum viable market sizes, as part of their business planning. These numbers are also desired from RESCOs, in order for the oversight body to have an indication of expected outputs (potential households to be electrified), and basis for comparing with offerings by other service providers, among all other criteria.

Benchmarks. RESCOs could be helped to arrive at their desired minimum viable market sizes, by providing values to certain variables. Hence, it may be necessary for market packages to already indicate benchmarks for subsidies, return for investments, as well as, possibly, for (re) defining barangay electrification.

6.2 Working Size for a Market Package

The working size for a market package is a safe size estimate prior to completely figuring out the minimum viable market size. The selection of 1000 households, or a municipality, as scope of a market package is initially based on a rough estimate -- of that much moving room for varied systems to make investment returns.

Indicative numbers. From the earlier RPE experience, for instance, about 20 SHS installations are required to be able to recoup operating expenses in ___ years for a given target of __% equity. SOLUZ Inc. looks for at least a potential market of *5,000 paying* *customers* or “service clients” for its solar PV home systems.

For community-based MHDs, target number of households form part of the needs assessment, which is then matched by resource or supply potential. One hundred percent electrification is assumed, and made possible by community-based mechanisms.

An NRE system based on solar PV would always require investment costs and more end-user payments per unit of service versus a system based on micro-hydro project for the same unit of service. Nevertheless, it is hoped that the following could help:

- ☑ For solar PV-based systems, at least 1,000 paying customers may be required for a sustainable operation with *full* cost recovery. It is assumed that the customers have a willingness to pay of around US$ 11 monthly. Buy-downs of capital cost will greatly lower minimum market size and service fee.

- ☑ For microhydro-based systems, which are considered the more cost effective option, even a market of about 200 paying customers may be enough for *full* cost recovery. Likewise, buy-downs of capital cost will greatly lower minimum market size and service fee.

- ☑ Other technologies may fall between the foregoing cases.

Chapter 7.
PRICING OF RE-BASED SERVICES

7.1 Framework

The main pricing issue for off-grid electrification is setting the service fee. There has been negative opinion about imposition of uniform fee (as this has prevented cost recovery in remote areas), believing that, in principle, RE-based payment should be unregulated and market-based, and set in a way that will give the RESCO sufficient income to be financially viable, and on the other hand, will not discourage consumers to avail of the services.

Service fee pricing policy should carry the principle that energy pricing should be based on meeting both CTP and WTP. There may be issues coupled with CTP and WTP; they remain critical variables though for ensuring payments and have to be made as accurate as possible.

The price oversight authorities shall establish the allowable rate schedules only after undergoing proper public consultations and evaluation of technical and financial proposal of the bidder and market characteristics/potential of a given area.

7.2 Service Fee Coverage

The service fee should be able to cover running costs (salaries of operators, payment of interest and capital, funds such as those to develop end-uses and payment for spare parts and maintenance) and reasonable profit (for a RESCO) and revenue (to plow back to development projects by the community-based project proponent). The fees set by some community-based and subsidy-based mechanisms cover (aside from running costs) -- savings for systems replacement in place of payment for interest and capital.

For A RESCO, the *service fee should be able to meet desired return on equity*. The gap, between costs and desired ROE can thus be met by appropriate subsidy. Said subsidy will allow the delivery of quality and required hours of service even in situations of low CTP or low demand in very poor communities.

The lowering the cost of supply for small consumers should be encouraged through the following:

1. Capacity-based tariff, where the consumer is charged a fixed monthly fee (according to the agreed load limit) irrespective of the total amount of energy consumed;
2. pre-payment metering;
3. fixed maximum demand tariffs with current load limiters or 'load economy devices' (a device which automatically discontinues supply once the current is exceeded, i.e., overload, which may be reset manually, or automatically resets when overload is removed);
4. limiting supply to certain hours in the day; and
5. low fixed charges (revenue collection cost) through metering or prepayment.

Finally, fees should be set with adequate participation and concurrence of the paying community and households.

Chapter 8.
COMMUNITY OWNERSHIP

The RESCO mechanism proposes to own, operate and maintain the systems to take away the technology and capital risk from poor consumers. There are situations though, such as those in poorer areas, where community ownership is a preferred ultimate development, of what was initially a private-led transaction.

It is hereby proposed that community ownership be treated or encouraged as a positive end for a RESCO operation, or, a favored mechanism (over a RESCO) where all requirements are present.

If the community deems that it is ready to undertake operation and management of the system, and the RESCO concurs, appropriate arrangements then could be worked out, such as the buying out of the RESCO by funds from government.

Community ownership may involve the establishment of a company (or community RESCO), in due time as determined by the business plan. It could begin as a RESCO-community partnership, where the community has equity which may be less at the early phases, but which can be supported to grow to 100% over time, with public and NGO support.

Advantages. The policy on ownership of the energy service system needs to recognize the advantages of community ownership, and hence should not be limited to corporate energy companies, particularly in poorest segments of the off-grid market. The community can facilitate planning and assist in certain aspects of the work, e.g., routing of distribution lines and right-of-way disputes. They can elect a committee to aid communication between them and the service provider.

The ownership of the energy service system by the community is to be encouraged when the following criteria are present:

- ☑ There is a history of community planned and owned development activities; and

- ☑ Where local NGOs are able to facilitate participative planning of the RE development project.

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PHILIPPINES CLIMATE CHANGE MITIGATION PROGRAM

A Joint Program of the

Philippines Department of Energy

US Agency for International Development

TERMINAL REPORT

Technical Assistance to DOE for Enhancing Private Sector Participation in New and Renewable Energy Investments for Off-Grid Rural Electrification (TASK 6 – Collection, Analysis and Packaging of Critical Investment Information)

Submitted to the:

United States Agency for International Development (USAID)

and the

Department of Energy
Manila, Philippines

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This report was prepared under the terms and conditions of Contract No. 492-C-00-97-00063.
The opinions expressed herein are those of the authors and do not necessarily reflect the views of the USAID.

THE MARKET FOR NRE

Until recently, the promotion of new and renewable energy (henceforth, NRE) in the Philippines was pursued in the context of attaining energy self-sufficiency. Such perspective has changed in light of the pressing need to provide power to some 10,000 unenergized barangays. NRE has become a strategic instrument to attain the goal of rural electrification.

The challenges posed by rural electrification are by no means facile. It involves supplying power to sites that have widely dispersed population. Inevitably, the cost of infrastructure increases as the site becomes more remote. Energy demand in these sites are generally low; payback period is long and uncertain. While the investment is highly profitable from a social point of view, the converse holds from private standpoint.

Yet promoting NRE is no less formidable as providing power to remote areas. Foremost, many NRE systems are uncompetitive to grid power and diesel generators that benefit from various tariff support and investment incentives. Even when the NRE system is cost-effective on a life-cycle basis, the system requires large front-end investment. As most financing institutions still view NRE technologies as either unproven or non-commercial, it has been difficult to mobilize investment capital. Then there is often a lack of appreciation among end-users on the capabilities of NRE technologies. Utilities remain conservative in regard to small, decentralized and nonconventional technologies.

Matching rural electrification with NRE technologies may yet be the appropriate strategy to attain two elusive goals. The fact is NRE systems become increasingly competitive against conventional power source as the site grows farther from the grid. Not only is the cost of grid extension prohibitive, maintaining conventional power supply is impractical in the absence of technical support. Moreover, modularity and ease of maintenance are characteristic of NRE systems that make them suitable choice for deployment in rural areas.

This report probes the prospects of deploying NRE systems to achieve the goal of rural electrification. In particular, it inquires on the market environment for NRE systems, the fiscal incentives afforded to investors, and the investment, operation and maintenance costs of the systems. It assesses the potentials for off-grid rural electrification of four NRE technologies, namely solar, wind, hydro and biomass. The report concludes with a prognosis on the prospects of utilizing NRE technologies in the Philippines in view of pending reforms in the electricity sector.

1.1 NRE Installations in the Philippines

NRE installations in the Philippines have reached close to 46,000.[1] Of this number, only 5,822 systems or 12 percent are designed to generate electricity. Photovoltaic systems are concentrated in Region VIII, while Region III has the largest number of wind energy installations. Close to half of small hydro systems are in the Cordillera Region. Biomass systems, specifically biogas,

[1] This is based on NESCON data and an ad hoc survey conducted by SATMP involving NRE suppliers and organizations. NESCON is the most comprehensive available database on NRE energy installations in the Philippines. It was last updated in October 1999. The SATMP survey was undertaken between March-April 2001 to obtain information on installations after the last NESCON date.

biomass-fired boilers and gasifiers, are represented in all regions, but most installations can be found in Regions III, IV, VI and VII.

Table 1.1
NRE Installations for Off-grid Rural Electrification
As of 30 April 2001

Region	Photovoltaic[1, 2]	Wind Turbine & Pumps	Small Hydro	Biomass[3]
CAR	807	6	68	20
I	217	20	2	22
II	312	7	8	21
III	81	117	3	112
IV	598	9	6	81
V	126	2	7	9
VI	502	52	14	82
VII	301	24	12	71
VIII	1,035	2	5	17
IX	16	6	6	25
X	53	1	8	19
XI	224	6	4	46
XII	16		3	4
XIII	142			28
ARMM	420	2	1	12
Total	**4,850**	**254**	**147**	**571**

[1] *Excludes solar dryers and solar heaters.*
[2] *Excludes NEA-GTZ PV systems scheduled for installation in year 2001, but unreported to date.*
[3] *Includes only biogas, biomass-fired boiler and gasifiers, as of 30 September 1999.*
Source: NESCON, Survey returns.

On the province-level, Eastern Samar, Lanao del Sur, Abra and Kalinga-Apayao have the most number of photovoltaic installations. Biomass-fired dryers are more popular in Surigao del Norte, Misamis Occidental, Misamis Oriental, Agusan del Norte and Lanao del Norte. The largest concentration of small hydro facilities is in Benguet, having a total of 101 installations. Ilocos Norte, Batanes and Iloilo are favorite sites for wind turbines. **Annex I** shows the distribution of NRE installations in the Philippines by region and province.

Various studies have confirmed the enormous energy resources in the Philippines that may be harnessed for power generation. The wind mapping study of the DOST-PCIERD, PNOC and Winrock International reveals that 76,000 MW may be tapped from wind resource. The Department of Energy estimates that about 888 mini-hydro facilities may be installed in various parts of the Philippines to generate 1,784 MW of electricity. On biomass, the WB/ESMAP study indicates that 60 to 90 MW may be generated from grid-connected sugarcogen facility, and another 40 MW from rice residues.

The proliferation of NRE systems is an offshoot of a number of public and private initiatives. The biggest to date is the Rural Photovoltaic Electrification (RPE) program of the National Electrification Administration (NEA). Since its launching in 1992, the RPE program is responsible for installing 2,454 solar home systems and 195 battery charging stations nationwide. NEA is also involved in installing small hydro facilities; 15 mini-hydro power plants have been constructed to date, with an aggregate capacity of 21.2 MW. For year 2000-2009, NEA has allotted P60 billion to its rural electrification program, of which P5 billion is committed to NRE.

Since 1997, the Department of Interior and Local Government has been managing a community-based program dubbed Municipal Integrated Social Development Project (MISDP) that deploys solar energy packages to meet the infrastructure needs in rural areas. The first phase of the program has installed 1,145 solar facilities in selected provinces in Visayas and Mindanao. Another 4,663 solar packages are targeted for the second phase that slated to begin in year 2002.

In December 1999, the Department of Energy launched a five-year drive to energize all barangays in the Philippines. The inaugural year saw 64 projects implemented; 17 micro-hydro, 3 hybrid and 40 solar facilities were installed.

NRE projects are still unattractive as financing proposition, but a few financing windows are open. One such window is being managed by the Development Bank of the Philippines. The project called "Financing Energy Services for Small-Scale End Users"(FINESSE) extends loans for small hydro, solar, wind and biomass energy projects. The Netherlands Government through the United Nations Development Programme (UNDP) provides the funds in the form of Official Development Aid (ODA). Among the projects funded by the program are the 100 solar home systems in San Pascual, Masbate; 1.5 MW mini-hydro plant in Matling, Iligan, Lanao del Sur; solar PV project in Palawan; and 500 kW minihydro in Dinagat Island, Surigao del Norte.

The Decentralized Energy Systems (DES) Project, managed by the Philippine National Oil Company-Energy Research and Development Center, is another financing window. DES aims to commercialize selected decentralized energy systems by providing financial assistance to entrepreneurs and private organizations. Funding support comes from the European Union. To date, DES has awarded loans to 15 NRE projects, of which 11 are biomass systems.

1.2 Fiscal and Non-fiscal Incentives for NRE Projects

The government's commitment to renewables has been marked by a series of policy pronouncements and laws aimed at promoting awareness and creating a market for NRE systems. A review of these edicts follows.

1.2.1 P.D. 1068

Efforts to develop NRE dates back to the pre-War years, but these were mostly ad hoc and uncoordinated. An earnest attempt by the government to spur investments in renewables began with the promulgation of Presidential Decree (PD) 1068 in 1977. PD 1068 directed the acceleration of research, development and utilization of non-conventional energy resources. Two of its most important provisions pertain to granting of incentives and allowing private sector participation in energy generation.

Among the incentives provided by PD 1068 include: (i) capital & organizational expenses chargeable to expenses and deductible from gross income in the year incurred; (ii) **e**xemption from duty and compensating tax of importation of capital equipment; (iii) high priority in financing assistance from GFIs.

The decree also directed the Energy Development Board to develop and implement specific programs requiring the participation of the private sector. This provision presaged the Build-Operate-Transfer Law of 1990 which would later provide impetus for private investments in infrastructure.

While PD 1068 laid the incentives for NRE projects, there were flaws in the implementation. One was the discretion given to Customs Examiners in interpreting whether an imported machinery, equipment or part was for tax and duty-free importation. Since many parts and components have multiple uses or applications, the burden of proving that the imports were to be used exclusively for NRE projects rested on the proponent. However, as a revenue-generating unit, the Customs Office was inclined to impose the tax; appeals were seldom heard. Thus, the proviso that allowed for duty-free importation of parts and components was not enforced. In the same vein, NRE project financing was hardly given priority by GFIs; the requirements to present collaterals and proof of project viability hampered the chances of NRE projects from accessing the funds of GFIs. It would be noted that the same problems constrain recent NRE policies from stimulating investments.

1.2.2 EO 226 Omnibus Investment Code of 1987 as Amended by RA 7918

The Omnibus Investment Code provides a set of incentives to spur investments in identified key sectors of the economy. NRE investors can claim entitlement to these incentives, having qualified in what the Code defines as a pioneer enterprise. Specifically, an enterprise may qualify for pioneer status if, among others, "it produces non-conventional fuels or manufactures equipment which utilize non-conventional source of energy or uses or converts to coal or other non-conventional fuels of sources of energy in its production, manufacturing or processing operations."[2]

As a pioneer enterprise, the investor can avail of the following:

- *Income Tax Holiday.* Qualified pioneer enterprises are exempt from payment of income taxes for 6 years from commercial operation. The exemption may be extended by another year if the project utilizes indigenous raw materials at rates set by the Board of Investments.

- *Additional Deduction for Labor Expense.* During the first five years of registration, an enterprise that expands its employment may claim additional deduction from taxable income equivalent to 50% of the wages corresponding to the increment in direct labor hired. If the project were located in a less developed area, the additional deduction may be doubled.

- Expansion expenses can be deducted from taxable income in proportion to such expansion, but enterprises that are availing of such privilege cannot claim additional deduction for incremental labor expenses incurred during such period.

- *Exemption from Contractors Tax.* Registered enterprises shall be exempt from contractors tax (equivalent to 10 percent VAT), whether national or local.

- *Simplified Customs Procedures.* Customs procedures for the importation of capital equipment and parts shall be simplified by the Bureau of Customs.

- *Unrestricted Use of Consigned Equipment.* Registered enterprises are not subject to restrictions on the period of use of such machinery, equipment and parts.

- *Employment of Foreign Nationals.* A registered enterprise may employ foreign nationals in supervisory, technical or advisory position for a period not exceeding five years from its registration.

[2] Art. 17, Chapter 1, Book 1 of The Omnibus Investment Code of 1987 as Amended.

- *Incentives to Less-Develop-Area Registered Enterprise.* An enterprise registered with the BOI and located in less-developed area shall enjoy pioneer status and be entitled to the incentives provided for pioneer enterprises. Off-grid NRE projects, by reason of their location, may avail of this privilege.

- *Incentives for Necessary and Major Infrastructure and Public Facilities.* All expenditures on necessary infrastructure related to project development may be deducted from the enterprise's taxable income, subject to BOI approval. Any amount not deducted for a particular year may be carried over for deduction in subsequent years not exceeding ten years. This would include expenses on access roads, bridges, communication facilities and the like.

Until 1997, pioneer enterprises can avail of tax and duty exemption on imported capital equipment and tax credit on domestic capital equipment. The latter pertains to the taxes and customs duties that would have been waived on the machinery, equipment and spare parts, had such items been imported. As part of the commitment to the Trade-Related Investment Measures (TRIMs) of the World Trade Organization, the BOI has to discontinue granting incentives related to capital equipment. It would be noted though that these incentives have been restored in the case of mini-hydro projects by virtue of RA 7156.

1.2.3 Mini-Hydro Power Incentives Act (RA 7156)

Cognizant of the significant contribution of hydropower to the country's goal of energy self-sufficiency, the government enunciated RA 7156 or the Mini-Hydro Power Incentives Act in 1991. While other NRE projects may invoke the Omnibus Investment Code to avail of incentives, mini-hydro projects are accorded special privileges through RA 7156. The law provides the following incentives:

- *Special Privilege Tax Rates of 2 percent* on gross receipts from the sale of electric power and from transactions incident to the generation, transmission and sale of electric power.

- *Tax and Duty-free Importation of capital equipment, materials and parts* within seven (7) years of the award, subject to certain conditions and with expressed approval of the DOE.

- *Tax credit (VAT+Duty) on Domestic Capital Equipment.* Local purchases of capital equipment shall be eligible for tax credit equivalent to 100% of the customs duties and value added tax had such items been imported, subject to certain conditions.[3]

- *Special Realty Tax Rates on Equipment & Machinery.* This limits the rate of realty tax that can be imposed on mini-hydropower developer to not more than 2.5 percent of the original cost of machinery and equipment.

- *VAT Exemption on gross receipts from electricity sales.* Gross receipts derived from the sale of electric power, whether through NPC grid or existing utility lines, shall be exempt from the VAT.

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[3] Availing of this incentive is often mired by the problem of demonstrating that the imported equipment is equivalent to domestic capital equipment.

- *Income Tax holiday for seven years.* RA 7156 explicitly provides for seven years tax holiday for mini-hydro projects, compared to the six year income tax holiday provided by the Omnibus Investment Code.

- *Exemption from Contractors Tax.* Registered enterprises shall be exempt from contractors tax (equivalent to 10 percent VAT), whether national or local.

The term of contract with mini-hydropower developers is for a period of 25 years, which may be extended another 25 years. The developer must first offer to sell electric power to the NPC, franchised private electric utilities or cooperatives at price equivalent to the utility's avoided cost, *i.e.*, the costs had NPC generated the equivalent power itself. The NPC will also provide wheeling privilege to mini-hydro developers for them deliver power to their customers.

If the contractor commits to develop less than 50 percent of the hydroelectric power potential of a site, the contract shall be non-exclusive. NPC may grant the right to develop the full potential of the site to another qualified developer if the existing developer relinquishes his right of first refusal. In this case, the first developer will be reimbursed by the successor-developer for the value of his investments, which would be based on the declared value of the development for real estate tax purposes for the last three years.

The Act also provides that Official Development Assistance can be availed by the private sector for mini-hydro electric power projects without the need to pass through the evaluation process set by the National Economic and Development Authority (NEDA) Board.

1.2.4 EO 462 as Amended by EO 232

While RA 7156 accorded special privileges to mini-hydro power projects, the intent of Executive Order (EO) 462 is to provide the same for ocean, solar and wind (OSW) technologies. Promulgated in 1997, EO 462 elicits private sector participation in the exploration, development, utilization and commercialization of ocean, solar and wind energy resources for power generation and other energy uses. However, the law covers only OSW energy generation exceeding 1 MW. The private sector is made to enter into a production sharing contract with the DOE after due consultation with the host communities and local government units (LGUs) concerned, through public bidding or negotiation.

In 1999, EO 232 amended EO 462 and provides specifically that production sharing contracts shall be applied to projects satisfying two criteria: (i) that it harnesses OSW resources in lands of the public domain and/or offshore waters within the Philippine territory, contiguous zone and exclusive economic zone; (ii) that it has a net electric power output of more than 1 MW for sale to an electric utility. Projects that do not meet the above criteria shall be considered a private endeavor, hence exempted from the requirement of entering into production sharing contract with the government. OSW energy generation of more than 1MW in private lands and privately-held offshore shall also be regulated by the DOE using existing accreditation system for power plants. Generation projects of 1MW or less shall be regulated by the local government concerned according to local energy plans approved by the DOE.

EO 232 strengthened the set of incentives to OSW developers by directing the DOE to extend assistance to OSW developers in obtaining all applicable fiscal and non-fiscal incentives, including registration as pioneer industry with the BOI. In addition, OSW developers can charge the cost of assessment, field verification and feasibility studies on other sites to their current commercial projects. They can also secure access to land and/or offshore areas where OSW energy resources can be harnessed.

1.2.5 Agriculture and Fisheries Modernization Act of 1997 (RA 8435)

Section 109 of the Act provides trade and fiscal incentives to agriculture and fisheries projects for a period of five years from the promulgation of the Act. Such incentives allow duty-free importation of machinery and equipment including renewable energy systems such as solar panels, provided such equipment is for the exclusive use of the importing enterprise.

1.2.6 Build-Operate-Transfer Law (RA 6957, July 1990; amended by RA 7718, May 1994)

This law aims to mobilize private sector resources in financing the construction, operation and maintenance of infrastructure and development projects such as power plants, hydropower projects, water supply, etc. Project proponents are authorized to charge reasonable fees, tolls and rentals for the use of the project facility based on a reasonable rate of return. Projects costing more than one billion pesos are included in the year 2000 Priority Investment Areas and are entitled to incentives provided in the Omnibus Investment Code. This law provides a route for NRE projects to qualify for investment incentives of the BOI. The Masbate wind farm is reportedly being pursued under this scheme.

1.2.7 Clean Air Act of 2000 (RA 8749)

The Act sets emission standards on stationary and mobile sources of greenhouse gases, including power plants. NRE projects are favored to the extent that some of its technologies, such as photovoltaics, have zero emissions. But the Act imposes outright ban on incineration facilities. This may have adverse impact on biomass combustion facilities. Accordingly, the combustion process should be made to attain a very high temperature level for the combustion to be completed and the system to be free of emission.

1.2.8 NIPAS or National Integrated Protected Areas System Act of 1992 (RA7586)

Some areas in the Philippines have been declared protected, thus construction of NRE projects in these sites would require special permit. The Department of Environment and Natural Resources (DENR) issues the Environment Compliance Certificate to all projects that have impact on the environment. For NRE projects that are to be located in areas considered ancestral domain, the proponent must secure permits from the indigenous communities.

1.2.9 DOE Circular No. 2000-03-004

The Circular amends the IRR of EO 215 on “Private Sector Participation in Power Generation” as amended by Circular No. 97-01-001. The amendments relevant to NRE development are the following:

(i) Companies do not have to show a 5-year track record to receive accreditation for NRE generation facilities, provided that the commercial status of the technology has been established and is locally adaptable, or if the project is for self-generation purposes.

(ii) Spinning reserve is required on NRE projects that will be connected to the backbone grid. This is will be evaluated on a case-by-case basis. NRE projects on small grids are not covered by the requirement.

(iii) Thermal efficiency requirement for cogeneration facilities using NRE has been removed.

(iv) Renewable resource power production facilities are exempt from 10-year power purchase requirement and are only required to demonstrate potential net foreign exchange savings.

(v) For projects that supply electricity to a designated utility or user, the power development plan review and approval requirements of the Department of Energy have been dispensed.

1.2.10 DOE Circular No. 2000-10-011

To accelerate the implementation of the Rural Electrification Program, this Circular instituted summary procedures in the approval and subsequent release of the electrification fund to the franchised distribution utility or project implementor. Moreover, Section 2f of the Circular specifies that the electrification of target areas should be accomplished in the least-cost possible manner, which implies adoption of conventional line design or utilization of indigenous or renewable energy sources as may be optimal.

1.2.11 DOE Circular No. 2000-03-003

The Circular amends the 1994 DOE regulation that prescribes the provision of direct benefits to local government units hosting energy resource development projects and/or energy-generating facilities. The amendments streamlined provisions concerning allocation of fund and generation of livelihood projects. Section 7 of the Circular also provides that in cases where the grid type is deemed unavailable for energizing a particular local government unit, the electrification fund may be redirected by the DOE in favor of utilizing NRE system to speed up the electrification of the area.

1.2.12 Electric Power Industry Reform Act

The passage of the Electricity Power Industry Reform Act 2001 is expected to boost the NRE program of the government. This may be gleaned from the Act's Declaration of Policy which states that it is the State policy to promote the utilization of indigenous and new and renewable energy resources in power generation in order to reduce dependence on imported energy.

Two specific provisions of the Act favor NRE systems. First, Section 34 provides the imposition of universal charge on all electricity end-users to be used for missionary electrification, and equalization of taxes and royalties applied to indigenous or renewable sources of energy *vis-a-vis* imported energy fuels. In addition, an environmental charge of P0.0025/kWh will be levied and used solely for watershed rehabilitation and management. Another provision is Section 35 which empowers the President of the Philippines to reduce the royalties and taxes collected from the exploitation of all indigenous sources of energy to effect parity of tax treatment with existing rates for imported coal, crude oil, bunker fuel and other imported fuels.

Apart from these specific provisions, major reforms in the power sector are likely to have indirect effects on NRE projects. In particular, the new law provides that the power generation sector shall be considered a public utility operation. As such, any person engaged in power generation and supply of electricity shall not be required to secure a local or national franchise. Moreover, the new law eschews regulation of electricity prices charged by the generators upon implementation of retail competition and open access. Sales of generated electricity is also to be exempted from value-added tax. While these provisions apply generally to all power generators, these provisions are aimed at reducing the cost of generating power, and eventually the price of electricity to users.

1.3 Financial Implications of Fiscal Incentives

From an investor's standpoint, the incentives afforded to NRE projects are relevant to the extent that they impact on the finances of the project. Specifically, the incentives should be able to reduce the large investment cost that is often regarded a major hurdle in curving a niche for NRE in the rural market. Moreover, NRE projects must be able to realize returns comparable with other investment opportunities. Of course it is not fair to stack up NRE simply against any other business opportunity, since the more important returns from NRE investments actually accrue to the environment. An accurate comparison requires one to impute the costs on the environment of alternative investments. This, however, is beyond the scope of this report. Nonetheless, the financial returns on NRE projects should be reasonably attractive, at least to investors who would inherently place premium on the environment to favor NRE.

There is also interest in minimizing the levelized cost of power. Here again, it is inappropriate to compare cost per kW of NRE systems with grid electricity prices, especially since grid extension is not only prohibitive, but also in some cases, technically infeasible. But the costs of NRE generated power must be able to spur economic activity in the host community.

Except for fiscal incentives, many NRE policies are difficult to translate in monetary terms. Thus the financial impact can only be assessed for a few incentives that have direct impact on the investor's income statement. Then again, what can be legally availed may actually be redundant or difficult to implement in practice. A case in point is the tax credit on domestic capital equipment to which NRE investments are entitled by virtue of the Omnibus Investment Code. The tax credit applies to locally fabricated capital equipment that otherwise would have been imported. In practice, this provision is hardly availed since no clear criteria has been set to determine if a locally fabricated equipment is an "equivalent" of an imported equipment. The matter is often left to the discretion of tax and customs authorities.

A similar problem applies when an investor attempts to avail of exemption from taxes and duties on imported parts that are used in the NRE system. Hitherto, only solar panels have been exempted from tariffs. Other major components of the NRE systems are still levied tariffs between 3 to 20 percent. **Annex II** presents a schedule of import duties imposed on major parts and equipment that are used in the NRE system. To claim relief from these duties, the investor has to convince the tax authority that the components are to be used exclusively in the system. By no means is this an easy feat; it can be costlier than paying the corresponding duties.

Notwithstanding the problem of implementation, it is still a worthwhile exercise to determine the potential impact of the policies on the financial portfolio of NRE investors. A simulation exercise is undertaken for minihydro and gasifier projects.

Four measures are used to assess the financial impact of the fiscal incentives, namely, investment cost per kW, payback period, internal rate of return and levelized cost of generated electricity. The first measure can be obtained straightforward by dividing the front-end costs of the system by its capacity. Payback period is the number of years necessary to generate an income stream sufficient to cover for the investment cost of the system. The economic internal rate of return (IRR) is the interest rate realized from the income stream generated by the system. Finally, the levelized cost discounts the costs of installation, operation and maintenance of the system over its lifetime, and allocating such costs to the output of the system. A capital recovery factor of 12 percent is assumed. Loans related to the investments in the system are also assumed to carry an interest rate of 12 percent, payable over a 15-year period.

1.3.1 Fiscal Incentives on Mini-hydro Projects

The financial impact of some of the major provisions in the Mini-Hydro Power Incentives Act are simulated on a prospective 550-kW mini-hydro facility in Loreto, Dinagat Island, Surigao del Norte. The relevant provisions are:

(i) Special privilege tax rate of 2 percent on gross receipts;
(ii) Tax and duty-free importation of capital equipment, materials and parts;
(iii) A ceiling of 2.5 percent on special realty tax rate on equipment and machinery;
(iv) VAT exemption on gross receipts from electricity sales; and
(v) Income tax holiday for seven years.

The simulation is based on the following assumptions:

(i) The electro-mechanical equipment is imported and levied 3 percent tariff and 10 percent value-added tax.
(ii) The electricity generated by the system can be sold at P4 per kWh;
(iii) Annual electricity generation is 3,018 MWh.
(iv) The cost of equipment and civil works will be financed by a loan carrying an interest rate of 12 percent and payable in 15 years.

Table 1.2 presents the results of the simulation. Fiscal incentives reduced the investment cost by 4 percent; nearly doubled the internal rate of return; shorten the payback period by 3 years; and lowered the levelized cost of power by 3.6 percent. Indeed, the fiscal incentives enhanced the financial profile of the project.

Table 1.2
Impact of Fiscal Incentives on 550-kW Mini-hydro System
(*in pesos, unless otherwise stated*)

	Without Incentives	With Incentives
Investment Cost		
Imported equipment (CIF price: US$269,563)	15,308,921	13,511,845
Civil works	30,126,384	30,126,384
Total	45,435,305	43,638,229
Investment cost per kW	82,610	79,342
Internal rate of return (%)	6.46	12.81
Payback period (*years*)	11.89	8.87
Levelized cost per kWh	3.92	3.78

1.3.2 Fiscal Incentives on other NRE Projects

As discussed in Section 2, the relevant set of incentives for other NRE installations not covered by RA 7156 is found in the Omnibus Investment Code. However, except for income tax holiday, the other incentives have only indirect impact on investment cost, hence difficult to quantify.

The basis of simulation is a 250-kW gasifier, consisting of an imported BG-System Equipment. Since Code has lifted the tax exemption on capital equipment, a 3 percent import tax and 10 percent value-added tax will be paid on the imported gasifier. It is assumed that the generated electricity may be sold at P6 per kWh.

From Table 1.3, the fiscal incentives raised the internal rate of return by 22 percent and advanced the payback period by 1.5 years. The investment and levelized energy costs are not affected.

Table 1.3
Impact of Fiscal Incentives on 250-kW Gasifier
(*in pesos, unless otherwise stated*)

	Without Incentives	**With Incentives**
Investment Cost		
Imported equipment (CIF price: US$214,500)	12,181,804	12,181,804
Civil works	1,430,000	1,430,000
Total	13,611,804	13,611,804
Investment cost per kW	54,447	54,447
Internal rate of return (%)	4.84	5.93
Payback period (*years*)	12.89	11.26
Levelized cost per kWh	6.60	6.60

1.4 Plan of Work

In light of the fiscal incentives afforded to NRE projects and the renewed thrust of the government in rural electrification, the succeeding chapters evaluate the technical and economic potentials of the different NRE systems. For each of these systems, namely, biomass, wind, hydro and solar, the different applications are described. Instructive experiences on current and past installations, as well as government promotions and initiatives on specific technologies are examined.

The main contribution of this study is an assessment of the economic viability of these various systems. In particular, the life-cycle costs of each of the applications are appraised. Biomass systems emerge as the most economically viable, followed by small hydro systems. Given the present state of technology, PV systems would require enormous subsidies if they have to be utilized. The fact however is that among the renewable technologies, PVs are the most flexible and easiest to deploy. Thus, in many instances, PVs are regarded the most viable option in supplying power to rural masses.

BIOMASS ENERGY SYSTEMS

Biomass is a versatile source of energy; it can produce electricity, heat or fuel for transportation and is storable. Production units can vary from small scale up to multi-megawatt size. It is estimated that biomass constitutes the world's fourth largest energy source today and contributes at least 14 percent of the world's primary energy demand. In developing countries, biomass contribution represents at least 35% of primary energy supply. In more developed economies such as the European Union, biomass contribution ranges from 2 to 14 percent.[1]

The Philippines has abundant agricultural residues that are suitable for power generation. The EC-ASEAN COGEN Programme estimated that the volume of residues from the rice, coconut, palm oil, sugar and wood industries at 16 million tons per year. Bagasse and coconut husks and shell can contribute at least 12% of total national energy supply. The World Bank Energy Sector Management Assistance Program estimated that residues from sugar, rice and coconut could produce 90 MW, 40 MW, and 20 MW, respectively, of excess power for export to the grid.[2] Rice husk, has been found by Agrilectric of the United States, of capable of generating one kilowatt for every kilogram of rice husk burned. This is made possible by improving burning efficiency in which rice husks are ground or pulverized and fired as powder fuel.[3]

The Philippine Energy Plan, 1999-2008 envisions the aggregate biomass fuel supply potential to grow from 247.9 MMBFOE in 1999 to 301.5 MMBFOE in 2008, or annual growth rate of 2.2 percent. Bagasse is projected to account for almost half of NRE contribution for commercial/industrial sector. Municipal solid waste is expected to provide 10MW in 2005 and 50 MW in 2008.

Table 2.1
Biomass Fuel Supply Projections
In Million Barrels of Fuel-Oil-Equivalent, MMBFOE

	1998	**1999**	**2004**	**2008**
Rice Residues	7.5	7.7	8.7	9.6
Coco Residues	22.9	23.2	24.8	26.2
Bagasse	17.8	18.1	20.0	21.6
Woodwastes	83.2	84.7	92..1	97.7
Animal Wastes	12.1	12.2	12.8	13.4
Municipal Wastes	98.7	101.9	119.1	133.1
Total	**242.1**	**247.9**	**277.6**	**301.5**

Source: Philippine Energy Plan, 1999-2008

[1] EUREC Agency, *The Future for Renewable Energy, Prospects and Directions.* Section 2.1 draws heavily from this source.
[2] Trade Guide on Renewable Energy in the Philippines, p.7.
[3] Society for the Advancement of Technology Management in the Philippines, *Can the Philippines Become an Energy Exporter by the Year 2020?*. Roundtable discussion on Energy, Monograph Series No. 97-01, p. 32.

2.1 Technology, Materials and Processes

The primary biomass materials include: (i) short rotation forestry (e.g., ipil-ipil) ; (ii) wood wastes(e.g., saw dusts); (iii) sugar crops (e.g., bagasse) ; (iv) starch crops; (v) herbaceous lignocellulosic crops; (vi) oil crops; (vii) agricultural wastes (e.g., rice hull); (viii) municipal solid wastes and refuse; and (ix) industrial wastes.

Figure 2.1 provides an overview of the different materials, processes and end-products from biomass. For purposes of producing electricity, there are four alternative processes, namely, combustion, gasification, pyrolysis and anaerobic digestion. Other processes such as fermentation and extraction can produce liquid biofuels that may be used to run engines. The conversion involves three main processes: thermochemical (combustion, gasification, pyrolysis, liquefaction), chemical (esterification) and biochemical (acid hydrolysis, enzyme hydrolysis, fermentation) processes.

2.1.1 Thermal Conversion

Combustion can be defined as the direct burning of biomass to produce heat that can be used directly (heating or drying) or indirectly (steam turbine) transformed into electrical energy. The amount of heat produced depends on the humidity of the biomass source, the level of excess air required and the degree to which the combustion process is accomplished. Present combustion technology is considered well advanced allowing for various industrial applications. Developed economies view future developments towards large combined heat and power plants. In the Philippines, rice hull, as an abundant biomass resource, has been the subject of several development initiatives. In view of the scattered distribution of the resource, however, the scope of applications has remained limited.

Rice hull thermal conversion processes may be classified into three major process types: (i) direct combustion; (ii) gasification; and (iii) pyrolysis. In the direct combustion process, rice hull is burned in a furnace to produce steam (in a boiler) for use in running a steam engine or a steam turbine, which, in turn, can drive an electric generator. In gasification and pyrolysis, rice hull is converted into combustible gas to fuel internal combustion engines (diesel or gasoline types). The thermal conversion occurs inside a reactor containing the rice hull. In gasification, air is utilized as an oxidant medium of conversion in order to facilitate production of combustible gas. Pyrolysis is done without an oxidant. It is a more energy intensive process, and the gas quality produced is better. The latter process produces liquid and solid (charcoal) by-products. The liquid portion contains methanol, acetone and other organic acids.

Direct Combustion

Not all the heat released by direct combustion of rice hull is absorbed by the water in a boiler; the efficiency is normally between 50% and 90%. If used for power generation, the efficiency can go down to about 20%, albeit this could be improved under a cogeneration scheme where the spent steam can be used for other applications such as drying of palay.[4]

In a direct combustion process, boilers are primordial components of the system. There are two types: boilers with fixed or travelling grates; and boilers with fluidized bed. The first type is

[4] A system installed in Denmark burns 5.3 tons of barley straws to produce 5.1 MW of electricity and 46800 MJ/hr of heat for domestic heating. Cogeneration increased efficiency to 85% from 22.5%.

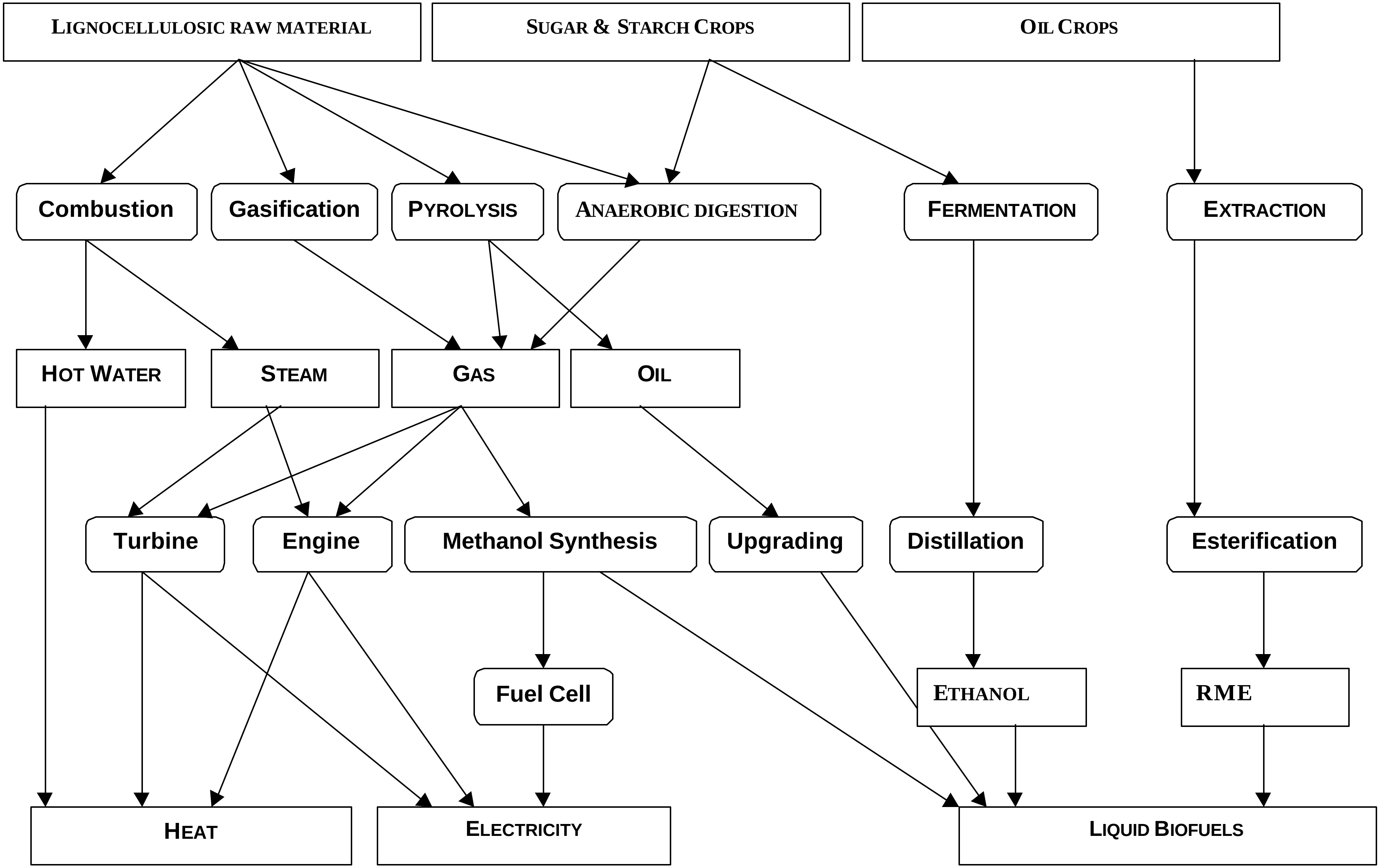

Figure 1. Overview of Processes from Biomass to End-Products

Source: EUREC Agency (1996), *The Future for Renewable Energy: Prospects and Directions*, p.19.

common; they range from household boilers to large scale 50 MW industrial furnaces. They accommodate combustible materials of varying humidity values and granulity. However, these types of boiler do not adapt readily to variations in load. In a fluidized bed boiler system, fluid is passed upward through a bed of solids with a velocity high enough for the particles to separate from one another and become freely supported in the fluid.

Boilers can be further classified as water-tube boilers and fire-tube boilers. Water-tube boilers are more complicated to operate since more rigid treatment of feed water is required. Fire-tube boilers are relatively cheaper, simpler, easier to maintain and thus more practical for rice millers. The steam produced by these boilers is fed into a steam engine or steam turbine, which then is coupled to an electric generator.

Gasification

This process is characterized by incomplete combustion of a solid and gas, where a mixture of combustible gases is diluted in nitrogen (except when gasification is performed with oxygen). The combustible gas components are mainly carbon monoxide and hydrogen [collectibly called producer gas] with traces of hydrocarbons such as methane. These gases could be generated either through a fixed-bed (updraft or downward gasifier) or a fluidized bed gasifier. Downdraft gasifier produces cleaner gas than the updraft unit, and thus is more suitable for internal combustion engines.

One major problem is the use of producer gas is in the elimination of tar that may damage the engine. To address this problem, an elaborate gas clean up system involving scrubbers, cyclones, tar condensers, water scrubbers and packed bed filters is usually employed.

Pyrolysis/Carbonization Process

Pyrolysis is a process of decomposition through the effect of temperature in the absence of oxygen. The products obtained by pyrolysis of lignocellulosic matter are: solids (charcoal), liquids (pyrolysis oils) and a mix of combustible gases. The proportion of each of the products depends on the reaction parameters, i.e., the temperature, heating rate and residence time of the process.

There are major R&D initiatives on the production of pyrolysis oils, which have the advantage of being easier to handle than the starting biomass and have a much higher energy density. It is estimated that up to 80% weight liquid may be obtained from biomass material through fast or flash pyrolysis at moderate reaction temperatures. These liquids, also referred to as bio-oils or bio-crudes, are intended to be used in direct combustion in boilers, engines or turbines. However, bio-fuels contain unwanted characteristics such as poor thermal stability and heating value, high viscosity and corrosivity.

2.1.2 Chemical Processes

Esterification

Esterification is the chemical modification of vegetable oils into oil esters that can be used as biofuels in engines. Oils are extracted from oil crops, e.g., rapeseed, coconut, sunflower, and made to undergo esterification to adapt the vegetable oil to the requirements of diesel engine. The introduction of alcohol and a catalyst (sodium hydroxide or potassium hydroxide) eliminates glycerides. Methyl esters are formed when methanol is used while ethyl esters are formed if ethanol is used. It is estimated that 1 ton of methyl ester can be produced from 3 tons of rape seed.

2.1.3 Biological/biochemical Processes

Biological processes include anaerobic digestion, acid and enzyme hydrolysis and fermentation. Anaerobic digestion of wastes to produce methane is a mature technology for waste treatment. Methane can be used for direct burning or for internal combustion engines. A kilo of dry solids can produce 0.2-0.3 m^3 of biogas.

The main product from acid and enzyme hydrolysis, fermentation and distillation is ethanol. Ethanol can be used as fuel for engines either in its pure form or in mixture with gasoline. The technology for acid hydrolysis, fermentation and distribution are already in commercial stage, especially for sugar and starch substrates. Acid and enzymatic hydrolosis of cellulosic substances still need strong R&D support.

2.2 Biomass Installations and Development Initiatives

Biomass constitutes the largest NRE systems installations in the Philippines. In 1999, out of the 42,872 operating NRE installations, 40,735 (95%) are biomass systems. This represents a modest growth of 10% over 1998 installations, and constitutes 99.91% of NRE energy in terms of fuel oil equivalents (MMBFOE). In 1999, biomass was estimated to contribute 70.27% MMBFOE in the NRE sector, and further forecasted to grow to 88.84% by year 2008.[5] While the contribution of biomass to energy generation has been substantial, utilizing biomass for generating electricity remains on the R&D and demonstration phases.

Table 2.2
Installations of Biomass Systems in the Philippines

System	Units
Biogas	374
Biomass-fired Boilers	177
Gasifiers	19
Cookstove	4,720
Biomass-fired Dryers	14,958
Biomass-fired Furnace	18,378
Other Biomass	2,109
Total	**40,735**

Source: NESCON.

In terms of capacity, 19 operating gasifiers have aggregate capacity of 307 Hp; 307 biogas digesters have a combined 4,728 cubic meters of digester capacity, and 177 operating biomass-fired boilers are capable of generating an estimated 30,535 kW energy.

[5] Quejas, Reuben E.T. *Philippine Renewable Energy Policies and Opportunities for Development*. International Workshop on Energy Efficiency, Cebu City, 21-22 June 2000.

Table 2.3
Operating Biomass Energy Systems in the Philippines
By region, 1999

	Units	Capacity
Biogas system		
CAR	22	96.8
I	20	80.6
II	19	92.0
III	105	552.3
IV	67	249.2
V	7	44.5
VI	16	186.1
VII	49	191.9
VIII	5	1.1
IX	24	67.5
X	9	84.5
XI	27	3,065.5
XII	1	0.3
XIII	1	15.0
ARMM	2	0.6
Total biogas systems	**374**	**4,727.9 cu m**
Biomass-fired boilers		
I	1	-
II	2	111.3
III	6	1,179.1
IV	14	5,168.9
V	2	-
VI	63	10,342.8
VII	22	2,761.6
VIII	8	740.0
X	10	447.4
XI	18	5,646.6
XII	2	604.0
XIII	27	3,433.7
ARMM	2	100.0
Total biomass-fired boilers	**177**	**30,535.5 kW**
Gasifiers		
III	1	8.9
VI	3	71.5
VIII	4	215.0
IX	1	7.4
XI	1	0.0
XII	1	0.3
ARMM	8	3.5
Total gasifiers	**19**	**306.7 Hp**
Total biomass installations	**570**	

Source: NESCON.

Table 2.3 provides the regional breakdown of operating biomass Systems. Central Luzon (Region III) has the most number of biogas installations, 105 units, but Davao (Region XI) have the largest capacity, 3,065 cu.m. For biomass-fired boilers, the installations are concentrated in

Western Visayas (Region VI) that has 63 units, accounting for total capacity of 10,342 kW. This could be traced to the presence of sugar mills in the area that utilize bagasse as fuel. For gasifiers, Region VIII or Eastern Visayas has the largest operating capacity at 215Hp.

Two-thirds of biogas systems uses manure; they account for 41 percent of installed capacity. The other biogas systems use industrial wastes. For biomass-fired boilers, bagasse, coconut and woodwaste are the common fuel used. The characteristics of typical biogas, biomass-fired boiler and gasifier in the Philippines are presented in the following tables.

Table 2.4
Average Configuration of Operating Biogas System
By fuel type

	Manure (237 installations)	**Industrial Waste** (137 installations)
Total digester capacity (cu. m.)	158.7	77.2
Years in operation	12.2	9.6
Operating hours per day	1.7	1.4
Operating days per year	105.0	94.7

Source: NESCON.

Table 2.5
Average Configuration of Operating Biomass-fired Boilers
By fuel type

	Bagasse (98 installations)	**Coconut** (22 installations)	**Woodwaste** (48 installations)
Rated output (kW)	200.2	160.4	140.6
Ann. energy generated (kWh)	878,761.2	78,444.4	0.5
Biomass used per day (tonnes)	1,071.5	182.3	173.1
Operating days per year	127	166	120

Source: NESCON

Table 2.6
Average Configuration of Operating Gasifiers
By fuel type

	Charcoal (6 installations)	**Coconut** (6 installations)	**Other Biomass** (7 installations)
Rated capacity (Hp)	37.4	0.4	11.4
Gas output (cu m/kg)	18.3	1.8	9.9
Fuel input (kg/hr)	130.2	45.8	138.9
Operating hours per day	8.3	15.3	7.0
Operating days per year	95.4	360.0	213.1
Years in operation	8.8	11.0	8.2

Source: NESCON.

The Biomass Atlas

The development and publication of the *Biomass Atlas of the Philippines* is a significant milestone towards rationalizing biomass development in the Philippines. The *Atlas* is a consolidation of biomass resource data that converts various information into a convenient form for analysis and project development.

Developed by the Philippine Biomass Energy Laboratory of the University of the Philippines Los Banos, with the support of the USAID and the Philippine DOE, the Atlas identified major production regions for six biomass resources, namely: rice hull, bagasse, coconut residues, animal manure, forestry wastes and urban refuse. The main feature of the Atlas is the development of Geographic Information System (GIS)-based maps (regional, provincial & municipal) that could be linked to automated programs of the US National Renewable Energy Laboratory. Moreover, the processing centers that can serve as point sources of biomass resources were identified using a differential global positioning system (DGPS). The use of DGPS provides a more accurate estimate of the biomass resource, transport distances and relevant costs. The database covers ten years starting 1990. Data validation included ground verification, hence a high confidence level can be placed on the resource estimates. Table 2.7 shows the breakdown of estimated biomass resource by region.

Table 2.7
Philippine Biomass Resources, 1999
In Metric Ton

Region	Rice hull	Bagasse	Coco shell	Coco husk	Coco coir
CAR	44.3			0.4	0.3
I	216.4		14.9	33.0	23.1
II	341.8	55,591.4	86.2	16.0	134.0
III	368.5	392,732.9	546.7	1.1	850.0
IV	241.5	521,779.1	65.0	740.3	101.1
V	144.0	74,836.3	7.2	252.9	11.2
VI	306.3	3,441,250.8	0.5	97.4	0.8
VII	41.7	687,724.0	333.1	136.9	518.2
VIII	101.3	183,257.9	114.2	509.6	177.7
IX	65.2		43.8	539.0	68.2
X	66.4	426,274.4	61.6	191.5	95.8
XI	136.2	135,649.9	229.3	1,214.9	356.7
XII	159.8	66,742.9	242.6	144.5	377.0
XIII	56.0		43.0	95.5	66.8
Philippines	**2,357.3**	**5,985,840.5**	**1,948.9**	**4,330.8**	**3,031.6**

Source: Biomass Atlas of the Philippines, 2000.

2.3 Major Biomass Installations

FBC--Asia Rattan Co., Inc.[6]

An example of Biomass combustion technology using Fluidized Bed Combustion (FBC) process is a project of the ASEAN-AAECP III Project on Energy from Biomass Residues. The FBC technology has been effectively demonstrated at the Asia Rattan Co., Inc. based in Angeles City, Pampanga. Asia Rattan claims that it is the only successful FBC in Asia; counterpart projects in Indonesia and Vietnam have remained non-operational. Asia Rattan's FBC technology is used for the production of combined heat and power utilizing biomass residues (sawdust, rattan shavings, woodblocks/chips). The boiler is rated at 130kWt (about 200kg/hr-steam rate @ 1 bar) using

[6] ASEAN-AAECP III Project—Energy from Biomass Residues, "Design Workshop I—Biomass Fired FBC CHP Plant Design", Philippines' Project.

sawdust and rattan chips as fuel. The FBC system is connected to the factory's process steam system which is used for drying of handicrafts, heat treatment of rattan and live steam heating of rattan bleaching. The small scale system costs P3.97million with a payback period of 2.15 years. It was meant to displace 230,400Kwh of electricity at a cost of P3.08/kwh.

A similar unit was fabricated by Asia Rattan with a higher rating of 300kWt (about 400 kg/h steam rate @ 10 bar) which is being used in another production line. However, power generation still awaits the replacement of the generator provided by Australia, which is rated at 440 volts instead of 220 volts. Asia Rattan is confident that electricity will be generated once the replacement arrives. This unit was estimated to cost P28.5 million with payback of 2.76 years and a yearly electricity savings of 2,304,000kwh.

2.3.2 Biomass Gasification—DA-Philrice

This rice hull gasification system has been proven useful for a wide range of applications (irrigation, grain milling and drying), as it produces an alternative fuel which can effectively substitute 100% of gasoline and 30-70% of diesel for running a spark ignited and compression ignition engine, respectively. Except for the addition of producer gas and combustion air mixer, no major modifications are needed to run these engines.

The PhilRice design is similar to the one being commercialized in India (Ankur Scientific Energy Technologies Pvt., Ltd.) and commercialized by BG Technologies (US). The original design was conceptualized by Dr. Valentino Tiangco, formerly of the International Rice Research Institute (IRRI) and now at the University of California at Davis. Indian researchers also worked in that lab, thus, the similarities in the design.

2.3.3 Communal Biogas System

A community-based biogas system can be found in a number of municipalities involved in hog and poultry farming in Batangas. In the four municipalities of Lemery, Ibaan, San Jose and Batangas City, the SIBAT (Sibol ng Agham at Teknolohiya) has identified 15 biogas operating units. The projects were introduced in 1993 through the collaboration of the municipalities and the Cavite State University-ANEC. Utilizing manure from hog and poultry farms, the system is used for cooking, heating and lighting. Most of the biogas are of the fixed dome model measuring 6-8 cu. meters and installed at costs ranging from P10,000 to P40,000. The largest unit (40 cu.m. fixed dome) operates in Lumil, San Jose in a 5000-7000 chicken farm and cost P40,000.

The Taneg Biogas System in Mankayan, Benguet is another SIBAT-assisted project on biogas production and utilization from hog manure. It is a communal type involving three biogas units that would benefit 16 households. Aside from providing energy for cooking, the system will provide fertilizer and feed materials. The project, presently under construction, will cost P164,000 when completed.

2.3.4 ITDI-Initiated Rice Husk Gasifier Combustor

The Fuels and Energy Division of the Industrial Technology Development Institute has initiated a number of rice husk gasifiers. These include a small scale brickmaking and pottery project in Sto. Nino Ceramic Producers Association in San Jose City, Nueva Ecija, another pottery project in Sta. Barbara Pottery in Victoria, Tarlac and in Lezo, Aklan, brick plants in the Capisan Multi-

Purpose Cooperative Inc. in San Dionisio, Iloilo; the Hinterwealth Agro-Industrial Corporation in Tanauan, Leyte; the Dinalupihan Brick Plant in Bataan, and the San Isidro Brick Plant in Isabela.

Several palay drying facilities were installed. The Norala Foundation in South Cotabato adopted the rice hull gasifier-combustor for palay drying. A project with Philippine Rice Research Institute on rice hull flat bed drier system has been completed while an R&D facility has been set up in IRRI, Laguna.

ITDI has converted wood-fired kilns to rice husk gasifiers combustor fed kiln. In Maasin, Leyte a 1.5 cu.m. wood-fired periodic type kiln using four (4) units drum size gasifier-combustor was converted to rice husk gasifier. At the University of Southern Mindanao, North Cotabato, a wood-fired brick kiln has been converted to rice husk gasifier combustor. In Paete, Laguna rice husk gasifier has resulted in quadrupling production of papier mache by accelerating drying to one hour instead of the 8-hour sundrying. An innovator in Abucay, Bataan has coupled the rice husk gasifier combustor to a mechanical drier and through a heat exchanger and furnace assembly has successfully produced clean hot air. In Kanaga, Ormoc a drum size rice hull gasifier combustor is used as heat source for the extraction of citronella oil.

2.3.5 Bagasse Power Plant

The use of sugarcane bagasse for energy generation has been demonstrated in the sugar provinces of Negros. Victorias Milling Co. has a rated capacity of 15,000TCD producing 263,514 tons of bagasse. Victorias has been utilizing its bagasse to generate its heat and steam requirements. The company plans to expand NRE utilization by establishing a power plant based in VICMICO. Initial phase of the plan calls for generation of at least 32 MW of power. Of these output, at least 20 MW will be sold to the Seneco grid.

For its part, the UPLB Biomass Laboratory has drawn a proposal to establish two biomass plants in Negros. The first plant with a rated capacity of 221MW, to be located in Victorias, will utilize 1,114,432MT of bagasse per year. Total plant cost is estimated at P10.3 billion and a payback period of 12 years. Revenues are forecast at P871 million/yr. Electricity will be priced at P1.50/kWh. The second plant will cost P4.78 billion with a rated capacity of 97MW and payback of 18 years. Revenues are estimated at P263 million per year. The plant will utilize 488 tons of bagasse.

2.4 Fiscal measures applicable to biomass energy system

Several measures have been formulated to promote NRE research, development and utilization. RA 7638, or the DOE Law, and RA6395, amending the NPC charter, cited NRE development as instrumental to indigenous energy generation. However, the major impetus to NRE development emanate from PD 1068 that contains specific provisions on incentives and priority in financing. These provisions have however been superseded by the Omnibus Investment Code or EO 226. The more recently promulgated Agriculture and Fisheries Modernization Act, RA 8435, also provides tax and tariff duty exemption to all types of agricultural and fisheries inputs, equipment and machinery such as renewable energy systems.

Biomass power projects are eligible for BOI registration on a pioneer status since the development of renewable energy sources remains in the List of Priority Investment Areas. The Omnibus Investment Code provides, among others, the following incentives to registered enterprises: (i) 6-year income tax holiday; (ii) additional deduction for labor expenses; (iii) exemption from contractors tax; and (iv) infrastructure expenses deduction from taxable income.

RA 8749, the Clean Air Act, addresses the problem of air pollution coming from mobile and stationary sources. The law subdivides the country into airsheds and prescribes emission standards accordingly. The Act embodies the policy of promoting environment-friendly facilities, which potentially favor renewables over conventional energy systems. But one contentious provision of the law pertains to the ban of incineration plants. The ban in effect favors the use of gasifiers versus direct combustion technologies. While several sectors have raised alarm on the ban, citing the possibility of widespread burning of trash instead of a centralized and contained incineration plant, the DENR-EMB has been steadfast in implementing the law to the letter.

2.5 Economics of Biomass

2.5.1 Gasifier

Gasifiers generate electrical power that is not much different from direct combustion system described previously. Table 2.8 compares imported gasifier with locally fabricated system. The imported system pertains to the 250-kW of BG Technologies. The CIF price of the equipment is quoted at US$214,500, and an additional P14.3 million would be needed for civil, electrical works, systems design, installation, training and commissioning. The annual operating cost and maintenance expense could go up to 10% of initial cost. BG Technologies claims the system can produce at US$0.10/kWe.

Investment cost per Kw for imported gasifier would be cheaper than rice hull thermal power plant and would approximate the cost of bagasse plant. For smaller capacities, however, the savings could be more than half because used engines could be utilized. Levelized cost could go down to P3.43/kwh for a 10kW system compared to P6.60/kwh for the 250kW system.

Table 2.8
Economics of Imported vs. Locallly Fabricated Gasifier

	Imported Gasifier	Locally Fabricated Gasifier
Capacity (kW)	250	10
Investment cost	13,611,804	214,700
IC per kW	**54,447**	**21,470**
Operation	1,361,180	42,940
Maintenance	1,218,180	19,000
Life-cycle cost	41,047,543	851,645
LC per kWh	**6.60**	**3.43**

A locally fabricated gasifier of 10kW would be more expensive compared to a rehabilitated ethanol power genset on a per kW basis. The ethanol plant also comes out with a much lower levelized cost: P1.91 vs. P3.43/kwh. Total investment cost for a locally fabricated gasifier would be the same for the rehabilitated ethanol plant.

2.5.2 Biogas Digester

The most cited work on biogas has been that of the Maya Farms for its large-scale continuous split type biogas systems using floating gas holder. Since Maya Farms has ceased operations, there has been no report of large-scale utilization of biogas for power generation. Numerous small-scale systems utilizing different designs have been reported with intermittent power generation but not for village power.

Table 2.9 presents comparative investment costs for two locally popular designs: metal elevated tank and rectangular concrete commercial type. The first involves a digester of 100-head capacity while the second is designed for 300 heads. The corresponding costs are P300,000 and P865,000, respectively. Operating the first type would involve 4 persons only, while the 300-head system would need 10 persons excluding those for the piggery operation itself. The annual operating cost may be assumed to be about 20% of the initial cost. Maintenance and repair expenses could go up to 10% of the initial investment as well.

Using biogas digester to generate power would require investment cost amounting to about P50,000 per kW. The cost difference is not material albeit there are marginal savings in terms of levelized cost per kWh. Since used engines can be utilized for both systems, there would be no tariff costs to reckon with.

Table 2.9
Economics of Biogas Digester

	Commercial	Elevated Tank
Capacity (kW)	18	6
Investment cost	865,000	300,000
IC per kW	**48,056**	**50,000**
Operation	173,000	60,000
Maintenance	78,500	26,500
Life-cycle cost	2,562,826	904,122
LC per kWh	**5.22**	**5.53**

2.5.3 Ethanol Plant

The continuing rise in prices of petroleum-based fuels provides economic justification for a fresh review of the potential of ethanol production from sugarcane molasses, coconut and nipa sap, among others. The production cost of ethanol (based in sugar-cane) in other countries has gone below the US$1/gallon (P13.21/liter). Ethanol produced from corn costs a little more than US$1.2/gallon (P15.85/liter). While the technological development of ethanol use for power generation in other countries is reportedly more advanced, local demonstration has not gone to commercial stage on account of lower cost of petroleum fuel in the past. The following discussion therefore pertains to a theoretical ethanol power plant.

When the production cost barrier for ethanol has gone below that for gasoline, the limiting step for its technical feasibility for power production is the cost of a modified engine running on ethanol and the of the generator. The highest available engine-generator rating in the local market is only 12-kVA that cost about P472,000. This would involve brand new Honda 4-cylinder engine with a rating of 100hp or 75kW that costs P336,000 and a brand new 12-kVA generator costing P136,000. If surplus genset is used, investment cost would be reduced by about two-thirds. Costs of other equipment and peripherals such as distilling column, boiler and control systems would be the same for both options. Operating expenses are about the same for both systems while maintenance expenses for the brand new units are lower by about 50 percent compared to a rehabilitated genset.

Table 2.10
Economics of Ethanol Rehab vs. Brand New Ethanol Power Plant

	Rehabilitated power gen	Brand new power gen
Capacity (kW)	12	12
Investment cost	215,000	612,000
IC per kW	**17,917**	**51,000**
Operation	43,000	43,000
Maintenance	16,500	8,250
Life-cycle cost	624,660	827,093
LC per kWh	**1.91**	**2.53**

Two ethanol plants, one using a rehabilitated, another a brand-new generator, are compared in Table 2.10. The life-cycle cost and the levelized cost of a rehabilitated genset is 25% lower than that of a brand new genset. In a rural setting, maintenance differentials and difficulty of getting replacement parts would favor installing brand new generator set.

2.5.4 Biomass Thermal Power Plants

Several models have been designed locally to utilize biomass for power generation. Most notable are those involving rice hull and bagasse, two of the most abundant agricultural resources in rural areas. However, there is yet no operating biomass power plant in the Philippines for which actual data can be used as basis. Previous biomass power projects such as the 1,920-kW Southern Philippines Grains Complex Power Plant, the 2.1-MW NFA Rice Hull Fired Steam Power Plant in Iloilo, and PNOC's 22-kW Pilot Power Plant, have not been successful.

The data used in the simulation are based on the Biomass Atlas of the Philippines which provides estimates on available biomass resource, costs of transporting biomass fuel, and prices of technologies. The estimates have been carefully validated using ground data of operating rice or sugar mills within a certain economical radius of potential sites. In addition, the use of Differentiated Global Positioning System increases the reliability of the estimates, especially on transport costs which were based on actual road network in rural areas. Nonetheless, the estimates remain theoretical as the feasibility of setting up renewable power plants of this magnitude in rural areas remains to be proven.

Tables 2.11 and 2.12 present the economic viability of rice hull-fuelled thermal power plants to be located in the province of Isabela. The rice hull will be sourced from 71 mills operating within a radius of 10 and 15 kms from Santiago and Cabatuan, respectively. Bulk density of rice hull is set at 125kg/cu.meter; one truckload can carry 25 cu.m or 3.2MT per trip, while transporting the rice hull will cost P63.75/km. Given the seasonality of rice farming, the mills are assumed to operate at 8 hours/day for 210 days or 7-month operation. The power plants are assumed to operate 24 hours per day for 365 days/year. The heating value of rice hull is equal to 16.80MJ/kg. The capacities of the plants were based on maximizing available resource to sustain year-long operating cycle. Thus, the Santiago plant will be fed out of the 12,489 MT generated by mills around the plant which will involve almost 4000 trips at a cost of P1.8 million. The Cabatuan plant will utilize 23,093MT of rice hull involving more than 7000 trips that will cost P6.6 million in freight charges.

The 3-MW Santiago plant will cost P311 million or about P103,667/kW of installed capacity. It will generate revenues of P43.7 million/year against an annual operating cost of P38 million or about P5.7 million profit per year. Materials cost is estimated at P1.87 million, while operating and maintenance expense is estimated at 0.5% of plant cost or P1.4 million. Financial charges would amount to P32.9 million based on interest rate of 10% for 20 years amortization. Its life-cycle cost is estimated at P584.2 million and levelized cost at P2.98/kwh.

The 6-MW Cabatuan plant will cost P436.5 million or P82,750/kW of installed capacity. Annual net profit is estimated at P16.2 million from revenues of P80.8 million and operating cost of P64.6 million. Materials will cost P3.4 million while operating and maintenance expense will be about P2.2 million. Interests charges would amount to P52.5 million at 10% for 20 years amortization. The life cycle cost is estimated at P961.89 million and the levelized cost would be P2.45/kwh.

Table 2.11
Economics of Rice Hull Biomass

	Rice Hull-1	**Rice Hull-2**
Capacity (MW)	3	6
Fuel	rice hull	rice hull
Location	Santiago City, Isabela	Cabatuan, Isabela
Investment Cost	311,000,000	436,500,000
IC per kW	**103,667**	**82,750**
Transport	1,833,932	6,385,500
Materials	1,873,368	3,441,312
Operation & Maintenance	1,400,000	2,235,000
Life-cycle cost	584,229.6	961,893
LC per kWh	**2.98**	**2.45**

For the bagasse power plant, two sites were considered: plant 1 with a theoretical size of 220MW to be located in Victorias, northern Negros, and a 97-MW second plant in southern Negros. Bagasse will come from 18 mills with a total rated capacity of 98,729 tons canes per day (TCD). The Victorias plant will be served by 1,114,432 DM bagasse tonnage from 14 mills; the second plant will utilize 488,016 DM bagasse tonnage from four mills. The bagasse will be loaded on trucks at 30 tons per truckload-trip. Transport costs are estimated atP63.75/km

The 220-MW Victorias plant will involve 3 generating units (2 x 85MWe and 1 x 60MWe). The 85MW system costs US$82.93 million while the 60MWe costs $63.64 million. In terms of $/MW, the latter is more expensive at $1,060/kW versus the bigger unit at $975/kW. The 94-MW southern plant will also involve three generating units (85MW, 6MW, 3MW). The huge investment was meant to maximize the available resource in the area.

The proposed thermal plants would be operating 365 days per year at 50% efficiency. Bagasse has a heating value of 12.5MJ/kg. The electricity generated will be priced at P1.50/kwh. The first plant will cost P11.47 billion (or P52,159/kW). Life cycle cost would amount to P26.25 billion while levelized cost will be lower at P1.82/kwh.

For the second plant, the project total cost amounts to P4.95 billion (P52,702/kW or not much different from the first plant). Life cycle cost would about half of the first plant at P12.67 billion, levelized cost would amount to P1.95/kwh.

Facilities that use rice hull as fuel for combustion could have smaller investment cost but higher levelized cost of power compared to facilities that utilize bagasse. In terms of investment per kilowatt, however, the use of bagasse is more economical, although the investment required is huge in order to realize scale economies. The levelized costs between the two bagasse plants exhibit not much of a difference and are more economical than those of rice hull thermal power plants.

Table 2.12
Economics of Bagasse Biomass

	Bagasse-1	**Bagasse-2**
Capacity (MW)	220	94
Fuel	sugarcane bagasse	sugarcane bagasse
Location	Negros	Negros
Investment Cost	11,475,000,000	4,954,000,000
IC per kW	**52,159**	**52,702**
Transport	421,031,149	270,638,893
Materials	344,883,364	150,956,399
Operation & Maintenance	51,640,000	24,770,000
Life-cycle cost	26,255,603,872	12,014,324,022
LC per kWh	**1.82**	**1.95**

2.6 Future Prospects and Barriers to Biomass Development

Several biomass power plants are being proposed based on the country's resource distribution identified in the Atlas. They form the bases for the comparative cases enumerated above. The more attractive options include: (i) the bagasse power plants in Negros; (ii) the rice hull-based power plant in Isabela; and (iii) a coconut shell-powered plant in Sariaya, Quezon.

Yet the realization of these projects hinges in overcoming the major barriers to biomass development. Foremost is the inadequate local capability to manufacture, operate and manage biomass-fueled power plants. Local R&D on biomass energy system is nascent. For power generation, the reliability of operation has to be demonstrated, otherwise the local market will not develop as fast. Foreign technologies are sometimes ill-suited to local conditions; local adaptation remains a challenge.

The problem of biomass fuel supply availability becomes more acute when considering large biomass power plants. Compounding the problem are high transport costs and moisture content of the raw material.

There is also difficulty in developing the local market for biomass. For example, while rice mill operators are ready market for rice-hull fueled power plants, they have remained dependent on

power facilities fueled by diesel. The need to develop market standards for the quality of fabricated equipment and systems through an accreditation system has long been recognized, but remains unrealized.
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Finally, while the present prices of biomass residues and wastes are low, it should be recognized that these materials have other alternative uses. Thus, one may expect that their prices will go up when these materials are harnessed on a large scale for power generation. When this happens, the economics of the project would have to change, but it is not expected to materially diminish the competitive status that biomass currently enjoys against other conventional fuel.

SMALL HYDRO POWER

Hydro power is considered the largest and most mature application of renewable energy. The installed capacity worldwide is estimated at 630,000MW, producing over 20% of the worlds electricity. In the European Union, hydro power already contributes at least 17% to electricity supply. Translated in terms of environmental costs, the hydro installations in the European Union are instrumental in avoiding 67 million tons of CO2 emissions annually.

The developments in large-scale hydro power have resulted in misconception that there is limited scope for further technical innovations for small hydro power. However, there is considerable scope for improving the cost-effectiveness of small hydro power (SHP) systems especially with low-head systems, both through technical and non-technical innovations.[1]

There is still no international consensus on the classification of large and small hydro systems. The European Small Hydro Association however has accepted the benchmark of 10MW and below for small systems. In the Philippines, RA 7156 defines mini-hydro systems as those installations not less than 101kw nor more than to 10MW. By inference, micro-hydro systems consist of installations up to 100kw. SHPs are mainly 'run-off-river' systems requiring insignificant water impounding, constructing of dam and reservoirs. They are therefore considered environmentally benign forms of energy generation. It is estimated that a 5-MW SHP plant can replace annually 1,400 tons of fossil fuel, and avoid emissions of 16,000 tons of CO2 and more than 100 tons of SO2, while producing electricity for 5,000 families.

In the Philippines, the Mini-Hydro Division, Energy Utilization Management Bureau of the DOE has identified 1,081 sites with potential capacity of 13,426MW. There are 51 operating installations with an aggregate rated capacity of 82 MW; still in the pipeline for development until year 2008 are installations with a total capacity of 76.8MW. NRE demand projections for the hydro sector is placed at 0.21 MMBFOE in year 2000 and increasing to 0.29 MMBFOE by 2008.

[1] EUREC Agency, *The Future for Renewable Energy: Prospects and Directions*. p.100.

Table 3.1
Philippine Hydropower Potential

Status	Type	No. of Plants/Sites	Capacity MW	Capacity %	Annual Energy GWh	Annual Energy %
Definite Design	Large	3	1,130.00	8.42	3,312.03	7.63
	Small	2	43.00	0.32	211.10	0.49
	Mini	40	55.98	0.42	245.19	0.56
	SUBTOTAL	45	1,228.98	9.15	3,768.32	8.68
Feasibility Study	Large	17	3,229.80	24.06	10,617.52	24.45
	Small	41	873.10	6.50	3,113.05	7.17
	Mini	25	88.72	0.66	388.59	0.89
	SUBTOTAL	83	4,191.62	31.22	14,119.16	32.51
Pre-FS and Desk Study	Large	37	4,646.00	34.60	11,957.00	27.53
	Small	93	1,720.95	12.82	6,676.54	15.37
	Mini	823	1,638.91	12.21	6,906.60	15.90
	SUBTOTAL	953	8,005.86	59.63	25,540.14	58.81
Total		**1,081**	**13,426.46**	**100.00**	**43,427.62**	**100.00**

Source: *Guide on Mini-Hydropower Development in the Philippines*, Mini-hydro Division, Energy Utilization Management Bureau, Department of Energy, February 1999.

3.1 Technology and Process

Hydro power system requires the creation of an artificial head of water so that water can be diverted through a pipe (penstock) into a turbine where it discharges, usually through a draft tube or diffuse back into the river at a lower level. Different types of turbine have been developed to cope with different levels of head and flow. There are generally two general categories: impulse turbines and reaction turbines.

In impulse turbines (e.g., Pelton), a jet of water impinges on the runner that is designed to reverse the direction of the jet and thereby extract momentum from the water. Reaction turbines (e.g., Francis and Kaplan), run full of water and in effect generate hydrodynamic "lift" forces to propel the runner blades. The sizing of turbines should be adapted to the flow characteristics of the river or water stream to be used. The amount of energy captured depends on the sizing strategy. The larger the turbine at site, the poorer is its load factor (or capacity factor) as it will only run at rated power for a shorter period. A turbine designed to utilize minimum flow can only have a load factor approaching 100%, but it will extract less energy than a larger turbine. A technological innovation that captures variations in the flow and volume of water can therefore maximize capacity throughout the seasons. It will also dispense with the need to employ different sizes of turbines, and therefore reduce the investments costs. Such an innovation, developed by the Dela Salle University, is highlighted in the later section of this report.

3.2 Installations and Development Initiatives

The DOE has identified 436 potential sites for microhydro (100kW and below) systems development with a total capacity of 29.06MW. Another 888 sites can be developed for minihydro (100kW to 10MW) installations with a total capacity of 1,784MW. The NEA shepherds 15 operating minihydro projects with an aggregate capacity of 21.23MW. Feasibility studies have been conducted by the NEA for 45 sites, while 25 sites have undergone initial studies.

Table 3.2
Operating Small Hydro Installations in the Philippines
as of 30 April 2001

Region	Units	Capacity (kW)
Micro-hydro (100 kW and less)		
CAR	54	370.31
I	1	20
II	5	3.2
III	2	2.04
IV	2	2
V	2	4
VI	14	16.75
VII	6	16.65
VIII	3	23
IX	4	0.8
X	4	11.1
XI	2	25
XII	3	100
Total Micro-hydro	102	594.85
Mini-hydro (101 – 10,000 kW)		
CAR	14	37,950
I	1	4,550
II	3	8,520
III	1	300
IV	4	2,795
V	5	5,160
VII	6	8,720
VIII	2	2,080
IX	2	950
X	4	9,400
XI	2	2,700
ARMM	1	1,500
Total Mini-hydro	45	84,625
Total small hydro installations	147	85,219.85

Source: NESCON; Mini-hydro Division, Energy Utilization Management Bureau, Department of Energy; Survey returns.

At present there are 45 operating minihydro installations with an aggregate capacity of more than 84MW. For the period 2000-2008, close to 77MW of planned capacity is targeted for the minihydro system. For microhydro system, there are presently 102 operating installations with an aggregate capacity of 594kW. Most of the mini and microhydro systems are expectedly located in the mountainous area of the Cordellera Administrative Region.

3.2.1 Some Major Small Hydro Installations in the Philippines

1.5-MW Matling Mini-hydro Project in Malabang, Lanao Sur

Pressures from international competition drove the Matling Industrial and Commercial Corporation (MICC) to replace its 30-year old, four (4) units of 250-KW diesel-fed generators with a 1.5MW mini-hydro power facility. The mini-hydro system utilizes the 6 cu.m./sec flow of water and 35 meters head from the Matling River. (Matling River's potential is estimated at 10MW) The project, which was completed in May 1995, is the first of its kind in the Autonomous Region of Muslim Mindanao and a classic case for off-grid electrification. It energizes the 3000 hectare MICC compound including the Malabang town surrounding the complex.

The dam intake is placed at an elevation of 320 m. and the catchment area at this point is 330 sq. km. The headrace passes on the right bank looking upstream. The water that generates power drops to elevation 280 m. for a gross head of 40 m. Two-750KW generators were set up based on an original plan to use 750 KW internally and sell the other half to NAPOCOR.

The present value of total development cost is estimated at P70 million composed of P26 million for electro-mechanical equipment sets and the balance of P44 million for civil works. Annual operating cost is estimated at P1.25 million and maintenance cost at P2.69 million. At a conservative estimated useful life of 20 years and capital recovery factor of 12%, the life cycle cost would amount to P153 million while levelized cost is estimated at P1.71/kwh. Payback was estimated at only 4 years.

960-kW Inarihan Mini-hydro Project in Camarines Sur

The Inarihan Mini-hydro power plant, located in the outskirts of Naga City and operated by the Bicol Hydro power Corporation, is the first project implemented under RA 7156. The project was launched in February 1996 and was completed two years after. The project is a run-off-the-river scheme utilizing a 1.80-meter high concrete boulder filled weir across a 30-meter wide river. Water in the amount of 1.52 cu.m./sec., passes an intake structure and proceeds to a 0.90 m diameter, 1.6 km-long polyethylene plastic pipe. From the pipeline, water will be temporarily stored in a 55-meter long by 36-meter wide by 4-meter deep concrete lined forebay before it goes to a 0.70-meter by 289-meter long steel high pressure penstock. The water then proceeds to three-Francis type turbines located at 86 meters below the power intake structure. The project was designed to generate 960 kilowatts of power and to produce an annual energy generation of 5.30 megawatt-hours on the average.

The actual cost of the project is P48 million (at 1997 prices) or about P50,000 per installed kW. The original project cost estimate was P42 million; an additional P6 million was needed for expenditures on right-of-way acquisition, slope and watershed protection. Annual operating and maintenance expenses are projected at P1.2 million and P1.5 million, respectively. The power will be sold to the Camarines Sur Electric Cooperative II (Casureco II) at a rate of P1.80/kwh, or 5% lower than the rate of the National Power Corporation.

The project enjoys several incentives: (i) tax and duty-free importation of capital equipment sourced from China; (ii) tax credit on Domestic Capital equipment equivalent to 100% of the value of the VAT and custom duties for the local purchase of machinery, equipment, materials and parts; (iii) special Realty Tax rates on equipment and machinery not exceeding 2.5% of original cost; (iv) VAT exemption; and (v) income tax holiday for seven years of operation.

Two problems have surfaced during the first two years of operations. The peak kW capacity is 880 kW or about 92% of the designed capacity. A study has been proposed to determine the reasons for the apparent underperformance of the system and to serve as reference for future designs. The second problem pertains to insufficiency of water. The actual annual generation is about 3-4 million kWh (out of projected 5.3 million kWh) which translates to P6 million in revenues. The full utilization of the three turbines was achieved only for three months of the year due to the depletion of water resource.

Villa Escudero (VESCO) Micro-hydro Project

VESCO maintains an old 75-kW hydroelectric plant that was built in 1937. This unit provided for the electricity requirements of the plantation including a 5-ton ice plant, a coffee mill and other small applications. The expansion of Vesco’s corporate activities provided the impetus to develop two micro-hydro systems in 1997: a new 38-KW plant downstream of the original one; and a new 75-kW plant in the original location. These brought total installed capacity to 188-kW, possibly expanding to 230-kW if the feasibility of the third power station is confirmed.

The systems are of the run-off-river type, sourced from two rivers, Bulakin and the Labasin Rivers. The headwaters of the Bulakin river is the Kasunguanan Spring which reaches peak-flows during the dry season while its lowest stream flows occur during the usual monsoon months of July to September. The aggregate watershed area of the two rivers is estimated at 2,000 hectares of lush vegetation and 18 natural springs. The area is also near Mt. Banahaw, the least exploited forest in the country.

The 38-kW plant known as the “Kipot” plant has a calculated net head of four feet or half of the original plant and would have the same optimal flow duration discharge of 1200 liters/second. The second “Resort” plant capacity of 75-kW was based on the confirmed flow of 2,000 liters/second occurring in the original plant site. The estimated annual generation of the two plants is estimated at 573,760 kWh per year. At a project cost estimate of P10 million, the payback period would be about 5 years.

Dakkitan Microhydro Project

This project, located in Dakkitan, Hungduan, Ifugao, is a 6-kW micro-hydro which began operation in March 1995. The project is a collaboration among the village association, Samahan ng mga Magsasaka para sa Kabuhayan (SAMAKA), the Ifugao Resource Development Center and the Montanosa Research and Development Center. The micro-hydro project provides power using a Pelton turbine powered by a 32.8-meter head from the Dakkitan River. It runs a rice mill at 3kg/min milled rice capacity including several equipment such as welding, vulcaninzing, blacksmithing, wood polishing and battery charging.

The power cum livelihood project costs about P280,000 including the cost of equipment, amounting to P61,000, that comprise the power load. P93,955 represents capital expenditures for the turbine, powerhouse, intake tank, canal rehabilitation and penstock. SAMAKA’s counterpart was valued at P54,000 representing labor contribution.

The project generates close to P7,000 for the community organization. The accessibility of the ricemill has also saved time for the households. Expenditures fell by about P 21 per milling due to reduced milling charges and zero transport costs.

Dulao and Gacab Microhydro Power Projects

The projects include a 3-kW cross-flow turbine for a rice mill and a 10-kW two-cell cross-flow turbine with an electronic load controller and instrumentation for Malibcong village electrification. The smaller system was completed in 1995. The project was a close collaboration among the Department of Science and Technology, PCIERD and the De La Salle University

(DLSU), in partnership with the host community. A parallel objective in installing a second turbine rather than enhancing the existing 3-kW unit was to allow the DLSU team to perform pilot research.

The system runs a rice mill, provides electricity to 44 households, charges automotive batteries and power carpentry and metalworking tools. It operates twice a day (4:00 to 6:00 a.m. and 6:00 to 9:00 p.m.). Each household has two bulb receptacles; a 20-watt bulb is charged P10 per month.

The two projects involved a cash outlay of P 418,475. This is not the true cost of the system since it excludes volunteer work of local residents and technical consultants. Materials and equipment amounted to P130,000 and P180,000 for the first and second phase, respectively. The project reduced rice milling expenses by 20% to P16 per 12-kg can. Moreover, fuel reduction amounted to a maximum of P160 per month in lieu of P 25 tariff for milling.

A much-improved 20-kW version was also designed, fabricated and installed in Gacab, Malibcong. It provides lighting to 72 households. The Electronic Load Controller (ELC) replaces the expensive and imported governor that regulates the speed of the generator. The ELC imposes a constant load on the generator in spite of changing user's load. The controlling element is the inlet guide vane that controls the flow of water coming from the reservoir through the penstock in a cross-flow turbine. The concept is to close the valve if the generator speed becomes faster and open the valve if the generator slows down. The fuzzy logic controller decides which valve to open, and how much opening will be made, 1/3; 2/3; or full opening, to maintain the frequency. In effect, the two-cell cross-flow turbine is a 3-in-1 turbine using two generators of different sizes (10 and 20KVA). The fuzzy logic controller will choose the size of the generator needed for optimum efficiency based on the demand load and select which of the two inlet guide vanes will be utilized.

The cash outlay for latter project was P580,000; again, volunteer labor and technical help were not valued. Imported capital components amounted to P131,000.

Ngibat Microhydro Project

This 5-KW project, located in Tinglayan, Kalinga, provide lighting to 32 households and 15 lampposts in Ngibat village. It also supplies electricity to a rice mill that operates 6 hours per day, an average of 8 days operation per month, and to blacksmiths working an average of 8 hours per day, 10 days per month, for 3 to 4 months in a year. The system load also includes the 500-kWh/month consumption of an electric grinder, drill press, hand drill and grinder.

The project was partly financed by interest-free loan amounting to P189,000, a grant from MRDC amounting to P130,000 and local counterpart labor estimated at P64,000. As this is a community-initiated project, households are charged P22 per month, equivalent to avoided fuel costs. Monthly revenues have been computed at P6,500. Some households are unable to pay the tariff while others are exempted for humanitarian reasons.

Yamog Renewable Energy Development Group, Inc.

This 20-KW pelton turbine project, located in Sitio Polokon, Lamanan, Calinan District, Davao City, provides power to 105 rural households 24 hours a day during rainy seasons and 7 hours per day during normal dry seasons. It derives energy from the strong water flow and high head of four contributing small springs. For reasons of economy, the system uses an induction motor as generator.

The project's pelton turbine has two nozzle jets discharging water that strikes a series of buckets. The impulse type of turbine is appropriate considering the high head (65 m.) and a flow discharge of 50 liters/sec., giving a power design capacity of 20kw. The turbine consisting of 20 buckets/blades has a runner diameter of 300mm that uses two nozzles with spear valves. The bucket split into two halves so that a central area would not act as a dead spot incapable of deflecting water away from incoming jet. A cut-away notch on the lower lip allows the following bucket to move further into place before interfering with the jet which is still propelling the earlier bucket.

3.3 Fiscal Measures Applicable to Hydropower Systems

Hydropower project proponents have to secure four kinds of permits or licenses to set up a project. Water rights are issued by the National Water Resources Board for the use of water. Once operational a fee is charged for water use. The DOE provides the clearance for the project. The DENR-Environment Management Bureau issues the Environment Clearance Certificate, especially in areas identified as protected areas under the National Integrated Protected Areas System (NIPAS). If the project is located in ancestral domain, a permit must be secured from the affected community and the National Commission on Indigenous Peoples. It should be noted that part of the revenues arising from NRE installations are mandated by law to redound to tbe benefit of host communities.

RA 7156 or the Mini-hydroeelectric Power Incentive Act promulgated on 12 September 1991 provides the necessary incentives and privileges to mini-hydroelectric power developers. The objectives of the Act are as follows:

(i) To encourage entrepreneurs to develop potential sites for hydroelectric power existing in their respective localities;
(ii) To encourage entrepreneurs to develop potential sites for hydroelectric power existing in the country by granting the necessary incentives which will provide a reasonable rate of return;
(iii) To facilitate hydroelectric power development by eliminating overlapping jurisdiction of the many government agencies whose permits, licenses, clearances and other similar authorizations issued by various government agencies as presently required for such development, and by vesting in one agency the exclusive authority and responsibility for the development of mini-hydroelectric power;
(iv) To apportion a part of the realty and special privilege taxes and other economic benefits of the hydroelectric power potential to the respective localities where they are established; and
(v) To provide a contractual framework wherein some stability of conditions can be relied upon for long-term financing purposes.

The Office of Energy Affairs shall be the sole and exclusive authority responsible for the regulation, promotion and administration of mini-hydroelectric power development and the implementation of the provisions of the Act. Any person authorized to engage in mini-hydroelectric power development shall be granted the following tax incentives or privileges:

(i) Special Privilege Tax Rates limited to two per cent (2%) of gross receipts from the sale of electric power and transactions incident to the generation, transmission and sale of electric power;
(ii) Tax and Duty-free Importation of Machinery, Equipment and Materials applicable within seven (7) years of the award, subject to certain conditions that said machinery, equipment and parts: (i) are not manufactured domestically in reasonable quantity and quality at reasonable prices; (ii) are directly and actually needed in the project; (iii) are covered by shipping documents in the name of the duly registered developer; and (iv) prior approval of the OEA was obtained before such importation.
(iii) Tax Credit on Domestic Capital Equipment equivalent to 100% of the value of the VAT and customs duties that would have been paid on the machinery, equipment, materials and parts had these items been imported.
(iv) Special Realty Tax Rates on Equipment and Machinery shall be limited to 2.5% of their original cost.
(v) Value-added Tax Exemption on gross receipts derived from the sale of electric power whether through the NPC grid or through existing electric utility lines; and
(vi) Income Tax Holiday for seven (7) years from the start of commercial operation.

Apart from the above incentives, privately-owned mini-hydroelectric power plants shall be eligible for foreign loans and grants without further evaluation by the Board of the National Economic and Development Authority.

3.4 Economics of Hydropower Systems

Table 3.3 compares financial costs of installing micro-hydro facility under two possible modes: contracted and self-administered. The basis of the estimates is a 75-kW installation. Project proponents economizing on project costs might well consider the 30 to 40 percent difference between contracted installations and self-administered construction. However, turnkey contracts provide technical expertise and can lessen the supervisory hustles inherent in engineering projects. In terms of levelized cost of power, however, projects by administration can enjoy almost 40% difference in cost.

Table 3.3
Economics of Micro-Hydro System
By Mode of Construction

	BY CONTRACT	BY ADMINISTRATION
Capacity (kW)	75	75
Investment cost	29,036,250	20,025,000
IC per kW	387,150[a]	267,000[b]
Operation	500,625	500,625
Maintenance	200,250	200,250
Life-cycle cost	56,111,437	40,322,243
LC per kWh	**24.96**	**17.94**

[a] *Excludes distribution cost, estimated at Php 47,850 per kW.*
[b] *Excludes distribution cost, estimated at Php 33,000 per kW.*

Three installations were selected to demonstrate the economics of mini-hydro facilities: a prospective 550-kW installation in Surigao del Norte, 960-kW installation in Camarines Sur and 1,500-kW installation in Lanao Sur.

Table 3.4
Economics of Mini-Hydro

	HYDRO 1	HYDRO 2	HDYRO 3
Capacity (kW)	550	960	1,500
Location	Loreto, Dinagat Is., Surigao del Norte	Inarihan, Camarines Sur	Malabang, Lanao Sur
Year installed	2001*	1998	1995
Historical investment cost		48,000,000	40,000,000
Present values:			
Investment cost	42,179,534	67,309,170	70,002,747
IC per kW	76,690	70,114	46,668
Annual Costs:			
Operation	1,182,279	1,496,872	1,253,837
Insurance	105,449	168,273	175,007
Maintenance	227,456	1,871,091	2,696,425
Life-cycle cost	85,282,109	144,350,463	153,469,801
LC per kWh	3.78	3.65	1.71

*Scheduled for construction in July 2001.

Economies of scale is evident in large mini-hydro installations. The Matling project in Lanao Sur highlights major cost differential in power generation compared to smaller systems. The levelized cost is estimated at only P1.71/kwh, or more than 50% compared to the proposed Surigao project. For this reason, some large mini-hydro installations are not only competitive against conventional power systems, but can also be sold below grid electricity prices.

3.5 Future Developments in Small Hydro in the Philippines

There is a marked shift towards community-based initiatives in developing hydro resources for power generation in tandem with promoting livelihood projects. This is but a natural offshoot, especially in areas where work has been traditionally carried out manually and without the benefit of electricity. With the rising cost of fuel and the constraints imposed by a ballooning budget deficit that causes delay in grid electrification, communities are pressured to seek alternative and cheaper source of energy. Some of the small hydro projects in the pipeline do not only meet the objectBelow are illustrative cases of innovation to harness the potential of hydro power.

550-kW Hinubasan Minihydro Project in Loreto, Dinagat Island, Surigao del Norte

This project is a typical case of remote island electrification. It is located in Loreto muunicipality, in Dinagat Island, about four hours by pump boat from Surigao City. The Hinubasan project is envisioned to provide 24-hour power supply to 1,686 households of the municipality. Funding has been by the Development Bank of the Philippines, and construction is scheduled to commence in July 2001.

The project involves the installation of two 275-kW Turgo impulse turbines at 162 m. net head and flow of 0.228 cu.m/sec per unit. The turbines including the generators, governors, control panels, transformers will be sourced from China. The project fund requirement amounting to P48.5 million will be provided by the DBP. A loan amounting to P0.95 million was approved by DBP in February 2000 for the conduct of project feasibility study. When operational, the estimated basic power rate is P3.9687/kwh while generation cost for the first year is estimated at P2.96/kwh. Payback period is computed at 5 years.

Romblon Mini-hydro Project

This 900-kW mini-hydro project was the second project of the Development Bank of the Philippines (DBP) under its FINESSE project. A pre-feasibility study had been completed for the site. Technical experts attest to exceptionally good resource potential. The Romblon Electric Cooperative, the principal project proponent, is exploring DBP financing for the construction of the plant. The main project is expected to cost about P55 million.

Bubunawan Hydro Project

This 7-MW mini-hydro project located in Baungon, Bukidnon will generate 37.6MWh of electricity annually. The proponent, the Bubunawan Power Company, Inc. has scheduled commissioning late last year.

Steady Flow Hydro power Plant

A promising innovation in the hydro energy system has been recently developed by Mr. Cornelio Seno of Laguna. Although still at R&D stage, Seno's invention, dubbed as "Steady Flow Hydro System," received a special citation for innovativeness in the Nationwide Contest for New and Renewable Energy Systems sponsored by the Philippine National Oil Company last year. The innovation ensures constant flow rate, rotative speed, frequency and voltage for all operating conditions of head and electrical load, while eliminating problems involving water hammer, surging and silting-up.

The need for a speed governor is eliminated since a synchronous speed is assured by a metering pump at the forebay. The pump delivers fixed water flow rate at negligible head from the forebay through the penstock and to the hydro engine. This set up assures that the latter runs at the synchronous speed of the generator. Since the head of the metering pump is negligible, the pipeworks connecting the forebay and tailrace exerts siphoning effect, and the electric motor is required to surmount mechanical friction only; its power consumption is a small fraction of the total hydropower output. The metering pump and its driver can be conveniently controlled and monitored for performance at the control panel of the generator.

There are other notable innovations in local small hydro facilities that were developed out of necessity to adapt the system to the specificities of local conditions. With proper support, innovations, such as the one developed by Seno, may find commercial applications that will enhance the economic profile of small hydro facilities.

WIND ENERGY SYSTEMS

Wind energy, as a secondary form of solar energy, is considered one of the safest and cleanest forms of renewables. Wind turbines do not generate greenhouse gases albeit there are concerns about its noise and harmful effects on bird life. Moreover, wind energy systems do not pose negative externalities related to decommissioning of obsolete plants. Apart from low operating costs, wind energy system can be used for varied applications. It can be used to reduce cost of production in agriculture and other industries. The system, however, is site-specific requiring areas with wind speed of at least 3 meters per second. It requires storage in terms of batteries or water reservoir due to considerable power supply variations. A back-up system is also recommended for areas where wind supply is low.

Wind farm technology has had more advanced applications in Europe and the US. The Middelgrunden wind farm in Denmark is currently the world's largest offshore wind farm with a capacity of 40 MW. It is the first step towards a batch of other Danish offshore wind farms, each planned to generate 150 MW. In the US, the state of Texas has become the hottest wind energy market, having recently developed a 250-MW wind energy facility. A 500-MW facility is scheduled for construction this year; another 300 MW is being considered. This development occasioned the restructuring of the power sector in Texas. An integral component of the reform is the "Renewable Portfolio Standard" (RPS), *i.e.,* a program to dedicate to renewables about 2,000MW of energy capacity, approximately 3 percent of the state's power supply, by 2009. [1]

In the Philippines, wind energy system is gradually gaining popular advocates following the completion of the wind resource map for the country. The potential sites for wind energy generation have already been identified; majority of them are in the western side of the archipelago. Among the promising areas are: Cuyo Island (5.58mps), Basco, Batanes (5.39mps), Catanduanes (4.15mps), and Tagaytay City (5.0mps). Under current negotiations is a project in Masbate that will showcase wind energy system in the Philippines. BreezElectric Philippines plans to set up 25 units of 750-kW or a 18.75-MW of wind power facility. A similar system is being eyed for installation in the province of Catanduanes.

The Philippine Energy Plan for 1999-2008 forecasts that the contribution of wind energy systems in the country's power supply will reach 5 to 80 MW between year 2004 to 2008. If current plans materialize, off-grid stand-alone wind turbine generators may be able to contribute 36.87 MW to the grid by 2008.

4.1 Technology

Wind energy is derived from kinetic energy of moving air that is converted into power through a mechanism called *rotor*. The kinetic energy produced by the wind in unit time increases with the wind velocity (exponentially, at a power of three). Thus, doubling the wind speed increases the power eight times, while doubling the rotor diameter increases the available power four times. For example, at 3 meters per second wind speed, the wind power per square meter is about 17 watts; while at 6 mps, the power that can be generated per square meter is 136 watts.

In general, wind machines can only extract about 59 percent of the wind kinetic energy. Actual performance efficiency of wind machines varies from 10 to 50 percent depending on the

[1] Renewable Energy World Jan-Feb 2001

aerodynamic quality of the rotor. They are useful at a mean wind velocity of about 2 mps and are safe to operate up to a wind velocity of 25 mps.[2]

Wind energy conversion technologies are classified depending on size and applications. The first is *medium- to large-size grid-connected Wind Turbine Generators (WTG)* that have evolved from 50-kW in the 1980s to about 800-kW in the 1990s. The present generation of commercial wind turbines has gone past the 1000-kW mark. There are different design concepts: three-bladed, stall- or pitch-regulated, horizontal-axis machines operating at near-fixed rotational speed. There are other concepts such as gearless designs and variable rotor speed designs. Modern installation techniques allow commissioning in less than 6 months.

Another group belongs to *intermediate-size wind turbines in hybrid energy systems*. The system is usually combined with other energy sources such as photovoltaics, hydro, and diesel, and used in small remote grids or for special applications such as water pumping and battery charging. These systems may have a capacity between 10 to 500 kW.

The third group is *small stand-alone turbines* for battery charging, water pumping, heating, and the like. These systems have capacity less than 10 kW. In small battery-charging wind turbines, the size can range from 25 to 150 watts. By far, the most common use of wind energy system in the Philippines is the mechanical wind pump.

4.2 Installations and Development Initiatives

Table 4.1 shows the operating wind energy systems in the Philippines. Region III has the most number of installations with 117 wind pumps, while Region VI has the most number of operating wind turbine generators. As of April 2001, there are 241 operating wind pumps, with aggregate capacity of 245,263 cu. m. of water, and 13 operating wind turbines with combined capacity of 63.35 kW.

[2] The Basics of Wind Energy Systems, Alexis T. Belonio, Wind Energy Association of the Philippines.

Table 4.1
Operating Wind Energy Systems in the Philippines
as of 30 April 2001

	Wind pump	Wind Turbine
CAR	6	
I	18	2
II	5	2
III	117	
IV	7	2
V	1	1
VI	46	6
VII	24	
VIII	2	
IX	6	
X	1	
XI	6	
ARMM	2	
Total installations	241	13
Capacity	**245,263.1 cu m**	**63.35 kW**

Source: NESCON; Survey returns.

The typical operating wind pump in the Philippines would have a configuration presented in Table 4.2. It would be noted that horizontal type wind pumps are more popular than vertical type.

Table 4.2
Average Configuration of Operating Wind Pumps

	Vertical type (29 installations)	**Horizontal type** (208 installations)
Years in operation	9.8	9.3
Rotor diameter	less than 5 m	less than 5 m
Storage tank capacity	91.2 cu. m.	790.5 cu. m.
Total head	20.9 m	19.8 m
Tower height	12.0 m	10.4 m

Source: NESCON.

4.2.1 Existing Major WTG Installations

Pagudpud, Ilocos Norte

In March 1996, NPC commissioned a pilot wind turbine in Ayoyo, Pagudpud, Ilocos Norte with support from the Philippine Council for Industry Energy Research and Development (PCIERD). The project demonstrates the technical and economic viability of harnessing wind energy for power generation based on local conditions. The average wind speed at the site was monitored at 7.3 m/sec. The easterly wind blows about 36% of the year, and the equivalent annual wind power density was estimated at 532W/m^2.

The stand-alone system is a horizontal axis, upwind wind energy conversion machine with directional vane. The mini-power plant consists of a 10 kilowatt BWC Excel-R/120 wind turbine installed atop a 24-meter galvanized steel guyed-lattice tower, VCS-10 charge controller, an 800 Amp.DC source center, an 84 kWh/120VDC battery bank (Trojan L-16), and AES 10kW static converter. Its three fiberglass rotor blades turn a special low-speed alternator that converts the rotational energy into electricity. The alternator utilizes permanent magnets and has an inverted configuration in that the outside housing rotates while the internal windings are stationary. The alternator generates electricity whenever the rotor turns. The static inverter system converts the 220 VDC power into 220VAC, 60 hertz, single phase for distribution to the village. It supplies the power needs of 23 households with an estimated daily load demand of 16kwh in a small fishing village in the area. It was originally manned by four technical personnel shifting every eight hours everyday. While its static inverted can be used as battery charger, the system does not have a backup generator.

Plant operation is limited to nighttime for 4-6 hours during the lean wind months of May to September but was available for 24 hours daily during peak wind periods from October to April. In its first year of operations, the plant had an energy surplus since the turbine was generating more electricity than what was needed by the village. Due to the limited capacity of the battery banks, surplus energy has to be dumped. In its first year of operation, no major problem was encountered.

The wind turbine generator including its associated equipment were purchased from the US at about $60,000 (P1,525,112). Local expenditures such as the power house, distribution lines, meters, lamps and house wiring amounted to P581,000. Overall, the project cost was estimated at P2.1 million. The estimated revenue from house billing was estimated at P21,600 per year. The cost of energy was estimated at P42/kwh at 12% discount rate for capital and a capacity factor of 9%. This cost can be reduced to P7.47/kwh if the electricity generated is fully utilized and the cost of capital can be reduced to official loan assistance rate of 3 percent.

The project has been in operation until the battery system, with an estimated useful life of two years, got damaged recently. The acquisition of replacement battery costing about P300,000 has been deferred by the NPC in view of the plan of the Ilocos Norte Electric Cooperative to expand its grid to the village. The capacity factor will increase to 30% if its power output can be fully harnessed. The recommendation of the NPC is to convert the WTG into a grid connected system; the conversion would entail an additional investment of P500,000.

In the meantime, PCIERD has indicated interest to takeover the wind facility but no concrete agreement has yet been forged between NPC and PCIERD.

11.5kW Atulayan Hybrid Remote Area Power System (HRAPS)

The Atulayan NRE system is a hybrid of wind turbine as primary energy generator, and solar panels as secondary energy source. The wind turbine generates power even at low wind speed of 4.5 meters per second. The turbine's patented tilting axis allows power generation even at high wind speeds; and in cases of typhoon, the turbine tower can be lowered for safety. The solar power component has twelve 75Wp panels. An existing 75kVA genset was retrofitted for the purpose. In periods where solar and wind resources are not available, a diesel generator serves as a back up system.

The system provides 36.5kWh/day of electric power to the village's 72 households, a school, street lights, playground and seaweed dryer. It is equipped with 3x5.5kVA sine wave interactive inverter and storage battery bank that allows 24-hour AC power, 220V single phase and 380V three-phase. Synergy Power Philippines, the system's provider, has incorporated safety features that are ideal for remote area operations including automatic controls for easy operation.

4.2.2 Innovations

ANEC-Iloilo KW-Level WTG

A locally-designed and fabricated kilowatt-level wind turbine generator designed by the ANEC-Iloilo is installed in Isla Maahas, Calatagan, Batangas. The rotor has three 10-foot long fiberglass blades with NACA 4412 profile. It is coupled to a 15kVA generator via a two-step belt and pulley transmission that multiplies the rotational speed (rpm) of the rotor to match the rpm of the generator. The protected head assembly is mounted atop a 60-foot tower made up of galvanized pipes.

The power produced by the generator is used to charge a battery bank which stores the energy for a more sustained power availability even in the absence of wind conditions. An inverter is used to convert the DC electricity from the battery bank to 220VAC.

The generator is an induction motor that was slightly modified to work as a generator. The modification was introduced so the generator could operate at variable rotational speeds thus enabling the system to produce electricity even at varying speeds by operating as an asynchronous generator.

The materials used to fabricate the components are all locally sourced. The rotor is composed of three aerodynamically-designed fiberglass blades and is capable of extracting up to 50% of the available energy from the wind. Each blade is 10 feet long and weighs 27 kg. The rotor was designed to have a cut-in wind speed of 5m/sec and a cut-out wind speed of 12m/sec with a minimum operating wind speed of 2.5m/sec.

In addition to the above, the system incorporates an electronic charge controller that automatically controls the power of the generator. Automatic and manual safety features are also included in the system. An off-center, inclined, main hinged vane control mechanism automatically turns the rotor away from the wind direction when the wind speed reaches the cut-off speed of 12m/sec. A manual brake system has been incorporated to lock the rotor during maintenance and repair jobs. The electrical braking system also helps protect the rotor from overspinning at high wind speeds.

The total cost of the system amounted to P725,000 including site survey, installation and capital costs. The system can generate up 25kWhr of energy per day at an average wind speed of 6m/sec.

Aerovolt: NewFendered Bucket Windmill

Aerovolt is a vertical axis windmill apparatus where a movable wind shield covers the backturning buckets. This set up limits the entry of usable wind to prevent over-revolution of the windmill during strong winds. The aerovolt, which is installed in Isla Maahas, Calatagan, Batangas, comprises of six sets of half-rounded buckets that are made of light metals. The wind pushes the buckets to rotate the centrally located vertical shaft connected to the gears and pulleys that drive the synchronous generator assembly. As the intercepted wind is released, the buckets backturn traveling against the flow of the wind. The slamming between the bucket and the wind is prevented by the movable windshield that moves forward to the position of wind scooping buckets.

The estimated investment for a 20 KW typhoon-proof aerovolt windmill is about P716,800. The only imported component would be the generator amounting to P49,000 representing not more than 10% of the total cost. The prototype has produced 50 to 100VAC electric power from a 5kw generator at windspeeds of 4 to 10 meters/second. The overall efficiency of the model was estimated at 30% to 40% and could go up to 70% with improvements. The estimated cost of power generation was P0.22/kwh.

4.3 Fiscal Measures Applicable to Wind Energy Systems

In view of megawatt-size of wind energy systems that are in the pipeline, the relevant fiscal measure is EO 462, as amended by EO 232. This law, also known as the OSW law, mandates the DOE to engage in the assessment, field verification, development and utilization of ocean, solar and wind energy resources through the participation of the private sector under production sharing contracts.

Production sharing contracts shall be applied to project meeting **all** of the following criteria:

(i) It harnesses OSW resources in lands of the public domain and/or offshore waters within the Philippine territory, contiguous zone and exclusive economic zone. All lands or offshore waters covered by contracts granted under this EO shall be subject in public easements established or recognized by existing laws.

(ii) It has a net electric output of more than 1 MW for sale to an electric utility.

A production-sharing contract bestows exclusive privilege to the contractor for the exploration, development and utilization of OSW energy resources in a specified area. Such privilege cannot be transferred to another qualified person without the approval of the Secretary of the DOE.

In case other natural resources are present in the contract area, multiple-use concept will be applied to the extent practicable. If a natural resource-use conflict is not resolved by the concept, the first-come-first-serve basis will be used.

OSW contract areas will be divided by meridional blocks, each an area of about 81 hectares. This will constitute the minimum size of a contract area. The maximum area that can be awarded to wind or solar contractors is 8,100 hectares.

For contract areas on land, an occupation fee of P50 per hectare will be paid by contractors immediately upon award of the contract and yearly thereafter. During the pre-commercial phase of the contract, at least 50 percent of the contract area will be relinquished at the end of every two years subject to the approval of the DOE Secretary. The relinquished area will be of a regular shape consisting of contiguous meridional blocks. The contractor will specify the area that will be retained for commercial phase of the project in the “declaration of commerciality.”

The Pre-Commercial Contract has a maximum duration of 5 years for solar and/or wind projects, and 7 years for ocean or in combination with solar and/or wind. The Commercial Contract involving any of the energy resource or their combination, will have a life of 25 years, renewable for the same number of years.

The DOE and the contractor negotiate on the government share on profits generated from the operation of the facility. The government share will include a signature bonus and production bonus. The production bonus will be given to DOE at the date of signing of the Pre-Negotiated Commercial Contract and upon the latter’s issuance of a “Letter of Confirmation” of the commercial feasibility of the project. The government may opt to waive the signature bonus on the first project to reduce the pre-operating cost burden on the contractor.

The production bonus will be paid to the DOE at the end of each calendar year during the commercial phase of the project and will be applied only after the project has fully recovered its pre-operating expenditures. Moreover, to protect the welfare of electricity consumers, the government share will be limited to the extent that it will not raise the cost of generating electricity higher than the contracted selling rates to electric utility in the area. The production bonus will also not exceed 15 percent of net proceeds, where net proceeds is defined as the difference between gross sales and operating and maintenance costs.

In addition, DOE will assist OSW developers in obtaining all applicable fiscal and non-fiscal incentives, including registration as pioneer industry the BOI, and securing access to lands and/or offshore areas where OSW energy resources will be harnessed. OSW developers may also charge the cost of assessment, field verification and feasibility studies of other sites to its current commercial projects.

It would be noted however that for small-scale wind energy systems, the only pertinent incentives are those provided by the Omnibus Investment Code. To wit, the incentives include among others: (i) 6-year income tax holiday; (ii) exemption from Contractors Tax; (iii) additional deduction for labor expenses; (iv) employment of foreign nationals; and (v) unlimited consignment of machinery and equipment.

Although a menu of incentives, as outlined in the Omnibus Investment Code, is offered to wind energy proponents, in practice, the only relevant incentive is the income tax holiday. Moreover, investors in wind energy system would have to reckon several government regulatory guidelines such as right-of-way provisions, environment compliance certificates, indigenous community permits for sites in ancestral domain or in national protected areas. These hurdles are common to all NRE projects.

4.4 Economics of Wind Power Systems

Tables 4.3 and 4.5 summarize the economics of wind energy systems according to different size and capacities. The cost of wind energy systems vary considerably depending on the design, materials, labor costs related to manufacturing and installation, and the cost of transporting the system to the site. For mechanical wind pumps, prices may range from P30,000 for a small system to P145,000 for a larger model. Investment cost per cubic meter of pumped water decreases as capacities increase. Levelized cost per cubic meter based on a useful life of 10 years and a capital recovery factor of 12% could be as low as P2.00 per cubic meter for systems that could pump as much as 120 cu. meters per day with a rotor diameter of 6 meters.

At present, the local government does not impose a tax in the installation and operation of wind pump since the system is treated like an agricultural machinery.

Table 4.3
Economics of Wind Pump

	WP 1.5	WP 3.5	WP 4.5	WP 6.0
Rotor Diameter	1.5 m	3.5 m	4.5 m	6.0 m
No. of blades	8	18 – 24	18 - 24	24 – 32
Tower height	6 – 10 m	6 – 10 m	6 – 10 m	6 – 10 m
Pumping head	6 m	6 – 10 m	10 – 40 m	10 – 40 m
Typical output*	1 – 5 m^3/day	15 – 30 m^3/day	30 – 70 m^3/day	45 – 120 m^3/day
Investment cost	30,000	68,000	100,000	145,000
IC per cu m	10,000	3,022	2,000	1,758
Ann. operation	4,500	4,500	9,000	9,000
Ann. maintenance	2,500	6,000	9,000	13,000
Life-cycle cost	84,288	160,730	403,381	493,087
LC per cu m	**13.62**	**3.46**	**2.43**	**2.00**

*at 3 m/s wind speed.

Investing in a large windpump would typically involve the following capital expenditures:

Table 4.4
Costs of Selected Components of Wind Energy System

	Component cost
Rotor and blades	10,000
Head Assembly	40,000
Tail and side vanes	15,000
Tower and foundation	45,000
Pump	5,000
Pipes and fittings	15,000
Total Capital Cost	130,000

For wind turbine generators, a 50-watt model utilizing local components would cost P45,000. Annual operating and maintenance expenses would amount to P8,500. Based on estimated useful life of 15 years and capital recovery factor of 12%, levelized cost would amount to P103.40/kwh. A larger system of 500-W would need an investment of P80,000 but levelized cost would decrease to P18.63/kwh. This may be compared with imported systems: a 300-watt aerogenerator costs P65,000 while a 500-watt model, P110,000. A 600-watt model having a rotor diameter of 2.13 meters costs P150,000. An additional investment of P6,000 would have to be made on an inverter.

Table 4.5
Economics of Wind Turbine

	WT 1.0	WT 1.5	WT 2.0
Rotor diameter	1.0 m	1.5 m	2.0 m
No. of blades	2	2	2 or 3
Drive	direct	direct	direct
Power output*	50 W	200 W	500 W
Voltage	12 or 24	12 or 24	12 or 24
Battery	automotive	automotive	automotive
Investment cost	45,000	67,500	80,000
IC per kW	**900,000**	**337,500**	**180,000**
Ann. operation	4,500	4,500	4,500
Ann. maintenance	4,000	6,000	8,000
Life-cycle cost	154,229.87	216,020	277,811
LC per kWh	**103.40**	**36.21**	**18.63**

*at 4 m/sec wind speed.

Table 4.6 illustrates the economics of wind hybrid system coupled to biomass, PV and internal combustion engine. Levelized cost would be lower for wind-biomass hybrid using rice hull gasifier, albeit the difference would be about 3 percent compared to an ICE system. Utilizing a solar module would drive the cost up to P166.12 per kwh on account of the higher cost of solar panels. Investment cost would be higher for wind-biomass hybrid on account of additional investment for fabrication of gasifier, imported generator and purchase of surplus engine.

Table 4.6
Economics of Wind Hybrid Systems

	Wind-Biomass	Wind-PV	Wind-ICE
Technical specification	WT 2.0 (500 W) Generator 3 kW, 220V (China-made) Surplus engine: 4K Toyota or 3-cylinder Suzuki engine 40 cm rice hull gasifier	WT 1.0 (50 W) Solar module 75 W Controller 6 A Inverter 200 W 2 units Car battery 12V	WT 2.0 (500 W) Robin engine generator set with rated output of 1400 W, 220/110V
Capacity (W)	3,500	125	1,900
Investment cost	167,000	99,400	127,000
IC per kW	**47,714**	**795,200**	**66,842**
Ann. operation	11,435	4,500	32,240
Ann. maintenance	14,700	6,170	11,200
Life-cycle cost	529,901	247,778	549,247
LC per kWh	**35.53**	**166.12**	**36.82**

4.5 Future Developments

Two major wind energy installations are currently in the pipeline: the 1,100-kW Batan Island Wind Plant Project and the Masbate Wind Farm.

The Batan project was originally conceptualized as a stand-alone PV-Wind-Diesel hybrid system by the provincial government of Batanes. Due to the high cost of solar panels, the photovoltaic component was eliminated. The plant is envisioned to have an initial capacity of 200KW and will be expanded to 1100 KW over a ten-year period as the demand increases and funds are made available.

The project team would be led by the First Philippine Energy Corporation with the support of the Advanced Energy Systems Ltd. of Australia. The facility will supply power to four towns: Ivan, Uyugan, Mahatao and the capital town of Basco.

The project cost, including the provision for automated diesel control and radio communication hardware, is estimated at P160.4 million. The generation cost of the existing diesel generation system in Batan Island is P12.80/kwh; the wind project is expected to generate power at P4.77/kwh.

Another boost to the wind energy sector is the proposal of the BreezElectric Philippines Corporation to construct a wind farm in Masbate. The project involves developing 18.75-MW of wind power. Annual output is projected to reach 59 to 68 GWh. The details and terms of the proposal are still being worked out with concerned agencies. BreezElectric is however targeting to set up a similar facility in Catanduanes.

PHOTOVOLTAIC SYSTEM

Most off-grid rural electrification programs turn to photovoltaics (PVs) for the arduous task of providing power to widely dispersed population. Indeed, in the Philippines, PVs have found a niche in major electrification programs.

The main advantage of PV over other renewable energy technologies is its virtually inexhaustible source of power, *i.e.*, the sun. PV converts solar radiation directly into electricity.[1] The Philippines is apt to harness solar energy given its relatively high average daily insolation, ranging from 3.5 to 5.2 kWh per square meter, and the low seasonal variation of solar radiation. The solar potential is greatest during the summer months of May, June and July when the sun is positioned over the Northern Hemisphere. Conversely, the months with the weakest sunlight are November, December and January.

In addition, PV systems are modular and can be employed for milliwatt to megawatt power generation. High reliability, long lifetime, low maintenance cost and zero fuel requirement of PV modules have made the technology a viable and cost-effective option in remote site applications where the cost of grid extension and maintenance of conventional power supply systems would be prohibitive.

While PV technology is already considered commercial, costs remain high, as the industry struggles to make its transition from R&D level production to one of large-scale manufacturing. Nonetheless, the interest on PV has not waned; worldwide, research and development activities on the technology have been sustained. Since 1975, much of the work on PVs is focused on increasing the efficiency and stability of different PV cell technologies and on reducing manufacturing costs. In addition, crystalline silicon cells, the dominant PV cell technology, is profiting from huge R&D activities in the semiconductor industry. The upshot is a steady decline in the price of PV module – from US$4.75 per Wp in 1990 to the current price of US$3.50 per Wp. By 2010, the price of PV module is forecast to fall between US$1.50 to US$2.00 per Wp.[2] These developments are boosting the potentials of PV as a technology choice for rural electrification.

5.1 Overview of PV systems

A useful classification of PV systems is by type of applications, namely: stand-alone, hybrid and grid-connected. This classification corresponds to the ways by which PV systems cope with the intermittent nature of its energy source. Thus, for a PV system to deliver stable supply of power, it has to make use of storage or be connected to the electric grid, or be combined with other technologies. To date, only off-grid types are found in the Philippines.

Grid-connected PV plants are largest in the U.S., Japan and Germany where 'PV-on-roof-tops and facades' programmes were initiated since 1995. Other industrialized countries notably Switzerland, Italy, Netherlands, Spain and Australia have also adapted their own 'residential roofs' programmes. While the bandwagon is responsible for the phenomenal growth of the world

[1] Solar energy can also be converted into electricity by concentrating the radiation in thermal power plants. This would require high incidence of sunshine. Where solar radiation is however diffused as in the Philippines, solar thermal plant is not a relevant option.
[2] Renewable Energy World, July-August 2000, p. 59.

PV market, *i.e.*, from less than 1 MW/year in 1995 to 200 MW in 1999, grid-connected systems are still highly subsidized. The shift away from subsidies may happen in year 2010 if the world PV market can attain its target of 700 MW. By this time, it is expected that the installed cost for grid-connected PV would have dropped from the present US$8.00 per Wp to US$3.00 per Wp.[3]

Off-grid PV applications, stand-alone and hybrid systems, comprise a bigger market than grid-connected PV. This owes to the fact that PV tends to be more competitive relative to other technologies the farther the distance of the site is from the grid.

Stand-alone systems usually operate with the use of battery for storage. They are deployed in remote locations that have no access to a public utility grid. The load can be direct current (DC) or alternating current (AC). For small lighting applications, the standard configuration is a 12/24 V DC system.

The most popular stand-alone applications in rural villages are solar home systems and battery charging system. A solar home system consists of one or several PV modules mounted onto a suitable support structure such as a roof, a battery and a charge controller. The system is designed to supply small amounts of energy in off-grid households. On the other hand, a battery charging system can be a low power Ni-Cd charger or a community charging station.

Other commercial applications include communications (for powering repeaters), cathodic protection of pipelines and remote signaling. There is also demand for refrigeration, specially in rural villages. A PV refrigerator utilizes a PV array of 100 to 300 Wp, a battery and associated charge and compressor controllers, and a 12 or 24 V compressor refrigerator specially designed for photovoltaic power.

Yet a rapidly growing PV application in the Philippines is water pumping. Most PV water pump systems are designed without a battery; the water reservoir itself provides the storage. The system has a power range from 600 Wp to 3.5 kWp. A variable-frequency inverter, directly connected to the PV array, regulates the pump speed to maximize the use of the available PV power. The system is compatible with many off-the-shelf standard AC pumps.

PV may be coupled with other power generating system to provide steady source of power. The more common configurations are: (i) PV-diesel with battery; (ii) PV-diesel with load management; and (iii) PV-wind-diesel with battery. In the first, PV backstops diesel-powered plants in places where transporting diesel is difficult or costly. It is also feasible to combine PV and diesel without battery storage, but such system must have an automated capability to regulate the load. The loads are prioritized according to available generation. Thus apart from saving on storage cost, this configuration permits greater utilization of renewable energy as diesel runs are reduced when solar power is available. Finally, a system that combines PV with wind and diesel can provide 24-hour electricity, but the system is more complex and involves larger upfront capital investment.

5.2 Current installations and major initiatives

By recent inventory, the total PV installations in the Philippines has reached 4,850 units. Although one can find a PV system in every region, the concentration is in Region VIII which has more than one-fifth of the installations. The provinces that have the highest number of PV

[3] ibid.

systems are Easter Samar (752); Kalinga-Apayao (431); Palawan (358); Lanao del Sur (356); Iloilo (280); and Abra (273).

The diffusion of solar electricity in rural Philippines owes to major socio-economic programs implemented by the National Electrification Administration (NEA) since early 1990s, and recently, by the Department of Interior and Local Government (DILG).

5.2.1 NEA-GTZ Rural Photovoltaic Electrification

With the support of the *Gesellschaft fur Technische Zusammenarbeit* (GTZ), NEA embarked on a program dubbed "Rural Photovoltaic Electrification"(RPE) in 1992. By the end of 2000, the project has installed 2,454 individual solar home systems (SHS), 195 battery charging stations (BCS) and 11 demonstration units. About 60 percent of SHS units is in Luzon, while 78 percent of BCS is in Mindanao. In all, the systems have total capacity of 166.7 kW, providing power to about 2,890 rural households.

Table 5.1
NEA-GTZ Photovoltaic Installations
As of 31 December 2000

	Solar Home System		Battery Charging Stn		Demo Units	
	Units	Capacity*	Units	Capacity*	Units	Capacity*
Luzon	1,465	96,482	38	2,870	4	300
Visayas	529	35,005	5	462		
Mindanao	460	27,440	152	3,632	7	525
Philippines	2,454	158,927	195	6,954	11	825

*in Watt-peak.
Source: National Electrification Administration.

NEA works jointly with the electric cooperatives to implement the program. Concretely, NEA provides loan to the cooperative for installing and managing the solar energy facilities. The SHS, for instance, is rented by the consumer from the electric cooperative for a monthly fee. The consumer shoulders the cost of maintenance. Although the program dabbled with other systems beside SHS and BCS, such as rechargeable lamps and central solar power plants, the program has had more success in SHS because of ease in administration and low maintenance requirement. SHS also eschews the need of setting up a grid in the barangay.

The SHS unit consists of a 75 Wp solar crystalline silicone panel and 100 AH, 12 V solar battery. NEA lends to the electric cooperative P25,000 for each SHS installed to cover the costs of the solar panel, battery charge controller, and some of the auxiliary components. The other components of the system, *e.g.,* battery and converter, estimated to have a value of P5,000, are shouldered by the cooperative and represents the consumer's counterpart.

A BCS unit is designed to cater to the needs of 10 households. It consists of three 75-Wp solar panels. NEA extends P65,000 loan to the electric cooperative for every BCS unit set up in its franchise area. The consumer's counterpart is P5,000.

In the pipeline for year 2001 are 529 SHS units with a funding requirement of P11.225 million. The units will be installed in Benguet, Cagayan, Ilocos Sur, Marinduque and Occidental Mindoro.

5.2.2 Municipal Solar Infrastructure Project

In November 1997, the Department of Interior and Local Governments (DILG) initiated a community development program aimed at providing services to poor communities unconnected to the power grid. The program, known as the Municipal Solar Infrastructure Project (MSIP), is assisted by the Australian Agency for International Development (AusAID) through a mix of loans and grants from the Australian Government and Export Finance and Insurance Corporation.

MSIP works through the Local Government Units (LGUs) in deploying solar packaged systems for use in water pumping, barangay and rural health centers, district hospital, schools, communal light, and municipal and barangay halls. The packages are to be installed in 435 barangays, covering 52 municipalities of 10 provinces in Visayas and Mindanao over a 49-month period, ending December 2001. Yet as of 30 January 2001, the project is almost complete, having installed 1,143 packages of the 1,145 units targetted.

Table 5.2
MSIP Project Allocations

Province	BH/MH	BHC/ RHC	DH	SHW	CL	SCH	WS
Guimaras	6	2			14	6	3
Antique		1			34	7	12
Biliran	7	4			5	12	15
Eastern Samar	175	74	1	1	135	205	128
Southern Leyte	4	11	1	1	46	19	17
Western Samar		2			32	3	39
Surigao del Sur	6	5			2	9	2
Tawi-tawi	8	5	1	1	5	5	7
Sulu	1	6	1	1			25
Bohol		5			16	4	11
DILG						1	
Total	**207**	**115**	**4**	**4**	**289**	**266**	**259**

Legend: BH = barangay hall; MH = municipal hall; BHC = barangay health center; RHC = rural health center; DH = district hospital; SHW = solar hot water; CL = community light; SCH = schools; WS = water system
Source: Department of Interior and Local Government.

The selection of sites has been guided by the Social Reform Agenda (SRA) Program of the government. Thus the beneficiaries are the remote barangays in the identified SRA provinces. A barangay is considered “remote” and thus qualified in the program, when its distance from the public grid is at least 5 kilometers. The program also selects those barangays with existing infrastructure such as municipal and barangay halls, district hospitals, rural and barangay health centers, and schools, where the solar packages may be installed. For PV water pumping, the barangay must not only have a stable water source, but the water should also pass the purity standards of the World Health Organization. The technical design and costs of the solar packages are presented below.

Table 5.3
Technical Specifications and Costs of Solar Packages of MSIP

		Costs (*in pesos*)	
	Load Capacity	Eqpt & Inst.*	Ann. O&M
District hospital	❑ 153 light hours per day from 30 low energy AC lights ❑ 12 fan hours per day from 2 ceiling fans ❑ 60 watt hours/day for communication ❑ Vaccine fridge/freezer able to supply 2 kg ice/day ❑ 200 liters/day hot water from solar hot water system ❑ 10,000 liters stored potable water	2,086,100	66,000
Rural health unit	❑ 43 light hours per day from 12 low energy AC lights ❑ 6 fan hours per day from 1 ceiling fan ❑ 60 watt hours/day for communication ❑ Vaccine fridge/freezer able to supply 2 kg ice/day ❑ 300 watt hour/day 220V 60hz for small appliances	1,108,919	51,000
Barangay health center	❑ 18 light hours per day from 4 low energy DC lights ❑ Vaccine fridge/freezer to supply 2 kg ice/day	321,068	17,400
Municipal hall	❑ 74 light hours per day from 20 low energy AC lights ❑ 6 fan hours per day from 1 ceiling fan ❑ 60 watt hour/day for communication ❑ 1,995 watt hour/day 220V 60hz for small appliances	1,212,458	41,000
Barangay hall	❑ 18 light hours per day from 4 low energy DC lights	46,891	3,000
School	❑ 32 light hours per day from 8 low energy DC lights ❑ 5 TV/Video hours/week for school use	157,783	10,000
Community light	❑ 12 light hours per day from one 18-watt, DC low energy fluorescent light	146,785	3,100
Water system 10/20	❑ 10,000 cu m/day supply for barangay population approx. 350	1,070,523	35,000
Water system 20/20	❑ 20,000 cu m/day supply for barangay population approx. 700	1,887,070	42,000
Water system 40/20	❑ 40,000 cu m/day supply for barangay population approx. 1400	2,543,195	62,000

*Based on exchange rate of 1 AU$ = Php 25.80
Source: Department of Interior and Local Government.

Notwithstanding the advance implementation of the program, proponents are still concerned about its sustainability. Among the issues raised are the peace and order condition in the identified provinces, delays on the part of LGU units in fulfilling their counterpart activities, and the continued operability of the installed PV systems. On the last issue, the program elicits the participation of the community in managing, operating and maintaining the solar facilities. Thus, an important component of the program is the training of Barangay Technical Teams (BTTs) and organization of solar project management groups (SPMGs) that will have oversight function on the installations. Although the Affiliated Nonconventional Energy Centers (ANEC), the university-based network of the Department of Energy, has been tasked to provide technical support to the communities, the strengthening of BTTs and SPMGs is still critical to the program's long-term success.

A second phase of MSIP, slated for implementation in year 2002-2006, is currently under evaluation by the National Economic and Development Authority (NEDA). The target coverage is broader: 4,663 solar package systems to be installed in 1,158 barangays in 60 municipalities and 16 provinces. Regions in Luzon, specifically Regions IV, V and CAR, are among the target beneficiaries. The project has a budget of US$155 million, of which US$150 million is to be obtained through foreign loan, and the remaining US$5 million represent government counterpart.

5.2.3 Private Initiatives

A number of PV installations in the Philippines were installed through the initiatives of non-government organizations and private individuals. Yet while these are private undertakings, none is known to generate commercial returns.

The more recent installations include the PV-biomass system (3.6 kWp of PV coupled with 6 kW gas generator) of Shell Renewables Philippines Corporation in Alaminos, Madalag, Aklan. Households register with Shell their daily load energy demand, measured in terms of energy unit. One energy unit is equivalent to about 100 watt-hours of daily energy consumption. Shell collects P50 a week from each household who signed up for one-unit energy level consumption. The fee translates to an electricity charge of P71.43 per kWh. Although this price is many times higher compared to grid price, Shell proponents still claim that the fees collected from users are barely enough to cover their operating expenses.

Similarly, in the solar home systems set up by the Philippine Rural Reconstruction Movement (PRRM) in 5 barangays in El Nido, Palawan, the P50 monthly charge to households is only a reimbursement for the cost of maintaining the system.

As most of the PV systems are highly subsidized, the finances for installation and maintenance of the facilities often come from a number of sources. In the case of the PV project in Puerto Princesa, Palawan, the Development Bank of the Philippines (DBP) extended P10.65 million loan to the Local Government Unit to fund the installation of solar home systems in 400 households. In addition to the loan, the Department of Energy has to infuse P800,000 in the project to defray the costs of the system.

Where PV applications may however prove economically viable is in the telecommunications sector. The PV-diesel-battery hybrid has emerged as a cost-efficient alternative to traditional diesel generators for remote communication installations. Among the early adapters of this system are Radio Communication of the Philippines, Inc. (RCPI) and Pilipino Telecommunications, Inc. Recently, it has been reported that the Philippine Long Distance Telephone Co. (PLDT) is exploring the DBP's FINESSE window for its plan to replace the diesel generators that are currently powering its repeater stations.

The PV-diesel-battery hybrid system that the First Philippine Energy Corporation (FPEC) designed for RCPI has the capacity of providing a continuous load of 1,600 watts. The PV component, with a total peak capacity of 9.6 kW, was sized on the assumption of 3.2 $kWh/m^2/day$

daily insolation, while the battery bank, for a 3-day autonomy. The diesel generator is connected to a 400A, 48V rectifier which shortens the charging time of the battery and minimizes the run time of the generator. The generator serves as a back-up to the solar system when the energy production from PV modules is not sufficient or when the battery bank is depleted.

In general, a mix of PV and non-renewable (commonly diesel) energy sources is perceived to be more economical and more reliable power source than a fully PV system. Some of the recent hybrid installations are: PV-hydro system in Dupax del Norte, Nueva Vizcaya; PV-wind turbine systems in Anilao, Iloilo; and PV-Wind-hydro system in Talisay, Negro Occidental.

In Atulayan Island, Sagnay, Camarines Sur, Synergy Power Philippines, Inc. constructed a PV-wind-diesel-battery hybrid that has the capacity to supply an average of 36.5 kWh/day for use of 72 households. The wind turbine acts as primary energy generator; it is designed to produce power at wind speed as low as 4.5 meters per second. The PV system serves as secondary energy source. When energy production from wind and solar are not sufficient, power can be obtained from the diesel generator.

The Atulayan facility, costing US$50,000, was commissioned in September 2000. CASURECO IV manages the facility and charges users P4.35 per kWh plus fuel cost. Nine barangay volunteers were trained to operate and maintain the facility. It is estimated that the first two years of the system will require monthly operating expenses of P6,500 (including P4,000 cost of fuel). Whether the facility will be found economically viable for off-grid rural electrification remains to be seen.

5.3 Fiscal Incentives

Investors of PV systems can avail of the same privileges accorded to BOI-registered firms. As provided in EO 226, the incentives include: (i) income tax holiday; (ii) additional deduction for labor expenses; (iii) exemption from contractor's tax; (iv) deduction of infrastructure expenses from taxable income; (v) unrestricted use of consigned equipment; and (vi) employment of foreign nationals.

Since most PV installations are small and individualized, these privileges have limited use to the proponents. Moreover, PV installations have remained uncompetitive relative to grid-connected power generators. In addition, the systems are often deployed in remote rural areas where consumers' purchasing power is low. Consequently, recovering costs is a hurdle that investors have yet to overcome. Since revenues are not sufficient to cover costs, the provisions as regards to taxable income become moot. Nor is the exemption from contractor's tax applicable to PV investors; it is often the case that the host communities assist in the installation of the system.

The Agriculture and Fisheries Modernization Act (RA 8435) however provides relief to PV investors from paying duties on importation of solar panels for five years beginning 1999. The other major items in PV facilities, such as battery and charge controller, are still levied between 3 to 10 percent.

5.4 Economics of PV systems

As is the case for most renewable energy systems, the biggest hurdle in nurturing the market for PV in rural areas is the large upfront cost. However, the modularity of the system, *i.e.*, it can be sized variably depending on the energy requirement of target users, ease of operation and low maintenance costs make the system appropriate to supply the energy needs of low-income rural households.

In the foregoing, the levelized economic cost of various PV installations are calculated under the following assumptions:

(i) Daily insolation of 5 kWh per sq. m. per day

(ii) Autonomy period of 3 days

(iii) The life of the system coinciding with the life of the PV modules, *i.e.*, 20 years, without salvage value.

(iv) Capital recovery factor of 12 percent.

(v) It is assumed that financing will be needed only for equipment and materials. The installation cost is to be borne by the individual or community, representing the beneficiaries' loan counterpart. Loan is amortized over the life of the system. The cost of financing is 12 percent.

(vi) Replacement of battery after 3 years if the battery is shallow-type (used in automotive) or after 5 years if the battery is deep-cycle. The battery charge controller is replaced every 5 years.

(vii) The installation cost includes only labor. Costs of transporting equipment and materials to the site are excluded since they are too variable.

(viii) Accuracy of the estimates is within ±20 percent margin.

The cost estimates were obtained from major solar equipment suppliers, namely, First Philippine Energy Corporation and Solar Electric. The costs reflect the retail prices in the local market. It is therefore possible to reduce the costs of the system if the components can be purchased in volume. The retail costs of the major components of the PV installations are shown below.

Table 5.4
Retail prices and tariffs of major components in PV system

COMPONENT	TARIFF	PRODUCED LOCALLY?	RETAIL COST	UNIT
PV modules	0	No	$4.2 – 8.0	per Wp
Battery				
Automotive Battery	15	Yes	P25 – 40	per A-hr
Deep-cycle battery	7	No	$2.0 – 5.0	per A-hr
Controller	3	Yes	$4.0 – 7.0	per A
Pump	3	No	$0.8 – 4.0	per W
Pump controller	3	No	$0.4 – 1.0	per W
Hybrid supply controller	3	No	$0.8 - $2.0	per W
Inverter	3	Yes	P30 – 100 $0.6 – 1.6	per W
Converter	3	Yes	P25 – 80 $0.5 – 2.0	per W

5.4.1 Solar Home Systems

A solar home system consists of PV modules and balance of system components, *i.e.*, battery, charge controller and support and wiring. More than half of the investment cost is due to PV modules.

Four solar home systems, with daily generating capacity ranging from 125 Wh to 450 Wh, are configured in Table 5.5. The systems use automotive (shallow-type) battery which is replaced every three years.

Since the system is individualized, no operating cost is imputed. The annual maintenance cost represents the value of time of the person charged to periodically refill the battery with distilled water. In addition, the battery and charge controller are replaced every 3 and 5 years, respectively.

Table 5.5
Investment Costs of Solar Home Systems

	SHS1	**SHS2**	**SHS3**	**SHS4**
Daily load (Wh)	125 – 150	180 – 225	250 – 300	360 – 450
PV (Wp)	50	75	100	150
Battery (A-hr)	70	100	140	200
Controller (A)	5	6	10	12
Typical load	❑ 2 units of 10W lamp at 4 hrs. each ❑ 5W radio at 3 hrs.	❑ 3 units of 10W lamp at 4 hrs. each ❑ 15W radio at 4 hrs. or 30W B&W TV at 2 hrs.	❑ 4 units of 10W lamp at 4 hrs. each ❑ 15W radio at 6 hrs. or 30W B&W TV at 3 hrs.	❑ 4 units of 10W lamp at 5 hrs. each ❑ 15W radio at 4 hrs. ❑ 30W B&W TV at 4 hrs.
Investment cost	**26,000**	**35,000**	**43,200**	**57,500**
PV module	13,500	20,000	25,000	36,000
Battery	2,450	3,500	4,900	7,000
Controller	1,750	2,100	3,500	4,200
Auxilliary	2,300	2,400	2,600	2,800
Installation	6,000	7,000	7,200	7,500
IC per kWh	**520,000**	**466,667**	**432,000**	**383,333**
Ann. operation	0	0	0	0
Ann. maintenance	250	350	500	700
Life-cycle cost	54,563	73,711	93,708	125,520
LC per kWh	**145.55**	**133.51**	**124.99**	**113.68**

The levelized costs per kWh range from P114 to P146; costs fall as capacity of the system increases. Similarly, investment cost per kWh is between P383,000 to P520,000; economies of scale is evidently strong. It is also apparent that the current fees imposed on households, *e.g.,* P50 per month by the Philippine Rural Reconstruction Movement are not designed to cover the costs of the system, but merely to reimburse the maintenance expenses.

5.4.2 PV Street Lighting System

Table 5.6 presents six configurations of PV street lighting systems. The systems are designed to operate for 12 hours daily. Automotive shallow-type battery is used. The sizes of the battery and controller are matched with the capacity of the PV module. No operating cost is imputed since each system is individualized and therefore the operation involves a simple switching on and off. Maintenance of the system only requires periodic water refilling of the battery; thus as in solar home systems, the cost is nominal.

PV street lights, like solar home systems, have levelized costs that are several fold higher than prices of grid connected facilities. The levelized costs range from P125 to P172 per kWh. Strong economies of scale is evident; larger system, i.e., with more lighting load, requires higher upfront investment cost, but is associated with lower investment cost per kW and levelized cost per kWh.

Table 5.6
Investment Costs of PV Street Lighting Systems

	PSLS1	PSLS2	PSLS3	PSLS4	PSLS5	PSLS6
Lighting load W	10	12	16	18	23	25
PV (Wp)	50	50	50	75	100	100
Battery (A-hr)	70	100	100	140	140	200
Controller (A)	5	5	6	6	10	10
Investment cost	**27,000**	**28,500**	**35,000**	**37,000**	**43,500**	**45,000**
PV Module	13,500	13,500	19,000	19,000	25,000	25,000
Battery	2,450	3,500	3,500	4,900	4,900	7,000
Charge Cont.	1,750	1,750	1,750	2,100	3,500	3,500
Auxilliary com.	3,300	3,750	3,750	4,000	2,600	2,000
Installation	6,000	6,000	7,000	7,000	7,500	7,500
IC per kW	**540,000**	**570,000**	**466,667**	**493,333**	**435,000**	**450,000**
Ann. operation	0	0	0	0	0	0
Ann. maintenance	250	350	350	500	500	700
Life cycle cost	56,316	61,947	73,336	81,344	94,234	102,867
LC per kWh	**172.13**	**157.79**	**140.10**	**138.13**	**125.23**	**125.77**

5.4.3 Battery Charging Stations

Among small-scale PV installations, battery charging stations yield the lowest electricity generation cost. The levelized costs per kWh of six battery charging stations are presented in Table 5.7. For comparability, all households served by the stations are assumed to have an average daily load of 150 Wh.

The stations are sized according to the target number of household users. To illustrate, in BCS1, the station has 2 channels for use of 10 households whose batteries have load of 70 ampere-hours. This implies that at any day, 2 households can charge their batteries with power supply sufficient for their 5-day use. Thus, the station can supply energy equivalent to 1.5 kWh per day.

Annual operation costs pertain to the salary of the administrator of the station. No maintenance cost is imputed since the system does not have a battery to maintain. The costs of maintaining the batteries owned by the households are assumed to be on the individual household account.[4] The only replaceable part is the battery charge controller with an expected life of 5 years.

Table 5.7
Investment Costs of Battery Charging Stations

	BCS1	BCS2	BCS3	BCS4	BCS5	BCS6
No. of households served	10	20	40	10	20	40
Daily load (Wh) per household	150	150	150	150	150	150
Battery (A-hr)	70	70	70	100	100	100
Channel Specs						
PV (Wp)	300	300	300	450	450	450
Controller (A)	25	25	25	36	36	36
No. of channels	2	4	8	2	3	5
Investment cost	**220,000**	**440,000**	**880,000**	**325,000**	**487,500**	**812,500**
PV module	150,000	300,000	600,000	225,000	337,500	562,500
Controller	15,000	30,000	60,000	20,000	30,000	50,000
Other mat'ls	5,000	10,000	20,000	5,000	7,500	12,500
Installation	50,000	100,000	200,000	75,000	112,500	187,500
IC per kW	**366,667**	**366,667**	**366,667**	**361,111**	**361,111**	**361,111**
Ann. Operation	6000	6000	6000	6000	6000	6000
Ann. Maintenance	0	0	0	0	0	0
Life-cycle cost	446,374	847,932	1,651,047	635,712	931,160	1,522,055
LC per kWh	**109.15**	**103.67**	**100.93**	**155.45**	**113.85**	**93.05**

Private charging stations impose a fee between P30 to P60 for charging 70 to 100 ampere-hour of battery. This fee is equivalent to an electricity charge of P35 to P60 per kWh. Thus, as the proponents claim, the current fees are insufficient to cover the full cost of the system.

5.4.4 PV Pumping Stations

The various sizes of PV water packages shown in Table 8 can be deployed in rural communities depending on water source and demand. As in other PV installations, smaller systems have higher investment and levelized costs per output unit.

In this system, the pump controller is replaced every 10 years. The design is for submersible pump. It has no battery as the water tank serves as storage. Operation is simple, thus the cost pertains to the honorarium due the administrator.

[4]The situation is different when the battery charging station leases the batteries to the households. In which case, the costs of maintaining the batteries are part of the station's account.

Table 5.8
Investment Costs of PV Pumping Stations

	PVP1	PVP2	PVP3	PVP4
Daily water supply (li)	600 – 750	900 – 1,125	1,800 – 2,250	3,000 – 3,750
Head	30	30	30	30
PV (kWp)	0.10	0.15	0.30	0.50
Pump Controller (A)	10 @ 12 V	12 @ 12 V	30 @ 12 V	50 @ 12 V
Investment cost	**78,000**	**104,000**	**195,000**	**312,000**
PV module	25,000	36,000	75,000	110,000
Pump controller	20,000	25,000	40,000	100,000
Other materials	15,000	19,000	35,000	30,000
Installation	18,000	24,000	45,000	72,000
IC per cu m	**115,556**	**102,716**	**96,296**	**92,444**
Operation	6,000	6,000	6,000	6,000
Maintenance	1,800	2,400	4,500	7,200
Life-cycle cost	201,370	253,018	432,980	677,469
LC per cu m	**109.42**	**91.66**	**78.43**	**73.63**

	PVP5	PVP6	PVP7	PVP8
Daily water supply (kl)	4.8 – 6.0	9.6 – 12.0	18.0 – 22.5	48.0 – 60.0
Head	30	30	30	30
PV (kWp)	0.8	1.6	3.0	8.0
Pump controller	20 @ 48 V	40 @ 48 V	75 @ 48 V	80 @ 120 V
Investment cost	**520,000**	**715,000**	**1,105,000**	**2,080,000**
PV module	180,000	320,000	600,000	1,350,000
Pump controller	188,000	195,000	215,000	215,000
Other materials	32,000	35,000	35,000	35,000
Installation	120,000	165,000	255,000	480,000
IC per cu m	**96,296**	**66,203**	**22,376**	**38,519**
Operation	6,000	6,000	6,000	6,000
Maintenance	12,000	16,500	25,500	48,000
Life-cycle cost	1,106,107	1,483,645	2,240,654	4,117,077
LC per cu m	**75.13**	**50.39**	**40.59**	**27.96**

How does a PV water system compare with a wind pump? The former, of course, is more flexible and reliable as it does not require minimum wind resource, hence can be deployed almost anywhere. In terms of costs, however, wind pump is more economical, requiring lower investment as well as operation and maintenance costs. The economics of the two systems are compared below. Resources permitting, wind pump is clearly preferred to PV water system.

Table 5.9
PV water system vs. Wind pump

	PV	Wind	PV	Wind
Output (cu m)	3 – 3.75	1 – 5	48 – 60	45 – 120
Investment cost	312,000	30,000	2,080,000	145,000
IC per cu m	92,444	10,000	38,519	1,758
Ann. O & M	13,200	7,000	54,000	22,000
Life-cycle cost	677,469	84,288	4,117,077	493,087
LC per cu m	73.63	13.62	27.96	2.00

5.4.5 PV Power Plants

The PV power plants in Table 5.10 are designed to generate electricity of 220 volts. Deep-cycle batteries are used; these are imported and have an expected life of 5 years. The inverter is replaced every 10 years.

The beneficiary community is comprised of households with an average daily energy demand of 200 kWh. Operation cost is relatively higher than other PV installations, since the system will require an engineer as system administrator. Maintenance expenses increase with the size of the plant.

Table 5.10
Investment Costs of PV Power Plants

	PVPP1	PVPP2	PVPP3	PVPP4
Daily load (kWh)	2.4 – 2.7	7.2 – 8.0	12.0 – 13.5	24.0 – 27.0
No. of households served	12	36	60	120
PV (kWp)	1	3	5	10
Battery (kWh)	10	30	50	100
Inverter @ 0.6 DF (kW)	1.4	4.5	7.5	12.5
Investment cost	**455,000**	**1,170,000**	**1,755,000**	**3,250,000**
PV module	200,000	600,000	900,000	1,800,000
Battery	45,000	90,000	187,500	375,000
Inverter	60,000	135,000	187,500	250,000
Other materials	45,000	75,000	75,000	75,000
Installation	105,000	270,000	405,000	750,000
IC per kW	**455,000**	**390,000**	**351,000**	**325,000**
Ann. operation	180,000	180,000	180,000	180,000
Ann. maintenance	4,500	9,000	18,750	37,500
Life-cycle cost	2,242,910	3,601,713	4,820,989	7,801,669
LC per kWh	**322.62**	**173.83**	**138.69**	**112.21**

One may compare the economic viability of installing solar home systems and constructing PV power plant. If solar home systems are installed instead (SHS2 in Table 5.5), the investment cost for 120 household amounts to P4.2 million, higher than the P3.25 million required by a comparable PV power plant (*i.e.*, PVPP4 in Table 5.10). The levelized energy costs are P133.15

per kWh for solar home and P112.21 per kWh for PV power plant. In this case, the PV plant is optimal.

On the other hand, a smaller community of 60 households will require investments of P2.1 million and P1.8 million for solar home and PV plant (PVPP3), respectively. But the life-cycle cost of solar home systems is smaller, *i.e.*, P4.1 million compared to P4.5 million for a PV plant. Corollarily, the levelized cost is lower for solar home, P123.98 per kWh, versus P132.52 for PV plant. Here, solar home system is preferred to PV plant.

Thus, for small-sized communities, as is the case for most remote rural villages, solar home systems are more economical compared to PV power plant. Apart from costs, another consideration is the relative ease of operating and maintaining solar home systems compared to PV plant. This explains the sparseness of investments in PV plants for rural electrification.

5.4.6 Hybrid systems

Since solar is an intermittent source of energy, photovoltaics are often coupled with other systems that rely on other energy resource, such as diesel, wind, biomass and hydro. PV-generated power is often costlier than those of other systems, thus PV is usually sized after the use of other generators is optimized. Thus the contribution of PV to the total system is determined after considering the cost of fuel (diesel, gas or biomass) and availability of other resources (wind speed or water flow).

Table 5.11 considers the economics of five equally sized hybrid systems. The first system, PV-wind, is imported, thus the huge investment cost of P8.8 million. The large life-cycle cost of this system, P16 million, owes in part to the kind of battery included in the system. It is estimated that such battery, costing P1.5 million, has a useful life of 10 years.

The inclusion of battery storage in hybrid systems 2 and 4 increases the upfront investments, but lowers the electricity generation costs. As explained in section 1, a hybrid system without a battery must have an automated load regulator that permits greater utilization of renewable resource.

Of the five systems, it is clear that the PV-wind-diesel-battery combination yields the lowest power cost, but requires the largest investments compared to other local designs. It is interesting to note that this system is similar to the Atulayan facility recently constructed by Synergy Power, Inc.

Table 5.11
Investment Costs of Hybrid PV Systems

	Hybrid1 (PV-Wind)	Hybrid2 (PV-Diesel-battery)	Hybrid3 (PV-Diesel)	Hybrid4 (PV-Wind-diesel-battery)	Hybrid5 (PV-Wind-Diesel)
Daily load (kWh)	55	55	55	55	55
PV (kWp)	16	1	1	1	1
Wind (kW)	9			1	1
Diesel (kW)		8	8	8	8
Battery (kWh)	250	25		25	
Inverter (kW)	8	4	1.5	4	1.5
Investment cost	**8,800,000**	**975,000**	**730,000**	**1,300,000**	**1,040,000**
PV module	3,000,000	200,000	200,000	200,000	200,000
Wind turbine	1,800,000	-	-	250,000	250,000
Diesel generator	-	200,000	200,000	200,000	200,000
Battery	1,500,000	150,000		150,000	
Inverter	250,000	100,000	60,000	100,000	60,000
Others	650,000	100,000	90,000	100,000	90,000
Installation	1,600,000	225,000	180,000	300,000	240,000
IC per kW	**366,667**	**108,333**	**81,111**	**130,000**	**104,000**
O & M	280,000	320,000	410,000	320,000	415,000
Life-cycle cost	18,278,399	4,284,656	4,652,710	5,181,284	5,261,625
LC per kWh	**121.90**	**28.57**	**31.03**	**34.55**	**25.09**

5.5 Future of PV Systems in the Philippines

In the coming years, the popularity of PV systems in the Philippines is expected to be boosted by new socio-economic programs that are currently in the pipeline. One such project is the Solar Power Technology Support (SPOTS) Project of the Department of Agrarian Reform. SPOTS is akin to DILG-MSIP in that both utilize solar energy technologies to push community development programs.

The project, costing US$57 million, will be funded by loan proceeds from the Government of Spain. Some 79 agrarian reform communities (ARCs) in 41 provinces are the target beneficiaries. The program will run in two phases: the first phase is of 18-month duration and expected to commence either in the fourth quarter of 2001 or early part of 2002. During this phase, 37 ARCs are to be selected in 5 regions (IX, X, XI, XII and CARAGA) and 15 provinces.[5] Priority will be given to ARCs where at least 76 percent of land was distributed through the Comprehensive Agrarian Reform Program (CARP).

Working through the farmer cooperatives, SPOTS will install solar packages aimed at raising agricultural productivity and promoting community development. Packages for agricultural

[5] Target provinces include Zamboanga Norte, Zamboanga Sur, Misamis Oriental, Davao Norte, Davao Sur, Davao Oriental, Sarangani, South Cotobato, Sultan Kudarat, Cotobato, Agusan Sur, Agusan Norte and Surigao Norte.

development include water pumping systems (livestock or drip irrigation) and power supply system for agri-business activities such as egg incubation, chicken hatchery, piggery, bakery and refrigeration. To support community infrastructure, solar packages will be installed in barangay health clinics, barangay halls and schools. PV installations will also be set up for community lighting and potable water supply system.

A noteworthy feature of the program is that the solar installations will be transferred to farmer cooperatives as a grant, thus, DAR does not expect to recover the cost of the project. The subsidy is important in light of the high levelized costs of generating power from the system, which is clearly beyond the means of target beneficiaries. Nonetheless, a user's fee will be collected from direct beneficiaries, but such fee will be used mainly for operating and maintenance expenses. Collections in excess of these expenses will accrue to the farmers' cooperative in support of their capital build-up.

SPOTS project will complement the "Decentralized Energy Systems" (DES) Project of the Philippine National Oil Company-Energy Research and Development Center (PNOC-ERDC). DES promotes all off-grid energy systems. The project has approved funding to Base Corp. and RULEC for installation of PV lighting systems.

In addition, the *O'Ilaw* Rural Electrification Program of the Department of Energy has gained momentum of late. Although the program has no inherent biased on PV, it would be noted that 40 out of 64 projects implemented between December 1999 to December 2000 are PV installations.

Yet the emergence of a true market for PV will depend on the technological developments in the global industry. The major impediment to widespread use of PV remains to be its high costs. Efforts to reduce the costs of the system are not lacking. One track is to increase the efficiencies of solar cells. It is said that the operating efficiencies of present commercial systems are less than half of their laboratory potential and much lower than their theoretical efficiency. Another track is to explore less expensive materials, in particular, producing crystalline thin-film cells on foreign substrates, thus minimizing the use of silicon. Still another is to develop low cost optical concentrating systems to focus sunlight on small high efficiency cells. [6]

The penultimate objective is to reduce the cost of PV systems to the extent that subsidies may be dispensed in favor of market forces. Until such time, PV systems may still be the technology choice for rural electrification given its high availability and minimal maintenance.

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[6] Renewable Energy World, "Renewable Prospects in Today's Conventional Power Generation Market," July 1999, p. 42.

Annex 1
NRE Installations in the Philippines

NRE Installation in the Philippines

As of April 30, 2001

Region	Provinces	Wind Pump	Wind Turbine	Micro-Hydro System	Photovoltaic System	Solar Water Heater	Solar Dryer	Biogas System	Biomass Fired Dryer	Biomass Fired Boiler	Gasifiers	Biomass Fired Oven
CAR	Abra	4			273			1				2142
	Apayao				38							
	Benguet	1		100	51	4		6				1
	Ifugao			18	2			1				
	Kalinga-Apayao	1		22	431			3	3			
	Mt. Province			3	12			11				1
1	Ilocos Norte	3	2	1	21			3				4785
	Ilocos Sur	5			154			2				8544
	La Union	7		3	34	3		11	5532		1	61
	Pangasinan	3			8		4	4		1		353
2	Batanes		2		46			1				
	Cagayan				41				5			
	Isabela	4		5	101			12	11	2		3
	Nueva Vizcaya			3	116			3	2			2
	Quirino	1			8			3	3			
3	Bataan	2										3
	Bulacan	7			7	1		44				6
	Nueva Ecija	88		1	24			24	4	3		33
	Pampanga	14			4			34		2	1	6
	Tarlac	1				1		1	2	1		3
	Zambales	5			46			2				
4	Aurora				19							
	Batangas	1			45	3		25		3		
	Cavite	1		3	18	1	1	17				97
	Laguna			3				4	1	2		1
	Marinduque				13			3				

Region	Provinces	Wind Pump	Wind Turbine	Micro-Hydro System	Photovoltaic System	Solar Water Heater	Solar Dryer	Biogas System	Biomass Fired Dryer	Biomass Fired Boiler	Gasifiers	Biomass Fired Oven
	Occidental Mindoro				83							
	Oriental Mindoro			1	2			1				
	Palawan	3	2		358	1		2	124			94
	Quezon			1	5			10		9		1
	Rizal	2				3		5				
	Romblon				54							
5	Albay							2				49
	Camarines Norte				13		1	3	3			30
	Camarines Sur		1	7	34			2	11	2		123
	Catanduanes			1	1							22
	Masbate	1			78							24
	Sorsogon			1								65
6	Aklan		1	3	2	2						57
	Antique		1	1	57			1	1	1		83
	Capiz				25			9		2		63
	Guimaras	2		1	40					2		31
	Iloilo	37	2	1	278			4	1	3	3	157
	Negros Occidental	7	2	7	100	1		2	1	55		28
7	Bohol	6		2	100			2	16			17
	Cebu	4		4	79	71		31	13	15		90
	Negros Oriental	14		6	118		2	16	93	7		42
	Siquijor			1	4				11			
8	Biliran				43				2			1
	Eastern Samar			1	752							18
	Leyte	1		2	8	1		5	41	8	1	14
	Southern Leyte	1		2	100				1		3	1
	Northern Samar				40				20			37
	Western Samar			1	92				1			14
	Southern Samar											

Region	Provinces	Wind Pump	Wind Turbine	Micro-Hydro System	Photovoltaic System	Solar Water Heater	Solar Dryer	Biogas System	Biomass Fired Dryer	Biomass Fired Boiler	Gasifiers	Biomass Fired Oven
9	Basilan			2	1			1	9			1
	Zamboanga del Norte	3			5			15	9			4
	Zamboanga del Sur	3		4	10			8	6		1	327
10	Bukidnon			7	15		1	4	86	6		115
	Camiguin			1	9				89			16
	Misamis Occidental	1			16			2	1055	4		56
	Misamis Oriental				13			3	1169			50
11	Davao del Norte			2	140	3	3	1	16			36
	Davao del Sur	3		3	26	17		21	22	17		123
	Davao Oriental				7			2	1			
	Sarangani								26			
	South Cotabato	1			36							2
	Sultan Kudarat	2			15		1	3	21	1	1	33
12	Lanao del Norte				6		1	1	1092	1		89
	North Cotabato											
	Cotabato			3	10				4	1	1	98
13	Agusan del Norte				106		1	1	1754	27		88
	Agusan del Sur				1				903			25
	Surigao del Norte			1	8				2604			50
	Surigao del Sur				27		1					
ARMM	Lanao del Sur	2		3	356		3	2	190	2	1	131
	Maguindanao				1				8		7	43
	Sulu				35							
	Tawi-Tawi				28							
Total Installations		**241**	**13**	**231**	**4850**	**112**	**19**	**374**	**14966**	**177**	**20**	**18389**

Source: NESCON; SATMP survey.

Annex 2
Tariff Schedules on Capital and Equipment used in NRE Systems

Code	Description	Tariff Rate
84.02	**Steam or other vapour generating boilers (other than central heating hot water boilers capable also of producing low pressure steam); super-heated water boilers.**	
8402.11 00	Watertube boilers with a steam production exceeding 45 t per hour	10
8402.19 00	Other vapour generating boilers, including hybrid boilers	10
84.06	**Steam turbines and other vapour turbines.**	
8406.81 00	Of an output exceeding 40 MW	3
8406.82 00	Of an output not exceeding 40 MW	3
84.10	**Hydraulic turbines, water wheels, and regulators therefor.**	
8410.11 00	Of a power not exceeding 1,000 kW	3
8410.12 00	Of a power exceeding 1,000 kW but not exceeding 10,000 kW	3
8410.13 00	Of a power exceeding 10,000 kW	3
84.12	**Other engines and motors.**	
8412.10 00	Reaction engines other than turbo-jets	3
	Hydraulic power engines and motors:	
8412.21 00	Linear acting (cylinders)	3
8412.29 00	Other	3
	Pneumatic power engines and motors:	
8412.31 00	Linear acting (cylinders)	3
8412.39 00	Other	3
8412.80 00	Other	3
8412.90 00	Parts	3
84.13	**Pumps for liquids, whether or not fitted with a measuring device; liquid elevators.**	
	Pumps fitted or designed to be fitted with a measuring device:	
8413.11 00	Pumps for dispensing fuel or lubricants, of the type used in filling-stations or in garages	3
8413.19 00	Other	3
8413.20 00	Hand pumps, othern than those of subheading No 8413.11 00 or 8413.19 00	10
8413.30 00	Fuel, lubricating or colling medium pumps for internal combustion piston engines	3
8413.40 00	Concrete pumps	3
8413.50 00	Other reciprocating positive displacement pumps	3
8413.60 00	Other rotary positive displacement pumps	3
8413.70 00	Other centrifugal pumps:	
8413.70 10	Centrifugal water pumps, single stage, single suction, horizontal shaft type suitable for belt drive or direct coupling (except pumps with shafts common with prime mover)	10
8413.70 90	Other	3
	Other pumps; liquid elevators	3
8413.81 00	Pumps	3
8413.82 00	Liquid elevators	3
	Parts:	
8413.91 00	Of pumps	
8413.91 10	Of the goods of subheading Nos 8413.20 00 and 8413.70 10	10
8413.91 90	Other	3
8413.92 00	Of liquid elevators	3

84.19	**Machinery, plant or laboratory equipment, whether or nor electrically heated, for the treatment of materials by a process involving a change of temperature such as heating, cooking, roasting, distilling, rectifying, sterilising, pasteurising, steaming, drying, evaporating, vaporising, condensing ot colling, other than machinery or plant of a kind used for domestic purposes; instantaneous or storage water heaters, non-electric.**	
	Instantaneous or storage water heaters, non-electric:	
8419.11 00	Instantaneous gas water heaters	3
8419.19 00	Other	3
8419.20 00	Medical, surgical or laboratory sterilisers	3
	Dryers:	
8419.31 00	For agricultural products	3
8419.32 00	For wood, paper pulp, paper or paperboard	3
8419.39 00	Other	3
8419.40 00	Distilling or rectifying plant	3
8419.50	Heat exchange units:	
8419.50 10	Condensers for air-conditioning machines for motor vehicles	5
8419.50 90	Other	
8419.60 00	Machinery for liquefying air or other gases	3
	Other machinery, plant or equipment:	
8419.81 00	For making hot drinks or for cooking or heating food	3
8419.89 00	Other:	
8419.89 10	Evaporators for air-conditioning machines for motor vehicles	5
8419.89 20	Chemical vapor deposition apparatus for semiconductor production	Free
8419.89 90	Other	3
8419.90	Parts:	
8419.90 10	Parts of chemical vapor deposition apparatus for semiconductor production	Free
8419.90 90	Other	3
84.21	**Centrifuges, including centrifugal dryers; filtering or purifying machinery and apparatus, for liquids or gases.**	
	Centrigues, including centrifugal dryers:	
8421.11 00	Cream separators	3
8421.12 00	Clothes dryers	3
8421.19	Other	
8421.19 10	Spin dryers for semiconductor wafer processing	Free
8421.19 90	Other	3
	Filtering or purifying machinery and apparatus for liquids:	
8421.21 00	For filtering or purifying water	10
8421.22 00	For filtering or purifying beverages other than water	3
8421.23 00	Oil or petrol-filters for internal combustion engines	10
8421.29 00	Other	
	Filtering or purifying machinery and apparatus for gases:	
8421.31 00	Intake air filters for internal combustion engines	10
8421.39 00	Other	3
	Parts:	
8421.91	Of centrigues, including centrifugal dryers:	
8421.91 10	Parts of spin dryers for semiconductor wafer processing	Free
8421.91 90	Other	3
8421.99 00	Other	3

84.81	**Taps, cocksm valves and similar appliances for pipes, boiler shells, tanks,vats or the like including pressure-reducing valves and thermostatically controlled valves.**	
8481.10 00	Pressure-reducing valves	3
8481.20 00	Valves for oleohydraulic or pneumatic transmission	3
8481.30 00	Check valves	7
8481.40 00	Safety or relief valves	3
8481.80	Other appliances:	
8481.80 10	Magnetic valves for closing or opening of doors of buses	3
8481.80 20	Gate valves	7
8481.80 30	Tire valves	3
8481.80 40	Pneumatically controlled valves	3
8481.80 50	Hog nipple waterer	3
8481.80 60	Gas cock/valve whether or not fitted with piezo-electric igniters for stoves and ranges	3
8481.80 90	Other	7
8481.90 00	Parts	3
85.01	**Electric motors and generators (excluding generating sets).**	
8501.31 00	Of an output not exceeding 750 W	3
8501.32 00	Of an output exceeding 750 W but not exceeding 75 kW	3
8501.33 00	Of an output exceeding 75 kW but not exceeding 375 kW	3
8501.34 00	Of an output exceeding 375 kW	3
8501.40 00	Other AC motors, single phase	3
8501.51 00	Of an output not exceeding 750 W	3
8501.52 00	Of an output exceeding 750 W but not exceeding 75 kW	3
8501.53 00	Of an output exceeding 75 kW but not exceeding 375 kW	3
8501.61 00	Of an output not exceeding 75 kVA	3
8501.62 00	Of an output exceeding 75 kVA but not exceeding 375 kVA	3
8501.63 00	Of an output exceeding 375 kVA but not exceeding 750 kVA	3
8501.64 00	Of an output exceeding 750 kVA	3
85.02	**Electric generating sets and rotary converters.**	
8502.11 00	Of an output not exceeding 75 kVA	
8502.12 00	Of an output exceeding 75 kVA but not exceeding 375 kVA	
8502.13 00	Of an output exceeding 375 kVA	
8502.20 00	Generating sets with spark-ignition internal combustion piston engines	
8502.31 00	Wind powered	
8502.39 00	Other	
8502.40 00	Electric rotary converters	
85.03 8503.00 00	**Parts suitable for use solely or principally with the machines of heading 85.01 or 85.02**	
85.04	**Electrical transformers, static converters (for example, rectifiers) and inductors.**	
8504.10 00	Ballasts for discharge lamps or tubes	10
8504.21	Having a power handling capacity not exceeding 650 kVA:	
8504.21 10	Step-voltage regulators; instrument transformers (potential and current) with handling capacity not exceeding 5 kVA	3
8504.22	Having a power handling capacity exceeding 650 kVA but not exceeding 10,000 kVA	
8504.22 10	Step-voltage regulators	3
8504.23	Having a power handling capacity exceeding 10,000 kVA:	

8504.23 10	Not exceeding 15,000 kVA	15
8504.31	Instrument potential transformers	3
8504.32	Instrument transformers (potential and current) with handling capacity not exceeding 5 kVA	3
8504.33	Having a power handling capacity exceeding 16 kVA but not exceeding 500 kVA	15
8504.34	Not exceeding 15,000 kVA	15
8504.40	Static converters for automatic data processing machines and units thereof, and telecommunications apparatus	Free
8504.50	Other inductors for power supplies for automatic data processing machines and units thereof, and telecommunication apparatus	Free
8504.90	Parts	3
85.05	**Electro-magnets; permanent magnets and articles intended to become permanent magnets after magnetisation; electro-magnetic or permanent magnet chucks, clamps and similar holding devices; electro-magnetic couplings, clutches and brakes; electro-magnetic lifting heads.**	
	Permanent magnets and articles intended to become magnets after magnetisation:	
8505.11 00	Of metal	3
8505.19 00	Other	3
85.06	**Primary cells and primary batteries.**	
8506.10 00	Manganese dioxide	15
8506.30 00	Mercuric oxide	7
8506.40 00	Silver oxide	7
85.07	**Electric accumulators, including separators therefor, whether or not rectangular (including square).**	
8507.10 00	Lead-acid, of a kind used for starting piston engines	15
8507.20 00	Other lead-acid accumulators	15
85.14	**Industrial or laboratory electric (including induction or dielectric) furnaces and ovens; oter industrial or laboratory induction or dielectric heating equipment.**	
8514.10	Resistance heated furnaces and ovens:	
8514.10 10	Resistance heated furnaces and ovens for the manufacture of semiconductor devices on semiconductor wafers	Free
8514.30	Other furnaces and ovens:	
8514.30 10	Apparatus for rapid heating of semiconductor wafers	Free
85.16	**Electric instantaneous or storage water heaters and immersion heaters; electric space heating apparatus and soil heating apparatus; electro-thermic hair-dressing apparatus (for example, hair dryers, hair curlers, curling tong heaters) and hand dryers; electric smoothing irons; other electro-thermic appliances of a kind used for domestic purposes; electric heating resistors, other than those of heading No. 85.45.**	
8516.10 00	Electric instantaneous or storage water heaters and immersion heaters	10

85.35	**Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (for example, switches, fuses, lightning arresters, voltage limiters, surge supressors, plugs, junction boxes), for a voltage exceeding 1,000 volts.**	
8535.10 00	Fuses	3
8535.21 00	For a voltage of less than 72.5 kV	7
8535.29 00	Other	7
8535.30 00	Isolating switches and make-and-break switches	3
8535.40 00	Lightning arresters, voltage limiters and surge suppressors	3
8535.90	Other:	
8535.90 10	Bushing assembly, tap changer assembly, connectors and terminals for electric distribution and power transformers	3
85.36	**Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (for example, switches, relays, fuses, surge suppressors, plugs, sockets, lamp-holders, junction boxes), for a voltage not exceeding 1,000 volts.**	
8536.10	Fuses:	
8536.10 00	Thermal fuses; glass type fuses	3
8536.2	Automatic circuit breakers:	
8536.20 10	For electro-thermic domestic appliances of heading no 85.16	3
8536.30 00	Other apparatus for protecting electrical circuits	7
8536.41 00	For voltage not exceeding 60 V	3
8536.49 00	Other	3
85.37	**Boards, panels, consoles, desks, cabinets and other bases, equipped with two or more apparatus of heading No. 85.35 or 85.36, for electric control or the distribution of electricity, including those incorporating instruments or apparatus of Chapter 90, and numerical control apparatus, other than switching apparatus of heading No. 85.17.**	
8537.10 00	For a voltage not exceeding 1,000 V	7
8537.20 00	For a voltage exceeding 1,000 V	7
85.41	**Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes; mounted piezo-electric crystals.**	
8541.30 00	Thyristors, diacs and triacs, other than photosensitive devices	Free
85.44	**Insulated (including enamelled or anodised) wire, cable (including co-axial cable) and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors.**	
8544.30	Electrical wiring harness for motor vehicles	20
8544.41 10	Telephone cables; battery cables	20
8544.49	Other:	
8544.49 10	Shielded wire of a kind used in the manufacture of automotive wiring harness	3

90.28	**Gas, liquid or electricity supply or production meters, including calibrating meters therefor.**	
9028.10 00	Gas meters	3
9028.20	Liquid meters:	
9028.20 10	Totalizing water meters	7
9028.30	Electricity meters:	
9028.30 10	Kilowatt-hour meters	7

Source: Tariff and Customs Code of the Philippines, June 2000.

Annex 3
Directory of NRE Suppliers and Organizations

Directory of NRE Suppliers and Organizations

Name of Office	**ABB POWER, INC.**
Contact Person	Thomas Ng
Designation	President
Address	Km. 20 Sucat, Parañaque City
Telephone	821-7777
Fax	824-8442
Company Description	Distributor of individual components of power plant from gas turbines to boilers

Name of Office	**ABRA ELECTRIC COOPERATIVE, INC.**
Contact Person	Atty. Marco Bautista
Address	Bangued, Abra
Telephone	(077) 752-8086
Location	Tineg, Abra
Project Title	53 W Solar Home System

Name of Office	**ACC ENGINEERING**
Contact Person	Antonio Cadullo
Designation	President
Address	372 Lopez Jaena, Jaro, Iloilo City
Company Description	Manufacturer of the ACCE Windpumps (multi-bladed type, horizontal axis) for water pumping and irrigation

Name of Office	**ADRIAN WILSON INTERNATIONAL ASSOCIATES, INC.**
Contact Person	Joven Joaquin
Designation	Chairman/CEO
Address	2/F AWIA Bldg. Libertad cor. Sinag St., Mandaluyong City
Telephone	532-1636
Fax	533-3508
E-mail	awia@info.com.ph
Company Description	Consultants & contractors for mini-hydropower projects

Name of Office	**ADVANCED RENEWABLE ENERGY CONVERSION SYSTEMS CORP.**
Contact Person	Antonio Y. Teves
Address	126 Dr. E. Meciano Rd. Dumaguete City, Negros Occidental
Telephone	(035) 422-9369, 225-4402
Fax	(035) 422-9369, 225-2214
Project Title	Reducing Fuel Costs, Pollution & Production of Low-Cost Electricity by Implementing the Teves Water Fuel Converter System from Ordinary Water

Name of Office	**AFA ELECTRO INDUSTRIAL SYSTEMS, INC.**
Contact Person	Arturo T. Uy
Designation	President
Address	28 Sct. Borromeo St., South Triangle, Quezon City
Telephone	924-1735/924-1729
Fax	924-1729
Company Description	Manufacturer of locally-designed AFA battery control units, ballast, flourescent lamps, flourescent inverter sets and battery chargers for PV systems. AVR/UPS, Emergency Light.

Name of Office	**AGUSAN POWER CORPORATION**
Contact Person	Alberto Rodriguez, Jr.
Designation	President
Address	202 Westwood Cond., 23 Eisenhower St., Greenhills, San Juan, M.M.
Telephone	722-2048, 722-1844
Fax	722-1842
Company Description	Constructor of Lake Mainit NRE project, Agusan

Name of Office	**ALFA-LAVAL PHILS., INC.**
Contact Person	Bien Orgiales
Designation	General Manager
Address	3/F Molave Bldg., 2231 Pasong Tamo, Makati City
Telephone	810-3930
Fax	815-0642
Website	www.alfalaval.com
Company Description	Contractor of sludge dewatering systems, and industrial and municipal sewage treatment systems

Name of Office	ALPHA MACHINERY & ENGINEERING CORPORATION
Contact Person	Ceferino G. Follosco
Designation	Chairman of the Board
Address	1167 CLF Bldg. 1, Don Chino Roces Avenue, Makati City
Telephone	896-5556
Fax	895-3494, 890-7202
E-mail	almech@compass.com.ph
Company Description	Distributor of imported (Japan-made) and locally-fabricated conventional energy and biomass-fired boilers

Name of Office	ALSTOM PHILS., INC.
Contact Person	Waldo Darvin
Designation	Power Plant Division
Address	Km. 20 South Superhighway, Sucat, Parañaque City
Telephone	886-0777
Fax	886-0787
E-mail	philippine@power.alstom.com
Company Description	Supplier of electro-mechanical equipment

Name of Office	ALTERNATIVE ENERGY DEVELOPMENT PHILS., INC.
Contact Person	Laurie B. Navarro
Designation	President
Address	2303 Medical Plaza, Ortigas Cond. 25 San Miguel Ave., Ortigas Center, Pasig City
Telephone	910-3008, 638-5529
E-mail	lnavarro@aed.p.com.ph
Website	www.aedp.com.ph
Company Description	Consultancy

Name of Office	ALVIN'S BAKESHOP
Contact Person	Alma A. Ronquillo
Designation	Proprietor
Address	Brgy. Buray, Oton, Iloilo
Telephone	(033) 337-7915
Company Description	Manufacturer of ricehull-fed bakery ovens

Name of Office	AMBIT TRADING & TECHNICAL SERVICES
Contact Person	Orlando M. Cruz
Designation	President
Address	Unit 410 Cityland Shaw Tower, Mandaluyong City
Telephone	632-1220
Fax	631-2413
E-mail	ambit@pacific.net.ph
Company Description	Installation & erection of power generators

Name of Office	AREA RESEARCH AND TRAINING
Contact Person	Mr. Rene E. Alburo
Designation	ANEC Project Leader
Address	University of San Carlos – Main, P. del Rosario St., Cebu City
Telephone	(032) 253-1000 loc. 207 / 161
Fax	(032) 253-7183/7989/346-7941 PVP
Company Description	Affiliated Nonconventional Energy Center

Name of Office	ASSISTCO ENERGY & INDUSTRIAL CORP.
Contact Person	Pedro O. Enciso
Designation	President/CEO
Address	1st Ave., Bagong Bayan, Manalac Industrial Estate Bicutan, Taguig, Metro Manila
Telephone	838-7315, 838-7316
Fax	838-7441
Company Description	Design, construction, repair and rehabilitation of large and small reactors and biomass furnaces, refractories boilers

Name of Office	ATLANTIC GULF & PACIFIC COMPANY OF MANILA, INC.
Contact Person	Cesar Buenaventura
Designation	President
Address	Dacon Bldg., 2281 Don Chino Roces Ave., Makati City
Telephone	867-3386, 894-2943, 894-2964
Fax	563-0034
Company Description	Fabrication, design and assembly of small (250 kW and below) and large (43,000 to 88,000 kW) bagasse-fired-boilers

Name of Office	**BASE CORP.**
Contact Person	Abraham L. Cu
Designation	President
Address	700 Lerma St., Mandaluyong City
Telephone	532-6753
Fax	532-6667
E-mail	sales@han-gang.com.ph
Company Description	Distribution of MATEC solar products; conducts feasibility study, design, installation and maintenance of Siemens solar energy systems products.

Name of Office	**Bayan Telecommunications, Inc.**
Contact Person	Homer Nantes
Address	234 Roosevelt Ave., San Francisco Del Monte, Quezon City
Telephone	449-3880
Fax	449-3763
Location	Southern Leyte
Project Title	PV/ Diesel Hybrid System of Bayantel Mt Pintuyan

Name of Office	**BENGUET ELECTRIC COOPERATIVE (BENECO)**
Contact Person	Joselito Villarey
Designation	Assistant General Manager
Address	Alapang, La Trinidad, Benguet
Telephone	(074) 422-2848
Fax	(074) 422-5138
E-mail	beneco@skyinet.net
Company Description	Electric Cooperative

Name of Office	**BENGUET STATE UNIVERSITY**
Contact Person	Engr. Edgar Molintas
Designation	ANEC Project Leader
Address	La Trinidad, Benguet
Telephone	(074) 422-2403/309-1314
Fax	(074) 422-2281
Company Description	Affiliated Nonconventional Energy Center

Inventor	**BENITO B. MARAY**
Address	118 Lozada St., Phase 2A, Gatchalian Subd., Sucat, Parañaque City
Telephone	826-3015, 438-6080. 438-2001
Fax	523-1754, 525-6129
E-mail	benmaray@yahoo.com
Location	Guinarona, Dagami, Leyte
Project Title	A NRE system Consisting of a Diesel Generating Set, Electrical Set-up and Fuel Oil Produced by the Anaerobic Fermentation, Electro-magnetization, and Heating Under Pressure of Grated Coconut & Coconut Water

Name of Office	**BICOL HYDROPOWER CORPORATION**
Contact Person	Romeo Y. Tan
Designation	President
Address	Elias Angeles St.,Naga City
Telephone	(054) 811-1703 to 04
Fax	(054) 811-1703
Company Description	Consultants and contractors for mini-hydropower projects

Name of Office	**BIOMASS ENERGY ASSOCIATION OF THE PHILIPPINES (BEAP)**
Contact Person	Celestino Damian
Designation	President
Address	# 1 Lopez Jaena St. Kapasigan, Pasig City
Telephone	641-0286, 641-1794, 916-0701
Fax	641-0286
E-mail	padiscor@edsamail.com

Name of Office	**BP SOLAR PHILIPPINES**
Contact Person	Katrina V. Ignacio
Designation	Country Manager
Address	Suite 71, Zeta Bldg., 191 Salcedo St., Legaspi Village, Makati City
Telephone	8159036 / 37
Fax	8171523
Website	www.bpsolar.com.ph
Company Description	Supply, design, and installation of PV System; affiliate of BP Panels of Australia

Name of Office	**BREEZE ELECTRIC PHILIPPINES**
Contact Person	Nicanor S. Villaseñor
Designation	General Manager
Address	P.O. Box. 13750 Ortigas Center, Emerald Ave., Pasig City
Telephone	438-5678
Fax	438-5466
E-mail	breeze@pacific.net.ph
Company Description	Consultancy and construction of wind energy systems

Name of Office	**BUBUNAWAN POWER CO.**
Contact Person	Crisanto Laset, Jr.
Designation	Vice-President
Address	8/F Strata 100, Emerald Ave., Ortigas Center, Pasig City
Telephone	631-1581 - 84
Fax	631-2901
Company Description	Consultants and contractors for mini-hydropower projects

Name of Office	**CAGAYAN ELECTRIC POWER AND LIGHT COMPANY, INCORPORTED (CEPALCO)**
Contact Person	Ramon Abaya
Designation	Chairman
Address	Suite A, 8th Flr., Strata 100 Building Emerald, Pasig City
Telephone	631-1581 - 84
Fax	631-2901
E-mail	cepl@quickweb/com.ph
Company Description	Consultancy and Construction of mini-hydropower projects

Name of Office	**CAMARINES SUR STATE AGRICULTURAL COLLEGE**
Contact Person	Dr. Yolanda Castroverde
Designation	ANEC Project Leader
Address	Pili, Camarines Sur
Telephone	(054) 361-1411
Fax	(054) 477-3341
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**CAVITE STATE UNIVERSITY**
Contact Person	Dr. Ruperto S. Sangalang
Designation	President & ANEC Project Leader
Address	Indang, Cavite
Telephone	(046) 415-0021 / 415-0010
Fax	(097) 378-3542 / (046) 415-0012
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**CENTER FOR RENEWABLE RESOURCE & ENERGY EFFICIENCY**
Contact Person	Antonio De Castro
Designation	Director
Address	Rm. 204 NEC Bldg., U.P., Diliman, Quezon City
Telephone	436-3663
Fax	436-3663
E-mail	decastro@pacific.net.ph
Company Description	Consultants for NRE projects

Name of Office	**CENTRAL LUZON STATE UNIVERSITY**
Contact Person	Dr. Ireneo C. Agulto
Designation	ANEC Project Leader
Address	Muñoz, Nueva Ecija
Telephone	(044) 456-0688
Fax	(044) 456-0688
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**CENTRAL PHILIPPINE UNIVERSITY**
Contact Person	Engr. Jeriel Militar
Designation	ANEC Project Leader
Address	Jaro, Iloilo
Telephone	(033) 320-3004
Fax	(033) 320-3004
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**CEST INCORPORATED**
Contact Person	Camilo C. Domingo, Jr.
Designation	Senior Executive Assistant
Address	Unit 1404 Prestige Tower, Emerald Ave., Ortigas Center, Pasig City
Telephone	2-633-7946 / 633-7947
Fax	2-631-3080
E-mail	cest@mozcom.com
Website	www.cest-inc.com
Company Description	Consultancy and construction of mini-hydropower

Name of Office	**COLLEGE OF ENGINEERING-UNIVERSITY TAWN**
Contact Person	Engr. Rodolfo S. Yadao
Designation	ANEC Project Leader
Address	University Town, Musuan, Bukidnon
Telephone	(0912) 713-4289 / 711-8260 / (0917) 7180374
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**ISABELA STATE UNIVERSITY-COLLEGE OF ENGINEERING**
Contact Person	Engr. Ramon Velasco
Designation	ANEC Project Leader
Address	Isabela State University, Echague, Isabela
Telephone	(078) 672-2474 / 0912-244-8527
Fax	(078) 672-2474
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**CONDOR HYDRO MARKETING**
Contact Person	Daniel Dorillo
Designation	President
Address	Kamantigue St. Granplane Subd., Jaro, Iloilo City
Telephone	(033) 329-5587/ 509-0672
Fax	(033) 329-5587
Company Description	Manufacturer of the Condor Windpump for water water pumping and irrigation. Cyclone Windpump

Name of Office	**CENTRAL PHILIPPINE UNIVERSITY**
Contact Person	Walden S. Rio
Designation	Vice President, Administration
Address	Central Philippine University, Jaro, Iloilo City
Telephone	(033) 329-1971
Company Description	Developer of the Cyclone Windpumps for water pumping and irrigation

Inventor	**DANILO V. BRILLAS**
Contact Person	c/o Danah B. Sato 126-2 Pelayo St. Davao City
Telephone	(082) 224-3116, 224-3117
Fax	(082) 224-3109
Location	Buda, Marilog District, Davao City
Project Title	Mini Hydroelectric Power Plant

Name of Office	**DCCD ENGINEERING CORPORATION**
Contact Person	Roland Abalos
Designation	Assistant Vice President
Address	SOL Office Condominium Building 112 Amorsolo, Makati City 1229
Telephone	2-892-4586 to 97
Fax	2-810-6142
Website	www.dccd.com
Company Description	Consultants & design for mini-hydropower projects

Name of Office	**DE LA SALLE UNIVERSITY**
Contact Person	Godofredo C. Salazar
Designation	Associate Professor
Address	Mechanical Engineering Department, 2401 Taft Ave., Manila
Telephone	524-4611 loc 299
Fax	524-0563
Company Description	Research and design of NRE systems

Name of Office	**VISAYAS STATE COLLEGE-DEPARTMENT OF AGRICULTURAL ENGINEERING AND APPLIED MATHEMATICS**
Contact Person	Engr. Roque C. De Pedro, Jr.
Designation	ANEC Project Leader
Address	Visayas State College of Agriculture, Baybay, Leyte
Telephone	(053) 335-2624, 325-5448 (0918) 601-2441 (Tuesday & Thursday)
Fax	(053) 335-2624
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**DEVELOPMENT BANK OF THE PHILS.**
Contact Person	Eufemia Mendoza
Designation	Vice President, Window III
Address	DBP Bldg. Sen. Gil Puyat Ave., Makati City
Telephone	893-4444
Fax	893-5380
Company Description	Provides financial assistance to NRE projects

Name of Office	**DON MARIANO MARCOS MEMORIAL STATE UNIVERSITY**
Contact Person	Dr. Arturo M.I. Figueroa
Designation	ANEC Project Leader
Address	Bacnotan, La Union
Telephone	(078) 824-8574
Fax	(078) 824-8574
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**EAST ASIA POWER SERVICES, INCORPORATED**
Contact Person	Jaime Rosa
Designation	President & Chief Operating Officer
Address	20th Floor, OMM-CITRA Condominium San, Pasig City
Telephone	633-1626
Fax	633-1627
Company Description	Consultants & contractors for mini-hydropower projects

Name of Office	**EDWARD KELLER PHILS., INC.**
Contact Person	Andres Brechbuhl
Designation	Asst. Vice President
Address	2723 Chino Roces Ave., Makati City
Telephone	810-0351
Fax	818-3995
Company Description	Supplier for electro-mechanical equipment

Name of Office	**EDWARD MARCS PHILIPPINES, INC.**
Contact Person	Andres S. Cruz
Designation	President & General Manager
Address	2/F Timog Bldg., 28 Scout Albano St., 1103 Quezon City
Telephone	922-1371, 922-1658
Fax	922-1386
Company Description	Supplier of solar, water, heater, thermomax and parts

Name of Office	**ENERGY & AVIATION SUPPORT CORP.**
Contact Person	Rex Ligada
Designation	Manager
Address	Unit 804 Cityland Shaw Tower, Shaw Blvd., Mandaluyong City
Telephone	635-9372
Fax	635-9608
Company Description	Design and development of biomass-fired cogeneration systems

Name of Office	**ENERGY DEVELOPMENT & UTILIZATION FOUNDATION, INC.**
Contact Person	Benjamin Austria
Designation	Executive Director
Address	G/F PHINMA, 166 Salcedo St., Legaspi Village, Makati City
Telephone	840-0317
Fax	818-8206
E-mail	edufi@evoserve.com
Company Description	Consultancy and advocacy group

Name of Office	**ENERGY MANAGEMENT ASSOCIATION OF THE PHILIPPINES**
Contact Person	Raymundo Rafols
Designation	President
Address	Rm. 201 Vica Bldg., cor. Estrella St., Pasong Tamo, Makati City
Telephone	890-7540
Fax	890-7540
Company Description	Association of engineers

Name of Office	**ENERTECH SYSTEMS INDUSTRIES, INC.**
Contact Person	Guillermo Simeon
Designation	President
Address	81 Kaingin Rd., Balintawak, Quezon City
Telephone	362-2161 - 64
Fax	361-1805
E-mail	enertech@compass.com.ph
Company Description	Design, fabrication and installation of biomass-fired boilers (100 to 1000 kw) and pressure vessels.

Name of Office	**ENGINEERING DEVELOPMENT CORPORATION OF THE PHILIPPINES (EDCOP)**
Contact Person	Jose U. Jovellanos
Designation	Chairman of the Board
Address	6th Floor, CLNC Building 259-269 E. Delos Santos, Mandaluyong City
Telephone	724-6878, 727-6811, 727-6792
Fax	725-6277
E-mail	edcop@vasia-com.ph
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**FIRST PHILIPPINE ENERGY CORPORATION**
Contact Person	Ramon Tejero
Designation	Vice President
Address	3/F Benpress Bldg., Exchange Rd. cor. Meralco Ave., Ortigas Center,
Telephone	633-3502
Fax	631-3103
E-mail	fpecorp@skyinet.net
Website	www.fphc.com
Company Description	Supply, design and installation of PV system, SOLAREX Panels of USA

Name of Office	**G.O. ENGINEERING ENTERPRISES**
Contact Person	Rizal A. Obligar
Designation	Proprietor
Address	201 E. Miranda St. Paso De Blas, Valenzuela City
Telephone	432-1302
Fax	432-1302
E-mail	goeng@pworld.net.ph
Company Description	Manufacturer of charcoal stoves

Name of Office	**GEOSPHERE TECHNOLOGIES, INCORPORATED**
Contact Person	Leticia T. dela Cruz
Designation	Manager
Address	19-D, Eisenhower Tower Eisenhower St., Greenhills, Metro Manila 1504
Telephone	724-5665 / 724-5667
Fax	723-4250
E-mail	geosphere@pacific.net.ph
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**GEOTECNICA**
Contact Person	Arthur Saldivar-Sali
Designation	Chairman
Address	23 Avelino St., Loyola Heights, Quezon City
Telephone	426-1078
Fax	426-6641
Company Description	Consultancy and construction of mini-hydropower projects. Engineering consultancy

Name of Office	**GINGOOG POWER AND DEVELOPMENT CORPORATION**
Contact Person	Patrick Chang, Jr.
Designation	President & Chairman of the Board
Address	Suite 502, Fedman Building 199 Salcedo St., Legaspi, Makati City 1229
Telephone	812-0508
Fax	893-7960
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**HEBRON ENGINEERING**
Contact Person	Teofisto S.M. Reyes
Designation	General Manager
Address	5 Gen. Mascardo St., Kalookan City
Telephone	363-5808
Fax	363-6347
Company Description	Contractor of biomass-fired cogeneration systems

Name of Office	**HOT WATER SYSTEMS, INC.**
Contact Person	Jose T. Quimson
Designation	President
Address	3/F JMT Corporate Condo., ADB Ave., Oritigas Center, Pasig City
Telephone	633-5630/98/89
Fax	633-5628
E-mail	hotwater@pworld.net.ph
Company Description	Distributor of solar water heater from Australia

Name of Office	**HYDRO ELECTRIC DEVELOPMENT CORPORATION**
Contact Person	Manuel E. Espallardo
Designation	Liaison Officer
Address	Aboitiz Bldg., 110 Legaspi St., Legaspi Village, Makati City
Telephone	819-3844
Fax	817-9508
Website	www.aboitiz.com
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**HYDRO ELECTRIC DEVELOPMENT CORPORATION**
Contact Person	Mario A. Garcia
Address	214 Ambuklao Rd., Obulan, Beckel, La Trinidad, Benguet
Telephone	(072) 442-6080, 444-7948
Fax	(072) 444-7944
Location	La Trinidad, Benguet
Project Title	Francis Turbine Re-Engineering

Name of Office	**HYDRO SPECIALIST, INC.**
Contact Person	Benjamin Cariaso, Jr.
Designation	Vice President
Address	6/F Twin Cities Condominium, 110 Legaspi St., Legaspi Village, Makati City
Telephone	816-2881 loc. 376, 365, 750-3191
Fax	817-9508
Website	www.aboitiz.com
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**HYDROTERRE INCORPORATED**
Contact Person	Jose B. del Rosario
Designation	President
Address	Suite 602, 6th Floor, Culmat Building 1300 E., Quezon City
Telephone	2-721-8614
Fax	2-723-4225
Company Description	Consultancy and construction of mini-hydropower

Name of Office	**JAMANDRE INDUSTRIES INC.**
Contact Person	Alexis T. Belonio
Designation	President
Address	88 Rizal St., la Paz, Iloilo
Telephone	(033) 329-6574
Fax	(033) 329-6574
Company Description	Manufacturer of paddy-dryers and ricehull-fired palay dryer

Name of Office	**JARDINE SOLUTIONS**
Contact Person	Thomas Geoff
Designation	President
Address	Jardine Davies Bldg., 222 Sen. Gil Puyat Ave., Makati City
Telephone	843-6011
Fax	843-6041
Website	www.jardinedavies.com
Company Description	Contractor of biomass-fired cogeneration systems

Name of Office	**JOVER LIGHT INDUSTRIES**
Contact Person	Hector Jover
Designation	President
Address	Bgy. Tabucan, Cabatuan, Iloilo
Telephone	(033) 522-8789
Company Description	Manufacturer of the Jover Lights Windpumps for water pumping and irrigation applications

Name of Office	**KALINGA-APAYAO STATE COLLEGE**
Contact Person	Amadeo P. Imper
Designation	ANEC Project Leader
Address	Tatuk, Kalinga, Apayao
Telephone	(074) 872-2045 (076) 579-4204
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**KANLAON ENGINEERING CORP.**
Contact Person	Antonio M. Penafiel
Designation	Vice President
Address	115 San Rafael St., Mandaluyong City
Telephone	532-8720, 532-5733
Fax	532-0747
Company Description	Fabricates, installs and repairs biomass-fired boilers of any size and power range.

Name of Office	**L.V. BIOGAS PRODUCTION SYSTEMS PHILS.**
Contact Person	Leonardo D. Villanueva
Designation	Proprietor/Manager
Address	111 Roxas cor. Jacinto Sts. Magsaysay Village, Tondo, Manila
Telephone	254-7474
Fax	254-7474
Company Description	Manufacturer & distributor of household-scale biogas system

Name of Office	**LOS BAÑOS MANUFACTURING & TRADING VENTURES**
Contact Person	Ernesto Lozada
Designation	President
Address	College of Engineering, UPLB Los Baños, Laguna
Telephone	(049) 536-2926
Fax	(049) 536-2873
Company Description	Manufacturer of biomass-fed copra dryers, coconut shell-fired copra and grain dryer

Name of Office	**MADECOR ENVIRONMENTAL MANAGEMENT SYSTEMS, INC.**
Contact Person	Alice Bergonia
Designation	Business Development Manager
Address	10001 Mt. Halcon St., Umali Subd., Los Baños, Laguna
Telephone	(049) 249-2439, 536-0649, 536-0054
Fax	(049) 536-0649
E-mail	memsi@laguna.net
Company Description	Consultancy

Name of Office	**MADISON MAC KENZIE**
Contact Person	Philip Go Apostol
Designation	President
Address	3/F Reposo St., Makati City
Telephone	890-2736
Fax	896-5126
Company Description	Supplier of PV system, of CANNON USA

Name of Office	**MAKATI ACCUMOTION INTERNATIONAL**
Contact Person	Jose Ma. R. Concepcion
Designation	President
Address	30 Melantic, San Lorenzo Village, Makati City
Telephone	817-7468; 819-0192
Fax	813-0713
Company Description	Consultancy, designs and manufacturing furnaces and dryers (industrial and agricultural) using liquid and solid biomass fuels

Name of Office	**MANDALA DEVELOPMENT CORP. (MADECOR)**
Contact Person	Elpidio Del Rosario
Designation	President
Address	Unit 302 Prestige Tower, Emerald Ave., Pasig City
Telephone	638-4187, 638-1600
Fax	638-4185
E-mail	mcgutierrez@madecor.com
Website	www.madecor.com
Company Description	Consultancy on agriculture, education, training, environment

Name of Office	**MARDIZON ENTERPRISES**
Contact Person	Rolando Dizon
Designation	President
Address	804-B Fedman Bldg., 199 Salcedo St., Legaspi Village, Makati City
Telephone	893-4502
Fax	819-3760
Company Description	Supplier of drilling equipment

Name of Office	**MARIANO MARCOS STATE UNIVERSITY**
Contact Person	Engr. Rudy Bareng
Designation	ANEC Project Leader
Address	Batac, Ilocos Norte
Telephone	(077) 792-3125 (COA Office) 0918-217-5432 / 0918-217-5431
Fax	(077) 792-3879/792-3131/3191
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**MASCHINEN & TECHNIK, INC. (MATEC)**
Contact Person	Olegario S. Serafica
Designation	Vice-President
Address	Tech Center, Buencamino St., Alabang, Muntinlupa City
Telephone	850-6450 - 52
Fax	850-3631, 850-8801
E-mail	ossmatec@info.com.ph
Company Description	Supply, design and installation of PV System of SIEMENS, Germany; consultant and contractor of biogas systems.

Name of Office	**MATLING INDUSTRIAL CORPORATION**
Contact Person	Alexander Emlano
Designation	President
Address	3/F Penthouse Ermita Center Bldg., Roxas Blvd., Ermita, Manila
Telephone	521-8673
Fax	521-8680
Company Description	Developer of mini-hydro installed at Malaba, Lanao del Sur

Inventor	**MARIANO S. VENIDA, JR.**
Address	Autumn St., Summer Homes Subd., Concepcion I, Marikina City, Metro Manila
Telephone	941-8727, 816-1522
Fax	817-4789
E-mail	infarmco@pworld.net.ph
Location	Wastewater Treatment Facilities, Consolidated Distillers of the Far East, Inc. Nasugbu, Batangas
Project Title	Integration of a full scale working model of the VENIDA (Value-Engineered and Novel Industrial Digester Activator)

Name of Office	**MERALCO INDUSTRIAL ENGINEERING SERVICES CORPORATION**
Contact Person	Arsenio E. Martin
Designation	Senior Vice President - Electrical Engineering and
Address	Renaissance Tower 1000, Meralco Avenue Ortigas, Pasig City
Telephone	2-633-5123
Fax	2-635-5912
E-mail	aemartin@miescor.com.ph
Company Description	Consultancy, engineering design, construction, construction management and technical services for micro-mini hydro projects. Consultants & contractors for mini hydropower projects

Name of Office	**METS PHILIPPINES, INC.**
Contact Person	Carolino Risos
Designation	General Manager
Address	5/F SMS Bldg., 213 Gil Puyat Ave., Makati City
Telephone	813-1241
Fax	892-9383
Company Description	Contractor of biomass-fired cogenerations systems, compressor and replacement of filter elements

Inventor	**MIGUEL G. ALBERCA**
Address	University of Southern Mindanao, Kabacan, Cotabato
Telephone	(064) 248-2488
Fax	(064) 248-2138
Location	USM, Kabacan, Cotabato (near the dumpsite of Kabacan basura)
Project Title	Recycled (Basura) Degredable Wastes to Generate Power for NRE System

Name of Office	**MINDANAO STATE UNIVERSITY**
Contact Person	Prof. Mangompia U. Angod
Designation	ANEC Project Leader
Address	Marawi City, Lanao del Sur
Telephone	(063) 520-904
Fax	out of order
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**MINDANAO UPLAND MULTI-RESOURCE DEVELOPMENT**
Contact Person	Michael T. Feliciano
Designation	Manager
Address	Door 1, Fabie Apts., Jaruda Rd., Matina, Davao City
Telephone	(082) 300-5694
Fax	(082) 300-5694
Company Description	Contractor of solar installed in Paquibato District, Davao City

Name of Office	**NATIONAL HYDRAULIC RESEARCH CENTER (NHRC)**
Contact Person	Leonardo Q. Liongson
Designation	Professor & Research Fellow
Address	College of Engineering, University of the Philippines, Quezon City 1104
Telephone	927-7149 / 927-7176
Fax	927-7190
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**NORCONSULT INTERNATIONAL, A.S.**
Contact Person	Gloria A. Feliciano
Designation	Representative
Address	101 Paradise, Annex 16, Better Living Subd. Bgy., Parañaque City 1711
Telephone	823-9282
Fax	823-0893
E-mail	olinor@pworld.net.ph
Company Description	Consultants mini & micro-hydropower projects

Name of Office	**NORTHERN MINI-HYDRO CORPORATION**
Contact Person	Jovy P. Batiquin
Designation	Vice-President
Address	110 Legaspi St., Legaspi Village, Makati City
Telephone	750-3191
Fax	817-9508
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**NOTRE DAME UNIVERSITY**
Contact Person	Floriano M. Arañez
Address	9600 ND Ave., Cotabato City
Telephone	(064) 421-2698
Fax	(064) 421-4312
Location	Cotabato City
Project Title	Development of Hydraulic Ram

Name of Office	**ORIENTAL & MOTOLITE CORP.**
Contact Person	Roberto V. Garcia
Designation	President
Address	80-82 Roces Ave., Quezon Ave., Quezon City
Telephone	373-1234
Fax	373-2319
Website	www.sequel.net.~rmcrauto
Company Description	Supply, design and installation of PV system of BP panels of Australia

Inventor	**PABLO B. ESPAÑOLA, JR.**
Address	30-D Delgado St., Iloilo City
Telephone	(033) 508-0248
Project Title	High Power Vertical Axis Wind Turbine

Name of Office	**PASIG AGRICULTURAL DEVELOPMENT & INDUSTRIAL CORP.**
Contact Person	Celestino Damian
Designation	President
Address	# 1 Lopez Jaena St. Kapasigan, Pasig City
Telephone	641-0286, 641-1794, 916-0701
Fax	641-0286
E-mail	padiscor@edsamail.com
Company Description	Designer, fabricator, supplier and contractor of biomass-fired grain dryer (300 to 700 kw), ricemills and grain storage silos complete with bulk materials handling equipment

Name of Office	**PEKO BIOGAS AND FERTILIZER SYSTEMS**
Contact Person	Sin Del Jamorol
Designation	President
Address	1930 B. Lipunan St., Baclaran, Parañaque City
Telephone	833-1942
Company Description	Designs and manufactures modular-type biogas systems (50 sow level and above) and waste recycling systems

Name of Office	**PENTIUM INTERNATIONAL COMPANY, INC.**
Contact Person	Florencio Loh
Designation	Manager
Address	#59 West Capitolio Drive, Bo. Capitolio, Pasig City
Telephone	636-6561 to 64
Fax	638-7211
Company Description	Consultancy on soil drain and arch finishing

Name of Office	**PERT EQUIPMENT & INDUSTRIAL SUPPLY**
Contact Person	Reynaldo R. Espiritu
Designation	General Manager
Address	Rm. 302, MCR Bldg., 495 Boni Avenue, Mandaluyong City
Telephone	532-7273
Fax	532-2071, 532-0805
Company Description	Supplier of construction equipment

Name of Office	**PERTCONSULT INTERNATIONAL**
Contact Person	Homobono C. Pique
Designation	President
Address	Rm. 603 The Excelsor Bldg., Roxas Blvd. Ext. Parañaque, Metro Manila
Telephone	879-8269/71
Fax	879-8251
Company Description	Consultancy on micro- and mini-hydro projects

Name of Office	**PHILIPPINE ASSOCIATION OF SMALL HYDRO POWER DEVELOPMENT, INC. (PASSHYDRO)**
Contact Person	Manuel M. Vergel III
Designation	President
Address	35 Antoinette St., Parkway Village, SFDM, Quezon City
Telephone	362-0950
Fax	362-0950
Company Description	Association of contractors, engineers and NGOs involved in hydropower projects

Name of Office	**PHILIPPINE ELECTRIC CORPORATION**
Contact Person	Roberto Chan
Designation	President & CEO
Address	3/F Benpress Bldg., Exchange Rd. cor. Meralco Ave., Pasig City
Telephone	631-3133
Fax	631-3140
Company Description	Manufacturer of transformer & electrical products

Name of Office	**PHILIPPINE ELECTRIC PLANT OWNERS ASSOCIATION**
Contact Person	Zoilo M. Cortes
Designation	President
Address	8/F Strata 100 Bldg., Emerald Ave., Ortigas Center, Pasig City
Telephone	631-1581 - 84
Fax	631-2901
Company Description	Association of private electric utilities

Name of Office	**PHILIPPINE RURAL ELECTRIC COOPERATIVE ASSOCIATION**
Contact Person	Mr. Rosalino Culalig
Designation	President
Address	4/F Casman Bldg., 372 Quezon Ave., Quezon City
Telephone	374-2538, 374-1198, 374-1199
Fax	374-2513
Company Description	Organization of 119 electric cooperatives

Name of Office	**PHILIPPINE RURAL RECONSTRUCTION MOVEMENT**
Contact Person	Bobby Tañada
Designation	President
Address	56 Sct. Lozano St., Quezon City
Telephone	372-4991, 372-4992
Fax	372-4995
Company Description	NGO; installed solar home systems in El Nido, Palawan

Name of Office	**PHILIPPINE SOLAR ENERGY SOCIETY**
Contact Person	Rowaldo Del Mundo
Designation	President
Address	c/o Solar Laboratory, Diliman, Quezon City
Telephone	434-3660 to 61
Fax	434-36-60
Company Description	Research and development

Name of Office	**PHILIPS LIGHTING**
Contact Person	Mario Hernandez
Designation	Vice President
Address	106 Valero St., Salcedo Village, Makati City
Telephone	810-0161/845-7866
Fax	816-6340
Company Description	Manufacturer of lighting and control devices for solar energy systems

Name of Office	**PNOC COAL CORPORATION**
Contact Person	Florante J. Navarro
Designation	President
Address	PNPC Complex, Merritt Rd., Fort Bonifacio, Makati City
Telephone	893-7119, 893-6001 893-1320
Fax	815-2747
Company Description	Manufacturer of coal briquettes

Name of Office	**PREFERRED ENERGY, INC.**
Contact Person	Grace S. Yeneza
Designation	Managing Director
Address	10/F Strata 100 Bldg., Emerald Ave., Ortigas Center, Pasig City
Telephone	631-3078, 631-2826
Fax	632-7097
E-mail	pei@compass.com
Website	www.peinc-cjb.net
Company Description	Consultancy on renewable energy

Name of Office	**R.S. ARRIETA, INC.**
Contact Person	Roberto Arrieta, Jr.
Designation	President
Address	Arrieta Bldg., Pioneer cor. San Rafael Sts., Pasig City
Telephone	631-1331
Fax	631-3810
Company Description	Design and fabrication of multi-fueled boilers

Inventor	**RAYMUNDO R. CALUGCUGAN**
Address	21 Lilac St., SSS Village, Concepcion, Marikina City
Telephone	933-2003
Fax	948-9899
Location	Calatagan, Batangas
Project Title	Aerovolt: New Fendered Bucket Windmill for Clean Power Generation & Tidavolt: New Machine that ulitizes Tidal & River Currents for Clean Power Generation

Name of Office	**RENEWABLE ENERGY ASSOCIATION OF THE PHILIPPINES**
Contact Person	Vicente O. Roaring
Designation	Executive Director
Address	11 Liamzon St., Midtown, Marikina City
Telephone	645-8167; 646-7319
Fax	645-8167
E-mail	renergy@compass.com.ph
Company Description	Umbrella organization of the renewable energy group

Name of Office	**RENEWABLE ENERGY SOURCES**
Contact Person	Fredie Larona
Designation	General Manager
Address	12 B3 Dacon, Kasibulan, Cainta, Rizal
Telephone	656-7966
Fax	656-7966
Company Description	Supplier of PV System, BP Panels of Australia

Name of Office	**RESOURCE GROUP, INC.**
Contact Person	Vicente O. Roaring
Designation	President
Address	11 Liamzon St., Midtown, Marikina City
Telephone	645-8167; 646-7319
Fax	645-8167
E-mail	resource@compass.com.ph
Company Description	Consultancy and construction of NRE systems

Name of Office	**REYMILL STEEL PRODUCTS**
Contact Person	Felipe S. Reyes, Jr.
Designation	General Manager
Address	Rizal Street, Sta. Rosa, Nueva Ecija
Telephone	0917-6429624
Company Description	Manufacturer of the Reymill products for water pumping and irrigation applications

Name of Office	**ROBARR VENTURES**
Contact Person	Rodolfo Barreto
Designation	General Manager
Address	Timex Compound, Ortigas Ave. Ext., Cainta, Rizal
Telephone	655-0330
Fax	655-7372
Company Description	Distributor of BP Solar Panels and Motolite batteries

Inventor	**RODOLFO A. DAYOT**
Address	RAD Equipment Enterprises, Sapphire St., Sto. Niño Village, Matina, Davao City
Telephone	(082) 296-2139
Location	Palamas, New Corella, Davao Province
Project Title	Water Turbine for Driving Power Generating Unit

Inventor	**Rudy N. Lantano**
Address	RL Alco Diesel Enterprises DOST Compound, Gen. Santos Ave., Bicutan, Taguig, Metro Manila
Telephone	838-7224, 837-2071 loc 2156
Fax	838-0621
Location	RL Alco Diesel Enterprises DOST Compound, Gen. Santos Ave., Bicutan, Taguig, Metro Manila
Project Title	Electricity Derived from Super Bunker Formula - L [SBF-L]

Name of Office	**RURAL ELECTRIC CORPORATION (RULEC)**
Contact Person	Thelma Hizon
Designation	President
Address	1-A Masana St. Manotoc Subd., Baesa, Quezon City
Telephone	455-5349; 456-7967, 454-0606
Fax	456-7134
Company Description	Consultancy on NRE projects

Name of Office	**RURAL ELECTRIFICATION MULTI-PURPOSE COOPERATIVE**
Contact Person	Francis Nacienceno
Designation	Chairman
Address	114 Quensland, Green Park Village, Pasig City
Telephone	645-1748
Fax	645-1748
E-mail	stmjr@email.com
Company Description	Supply, design and installation of PV system,MESTA-75 of U.K.

Name of Office	**SCANCON, INC.**
Contact Person	Luz Santiago
Designation	President
Address	118 Sct. Fuentebella St., Quezon City
Telephone	928-8270
Fax	922-5134
Company Description	Designs, fabricates, installs and repairs biomass-fired (ricehull) grains dryers (175-700 kW), biomass heaters, and ricehull-fired palay dryer

Inventor	**SERGIO C. CAPAREDA**
Address	Agricultural Machinery Division, Institute of Agricultural Engineering, College of Engineering, & Agro-Industrial Technology, University of the Philippines, Los Baños, Laguna
Telephone	(049) 536-2792, 536-2860
Fax	(049) 536-2873, 2792, 3606
E-mail	scc@mudspring.uplb.edu.ph
Location	UPLB
Project Title	Recirculated Waste Pyrolyzer

Name of Office	**SHELL RENEWABLES PHILIPPINES CORP.**
Contact Person	Reynaldo A. Reynaldo
Designation	Project Manager
Address	Unit 7 De Mariano's Apt., F. Quimpo Ave., Kalibo, Aklan
Telephone	(036) 268-7305, 816-6065 (Mla. Office)
Fax	(036) 268-7305
Company Description	Contractor and supplier of Shell solar modules, comptrollers, lighting and fixtures

Name of Office	**SIBOL NG AGHAM AT TEKNOLOHIYA (SIBAT)**
Contact Person	Vicky Lopez
Designation	Executive Director
Address	28 Rd. 5 GSIS Hills, Novaliches, Quezon City
Telephone	983-1947, 983-1953
Fax	983-1947
E-mail	sibat@info.com.ph
Company Description	Technical assistance on renewable energy & sustainable agriculture

Name of Office	**SIGMA ENERGY TECHNOLOGIES, INCORPORATED**
Contact Person	Loreta Aguila
Designation	Managing Director
Address	Suite 602-A. Fedman Suites 199 Salcedo St., Legaspi, Makati City 1229
Telephone	2-813-7926 / 813-1434
Fax	2-892-6144
E-mail	sinergy@edsamail.com
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**SMITH BELL RENEWABLE ENERGY SOURCES CORP.**
Contact Person	Ruth Yu-Owen
Designation	Chief Operating Officer
Address	Smith Bell Bldg., 2294 Pasong Tamo Ext., Makati City
Telephone	816-7668, 816-7521, 867-1906
Fax	867-1904
E-mail	ruthowen@smithbell.com.ph
Company Description	Provide Mini-Hydro project

Name of Office	**SOLAHART PHILIPPINES**
Contact Person	Antenor G. Lopena
Designation	Executive Vice-President
Address	Malago Corporation, #4 Kitanlad St., Quezon City
Telephone	743-6555 loc. 14
Fax	731-6834
Company Description	Distributor of Solahart solar water heaters for domestic/household (189 and 300 liters capacity) and commercial (2500, 3000 and 6500 liters capacities) uses

Name of Office	**SOLAR ELECTRIC COMPANY, INC.**
Contact Person	Robert L. Puckett
Designation	President
Address	G/F, Gold Building, Unit 1501 Annapolis, Wilshire Plaza, 11 Annapolis
Telephone	724-4812; 726-4322; 724-4812
Fax	724-0223
Company Description	Supply, design and installation of PV system

Name of Office	**SOLAR TECH SYSTEMS**
Contact Person	Percival Favoreal
Designation	Representative Officer
Address	Delta St., Phase III Villagrande Homes, Concepcion Grande, Naga City
Telephone	(054) 475-1305
Fax	(054) 475-1305
E-mail	euz@mozcom.com
Company Description	Manufacturing of photovoltaic system in Brunei

Name of Office	**SPARKS SOLAR CORPORATION**
Contact Person	Gordon Sparks
Designation	General Manager
Address	Rm. 500 Cityland I, Herrera St., Legaspi Village, Makati City
Company Description	Assembly and marketing of Sparks Solar System (Australia)

Name of Office	**STATE POLYTECHNIC COLLEGE OF PALAWAN, ABORLAN,**
Contact Person	Engr. Bernardo Ocampo
Designation	ANEC Project Leader
Address	c/o Mrs. Ericka dela Peña, SPCI-IMS, Sta. Monica Tiniguiban, Puerto Princesa City
Telephone	(048) 433-4480
Fax	433-4367
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**SULTAN KUDARAT STATE POLYTECHNIC COLLEGE**
Contact Person	Dr. Nelson T. Binag
Designation	ANEC Project Leader
Address	Barrio 2, Tacurong, Sultan Kudarat
Telephone	(064) 200-4253/200-4261
Fax	(0918) 450-6398 Dr. Bong Genova (064) 200-4261
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**SUMITOMO CORPORATION**
Contact Person	Kojiro Shimbo
Designation	President
Address	10th Flr., BPI Building Ayala Avenue cor. Paseo de Roxas, Makati City
Telephone	810-0351
Fax	818-8168
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**SYNERGY POWER PHILIPPINES, INCORPORATED**
Contact Person	Elizabeth G. Peralta
Designation	Managing Director
Address	5th Floor,OPPEN Building 349 Sen. G. Puyat, Makati City
Telephone	2-897-1692
Fax	2-890-5679
E-mail	synergy@pacific.net.ph
Website	www.synergypowercorp.com
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**TCGI ENGINEERS**
Contact Person	Jose R. Jimenez, Jr.
Designation	President
Address	6th Floor, 150 JAKA II Building Legaspi St., Makati City 1229
Telephone	2-840-4764 / 817-8311
Fax	2-815-2410
Company Description	Consultancy and construction of mini-hydropower projects

Name of Office	**TECHNOLOGY DEVELOPMENT EXTENSION GROUP, INC.**
Contact Person	Angelito V. Angeles
Designation	Consulting Engineer & Professor
Address	52 Don Gregorio St., Don Antonio Heights, Quezon City
Telephone	931-5932
Fax	931-5932
Company Description	Consultancy on renewable energy systems

Inventor	**TITO L. PASTRANO, Ph.D**
Address	P.N. Roa Subd., Cala-anan Valley, Canito-an, Cagayan De Oro City
Location	Cala-anan Valley, Cagayan De Oro City
Project Title	Louvered-vane Turbine

Name of Office	**TOTAL SOLUTIONS TECHNOLOGY, INC.**
Contact Person	Ronald O. Diola
Designation	President & CEO
Address	Suite 506 Cebu Holdings Center, Cebu Business Park, Cebu City
Telephone	(032) 231-5599
Fax	(032) 231-5599
Company Description	Distributor of Solarex and Kyocera panel systems

Name of Office	**TRANS ACCESS CORPORATION**
Contact Person	Lito D. Fider
Designation	General Manager
Address	Penthouse, Gold Loop Tower, Amber Avenue, Ortigas Center, Pasig City
Telephone	633-8562
Fax	633-5197
Company Description	Distributor of boilers and various refinery equipment

Name of Office	**UNITED POWERLINK SPECIALISTS CORP.**
Contact Person	Delfin A. Villafuerte, Jr.
Designation	General Manager
Address	2/F Isaura Bldg., 216 Gen. Luis St., Novaliches, Quezon City
Telephone	920-1703, 419-5453, 419-8575
Fax	455-5800
Company Description	Installation and erection of power generators

Name of Office	**SILIMAN UNIVERSITY-EXTENSION PROGRAM**
Contact Person	Dr. Nichol R. Elman
Designation	ANEC Project Leader
Address	Siliman University, Dumaguete City
Telephone	(035) 225-4535 / 225-2414 loc. 236
Fax	(035) 225-4768/422-7207
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**UNIVERSITY OF EASTERN PHILIPPINES -UNIVERSITY TAWN**
Contact Person	Dr. Pedro Destura
Designation	President
Address	Catarman, Northern Samar
Telephone	(055) 354-1347/49, 0917-3732965
Fax	(055) 354-1347
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**UNIVERSITY OF SOUTHERN PHILIPPINES**
Contact Person	Engr. Fulton U. Yap
Designation	ANEC Project Leader
Address	Davao City
Telephone	(082) 221-1636
Fax	(082) 221-1636
Company Description	Affiliated Nonconventional Energy Center

Inventor	**VALENTINO M. TIANGCO, Ph.D**
Contact Person	c/o Engr. Eulito Bautista Philippine Rice Research Inst., Maligaya, Muñoz, Nueva Ecija
Address	Energy Technology Development Division, California Energy Commission, 1516 Ninth St., Sacramento, CA 95814
Telephone	(044) 456-0113 c/o Engr. Eulito Bautista (PhilRice)
Fax	843-5122
Location	Philippine Rice Research Institute (PhilRice), Maligaya, Muñoz, Nueva Ecija
Project Title	Biomass Gasification and Engine System for Shaft and Power Applications

Name of Office	**VERGEL 3 CONSULT**
Contact Person	Manuel M. Vergel III
Designation	President
Address	35 Antoinette St., Parkway Village, SFDM, Quezon City
Telephone	362-0950
Fax	362-0950
Company Description	Consultancy and construction of micro- and mini-hydropower projects

Name of Office	**VOEST ALPINE TECH INT'L**
Contact Person	Mario G. Toral
Designation	Project Development Manager
Address	Rm. 401 Golden Rock Bldg., 168 Salcedo St., Legaspi Village, Makati City
Telephone	817-4392
Fax	817-4674
Company Description	Supplier for Electro-Mechanical Equipment

Name of Office	**WIND ENERGY ASSOCIATION OF THE PHILIPPINES (WEAP)**
Contact Person	Alexis T. Belonio
Designation	President
Address	88 Rizal St., la Paz, Iloilo
Telephone	(033) 329-6574
Fax	(033) 329-6574
Company Description	Manufacturer of paddy-dryers and ricehull-fired palay dryer

Name of Office	**WESTERN MINDANAO STATE UNIVERSITY**
Contact Person	Prof. Felizardo S. Rebollos
Designation	ANEC Project Leader
Address	Zamboanga City
Telephone	(062) 991-5897
Fax	(062) 991-3065
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**WHITE TRILLIUM PHILS., INC.**
Contact Person	Rafael M. Valdez
Designation	President & CEO
Address	66 Don Vicente Quintas St., Malasiqui, Pangasinan
Telephone	(075) 536-5126
Fax	(075) 536-4587
Company Description	Supply, design and installation of PV system

Name of Office	**WINROCK INTERNATIONAL - REPSO PHILIPPINES**
Contact Person	Inocencio Bulo
Designation	Field Director
Address	11/F Strata 100 Bldg., Emerald Ave., Ortigas Center, Pasig City
Telephone	632-7323
Fax	631-2809
Company Description	Provides financial assistance to NRE projects

Name of Office	**XAVIER UNIVERSITY-COLLEGE OF AGRICULTURE**
Contact Person	Engr. Alejandro S. Villamor
Designation	ANEC Project Leader
Address	Xavier University, Cagayan de Oro City
Telephone	(08822) 724-096
Fax	(08822) 722-994
Company Description	Affiliated Nonconventional Energy Center

Name of Office	**YAMOG RENEWABLE ENERGY DEVELOPMENT GROUP, INC.**
Contact Person	Nazario R. Cacayanan
Designation	Project Director
Address	JL 2-A Denia Apartment, Juan Luna St., Davao City
Telephone	(082) 227-4031
Fax	(082) 227-4031
E-mail	yamog@interasia.com.ph
Company Description	Consultancy and construction of NRE systems

Technology Brief

Harnessing Biomass for Off-grid Rural Electrification

Biomass is a versatile source of energy; it can produce electricity, heat or fuel for transportation and is storable. It is the world's fourth largest energy source and contributes to at least 14 percent of the world's primary energy demand. In developing countries, the contribution of biomass to primary energy supply is at least 35 percent. In developed economies, such as the European Union, its contribution ranges from 2 to 14 percent.[1]

The Philippines has abundant agricultural residues that are suitable for power generation. The EC-ASEAN COGEN Programme estimated that the volume of residues from rice, coconut, palm oil, sugar and wood industries is 16 million tons per year. Bagasse, coconut husks and shell can account for at least 12 percent of total national energy supply. The World Bank-Energy Sector Management Assistance Program estimated that residues from sugar, rice and coconut could produce 90 MW, 40 MW, and 20 MW, respectively.[2] According to Agrilectric, U.S., burning one kilogram of rice husk can generate as much as one kilowatt of electricity. This is made possible by improving the burning efficiency in which rice husks are ground or pulverized and fired as powder fuel.[3]

The Philippine Energy Plan for 1999-2008 forecasts that the country's aggregate biomass fuel supply will grow from 247.9 MMBFOE in 1999 to 301.5 MMBFOE in 2008, an annual growth rate of 2.2 percent. Bagasse is projected to account for almost half of the contribution of renewables to energy supply to the commercial and industrial sectors. Municipal solid waste is expected to contributes 10 MW in 2005 and 50 MW in 2008.

Table 1
Biomass Fuel Supply Projections
In Million Barrels of Fuel-Oil-Equivalent, MMBFOE

	1998	1999	2004	2008
Rice Residues	7.5	7.7	8.7	9.6
Coco Residues	22.9	23.2	24.8	26.2
Bagasse	17.8	18.1	20.0	21.6
Woodwastes	83.2	84.7	92..1	97.7
Animal Wastes	12.1	12.2	12.8	13.4
Municipal Wastes	98.7	101.9	119.1	133.1
Total	**242.1**	**247.9**	**277.6**	**301.5**

Source: Philippine Energy Plan, 1999-2008

SATMP

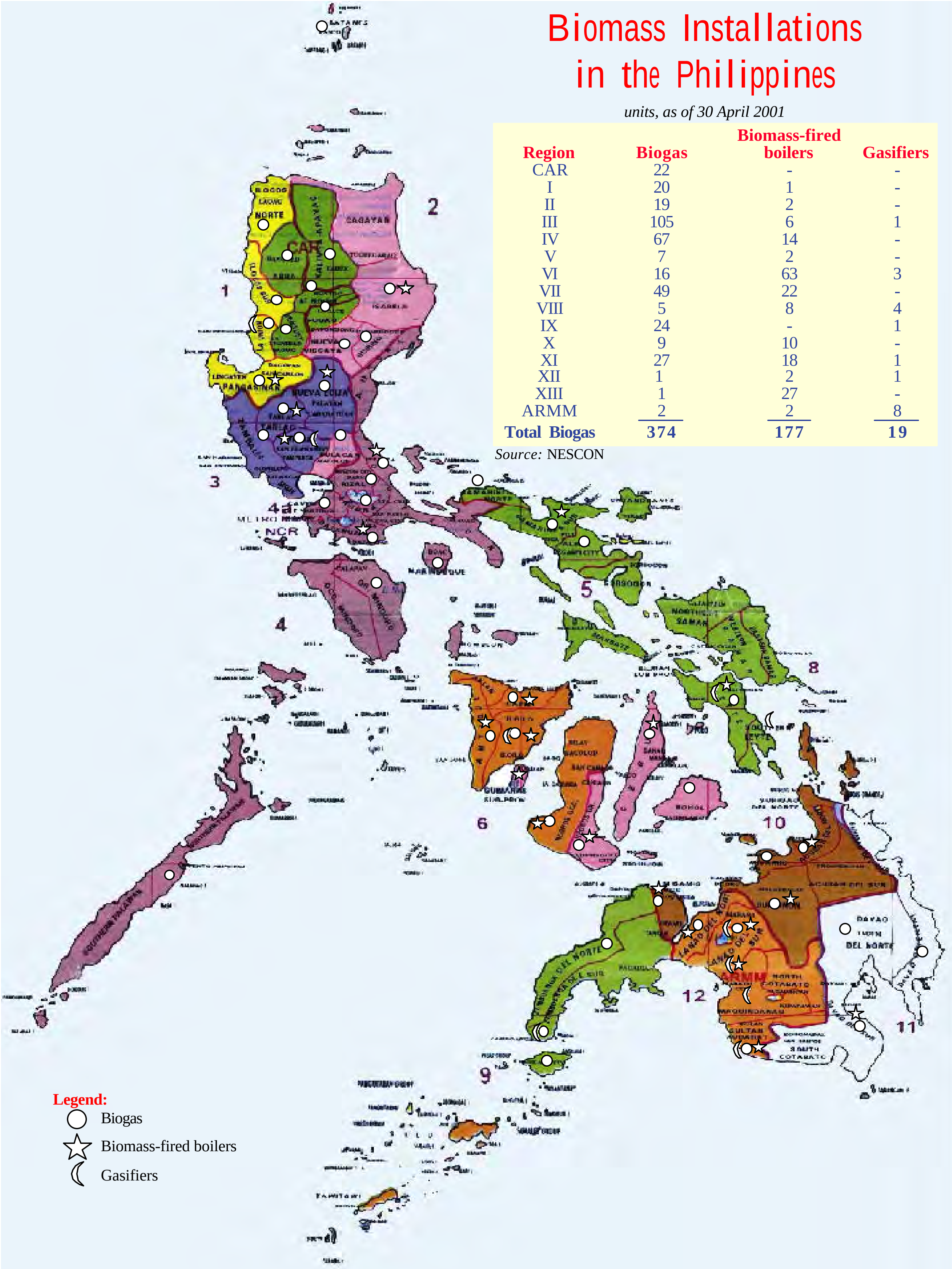
Prepared by the Society for the Advancement of Technology Management in the Philippines with the support of the Department of Energy and U.S. Agency for International Development as part of the *Technical Assistance to the DOE for Enhancing Private Sector Participation in Renewable Energy.*

Biomass Installations in the Philippines

units, as of 30 April 2001

Region	Biogas	Biomass-fired boilers	Gasifiers
CAR	22	-	-
I	20	1	-
II	19	2	-
III	105	6	1
IV	67	14	-
V	7	2	-
VI	16	63	3
VII	49	22	-
VIII	5	8	4
IX	24	-	1
X	9	10	-
XI	27	18	1
XII	1	2	1
XIII	1	27	-
ARMM	2	2	8
Total Biogas	**374**	**177**	**19**

Source: NESCON



Legend:
- Biogas
- Biomass-fired boilers
- Gasifiers

Producing Electricity from Biomass

Biomass Basics

The term biomass applies to a wide range of materials, but the main resources are: (i) short rotation forest crops (*e.g.*, ipil-ipil) ; (ii) woodwastes (*e.g.*, saw dusts); (iii) sugar crops (*e.g.*, bagasse); (iv) starch crops; (v) herbaceous lignocellulosic crops; (vi) oil crops; (vii) agricultural wastes (*e.g.*, rice hull); (viii) municipal solid wastes and refuse; and (ix) industrial wastes.

These materials are converted into fuels which are used to run the engines that generate electricity. The conversion involves three main processes: thermochemical (combustion, gasification, pyrolysis, liquefaction), chemical (esterification) and biochemical (acid hydrolysis, enzyme hydrolysis, fermentation) processes.

Thermal Conversion

Thermal conversion processes can be applied to rice hull, considered one of the more abundant biomass resource in the Philippines. There are three major processes involved: (i) direct combustion; (ii) gasification; and (iii) pyrolysis. In the direct combustion process, rice hull is burned in a furnace to produce steam in a boiler. The steam is used to run a steam engine or a steam turbine, which, in turn, drives an electric generator. In gasification and pyrolysis, rice hull is converted into combustible gas to fuel internal combustion engines (diesel or gasoline types). The thermal conversion occurs inside a reactor containing the rice hull. In gasification, air is utilized as an oxidant medium of conversion in order to facilitate the production of combustible gas. Pyrolysis is done without an oxidant. It is a more energy intensive process, and the quality of gas produced is better. The latter process produces liquid and solid (charcoal) by-products. The liquid portion contains methanol, acetone and other organic acids.

Chemical Conversion

Esterification is the chemical modification of vegetable oils into oil esters that can be used as biofuels in engines. Oils are extracted from oil crops, *e.g.*, rapeseed, coconut, sunflower, and made to undergo esterification to adapt the vegetable oil to the requirements of diesel engine. The introduction of alcohol and a catalyst (sodium hydroxide or potassium hydroxide) eliminates glycerides. Methyl esters are formed when methanol is used while ethyl esters are formed if ethanol is used. It is estimated that 1 ton of methyl ester can be produced from 3 tons of rape seed.

Biochemical Conversion

Biological processes include anaerobic digestion, acid and enzyme hydrolysis and fermentation. Methane is produced during the anaerobic digestion of wastes. It can be used for direct burning or for internal combustion engines. A kilo of dry wastes can produce 0.2 to 0.3 cu m of methane.

The main product from acid and enzyme hydrolysis, fermentation and distillation is ethanol. Ethanol can be used as fuel for engines, either in its pure form or in mixture with gasoline. The technologies for acid hydrolysis, fermentation and distillation, especially for sugar and starch substrates, are in the commercial stage, especially for sugar and starch substrates. In contrast, the process of acid and enzymatic hydrolosis of cellulosic substances still needs strong R&D support.

Table 2
Philippine Biomass Resources, 1999
In metric ton

Region	Rice hull	Bagasse	Coco shell	Coco husk	Coco coir
CAR	44.3			0.4	0.3
I	216.4		14.9	33.0	23.1
II	341.8	55,591.4	86.2	16.0	134.0
III	368.5	392,732.9	546.7	1.1	850.0
IV	241.5	521,779.1	65.0	740.3	101.1
V	144.0	74,836.3	7.2	252.9	11.2
VI	306.3	3,441,250.8	0.5	97.4	0.8
VII	41.7	687,724.0	333.1	136.9	518.2
VIII	101.3	183,257.9	114.2	509.6	177.7
IX	65.2		43.8	539.0	68.2
X	66.4	426,274.4	61.6	191.5	95.8
XI	136.2	135,649.9	229.3	1,214.9	356.7
XII	159.8	66,742.9	242.6	144.5	377.0
XIII	56.0		43.0	95.5	66.8
Philippines	**2,357.3**	**5,985,840.5**	**1,948.9**	**4,330.8**	**3,031.6**

Source: Biomass Atlas of the Philippines, 2000.

Investing in Biomass Power

Biomass represents the largest NRE installations in the Philippines. In 1999, out of the 42,872 operating NRE installations, 40,735 (or 95 percent) are biomass systems. They account for more than 70 percent of energy contributed by the NRE sector. It is forecasted that the energy share of biomass in the NRE sector will reach 89 percent by year 2008.[1] Yet while the contribution of biomass to energy generation has been substantial, its utilization for generating electricity remains scant. Less than 2 percent of the total installations is designed to generate electricity. These are biogas (374 units), biomass-fired boilers (177 units) and gasifiers (19 units).

In what follows, the economics of using biomass systems to supply electricity is explored. The levelized energy costs of the installations are calculated under the following assumptions: (i) 20-year life of the system; (ii) 12 percent capital recovery factor; and (iii) 12 percent cost of loan with repayment amortized over the life of the system.

Biogas Digester

The most successful application of biogas system to date was installed in Maya Farms, owned by Liberty Flour Mills, in Antipolo, Rizal. The system is known for its large-scale continuous split-type system using floating gas holder. However, apart from Maya Farms, there has been no report of large-scale utilization of biogas for power generation. A number of small-scale systems have been installed but they produce intermittent power and are not designed to supply village power.

Table 3 presents the comparative investment costs for two popular local designs: metal elevated tank and rectangular concrete commercial type. The first involves a digester of 100-head capacity, while the second is designed for 300 heads. The corresponding costs are P300,000 and P865,000, respectively. The first type would require 4 operators, while the second, about 10 persons, excluding those involved in the actual piggery operation. The annual operating cost is about 20 percent of the initial investment cost; maintenance and repair expenses are approximately 10 percent of the capital costs.

Utilizing biogas digester to generate power requires investments of about P50,000 per kW. On a per kW basis, the cost difference between the two systems is not material. The economies of scale however shows up in levelized energy costs. Used engines can be utilized for both systems.

Table 3
Economics of Biogas Digester
In pesos

	Commercial	Elevated Tank
Capacity (kW)	18	6
Investment cost	865,000	300,000
Investment Cost per kW	**48,056**	**50,000**
Annual costs:		
Operation	173,000	60,000
Maintenance	78,500	26,500
Life-cycle cost	2,562,826	904,122
Levelized Cost per kWh	**5.22**	**5.53**

Ethanol Plant

The continuous escalation in the prices of petroleum-based fuels inspires a fresh review on the potential of producing ethanol from sugarcane molasses, coconut and nipa sap, among others. In other countries, the production cost of ethanol (based in sugarcane) has been reduced to US$1 per gallon, or equivalently P13.21 per liter. Ethanol obtained from corn costs a little more than US$1.2 per gallon (P15.85 per liter). Even as technological development of ethanol use for power generation in other countries has advanced, the interest in locally developing the fuel remains lukewarm on account of the lower cost of petroleum fuel in the past. The following discussion therefore pertains to a theoretical ethanol power plant.

As the cost of ethanol falls below that of gasoline, the remaining issue to its commercial viability as fuel for power generation is the cost of engine and generator that will run on ethanol. The highest available engine-generator rating in the local market is only 12-kVA. This consists of a brand new Honda 4-cylinder engine with a rating of 100-hp or 75-kW, costing P336,000, and a brand new 12-kVA generator, costing P136,000. If a second-hand generator set were used instead, the investment cost would be reduced by about two-thirds.

Two ethanol plants, one using a rehabilitated, another a brand-new, generator set, are compared in Table 4. The life-cycle and the levelized energy costs for a rehabilitated genset are materially less than using a brand new genset. In a rural setting, however, maintenance cost differentials and the difficulty of sourcing replacement parts would favor installing brand new generator set.

Table 4
Economics of Ethanol Rehab vs. Brand New Ethanol Power Plant
In pesos

	Rehabilitated power genset	Brand new power genset
Capacity (kW)	12	12
Investment cost	215,000	612,000
Investment Cost per kW	**17,917**	**51,000**
Annual costs:		
Operation	43,000	43,000
Maintenance	16,500	8,250
Life-cycle cost	624,660	827,093
Levelized Cost per kWh	**1.91**	**2.53**

Biomass Thermal Power Plants

Several models have been designed locally to utilize biomass for power generation. Most notable are those involving rice hull and bagasse, two of the most abundant agricultural resources in rural areas. However, there is yet no operating biomass power plant in the Philippines for which actual data can be used as basis. Previous biomass power projects such as the 1,920-kW Southern Philippines Grains Complex Power Plant, the 2.1-MW NFA Rice Hull Fired Steam Power Plant in Iloilo, and PNOC's 22-kW Pilot Power Plant, have not been successful.

The data used in the simulation are based on the Biomass Atlas of the Philippines which provides estimates on available biomass resource, costs of transporting biomass fuel, and prices of technologies. The estimates have been carefully validated using ground data of operating rice or sugar mills within a certain economical radius of potential sites. In addition, the use of Differential Geo Positioning System increases the reliability of the estimates, especially on transport costs that were based on actual road network in rural areas. Nonetheless, the estimates remain theoretical as the feasibility of setting up renewable power plants of this magnitude in rural areas remains to be proven.

Table 5 shows the economic viability of two rice hull-fuelled thermal power plants to be located in the province of Isabela. The rice hull will be sourced from 71 mills operating within a radius of 10 and 15 kms from Santiago and Cabatuan, respectively. Bulk density of rice hull is set at 125kg/cu.meter; one truckload can carry 25 cu.m or 3.2MT per trip, while transporting the rice hull will cost P63.75/km. Given the seasonality of rice farming, the mills are assumed to operate at 8 hours/day for 210 days or 7-month operation. The power plants are assumed to operate 24 hours per day for 365 days/year. The heating value of rice hull is equal to 16.80MJ/kg. The capacities of the plants were based on maximizing available resource to sustain year-long operating cycle. Thus, the Santiago plant will be fed out of the 12,489 MT generated by mills around the plant which will involve almost 4000 trips at a cost of P1.8 million. The Cabatuan plant will utilize 23,093MT of rice hull involving more than 7000 trips that will cost P6.6 million in freight charges.

The 3-MW Santiago plant will cost P311 million or about P103,667/kW of installed capacity. It will generate revenues of P43.7 million/year against an annual operating cost of P38 million or about P5.7 million profit per year. Materials cost is estimated at P1.87 million, while operating and maintenance expense is estimated at 0.5% of plant cost or P1.4 million. Financial charges would amount to P32.9 million based on interest rate of 10% for 20 years amortization. Its life-cycle cost is estimated at P584.2 million and levelized cost at P2.98/kwh.

The 6-MW Cabatuan plant will cost P436.5 million or P82,750/kW of installed capacity. Annual net profit is estimated at P16.2 million from revenues of P80.8 million and operating cost of P64.6 million. Materials will cost P3.4 million while operating and maintenance expense will be about P2.2 million. Interests charges would amount to P52.5 million at 10% for 20 years amortization. The life cycle cost is estimated at P961.89 million and the levelized cost is P2.45/kwh.

TABLE 5
ECONOMICS OF RICE HULL BIOMASS
In pesos

	Rice Hull-1	Rice Hull-2
Capacity (MW)	3	6
Fuel	rice hull	rice hull
Location	Santiago City, Isabela	Cabatuan, Isabela
Investment Cost	311,000,000	436,500,000
Investment Cost per kW	**103,667**	**82,750**
Annual costs:		
Transport	1,833,932	6,385,500
Materials	1,873,368	3,441,312
Operation & Maintenance	1,400,000	2,235,000
Life-cycle cost	584,229.6	961,893
Levelized Cost per kWh	**2.98**	**2.45**

Table 6 presents the economic viability of bagasse power plants. Two sites were considered: plant 1 with a theoretical size of 220 MW to be located in Victorias, Northern Negros, and a 97-MW second plant in Southern Negros. Bagasse will come from 18 mills with a total rated capacity of 98,729 ton cane per day (TCD). The Victorias plant will be served by 1,114,432 DM bagasse tonnage from 14 mills; the second plant will utilize 488,016 DM bagasse tonnage from four mills. The bagasse will be loaded on trucks at 30 tons per truckload-trip. Transport costs are estimated at P63.75 per km.

The 220-MW Victorias plant will involve 3 generating units (2 x 85 MWe and 1 x 60 MWe). The 85MW system costs US$82.93 million while the 60MWe costs $63.64 million. In terms of $/kW, the latter is more expensive at $1,060/kW versus the bigger unit at $975/kW. The 94-MW southern plant will also involve three generating units (85 MW, 6 MW, 3 MW). The huge investment was meant to maximize the available resource in the area.

The proposed thermal plants would be operating 365 days per year at 50% efficiency. Bagasse has a heating value of 12.5MJ/kg. The electricity generated will be priced at P1.50/kwh. The first plant will cost P11.47 billion (or P52,159/kW). Life cycle cost would amount to P26.25 billion while levelized cost will be lower at P1.82/kwh.

For the second plant, the project total cost amounts to P4.95 billion (P52,702/kW or not much different from the first plant). Life cycle cost would about half of the first plant at P12.67 billion, levelized cost would amount to P1.95/kwh.

Facilities that use rice hull as fuel for combustion could have smaller investment cost but higher levelized cost of power compared to facilities that utilize bagasse. In terms of investment per kilowatt, however, the use of bagasse is more economical, although the investment required is huge in order to realize scale economies. The levelized costs between the two bagasse plants exhibit not much of a difference and are more economical than those of rice hull thermal power plants.

Table 6
ECONOMICS OF BAGASSE BIOMASS
In pesos

	Bagasse-1	Bagasse-2
Capacity (MW)	220	94
Fuel	sugarcane bagasse	sugarcane bagasse
Location	Negros	Negros
Investment Cost	11,475,000,000	4,954,000,000
Investment Cost per kW	**52,159**	**52,702**
Annual costs:		
Transport	421,031,149	270,638,893
Materials	344,883,364	150,956,399
Operation & Maintenance	51,640,000	24,770,000
Life-cycle cost	26,255,603,872	12,014,324,022
Levelized Cost per kWh	**1.82**	**1.95**

GASIFIER

Gasifiers generate electrical power in much the same way as direct combustion system. Table 7 compares the economics of an imported gasifier with a locally fabricated system. The imported system has a capacity of 250 kW. The import price of the equipment is quoted at US$214,500; an additional P14.3 million would be needed for civil, electrical works, systems design, installation, training and commissioning. The annual operating cost is benchmarked at 10 percent of initial investment, while maintenance expenses, at 10 percent of capital cost.

As an off-grid source of electricity, the gasifier is competitive to other biomass facilities. The investment cost per kW for an imported gasifier is less than for a rice hull thermal power plant and about the same for a bagasse plant. For smaller systems, the savings are even bigger because used engines can be utilized. The levelized cost of electricity can be reduced to P3.43/kwh for a 10-kW locally fabricated system.

Table 7
ECONOMICS OF IMPORTED VS. LOCALLLY FABRICATED GASIFIER
In pesos

	Imported Gasifier	Locally Fabricated Gasifier
Capacity (kW)	250	10
Investment cost	13,611,804	214,700
Investment Cost per kW	**54,447**	**21,470**
Annual costs:		
Operation	1,361,180	42,940
Maintenance	1,218,180	19,000
Life-cycle cost	41,047,543	851,645
Levelized Cost per kWh	**6.60**	**3.43**

However, a locally fabricated gasifier would be more expensive on a per kW basis compared to an ethanol power that uses a rehabilitated genset. The ethanol plant, demonstrated in Table 3, is almost of the same size as the local gasifier, but the former produces cheaper power: P1.91 versus P3.43 per kWh.

End Notes

[1] EUREC Agency, *The Future for Renewable Energy, Prospects and Directions.*
[2] Trade Guide on Renewable Energy in the Philippines, p.7.
[3] Society for the Advancement of Technology Management in the Philippines, *Can the Philippines Become an Energy Exporter by the Year 2020?.* Roundtable discussion on Energy, Monograph Series No. 97-01, p. 32.
[4] Quejas, Reuben E.T. *Philippine Renewable Energy Policies and Opportunities for Development.* International Workshop on Energy Efficiency, Cebu City, 21-22 June 2000.

Laws and Regulations Relevant to Renewable Energy Projects

Omnibus Investment Code of 1987 (amended by RA 7918)

The Code provides investment incentives to enterprises registered with the Board of Investments (BOI) NRE projects can be registered with BOI for its "pioneer" status to avail of the following incentives:

(i) Income tax holiday for 6 years
(ii) Exemption from value-added tax
(iii) Simplified customs procedure
(iv) Unrestricted use of consigned equipment
(v) Employment of foreign nationals
(vi) Deduction on taxable income of expenditures on necessary infrastructure related to project development
(vii) Additional deduction on taxable income of 50% of wages corresponding to the increment in direct labor hired within the first five years of registration
(viii) Deduction on taxable income of expansion expenses if additional deduction for labor expense were not claimed.

Mini-Hydro Power Incentives Act (RA 7156)

Mini-hydro proponents can avail of the following incentives:

(i) Special privilege tax rates of 2% of gross receipts from sale of electric power and from transactions incident to the generation, transmission and sale of electric power
(ii) Tax and duty-free importation of capital equipment, materials and parts
(iii) Tax credit on domestic capital equipment
(iv) Realty tax cap not exceeding 2.5% based on original costs of equipment and machinery
(v) VAT exemption on gross receipts from electricity sales
(vi) Income tax holiday for 7 years

Law on OSW (EO 462, amended by EO 232)

For generation projects exceeding 1 MW, the private sector is allowed to participate in the exploitation, development, utilization and commercialization of ocean, solar and wind (OSW) energy resources, through a production sharing contract with the national or local government. The Department of Energy can extend assistance to OSW developers in obtaining all applicable fiscal and non-fiscal incentives, including registration as pioneer industry with the Board of Investments. In addition, OSW developers can charge the cost of assessment, field verification and feasibilty studies on other sites to their current commercial projects. They can also secure access to lands and/or offshore areas where OSW energy resources can be harnessed.

Agriculture and Fisheries Modernization Act of 1997 (RA 8435)

Apart from providing trade and fiscal incentives on the agricultural and fisheries sectors, the Act provides for duty-free importation of machinery and equipment, including renewable energy systems such as solar panels, provided that such equipment shall be for the exclusive use of the importing enterprise.

Clean Air Act (RA 8749)

The Act sets emission standards on stationary and mobile sources for greenhouse gases, including power plants. NRE projects are favored to the extent that some of its technologies, such as photovoltaics, have zero emissions. But the Act imposes outright ban on incineration facilities which may have adverse impact on biomass combustion facilities. Combustion should be set at very high temperature levels for it to be complete and free of emissions.

National Integrated Protected Areas System (NIPAS) Act of 1992 (RA 7586)

Some areas in the Philippines have been declared protected, thus construction of NRE projects in these sites would require special permit. The Department of Environment and Natural Resources (DENR) issues the Environment Compliance Certificate to projects complying with the environmental standards . For NRE projects that are located in areas considered ancestral domain, the proponent must secure permits from the concerned indigenous communities and the National Commission on Indigenous Peoples.

RA 6957 BOT Law as Amended by RA 7718

Power plants may be constructed under a build-operate-transfer (BOT) scheme whereby the private sector project proponent can recoup its investments through the charging of toll fees and rentals during the contract periods. Section 10 of RA 7718 provides that BOT projects in excess of P1 billion shall be entitled to incentives as provided by the Omnibus Investment Code.

DOE Circular No. 2000-03-004

This Circular amends the law that seeks to elicit private sector participation in power generation. Relevant to NRE development are the following proviso:

(1) Companies do not have to show a five-year track record to receive accreditation for NRE generation facilities, provided that the technology being proposed has already achieved commercial status and can be demonstrated to be adaptable to local conditions; or if the project is for self-generation purpose, or the proponent is technically and financially capable.
(2) The provision for spinning reserve imposed on Private Sector Generation Facility shall not apply to RRPPF/NREF projects if (a) the project is not connected to either the national backbone grid, or regional or island mini-grids; or (b) the project is connected to a regional or island mini-grid powered by conventional generation reasonably capable of load following, e.g., peaking or intermediate diesel generation plants. If the RRPF/NREF project is proposed for connection to the national backbone grid, the provision on spinning reserve shall be subject to negotiation with the transmission system operator or from any future regulatory body overseeing the operations of the transmission grid system.
(i) Thermal efficiency requirement for cogeneration facilities using NRE, including hybrid systems has been removed.
(ii) Renewable resource power production facilities are exempt from submitting 10-year power supply agreement and are only required to demonstrate potential net foreign exchange savings by virtue of utilizing renewable energy sources.
(iii) For projects that supply electricity to a designated utility or user, or for internal use, the power development plan review and approval requirements of the Department of Energy shall not be required.

DOE Circular No. 2000-10-011

This Circular mandates the acceleration of Rural Electrification Program by instituting summary procedures in the approval and subsequent release of the electrification fund to the franchised distribution utility or project implementor. Section 2f of the Circular provides that the electrification of target areas should be accomplished in the least-cost possible manner which means either adopting the conventional line design or utilizing indigenous and renewable energy sources.

DOE Circular No. 2000-03-003

This Circular amends the 1994 DOE regulation that prescribes the provision of direct benefits to local government units (LGU) hosting energy resource development projects and/or energy-generating facilities. The amendments streamlined provisions concerning allocation of fund and generation of livelihood projects. Section 7 provides that in cases where the grid type is deemed unavailable for energizing a particular LGU, the electrification fund may be redirected by the DOE in favor of utilizing NRE system to speed up the electrification of the concerned area.

Technology Brief

Harnessing *Hydro Energy* for Off-grid Rural Electrification

Hydro power is considered the largest and most mature application of renewable energy. The installed capacity worldwide is estimated at 630,000 MW, producing over 20 percent of the world's electricity. In the European Union, hydro power contributes at least 17 percent to its electricity supply. Translated in terms of environmental costs, the hydro installations in the European Union are instrumental in avoiding 67 million tons of CO_2 emissions annually.

There is yet no international consensus on how to classify hydro systems by size. The European Small Hydro Association however has included in the definition of small hydro those systems with capacity up to 10 MW. The Philippines has adapted the European nomenclature, but further breaks down "small" systems into "mini" and "micro." RA 7156 defines mini-hydro systems as those installations with size ranging from 101 kW to 10MW. By inference, micro-hydro systems refer to installations with capacity of 100 kW or less.

Small hydro power plants are mainly 'run-off-river' systems since they involve minimal water impounding. As such, they are regarded environmentally benign forms of energy generation. It is estimated that a 5-MW small hydro power plant that can supply power to about 5,000 families, replaces 1,400 tons of fossil fuel and avoids emissions of 16,000 tons of CO_2 and more than 100 tons of SO_2 annually.

In the Philippines, the Department of Energy has identified 1,081 potential sites of small hydro installations that can produce power up to 13,426 MW. There are currently 102 micro-hydro and 45 mini-hydro operational installations, with aggregate rated capacity of 85 MW. Still in the pipeline for development until year 2008 are hydro projects with a total capacity of 76.8 MW. The projected demand for hydro power is expected to reach 0.29 MMBFOE by year 2008.

Table 1
Philippine Hydropower Potential

Status	Type	No. of Plants/Sites	Capacity MW	Capacity %	Annual Energy GWh	Annual Energy %
Definite Design	Large	3	1,130.0	8.4	3,312.0	7.6
	Small	2	43.0	0.3	211.1	0.45
	Mini	40	56.0	0.4	245.2	0.56
	Subtotal	45	1,229.0	9.2	3,768.3	8.7
Feasibility Study	Large	17	3,229.8	24.1	10,617.5	24.45
	Small	41	873.1	6.5	3,113.1	7.2
	Mini	25	88.7	0.7	388.6	0.9
	Subtotal	83	4,191.6	31.2	14,119.2	32.5
Pre-FS and Desk Study	Large	37	4,646.0	34.6	11,957.0	27.5
	Small	93	1,721.0	12.8	6,676.5	15.4
	Mini	823	1,638.9	12.2	6,906.6	15.9
	Subtotal	953	8,005.9	59.6	25,540.1	58.8
Total		**1,081**	**13,426.5**	**100.0**	**43,427.6**	**100.0**

Source: *Guide on Mini-Hydropower Development in the Philippines*, Mini-hydro Division, Energy Utilization Management Bureau, Department of Energy, February 1999.

USAID SATMP

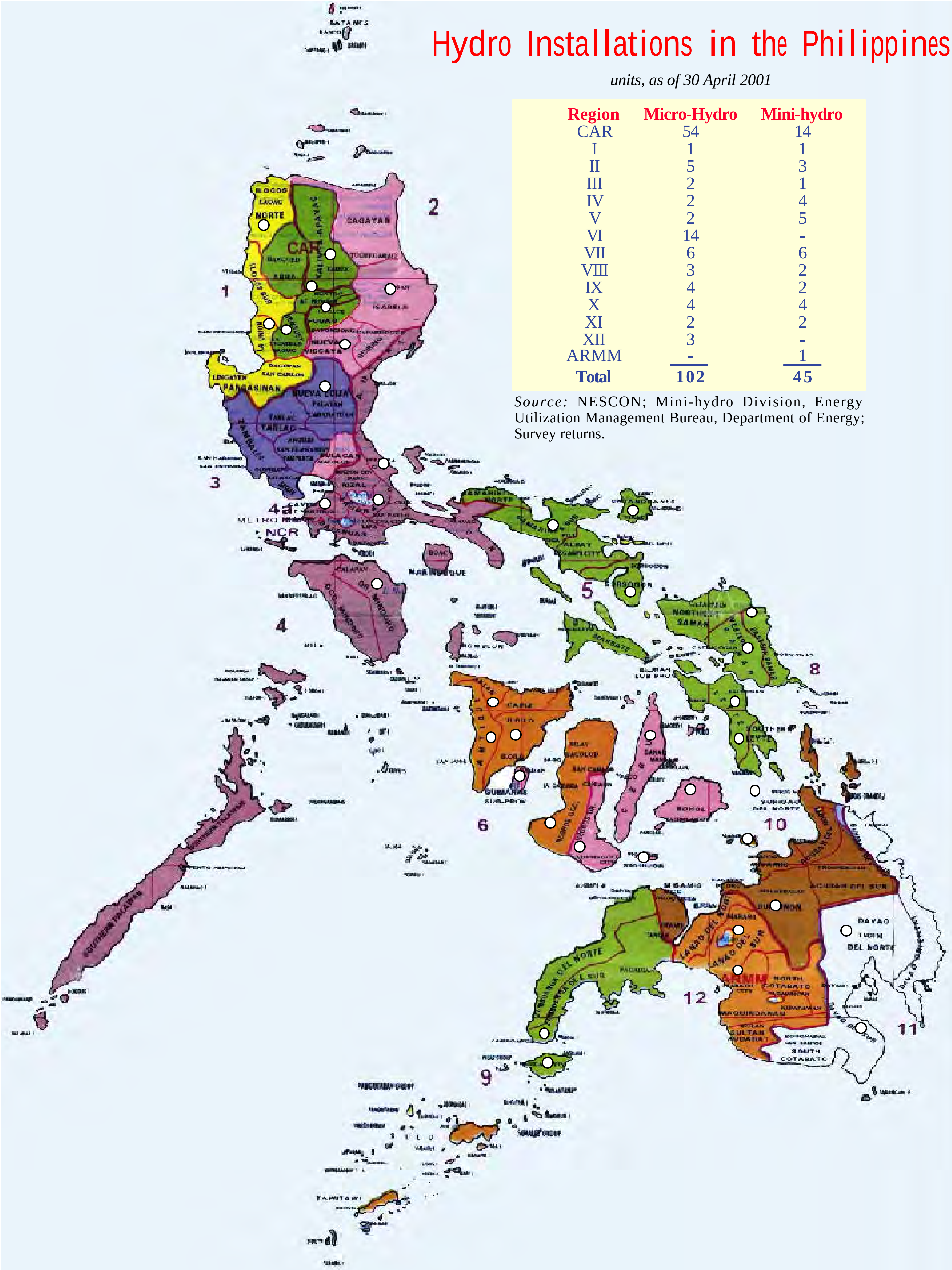
Prepared by the Society for the Advancement of Technology Management in the Philippines with the support of the Department of Energy and U.S. Agency for International Development as part of the *Technical Assistance to the DOE for Enhancing Private Sector Participation in Renewable Energy.*

Hydro Installations in the Philippines

units, as of 30 April 2001

Region	Micro-Hydro	Mini-hydro
CAR	54	14
I	1	1
II	5	3
III	2	1
IV	2	4
V	2	5
VI	14	-
VII	6	6
VIII	3	2
IX	4	2
X	4	4
XI	2	2
XII	3	-
ARMM	-	1
Total	**102**	**45**

Source: NESCON; Mini-hydro Division, Energy Utilization Management Bureau, Department of Energy; Survey returns.



Investing in Small Hydro Power Facilities

In constructing a hydro power system, an artificial water head is created so that water can be diverted through a pipe (penstock) into a turbine where it is discharged usually through a draft tube, or diffused back into the river at a lower level. Various types of turbine have been developed to cope with different sizes of head and flow.

Turbines are of two kinds: impulse and reaction. In impulse turbines (*e.g.,* Pelton), a jet of water impinges on the runner that is designed to reverse the direction of the jet and thereby extract momentum from the water. Reaction turbines (*e.g.,* Francis and Kaplan), run full of water and in effect generate hydrodynamic "lift" forces to propel the runner blades. The sizing of turbines is adapted to the flow characteristics of the river or water stream to be used. The amount of energy captured depends on the sizing strategy. On one hand, the larger the turbine at site, the poorer is its load factor (or capacity factor) since it will only run at rated power for a shorter period. On the other hand, a turbine that is designed to utilize the minimum flow can have a load factor approaching 100 percent, but it will extract less energy than a larger turbine. If the system can be made flexible to account for variations in the flow and volume of water, then its capacity can be maximized throughout the seasons. It will also eschew the need to employ different sizes of turbines, and therefore reduce the investments costs.

In what follows, the economics of small hydro facilities for power generation is explored. The levelized energy costs of the installations are calculated under the following assumptions: (i) 20-year life of the system; (ii) 12 percent capital recovery factor; and (iii) 12 percent cost of loan with repayment amortized over the life of the system.

Table 2 compares the financial costs of installing micro-hydro facility under two possible modes: by contract and by administration. The first is turnkey, while the latter has the proponent administering the project. The basis of the estimates is a 75-kW installation. By contract or turnkey installation is 30 to 40 percent more expensive than self-administered construction. However, in turnkey contracts, the proponent is freed of the supervisory hustles inherent in engineering projects.

Table 2
Economics of Micro-Hydro System
By Mode of Construction, in pesos

	By Contract	By Administration
Capacity (kW)	75	75
Investment cost	29,036,250[a]	20,025,000[b]
Iinvestment Cost per kW	387,150	267,000
Annual cost:		
Operation	500,625	500,625
Maintenance	200,250	200,250
Life-cycle cost	56,111,437	40,322,243
Levelized Cost per kWh	**24.96**	**17.94**

[a] *Excludes distribution cost, estimated at P 47,850 per kW.*
[b] *Excludes distribution cost, estimated at P 33,000 per kW.*

Three installations were selected to demonstrate the economics of mini-hydro facilities: a prospective 550-kW installation in Surigao del Norte, 960-kW installation in Camarines Sur and 1,500-kW installation in Lanao Sur.

Table 3
Economics of Mini-Hydro System
In pesos

	Hydro1	Hydro2	Hdyro3
Capacity (kW)	550	960	1,500
Location	Loreto, Dinagat Is., Surigao del Norte	Inarihan, Camarines Sur	Malabang, Lanao Sur
Year installed	2001*	1998	1995
Historical investment cost	-	48,000,000	40,000,000
Present values:			
Investment cost	42,179,534	67,309,170	70,002,747
Investment cost per kW	76,690	70,114	46,668
Annual Costs:			
Operation	1,182,279	1,496,872	1,253,837
Insurance	105,449	168,273	175,007
Maintenance	227,456	1,871,091	2,696,425
Life-cycle cost	85,282,109	144,350,463	153,469,801
Levelized Cost per kWh	3.78	3.65	1.71

**Scheduled for construction in July 2001.*

Economies of scale is evident in large mini-hydro installations. The Matling project in Lanao Sur highlights major cost differential in power generation compared to smaller systems. The levelized cost is estimated at only P1.71/kwh, or more than 50% compared to the proposed Surigao project. For this reason, some large mini-hydro installations are not only competitive against conventional power systems, but can also be sold below grid electricity prices.

Some Major Small Hydro Installations in the Philippines

1.5-MW Matling Mini-hydro Project in Malabang, Lanao Sur

In 1995, the Matling Industrial and Commercial Corporation (MICC) replaced its 30-year old, four units of 250-KW diesel-fed generators with a 1.5 MW mini-hydro power facility. The decision to shift to environmentally-friendly power source was spurred by increasing market competition confronting MICC. The mini-hydro system can generate power at a levelized cost of P1.71 per kWh, much lower than the cost of diesel-generated power. The system utilizes 6 cu.m. per sec. flow of water and 35 meters head from the Matling River. The river flow has a potential to generate electricity up to 10 MW.

When the project was completed in May 1995, it was the first mini-hydro facility in the Autonomous Region of Muslim Mindanao, and indeed a model case for off-grid electrification. It energizes the 3,000 hectare MICC compound, including the town of Malabang that surrounds the complex.

The dam intake is placed at an elevation of 320 m. and the catchment area at this point is 330 sq. km. The headrace passes on the right bank looking upstream. The water that generates power drops to an elevation of 280 m. for a gross head of 40 m. Two 750-kW generators were set up based on a plan to use half of the power supply internally, and sell the other half to the National Power Corporation.

In present values, the total development cost of the system is P70 million, consisting of P26 million for electro-mechanical equipment sets and the balance of P44 million for civil works. Annual operating cost is estimated at P1.25 million and maintenance cost at P2.69 million. The projected payback period is only 4 years.

960-kW Inarihan Mini-hydro Project in Camarines Sur

The Inarihan Mini-hydro power plant was the first project that availed of the incentives provided to micro-hydro proponents under RA 7156. The project was launched in February 1996 and was completed within two years. It is located in the outskirts of Naga City and operated by the Bicol Hydro power Corporation,

The project is a run-off-the-river scheme utilizing a 1.80-meter high concrete boulder filled weir across a 30-meter wide river. Water flows at a rate of 1.52 cu.m. per sec., passes through an intake structure, and proceeds to a 0.90 m. diameter, 1.6 km-long polyethylene plastic pipe. From the pipeline, the water is temporarily stored in a 55-meter long by 36-meter wide by 4-meter deep concrete lined forebay before it goes through a 0.70-meter by 289-meter long steel high pressure penstock. The water then proceeds to three-Francis type turbines, located at 86 meters below the power intake structure. The system has a capacity for 960 kilowatts of power; annual electricity generation is estimated at 5.30 megawatt-hours.

The actual cost of the project is P48 million (at 1997 prices) or about P50,000 per installed kW. The original project cost estimate was P42 million; an additional P6 million was needed for expenditures on right-of-way acquisition, slope and watershed protection. Annual operating and maintenance expenses are projected at P1.2 million and P1.5 million, respectively. The power will be sold to the Camarines Sur Electric Cooperative II (Casureco II) at a rate of P1.80/kwh, or 5% lower than the rate of the National Power Corporation.

The project enjoys several incentives: (i) tax and duty-free importation of capital equipment sourced from China; (ii) tax credit on Domestic Capital equipment equivalent to 100% of the value of the VAT and custom duties for the local purchase of machinery, equipment, materials and parts; (iii) special Realty Tax rates on equipment and machinery not exceeding 2.5% of original cost; (iv) VAT exemption; and (v) income tax holiday for seven years of operation.

Two problems have surfaced during the first two years of operations. The peak kW capacity utilization is 880 kW or about 92% of the designed capacity. A study has been proposed to determine the reasons for the apparent underperformance of the system and to serve as reference for future designs. The second problem pertains to insufficiency of water. The actual annual generation is about 3-4 million kWh (out of projected 5.3 million kWh) which translates to P6 million in revenues. The full utilization of the three turbines was achieved only for three months of the year due to the depletion of water resource.

Villa Escudero (VESCO) Micro-hydro Project

VESCO maintains an old 75-kW hydroelectric plant that was built in 1937. This unit provided for the electricity requirements of the plantation including a 5-ton ice plant, a coffee mill and other small applications. The expansion of Vesco's corporate activities provided the impetus to develop two micro-hydro systems in 1997: a new 38-KW plant downstream of the original one; and a new 75-kW plant in the original location. These brought total installed capacity to 188-kW, possibly expanding to 230-kW if the feasibility of the third power station is confirmed.

The systems are of the run-off-river type, sourced from two rivers, Bulakin and the Labasin Rivers. The headwaters of the Bulakin river is the Kasunguanan Spring which reaches peak-flows during the dry season while its lowest stream flows occur during the usual monsoon months of July to September. The aggregate watershed area of the two rivers is estimated at 2,000 hectares of lush vegetation and 18 natural springs. The area is also near Mt. Banahaw, the least exploited forest in the country.

The 38-kW plant known as the "Kipot" plant has a calculated net head of four feet or half of the original plant and would have the same optimal flow duration discharge of 1200 liters/second. The second "Resort" plant capacity of 75-kW was based on the confirmed flow of 2,000 liters/second occurring in the original plant site. The annual generation of the two plants is estimated at 573,760 kWh per year. At a project cost estimate of P10 million, the payback period would be about 5 years.

Dakkitan Micro-hydro Project

This project, located in Dakkitan, Hungduan, Ifugao, is a 6-kW micro-hydro which began operation in March 1995. The project is a collaboration among the village association, Samahan ng mga Magsasaka para sa Kabuhayan (SAMAKA), the Ifugao Resource Development Center and the Montanosa Research and Development Center. The micro-hydro project provides power using a Pelton turbine powered by a 32.8-meter head from the Dakkitan River. It runs a rice mill at 3kg/min milled rice capacity including several equipment such as welding, vulcaninzing, blacksmithing, wood polishing and battery charging.

The power cum livelihood project costs about P280,000 including the cost of equipment, amounting to P61,000, that comprises the power load. P93,955 represents capital expenditures for the turbine, powerhouse, intake tank, canal rehabilitation and penstock. SAMAKA's counterpart was valued at P54,000 representing labor contribution.

The project generates revenues close to P7,000 for the community. The accessibility of the ricemill has also saved time for the households. Rice milling expenditures fell by about P 21 per milling due to reduced milling charges and zero transport costs.

Dulao and Gacab Microhydro Power Projects

The projects include a 3-kW cross-flow turbine for a rice mill and a 10-kW two-cell cross-flow turbine with an electronic load controller and instrumentation for Malibcong village electrification. The smaller system was completed in 1995. The project was a close collaboration among the Department of Science and Technology, PCIERD and the De La Salle University (DLSU), in partnership with the host community. A parallel objective in installing a second turbine rather than enhancing the existing 3-kW unit was to allow the DLSU team to perform pilot research.

The system runs a rice mill, provides electricity to 44 households, charges automotive batteries and power carpentry and metalworking tools. It operates twice a day (4:00 to 6:00 a.m. and 6:00 to 9:00 p.m.). Each household has two bulb receptacles; a 20-watt bulb is charged P10 per month.

The two projects involved a cash outlay of P 418,475. This is not the true cost of the system since it excludes volunteer work of local residents and technical consultants. Materials and equipment amounted to P130,000 and P180,000 for the first and second phase, respectively. The project reduced rice milling expenses by 20% to P16 per 12-kg can. Moreover, fuel reduction amounted to a maximum of P160 per month in lieu of P 25 tariff for milling.

A much-improved 20-kW version was also designed, fabricated and installed in Gacab, Malibcong. It provides lighting to 72 households. The Electronic Load Controller (ELC) replaces the expensive and imported governor that regulates the speed of the generator. The ELC imposes a constant load on the generator in spite of changing user's load. The controlling element is the inlet guide vane that controls the flow of water coming from the reservoir through the penstock in a cross-flow turbine. The concept is to close the valve if the generator speed becomes faster and open the valve if the generator slows down. The fuzzy logic controller decides which valve to open, and how much opening will be made, *i.e.,* 1/3, 2/3, or full opening, to regulate the frequency. In this manner, the two-cell cross-flow turbine is a 3-in-1 turbine using two generators of different sizes (10 and 20KVA). The fuzzy logic controller will choose the size of the generator needed for optimum efficiency based on the demand load and select which of the two inlet guide vanes will be utilized.

The cash outlay for the latter project was P580,000; again, volunteer labor and technical help were not valued. Imported capital components amounted to P131,000.

Ngibat Microhydro Project

The 5-KW Ngibat project, located in Tinglayan, Kalinga, provides lighting to 32 households and 15 lamp posts in the village. It also supplies electricity to a rice mill that operates 6 hours daily for an average of 8 days operation in a month, and to blacksmiths working on an average of 8 hours daily for 10 days in a month and for 3 to 4 months in a year. The system load also includes the 500-kWh/month consumption of an electric grinder, drill press, hand drill and grinder.

The project was partly financed by an interest-free loan of P189,000, a grant from Montanosa Research and Development Center of P130,000 and local counterpart labor valued at P64,000. As this is a community-initiated project, households are charged P22 per month, which is equivalent to the avoided fuel costs. Some households are unable to pay the tariff while others are exempted from payment for humanitarian reasons.

Yamog Renewable Energy Development Group, Inc.

In September 1999, the Yamog Renewable Energy Development Group, Inc. constructed a 20-KW Pelton turbine project in Sitio Polokon, Lamanan, Calinan District, Davao City to provide power to 105 households for 24 hours daily during rainy seasons, and for 7 hours daily during normal dry seasons. It derives energy from the strong water flow (50 liters/sec) and head (68 m.) of five contributing natural springs. This project replicates a 3-KW micro project in Sto. Niño, Megkawayan, Calinan that serves 30 households.

The locally-manufactured Pelton turbine has two nozzle jets discharging water that strikes a series of 20 buckets. The bucket splits into two parts so that a central area would not act as a dead spot incapable of deflecting water away from incoming jet. A cut-away notch on the lower lip allows the following bucket to move farther into place before interfering with the jet which is still propelling the earlier bucket. This innovation maximizes the energy provided by the water; the overall hydraulic efficiency of the system is designed at no less than 60%. To economize on cost, the system uses an induction motor to serve as generator. Apart from being more economical compared to the synchronous type of generator, the use of an induction motor-generator is deemed to provide reliability and robustness of the generating equipment.

The project, which costs P890,000, is a collective effort of the community in Polokon. An offshoot of the hydropower project is the rehabilitation of the watershed area. Biodiversity protection and reforestation activities are on-going with the establishment of tree nurseries for hardwood species such as narra, mahogany, lauan and fruit-bearing trees. To provide operating and maintenance expenses for the long-term sustainability of the project, the community has set up a capital replacement fund, a welfare development fund and a maintenance fund. Additional revenues are expected with the establishment of agro-industrial facilities such as corn mill, battery chargers and coffee huller.

Future Developments in Small Hydro in the Philippines

There is a marked shift towards community-based initiatives in developing hydro resources for power generation in tandem with promoting livelihood projects. This is but a natural offshoot, especially in areas where work has been traditionally carried out manually and without the benefit of electricity. With the rising cost of fuel and the constraints imposed by a ballooning budget deficit that causes delay in grid electrification, communities are pressured to seek alternative and cheaper source of energy. Below are illustrative cases of innovation to harness the potential of hydro power.

550-kW Hinubasan Minihydro Project in Loreto, Dinagat Island, Surigao del Norte

This project is a typical case of remote island electrification. It is located in Loreto muunicipality, in Dinagat Island, about four hours by pump boat from Surigao City. The Hinubasan project is envisioned to provide 24-hour power supply to 1,686 households of the municipality. The Development Bank of the Philippines has earmarked P48.5 million funding for the project. Construction is scheduled to commence in July 2001.

The project involves the installation of two 275-kW Turgo impulse turbines at 162 m. net head and flow of 0.228 cu.m per sec per unit. The turbines, generators, governors, control panels and transformers will be sourced from China. It is expected that the costs of generating power from the facility is P2.96 per kWh. This rate compares favorably against the basic power charge in the area of P3.97 per kWh. The proponents expect to recoup their investments within 5 years.

Romblon Mini-hydro Project

This 900-kW mini-hydro project is the second project of the Development Bank of the Philippines (DBP) under its FINESSE program. A pre-feasibility study had been completed. Technical experts attest to exceptionally good resource potential. The Romblon Electric Cooperative, the principal project proponent, is exploring DBP financing for the construction of the plant. The main project is expected to cost about P55 million.

Bubunawan Hydro Project

This 7-MW mini-hydro project, located in Baungon, Bukidnon, has the potential to generate 37.6 MWh of electricity annually. The project proponent is the Bubunawan Power Company. The system was commissioned in the later part of 2000.

Steady Flow Hydro Power Plant

A promising innovation in the hydro energy system has been recently developed by Mr. Cornelio Seno of Laguna. Although still at R&D stage, Seno's invention, dubbed as "Steady Flow Hydro System," received a special citation for innovation in the Nationwide Contest for New and Renewable Energy Systems sponsored by the Philippine National Oil Company last year. The innovation ensures constant flow rate, rotative speed, frequency and voltage for all operating conditions of head and electrical load, while eliminating problems involving water hammer, surging and silting-up.

The need for a speed governor is eliminated since a synchronous speed is assured by a metering pump at the forebay. The pump delivers fixed water flow rate at negligible head from the forebay through the penstock and to the hydro engine. This set up allows the latter to run at synchronous speed with the generator. Since the head of the metering pump is negligible, the pipeworks connecting the forebay and tailrace exert siphoning effect. Consequently, the electric motor is used only to surmount mechanical friction; its power consumption is a small fraction of the total hydropower output. The metering pump and its driver can be conveniently controlled and monitored for performance at the control panel of the generator.

There are other notable innovations in local small hydro facilities that were developed out of necessity to adapt the system to the specificities of local conditions. With proper support, innovations, such as the one developed by Seno, may find commercial applications that will enhance the economic profile of small hydro facilities.

Boosting Hydro Power

Hydropower project proponents have to secure four kinds of permits or licenses to set up a project. Water rights are issued by the National Water Resources Board for the use of water. Once operational, a fee is charged for water use. The Department of Energy provides the clearance for the project. The Environment Management Bureau of the Department of Environment and Natural Resources issues the Environment Clearance Certificate, especially in areas identified as protected areas under the National Integrated Protected Areas System (NIPAS). If the project is located in ancestral domain, a permit must be secured from the affected community and from the National Commission on Indigenous Peoples. It should be noted that part of the revenues arising from NRE installations are mandated by law to redound to tbe benefit of host communities.

RA 7156, also known as the Mini-hydroelectric Power Incentive Act, promulgated on 12 September 1991, provides the necessary incentives and privileges to mini-hydroelectric power developers. The objectives of the Act are as follows:

(i) To encourage entrepreneurs to develop potential sites for hydroelectric power existing in their respective localities;
(ii) To encourage entrepreneurs to develop potential sites for hydroelectric power existing in the country by granting the necessary incentives which will provide a reasonable rate of return;
(iii) To facilitate hydroelectric power development by eliminating overlapping jurisdiction of the many government agencies whose permits, licenses, clearances and other similar authorizations issued by various government agencies as presently required for such development, and by vesting in one agency the exclusive authority and responsibility for the development of mini-hydroelectric power;
(iv) To apportion a part of the realty and special privilege taxes and other economic benefits of the hydroelectric power potential to the respective localities where they are established; and
(v) To provide a contractual framework wherein some stability of conditions can be relied upon for long-term financing purposes.

The Office of Energy Affairs/DOE shall be the sole and exclusive authority responsible for the regulation, promotion and administration of mini-hydroelectric power development and the implementation of the provisions of the Act. Any person authorized to engage in mini-hydroelectric power development shall be granted the following tax incentives or privileges:

(i) Special Privilege Tax Rates limited to two per cent (2%) of gross receipts from the sale of electric power and transactions incident to the generation, transmission and sale of electric power;
(ii) Tax and Duty-free Importation of Machinery, Equipment and Materials applicable within seven (7) years of the award, subject to certain conditions that said machinery, equipment and parts: (i) are not manufactured domestically in reasonable quantity and quality at reasonable prices; (ii) are directly and actually needed in the project; (iii) are covered by shipping documents in the name of the duly registered developer; and (iv) prior approval of the OEA/DOE was obtained before such importation.
(iii) Tax Credit on Domestic Capital Equipment equivalent to 100% of the value of the VAT and customs duties that would have been paid on the machinery, equipment, materials and parts had these items been imported.
(iv) Special Realty Tax Rates on Equipment and Machinery shall be limited to 2.5% of their original cost.
(v) Value-added Tax Exemption on gross receipts derived from the sale of electric power whether through the NPC grid or through existing electric utility lines; and
(vi) Income Tax Holiday for seven (7) years from the start of commercial operation.

Apart from the above incentives, privately-owned mini-hydroelectric power plants shall be eligible for foreign loans and grants without further evaluation by the National Economic and Development Authority.

Technology Brief

Harnessing *Wind Energy* for Off-grid Rural Electrification

Wind energy is a secondary form of solar energy. It is considered one of the safest and cleanest forms of renewables. Wind turbines do not generate greenhouse gases although there are concerns about their noise and harmful effects on bird life. Moreover, wind energy systems do not pose environment problems related to decommissioning of obsolete plants. Apart from low operating costs, wind energy system can be used for various applications in agriculture and industries. The system, however, is site-specific requiring areas with wind speed of at least 3-4 meters per second. It requires storage in terms of batteries or water reservoir due to considerable power supply variations. A back-up system is also recommended for areas where wind supply is low.

Wind farm technology has had more advanced applications in Europe and the US. The Middelgrunden wind farm in Denmark is currently the world's largest offshore wind farm with a capacity of 40 MW. It is the first step towards a batch of other Danish offshore wind farms, each planned to generate 150 MW. In the US, the state of Texas has become the hottest wind energy market, having recently developed a 250-MW wind energy facility. A 500-MW facility is scheduled for construction this year; another 300 MW is being considered. This development occasioned the restructuring of the power sector in Texas. An integral component of the reform is the "Renewable Portfolio Standard" (RPS), *i.e.*, a program to dedicate to renewables about 2,000MW of energy capacity, approximately 3 percent of the state's power supply, by 2009.[1]

In the Philippines, wind energy system is gradually gaining advocates following the completion of the wind resource map of the country. The potential sites for wind energy generation have already been identified; majority of them are in the western side of the archipelago. Among the promising areas are: Cuyo Island (5.58mps), Basco, Batanes (5.39mps), Catanduanes (4.15mps), and Tagaytay City (5.0mps). Under current negotiations is a project in Mindoro that will showcase wind energy system in the Philippines. The proponent plans to set up 25 units of 750-kW or a 18.75-MW of wind power facility. A similar system is being eyed for installation in the provinces of Catanduanes, Masbate and 12 other islands.

The Philippine Energy Plan for 1999-2008 forecasts that the contribution of wind energy systems to the country's power supply will reach 5 to 80 MW between year 2004 to 2008. If current plans materialize, off-grid stand-alone wind turbine generators may be able to contribute 36.87 MW to the grid by 2008.

USAID SATMP

Prepared by the Society for the Advancement of Technology Management in the Philippines with the support of the Department of Energy and U.S. Agency for International Development as part of the *Technical Assistance to the DOE for Enhancing Private Sector Participation in Renewable Energy.*

Technology Brief

Harnessing Solar Energy for Off-grid Rural Electrification

Photovoltaics is the most popular technology choice for off-grid rural electrification. In the Philippines, some major socio-economic programs of the government utilize photovoltaics to bring electric power and economic development in remote rural areas.

The main advantage of PV over other renewable energy technologies is its virtually inexhaustible source of power, *i.e.*, the sun. PV converts solar radiation directly into electricity.[1] The geographical location of the Philippines enables it to harness solar energy because of high daily insolation, ranging from 3.5 to 5.2 kWh per square meter, and the low seasonal variation of solar radiation. The solar potential is greatest during the summer months of May to July when the sun is positioned over the Northern Hemisphere. Conversely, the months with the weakest sunlight are November to January.

In addition, PV systems are modular and can be employed for both small and large-scale power generation. High reliability, long lifetime, low maintenance cost and zero fuel requirement of PV modules have made the technology a viable and cost-effective option for remote site applications where the costs of grid extension and maintenance of conventional power supply systems are often prohibitive.

While PV technology is already considered commercial, costs remain high as the industry struggles to make its transition from R&D level production to large-scale manufacturing. Nonetheless, the interest on PV has not waned; worldwide, research and development activities on the technology have been sustained. Since 1975, much of the work on PV is focused on increasing the efficiency and stability of different PV cell technologies and on reducing manufacturing costs. In addition, crystalline silicon cells, the dominant PV cell technology, is profiting from the huge R&D activities in the semiconductor industry. The upshot is a steady decline in the price of PV module – from US$4.75 per Wp in 1990 to the current price of US$3.50 per Wp. By 2010, the price of PV module is forecast to fall between US$1.50 to US$2.00 per Wp.[2] These developments have increased the attractiveness of PV as a technology choice for rural electrification.

USAID SATMP

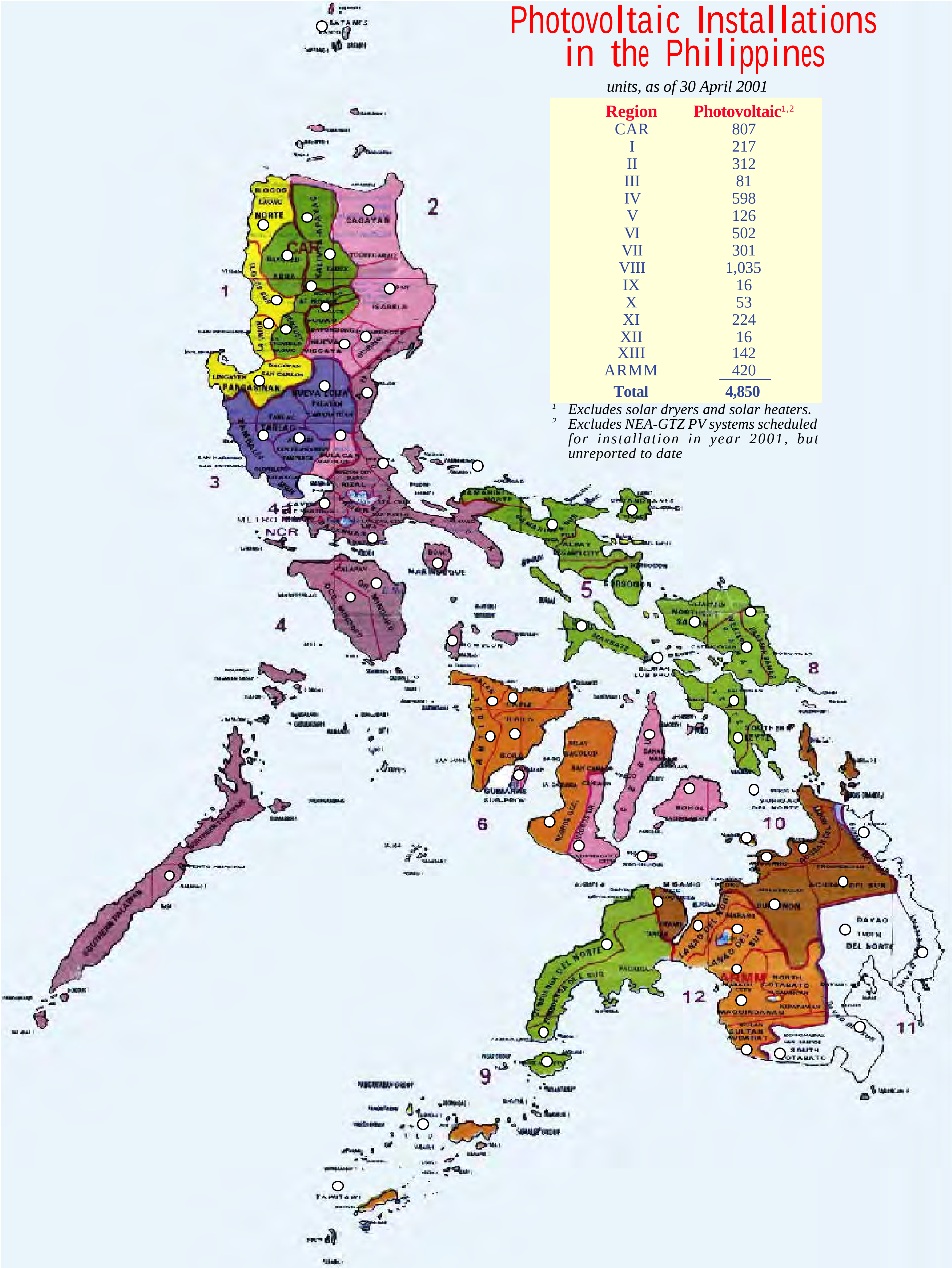
Prepared by the Society for the Advancement of Technology Management in the Philippines with the support of the Department of Energy and U.S. Agency for International Development as part of the *Technical Assistance to the DOE for Enhancing Private Sector Participation in Renewable Energy.*

Photovoltaic Installations in the Philippines

units, as of 30 April 2001

Region	Photovoltaic[1,2]
CAR	807
I	217
II	312
III	81
IV	598
V	126
VI	502
VII	301
VIII	1,035
IX	16
X	53
XI	224
XII	16
XIII	142
ARMM	420
Total	**4,850**

[1] *Excludes solar dryers and solar heaters.*
[2] *Excludes NEA-GTZ PV systems scheduled for installation in year 2001, but unreported to date*



Investing in Photovoltaic

As is the case for most renewable energy systems, the biggest hurdle in nurturing the market for PV in rural areas is the large upfront cost. However, because of the modularity of the system (*i.e.*, it can be sized variably depending on the energy requirement of target users), ease of operation and low maintenance costs, PV systems are appropriate supplying the energy needs of low-income rural households.

In what follows, the levelized economic cost of various PV installations are calculated under the following assumptions: (i) aaily insolation of 5 kWh per sq. m. per day; (ii) autonomy period of 3 days; (iii) 20-year life of the PV module; (iv) 12% capital recovery factor; and (v) 12% cost of loan with repayment amortized over the life of the system.

Solar Home Systems

A solar home system consists of PV modules and balance of system components, *i.e.*, battery, charge controller, support and wiring. More than half of the investment cost is due to PV modules. The systems use automotive (shallow-type) batteries that are replaceable every three years.

Since the system is individualized, no operating cost is imputed. The annual maintenance cost represents the value of time of the person charged to periodically refill the battery with distilled water. Utilizing maintenance-free but more expensive battery will reduce the cost of maintenance to nil. In addition, the battery and charge controller are replaced every 3 and 5 years, respectively.

Table 1
Investment Costs of Solar Home Systems
In pesos

	SHS1	SHS2	SHS3	SHS4
Daily load (Wh)	125 – 150	180 – 225	250 – 300	360 – 450
PV (Wp)	50	75	100	150
Battery (A-hr)	70	100	140	200
Controller (A)	5	6	10	12
Typical load	❑ 2 units of 10W lamp at 4 hrs. each ❑ 5W radio at 3 hrs. B&W TV at 2 hrs.	❑ 3 units of 10W lamp at 4 hrs. each ❑ 15W radio at 4 hrs. or 30W 30W B&W TV ar 3 hrs.	❑ 4 units of 10W lamp at 4 hrs. each ❑ 15W radio at 6 hrs. or ❑ 30W B&W TV ar 4 hrs.	❑ 4 units of 10W lamp at 5 hrs. each ❑ 15W radio at 4 hrs.
Investment cost	**26,000**	**35,000**	**43,200**	**57,500**
PV module	13,500	20,000	25,000	36,000
Battery	2,450	3,500	4,900	7,000
Controller	1,750	2,100	3,500	4,200
Auxilliary	2,300	2,400	2,600	2,800
Installation	6,000	7,000	7,200	7,500
Investment Cost per kWh	**520,000**	**466,667**	**432,000**	**383,333**
Annual costs:				
Operation	0	0	0	0
Maintenance	250	350	500	700
Life-cycle cost	54,563	73,711	93,708	125,520
Levelized Cost per kWh	**145.55**	**133.51**	**124.99**	**113.68**

PV Street Lighting System

PV street lighting systems are designed for 12-hour daily operation. Automotive shallow-type battery is used. The sizes of the battery and controller are compatible to the capacity of the PV module. No operating cost is imputed since each system is individualized and therefore the operation involves simple switching of the system. The maintenance of the system entails periodic water refilling of the battery. Thus, as in solar home systems, operation and maintenance costs are kept to the minimum..

Table 2
Investment Costs of PV Street Lighting Systems
In pesos

	PSLS1	PSLS2	PSLS3	PSLS4	PSLS5	PSLS6
Lighting load W	10	12	16	18	23	25
PV (Wp)	50	50	50	75	100	100
Battery (A-hr)	70	100	100	140	140	200
Controller (A)	5	5	6	6	10	10
Investment cost	**27,000**	**28,500**	**35,000**	**37,000**	**43,500**	**45,000**
PV Module	13,500	13,500	19,000	19,000	25,000	25,000
Battery	2,450	3,500	3,500	4,900	4,900	7,000
Charge Cont.	1,750	1,750	1,750	2,100	3,500	3,500
Auxilliary com.	3,300	3,750	3,750	4,000	2,600	2,000
Installation	6,000	6,000	7,000	7,000	7,500	7,500
Investment Cost per kW	**540,000**	**570,000**	**466,667**	**493,333**	**435,000**	**450,000**
Annual costs:						
Operation	0	0	0	0	0	0
Maintenance	250	350	350	500	500	700
Life cycle cost	56,316	61,947	73,336	81,344	94,234	102,867
Levelized Cost per kWh	**172.13**	**157.79**	**140.10**	**138.13**	**125.23**	**125.77**

Battery Charging Stations

Another popular application of PV system is a community battery charging station. The facility is sized according to the target number of household users. For example, a battery charging station can have 2 channels, designed for the use of 10 households whose batteries have load of 70 ampere-hours. At any day, two households can charge their batteries with power supply sufficient for their 5-day use. Assuming an average daily energy requirement of a rural household of about 150 Wh, the station can supply energy equivalent to 1.5 kWh per day.

Table 3
Investment Costs of Battery Charging Stations
In pesos

	BCS1	BCS2	BCS3	BCS4	BCS5	BCS6
No. of households served	10	20	40	10	20	40
Daily load (Wh) per household	150	150	150	150	150	150
Battery (A-hr)	70	70	70	100	100	100
Channel Specs						
PV (Wp)	300	300	300	450	450	450
Controller (A)	25	25	25	36	36	36
No. of channels	2	4	8	2	3	5
Investment cost	**220,000**	**440,000**	**880,000**	**325,000**	**487,500**	**812,500**
PV module	150,000	300,000	600,000	225,000	337,500	562,500
Controller	15,000	30,000	60,000	20,000	30,000	50,000
Other materials	5,000	10,000	20,000	5,000	7,500	12,500
Installation	50,000	100,000	200,000	75,000	112,500	187,500
Investment Cost per kW	**366,667**	**366,667**	**366,667**	**361,111**	**361,111**	**361,111**
Annual costs:						
Operation	6000	6000	6000	6000	6000	6000
Maintenance	0	0	0	0	0	0
Life-cycle cost	446,374	847,932	1,651,047	635,712	931,160	1,522,055
Levelized Cost per kWh	**109.15**	**103.67**	**100.93**	**155.45**	**113.85**	**93.05**

The annual operation costs in Table 3 pertain to the salary of the administrator of the station. No maintenance cost is imputed since the system does not have a battery to maintain. The costs of maintaining the batteries owned by the households are assumed to be on the individual household account.[3] The only replaceable part is the battery charge controller which has an expected life of 5 years.

PV Pumping Stations

Various sizes of PV water pump packages can be deployed in rural communities depending on water source and demand. As in other PV installations, smaller systems have higher investment and levelized costs per output unit.

In this system, the pump controller is typically replaced every 10 years. It is usually designed with a submersible pump and without a battery since the water tank can serve as storage. Operation is simple, thus the operating cost pertains only to the honorarium of the administrator.

Table 4
Investment Costs of PV Pumping Stations
In pesos

	PVP1	PVP2	PVP3	PVP4
Daily water supply (li)	600 – 750	900 – 1,125	1,800 – 2,250	3,000 – 3,750
Head	30	30	30	30
PV (kWp)	0.10	0.15	0.30	0.50
Pump Controller (A)	10 @ 12 V	12 @ 12 V	30 @ 12 V	50 @ 12 V
Investment cost	**78,000**	**104,000**	**195,000**	**312,000**
PV module	25,000	36,000	75,000	110,000
Pump controller	20,000	25,000	40,000	100,000
Other materials	15,000	19,000	35,000	30,000
Installation	18,000	24,000	45,000	72,000
Investment Cost per cu m	**115,556**	**102,716**	**96,296**	**92,444**
Annual costs:				
Operation	6,000	6,000	6,000	6,000
Maintenance	1,800	2,400	4,500	7,200
Life-cycle cost	201,370	253,018	432,980	677,469
Levelized Cost per cu m	**109.42**	**91.66**	**78.43**	**73.63**

	PVP5	PVP6	PVP7	PVP8
Daily water supply (kl)	4.8 – 6.0	9.6 – 12.0	18.0 – 22.5	48.0 – 60.0
Head	30	30	30	30
PV (kWp)	0.8	1.6	3.0	8.0
Pump controller	20 @ 48 V	40 @ 48 V	75 @ 48 V	80 @ 120 V
Investment cost	**520,000**	**715,000**	**1,105,000**	**2,080,000**
PV module	180,000	320,000	600,000	1,350,000
Pump controller	188,000	195,000	215,000	215,000
Other materials	32,000	35,000	35,000	35,000
Installation	120,000	165,000	255,000	480,000
Investment Cost per cu m	**96,296**	**66,204**	**54,568**	**38,519**
Annual costs:				
Operation	6,000	6,000	6,000	6,000
Maintenance	12,000	16,500	25,500	48,000
Life-cycle cost	1,106,107	1,483,645	2,240,654	4,117,077
Levelized Cost per cu m	**75.13**	**50.39**	**40.59**	**27.96**

PV Power Plants

PV power plants are designed to generate electricity of 220 volts. Deep-cycle batteries are used; these are imported and have an expected life of 5 years. The inverter is replaced every 10 years. Its operating cost is significantly higher than other PV installations since the system administrator has to be an engineer. Maintenance expenses increase with the size of the plant.

Table 5

Investment Costs of PV Power Plants

In pesos

	PVPP1	PVPP2	PVPP3	PVPP4
Daily load (kWh)	2.4 – 2.7	7.2 – 8.0	12.0 – 13.5	24.0 – 27.0
No. of households served*	12	36	60	120
PV (kWp)	1	3	5	10
Battery (kWh)	10	30	50	100
Inverter @ 0.6 DF (kW)	1.4	4.5	7.5	12.5
Investment cost	**455,000**	**1,170,000**	**1,755,000**	**3,250,000**
PV module	200,000	600,000	900,000	1,800,000
Battery	45,000	90,000	187,500	375,000
Inverter	60,000	135,000	187,500	250,000
Other materials	45,000	75,000	75,000	75,000
Installation	105,000	270,000	405,000	750,000
Investment Cost per kW	**455,000**	**390,000**	**351,000**	**325,000**
Annual costs:				
Operation	180,000	180,000	180,000	180,000
Maintenance	4,500	9,000	18,750	37,500
Life-cycle cost	2,242,910	3,601,713	4,820,989	7,801,669
Levelized Cost per kWh	**322.62**	**173.83**	**138.69**	**112.21**

* Assumes an average daily load per household of 200 Wh.

One may compare the economic viability of installing solar home systems and constructing a PV power plant. If solar home systems are installed, the investment cost for 120 household amounts to P4.2 million (for SHS2 in Table 1). This is higher than the P3.25 million required by a comparable PV power plant (*i.e.*, PVPP4 in Table 5). The levelized energy costs are P123.98 per kWh for solar home and P104.10 per kWh for PV power plant. In this case, the PV plant is optimal.

On the other hand, a smaller community of 60 households will require investments of P2.1 million and P1.8 million for solar home and PV plant (PVPP3), respectively. But the life-cycle cost of solar home systems is smaller, *i.e.*, P4.1 million, compared to P4.5 million for a PV plant. Corollarily, the levelized cost is lower for solar home, P123.98 per kWh, versus P132.52 for PV plant. Here, solar home system has an advantage over PV plant. Thus, for small communities, solar home systems are more economical than PV power plant. Apart from costs, another consideration is the relative ease of operating and maintaining solar home systems compared to PV plant.

Hybrid systems

Since solar is an intermittent source of energy, photovoltaics are often coupled with other systems that rely on other energy resource, such as diesel, wind, biomass and hydro. PV-generated power is often costlier than those of other systems, thus the size of the PV system is usually determined after the use of other generators has been optimized. Consequently, the contribution of PV to the total system is determined after considering the cost of fuel (diesel, gas or biomass) and availability of other resources (wind speed or water flow).

Table 6 considers the economics of five equally sized hybrid systems. The first system, PV-wind, is imported, hence the huge investment cost of P8.8 million. The large life-cycle cost of this system, P18 million, is due to the kind of battery included in the system. It is estimated that such battery costs P1.5 million with a useful life of 10 years.

The inclusion of battery storage in Hybrid2 and Hybrid4 jacks up the upfront investments but lowers the electricity generation costs. As explained earlier, a hybrid system without a battery requires an automated load regulator that permits greater utilization of renewable resource.

Of the five systems, it is clear that the PV-wind-diesel-battery combination yields the lowest power cost but requires the largest investments compared to other local designs. It is interesting to note that this system is similar to the Atulayan facility recently constructed by Synergy Power, Inc.

Table 6

INVESTMENT COSTS OF HYBRID PV SYSTEMS

In pesos

	Hybrid1 (PV-Wind)	Hybrid2 (PV-Diesel-battery)	Hybrid3 (PV-Diesel)	Hybrid4 (PV-Wind-diesel-battery)	Hybrid5 (PV-Wind-Diesel)
Daily load (kWh)	55	55	55	55	55
PV (kWp)	16	1	1	1	1
Wind (kW)	9			1	1
Diesel (kW)		8	8	8	8
Battery (kWh)	250	25		25	
Inverter (kW)	8	4	1.5	4	1.5
Investment cost	**8,800,000**	**975,000**	**730,000**	**1,300,000**	**1,040,000**
PV module	3,000,000	200,000	200,000	200,000	200,000
Wind turbine	1,800,000			250,000	250,000
Diesel generator		200,000	200,000	200,000	200,000
Battery	1,500,000	150,000		150,000	
Inverter	250,000	100,000	60,000	100,000	60,000
Others	650,000	100,000	90,000	100,000	90,000
Installation	1,600,000	225,000	180,000	300,000	240,000
Investment Cost per kW	**550,000**	**121,875**	**91,250**	**162,500**	**130,000**
Annual costs:					
O & M	280,000	320,000	410,000	320,000	415,000
Life-cycle cost	18,278,399	4,284,656	4,652,710	5,181,284	5,261,625
Levelized Cost per kWh	**121.90**	**28.57**	**31.03**	**34.55**	**35.09**

END NOTES

1 Solar energy can also be converted into electricity by concentrating the radiation in thermal power plants. This would require high incidence of sunshine. Where solar radiation is however diffused as in the Philippines, solar thermal plant is not a relevant option.

2 Renewable Energy World, July-August 2000, p. 59.

3 The situation is different when the battery charging station leases the batteries to the households. In which case, the costs of maintaining the batteries are included in the station's account.

Laws and Regulations Relevant to Renewable Energy Projects

Omnibus Investment Code of 1987 (amended by RA 7918)

The Code provides investment incentives to enterprises registered with the Board of Investments (BOI). NRE projects can be registered with the BOI for its "pioneer" status to avail of the following privileges:

(i) Income tax holiday for 6 years
(ii) Exemption from value-added tax
(iii) Simplified customs procedure
(iv) Unrestricted use of consigned equipment
(v) Employment of foreign nationals
(vi) Deduction on taxable income of expenditures on necessary infrastructure related to project development
(vii) Additional deduction on taxable income of 50% of wages corresponding to the increment in direct labor hired within the first five years of registration
(viii) Deduction on taxable income of expansion expenses if additional deduction for labor expense were not claimed.

Mini-Hydro Power Incentives Act (RA 7156)

Mini-hydro proponents can avail of the following incentives:

(i) Special privilege tax rates of 2% of gross receipts from sale of electric power and from transactions incident to the generation, transmission and sale of electric power
(ii) Tax and duty-free importation of capital equipment, materials and parts
(iii) Tax credit on domestic capital equipment
(iv) Realty tax cap not exceeding 2.5% based on original costs of equipment and machinery
(v) VAT exemption on gross receipts from electricity sales
(vi) Income tax holiday for 7 years

Law on OSW (EO 462, amended by EO 232)

For generation projects exceeding 1 MW, the private sector is allowed to participate in the exploitation, development, utilization and commercialization of ocean, solar and wind (OSW) energy resources, through a production sharing contract with the national or local government. The Department of Energy can extend assistance to OSW developers in obtaining all applicable fiscal and non-fiscal incentives, including registration as pioneer industry with the Board of Investments. In addition, OSW developers can charge the cost of assessment, field verification and feasibilty studies on other sites to their current commercial projects. They can also secure access to lands and/or offshore areas where OSW energy resources can be harnessed.

Agriculture and Fisheries Modernization Act of 1997 (RA 8435)

Apart from providing trade and fiscal incentives on the agricultural and fisheries sectors, the Act provides for duty-free importation of machinery and equipment, including renewable energy systems such as solar panels, provided that such equipment shall be for the exclusive use of the importing enterprise.

Clean Air Act (RA 8749)

The Act sets emission standards on stationary and mobile sources for greenhouse gases, including power plants. NRE projects are favored to the extent that some of its technologies, such as photovoltaics, have zero emissions. But the Act imposes outright ban on incineration facilities which may have adverse impact on biomass combustion facilities. Combustion should be set at very high temperature levels for it to be complete and free of emissions.

National Integrated Protected Areas System (NIPAS) Act of 1992 (RA 7586)

Some areas in the Philippines have been declared protected, thus construction of NRE projects in these sites would require special permit. The Department of Environment and Natural Resources (DENR) issues the Environment Compliance Certificate to projects complying with the environmental standards . For NRE projects that are located in areas considered ancestral domain, the proponent must secure permits from the concerned indigenous communities and the National Commission on Indigenous Peoples.

RA 6957 BOT Law as Amended by RA 7718

Power plants may be constructed under a build-operate-transfer (BOT) scheme whereby the private sector project proponent can recoup its investments through the charging of toll fees and rentals during the contract period. Section 10 of RA 7718 provides that BOT projects in excess of P1 billion shall be entitled to incentives as provided by the Omnibus Investment Code.

DOE Circular No. 2000-03-004

This Circular amends the law that seeks to elicit private sector participation in power generation. Relevant to NRE development are the following proviso:

(1) Companies do not have to show a five-year track record to receive accreditation for NRE generation facilities, provided that the technology being proposed has already achieved commercial status and can be demonstrated to be adaptable to local conditions; or if the project is for self-generation purpose, or the proponent is technically and financially capable.
(2) The provision for spinning reserve imposed on Private Sector Generation Facility shall not apply to RRPPF/NREF projects if (a) the project is not connected to either the national backbone grid, or regional or island mini-grids; or (b) the project is connected to a regional or island mini-grid powered by conventional generation reasonably capable of load following, e.g., peaking or intermediate diesel generation plants. If the RRPF/NREF project is proposed for connection to the national backbone grid, the provision on spinning reserve shall be subject to negotiation with the transmission system operator or from any future regulatory body overseeing the operations of the transmission grid system.
(i) Thermal efficiency requirement for cogeneration facilities using NRE, including hybrid systems has been removed.
(ii) Renewable resource power production facilities are exempt from submitting 10-year power supply agreement and are only required to demonstrate potential net foreign exchange savings by virtue of utilizing renewable energy sources.
(iii) For projects that supply electricity to a designated utility or user, or for internal use, the power development plan review and approval requirements of the Department of Energy shall not be required.

DOE Circular No. 2000-10-011

This Circular mandates the acceleration of Rural Electrification Program by instituting summary procedures in the approval and subsequent release of the electrification fund to the franchised distribution utility or project implementor. Section 2f of the Circular provides that the electrification of target areas should be accomplished in the least-cost possible manner which means either adopting the conventional line design or utilizing indigenous and renewable energy sources.

DOE Circular No. 2000-03-003

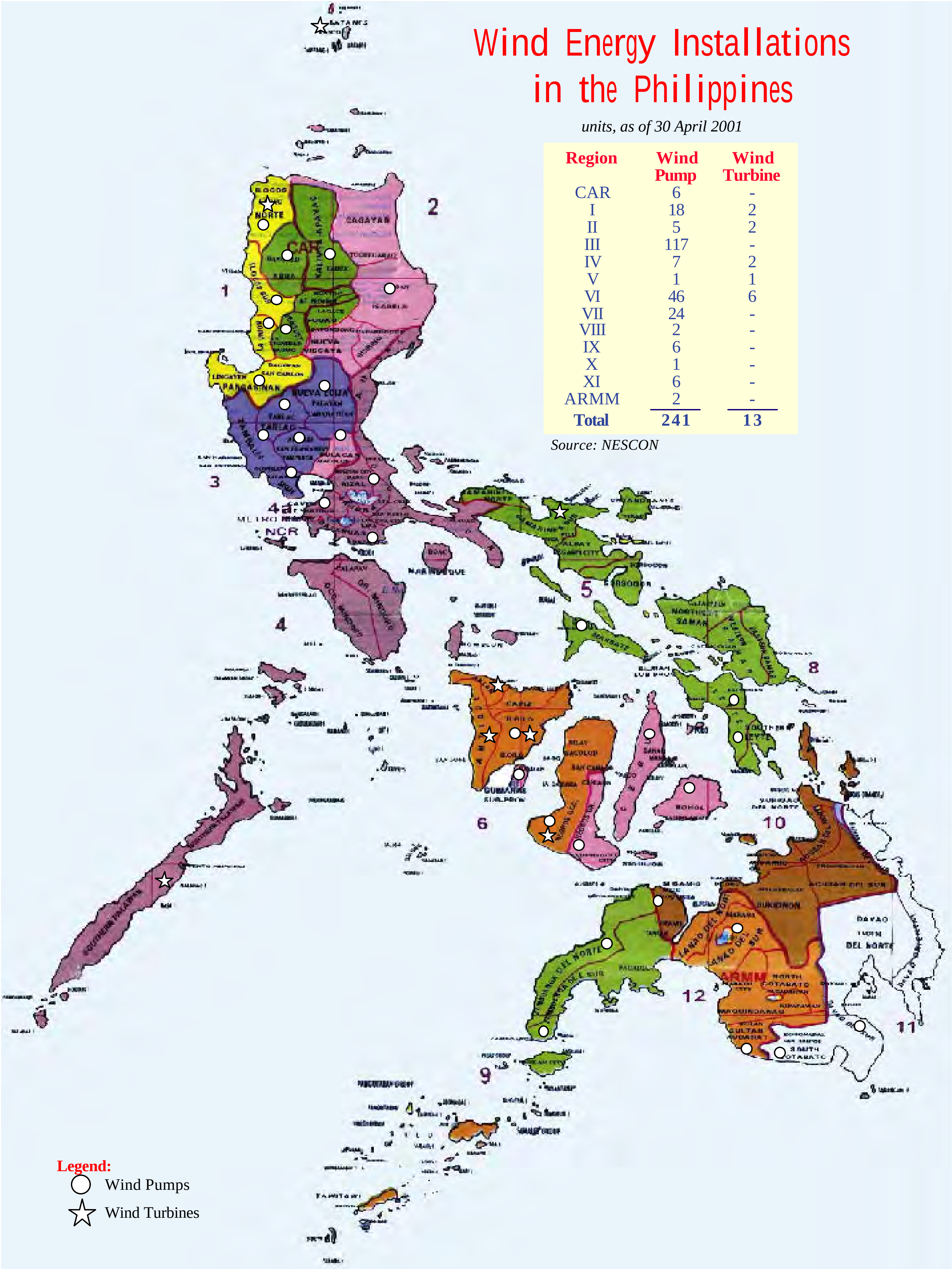
This Circular amends the 1994 DOE regulation that prescribes the provision of direct benefits to local government units (LGU) hosting energy resource development projects and/or energy-generating facilities. The amendments streamlined provisions concerning allocation of fund and generation of livelihood projects. Section 7 provides that in cases where the grid type is deemed unavailable for energizing a particular LGU, the electrification fund may be redirected by the DOE in favor of utilizing NRE system to speed up the electrification of the concerned area.

Wind Energy Installations in the Philippines

units, as of 30 April 2001

Region	Wind Pump	Wind Turbine
CAR	6	-
I	18	2
II	5	2
III	117	-
IV	7	2
V	1	1
VI	46	6
VII	24	-
VIII	2	-
IX	6	-
X	1	-
XI	6	-
ARMM	2	-
Total	**241**	**13**

Source: NESCON



Wind Energy Systems in the Philippines

What is wind energy?

Wind energy is derived from kinetic energy of moving air that is converted into power through a mechanism called *rotor*. The kinetic energy produced by the wind in unit time increases with the wind velocity (exponentially, at a power of three). Thus, doubling the wind speed increases the power eight times, while doubling the rotor diameter increases the available power four times. For example, at 3 meters per second wind speed, the wind power per square meter is about 17 watts; while at 6 mps, the power that can be generated per square meter is 136 watts.

In general, wind machines can only extract about 59 percent of the wind kinetic energy. Actual performance efficiency of wind machines varies from 10 to 50 percent depending on the aerodynamic quality of the rotor. They are useful at a mean wind velocity of about 2 mps and are safe to operate up to a wind velocity of 25 mps.[2]

Wind energy conversion technologies are classified depending on size and applications. The first is *medium- to large-size grid-connected Wind Turbine Generators (WTG)* that have evolved from 50-kW in the 1980s to about 800-kW in the 1990s. The present generation of commercial wind turbines has gone past the 1000-kW mark. There are different design concepts: three-bladed, stall- or pitch-regulated, horizontal-axis machines operating at near-fixed rotational speed. There are other concepts such as gearless designs and variable rotor speed designs. Modern installation techniques allow commissioning in less than 6 months.

Another group belongs to *intermediate-size wind turbines in hybrid energy systems*. The system is usually combined with other energy sources such as photovoltaics, hydro, and diesel, and used in small remote grids or for special applications such as water pumping and battery charging. These systems may have a capacity of 10 to 500 kW.

The third group is *small stand-alone turbines* for battery charging, water pumping, heating, and the like. These systems have capacity less than 10 kW. In small battery-charging wind turbines, the size can range from 25 to 150 watts. By far, the most common use of wind energy system in the Philippines is the mechanical wind pump.

Major wind turbine installations

- **11.5kW Atulayan Hybrid Remote Area Power System (HRAPS)**

Inaugurated in October 2000, the Atulayan facility is a hybrid of wind turbine as primary energy generator, and solar panels as secondary energy source. The wind turbine generates power even at low wind speed of 4.5 meters per second. The turbine's patented tilting axis allows power generation even at high wind speeds; and in cases of typhoon, the turbine tower can be lowered for safety. The solar power component has twelve 75Wp panels. In periods where solar and wind resources are not available, a diesel generator serves as a back up system. An existing 75kVA genset was retrofitted for the purpose.

The system provides 36.5kWh/day of electric power to the village's 72 households, a school, street lights, playground and seaweed dryer. It is equipped with 3x5.5kVA sine wave interactive inverter and storage battery bank that allows 24-hour AC power, 220V single phase and 380V three-phase. The system has safety features that are ideal for remote area installations including automatic controls for easy operation. The investment cost of the Atulayan project amounted to P2.3 million including installation cost. Consumers pay P4.35/ kwh plus a fuel cost adjustment charge.

- **10-kW Wind Turbine, Pagudpod, Ilocos Norte**

In March 1996, NPC commissioned a pilot wind turbine in Ayoyo, Pagudpud, Ilocos Norte with support from the Philippine Council for Industry Energy Research and Development (PCIERD). The project which costs P2.1 million demonstrates the technical and economic viability of harnessing wind energy for power generation based on local conditions. The average wind speed at the site was monitored at 7.3 m/sec. The easterly wind blows about 36% of the year, and the equivalent annual wind power density is estimated at 532W/m^2.

Plant operation is limited to nighttime for 4 to 6 hours during the lean wind months of May to September, but is available for 24 hours daily during peak wind period from October to April. In its first year of operations, the plant had an energy surplus since the turbine was generating more electricity than what was needed by the village. Revenues generated from the 23 households served by the system amounted to P21,600 during the year. This corresponds to a daily load demand of 16 kwh. Due to the limited capacity of the battery banks, surplus energy has to be dumped. The project has been in operation until recently when the battery system was damaged.

- **ANEC-Iloilo KW-Level WTG**

A locally-designed and fabricated kilowatt-level wind turbine generator designed by the ANEC-Iloilo is installed in Isla Maahas, Calatagan, Batangas. The rotor has three 10-foot long fiberglass blades with NACA 4412 profile. It is coupled to a 15kVA generator via a two-step belt and pulley transmission that multiplies the rotational speed (rpm) of the rotor to match the rpm of the generator. The protected head assembly is mounted atop a 60-foot tower made up of galvanized pipes.

The power produced by the generator is used to charge a battery bank which stores the energy for a more sustained power availability even in the absence of wind conditions. An inverter is used to convert the DC electricity from the battery bank to 220VAC.

The generator is an induction motor that was slightly modified to work as a generator. The modification was introduced so the generator could operate at variable rotational speeds thus enabling the system to produce electricity by operating as an asynchronous generator.

- **Aerovolt: NewFendered Bucket Windmill**

Aerovolt is a vertical axis windmill apparatus where a movable wind shield covers the backturning buckets. This set up limits the entry of usable wind to prevent over-revolution of the windmill during strong winds. The aerovolt, which is installed in Isla Maahas, Calatagan, Batangas, comprises of six sets of half-rounded buckets that are made of light metals. The wind pushes the buckets to rotate the centrally located vertical shaft connected to the gears and pulleys that drive the synchronous generator assembly. As the intercepted wind is released, the buckets backturn traveling against the flow of the wind. The slamming between the bucket and the wind is prevented by the movable windshield that moves forward to the position of wind scooping buckets.

The estimated investment for a 20 KW typhoon-proof aerovolt windmill is about P716,800. The only imported component is the generator costing P49,000. This represents not more than 10 percent of the total cost. The prototype has produced 50 to 100VAC electric power from a 5kw generator at windspeeds of 4 to 10 meters/second. The overall efficiency of the model was estimated at 30% to 40% and could go up to 70% with improvements. The estimated cost of power generation was P0.22/kwh.

Investing in Wind Power

Despite the abundance of wind resource in the Philippines and the fact that wind energy technology has matured, local utilization of wind energy system has not been as widespread as may be expected. Several reasons account for this. Foremost is the site specificity of the resource. In most areas with abundant wind resource, the communities have low incomes to be able to afford the relatively huge investment costs required by the system. In the case of mechanical water pump system, for instance, the upfront costs can be steep for a single household to bear. Another obstacle is the absence of product standards for locally fabricated systems. There have been plans to establish product standards, testing and accreditation procedures to ensure the quality production of wind energy systems, but none have yet materialized.

Nonetheless, communal wind pump systems are becoming popular because more consumers can pitch in for the upfront investment costs and there are cost savings in larger systems due to economies of scale. The scale economies apply as well to wind turbine generator systems; thus, bigger wind turbines involve larger investments and but the cost of generated electric power is lower.

The following sections show the life-cycle and levelized electricity costs of wind power installations under the following assumptions: (a) 10 years useful life for wind pump; 15 years for wind turbine generator; (b) 12 percent capital recovery factor; (c) 12 percent loan rate; (d) labor cost at P150/day.

Wind Pumps

Wind pumps are mechanical devices that transform the kinetic energy of wind to cause the vertical action of a piston to suck water upwards. In simple terms, the windmill replaces human power in a hand-operated water pump set up.

Table 1 presents the financial profile of wind pump systems, classified according to rotor size and capacity. The estimates are based on installations in Western Visayas. The cost of the system varies considerably depending on the design, materials, labor costs of manufacturing and installation, and the cost of transporting the system to the site. Prices may range from P30,000 for a small system to P145,000 for a larger model. Scale economies translate to lower investment cost per cubic meter of pumped water as capacities become larger. The levelized cost per cubic meter falls to P2.00 for large systems that can pump 120 cubic meters of water daily.

Investment-wise, a windpump installation in Central Luzon does not materially differ from those in Western Visayas. A 500-gallon model manufactured by Reymill Steel Products in Sta. Rosa, Nueva Ecija, is priced at P75,000. This model is comparable to the WP 3.5 model quoted at P68,000 in Iloilo. The price differential could be attributed to differences in labor costs, transportation charges and costs of raw materials.

The current policy of local government units is to treat wind pump system like other agricultural machinery or equipment. Thus, no tax is imposed on the installation and operation of the system.

Table 1
Economics of Wind Pump-Western Visayas
In pesos

	WP 1.5	WP 3.5	WP 4.5	WP 6.0
Rotor Diameter	1.5 m	3.5 m	4.5 m	6.0 m
No. of blades	8	18 – 24	18 - 24	24 – 32
Tower height	6 – 10 m	6 – 10 m	6 – 10 m	6 – 10 m
Pumping head	6 m	6 – 10 m	10 – 40 m	10 – 40 m
Typical output*	1 – 5 m^3/day	15 – 30 m^3/day	30 – 70 m^3/day	45 – 120 m^3/day
Investment cost	30,000	68,000	100,000	145,000
Investment Cost per cu m	10,000	3,022	2,000	1,758
Annual costs:				
Operation	4,500	4,500	9,000	9,000
Maintenance	2,500	6,000	9,000	13,000
Life-cycle cost	84,288	160,730	403,381	493,087
Levelized Cost per cu m	**13.62**	**3.46**	**2.43**	**2.00**

*at 3 m/s wind speed.

Wind Turbine Generator

Wind turbine generators (WTG) harness the power of the wind through a system of gears and pinions that drives a generator to produce electric current. The action of the wind rotates the blades, that in turn, drives the shaft to power the generator. Instead of a combustion engine or electric motor, the wind serves as the prime mover that drives the generator.

Table 2 presents three types of WTGs with 1 to 2 meters of rotor diameter. A 50-watt system utilizing local components costs P45,000. Annual operating and maintenance expenses amount to P8,500. Based on an estimated useful life of 15 years and capital recovery factor of 12 percent, the levelized electricity cost is P103.40/kwh. A larger system of 500-W would need an investment of P80,000, or almost double the smaller system but the levelized cost would decrease to P18.63/kwh. Increasing the capacity 10 times would lower the levelized cost per kwh by 5.5 times.

Table 2
Economics of Wind Turbine
In pesos

	WT 1.0	WT 1.5	WT 2.0
Rotor diameter	1.0 m	1.5 m	2.0 m
No. of blades	2	2	2 or 3
Drive	direct	direct	direct
Power output*	50 W	200 W	500 W
Voltage	12 or 24	12 or 24	12 or 24
Battery	automotive	automotive	automotive
Investment cost	45,000	67,500	80,000
Investment Cost per kW	**900,000**	**337,500**	**180,000**
Annual costs:			
Operation	4,500	4,500	4,500
Maintenance	4,000	6,000	8,000
Life-cycle cost	154,229.87	216,020	277,811
Levelized Cost per kWh	**103.40**	**36.21**	**18.63**

*at 4 m/sec wind speed.

Wind Hybrid Systems

Wind energy systems can be used in combination with other NRE systems. A WTG can work in tandem with a PV system to store power in batteries. A common and practical set up is an internal combustion engine such as diesel as a back up for windmills. Alternatively, an engine can be powered by biomass fuel in a windmill-biomass set up.

Table 3 illustrates the economics of wind hybrid system coupled to biomass, PV and internal combustion engine. Levelized cost would be lower for wind-biomass hybrid using rice hull gasifier, although the difference would only be about 3 percent compared to an Internal Combustion Engine system. Utilizing a solar module would drive the cost to P166.12 per kwh on account of the higher cost of solar panels. Investment cost would be higher for wind-biomass hybrid on account of additional investment for fabrication of gasifier, imported generator and purchase of used engine.

Table 3
ECONOMICS OF WIND HYBRID SYSTEMS*
In pesos

	Wind-Biomass	Wind-PV	Wind-ICE
Technical specification	WT 2.0 (500 W) Generator 3 kW, 220V (China); used engine (4K Toyota); 40 cu.m.rice hull gasifier	WT 1.0 (50 W) Solar module 75 W Controller 6 A Inverter 200 W 2 units car battery 12V	WT 2.0 (500 W) Robin engine genset 1400 W, 220/110V (brand new)
Capacity (W)	3,500	125	1,900
Investment cost	167,000	99,400	127,000
Investment Cost per kW	**47,714**	**795,200**	**66,842**
Annual costs:			
Operation	11,435	4,500	32,240
Maintenance	14,700	6,170	11,200
Life-cycle cost	529,901	247,778	549,247
Levelized Cost per kWh	**35.53**	**166.12**	**36.82**

*at 4 m/sec wind speed.

Projects in the Pipeline

Two major wind energy installations are currently in the pipeline: the 1,100-kW Batan Island Wind Plant Project and the Mindoro Wind Farm.

The Batan project was originally conceptualized as a stand-alone PV-Wind-Diesel hybrid system by the provincial government of Batanes. Due to the high cost of solar panels, the photovoltaic component was eliminated. The plant is envisioned to have an initial capacity of 200KW and will be expanded to 1100 KW over a ten-year period as the demand increases and funds are made available.

The project team would be led by the First Philippine Energy Corporation with the support of the Advanced Energy Systems Ltd. of Australia. The facility will supply power to four towns: Ivan, Uyugan, Mahatao and the capital town of Basco.

The project cost, including the provision for automated diesel control and radio communication hardware, is estimated at P160.4 million. The generation cost of the existing diesel generation system in Batan Island is P12.80/kwh; the wind project is expected to generate power at P4.77/kwh.

Another major boost to the wind energy sector is a proposal by BreezElectric-Philippines to establish wind farms in 14 islands in the archipelago. In Mindoro, the project involves developing 18.75-MW of wind power with an annual output projected to reach 59 to 68 GWh. The details and terms of the proposal are still being worked out with concerned agencies. Similar facilities are contemplated in Catanduanes, Masbate and other areas.

End Notes

[1] Renewable Energy World Jan-Feb 2001
[2] The Basics of Wind Energy Systems, Alexis T. Belonio, Wind Energy Association of the Philippines.

Laws and Regulations Relevant to Renewable Energy Projects

Omnibus Investment Code of 1987 (amended by RA 7918)

The Code provides investment incentives to enterprises registered with the Board of Investments (BOI) NRE projects can be registered with BOI for its "pioneer" status to avail of the following incentives:

(i) Income tax holiday for 6 years
(ii) Exemption from value-added tax
(iii) Simplified customs procedure
(iv) Unrestricted use of consigned equipment
(v) Employment of foreign nationals
(vi) Deduction on taxable income of expenditures on necessary infrastructure related to project development
(vii) Additional deduction on taxable income of 50% of wages corresponding to the increment in direct labor hired within the first five years of registration
(viii) Deduction on taxable income of expansion expenses if additional deduction for labor expense were not claimed.

Mini-Hydro Power Incentives Act (RA 7156)

Mini-hydro proponents can avail of the following incentives:
(i) Special privilege tax rates of 2% of gross receipts from sale of electric power and from transactions incident to the generation, transmission and sale of electric power
(ii) Tax and duty-free importation of capital equipment, materials and parts
(iii) Tax credit on domestic capital equipment
(iv) Realty tax cap not exceeding 2.5% based on original costs of equipment and machinery
(v) VAT exemption on gross receipts from electricity sales
(vi) Income tax holiday for 7 years

Law on OSW (EO 462, amended by EO 232)

For generation projects exceeding 1 MW, the private sector is allowed to participate in the exploitation, development, utilization and commercialization of ocean, solar and wind (OSW) energy resources, through a production sharing contract with the national or local government. The Department of Energy can extend assistance to OSW developers in obtaining all applicable fiscal and non-fiscal incentives, including registration as pioneer industry with the Board of Investments. In addition, OSW developers can charge the cost of assessment, field verification and feasibilty studies on other sites to their current commercial projects. They can also secure access to lands and/or offshore areas where OSW energy resources can be harnessed.

Agriculture and Fisheries Modernization Act of 1997 (RA 8435)

Apart from providing trade and fiscal incentives on the agricultural and fisheries sectors, the Act provides for duty-free importation of machinery and equipment, including renewable energy systems such as solar panels, provided that such equipment shall be for the exclusive use of the importing enterprise.

Clean Air Act (RA 8749)

The Act sets emission standards on stationary and mobile sources for greenhouse gases, including power plants. NRE projects are favored to the extent that some of its technologies, such as photovoltaics, have zero emissions. But the Act imposes outright ban on incineration facilities which may have adverse impact on biomass combustion facilities. Combustion should be set at very high temperature levels for it to be complete and free of emissions.

National Integrated Protected Areas System (NIPAS) Act of 1992 (RA 7586)

Some areas in the Philippines have been declared protected, thus construction of NRE projects in these sites would require special permit. The Department of Environment and Natural Resources (DENR) issues the Environment Compliance Certificate to projects complying with the environmental standards . For NRE projects that are located in areas considered ancestral domain, the proponent must secure permits from the concerned indigenous communities and the National Commission on Indigenous Peoples.

RA 6957 BOT Law as Amended by RA 7718

Power plants may be constructed under a build-operate-transfer (BOT) scheme whereby the private sector project proponent can recoup its investments through the charging of toll fees and rentals during the contract periods. Section 10 of RA 7718 provides that BOT projects in excess of P1 billion shall be entitled to incentives as provided by the Omnibus Investment Code.

DOE Circular No. 2000-03-004

This Circular amends the law that seeks to elicit private sector participation in power generation. Relevant to NRE development are the following proviso:

(1) Companies do not have to show a five-year track record to receive accreditation for NRE generation facilities, provided that the technology being proposed has already achieved commercial status and can be demonstrated to be adaptable to local conditions; or if the project is for self-generation purpose, or the proponent is technically and financially capable.
(2) The provision for spinning reserve imposed on Private Sector Generation Facility shall not apply to RRPPF/NREF projects if (a) the project is not connected to either the national backbone grid, or regional or island mini-grids; or (b) the project is connected to a regional or island mini-grid powered by conventional generation reasonably capable of load following, e.g., peaking or intermediate diesel generation plants. If the RRPF/NREF project is proposed for connection to the national backbone grid, the provision on spinning reserve shall be subject to negotiation with the transmission system operator or from any future regulatory body overseeing the operations of the transmission grid system.
(i) Thermal efficiency requirement for cogeneration facilities using NRE, including hybrid systems has been removed.
(ii) Renewable resource power production facilities are exempt from submitting 10-year power supply agreement and are only required to demonstrate potential net foreign exchange savings by virtue of utilizing renewable energy sources.
(iii) For projects that supply electricity to a designated utility or user, or for internal use, the power development plan review and approval requirements of the Department of Energy shall not be required.

DOE Circular No. 2000-10-011

This Circular mandates the acceleration of Rural Electrification Program by instituting summary procedures in the approval and subsequent release of the electrification fund to the franchised distribution utility or project implementor. Section 2f of the Circular provides that the electrification of target areas should be accomplished in the least-cost possible manner which means either adopting the conventional line design or utilizing indigenous and renewable energy sources.

DOE Circular No. 2000-03-003

This Circular amends the 1994 DOE regulation that prescribes the provision of direct benefits to local government units (LGU) hosting energy resource development projects and/or energy-generating facilities. The amendments streamlined provisions concerning allocation of fund and generation of livelihood projects. Section 7 provides that in cases where the grid type is deemed unavailable for energizing a particular LGU, the electrification fund may be redirected by the DOE in favor of utilizing NRE system to speed up the electrification of the concerned area.