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*27 November 2017*  
*Clark, Pampanga*



# New and Emerging Energy Technologies

*Federico G. Domingo, Jr*  
*Supervising Science Research Specialist*



## New and Emerging Energy Technologies

# Potentials of Innovation and Emerging Technologies in the Philippine Energy Sector

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## New and Emerging Energy Technologies

Potentials  
Applications in the  
Energy Sector

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- ENERGY SUPPLY DIVERSIFICATION
- ENERGY GENERATION, CONVERSION and STORAGE
- INDUSTRY, COMMERCIAL AND RESIDENTIAL ENERGY USE
- ALTERNATIVE FUELS PRODUCTION IMPROVEMENT
- NEXT GENERATION VEHICLE TECHNOLOGIES



## New and Emerging Energy Technologies

# Potentials of Innovation and Emerging Technologies in the Philippine Energy Sector

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# INNOVATION

Around The World



## New and Emerging Energy Technologies

# Potentials Applications in the Energy Sector

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## ➤ ENERGY RESOURCE DIVERSIFICATION

- ❖ Identification of new source of energy:



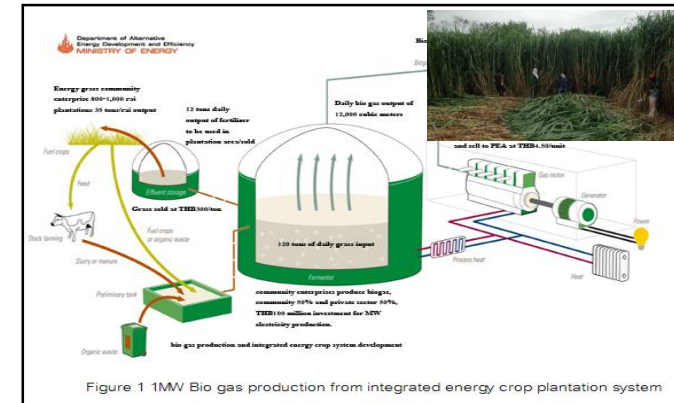
**Waste tire/plastic recycle to oil**  
 Waste rubber and plastics



Ethanol Production from Pineapple leaves



Energy from Human Kinetics



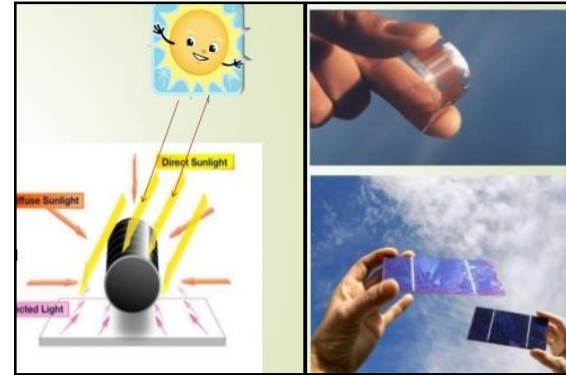
Bioethanol Production from Napier Grass

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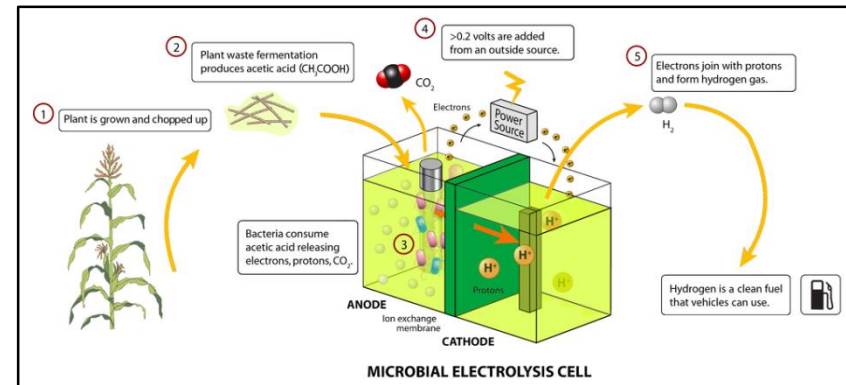
## Potentials Applications in the Energy Sector

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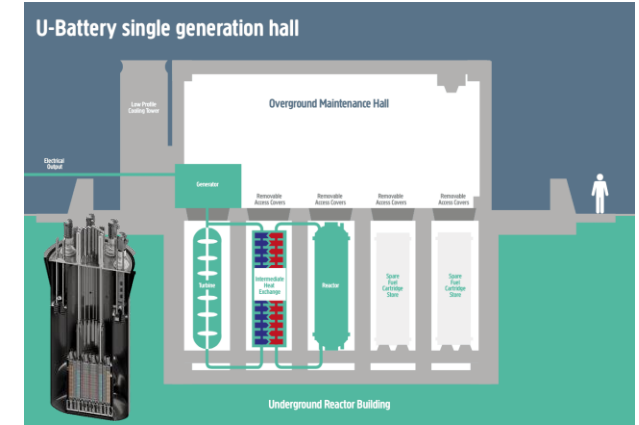
### ➤ ENERGY GENERATION, CONVERSION and STORAGE



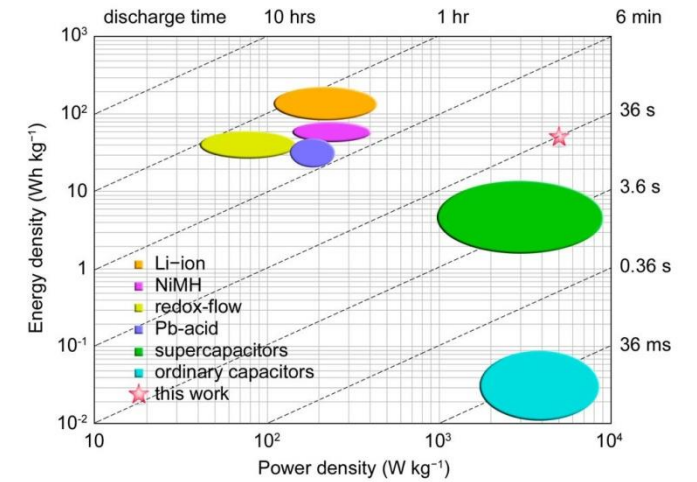
High Efficiency Nano Technology Solar Cell



Microbial Fuel Cells



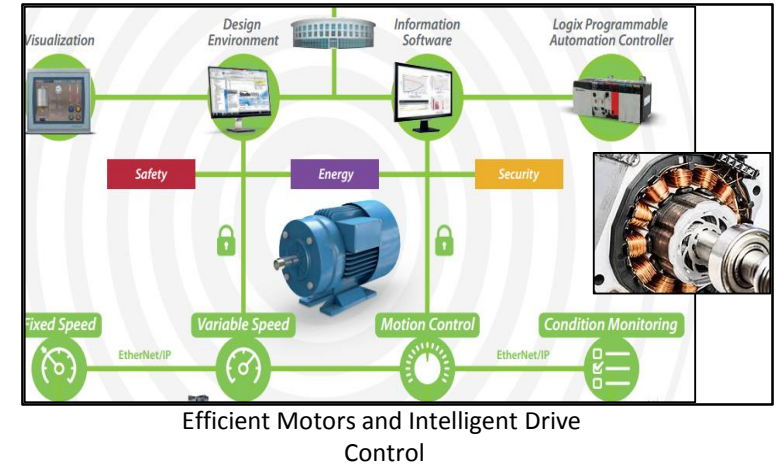
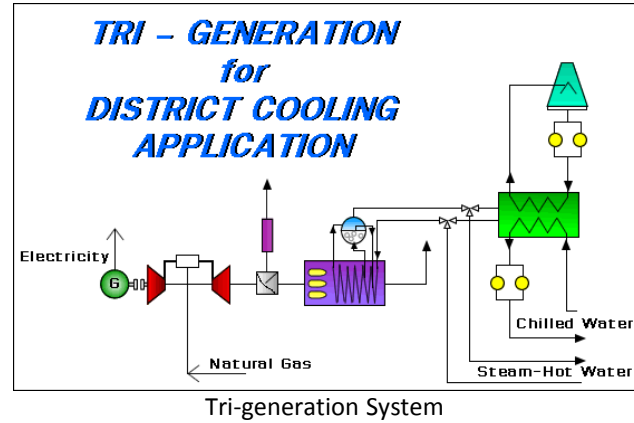
Small Modular Nuclear  
 (3 Mwe - Canada LeadCold Transportable)



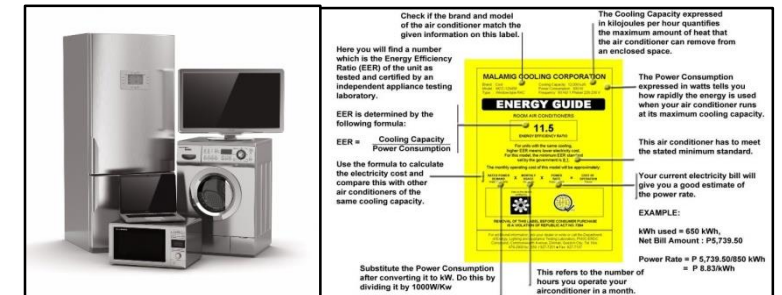
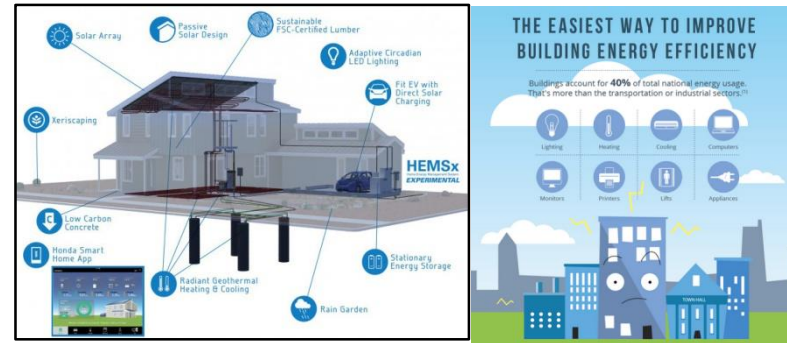
High Energy Density Batteries

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## ➤ INDUSTRY, COMMERCIAL AND RESIDENTIAL ENERGY USE



## Potentials Applications in the Energy Sector



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# New and Emerging Energy Technologies

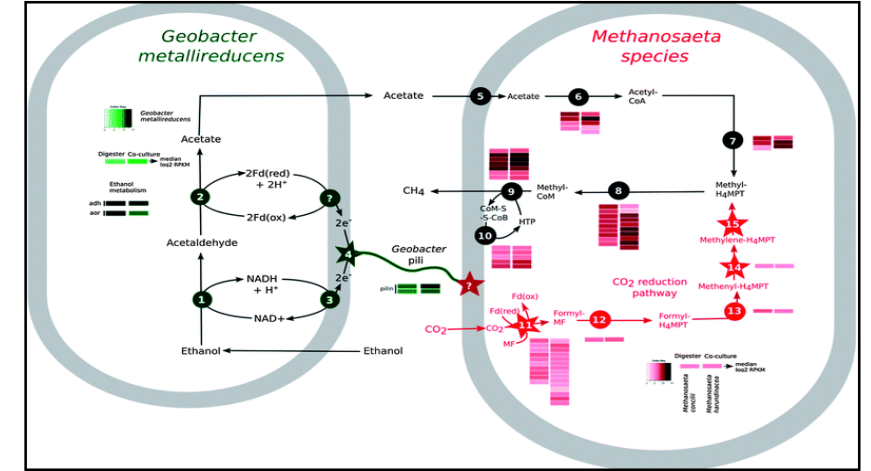
## Potentials Applications in the Energy Sector

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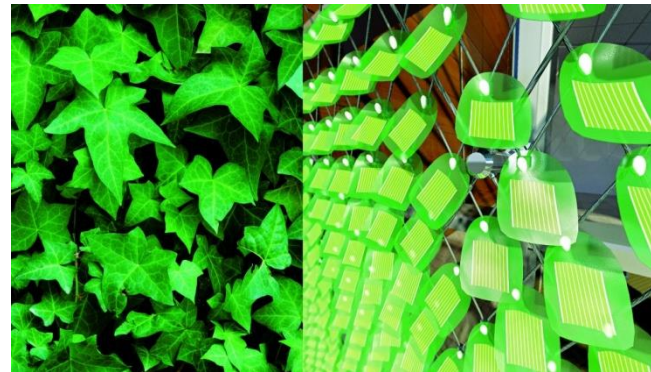
### ➤ INDUSTRY, COMMERCIAL AND RESIDENTIAL ENERGY USE



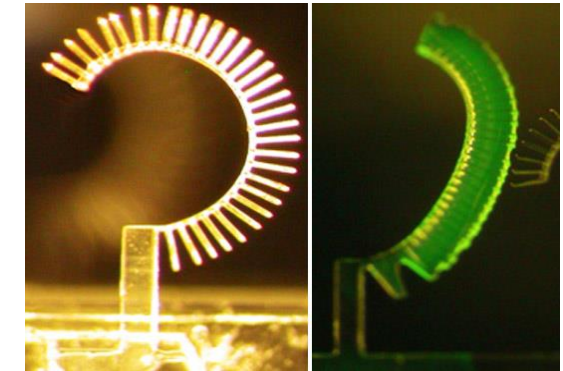
Ethanol Production from Micro-algae



New Source for Bio-Energy



Solar Cell Layout based on Vine-leaf arrangement



FERN POWER

Bio-Mimicking

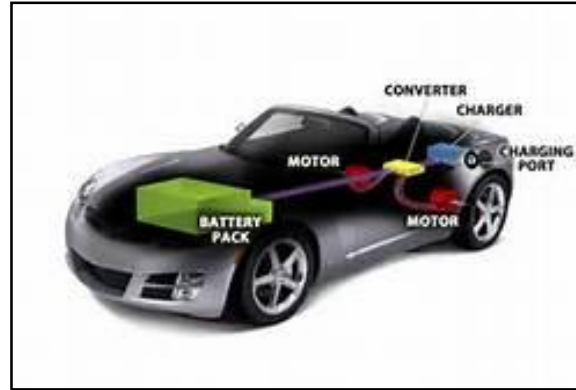


# New and Emerging Energy Technologies

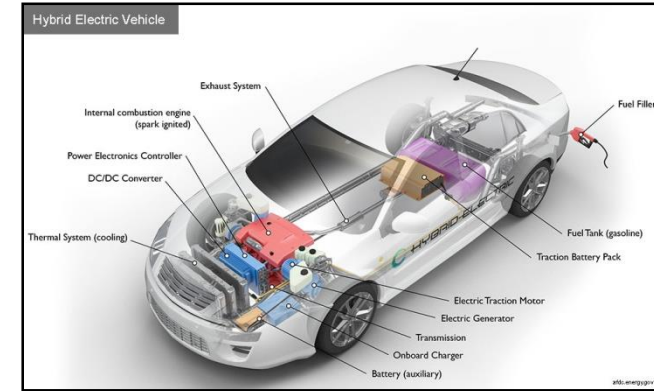
## Potentials Applications in the Energy Sector

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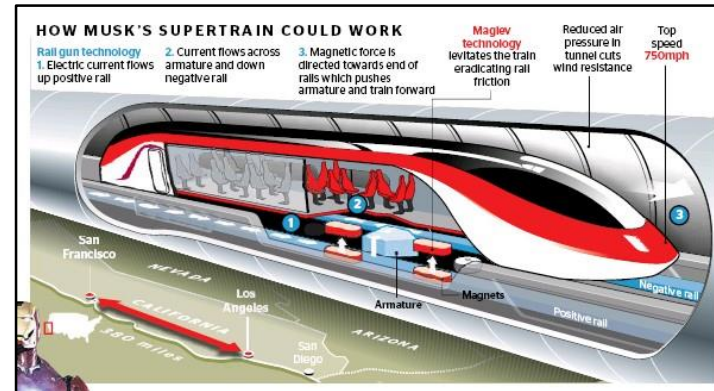
### ➤ NEXT GENERATION TRANSPORTATION TECHNOLOGIES



E-Vehicles



Hybrids



Rail-Gun Train



WalkCar Personal transport



STEP-GO Personal transport

New concepts in Transportation Technology



## New and Emerging Energy Technologies

## Innovation and Emerging Energy Technologies

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# New and Emerging Energy Technologies

## Philippine Science and Technology System Structure

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## New and Emerging Energy Technologies

## Philippine Global Ranking

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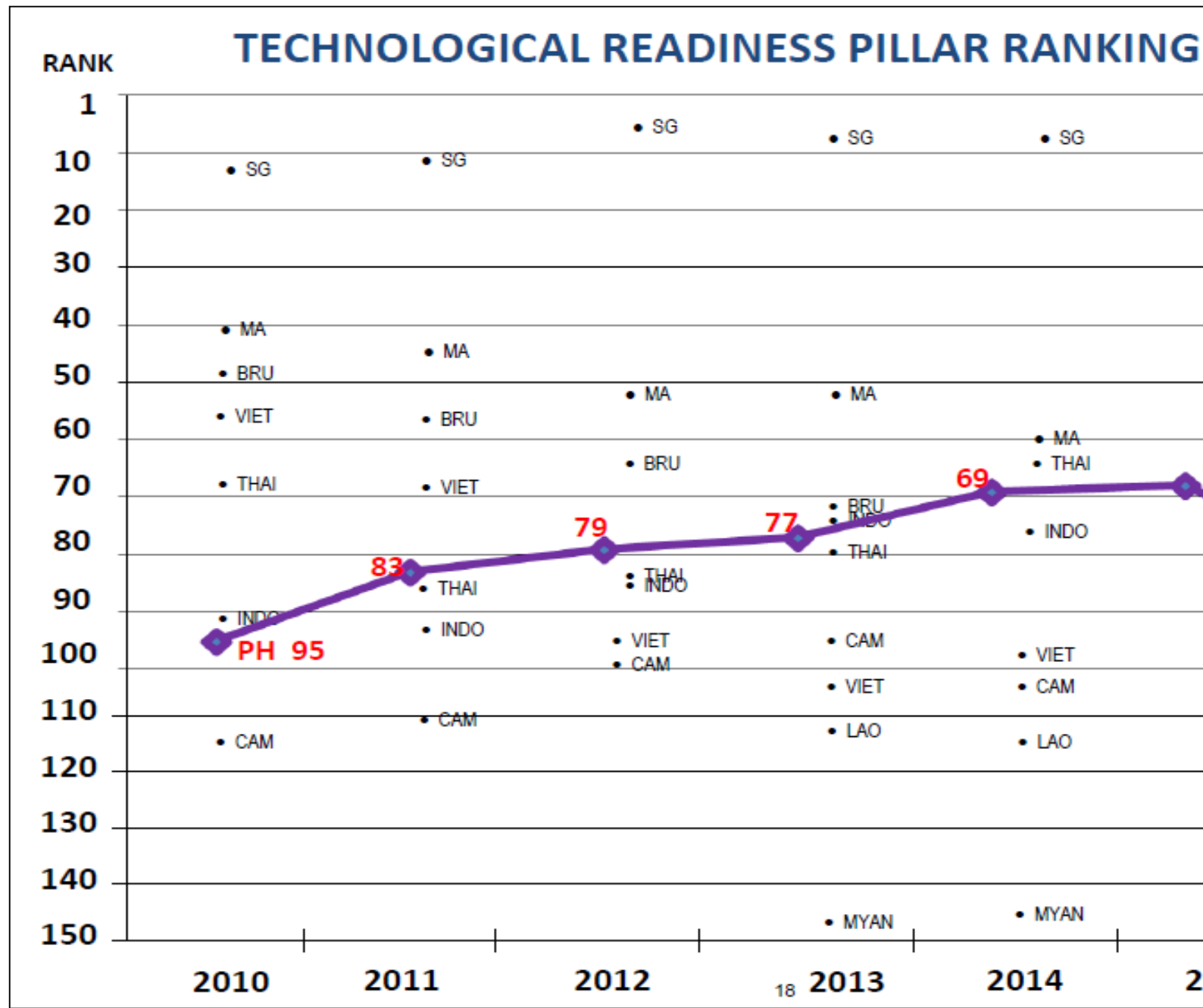
| Indicator  | 2011-2012               | 2012-2013               | 2013-2014               | 2014-2015               |
|--|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>Technological Readiness</b>   | <b>83/142*</b>          | <b>79/144*</b>          | <b>77/148*</b>          | <b>69/144*</b>          |
| <b>1) Availability of latest technologies</b>  | <b>62/142<br/>(5.2)</b> | <b>56/144<br/>(5.2)</b> | <b>47/148<br/>(5.3)</b> | <b>58/144<br/>(5.1)</b> |
| <ul style="list-style-type: none"> <li>❖ Executive Opinion Survey with question asked: <i>“To what extent are the latest technologies available in your country?”</i></li> <li>❖ Experts ranked 1 to 7 according to their perception on availability of technology giving a 7 as widely available</li> </ul>                           |                         |                         |                         |                         |
| <b>2) Firm-level technology absorption</b>   | <b>52/142<br/>(5.1)</b> | <b>46/144<br/>(5.2)</b> | <b>40/148<br/>(5.2)</b> | <b>41/144<br/>(5.1)</b> |
| <ul style="list-style-type: none"> <li>❖ Executive Opinion Survey with question asked: <i>“To what extent do businesses in your country aggressively absorb technology?”</i></li> <li>❖ Experts ranked the country from 1 to 7 with 1 as lowest or firm not absorbing technology and 7 as aggressively absorbing technology</li> </ul> |                         |                         |                         |                         |
| <b>3) FDI and technology transfer</b>  | <b>66/142<br/>(4.7)</b> | <b>40/144<br/>(5.0)</b> | <b>42/148<br/>(4.9)</b> | <b>31/144<br/>(5.0)</b> |



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## Philippine Global Ranking

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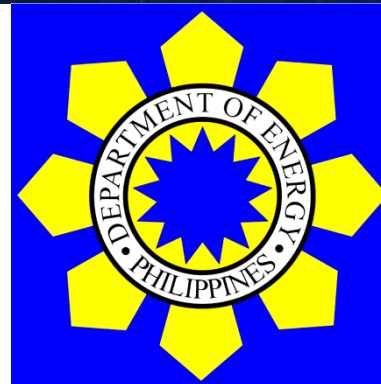


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Innovation and  
Emerging Energy  
Technologies

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**Where is**



**ENERGY  
INNOVATION**



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# Innovation and Emerging Energy Technologies

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MOA on STEA



Energy Research & Capacity Building



## ALTERNATIVE FUELS AND ENERGY TECHNOLOGY DIVISION

FORMULATES POLICIES, PLANS AND PROGRAMS RELATED TO NEW AND ADVANCED ENERGY TECHNOLOGIES (NAETs) AND ALTERNATIVE FUELS DEVELOPMENT TOWARDS A SOCIALLY AND ENVIRONMENTALLY RESPONSIVE AND EFFECTIVE UTILIZATION OF ENERGY RESOURCES

ALTERNATIVE FUELS AND ENERGY TECHNOLOGY EVALUATION AND PROMOTION

ALTERNATIVE FUELS AND ENERGY TECHNOLOGY PROGRAM DEVELOPMENT AND MANAGEMENT

- ITDI Industrial Technology Development Institute
- MIRDC Metals Industry Research and Development Center
- PNRI Philippine Nuclear Research Institute
- PSHSS Philippine Science High School System
- SEI Science Education Institute
- STII Science and Technology Information Institute
- TAPI Technology Application and Promotion Institute



## New and Emerging Energy Technologies

## Innovation and Emerging Energy Technologies

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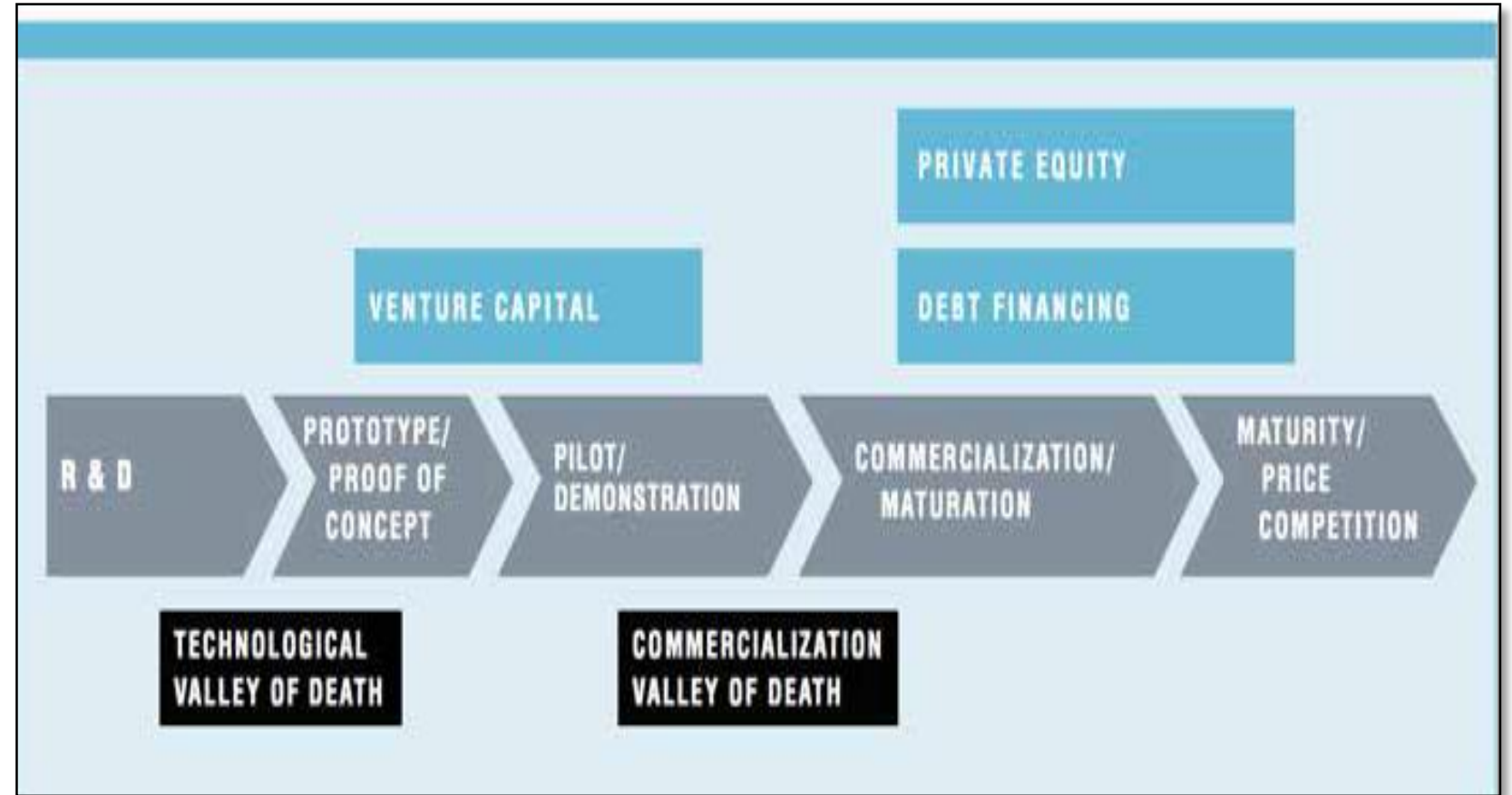




## New and Emerging Energy Technologies

# New Technology's Valley of Death

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New and Emerging  
Energy Technologies

New Technology's  
Valley of Death

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***Technology Evaluation for 2017  
Local Concept for Energy Innovation and Technologies  
(In coordination with TAPI and PCIEERD )***

- 1. Independent Power Generation (IPG)***
- 2. Drive-in Electric Turbine (DIET)***
- 3. Air Hydro Power Plant***
- 4. Modular Hydrogen Generation System***
- 5. Alternative Synchronous Electric Motor and Generator Energy Device***

***All Concepts did not passed the Valley of Death due to lack of sound scientific basis***



## New and Emerging Energy Technologies

Innovation and  
Emerging Energy  
Technologies

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## New and Emerging Energy Technologies

The Push for Local and Indigenous Energy innovation

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## On-Going Programs

### Commercial/Industrial Sector

#### Transport Sector

- Prototyping of Original Equipment Manufactured (OEM) and Philippine National Standards (PNS) compliant AutoLPG Jeepney
- Tricycle Modernization Program

#### Non-Biomass based waste-to-energy generation

- Collaboration with international technology provider for pilot technology demonstration

### Household Sector

#### Non-wood based fuel for domestic cooking

- Collaboration with Central Mindanao University for the identification and characterization of grass-based fuel for use in domestic cook stove

### Agriculture

- Collaboration with Isabela State University for the prototyping and demonstration on the use of LPG in agricultural machineries

## Technologies lined-up for research

Human Kinetic Energy Harvesting  
Micro-Energy Harvesting  
Enzymes for ethanol production from biomass  
Universally-compatible EV Quick Charging Station



## New and Emerging Energy Technologies

The Push for Local  
and Indigenous  
Energy innovation

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1st



ENERGY SECTOR







## New and Emerging Energy Technologies

The way to  
innovative thinking

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**WHAT'S  
THE PROBLEM...**

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The way to innovative thinking

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**TOO MANY SEEDS**

**CREATED**



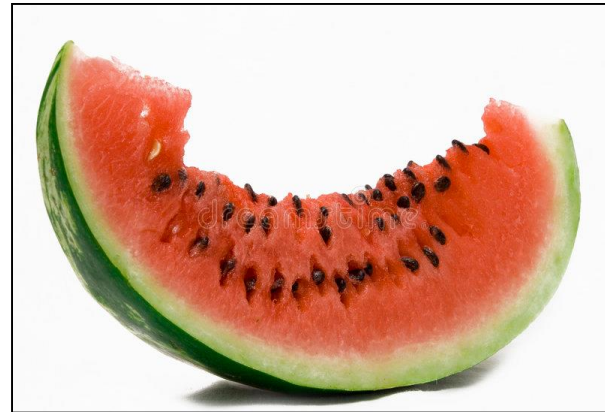
**SEEDLESS VARIETY**



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The way to innovative thinking

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**UN-APPEALING**

**IMPROVE** →

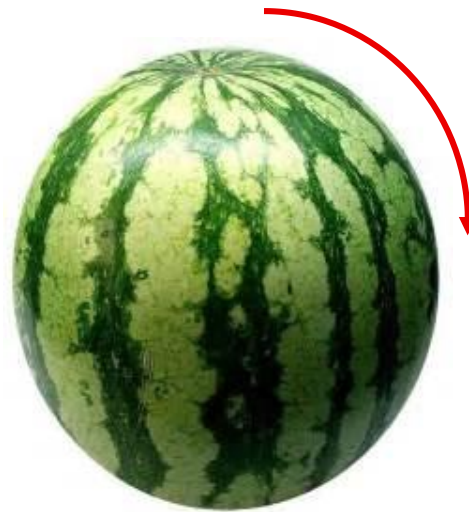


**ARTISTIC DESIGN**

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The way to innovative thinking

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**INCONVENIENCE IN HANDLING**

**INNOVATE**



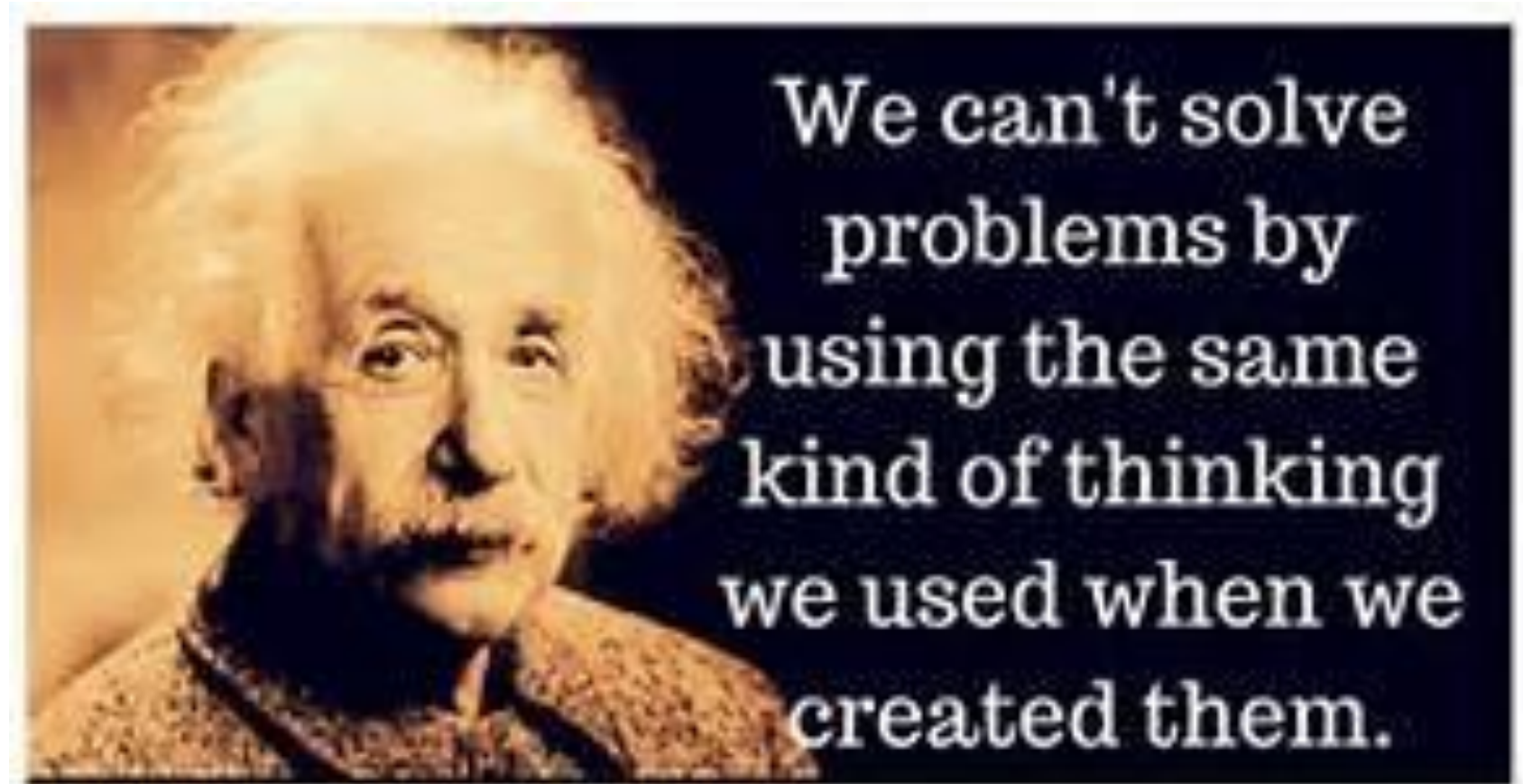
**STABLE GEOMETRIC SHAPE**



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innovative thinking

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*Thank you!*