



Mindanao Power Situation and Outlook

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Electric Power Industry Management Bureau

WESM Mindanao Participants Forum
14 June 2018
General Santos City



Presentation Outline

A circular icon containing a line graph with an orange line showing an upward trend on a grid.

2017 Mindanao Power Grid Snapshot

A circular icon containing a graph with a yellow curve and blue bars, representing demand and supply outlook.

2016-2040 Demand and Supply Outlook

A circular icon containing a purple silhouette of a power plant with a lightning bolt symbol.

2018-2020 Demand and Supply Outlook





2017 Mindanao Power Grid Snapshot



2016-2040 Demand and Supply Outlook



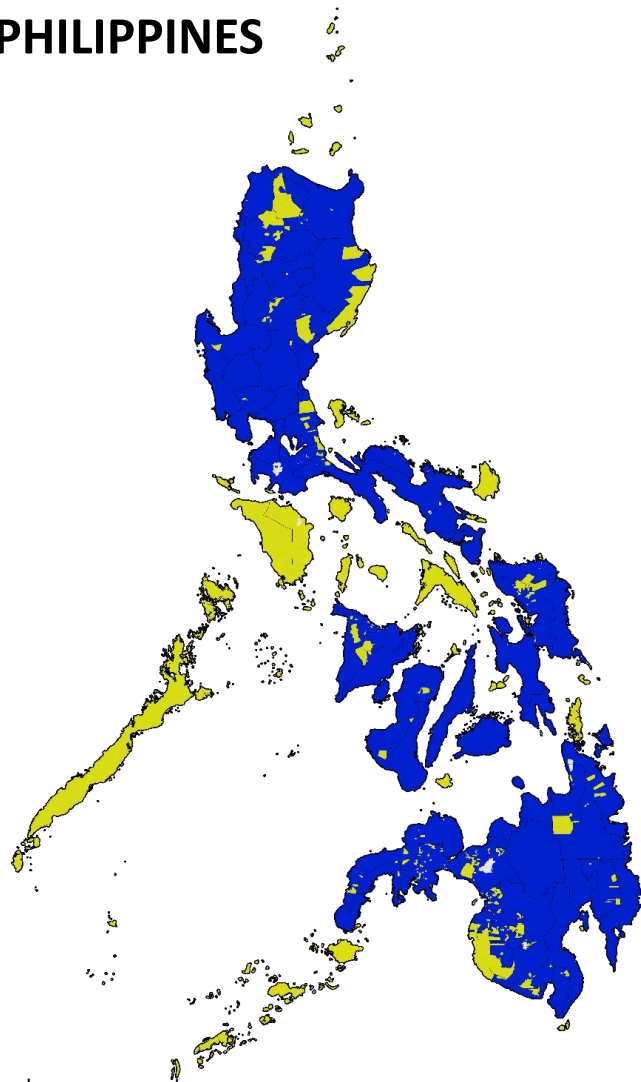
2018-2020 Demand and Supply Outlook



CAPACITY MIX

As of 31 December 2017

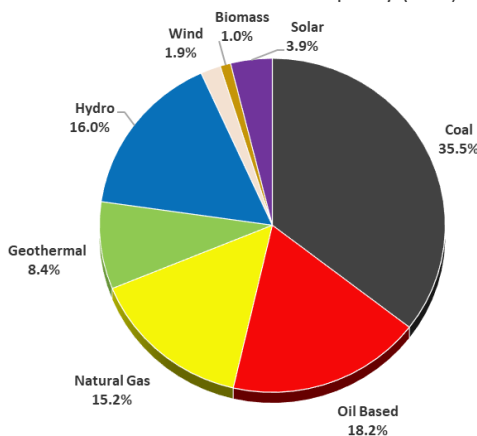
PHILIPPINES



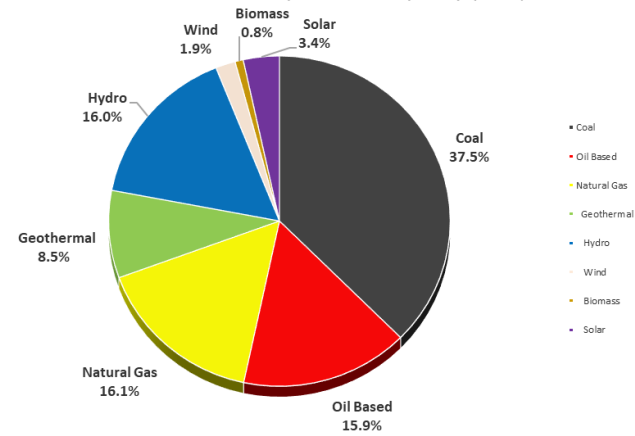
Legend:
■ Grid-Connected
■ Off-grid

FUEL TYPE	PHILIPPINES			
	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
Coal	8,049	7,674	35.4	37.4
Oil Based	4,153	3,286	18.3	16.0
<i>Diesel</i>	2,682	2,216	11.8	10.8
<i>Oil Thermal</i>	650	530	2.9	2.6
<i>Gas Turbine</i>	822	540	3.6	2.6
Natural Gas	3,447	3,291	15.2	16.0
Renewable Energy	7,079	6,264	31.1	30.5
<i>Geothermal</i>	1,916	1,752	8.4	8.5
<i>Hydro</i>	3,627	3,269	16.0	15.9
<i>Wind</i>	427	383	1.9	1.9
<i>Biomass</i>	224	160	1.0	0.8
<i>Solar</i>	885	700	3.9	3.4
TOTAL	22,728	20,515	100.0	100.0

PHILIPPINES - Installed Capacity (MW)



PHILIPPINES - Dependable Capacity (MW)



Note:

Generator nameplate capacity (installed): The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.

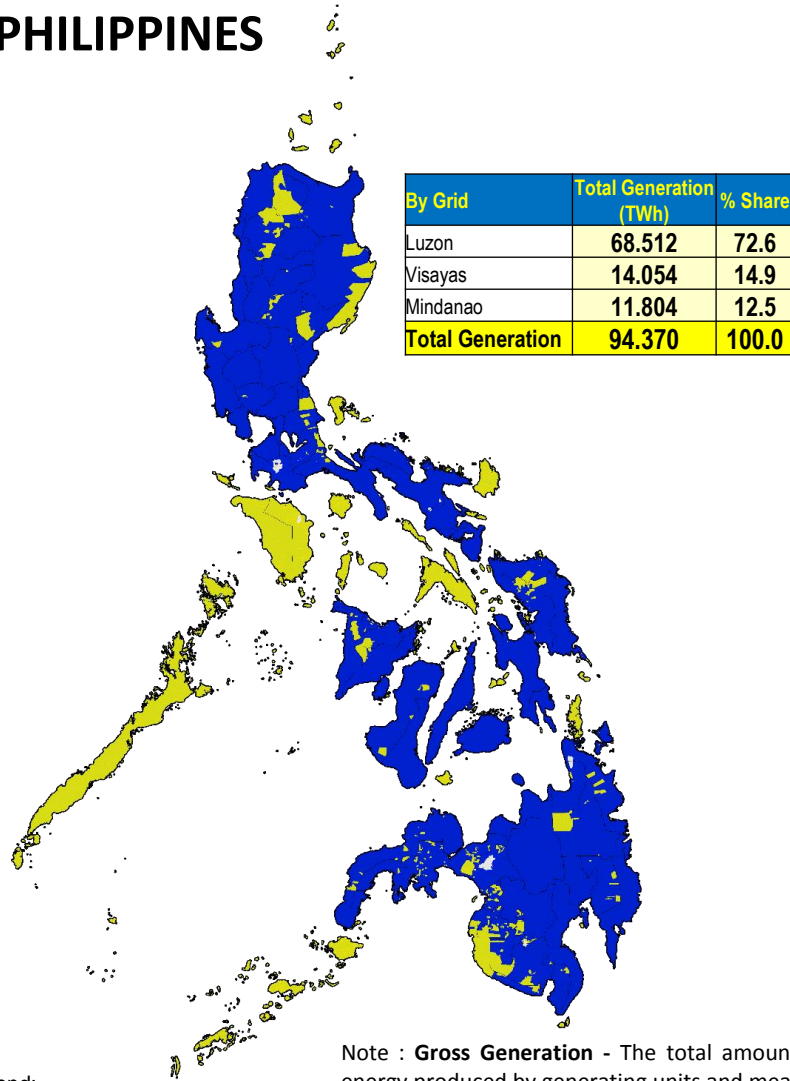
Dependable capacity: The load-carrying ability of a station or system under adverse conditions for a specified period of time.



GENERATION MIX

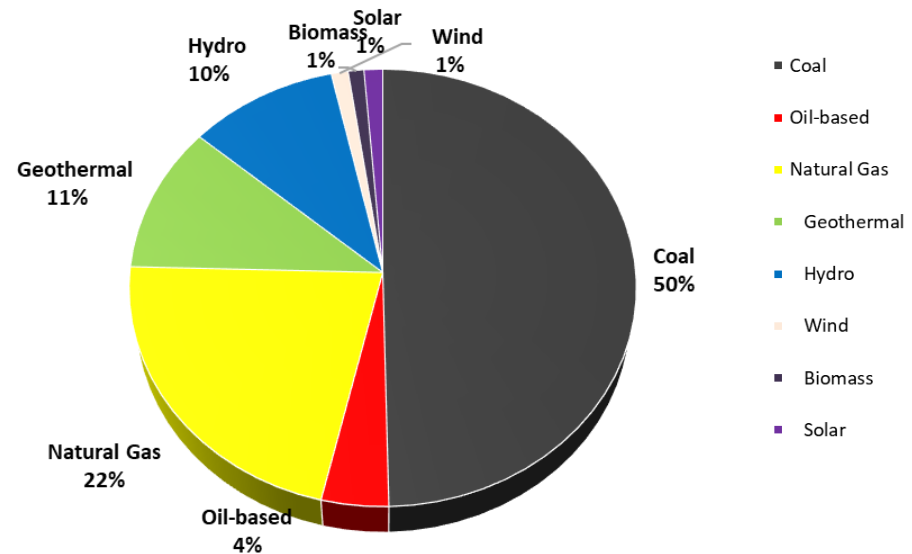
As of 31 December 2017

PHILIPPINES



Note : **Gross Generation** - The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatthours (kWh) or megawatthours (MWh).

Plant Type	Total Generation (MWh)	% Share
Coal	46,847,274	49.6%
Oil-based	3,787,093	4.0%
<i>Combined Cycle</i>	405,022	0.4%
<i>Diesel</i>	3,100,113	3.3%
<i>Gas Turbine</i>	0	0.0%
<i>Oil Thermal</i>	281,958	0.3%
Natural Gas	20,547,239	21.8%
Renewable Energy	23,188,735	24.6%
Geothermal	10,270,077	10.9%
Hydro	9,610,799	10.2%
Biomass	1,013,148	1.1%
Solar	1,201,152	1.3%
Wind	1,093,558	1.2%
Total Generation	94,370,341	100.0%



Legend:
■ Grid-Connected
■ Off-grid



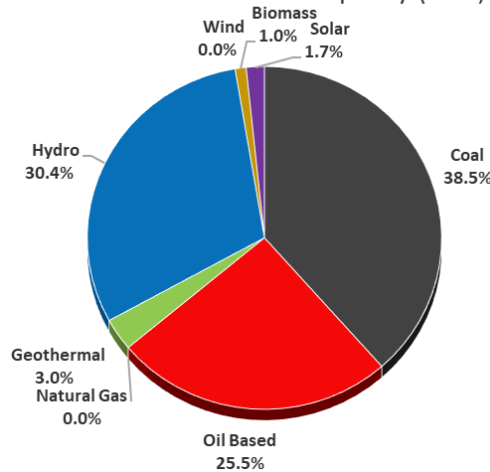
CAPACITY MIX

As of 31 December 2017

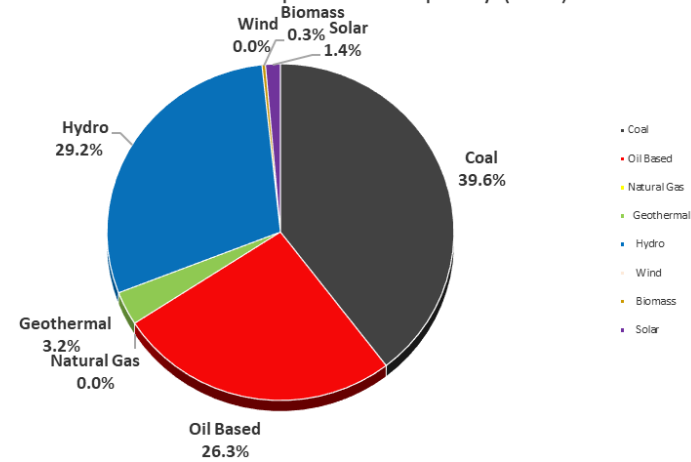
MINDANAO

FUEL TYPE	MINDANAO			
	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
Coal	1,370	1,220	38.5	39.6
Oil Based	906	811	25.5	26.3
<i>Diesel</i>	906	811	25.5	26.3
Natural Gas	0	0	0.0	0.0
Renewable Energy	1,284	1,052	36.1	34.1
<i>Geothermal</i>	108	100	3.0	3.2
<i>Hydro</i>	1,080	899	30.4	29.2
<i>Wind</i>	0	0	0.0	0.0
<i>Biomass</i>	36	10	1.0	0.3
<i>Solar</i>	59	43	1.7	1.4
TOTAL	3,559	3,083	100.0	100.0

MINDANAO - Installed Capacity (MW)



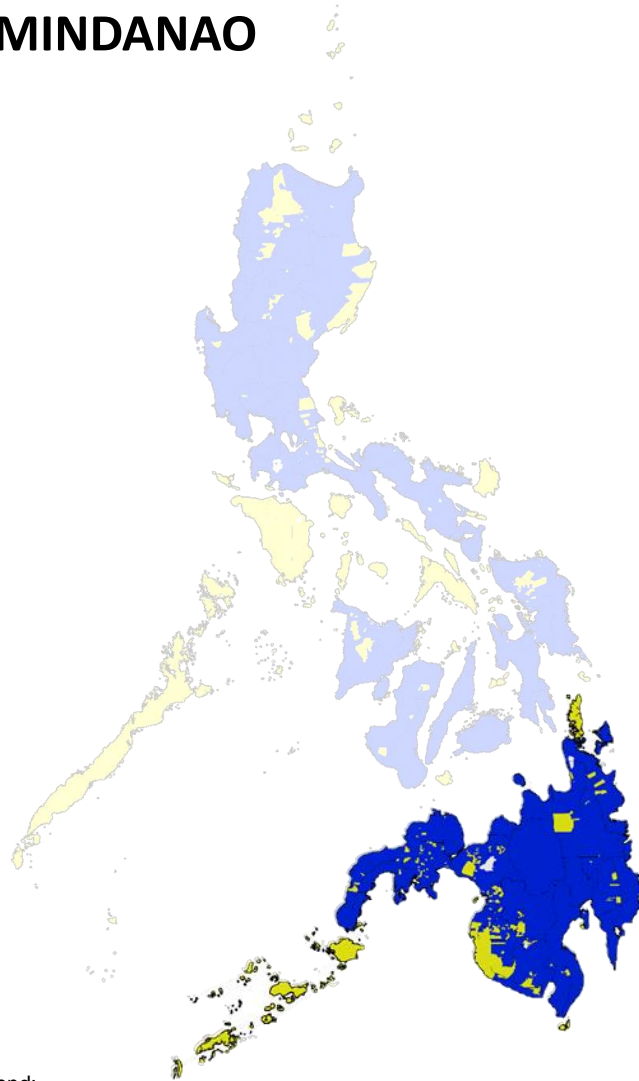
MINDANAO - Dependable Capacity (MW)



Note:

Generator nameplate capacity (installed): The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.

Dependable capacity: The load-carrying ability of a station or system under adverse conditions for a specified period of time.

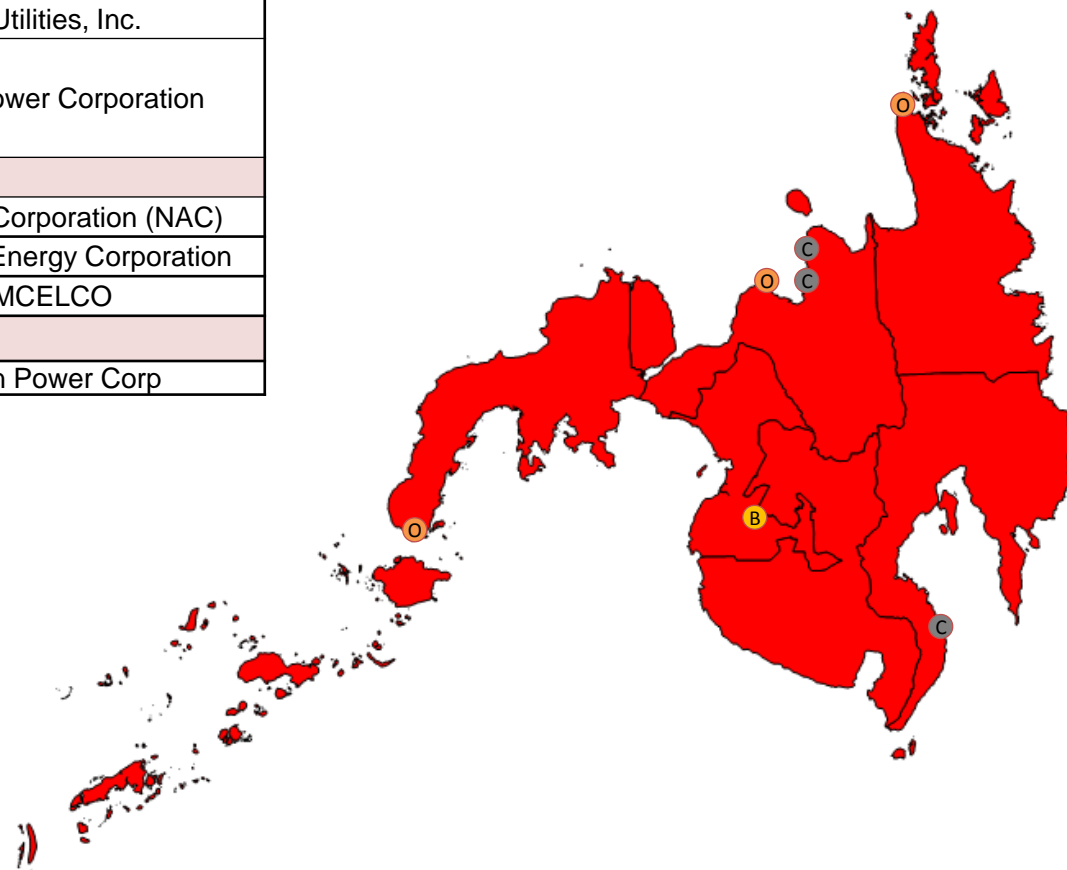


Legend:
■ Grid-Connected
■ Off-grid



Mindanao Newly Operational Power Plants

POWER PLANT	CAPACITY, MW		OWNER/OPERATOR
FACILITY NAME	INS	DEP	
MINDANAO	502.4	452.7	
COAL	450.0	405.0	
SMC Malia U2	150.0	135.0	SMC Consolidated Power Corporation
FDC MISAMIS U3	135.0	120.0	FDC Utilities, Inc.
MPC Balingasag U1	55.0	50.0	Minergy Power Corporation
MPC Balingasag U2	55.0	50.0	
MPC Balingasag U3	55.0	50.0	
DIESEL	37.4	34.7	
NAC DPP	10.9	8.2	Nickel Asia Corporation (NAC)
PACERM-1	10.5	10.5	PACERM-1 Energy Corporation
ZAMCELCO DPP	16.0	16.0	ZAMCELCO
BIOMASS	15.0	13.0	
LAMSAN Biomass	15.0	13.0	Lamsan Power Corp



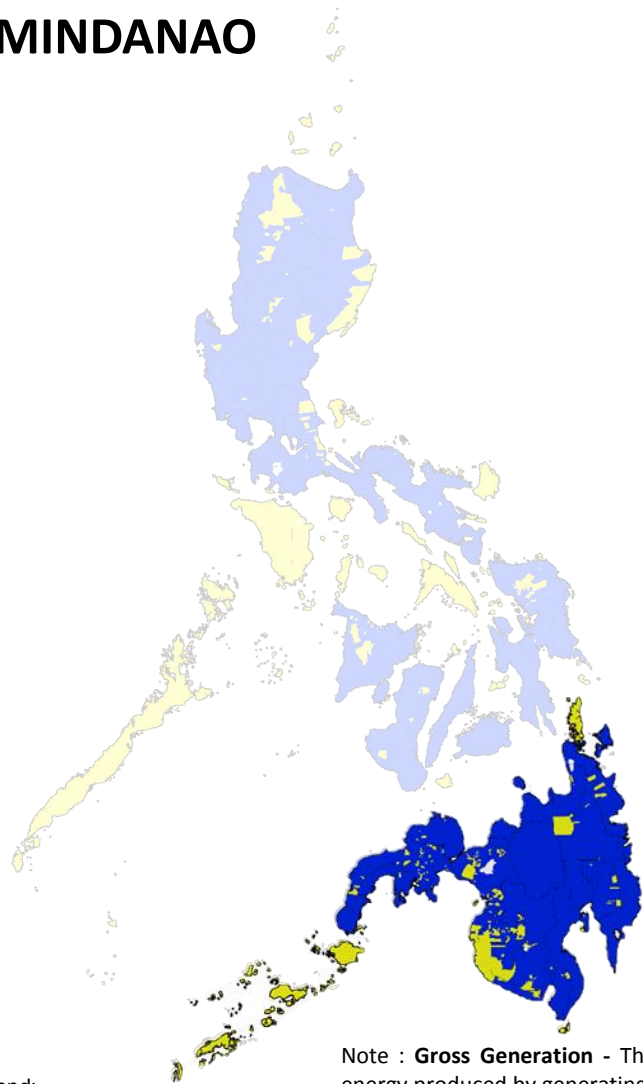
*Excluding Battery Energy Storage



GENERATION MIX

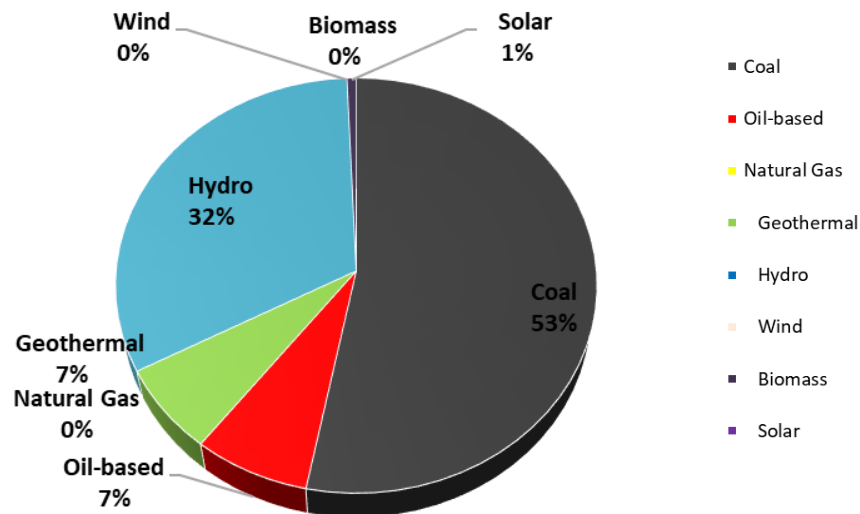
As of 31 December 2017

MINDANAO



Note : **Gross Generation** - The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatthours (kWh) or megawatthours (MWh).

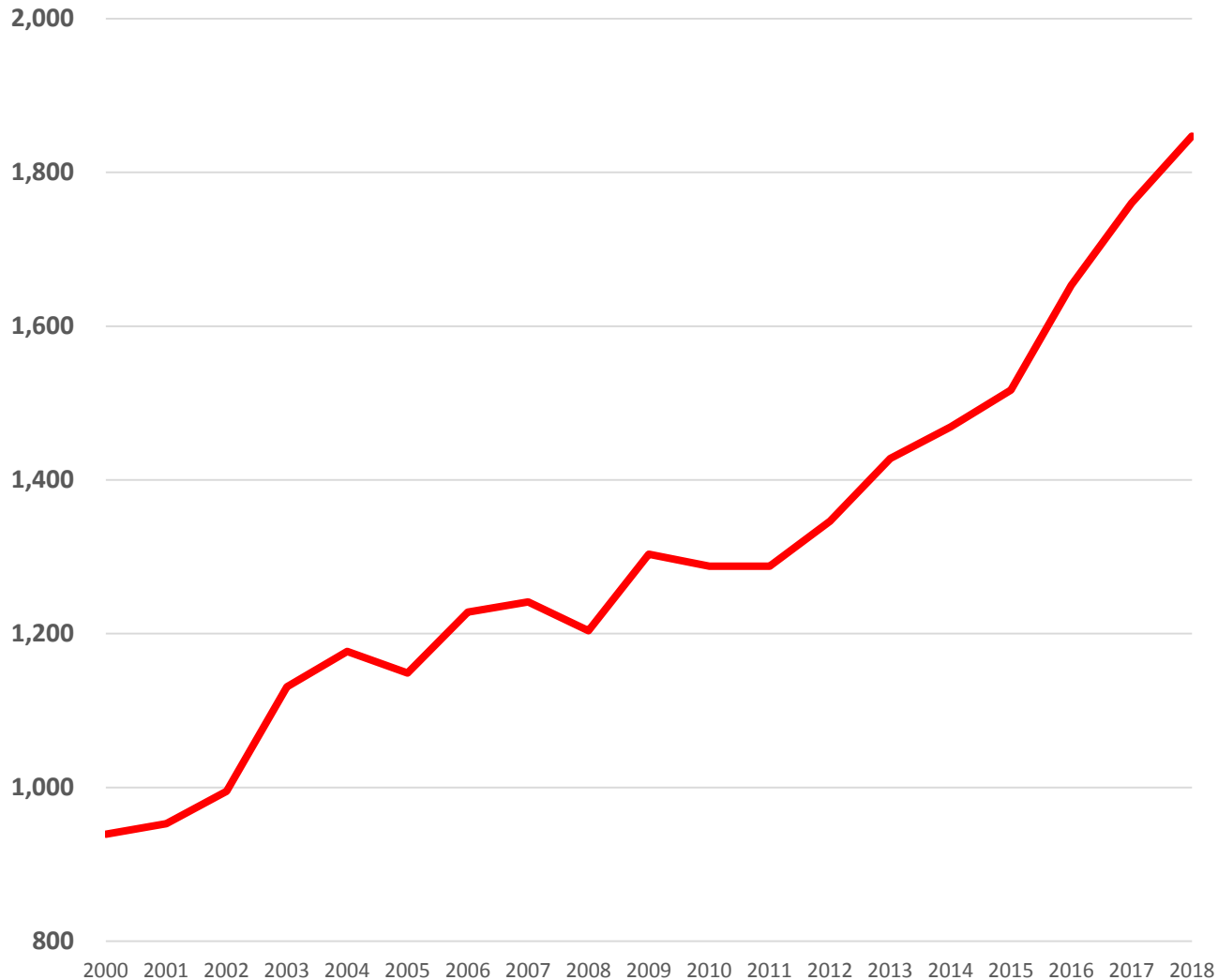
Plant Type	Total Generation (MWh)	% Share
Coal	6,271,010	53.1%
Oil-based	866,879	7.3%
<i>Combined Cycle</i>	0	0.0%
<i>Diesel</i>	866,879	7.3%
<i>Gas Turbine</i>	0	0.0%
<i>Oil Thermal</i>	0	0.0%
Natural Gas	0	0.0%
Renewable Energy	4,666,147	39.5%
Geothermal	796,792	6.8%
Hydro	3,791,144	32.1%
Biomass	0	0.0%
Solar	78,211	0.7%
Wind	0	0.0%
Total Generation	11,804,037	100.0%



Legend:
■ Grid-Connected
■ Off-grid



Historical System Demand



Year	Mindanao	% GR
2000	939	
2001	953	1.5
2002	995	4.4
2003	1,131	13.7
2004	1,177	4.1
2005	1,149	(2.4)
2006	1,228	6.9
2007	1,241	1.1
2008	1,204	(3.0)
2009	1,303	8.3
2010	1,288	(1.2)
2011	1,288	0.0
2012	1,346	4.5
2013	1,428	6.1
2014	1,469	2.9
2015	1,517	3.3
2016	1,653	9.0
2017	1,760	6.5
2018*	1,847	4.9

* 2018 Actual Peak Demand to Date as of 23 May 2018



A circular icon containing a line graph with an orange line showing an upward trend on a grid background.

2017 Mindanao Power Grid Snapshot

A circular icon containing a bar chart with a yellow line graph overlaid, representing demand and supply outlook.

2016-2040 Demand and Supply Outlook

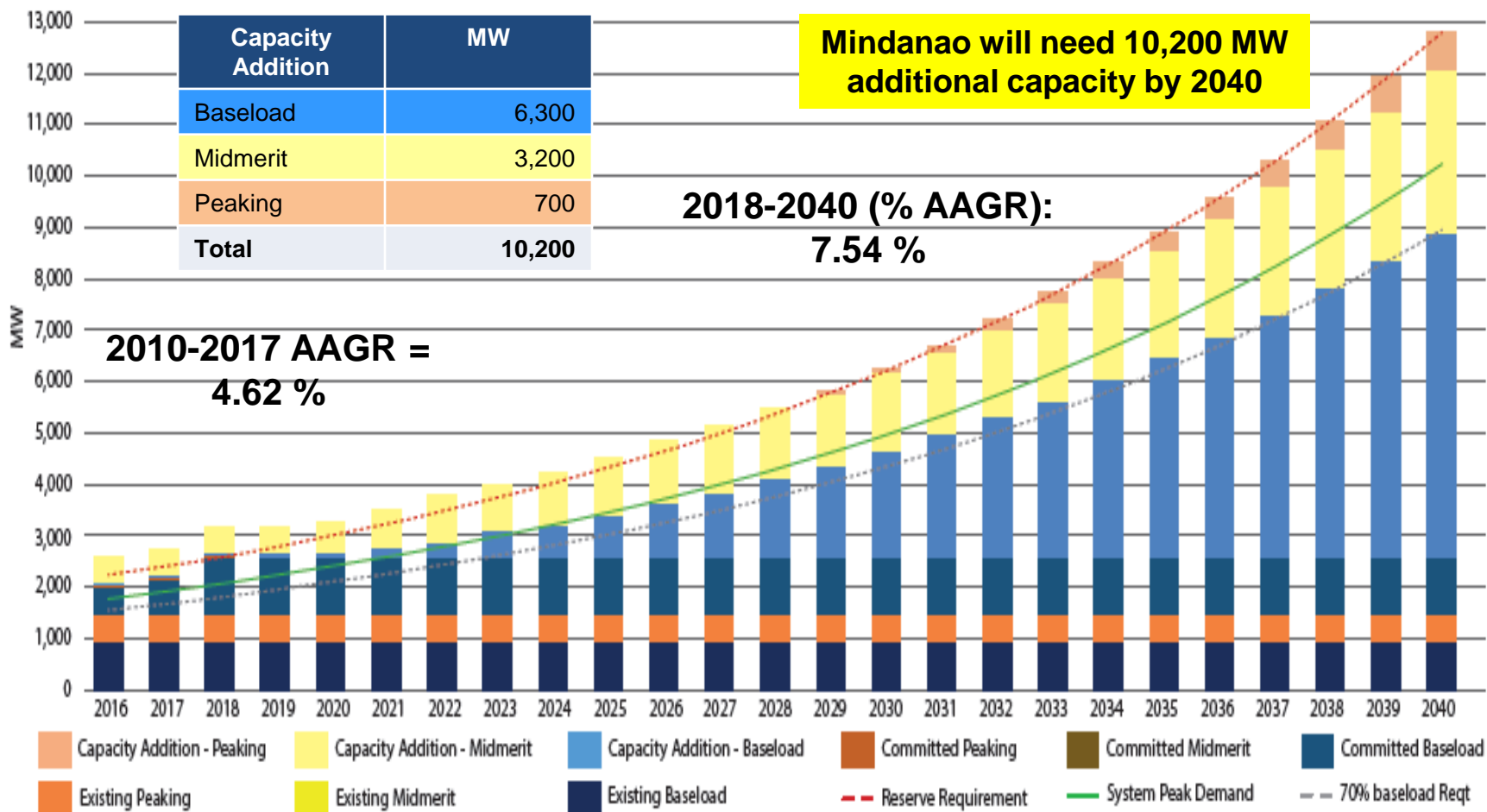
A circular icon containing a stylized purple power plant with a lightning bolt symbol, representing demand and supply outlook.

2018-2020 Demand and Supply Outlook



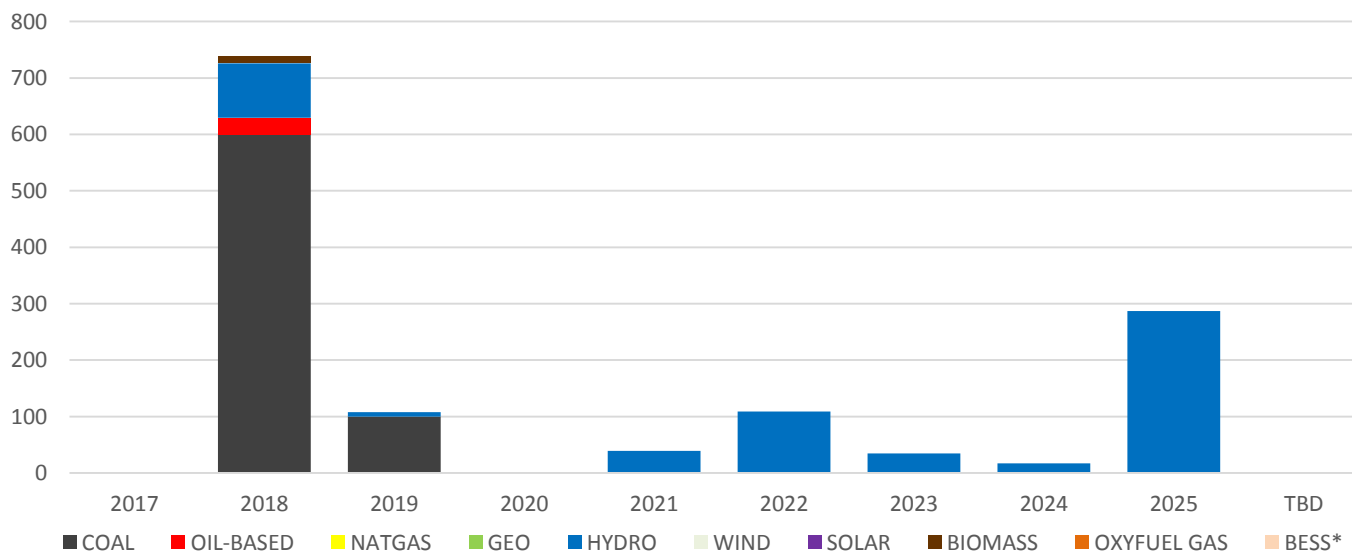
Power Development Plan to 2040

Mindanao Demand and Supply Outlook, 2016-2040



Mindanao Committed Power Projects

Plant Type	2018	2019	2020	2021	2022	2023	2024	2025	TBD	TOTAL by Type
COAL	600	100	0	0	0	0	0	0	0	700.00
OIL-BASED	29.54	0	0	0	0	0	0	0	0	29.54
NATGAS	0	0	0	0	0	0	0	0	0	0.00
GEO	0	0	0	0	0	0	0	0	0	0.00
HYDRO	96.2	8	0	39.2	108.7	34.8	16.85	287.14	0	590.89
WIND	0	0	0	0	0	0	0	0	0	0.00
SOLAR	0	0	0	0	0	0	0	0	0	0.00
BIOMASS	12	0	0	0	0	0	0	0	0	12.00
OXYFUEL GAS	0	0	0	0	0	0	0	0	0	0.00
BESS*	0	0	0	0	0	0	0	0	0	0.00
TOTAL by year	737.74	108.00	0.00	39.20	108.70	34.80	16.85	287.14	0.00	1,332.43



Note: TBD – To be Determined



Mindanao Committed Power Projects

TOTAL MINDANAO COMMITTED CAPACITY = 1,332 MW

Aggregated 591 MW from 36 Hydro Projects

540 MW GNPowr Kauswagan Coal Fired Power Project (2018)

5.2 MW PSFI Diesel Fired Power Project (2018)

10.4 MW PBI Diesel Fired Power Project (2018)

5.5 MW LPC Rice Husk-Fired Biomass Power Project (2018)

3 MW PTCI Rice Husk-Fired Biomass Cogeneration Power Project (2018)

3.5 MW GEEC Biomass Cogeneration Power Project (2018)

13.94 MW PSI Diesel Fired Power Project (2018)

100 MW SEC Coal Fired Power Project (2019)

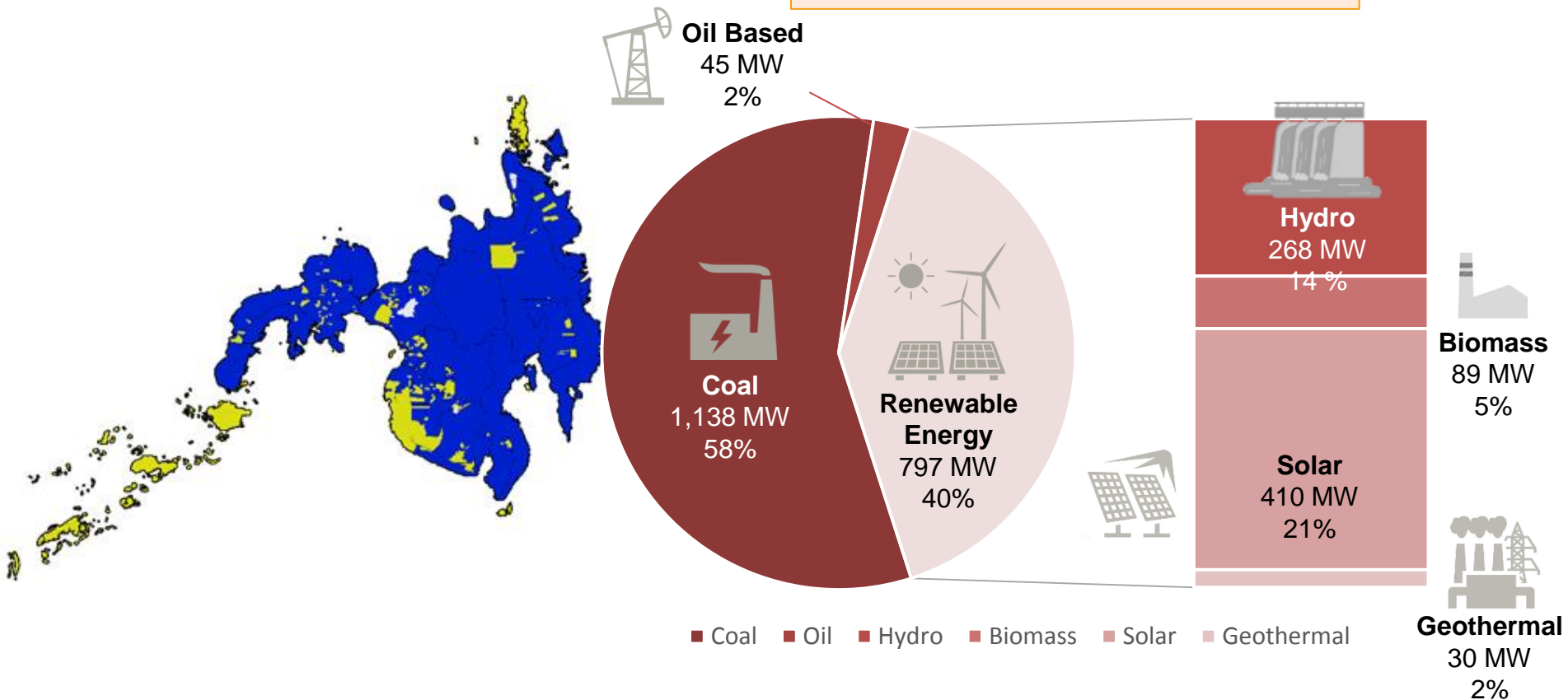
Legend:

Coal	Geothermal	Biomass
Oil-based	Hydro	Wind
NatGas	Solar	BESS



Mindanao Indicative Power Projects

**TOTAL MINDANAO INDICATIVE
CAPACITY = 1,980.6 MW**





2017 Mindanao Power Grid Snapshot



2016-2040 Demand and Supply Outlook



2018-2020 Demand and Supply Outlook



Mindanao 2018-2020 Power Outlook

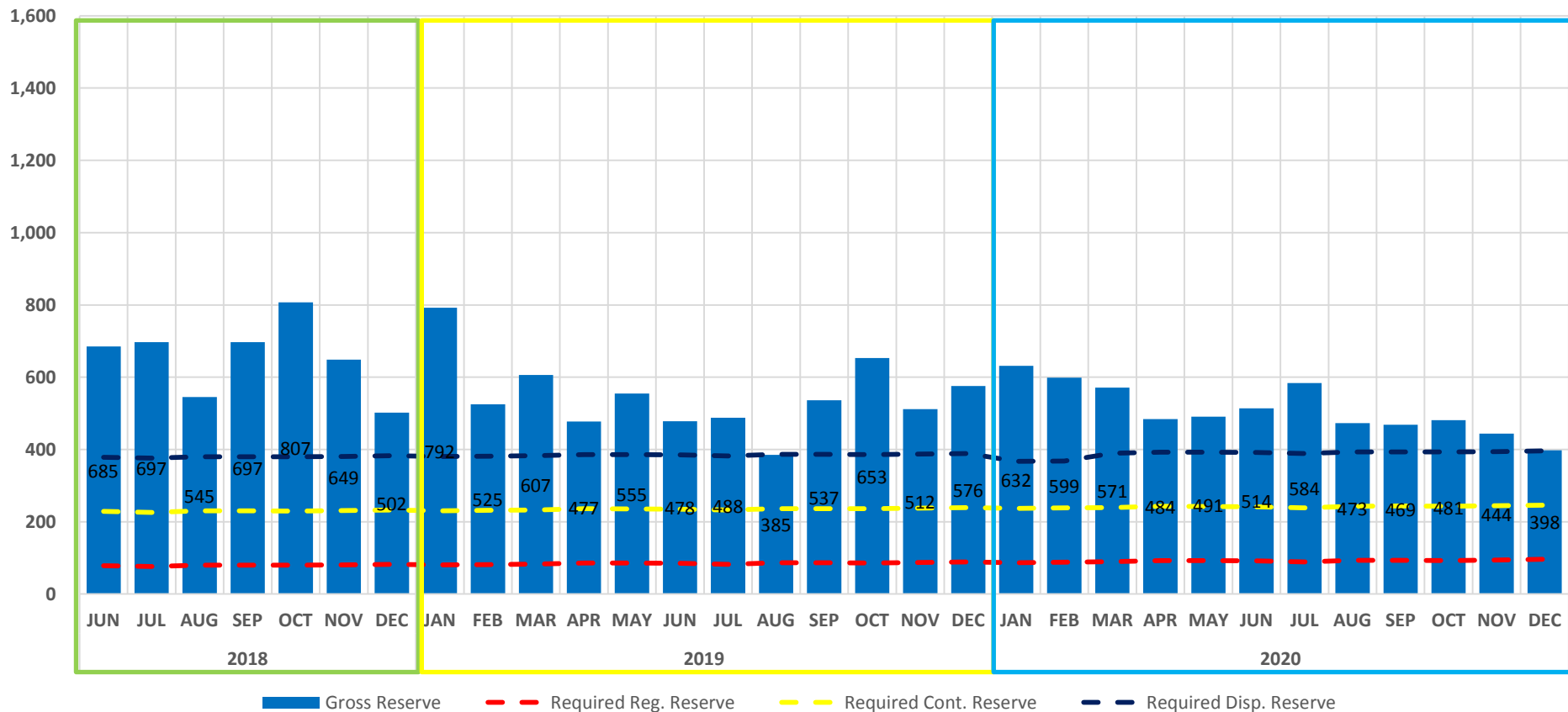
- **Assumptions**

- DOE Peak Demand forecast*
 - 2018 – 2,064 MW
 - 2019 – 2,229 MW
 - 2020 – 2,407 MW
- Committed Power projects based on actual project status
- Preventive Maintenance Schedule (PMS) considered based on NGCP Grid Operating Program (GOP) 2018-2020



Mindanao 2018-2020 Power Outlook

• Reserve Profile w/o Committed Power Projects



2018-2020

Monthly

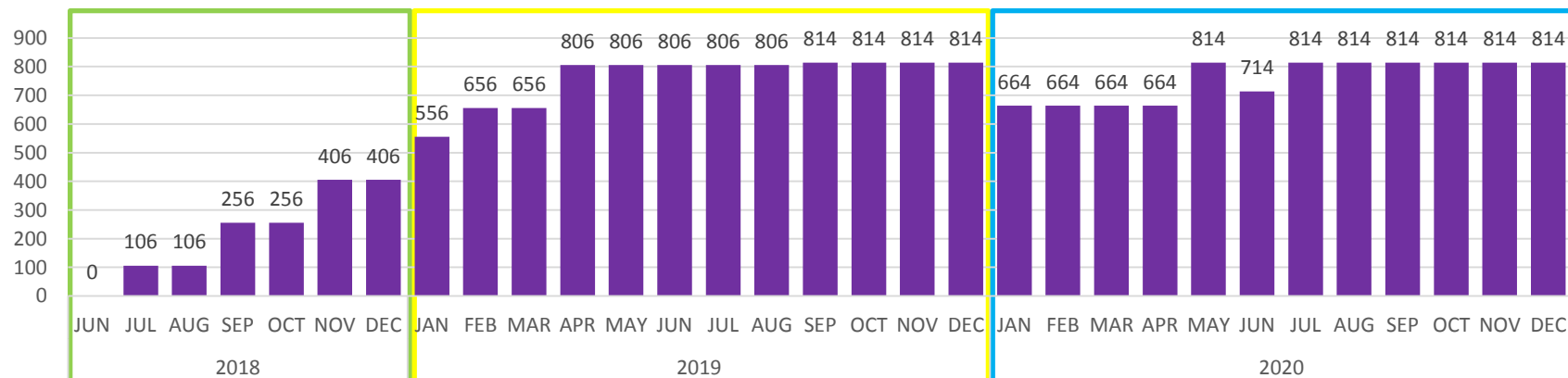
	2018												2019												2020											
	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC					
Total Available Capacity	2,650	2,602	2,545	2,700	2,800	2,673	2,566	2,805	2,568	2,675	2,627	2,698	2,600	2,545	2,545	2,700	2,805	2,698	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805					
System Demand	1,964	1,905	2,000	2,003	1,992	2,024	2,064	2,012	2,043	2,068	2,149	2,143	2,121	2,057	2,159	2,163	2,152	2,186	2,229	2,173	2,206	2,233	2,321	2,314	2,291	2,221	2,332	2,336	2,324	2,361	2,407					
Gross Reserve	685	697	545	697	807	649	502	792	525	607	477	555	478	488	385	537	653	512	576	632	599	571	484	491	514	584	473	469	481	444	398					
Required Reg. Reserve	79	76	80	80	80	81	83	80	82	83	86	86	85	82	86	87	86	87	89	87	88	89	93	93	92	89	93	93	93	94	96					
Required Cont. Reserve	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150					
Required Disp. Reserve	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150					



Mindanao 2018-2020 Power Outlook

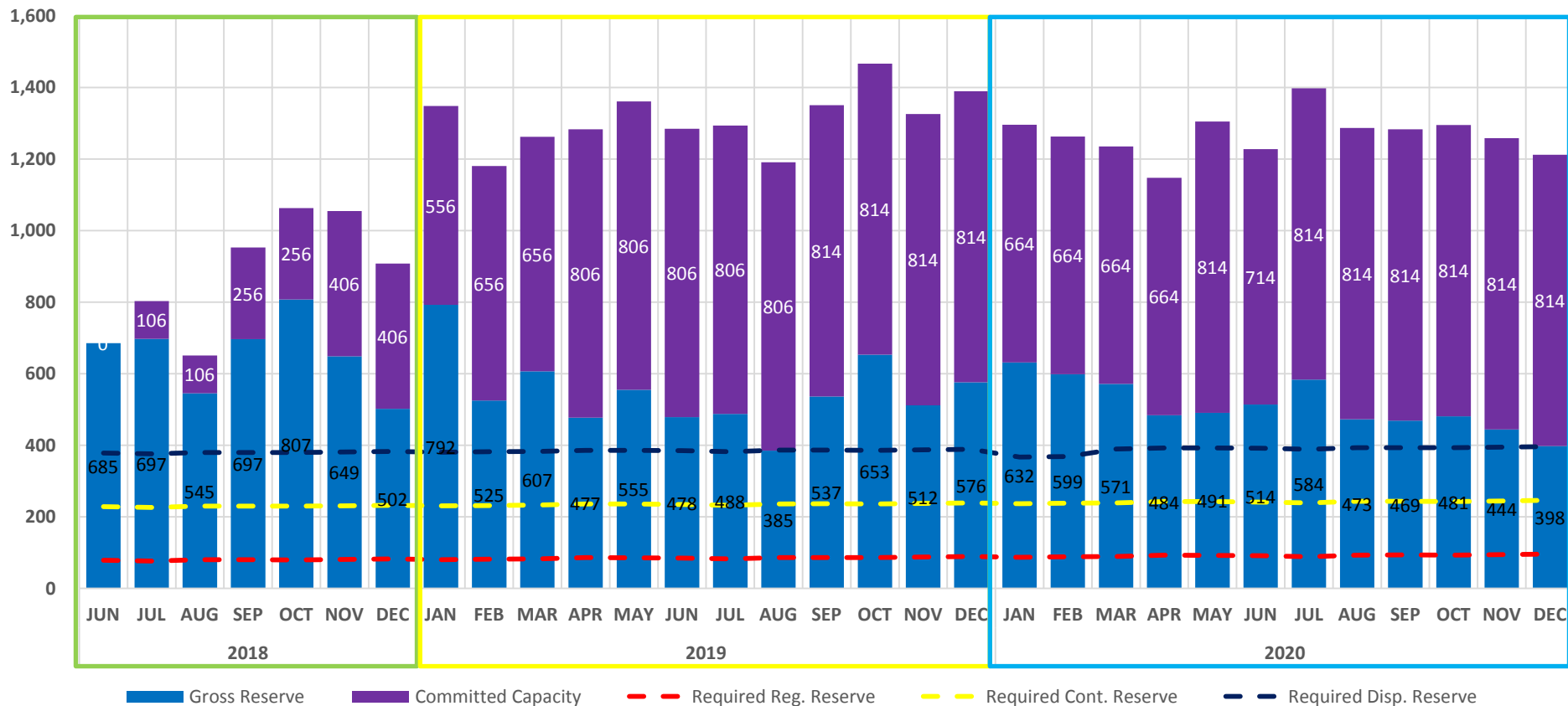
- Committed Power Projects

Power Project	Installed Cap (MW)	Target COD
MANOLO FORTICH 1 HYDRO	43.4	Jun-18
MANOLO FORTICH 2 HYDRO	25.4	Jun-18
LAKE MAINIT HYDRO	25.0	Jun-18
PHILTRADE BIOMASS	3.0	Jun-18
LAMSAN BIOMASS	5.5	Jun-18
GEEC BIOMASS	3.5	Jun-18
GNPK 1 COAL	150.0	Aug-18
GNPK 2 COAL	150.0	Oct-18
GNPK 3 COAL	150.0	Dec-18
SEC 2 COAL	100.0	Jan-19
GNPK 4 COAL	150.0	Mar-19
ASIGA GREEN ENERGY HYDRO	8.0	Aug-19
Total	813.8	



Mindanao 2018-2020 Power Outlook

Reserve Profile with Committed Power Projects



2018-2020 Monthly	2018												2019												2020											
	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC					
Total Available Capacity	2,650	2,602	2,545	2,700	2,800	2,673	2,566	2,805	2,568	2,675	2,627	2,698	2,600	2,545	2,545	2,700	2,805	2,698	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805	2,805						
System Demand	1,964	1,905	2,000	2,003	1,992	2,024	2,064	2,012	2,043	2,068	2,149	2,143	2,121	2,057	2,159	2,163	2,152	2,186	2,229	2,173	2,206	2,233	2,321	2,314	2,291	2,221	2,332	2,336	2,324	2,361	2,407					
Gross Reserve	685	697	545	697	807	649	502	792	525	607	477	555	478	488	385	537	653	512	576	632	599	571	484	491	514	584	473	469	481	444	398					
Committed Capacity	0	106	106	256	256	406	406	556	656	656	806	806	806	806	806	814	814	814	814	664	664	664	664	814	714	814	814	814	814	814						
Required Reg. Reserve	79	76	80	80	80	81	83	80	82	83	86	86	85	82	86	87	86	87	89	87	88	89	89	93	92	89	93	93	93	94	96					
Required Cont. Reserve	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150					
Required Disp. Reserve	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	130	130	150	150	150	150	150	150	150	150	150	150					





END OF PRESENTATION

Mindanao Power Situation and Outlook

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14 June 2018
General Santos City

