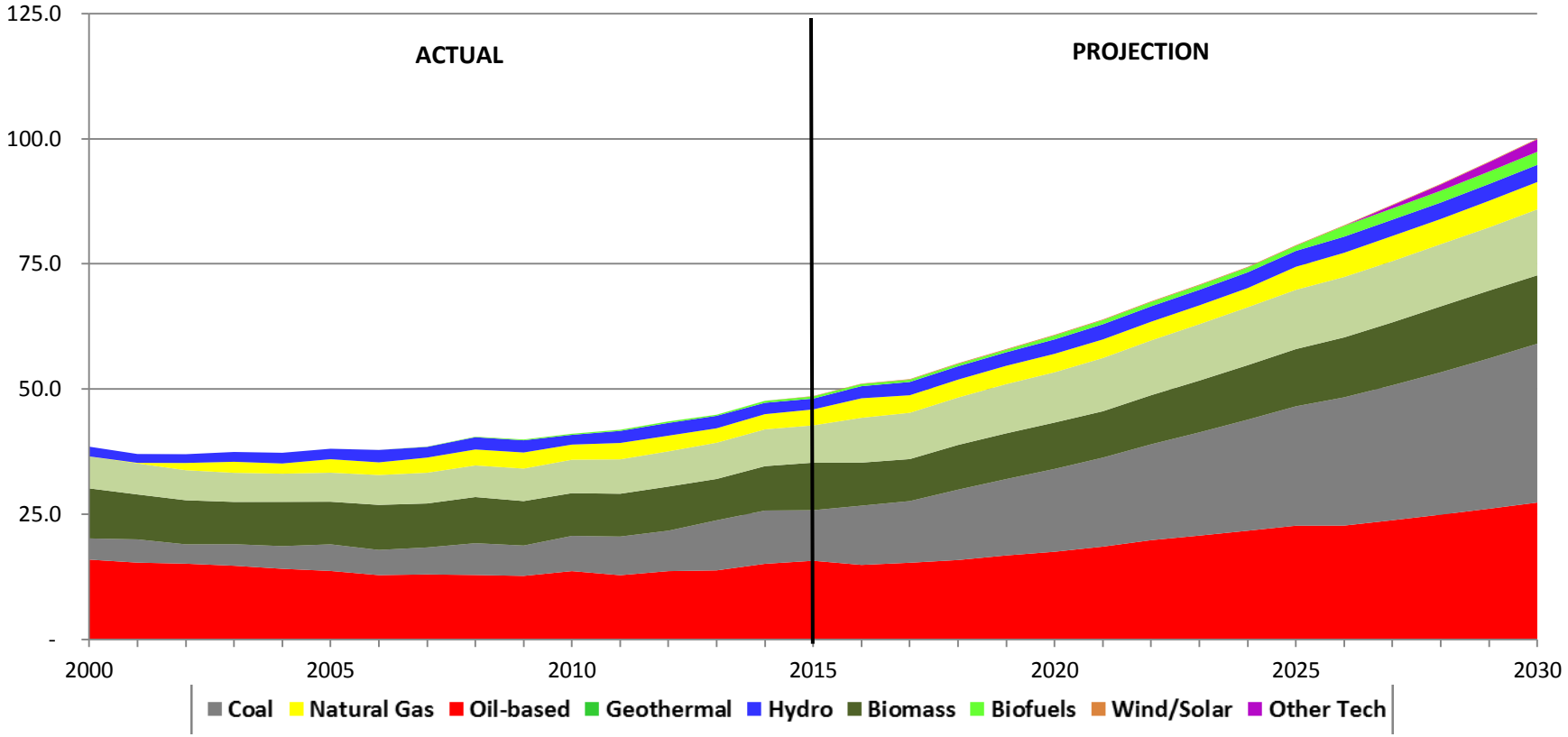
Investment Opportunities (Philippine Energy Sector)

Presentation Outline

- *Strategic Directions 2016-2030*
- *Energy Supply/Demand*
- *Opportunities*
  - Power Sector
  - Renewable Energy
  - Coal
  - Oil & Gas
  - Alternative Fuels
  - Energy Efficiency

DEPARTMENT OF
ENERGY

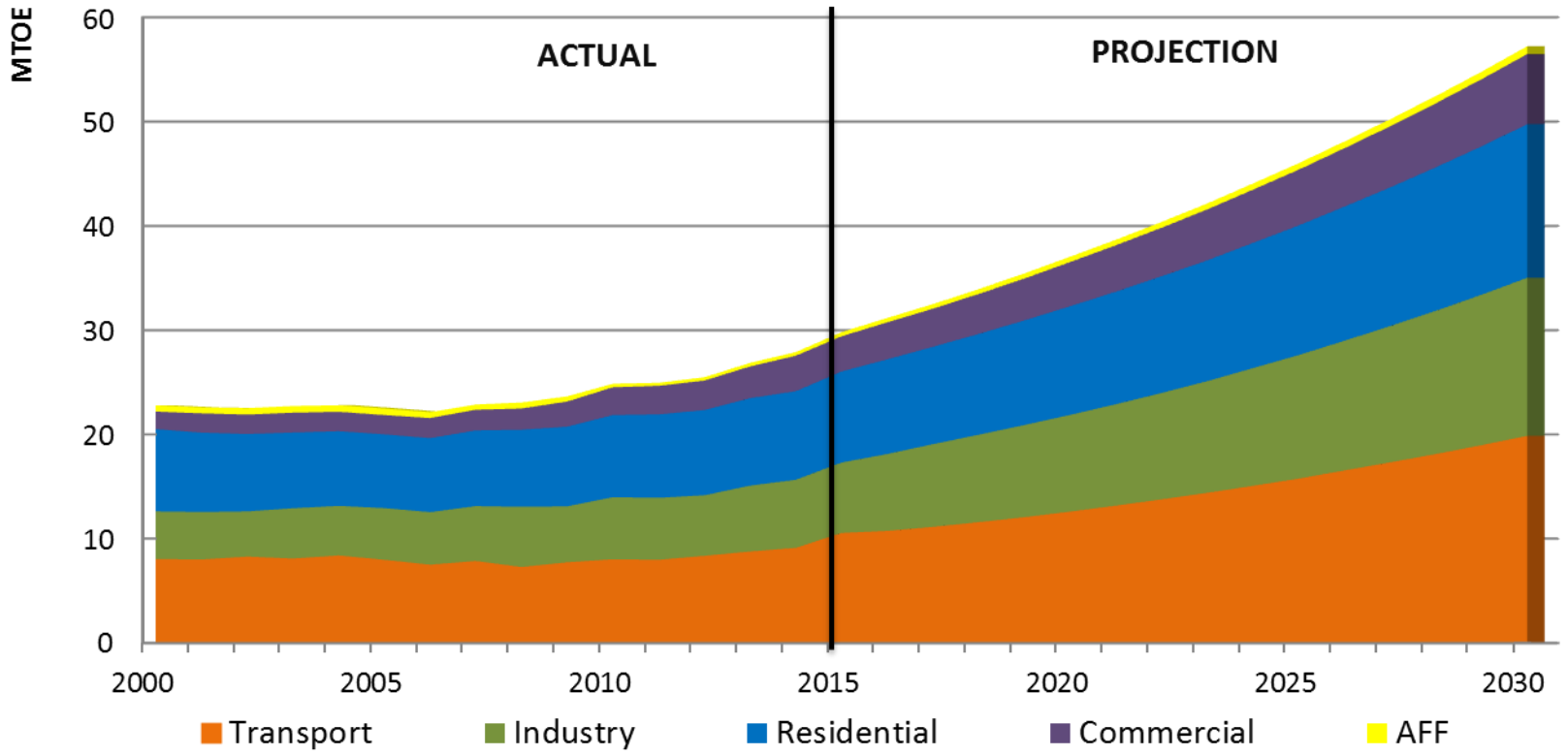
TOTAL PRIMARY ENERGY SUPPLY MIX: IN MTOE



Fuel	2015		2030 - CES		AAGR (2015-2030)
	MTOE	% Shares	MTOE	% Shares	
Coal	11.61	20.8	31.73	31.7	6.9%
Natural Gas	2.85	6.6	5.47	5.5	4.4%
Oil	17.68	32.3	27.30	27.3	2.9%
Renewable*	19.59	40.4	33.01	33.0	3.5%
Other Technology	-	-	2.48	2.5	-
Total	**51.75**	**100.0**	**99.99**	**100.0**	**4.5%**

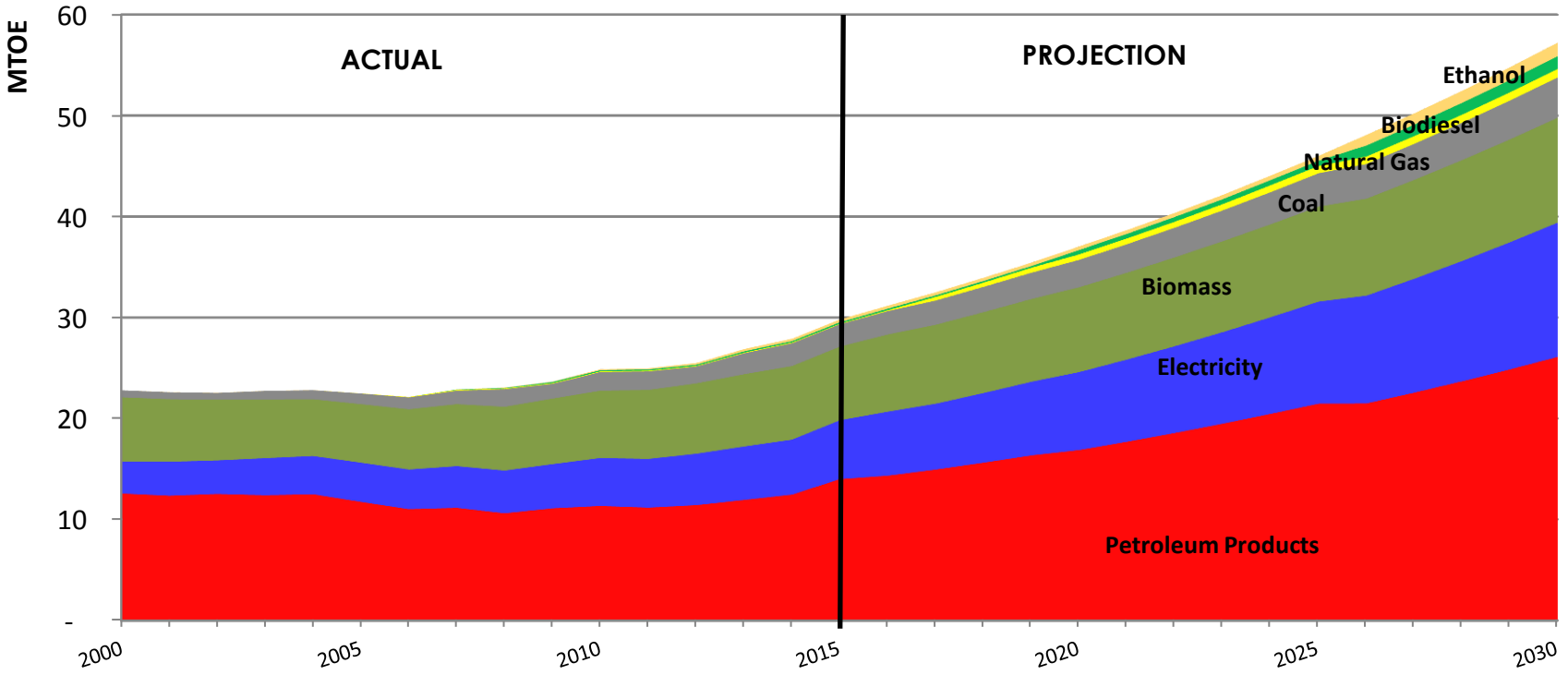
**geothermal, hydro, biomass, biofuels, wind & solar*

TOTAL FINAL ENERGY DEMAND BY SECTOR: IN MTOE



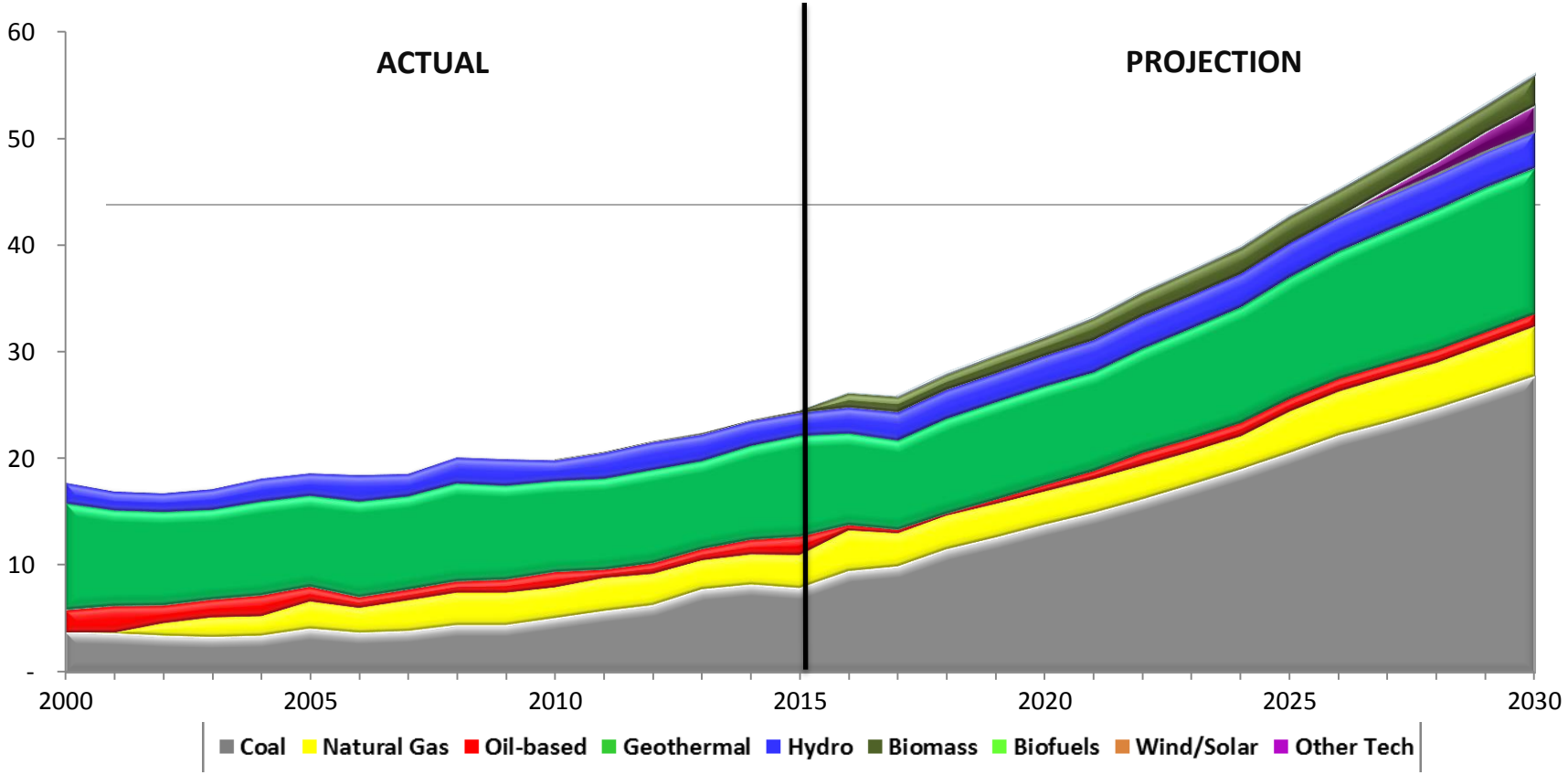
Sector	2015		2030		AAGR (2015-2030)
	MTOE	% Shares	MTOE	% Shares	
AFF	0.40	1.3	0.75	1.3	4.3%
Industry	6.75	22.6	15.16	26.5	5.5%
Commercial	3.37	11.3	6.72	11.8	4.7%
Residential	8.73	29.3	14.72	25.7	3.5%
Transport	10.56	35.4	19.87	34.7	4.3%
Total	**29.81**	**100.0**	**57.22**	**100.0**	**4.4%**

TOTAL FINAL ENERGY DEMAND: BY FUEL TYPE



Sector	2015		2030		AAGR (2015-2030)
	MTOE	% Shares	MTOE	% Shares	
Coal	2.22	7.4	3.99	7.0	4.0%
Natural Gas	0.05	0.2	0.84	1.5	20.8%
Petroleum Products	13.99	46.9	26.09	45.6	4.2%
Biodiesel	0.15	0.05	1.25	2.2	15.4%
Ethanol	0.28	0.09	1.35	2.4	11.0%
Electricity	5.83	19.6	13.30	23.2	5.7%
Biomass	7.29	24.5	10.39	18.2	2.4%
Total	**29.81**	**100.0**	**57.22**	**100.0**	**4.4%**

FUEL INPUT TO POWER GENERATION MIX: IN MTOE



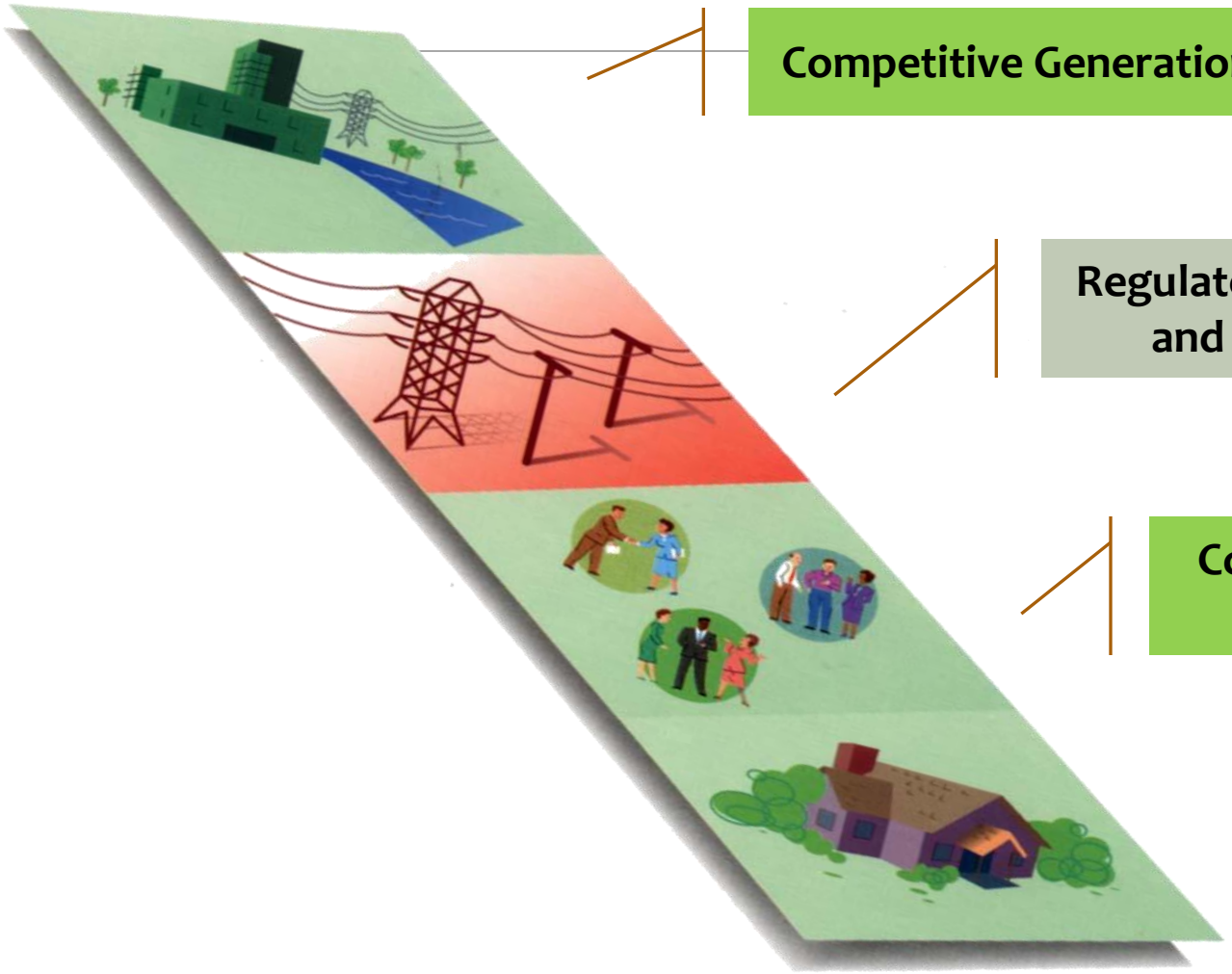
Fuel	2015		2030 - CES		AAGR (2015-2030)
	MTOE	% Shares	MTOE	% Shares	
Coal	9.26	36.7	27.74	49.5	7.6%
Natural Gas	2.70	10.7	4.63	8.2	3.7%
Oil	1.41	5.6	1.22	2.2	-1.0%
Renewable*	11.87	47.0	20.00	35.7	3.5%
Other Technology	-	-	2.48	4.4	
Total	**25.24**	**100.0**	**56.01**	**100.0**	**5.5%**

**geothermal, hydro, biomass, biofuels, wind & solar*

Investment Opportunities

Power Sector

Power Supply Chain



Competitive Generation

Regulated Transmission and Distribution

Competitive Retail Supply

End-Users

- **Contestable**
- **Captive**

Power Sector Situation

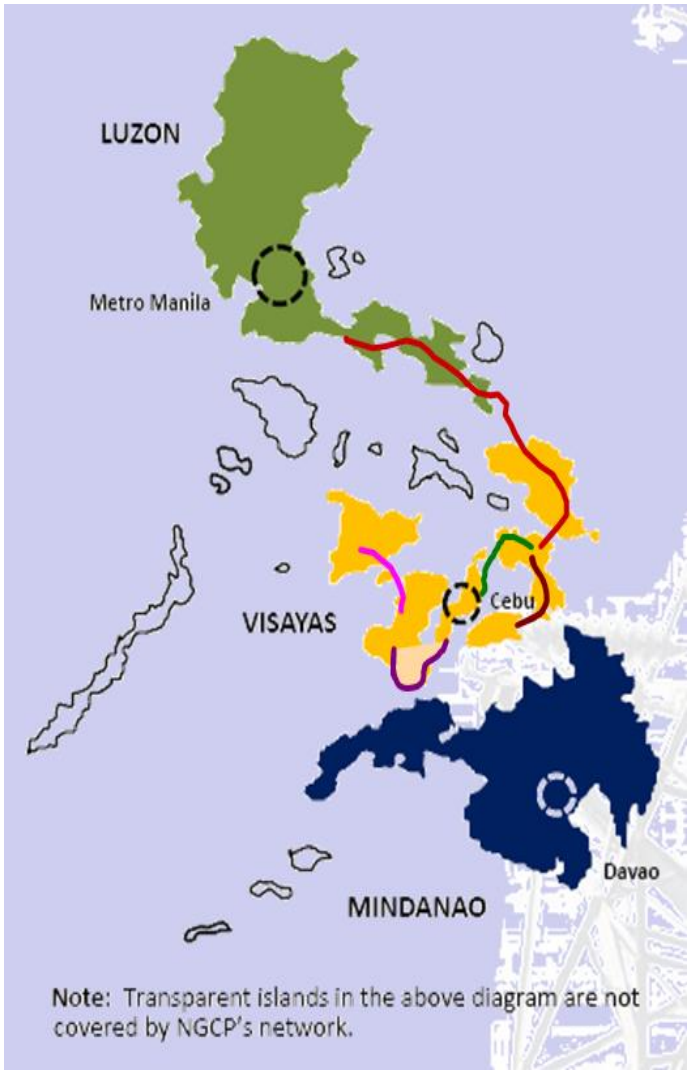
Capacity by Plant Type

FUEL TYPE	PHILIPPINES			
	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
Coal	6,484	6,135	32.6	35.1
Oil Based	3,634	2,707	18.3	15.5
Natural Gas	2,872	2,780	14.5	15.9
Geothermal	1,917	1,694	9.7	9.7
Hydro	3,609	3,120	18.2	17.8
Wind	427	383	2.1	2.2
Solar	684	524	3.4	3.0
Biomass	233	157	1.2	0.9
TOTAL	19,861	17,500	100	100

Note: Assuming all units of power plants are in operation.
Installed and Dependable capacity as of 30 June 2016
Excluding off –grid generators

Interconnection Line Capacity

- **Leyte-Luzon (440 MW)**
- **Leyte-Cebu (400 MW)**
- **Cebu-Negros (200 MW)**
- **Negros – Panay (100 MW)**
- **Leyte-Bohol (100 MW)**



LUZON DEMAND-SUPPLY OUTLOOK 2016-2020

2016

Aug: ***82 MW Anda Coal****
100 MW Avion Natgas*
450 MW San Gabriel Natgas*
6.1 MW AseaGas Biogas
3.5 MW Bicol Biomass
0.75 MW ACNPC WTE Bio Ph1

2016

Sep***:*** *18 MW Bataan Solar*
7.48 MW Dalayap Solar
*8.84 MW Armenia Solar **
1.68 MW CW Home Depot Solar
3.8 MW San Rafael Solar
*5.0 MW Morong Solar**
1 MW Sarrat Solar
Nov: ***150 MW Limay Coal U1***
Dec***:*** ***7.1 MW Sta Rita Solar Ph1****

2017

Feb: ***200 MW EWC U1***
May: ***200 MW EWC U2***
Jul: ***10.8 MW SJCIPower Bio P2***
150 MW Limay Coal U2
Aug: *12 MW Maibarara 2 Geo*
250 MW EWC U3
Nov: 420 MW Pagbilao 3

2018

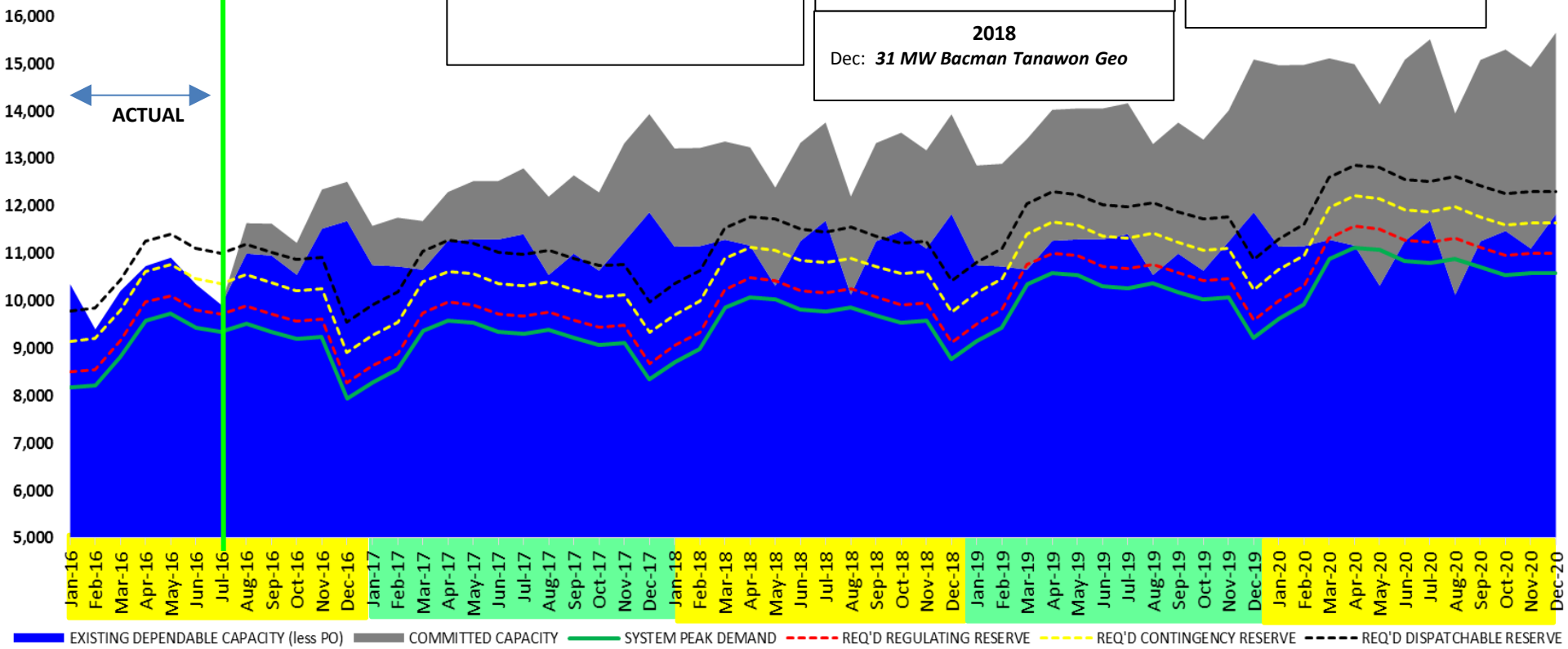
Dec: ***31 MW Bacman Tanawon Geo***

2019

Feb: 60 MW Kapangan HEPP
Mar: *600 MW GN Dinginin 1*
Sep: 1 MW Prismc HEPP
Dec: 500 MW SBPL

2020

Jan: ***600 MW GN Dinginin 2***
Mar: 1.5 MW Tubao MHEPP



Notes

a. Existing Dependable Capacity factoring in planned maintenance schedule based on NGCP GOMP
b. Committed Capacity based on DOE's List of Power Projects as of 31 July 2016
c. 8.4 % peak demand growth rate for 2016 based on the DOE's High GDP Demand Forecast.
d. 5.1 % average peak demand rate for 2017-2020 based on the DOE's High GDP Demand Forecast.
e. Required Reserve Margin (RM) i.e. 4% regulating reserve and contingency and dispatchable reserve requirement

* On-going testing and commissioning
Bold & italized – with changes on schedule; new entry

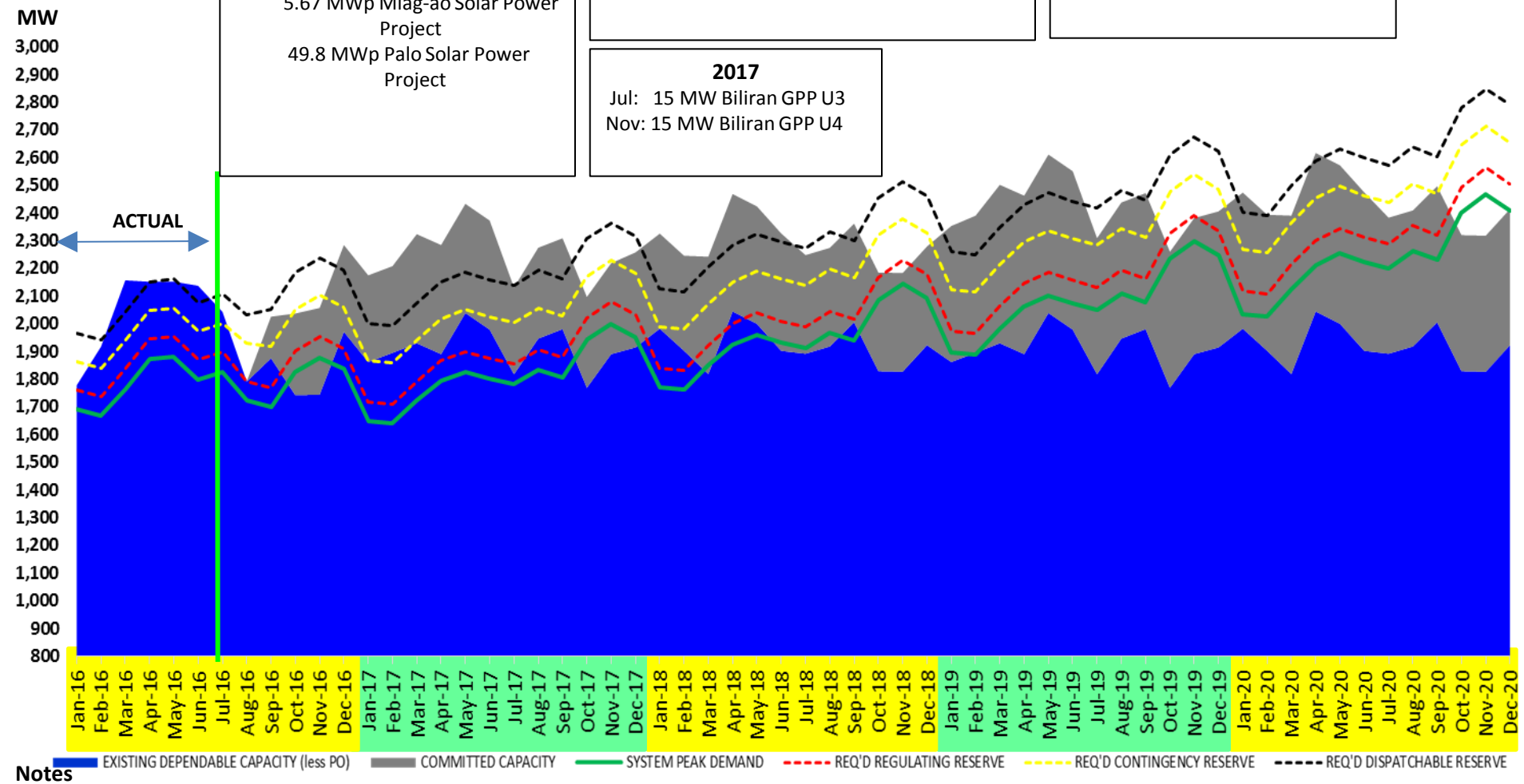
As of July 2016

Summary of Luzon Power Projects as of 31 July 2016

Type of Power Plant	Committed			Indicative		
	No. of Proponents	Capacity (MW)	% Share	No. of Proponents	Capacity (MW)	% Share
Coal	6	2,502.0	64.4	9	6,200.0	64.1
Oil-Based	0	0.0	0.0	3	196.0	2.0
Natural Gas	3	1,200.0	30.9	2	850.0	8.8
Renewable Energy	16	181.4	4.7	51	2,422.6	25.1
Geothermal	*2*	*43.0*	*1.1*	*1*	*80.0*	*0.8*
Hydro	*3*	*62.5*	*1.6*	*30*	*743.6*	*7.7*
Biomass	*4*	*22.9*	*0.6*	*2*	*16.3*	*0.2*
Solar	*7*	*53.0*	*1.4*	*13*	*585.7*	*6.1*
Wind	*0*	*0.0*	*0.0*	*5*	*997.0*	*10.3*
TOTAL	**25**	**3,883.4**	**100.0**	**65**	**9,668.6**	**100.0**
Battery Storage*	1	10.0		2	230.0	

** for accounting purposes; declared capacity for Ancillary Services (AS) to the system

VISAYAS DEMAND-SUPPLY OUTLOOK 2016-2020



Notes

a. Existing Dependable Capacity factoring in planned maintenance based on NGCP GOMP 2016-2018

b. Reserve Margin (RM) i.e. 4% regulating reserve and largest online unit for contingency reserve (CR) and dispatchable reserve (DR) requirement (103 MW to increase by 150 MW for CR and 135 MW for DR in 2016)

c. Committed Capacity Based on DOE's List of Power Projects as of 31 July 2016

d. 6.3 % peak demand growth rate for 2016 based on the DOE's High GDP Demand Forecast. 7.3 % average peak demand rate for 2017-2020 based on the DOE's High GDP Demand Forecast.

* On-going testing and commissioning

Bold & italized – with changes on schedule; new entry

As of July 2016

Summary of Visayas Power Projects (as of 31 July 2016)

Type of Power Plant	Committed			Indicative		
	No. of Proponents	Capacity (MW)	% Share	No. of Proponents	Capacity (MW)	% Share
Coal	2	420.0	69.2	3	900.0	34.7
Oil-Based	1	8.0	1.3	1	10.0	0.4
Natural Gas	0	0.0	0.0	0	0.0	0.0
Renewable Energy	6	178.6	29.5	22	1,680.3	64.9
Geothermal	1	50.0	*8.3*	1	40.0	*1.6*
Hydro	2	13.1	*2.2*	10	101.7	*3.9*
Biomass	0	0.0	*0.0*	2	78	*3.0*
Solar	3	115.5	*19.0*	6	321.6	*12.4*
Wind	0	0.0	*0.0*	3	1,139.0	*44.0*
TOTAL	9	606.6	100.0	26	2,590.3	100.0
Battery Storage**	0	0.0		3	100.0	

** for accounting purposes; declared capacity for Ancillary Services (AS) to the system

MINDANAO DEMAND-SUPPLY OUTLOOK 2016-2020

2016

Aug: ***135 MW FDC Coal U1****
150 MW SMC Davao Coal U1*
2.6 MW GEEC Biomass Cogen
1.6 MW PTCI Biomass *

2016

Sep: 135 MW FDC Coal U2
135 MW FDC Coal U3
Oct: 10 MW LPC Biomass
Nov: 13.94 MW PSI DPP
150 MW SMC Davao Coal U2
Dec: 5.2 MW PSFI DPP

2017

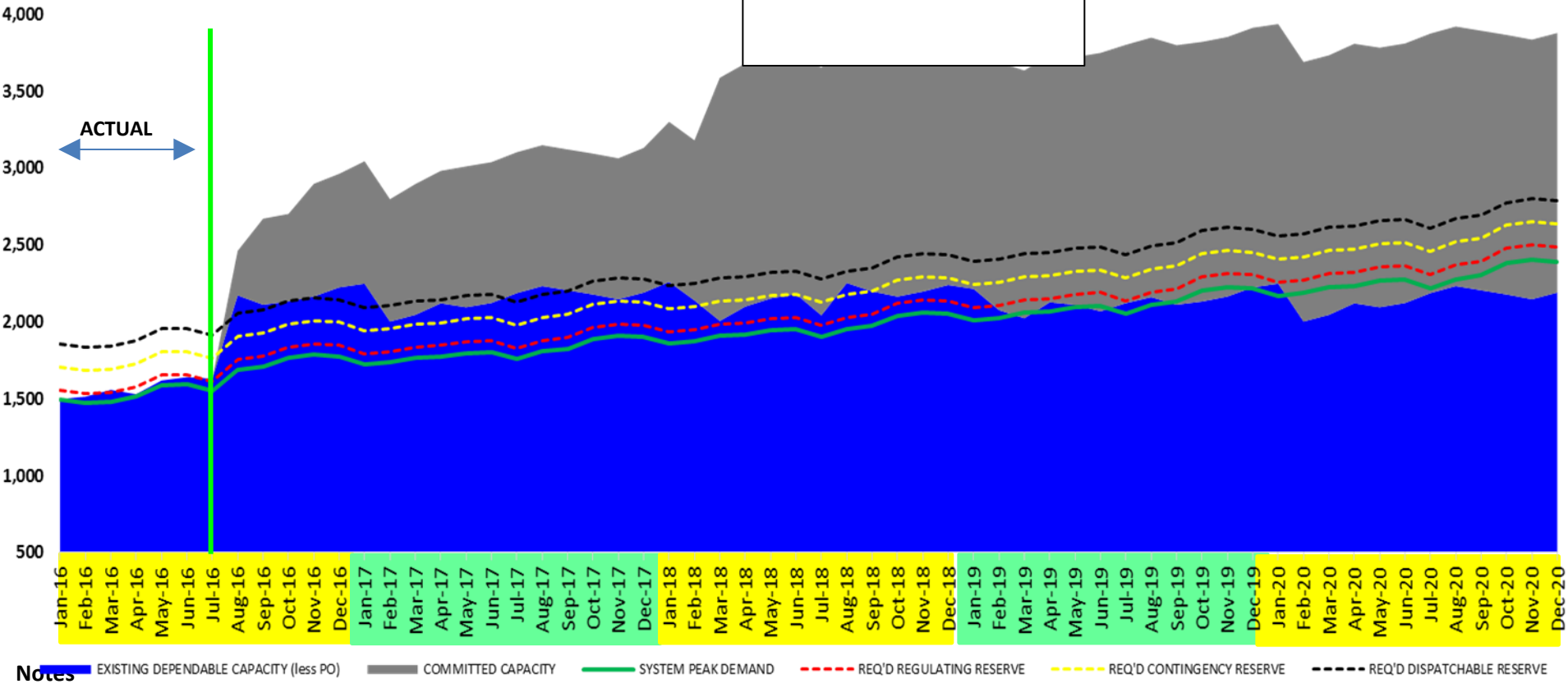
Jan: 55 MW Minergy Coal 1
2.4 MW New Bataan Hydro
Mar: 55 MW Minergy Coal 2
Apr: 10.4 MW PBI DPP
May: 55 MW Minergy Coal 3
Jun: : 43.4 Manolo Fortich 1 HEPP
25.4 Manolo Fortich 2 HEPP
Dec: ***25 MW Lake Mainit HEPP***

2018

105 MW SEC Coal U2
Mar: 4x135 MW GNPower Coal 1, 2, 3, 4
Jul: 30 MW Puyo HEPP

2019

Aug: 8 MW Asiga HEPP



Notes

a. Existing Dependable Capacity factoring in planned maintenance based on NGCP GOMP 2016-2018
b. Reserve Margin (RM) i.e. 4% regulating reserve and largest online unit for contingency reserve (CR) and dispatchable reserve (DR) requirement (105 MW to increase by 150 MW for CR and DR in 2016)
c. Committed Capacity Based on DOE's List of Power Projects as of 31 July 2016
d. 17.7 % peak demand growth rate for 2016 based on the DOE's High GDP Demand Forecast. 8.0 % average peak demand rate for 2017-2020 based on the DOE's High GDP Demand Forecast.

* On-going testing and commissioning
Bold & italized – with changes on schedule; new entry

As of July 2016

Summary of Mindanao Power Projects (as of 31 July 2016)

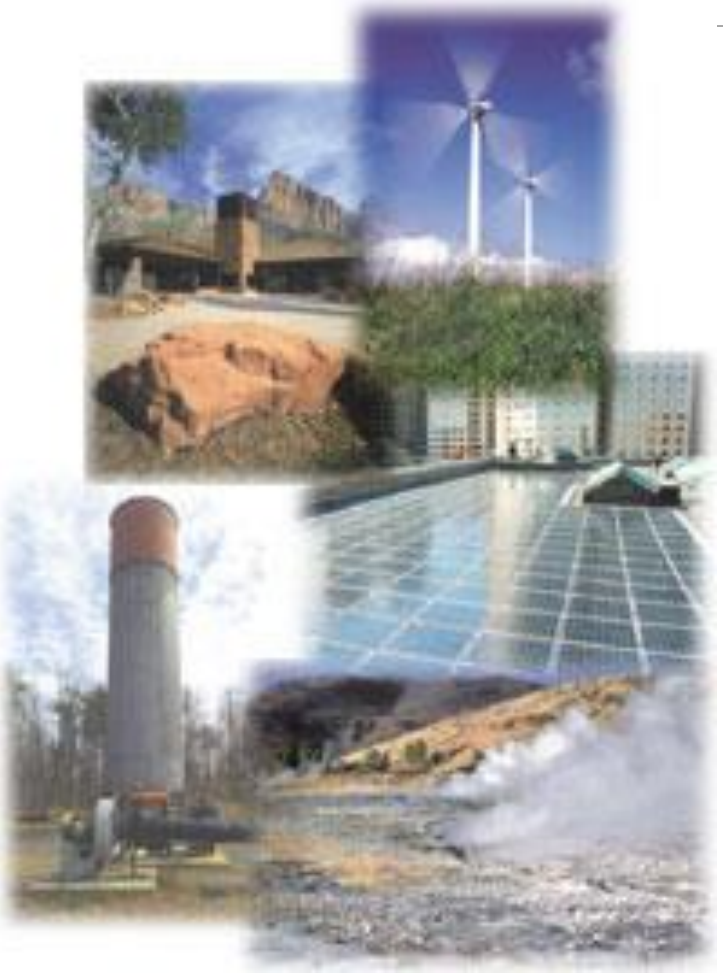
Type of Power Plant	Committed			Indicative		
	No. of Proponents	Capacity (MW)	% Share	No. of Proponents	Capacity (MW)	% Share
Coal	5	1,510.0	89.5	5	1,733.0	67.5
Oil-Based	3	29.5	1.7	1	10.9	0.4
Natural Gas	0	0.0	0.0	0	0.0	0.0
Renewable Energy	8	148.4	8.8	26	822.9	32.1
Geothermal	0	0.0	*0.0*	1	40.0	*1.6*
Hydro	5	134.2	*8.0*	15	498.6	*19.4*
Biomass	3	14.2	*0.8*	4	46.3	*1.8*
Solar	0	0.0	*0.0*	6	238.0	*9.3*
Wind	0	0.0	*0.0*	0	0.0	*0.0*
TOTAL	16	1,687.9	100.0	32	2,566.8	100.0

Energy Sources

Investment Opportunities

Renewable Energy

Renewable Energy



- **Bi**omas / **Bi**ofuels
- **G**eothermal
- **S**olar Power
- **H**ydropower
- **O**cean
- **W**ind Power

Policy Mechanisms - Renewable Energy

Feed-in-Tariff (FIT)

- Guaranteed tariff for 20 yrs (eligibility – DOE; rates – ERC)
- Priority or must dispatch

Net-Metering Rules and Interconnection Standards

- Connection / sale of customers' RE generation to the grid
  - The ERC approved the Net Metering Rules last May 27, 2013
  - Monitored capacity addition were 1.984.41 MWp
  - 428 Net Metering Customers with 2,380.98 kWp

Renewable Portfolio Standards (RPS) for On-grid and Off-Grid Areas*

- Mandated minimum percentage of RE generation

Green Energy Option Program*

- End-users' option to purchase electricity from RE facilities (open access)

**For Department of Energy's finalization*

Investment Opportunities

Coal

Summary of Regional Coal Reserves

(in Million Metric Tons)

QUEZON
Resource Potential - 2.00
In-situ Reserves - 0.09

MINDORO
Resource Potential - 100.00
In-situ Reserves - 1.44

SEMIRARA
Resource Potential - 570.00
In-situ Reserves - 112.32

NEGROS
Resource Potential - 4.50
In-situ Reserves - 2.01

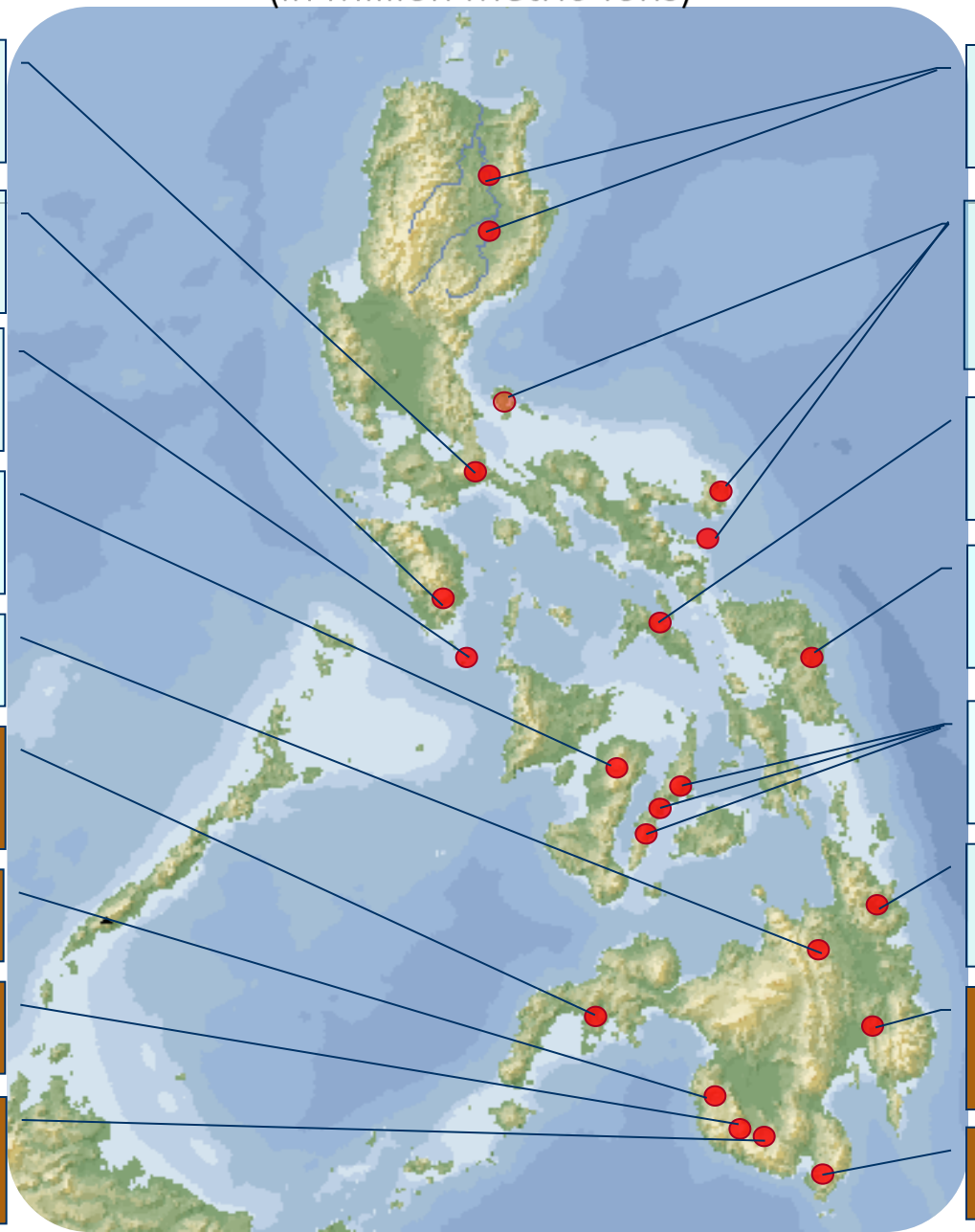
BUKIDNON
Resource Potential - 50.00

ZAMBOANGA
Resource Potential - 45.00
In-situ Reserves - 37.99

MAGUINDANAO
Resource Potential - 108.00

SULTAN KUDARAT
Resource Potential - 300.30

SOUTH COTABATO
Resource Potential - 230.40
In-situ Reserves - 81.07



CAGAYAN VALLEY
Resource Potential - 336.00
In-situ Reserves - 82.57

BATAN-POLILLO-CATANDUANES
Resource Potential - 17.00
In-situ Reserves - 6.02

MASBATE
Resource Potential - 2.50
In-situ Reserves - 0.08

SAMAR
Resource Potential - 27.00
In-situ Reserves - 8.59

CEBU
Resource Potential - 165.00
In-situ Reserves - 11.63

SURIGAO
Resource Potential - 209.00
In-situ Reserves - 69.55

DAVAO
Resource Potential - 100.00
In-situ Reserves - 0.21

SARANGANI
Resource Potential - 120.00

Investment Opportunities

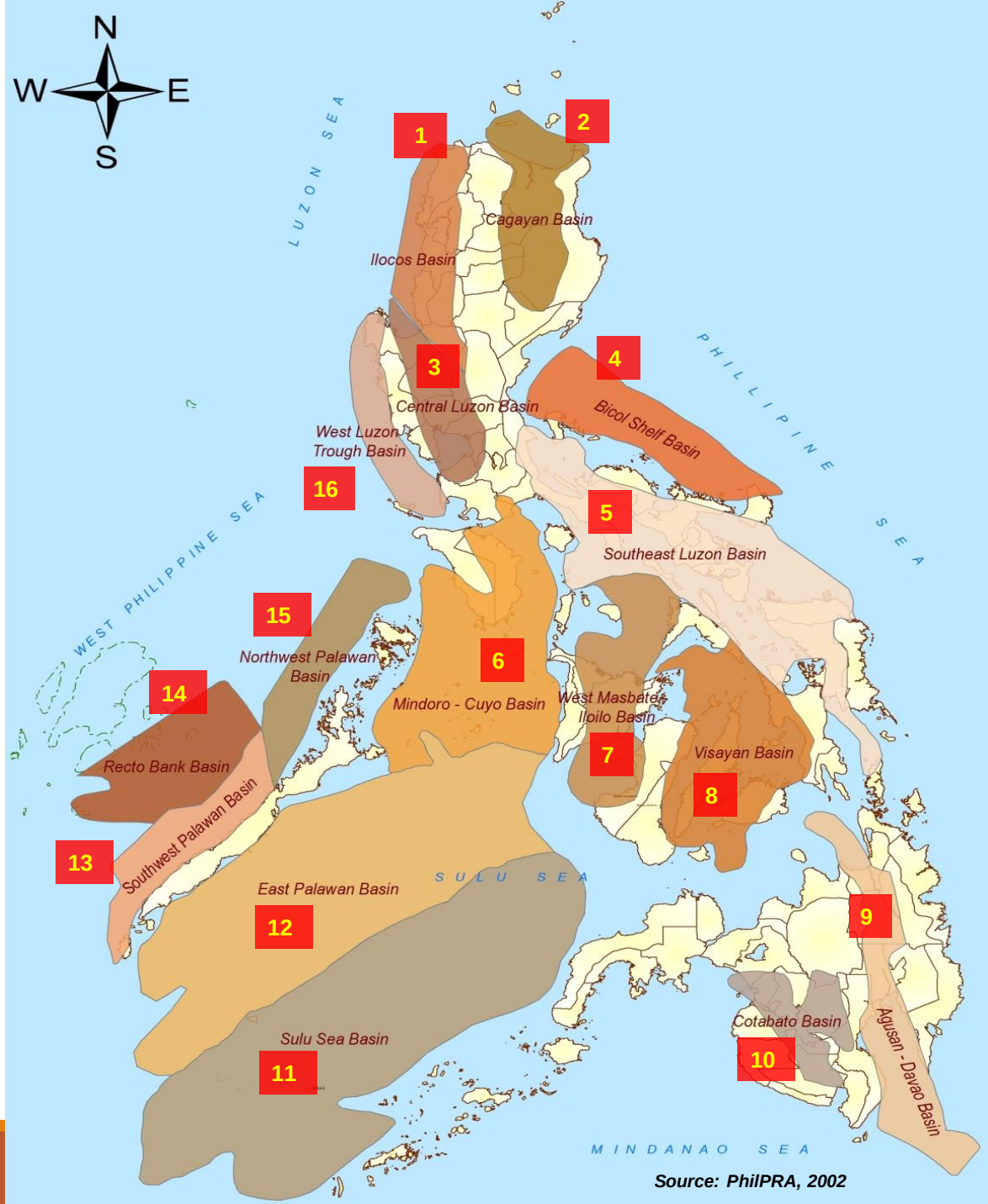
Oil & Gas

Areas of Opportunities

Philippines:

- **16** Sedimentary basins representing an
- area of over 700,000 sq km
- Combined potential of 4,777 MMBFOE

1. Ilocos Shelf
2. Cagayan Basin
3. Central Luzon Basin
4. Bicol Shelf
5. Southeast Luzon Basin
6. Mindoro-Cuyo Basin
7. West Masbate-Iloilo Basin
8. Visayan Basin
9. Agusan-Davao Basin
10. Cotabato Basin
11. Sulu Sea Basin
12. East Palawan Basin
13. Southwest Palawan Basin
14. Reed Bank Basin
15. Northwest Palawan Basin
16. West Luzon Trough



Investment Opportunities

Natural Gas

Natural Gas in Philippines

Shell Refinery

Malampaya Gas Field
2.7 TCF (2001)

CNG Bus (2008)

Libertad Gas Field
0.6 BCF (2012)

1MW DESCO
(Onsite/Mine mouth
Power Plant)

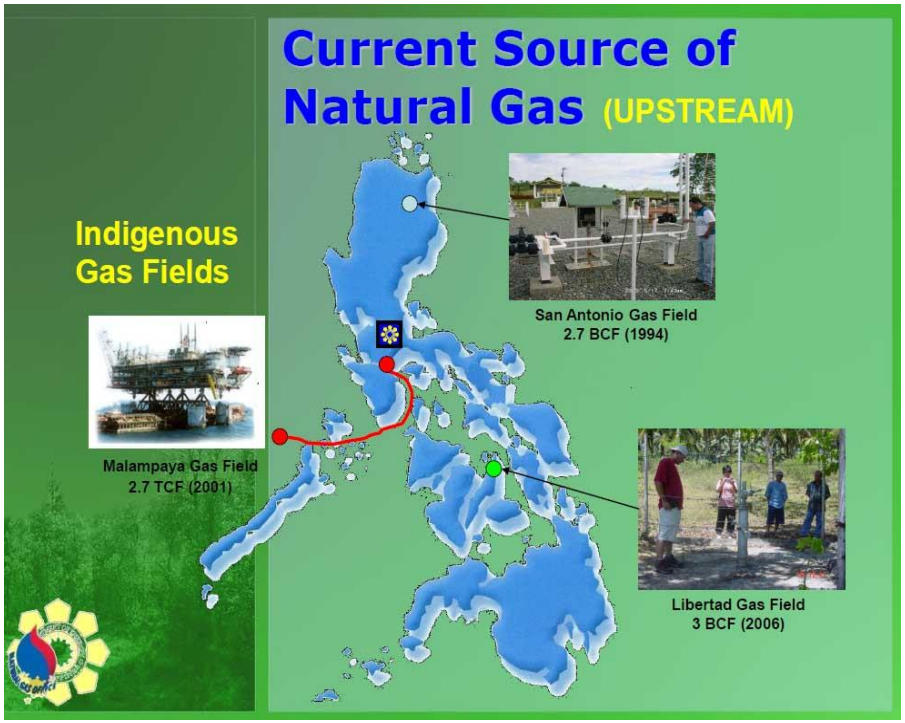
560 MW San Lorenzo
First Gen/ IPP

1,000 MW Sta. Rita
First Gen/ IPP

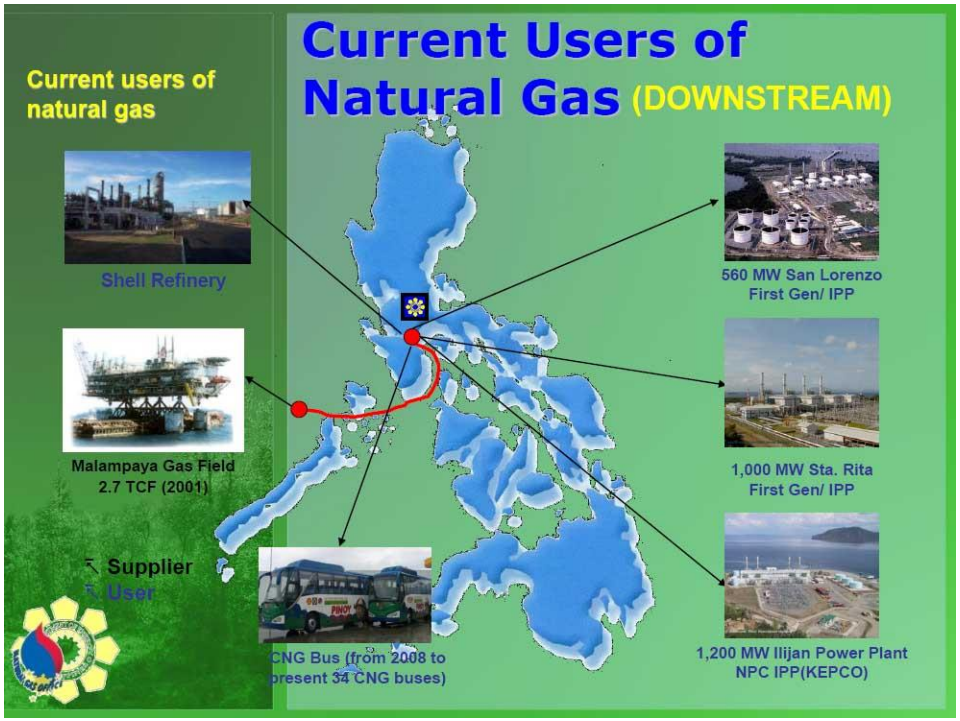
1,200 MW Ilijan Power Plant
NPC IPP(KEPCO)

Natural Gas Industry

Natural Gas Supply



Natural Gas Demand



Natural Gas Infrastructure

- Develop strategic infrastructure for receiving, storage, transmission and distribution
- Promote use of natural gas beyond power
- Serve as major alternative fuel for transport especially public transport

BATMAN 2
(Bataan - Manila)
140 kms. (2020)

ET LOOP
(EDSA – Taft Loop)
40 kms. (2020)

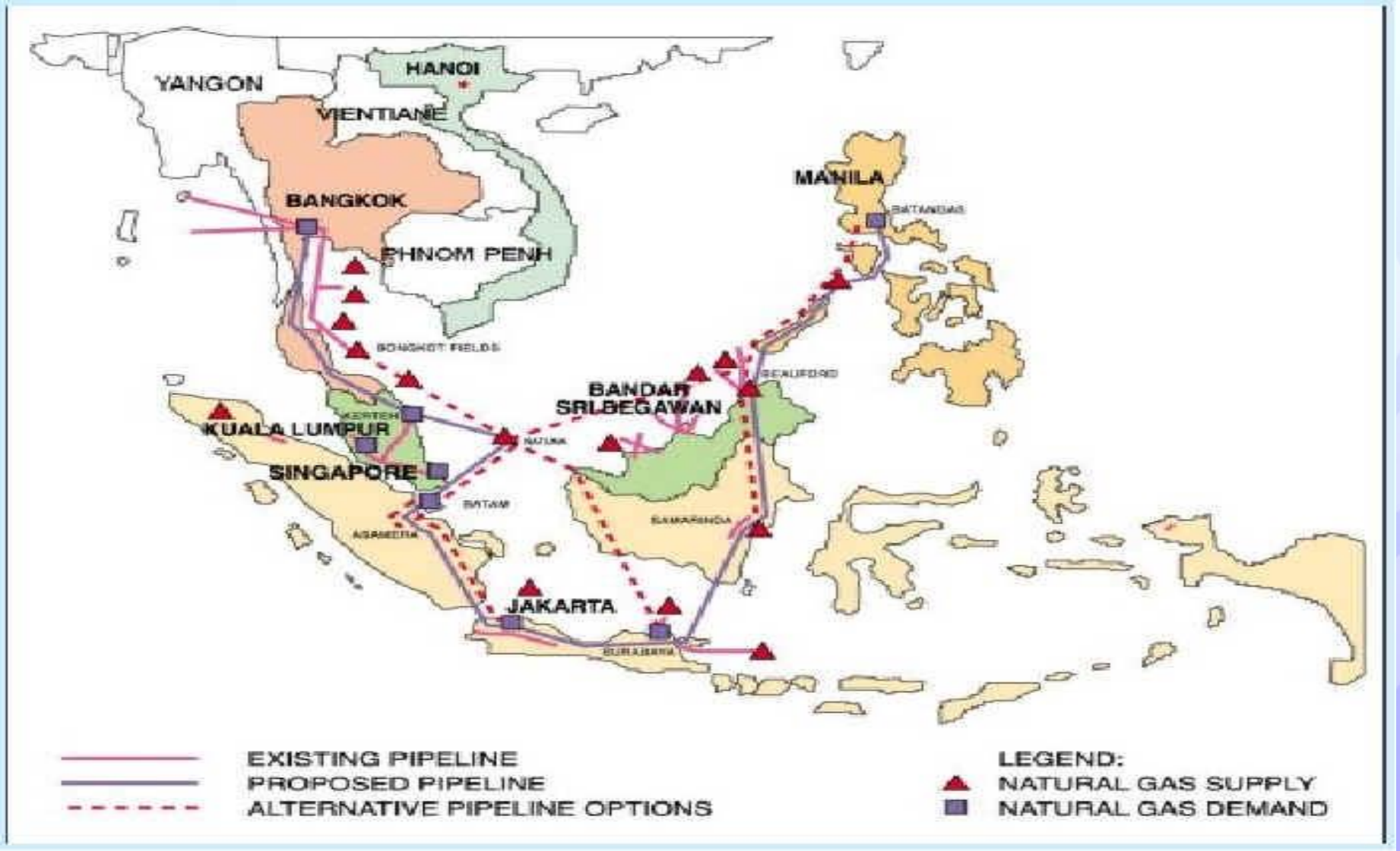
SU-MA
(Sucat - Malaya)
35 kms. (2017)

BATCAVE
(Batangas – Cavite)
40 kms (2022)

BATMAN 1
(Batangas Manila)
80-100 kms. (2015-17)

As of May 2016

Trans-ASEAN Gas Pipeline



Investment Opportunities

Alternative Fuels

Alternative Fuels for Transport

BIOFUELS

B2 E10

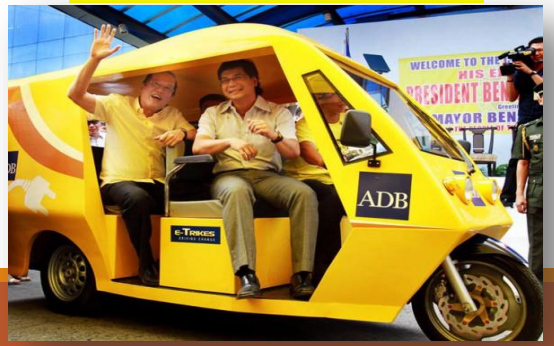
biodiesel

bioethanol

AUTO-LPG

CNG

E-TRIKE



Investment Opportunities

Energy Efficiency and Conservation

Energy Efficiency & Conservation Roadmap

Sector	Short Term	Medium Term	Long Term	2030 Objectives
	2014-2015	2016-2020	2021-2030	
Transport	▪ Fuel Efficiency Standards developed all vehicles ▪ • Risk management on vehicle conversion, e-vehicle programs ▪ • Re-formulated coordination mechanisms	▪ Financial incentives for EE through vehicle taxes ▪ Promotion of key vehicle technologies ▪ Driver education and fleet management pro-grams	▪ EE programs beyond road transport (passenger and cargo ships, aviation fuels) ▪ Reintegration of urban planning and transport energy use	▪ 40 % Reduction in energy intensity compared to 2010 baseline ▪ Decreased Energy consumption of 1.6% per year against baseline forecasts ▪ Savings of approx. 10,665 KTOE p.a. (one-third of current demand) by 2930
Industry	▪ Link existing training projects with ESCO capacity building ▪ Develop sectoral focus programs to facilitate EE in energy intensive industries (e.g. cement and construction, sugar)	▪ Develop standards for motors ▪ Facilitate example models including ESCOs, finance ▪ Implement demand response programs ▪ Review of energy pricing	▪ Review inward investment rules for EE to remove distortions	
Residential Buildings	▪ Enforceable minimum energy standards for appliances, with a focus on space cooling and refrigeration ▪ Building envelope measures – cool roofs and insulation	▪ Develop role of utilities as key implementation partners and information providers ▪ Specific EE programs for low-income house-holds	▪ Towards energy efficient housing precincts ▪ Inclusion of residential measures in Building Code	

Energy Efficiency & Conservation Roadmap

Sector	Short Term	Medium Term	Long Term	2030 Objectives
	2014-2015	2016-2020	2021-2030	
Commercial Buildings	▪ Reformulate group to oversee EE measures in Building Code ▪ Retro-commissioning program for existing buildings ▪ Benchmarking and ratings for building information & reporting	▪ EE measures for inclusion in national building code ▪ Government demonstration retrofits to show-case ESCOs and financing models ▪ Promote green building ratings	▪ Incentive funds in place for EE, including private financiers ▪ Mandatory disclosure of commercial building performance	▪ 40 % Reduction in energy intensity compared to 2010 baseline ▪ Decreased Energy consumption of 1.6% per year against baseline forecasts ▪ Savings of approx. 10,665 KTOE p.a. (one-third of current demand) by 2030
Cross-Sectoral	▪ Support passage of Enercon Bill ▪ Establish EE database, data collection regime, M&E framework ▪ Establish enforcement regimes ▪ Strengthen ESCO capacity ▪ Continue awareness-raising	▪ National strategy for efficiency in power supply sector ▪ Stronger coordination with other levels of government (LGUs) ▪ Regular reporting and monitoring to commence	▪ Energy Efficiency and Conservation Center mandated and established	

Acknowledgement:

Department of Energy

Energy Planning and Policy Bureau
Power Industry Management Bureau
Renewable Energy Management Bureau
Energy Resource Development Bureau
Oil Industry Management Bureau
Energy Utilization Management Bureau

and the
Investment Promotion Office

THANK YOU