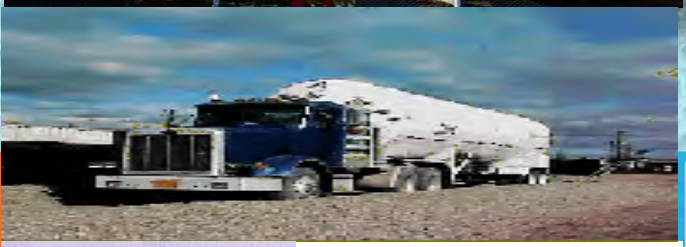


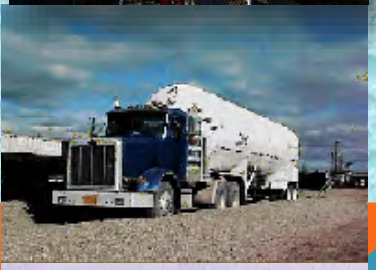
Natural Gas Infrastructure Development

(Philippine Downstream Natural Gas Industry)

Philippine Infrastructure Seminar
New World Hotel, Makati City
23 February 2015

Ma. Laura L. Saguin
Natural Gas Management Division
Oil Industry Management Bureau
Department of Energy

DISCUSSION OUTLINE



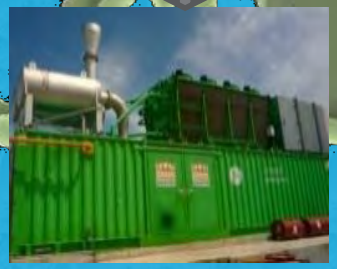
- Understanding the Philippine Natural Gas Industry
- Natural Gas Infrastructure Development Program
- Challenges

OVERVIEW OF THE NATURAL GAS INDUSTRY

Shell Refinery,
Tabangao, Batangas

1. Malampaya Gas Field
Northwest Palawan
2.7 TCF (2001)

2. Libertad Gas Field
Bogo, Cebu
0.6 *BCF* (2012)



1.0 MW DESCO
(Mine mouth
Power Plant),
Bogo Cebu

OGP

1

2

500 MW San Lorenzo
First Gen/ IPP

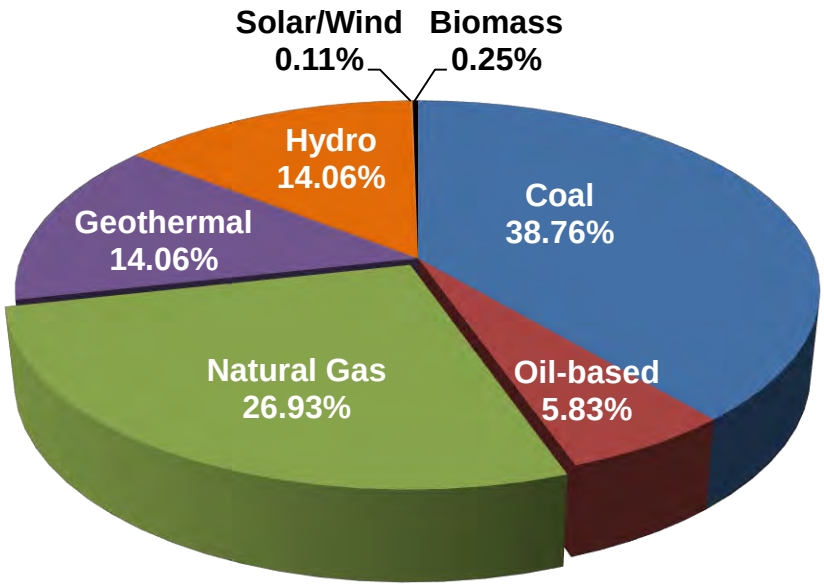
1,000 MW Sta. Rita
First Gen/ IPP

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

CNG Pinoy
Buses(2008)

POWER GENERATION MIX

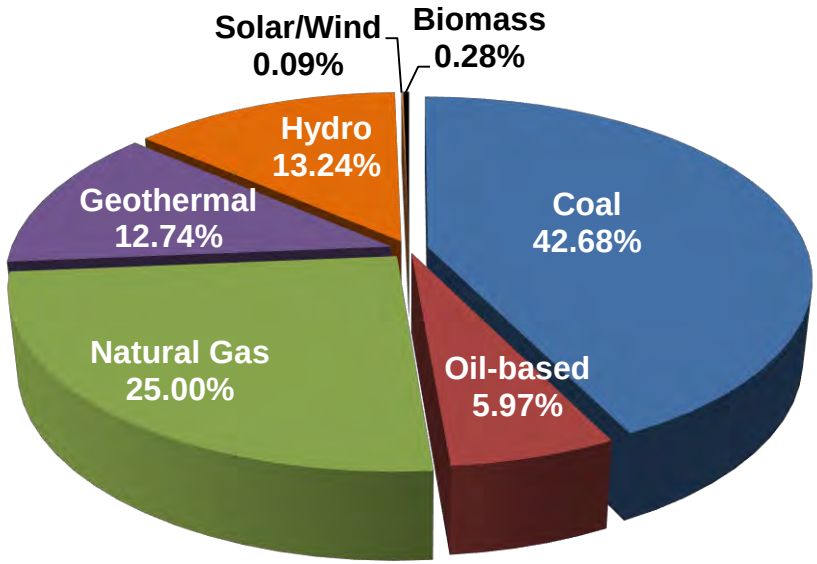
2012



Total Generation: 72,922.01 GWh

RE - 28.5 %
Green Energy (RE + Nat Gas) – 55.4 %

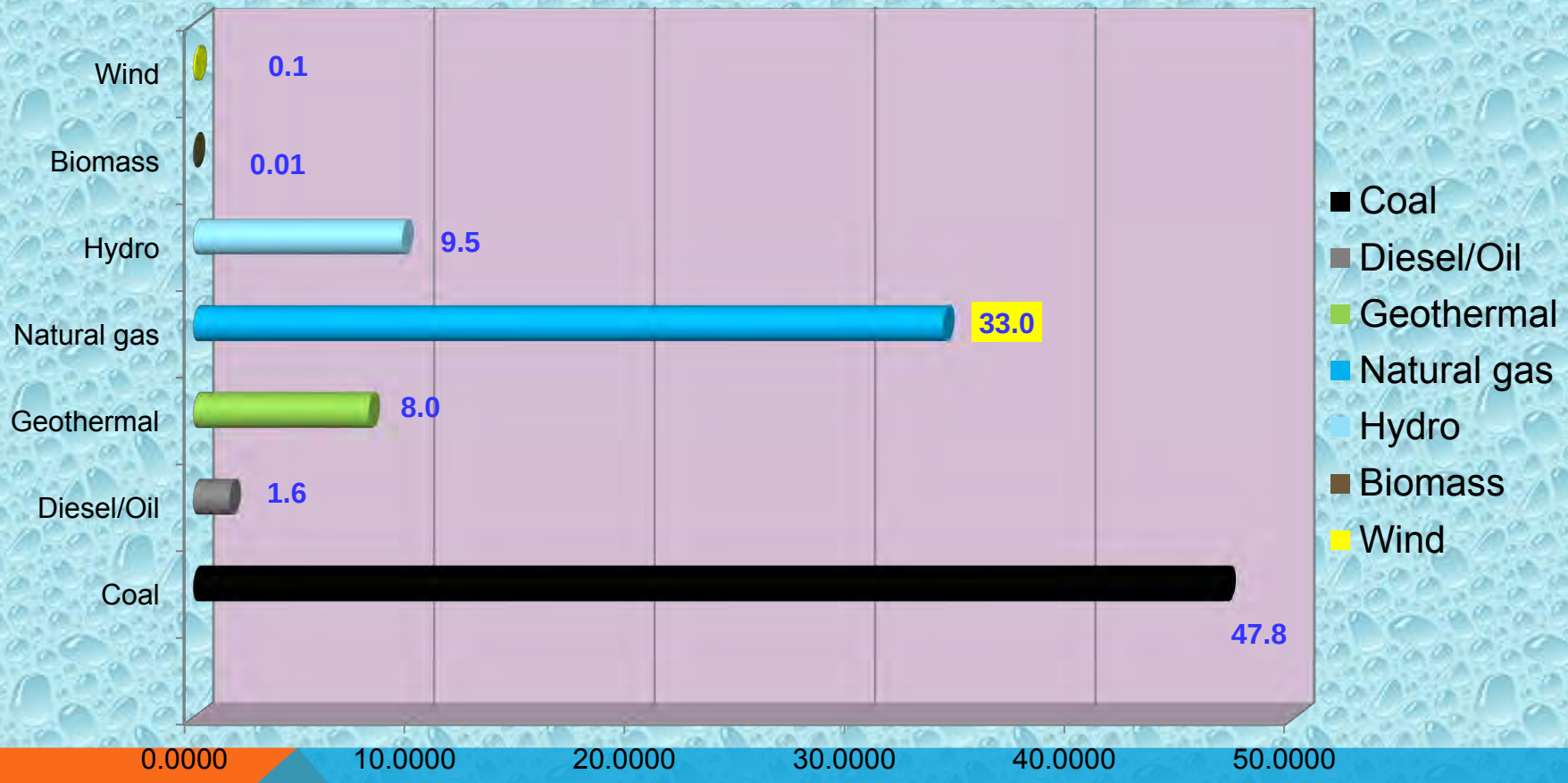
2013 (preliminary)



Total Generation: 75,172.86 GWh

RE - 26.4 %
Green Energy (RE + Nat Gas) – 51.3 %

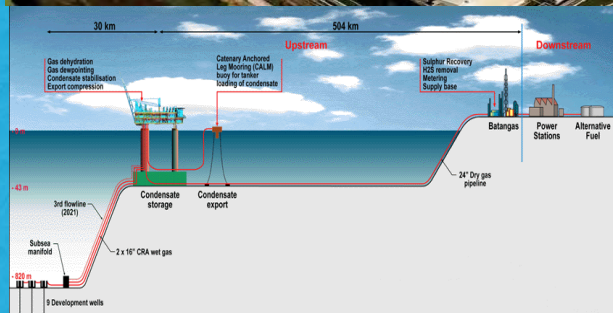
2014 LUZON GENERATION MIX



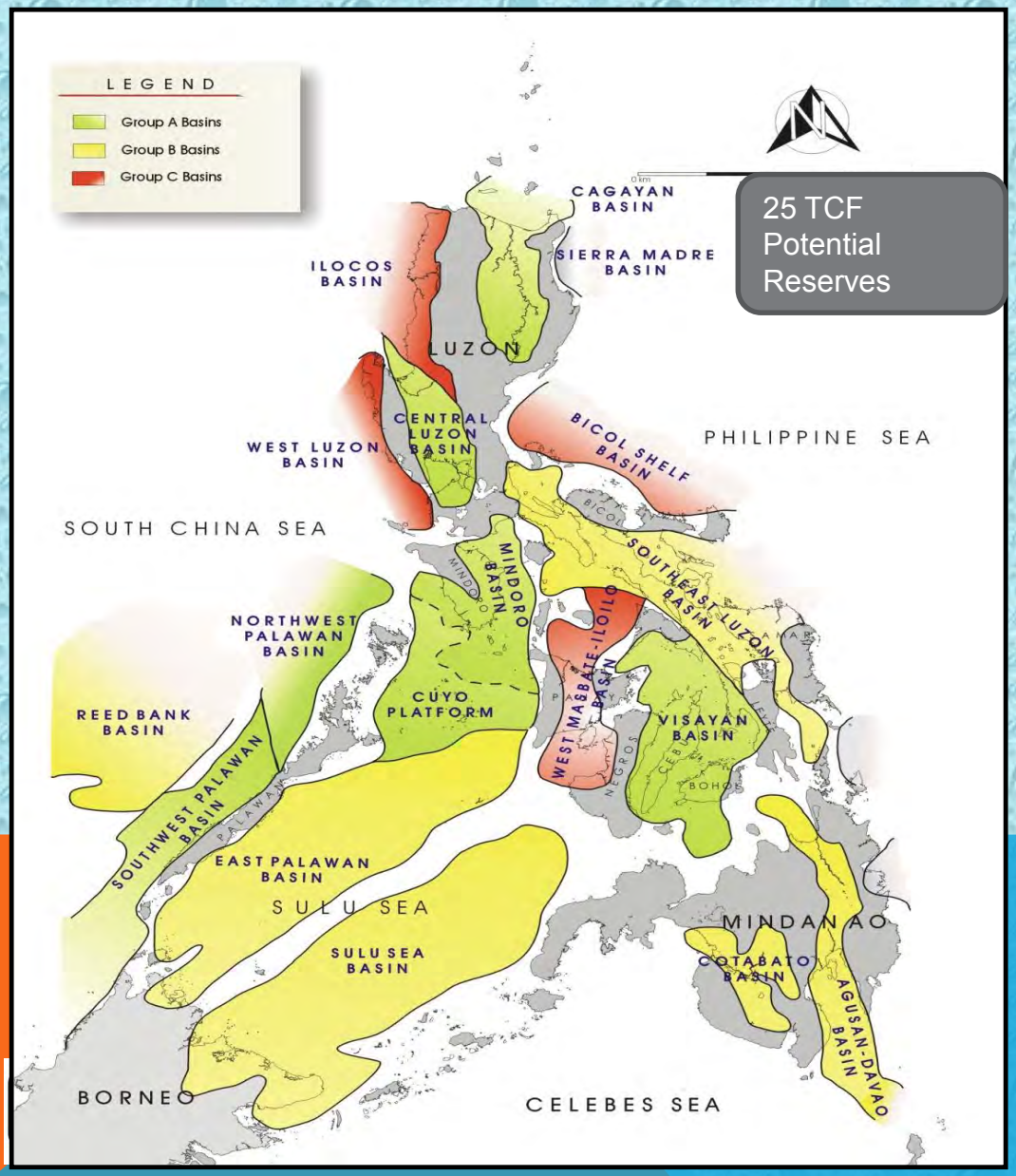
Natural Gas Contributes 33% to the Luzon Generation Mix

CURRENT STATUS OF NATURAL GAS SUPPLY

- Gas comes from the Malampaya field transported via a 504 km pipeline to Batangas
- Recoverable Reserve end of field life is 3.08 to 3.29 TCF
- Gas delivery commenced in 2002 with five gas sales and purchase agreements (GSPA)
- Total committed under existing GSPA is 2.7 TCF of natural gas: 2,700 MW of power stations + 100 MW Avion in 2015 and 1 oil refinery
- 2700 MW Power Plants operate as baseload resources for the most part, while the 100 MW Avion as mid-merit
- Installation of compressor platform in March 2015
- No significant additional onshore markets



POTENTIAL SOURCE OF NATURAL GAS SUPPLY



PETROLEUM BASIN PROSPECTIVITY MAP

Most Prospective Basins

1. NW Palawan Basin
2. SW Palawan Basin
3. Sulu Sea Basin
4. Cagayan Basin
5. Visayan Basin
6. Central Luzon Basin
7. Mindoro-Cuyo Platform

Prospective Basins

1. East Palawan Basin
2. Reed Bank Basin
3. SE Luzon Basin
4. Agusan-Davao Basin
5. Cotabato Basin

Frontier Basins

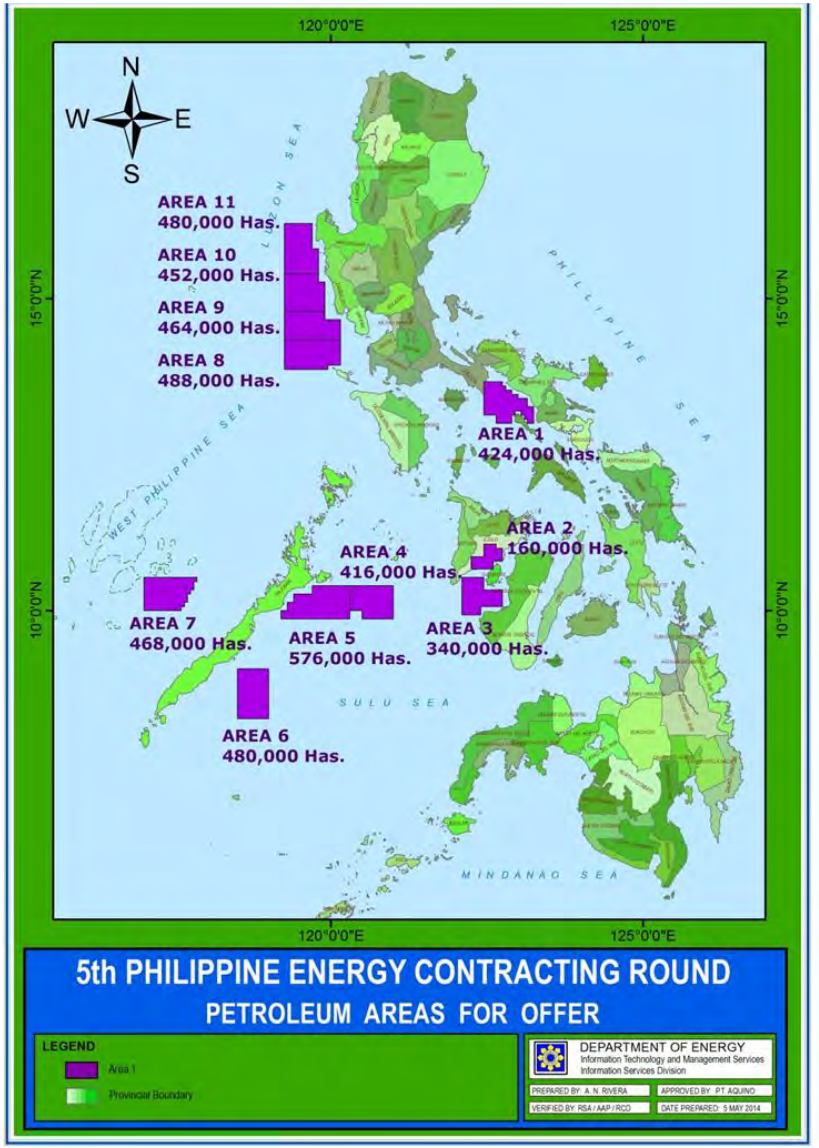
1. West Luzon Basin
2. West Masbate-Iloilo Basin
3. Ilocos Basin
4. Bicol Shelf Basin

PHILIPPINE ENERGY CONTRACTING ROUND

PECR5 OFFERED AREAS

Petroleum: 11 areas

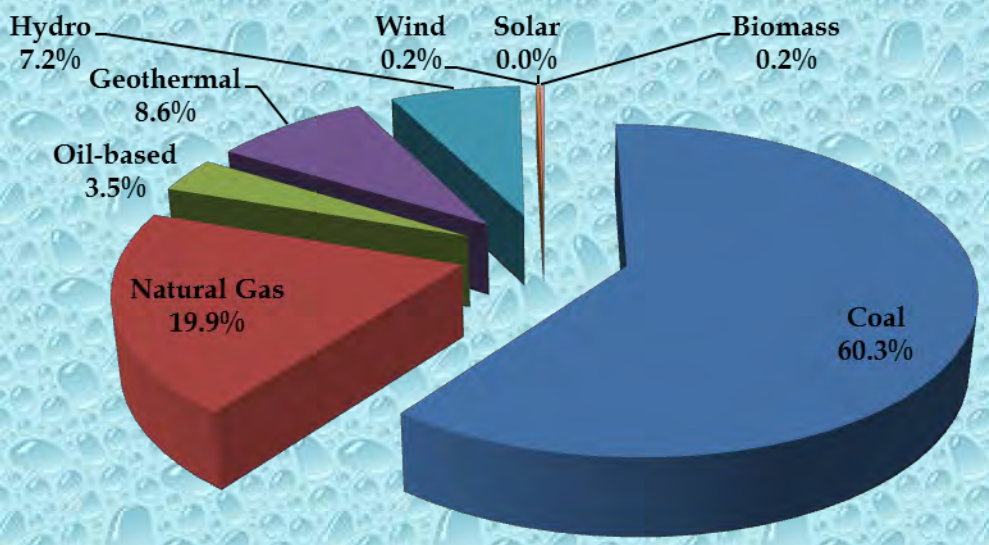
Area 1: Southeast Luzon Basin
Area 2: Iloilo-West Masbate Basin
Area 3: Iloilo-West Masbate Basin
Area 4: East Palawan Basin
Area 5: East Palawan Basin
Area 6: East Palawan Basin
Area 7: Recto Bank Basin
Area 8: West Luzon Trough/Basin
Area 9: West Luzon Trough/Basin
Area 10: West Luzon Trough/Basin
Area 11: West Luzon Trough/Basin



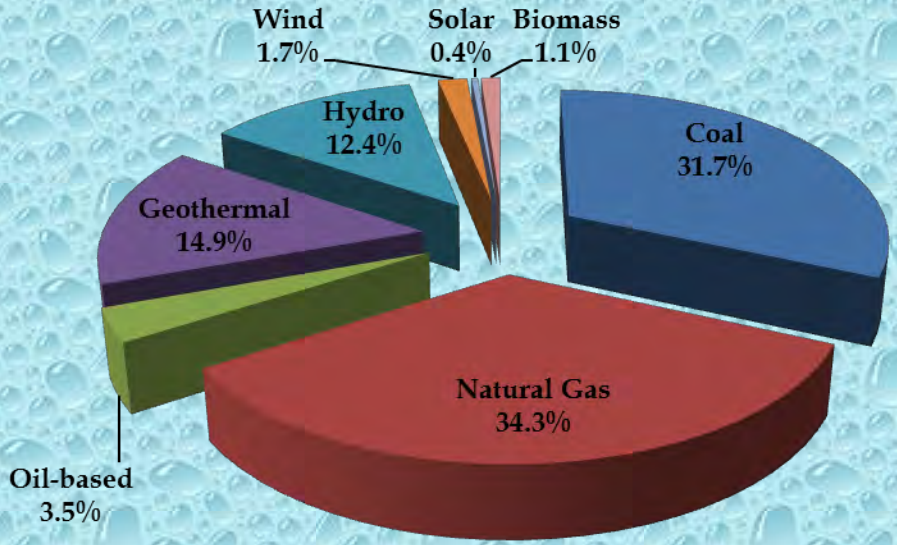
DOWNSTREAM NATURAL GAS INFRASTRUCTURE DEVELOPMENT PROGRAM

2030 POWER GENERATION MIX

Business As Usual (BAU)
2030 Total Generation = 147,111 GWh

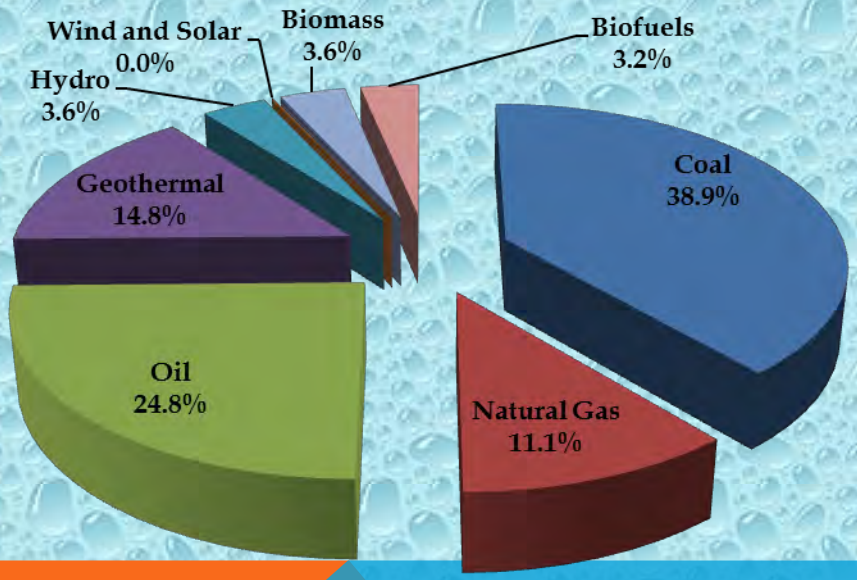


Low Carbon Scenario (LCS)
2030 Total Generation = 147,111 GWh

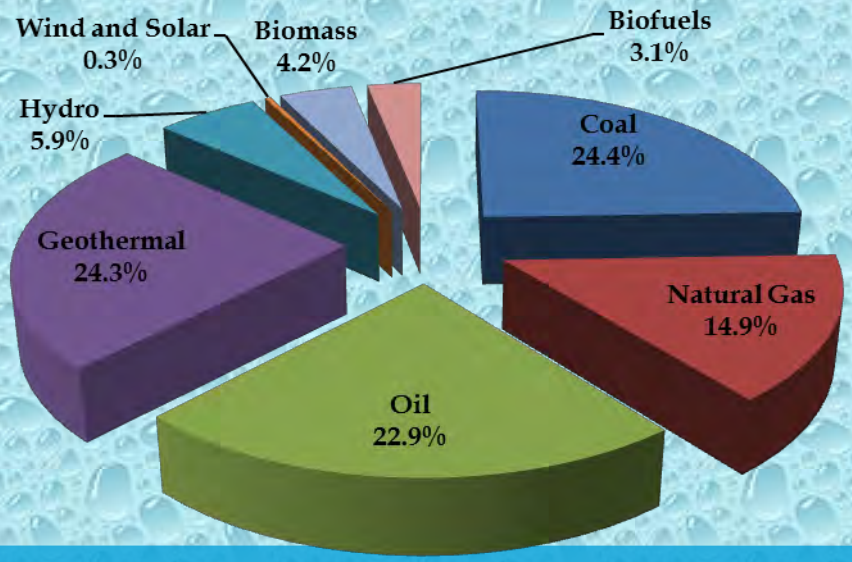


2030 PRIMARY ENERGY MIX

Business As Usual (BAU)
2030 Total Energy = 73.86 MTOE



Low Carbon Scenario (LCS)
2030 Total Energy = 77.52 MTOE



CRITICAL INFRASTRUCTURE FOR NATGAS

Policy Thrust

Private sector-led investments

Public-Private Partnership

Government supervision/ regulation

Critical Infrastructure

- Pipeline – transmission/ distribution
- Power Plants
- CNG Refuelling Stations
- LNG terminal/FSRU

Initiatives

- Masterplan – JICA 2002, World Bank 2013
- Mindanao Natural Gas Development Strategy (WB)
- Technical Feasibility Study for Batman 1 – JICA
- Comprehensive Feasibility Study for Batman 1 – PPP Center
- Natural Gas Bill
- Regulatory Framework Review – JICA
- Development of gas quality standard
- NatGas 101/IEC to ecozone locators and academe

STRATEGIC INFRASTRUCTURE IN LUZON

- *Pipelines*
  - ❑ 423 kms of Transmission
  - ❑ 504 sq. kms. of Distribution
- *Gas-fired Power Plants*
  - ❑ 3000 MW of Greenfield
  - ❑ 600 MW of Conversion
- *Gas in Industry*
  - ❑ 30 Ecozones in Calabarzon
  - ❑ Subic and Clark
  - ❑ Cogeneration Systems
- *Gas in Buildings*
  - ❑ Cogeneration Systems
  - ❑ District Cooling
- *Gas in Transport*
  - ❑ 10,000 units of CNG Vehicles
  - ❑ Refilling Stations
  - ❑ Mother Stations
  - ❑ Conversion Kits
- *LNG Terminals*

BATMAN 2
(Bataan - Manila)
140 kms. (2016)

ET LOOP
(EDSA – Taft Loop)
40 kms. (20200

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

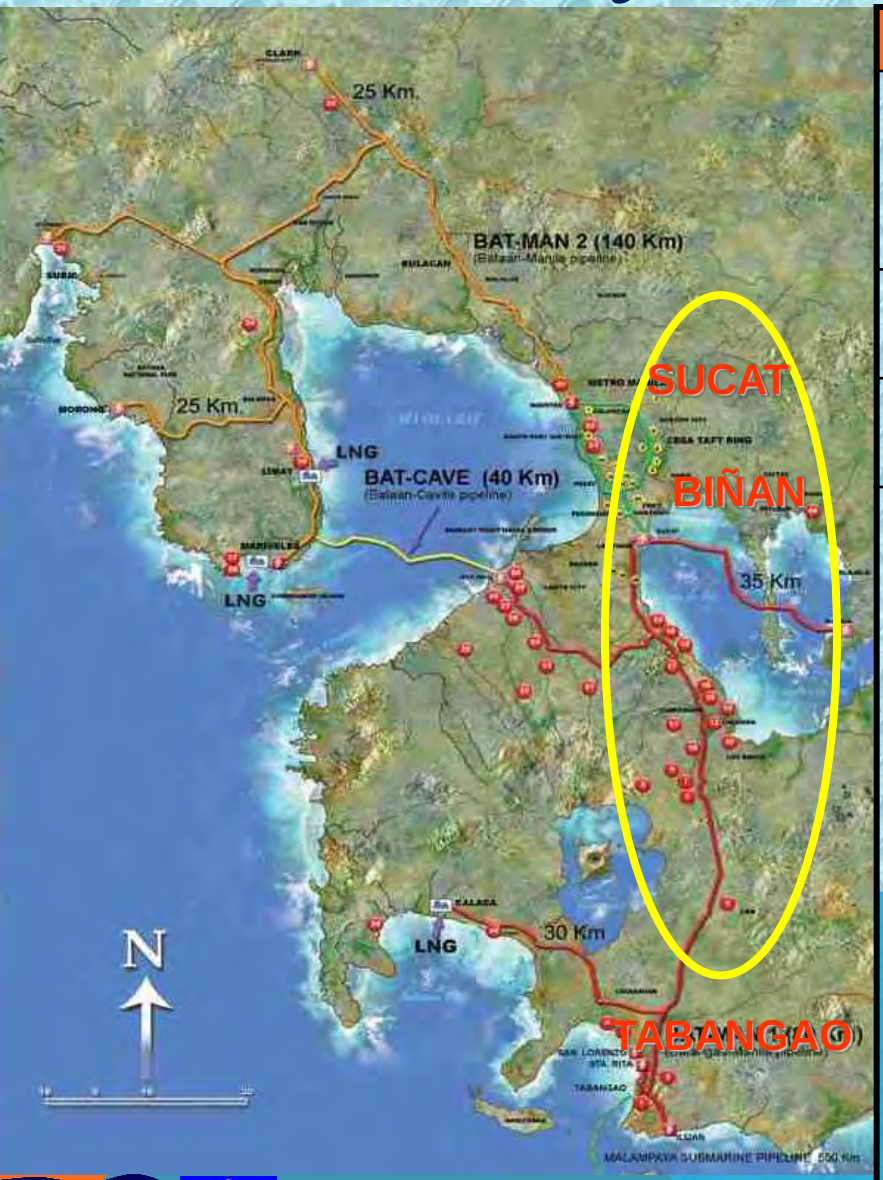
BATCAVE
(Batangas – Cavite)
40 kms (2020)

RO-BIN
(Rosario - Biñan)
35 kms. (2014)

BATMAN 1
(Batangas Manila)
80-100 kms. (2013)

CATLINE (Calaca
Spurline)
30 kms.

BATMAN 1 PROJECT (BATANGAS-MANILA NATURAL GAS TRANSMISSION PIPELINE)



Key Information	
Description	A 121 km high-pressure gas transmission pipeline that will service the converted Sucat thermal plant; ecozones and industries along the route.
Developer (% equity)	PNOC, open for private sector partnership
Target Construction	2016
Status (as of 2/19/2015)	• Two entities conducting the detailed study: JICA and PPP Center • JICA in a form of TA completed the Technical Study in June 2014 • Ongoing conduct of Comprehensive Feasibility Study by PPP Center through its transaction adviser Rebel Group, a Dutch company • Target completion of the report of the Technical Study will be in March 2015. • PPP Center will also recommend the mode of implementation Batman 1: ODA, PPP or combination of ODA/PPP • If PPP, assistance by PPP center will be until financial closing of the project

LNG PROJECTS IN LUZON

AG&P ENERGY CITY PROJECT (2017-20190

SHELL FSRU TERMINAL PROJECT (2017)

FIRST GAS LNG TERMINAL PROJECT (2019/2022)

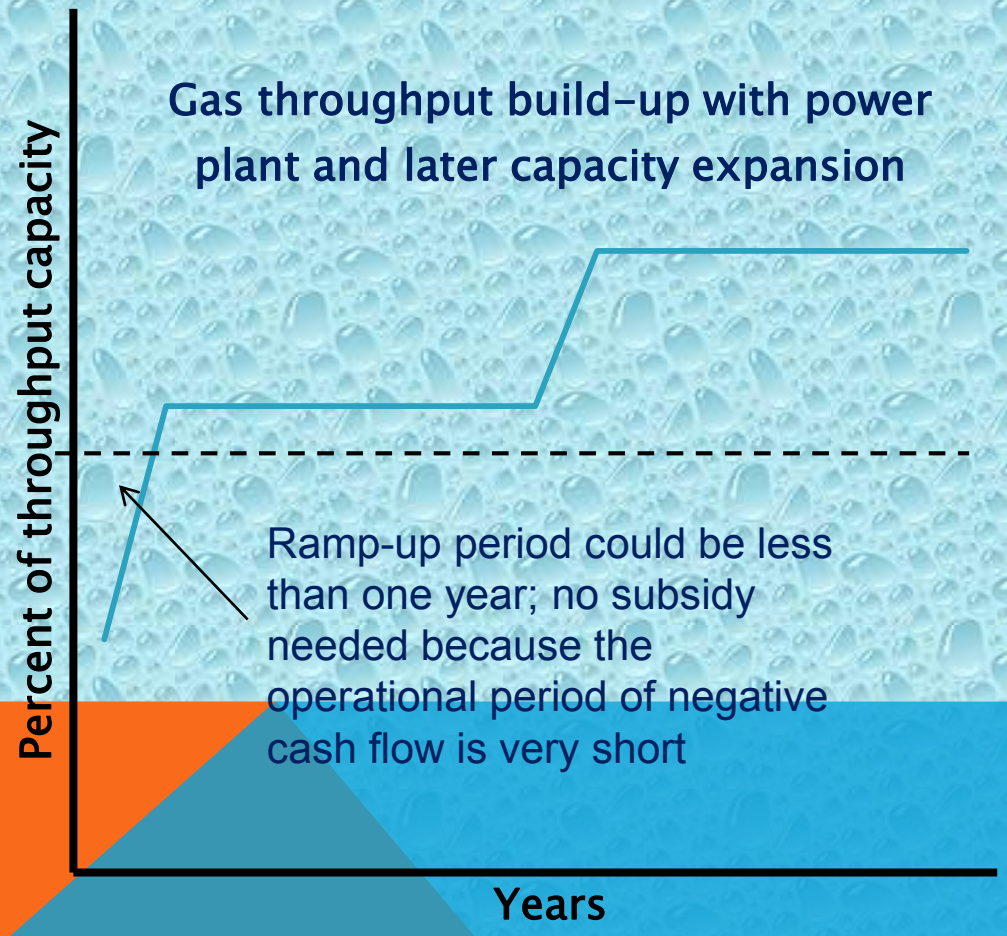
BATCAVE
(Batangas – Cavite)
40 kms (2020)

EWC LNG TERMINAL PROJECT (2015)

BATMAN 1
(Batangas Manila)
80-100 kms. (2013)

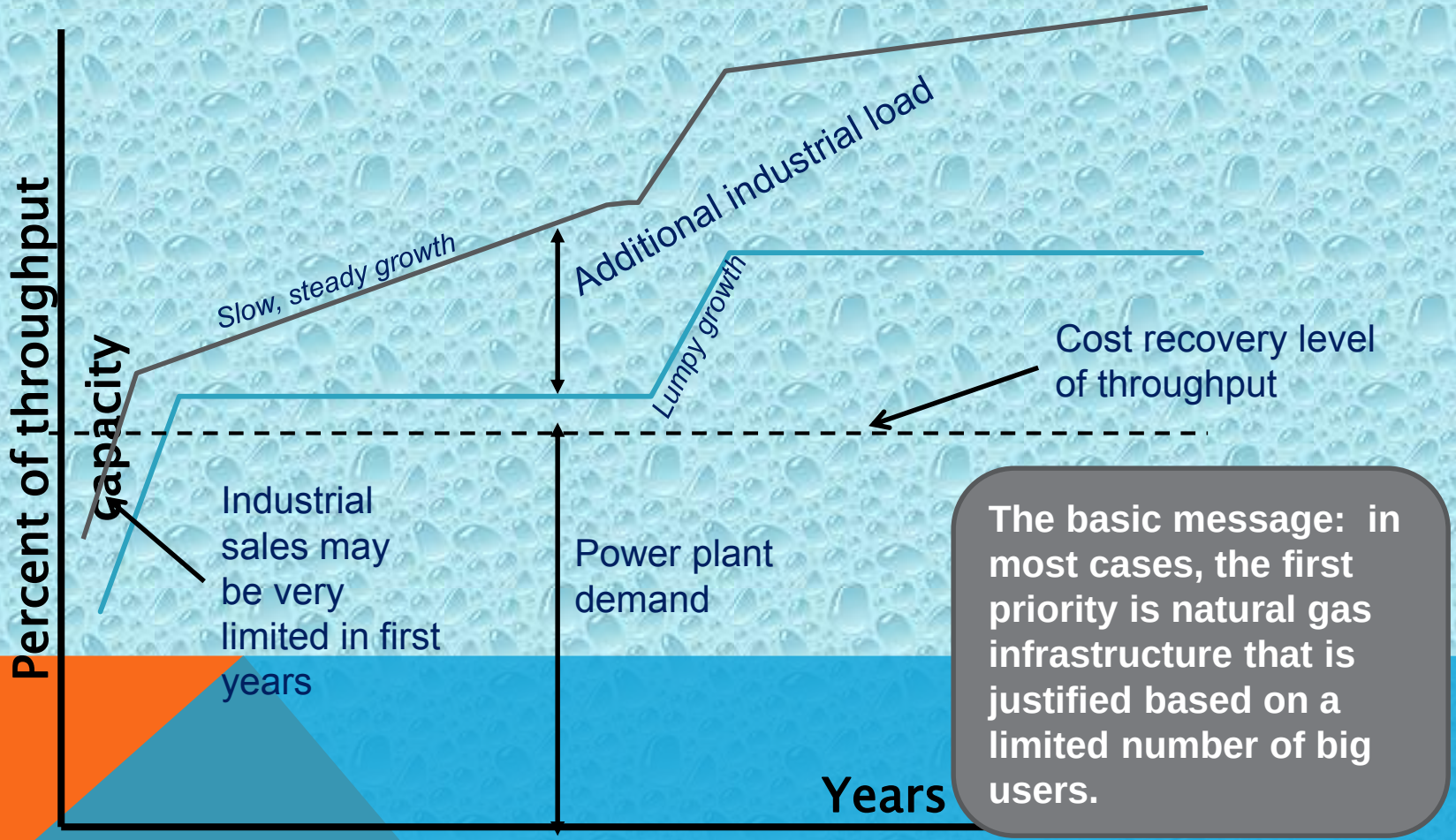
DEVELOPMENT CHALLENGES

Power plants are typically ideal anchor loads



- **Power generation capacity can come on-line when the gas infrastructure is complete**
- **Cross-indemnification: liquidated damages if either party does not complete infrastructure on time (if project is not fully integrated)**

Power plant and essential natural gas infrastructure needs to come first, distribution pipelines second



The basic message: in most cases, the first priority is natural gas infrastructure that is justified based on a limited number of big users.

BUT – SPECIAL PROBLEMS ARISE FOR ANCHOR POWER PLANTS IN THE PHILIPPINES

In Luzon-Visayas: power purchase contracts must be approved by the regulator, and need to be least-cost or . . .

. . . developed on a merchant basis and sold into the Whole Electricity Spot Market (WESM)

Luzon-Visayas: Baseload LNG plants will not be least-cost, and will be far too risky to develop on a merchant basis

In Mindanao, power purchase contracts must be approved by the regulator and need to be least-cost

Mindanao: Baseload LNG plants will not be least-cost. An interim WESM is being developed but merchant LNG plants too risky

Challenges

Power generation sector remains to be the main driver to natural gas infrastructure development	Limited initial market for gas infrastructure projects
Main challenge is to put up identified critical and strategic infrastructure	Gas infrastructure Projects: large capex and commitment with uncertain market build up
Development of natural gas markets on a commercial basis	Shortcomings of current Regulatory Framework
Financing initial gas infrastructure projects	Lack of gas-related policy and legislative frameworks

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Arigatô

Salamat po! Salamat po! Salamat po! Salamat po! Salamat po! Salamat po! Salamat po!

Salamat po!

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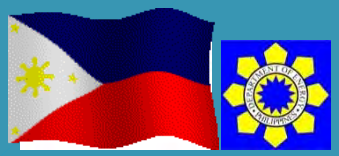

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