Natural Gas Infrastructure Development

(Philippine Downstream Natural Gas Industry)

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DISCUSSION OUTLINE

- Understanding the Philippine Natural Gas Industry
- Natural Gas Infrastructure Development Program
- Challenges
OVERVIEW OF THE NATURAL GAS INDUSTRY

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

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

- Shell Refinery, Tabangao, Batangas
- 500 MW San Lorenzo First Gen/IPP
- 1,000 MW Sta. Rita First Gen/IPP
- 1,200 MW Ilijan Power Plant, NPC IPP (KEPCO)
- 1.0 MW DESCO (Mine mouth Power Plant), Bogo Cebu
- CNG Pinoy Buses (2008)
POWER GENERATION MIX

**2012**

- Coal: 38.76%
- Natural Gas: 26.93%
- Geothermal: 14.06%
- Hydro: 14.06%
- Oil-based: 5.83%
- Solar/Wind: 0.11%
- Biomass: 0.25%

Total Generation: 72,922.01 GWh

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

**2013 (preliminary)**

- Coal: 42.68%
- Natural Gas: 25.00%
- Geothermal: 13.24%
- Hydro: 13.24%
- Oil-based: 5.97%
- Solar/Wind: 0.09%
- Biomass: 0.28%

Total Generation: 75,172.86 GWh

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

Legend:
- Green: Group A Basins
- Yellow: Group B Basins
- Red: Group C Basins

25 TCF Potential Reserves
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

- Hydro: 7.2%
- Geothermal: 8.6%
- Oil-based: 3.5%
- Natural Gas: 19.9%
- Coal: 60.3%

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

- Wind: 17%
- Solar: 0.4%
- Biomass: 1.1%
- Geothermal: 14.9%
- Hydro: 12.4%
- Natural Gas: 34.3%
- Coal: 31.7%
- Oil-based: 3.5%
Business As Usual (BAU)
2030 Total Energy = 73.86 MTOE

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

Private sector-led investments
Public-Private Partnership
Government supervision/ regulation

CRITICAL INFRASTRUCTURE FOR NATGAS

Initiatives

- 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

Critical Infrastructure

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

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**

**Luzon Map**

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

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

- **ET LOOP**
  - (EDSA – Taft Loop)
  - 40 kms (2020)

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

- **BATCAVE**
  - (Batangas – Cavite)
  - 40 kms (2020)

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

- **CATLINE**
  - (Calaca Spurline)
  - 30 kms.
**BATMAN 1 PROJECT** *(BATANGAS-MANILA NATURAL GAS TRANSMISSION PIPELINE)*

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<tr>
<th>Key Information</th>
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<td><strong>Description</strong></td>
<td>A 121 km high-pressure gas transmission pipeline that will service the converted Sucat thermal plant; ecozones and industries along the route.</td>
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<td><strong>Developer (% equity)</strong></td>
<td>PNOC, open for private sector partnership</td>
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<td><strong>Target Construction</strong></td>
<td>2016</td>
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| **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)

EWC LNG TERMINAL PROJECT (2015)

FIRST GAS LNG TERMINAL PROJECT (2019/2022)

SHELL FSRU TERMINAL PROJECT (2017)

BATCAVE (Batangas – Cavite) 40 kms (2020)

BATMAN 1 (Batangas Manila) 80-100 kms. (2018)
DEVELOPMENT CHALLENGES
Power plants are typically ideal anchor loads

Gas throughput build-up with power plant and later capacity expansion

- 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)

Ramp-up period could be less than one year; no subsidy needed because the operational period of negative cash flow is very short
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)

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

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

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