

**2nd Workshop on Natural Gas Field Development with high CO₂ and H₂S –
a case study on the Puguang Gas Field in Sichuan Basin, China
CCOP, Chengdu, China
15-18 September 2009**

**PHILIPPINE
NATURAL GAS DEVELOPMENT**



DEPARTMENT OF ENERGY



Outline


- **Petroleum Law**
- **Sedimentary Basin Map of the Philippines**
- **Existing Petroleum Service Contracts**
- **Natural Gas Resources**
- **Natural Gas Fields**
- **Sample Assays of Natural Gas in the Philippines**
- **Historical Gas Production**
- **Supply & Demand Scenario**
- **Major Programs on Natural Gas**
- **Key Challenges**

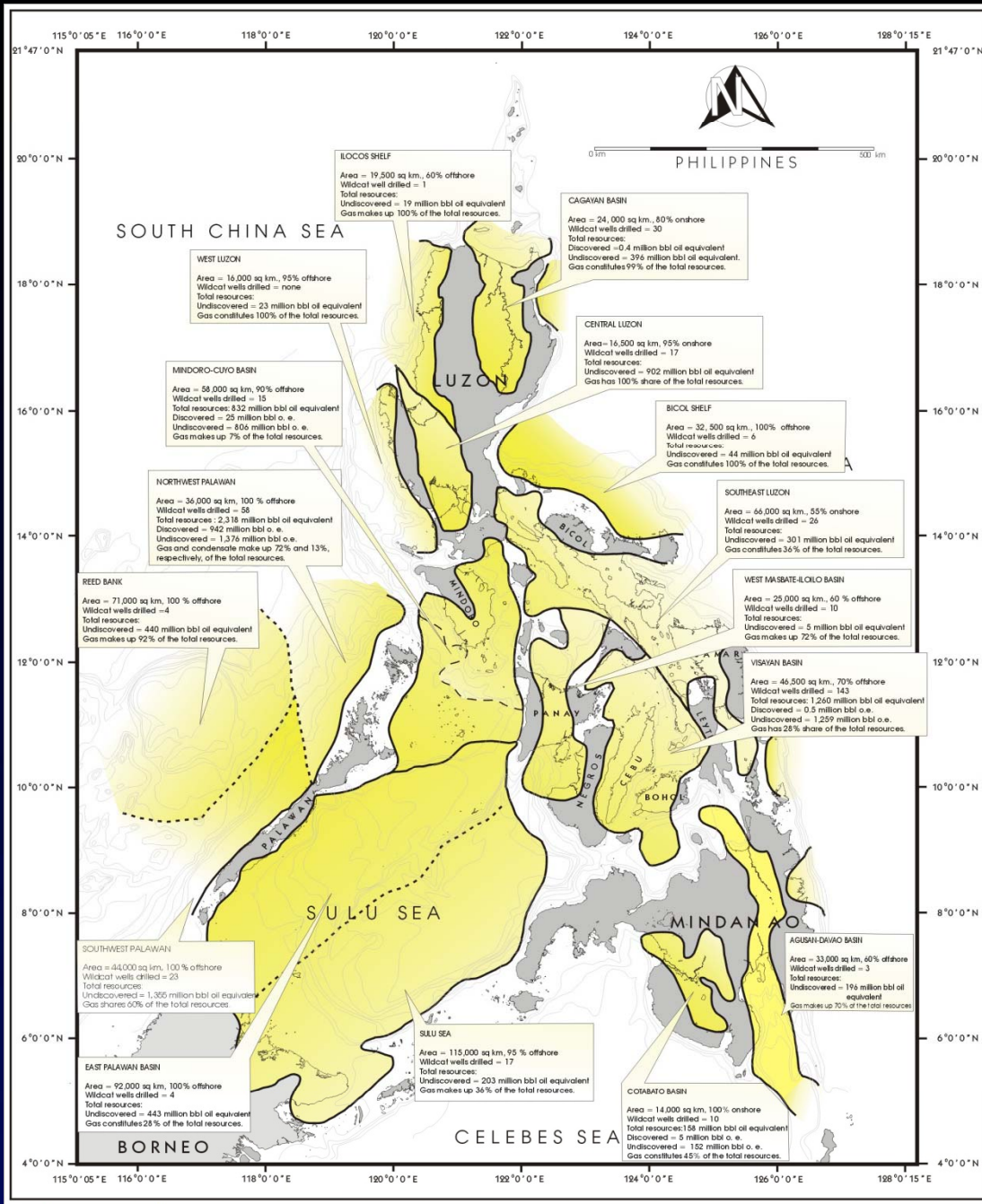


Petroleum Law

Presidential Decree No. 87: "The Oil Exploration and Development Act of 1972"

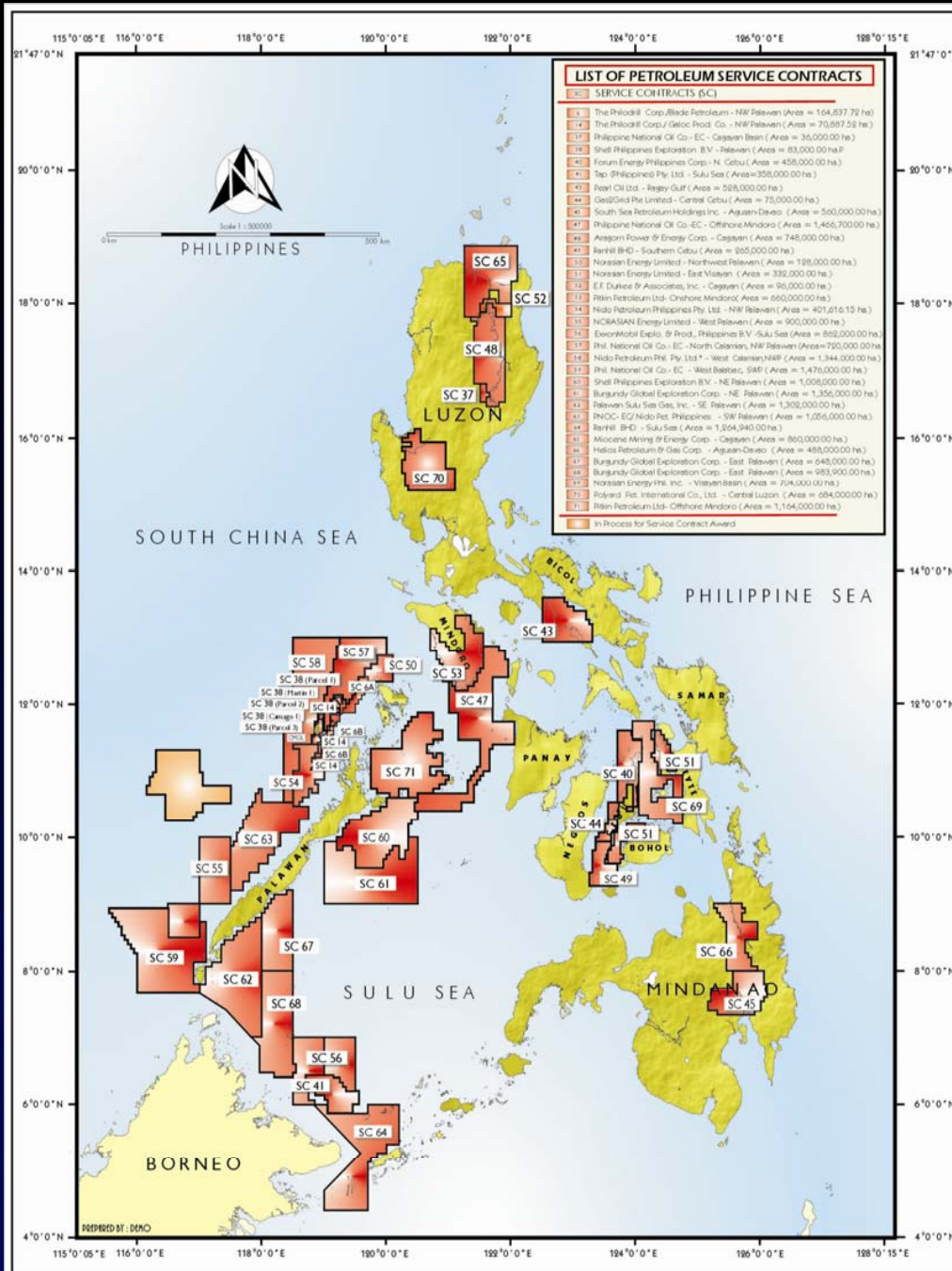
- * **Service Contract System**
 - **Service Contract (SC)**
 - **Geophysical Survey and Exploration Contract (GSEC)**
 - **Non-Exclusive Geophysical Permit (NEGP)**

 - * **Philippine Energy Contracting Round**
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- A large, semi-transparent watermark of the Department of Energy logo is visible in the background on the right side of the slide. The logo features a central sunburst design surrounded by a circular border containing the text "DEPARTMENT OF ENERGY" and "PHILIPPINES".



SEDIMENTARY BASIN MAP of the PHILIPPINES





EXISTING PETROLEUM SERVICE CONTRACTS(SC)

- 34 Active Service Contracts
- 1 Active Geophysical Survey & Exploration Contract (GSEC) for conversion to SC



Natural Gas Resources

- **Discovered:** 3.8 Tcf
- **Undiscovered:** 24.7 Tcf (33% mapped)



Gas Fields in the Philippines

San Antonio

- G&G for further development

Malampaya

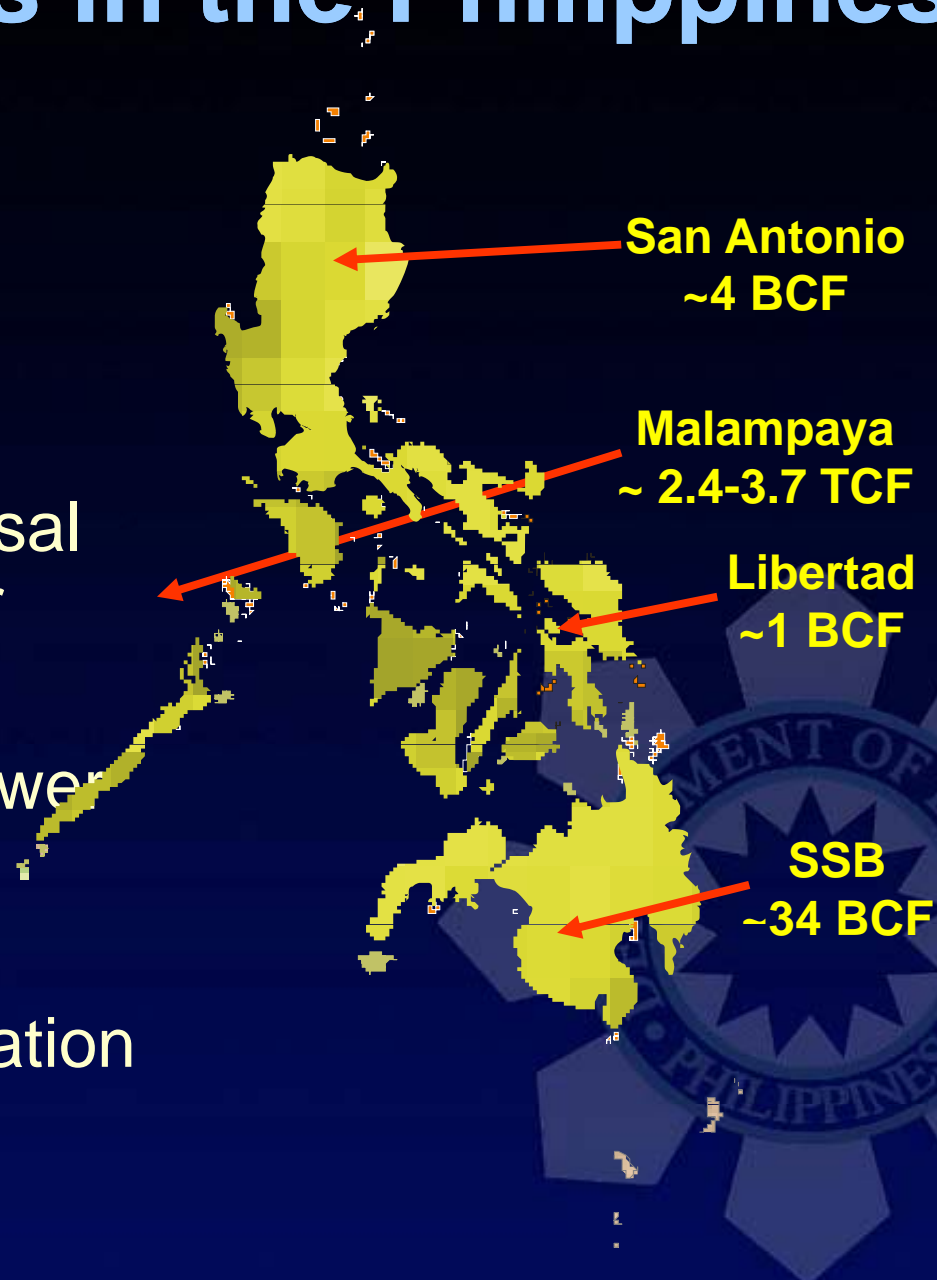
- Drilling of appraisal well later this year

Libertad

- To fuel 2-MW power plant

Sultan-sa-Barongis

- For further evaluation



Sample Assays of Natural Gas in the Philippines

Gas Field 1

Component	Concentration (/sm3 gas)	Technique
CO ₂	3 - 3.8% _m	Orsat
H ₂ S	4.8 - 12.3 ppm	Tutweiler
Radon-222	1.0 - 6.0 mWL	WLM-30
Water	3,850 – 14,248 (mg)	Karl Fischer reagens (ASTM E700)
Mercury	0.3 -4.2 (μg)	KMnO ₄ /H ₂ SO ₄ (ISO Method 6978A)
Chlorides	0.35 - 1.4 (mg)	CL 0992/IP 77 (AG ₂ NO ₄)

Sample Assays of Natural Gas in the Philippines

Gas Field 2

Components	Mole Fraction (%)
Methane	96.3006
Ethane	0.3508
Nitrogen	2.5832
CO ₂	0.0532
Water	0.7122
Total	100.000



Sample Assays of Natural Gas in the Philippines

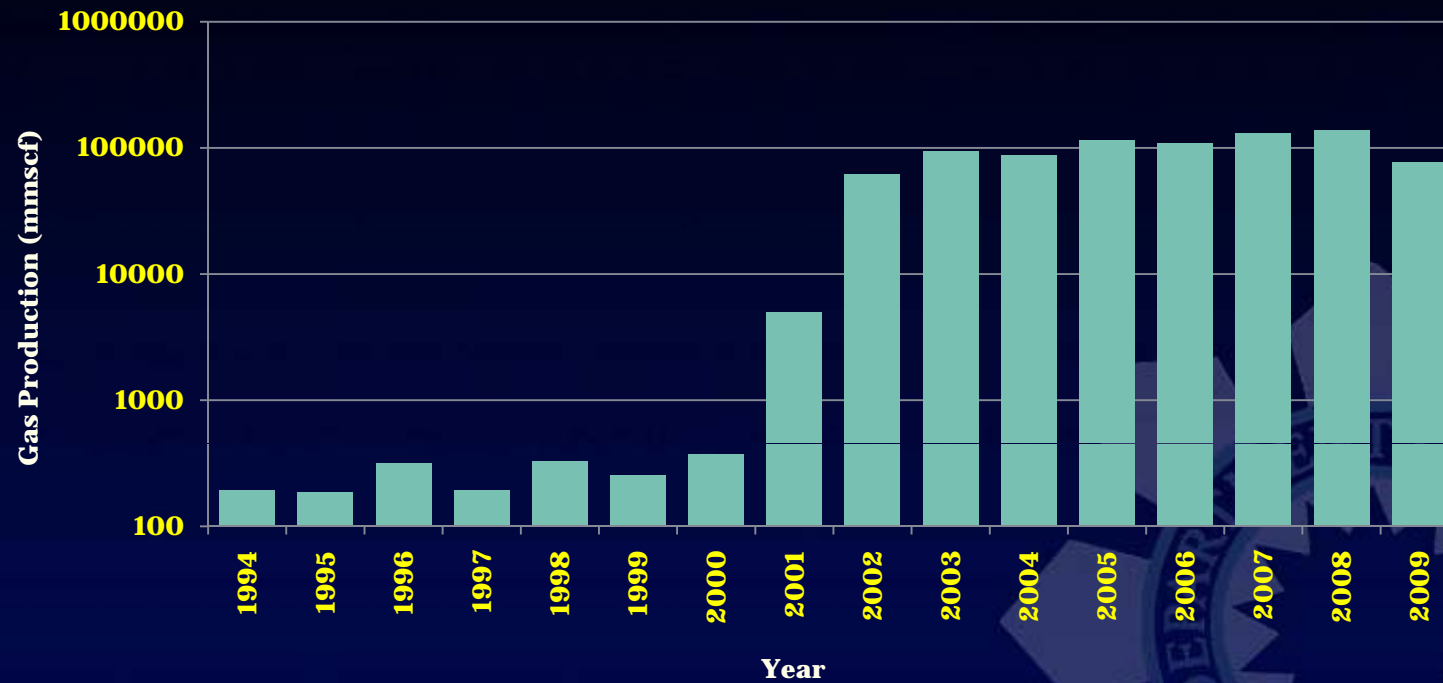
Gas Field 3

Component	Mol %
Nitrogen	4.52
Hydrogen Sulphide	0.04
Carbon Dioxide	0.25
Methane	95.05
Ethane	0.13
Propane	0.01
Isobutane	<0.01
N-Butane	<0.01
Isopentane	<0.01
N-Pentane	<0.01
Hexanes	<0.01
Heptanes +	0.00
Total	100.00
Specific gravity (air = 1.00)	0.576
¹ Gross Heating Value (BTU/SCF)	963
Average Molecular Weight	16.7

¹ Gross Heating Value, @ 15° C per vol @STP. STP is 15° C and 1.01325 BAR

Philippine Historical Gas Production

Historical Gas Production



Natural Gas Demand Outlook

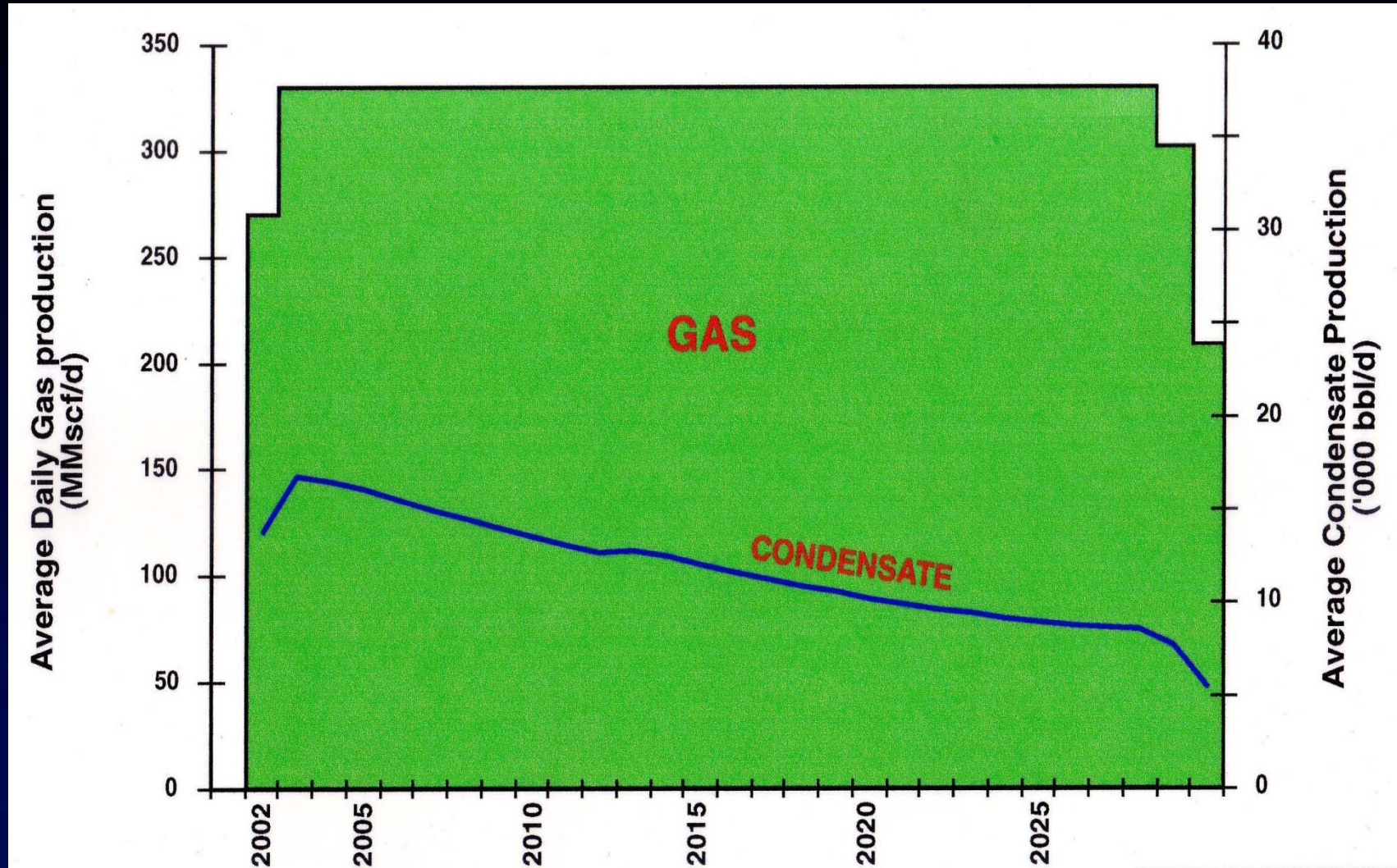
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NATURAL GAS DEMAND OUTLOOK

(In Billion Cubic Feet, BCF)

	2007	2008	2009	2010	2011	2012	2013	2014
Power Generation	70.00	74.00	79.00	95.00	107.00	121.00	139.00	155.00
Transport	4.05	4.44	4.83	5.66	6.65	7.38	7.77	7.83
Industrial	3.05	3.10	3.16	3.96	4.68	5.70	6.44	7.19
Total	77.10	81.54	86.99	104.62	118.33	134.08	153.21	170.02

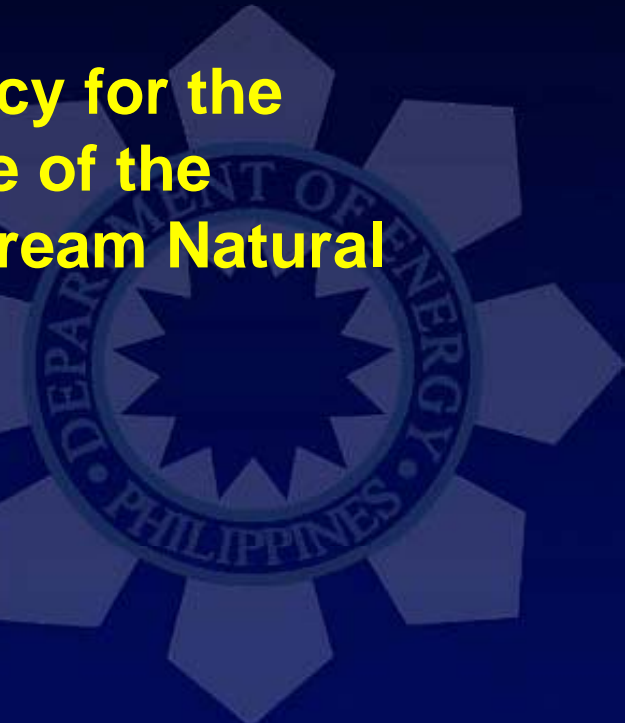
Natural Gas Supply Outlook



Major Programs on Natural Gas



- **NGas Infrastructure Development**
- **Investment Promotion**
- **Market Identification & Development**
- **Advocacy for the passage of the Downstream Natural Gas Bill**



Infrastructure Development Program



Transmission Pipelines in Luzon

BATMAN 2
(Bataan - Manila)
140 kms.

ET LOOP
(EDSA - Taft Loop)
40 kms.

SU-MA
(Sucat - Malaya)
35 kms.

BATCAVE
(Batangas - Cavite)
40 kms

RO-BIN
(Rosario - Biñan)
35 kms.

BATMAN 1
(Batangas Manila)
80-100 kms.

CATLINE (Calaca Spurline)
30 kms.

Infrastructure Development Program



Proposed LNG Terminal & CNG Mother/Daughter Stations

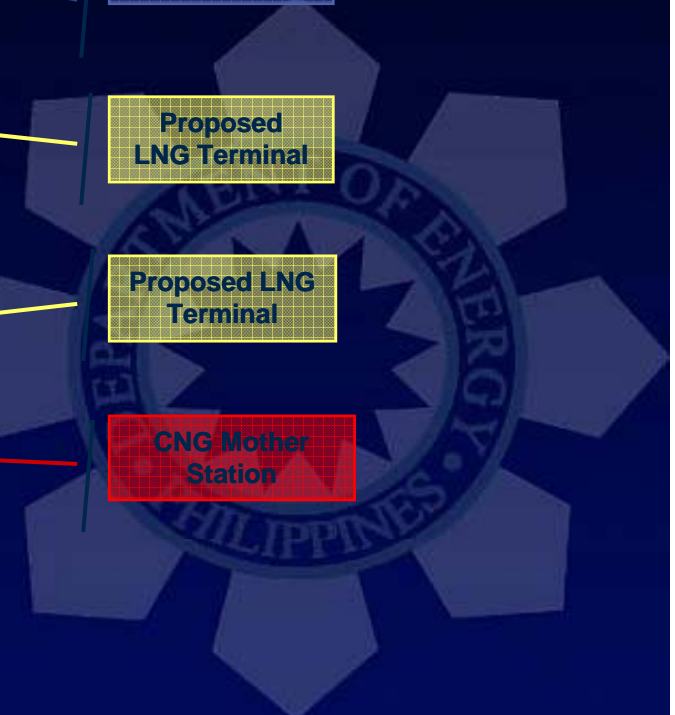
Proposed LNG Terminal

CNG Daughter Station

Proposed LNG Terminal

Proposed LNG Terminal

CNG Mother Station



Infrastructure Development Program

National Pipeline Network



Key Challenges

- **Investment Promotion**
- **Environmental Issues**
 - H₂S & CO₂ not a problem as of now
 - New guidelines for effluent discharge standard
- **Strengthened Exploration Programs**
- **Long-term Gas Supply**



Maraming Salamat Po!

