



# Thailand's Energy Infrastructure Development Plan

Presented by

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# Electricity Infrastructure Development: Power Plants & Transmission System

Forecast of Generation Requirement (Revised April 2006: Base Case)

	2006 (actual)	2011	2016
<b>Installed Capacity (MW)</b>	<b>27,181</b>	<b>35,206</b>	<b>45,246</b>
<b>Peak (MW)</b>	<b>21,064</b>	<b>29,337</b>	<b>38,241</b>

## New Plants 2008-2013

- EGAT: 4 New Plants
- Purchase from IPPs
- Purchase from Laos
  - By 2011: Nam Theun 2, Nam Ngeum 2
  - By 2013: Nam Theun 1, Nam Ngeum 3

## New Plants 2014-2021

- New EGAT Plants
- New IPPs
- Purchase from neighboring countries, e.g. Laos, Myanmar

# Approved Power Projects, with PPA Signed

Project	Capacity (MW)	COD
<b>EGAT New Power Plants (all are Combined Cycle):</b>		
1. Songkla Plant, Unit 1	747	Mar 2008
2. South Bangkok Plant, Unit 3	768	Mar 2009
3. Bang Pakong Plant, Unit 5	764	Mar 2009
4. North Bangkok Plant, Unit 1	723	Mar 2010

Source: EGAT, Oct06

# Approved Power Projects, with PPA Signed

Project	Capacity (MW)	COD
<b>IPP Power Plants:</b>		
1. BLCP Power	2 x 673.25	#1 – Oct06 #2 – Feb07
2. Gulf Power Generation	2 x 734	#1 – Mar07 #2 – Mar08
3. Ratchaburi Power	2 x 700	#1 – Mar08 #2 – Jun08
<b>Purchase from Abroad:</b>		
1. Nam Theun 2 (LPDR)	920	Nov 2009
2. Nam Ngeum 2 (LPDR)	597	Jan 2011

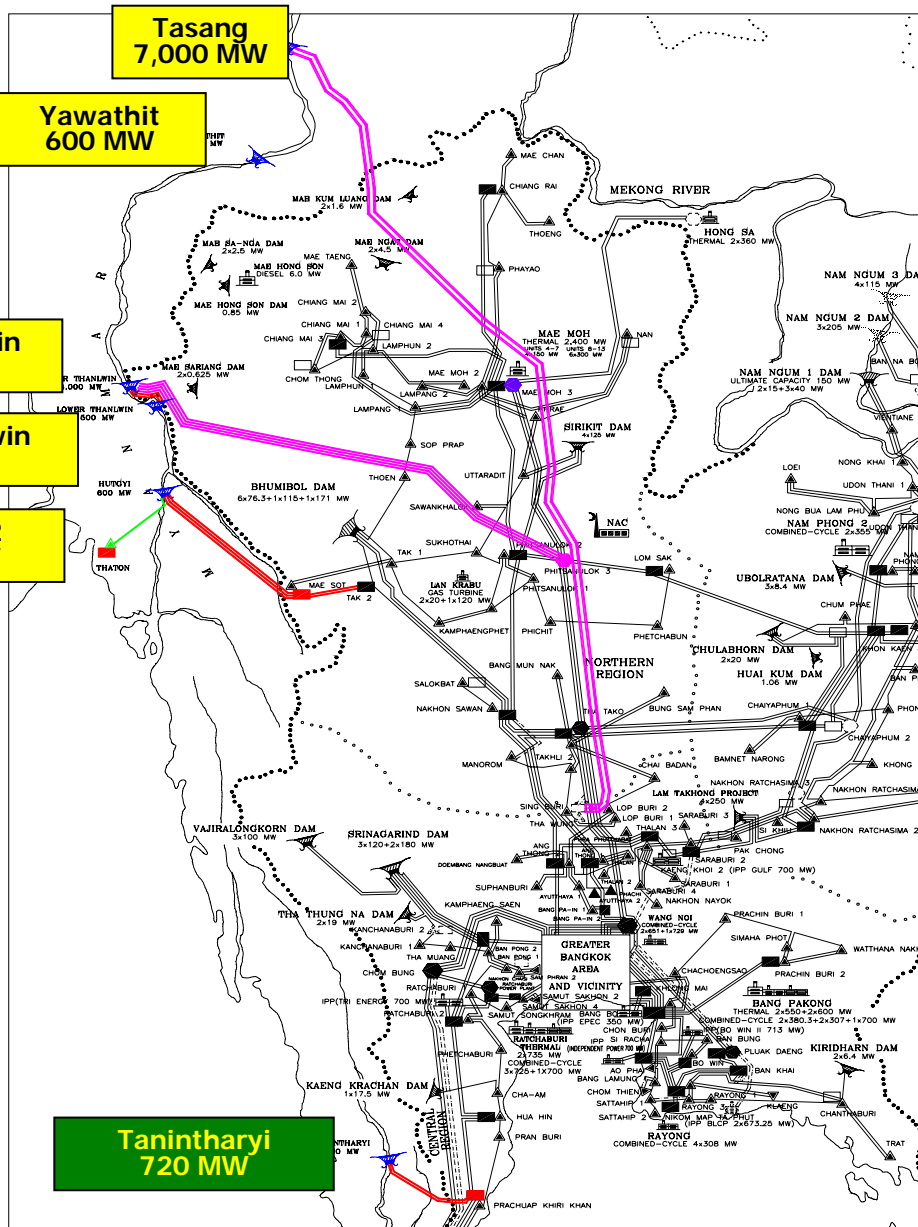
Source: EGAT, Oct06

# Transmission System Enhancement

	Completion
<b>1. Transmission Lines to Accommodate IPP Supply/Imported Electricity:</b>	
- Gulf Power Generation Plant	
• 230-kV Khaeng Khoi – Saraburi 2	Jun 2006
• 230-kV Thalan 3 – Khaeng Khoi	Sep 2007
- 500-kV Transmission Project for power purchase from Nam Theun 2 (LPDR)	Sep 2008
- 500-kV Transmission Project for power purchase from Nam Ngeum 2 (LPDR)	Sep 2010
<b>2. Transmission Expansion/Upgrading:</b>	
- Transmission System Expansion Phase 10	2005-2008
- Upgrading Central-Southern Transmission Line from 115 kV to 230 kV	Jun 2007
- Transmission Expansion in Greater Bangkok Area, Phase 2	2008-2010



# Potential Power Purchase from Myanmar



## Hydropower from

### Thanlwin River

1. Tasang 7,000 MW
2. Hutgyi 1,200 MW
3. Thanlwin (Upper) 4,000 MW
4. Thanlwin (Lower) 500 MW
5. Yawathit 600 MW

### Tanintharyi River

1. Tanintharyi 720 MW

# Natural Gas Industry

## Demand

NG demand is projected to increase ~6.4% during the next 15 years.

### Factors:

- NG is clean energy and can be produced domestically.
- NG is the major fuel for **power generation**.
- NG is promoted in the **industrial & transportation sectors**.

## Supply

- At present, most NG supply is from the Gulf of Thailand and import from Myanmar.
- In the future, more E&P from the Gulf of Thailand will be necessary, including import of LNG to meet the increasing demand.

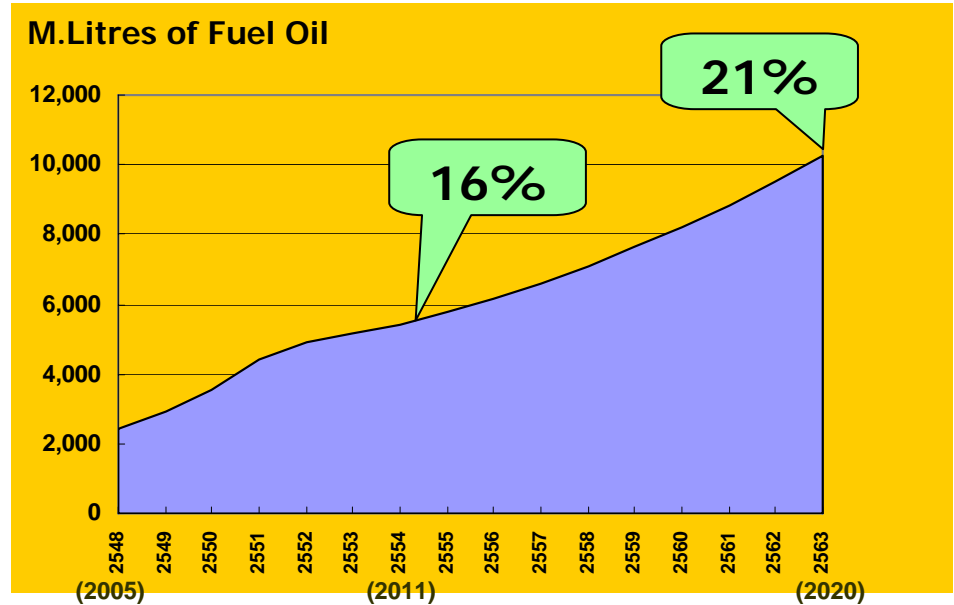
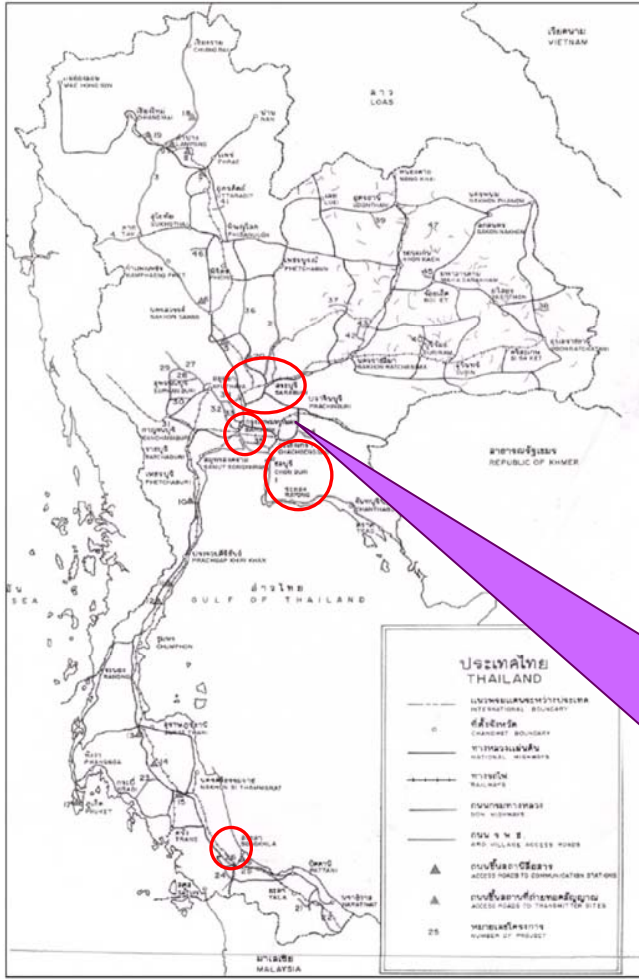


# Promotion of Natural Gas Utilization

- **Promotion of Greater Use of Natural Gas to replace fuel oil in the industrial sector**
  - In the industrial sector, Thailand will diversify energy supply from oil to natural gas, renewable energy and coal.
  - It is targeted that natural gas could replace 5% of oil consumption.



# Promotion of Natural Gas Utilization in the Industrial Sector



## Initial Target

Industrial Estates in:

- BKK & vicinities
- Songkhla
- Chonburi + Rayong
- Saraburi + Ayudhdhaya



2011 : NG use = 5,400 M. litres of fuel oil

2020 : NG use = 10,300 M. litres of fuel oil

# Promotion of Natural Gas Utilization

- **Promotion of Greater Use of Natural Gas to replace fuel oil in the transportation sector**

## Target

- **Replace 10% of oil by compressed natural gas, or “NGV,” by 2008.**
- **500,000 NGV-fueled vehicles by 2010.**  
Focus on public transport fleets, taxis & government car fleets
- **Increase NGV stations** from now 99 to 270 stations in 2007 and to 740 stations by 2010.



# NGV Promotion Implementation (as of Dec 2006)

## No. of NGV Vehicles

- Personal cars/ Government fleets	15,993
- Taxis	8,277
- Tuk-tuks	360
- BMTA Buses	93
- Diesel-engine vehicles (Pilot)	153
- Others	495
<b>Total</b>	<b>25,371</b>

## No. of Service Stations

- **Already in operation**
  - BKK + Vicinities **69**
  - Provincial **30**
  - Total** **99**

## Distribution Volume/ Oil Replacement

NGV distribution volume  
= 14.0 MMSCFD

## No. of NGV-Kit Installation Service Providers

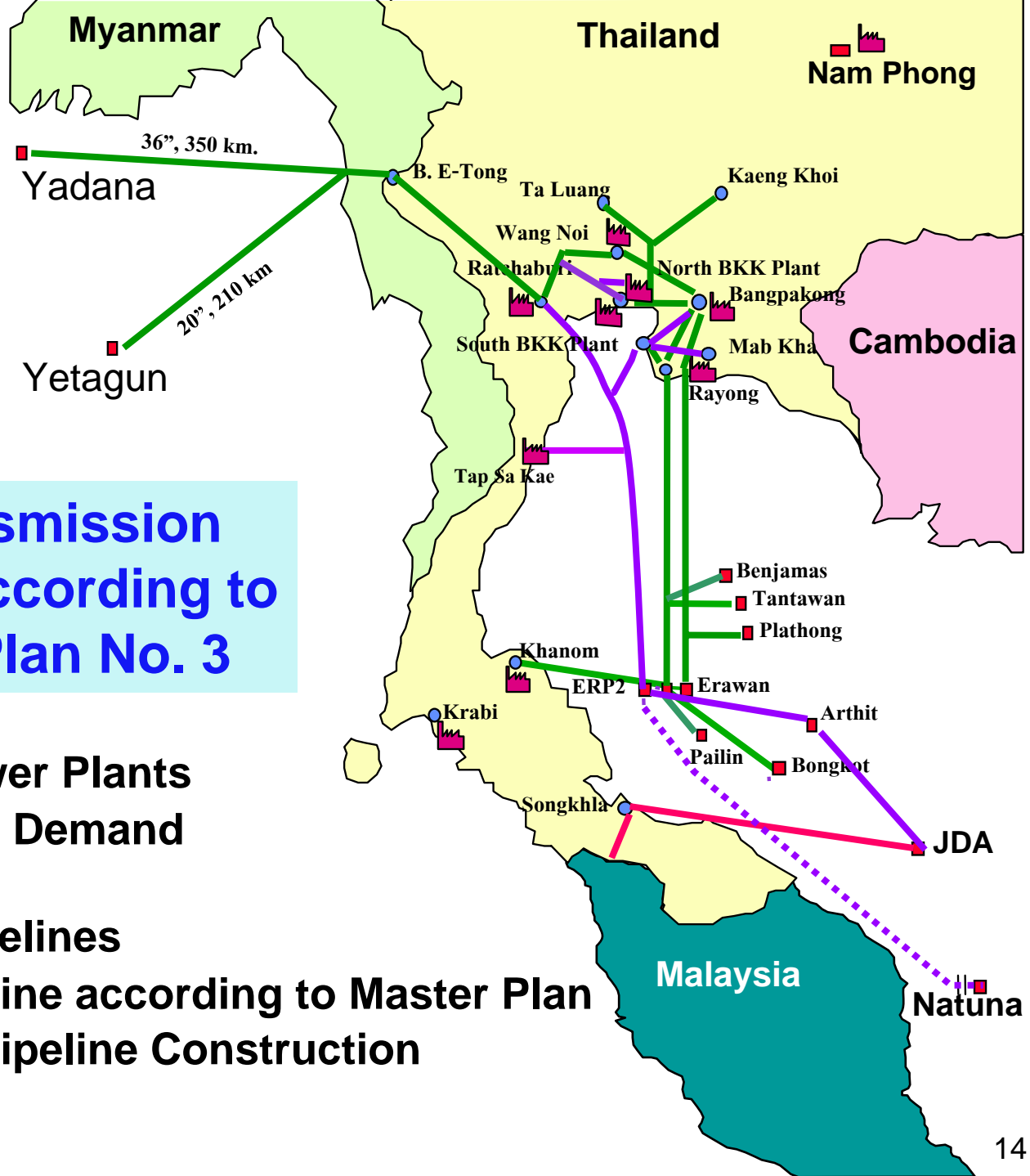
104 Companies

## Installation Certification







26 Authorized Entities

# Natural Gas Infrastructure Development

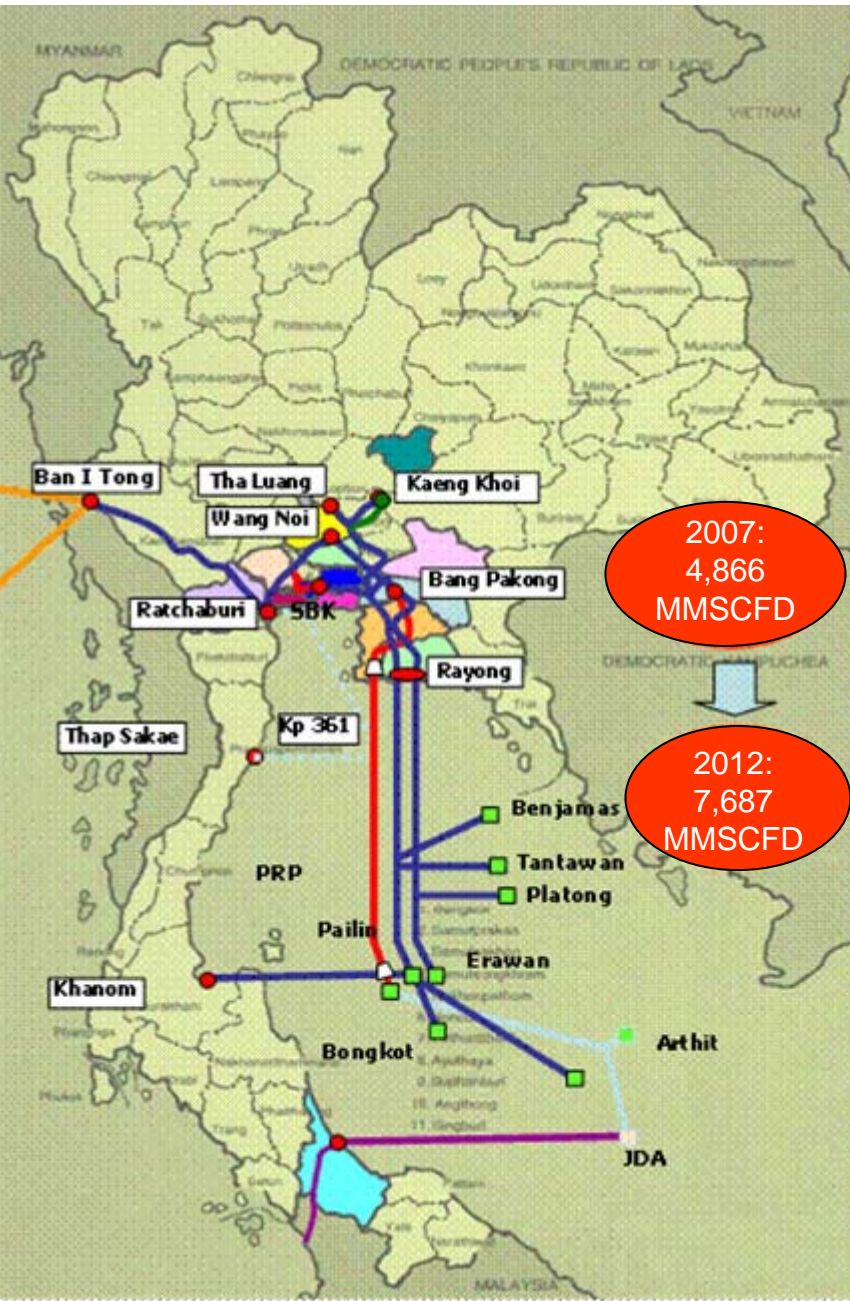
- **Expand the NG transmission pipeline capacity** to accommodate the increasing demand.
  - The existing pipelines (4,866 MMSCFD) are fully used.
- **3<sup>rd</sup> Offshore NG Transmission Pipeline**
  - Phase 1: partly in operation since Jul 2006;  
the whole phase will be completed in early 2009
  - Phase 2: COD 2007 – 2010
  - Phase 3: COD early 2012
- After completion of the 3<sup>rd</sup> NG transmission pipeline as well as other expansion projects under the Master Plan No. 3 in **2012, the total capacity will increase to 7,687 MMSCFD.**



**NG transmission pipeline according to Master Plan No. 3**

-  **EGAT's Power Plants**
-  **Areas of NG Demand**
-  **Gas Fields**
-  **Existing Pipelines**
-  **Future Pipeline according to Master Plan**
-  **Option for Pipeline Construction**

# Plan for Expansion of Distribution Pipeline System to Promote Use of Natural Gas in the Industrial & Transport Sectors



## Expand City Gas

- Suvannabhumi – Suksawad - Siriraj
- Sai Noi – Suksawad - Siriraj
- Samut Prakarn – Bang Chak

## Expand to Regional Estates/Industrial Areas

### Central Region

- Ayudhdhaya (Nakhon Luang district)
- Samut Sakhon (Kratumbaen district)
- Prachinburi (Gateway Estate, Sahapattana Group)

### Eastern Region

- Rayong (TPI)

### Western Region

- Ratchaburi (Ratchaburi Industrial Estate)

### Southern Region

- Songkhla (Chalung Industrial Estate)

# Plan for the Expansion of Natural Gas Pipeline Networks



## Expansion of Domestic NG Pipeline Networks

		(MMSCFD)
<b>East Coast</b>		
Offshore	2,010	→ 3,910
Onshore	1,200	→ 3,700
<b>West Coast</b>		
Onshore	1,265	→ 1,760
<b>Distance</b>	3,000	→ 4,400 km

## Expansion of Cross-Border NG Pipeline Networks

- Accommodate domestic demand in the long term
- Preparedness to be "Gas Hub"
  - Natuna (Indonesia) 1,600 km
  - A1, M7/M9 (Myanmar) 1,200 km
  - OCA (Thailand-Cambodia Overlapping Area)

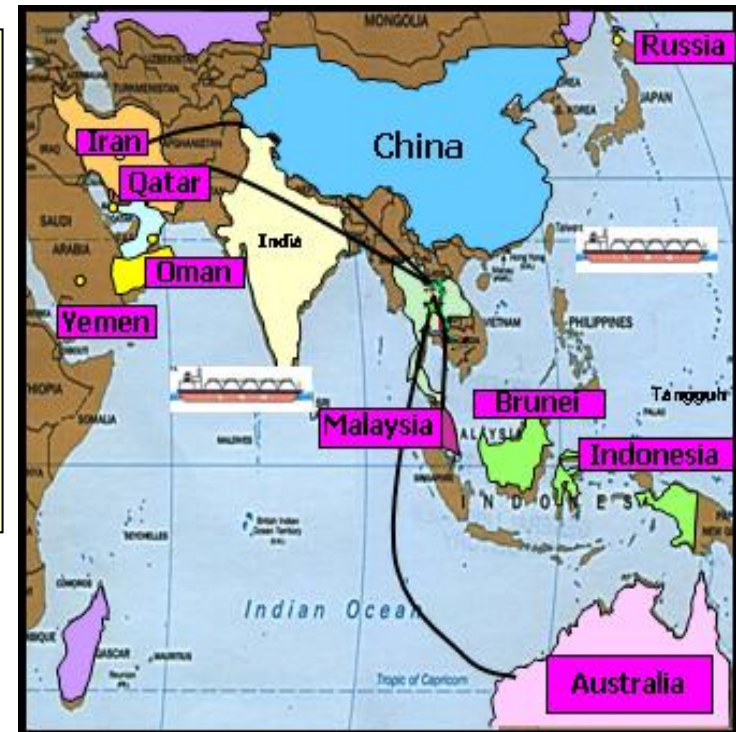
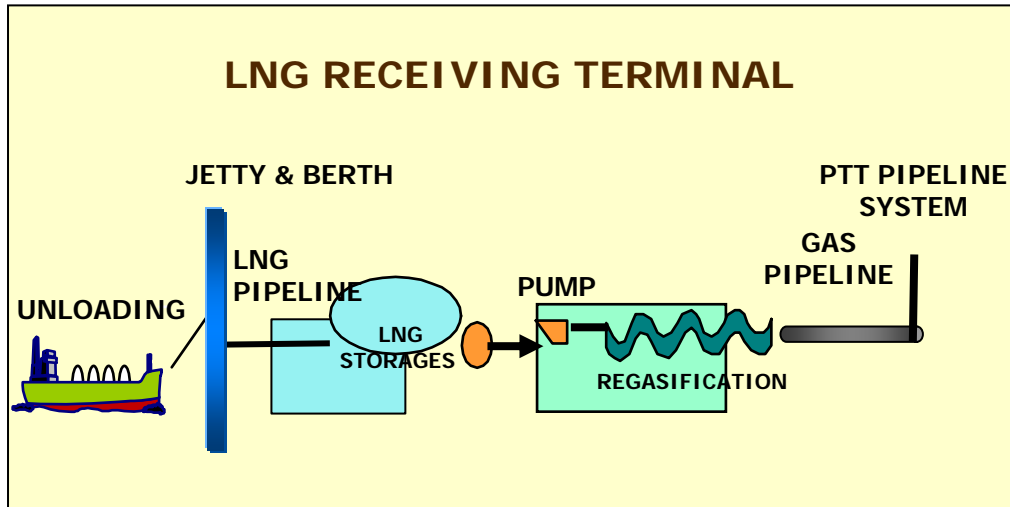
# LNG Receiving Terminal Project

- Location: **Map Ta Phut Industrial Estate (MapTa Phut Industrial Port, Phase 2)**
- Capacity: - Initial phase 5 M Tons/year (700 MMSCFD) as at 2011
  - Long Term 10 M Tons/year (1,400 MMSCFD) as at 2018
- Lining of Onshore Pipeline No. 4 (42"), 1,300 km, linking with the Terminal and the existing pipeline system/New IPPs
- Value creation of LNG
  - GSP 7 and 8
  - Power Plants/Petrochemical Industry



**Project Site: Map Ta Phut Industrial Port, Phase 2**

# LNG Import to Enhance the NG Supply Security in the Long Term



- Import: ~3-10 Million Tons/yr (~ 400-1,300 MMSCFD), starting 2011
- Targets (under negotiation): Malaysia, Iran, Australia, Qatar, Russia
- LNG Receiving Terminal: Phase 1: ~3-5 Million Tons  
Phase 2: ~10 Million Tons

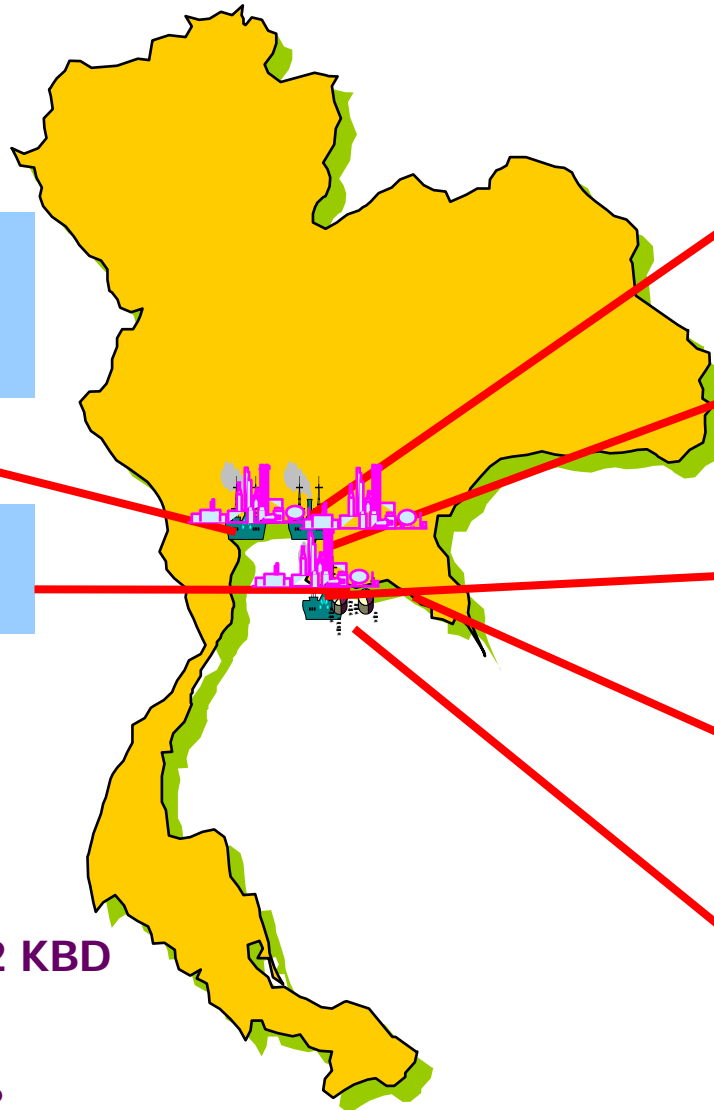
# Thailand Refineries

**BANGCHAK 120 KBD  
HYDROSKIMMING**

**RPC 17 KBD  
CONDENSATE SPLITTER**

**TOTAL CAPACITY: 1,022 KBD  
(as of Nov 2006)**

**Intake/Capacity = 91%**



**THAIOIL 220 KBD  
COMPLEX (FCCU, HCU)**

**ESSO 160 KBD  
COMPLEX (FCCU)**

**RRC 145 KBD  
COMPLEX (HCU, VBU)**

**IRPC 215 KBD  
CONDENSATE SPLITTER**

**SPRC 145 KBD  
COMPLEX (RFCCU)**

# Establishment of Energy Regulatory Board

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- The drafting of the **Energy Act, B.E. ....**, is already underway so as to optimize the efficiency of the energy industry regulation in the long run.
- When the Act takes effect, the **Energy Regulatory Board** will be established to regulate the operation of both the electricity and natural gas industry, pursuant to the government policy.

# Entities with Regulatory Function during the Transitional Period

- **Electricity Industry Regulation: 4 Sub-committees under the Committee on Energy Policy Administration, i.e.**
  - ❑ Sub-Committee Regulating the Power Tariffs and Service Charges
  - ❑ Sub-Committee on Load Forecast
  - ❑ Sub-Committee on the Power System Interconnection Regulations
  - ❑ Sub-Committee on the Purchase of Power from Independent Power Producers
- **Natural Gas Industry Regulation**
  - ❑ Petroleum Regulatory Board

# Development of Infrastructure to Promote Biofuel Utilization

Biofuel development and promotion has become one of the top agenda of the Thai government, aiming to reduce oil consumption.

- **Biofuels:**
  - ❖ Gasohol
  - ❖ Biodiesel



# Gasohol Promotion & Future Demand

## ■ GASOHOL

### Target

- **Reduce 10% of overall gasoline consumption**
- **2006:** use of Gasohol 95 = 3.5 M lt/day.  
Gasohol 95 (“E-10” – a mixture of ethanol & gasoline octane 91 at a ratio 1:9)
- As of Nov06: 3,445 service stations.
- **2007: target is to increase the use of gasohol to 9 M lt/day.**
- **2011:**
  - 45 ethanol production plants
  - Total production capacity of 12 M lt/day



### Government Measures to Promote Gasohol

#### **Price measure**

- Gasohol price is cheaper than the premium gasoline at 1.50 Baht (~4 US cents)/litre

#### **Government support:**

- BOI investment promotion for fuel-ethanol production plants
- Reduction of import & excise taxes for flexible-fuel vehicles (FFV)
- Soft-loans for domestic FFV manufacturing
- **Liberalization of fuel ethanol plants and distribution**

# Biodiesel Promotion & Future Demand

## ■ BIODIESEL

### Target

- Reduce diesel consumption by 10% in 2012.



<b>Target</b>	<b>Blending Ratio</b> (to replace diesel consumption)	<b>Distribution Area</b>
<b>2005-2006</b> (trial)	<b>2% (B2)</b>	<b>certain areas</b>
<b>2007-2011</b> (commercial)	<b>5% (B5)</b>	<b>certain areas</b> (e.g. in the South, BKK)
<b>2012 onwards</b>	<b>10% (B10)</b>	<b>nationwide</b>

Note: The trial of B2 was successful and hence the distribution of a higher blending ratio “B5” earlier than scheduled.

# Status of Biodiesel Development & Promotion

## Biodiesel Specifications

- **Commercial scale** – announced 11Jul05 & effective 23Sep05
- **Community scale** for agricultural machinery – announced 30Jun06 & effective 21Jul06

### Commercial Biodiesel

- 3 production plants of B100, with a total production capacity of 590,000 litres/day (2 plants just came on stream end of 2006)  
**Total actual production** 100,000 litres/day
- As of Nov06: 311 service stations for B5 (PTT: 114 & Bangchak: 197), with a total sale of B5 at 200,000 litres/day.  
⇒ sale to lorries & pick-up trucks
- Retail price of B5 is lower than diesel price at 0.50 Baht/litre.

### Community-Based Biodiesel (Pilot Project)

**Production Capacity (each):**

**100 litres/day**

**Raw Materials: used cooking oil, palm oil, jatropha oil**

**Target Dec 2006: 70 Communities (65 installed; 5 being installed)**

**Production: 7,000 litres/day**

**Replace diesel 2.3 M litres/yr**

# Conclusion

- The Thai government has clearly devised plans and strategies based on the concept of sustainable development with a view to creating energy balance between the demand side and the supply side, as this will eventually enhance energy security of the country.
- **Energy infrastructure development is essential and will require huge resources, especially technical expertise and financial support.**
- Continued collaboration and assistance from the private sector and financial institutions can very much contribute to Thailand's achievement of balanced growth, improved efficiency and competitiveness of the country.



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