PTT’s Analyst Meeting, Phuket Province

LNG Growth and Opportunities in Thailand

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Content

• LNG business/market for last decade

• LNG Market Outlook

• LNG sourcing strategy

• PTT LNG Receiving Terminal and further business opportunities
Unconventional Gas: Unconventional gas has been proposed as a supply source for numerous LNG projects.

**US EAST & GULF COAST (US)**
- Number of existing/emerging shale plays
- ‘Convertible’ import capacity ~ 90 mmtpa

**INDONESIAN CBM (Indo.)**
- South Sumatra / Kutei
- Gas Resource ~ 35 Tcf

**WESTERN CANADA (WC)**
- Horn River / Montney
- Gas Resource ~ 150 Tcf

**EAST AUS. CSG-TO-LNG (Aus)**
- 2 projects already taken FID
- 2 more are expected
- Gas Resource ~ 65 Tcf

Liquefaction: Train Size is getting bigger
Liquefaction: Smaller gas field and FLNG solution

Proposed FLNG Projects of Northern Australia

**Owner: Shell**
- FID: May 2011
- Capacity: 3.6 MTPA
- First LNG: 2016/17

**Owner: Flex LNG**
- FID: target Q1:2012
- Capacity: 2 MTPA
- First LNG: TBC

**Owner: PTTEP/PTT**
- Capacity: 2 MTPA

**Other 21 Projects**
- Other 21 projects are under developed, with total capacity 30 MTPA such as PETRONAS, INPEX, BHP and others

SOURCE: Wood Mackenzie, LNG Service
Shipping: LNG vessels double in size

Nakilat (Qatar)

- Q-Flex and Q-Max vessels have capacities of between 209,000 and 266,000 cu.m (and cost US$250-285 million each)

- By 2010, Nakilat own 54 LNG vessels, making it the largest LNG ship owner in the world.
Re-gasification: Floating Re-gasification Solution

- FSRU is an enlarged version of SRV. A stationary FSRU will allow offshore side by side discharge of traditional LNG carriers.

SRV is an LNG vessel with onboard LNG vaporizers. The SRV is classified as ship. Re-gasified LNG is discharged buoy connected to a riser and subsea pipeline. The Two separate buoys will ensure continuous send-out by overlap between arriving and departing SRVs.
Nominal Capacity of floating re-gasification terminal by country

Note: Only include floating terminal that are in-operation and under construction
New Buyers: “Middle East: Exporter or Importer?”

UAE looks to nuclear for meet power demand growth

Dubai to import LNG from 2010

New power plants in Saudi Arabia to be crude oil fired

Abu Dhabi and Oman to develop expensive sour, tight gas
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LNG Trade in 2010

Import/Export Volume 220 Million Ton

Exporting Countries
- Qatar: 25%
- Malaysia: 10%
- Indonesia: 11%
- Algeria: 6%
- Australia: 9%
- Nigeria: 8%
- UAE: 3%
- Oman: 4%
- Egypt: 3%
- Trinidad: 7%
- Others: 11%

Importing Countries
- Japan: 31%
- Korea: 15%
- Spain: 9%
- USA: 4%
- India: 4%
- Taiwan: 5%
- France: 5%
- Others: 27%

Source: BP Energy Statistic 2010
Global LNG supply\(^1\) and demand forecast
Million tons LNG per annum (mtpa)

1 Assuming 95% utilization. New projects coming on-stream deliver 25% in first year, ramping up to full production in second year

SOURCE: McKenzie
Many proposals target for long-term demand

SOURCE: Wood Mackenzie, 2011
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PTT’s LNG Procurement Plan

- **Short Term/Medium Term Supply (2011 -2014):**
  Opportunities from volatile market situation

- **Long Term Supply (2015+)**
  - Procure from reliable sources
  - Procure from multiple suppliers in order to mitigate risk
  - Participate in LNG projects throughout the value chain, if possible, including:
    - Conventional LNG Supply
    - Unconventional LNG Supply
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Re-gasified LNG will be blended with domestic gas through interconnecting pipeline (13 Km, yellow line) before sending to PTT’s customers by gas pipeline.
Description of Map Ta Phut LNG Terminal

<table>
<thead>
<tr>
<th></th>
<th>PHASE 1</th>
<th>PHASE 2</th>
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<tbody>
<tr>
<td>Jetty</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vessel Size (m³)</td>
<td>125,000-264,000</td>
<td>125,000-264,000</td>
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<tr>
<td>LNG Tank (m³)</td>
<td>160,000 x 2</td>
<td>160,000 x 1</td>
</tr>
<tr>
<td>Capacity: ORV (MTPA)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Truck Loading (ton/day)</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Commercial Operation</td>
<td>Q3 - 2011</td>
<td>To be determined</td>
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How large is a 100,000 cu.m tank?
PTTLNG was founded in August 2004 as a wholly owned by PTT to build and operate Thailand first LNG receiving terminal to serve long term energy supply need of the country.

Currently PTT owns 100% capacity right of terminal capacity (Phase I: 5 MTPA, Phase II: 10 MTPA)
Terminal Commissioning Accomplished—Get to Commercial Period

- PTT received 1st commissioning cargo in May 31st, 2011
- Commercial operation started on September 6, 2011
- Up until now, 11 cargoes have been imported to Map Ta Phut LNG terminal
Commissioning LNG Cargoes Imported to Thailand
LNG Business Opportunities and Challenges

PTT Aspiration

- PTT has ambition to be the Thai Premier Multinational Energy Company within 2020.
- We are very keen to work with international partner in LNG business both Thailand and worldwide.

Characteristics of Thai Gas Market

- Large natural gas market
- Less demand seasonality
- Well-established infrastructure & pipeline system
- Flexibility Gas VS LNG
- Strategic Location

LNG Business

- Utilize terminal’s spare capacity
- Cargo swap/ cargo diversion
- Participate in LNG project throughout value chain
- Cold energy utilization
- LNG truck loading
Thank you