LNG

Presented By: Khun Supawat Tatthong
Analyst
Liquefied Natural Gas Supply Department
Key Situation for Spot LNG Market in 2014

- **2008**: Shale Gas Revolution
- **2011**: Fukushima Incident
- **2016**: Physical LNG Export from US?

Big Bangs in LNG industry

- **Fukushima Incident**
- **JKM**
- **JLC**
- **NBP**
- **HH**

Source: PTT, Platts, MoF (J)
Key Situation for Global LNG Market in 2014

On May 21st, 2014
Russia (Gazprom) signed GSA with CNPC (China)
Duration: 30 Years from 2019
Volume: 38 Bcm/year of Gas (30 MTPA of LNG)
Est. Border Price: $9.9 – 10.2 /MMbtu
Est. Delivery Price: $11.9 – 13.2 /MMbtu
(Less Appetite for LNG in Mid Term & Competitive LNG Price)

Source: LEA, PTT, GIIGNL

New Strategic Plan
- On April 11, Japanese Cabinet approved a new Japanese Strategic Energy Plan
- Nuclear Power will count as important base-load power source to stability of energy supply & demand structure
- The Power Plant which meet the new regulatory requirement will restart sequentially

The Path of Restarting
- On September 10th, 2 reactors at Sendai power (Kyushu Electric) passed the principal design test
- Kyushu Electric request community in both Satsumasendai and Kogashima to vote for restarting the Sendai power plant
- Sendai Nuclear Power Plant has 2 reactor units for 890 MW/Unit
- Currently, all of the Japan’s nuclear plants still remain shut down
But market expected to see Sendai Nuclear Power plant to restart at early next year
Key Situation for Global LNG Market in 2014

**New US FID projects in 2014**

- 4 projects have been approved from FERC to start their construction but only 2 projects, Sabine Pass Train 1-4 and Cameron, did announce their FID (Cameron announce their FID in September 2014)
- So far, total FERC approval projects have commitment to export LNG approximately 50.3 MTPA to the global LNG market
- While, the remaining projects that wait for FERC approval in 2015 could make the export volume increase up to 105 MTPA
While market has expected China’s LNG demand would essentially grow at fastest pace (15% per year) from 2011 – 2019. China’s LNG demand in year 2014 is lower than market’s expectation (Last year China’s LNG import grew 25% (YoY) while this year LNG import has expected to grow 16% (YoY)).

**Expected 10 – 15 MPTA from Australia Projects in 2015 (QC LNG, GLNG, Gorgon LNG)**

**2015 Outlook: China’s LNG Demand sustainable or impetuous growth?**

<table>
<thead>
<tr>
<th>Year</th>
<th>Speculative</th>
<th>Planned</th>
<th>Under Construction</th>
<th>In Operation</th>
<th>LNG Demand (2013)</th>
<th>LNG Demand (2014)</th>
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<td>2030</td>
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Global LNG demand is lower than previous estimate
As Global economy slow down

**More Central Asia gas reaching coastal markets via Line C**

**Mild winter ’13/14 temperatures and cooler summer ’14 reducing spot demand**

**APP/CAPE policies moving away from gas switching to clean coal**

**Lower GDP growth restricting gas demand growth**

**Hydro outperformed in 2014, providing more power into southern China**

**Anyue discovery boosting future supply into coastal China**

**Rising north China regas capacity to meet winter swing demand**

**City Gate price increases still below delivered cost of new LNG**

**Key LNG markets face regas, storage and pipeline constraints**

Source: WoodMac
2015 Outlook: Australia LNG export projects - On Time or Delay?

NWS LNG, Pluto and Darwin LNG

Total Capacity: 26 mtpa

Source: WoodMac, PTT, LEA

*Many projects have experienced cost overruns and delays beyond original schedules.*

LNG production in all Australia projects will suppress Qatar at 89 mtpa in 2018.

Today: [Graph showing current LNG production]

Under construction: [Graph showing projects under construction]

2018-2019: [Graph showing projected LNG production]

As of October 2014
Spot Price will be lower than 2014, Approximately 13.5 – 14.5 $/MMBtu

Key Factors should be :-
- Severe or Mild Weather in this winter
- China’s LNG Demand and ability to receive long term commitment from Australia Projects
- Australia LNG Projects will be completed on time and delay?
- How many Japanese Nuclear Reactor will be allowed to restart again?
- Europe Economy getting better or still stagnation?
2015 Outlook : Henry Hub Price

EIA’s projected HH Price in 2015 is 3.90 USD/MMBTU (→ 0.27 USD/MMBTU)

HH in 2013 = 3.73 $/MMBtu
Average HH in 2014 = 4.17 $/MMBtu

Source: Short term Outlook, Dec2013 EIA, Street Research, Bloomberg and PTT

- Expectation on HH price through 2030 has been deducted from year to year as the growth in shale production continuously increase
- Generally, with comfortable storage position in 2015, HH prices should stay at average around $4/MMBtu, slightly lower from 2014
- Nonetheless, increasing in New LNG export projects and Gas-intensive manufacturing led by Chemicals could spike HH price in the future
Petroleum

Presented By: Khun Jitwassika Hongthong Silpakul
Analyst
Market Analysis Division
Current market situation: Recap 2014

- **Jan**: Ukraine evolved into full-scale civil war as Russia seized control of Crimea.
- **Feb**: US Airstrike over IS in Iraq; No impact to oil supply from IS crisis in Iraq.
- **Mar**: Polar Vortex: lowest temperature in decades.
- **Apr**: Resume Libya supply.
- **May**: Polar Vortex: lowest temperature in decades.
- **Jun**: Strong US dollar.
- **Jul**: Strong US dollar.
- **Aug**: North Sea Maintenance.
- **Sep**: Dubai Seasonality.
- **Oct**: Iran’s sanction lift.
- **Nov**: Dubai Seasonality.
- **Dec**: Dubai Seasonality.

**Dubai Seasonality**

- Iran’s sanction lift
- North Sea Maintenance
- Dubai Seasonality

**Notable Events**

- **2012**:
  - Dublin Seasonality
  - Dubai Seasonality

- **2013**:
  - Dublin Seasonality
  - Dubai Seasonality

- **2014**:
  - Dublin Seasonality
  - Dubai Seasonality
Current market situation:
Fund Flow: Oil price depreciation & Dollar appreciation

Sources: IMF World Economic Outlook
Current market situation:
Oversupplied market about 1 MMBD in 2014

2014 DEMAND = (Non-OPEC + OPEC NGLS/Condensate) + Call On OPEC crude

WORLD OIL SUPPLY AND DEMAND GROWTH 2014 VERSUS 2013

Source: PTT Analysts
Current market situation:
Downward Revision has been constant theme in IMF world’s GDP forecast

IMF Global GDP %Growth Forecast – Quarterly Publications

*Sources: IMF World Economic Outlook
**Current market situation:**

**OECD DEMAND: A RECOVERY ECONOMY WITH EFFICIENCY GAINS**

**Economy:** Better economics data as Fed completed the taper and focused on its forward guidance of rate increase.

**Economic Trend:** Ending Quantitative Easing leads to stronger dollar.

**Effect on oil demand:** Stronger greenback make dollar-denominated oil imports more expensive in non-dollar markets.

**Sources:** IMF WEO, IEA
Current market situation:

**NON – OECD DEMAND:** SLOW DEMAND GROWTH WITH GRADUAL SUBSIDIES CUT

**Economy:** GDP forecast in 2015 has been revised down from 7.5% YoY to 7.1% YoY as manufacturing and labor sector weakens.

**Economic Trend:** Concerns over economic slow down

**Effect on oil demand:** China processed more crude amidst concerns over a slowing economy. Growing car use as economy moves to urbanization. Chemical related petroleum such as LPG and naphtha consumption grows as capacity increases. In addition, China’s crude appetite is expected to edge up due to SPR filling through out the year.

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**Economy:** EM import growth has slowed markedly in response to a stronger Dollar

**Economic Trend:** Funds flowing out of emerging countries back to the US as Fed exit quantitative easing, which strengthens the dollar currency.

**Effect on oil demand:** Gradual cut in subsidies across several emerging countries consumers such as Indonesia, India, Brazil and Russia.

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Sources: IMF WEO, IEA
Current market situation:

DEMAND: Middle distillates lead oil demand growth

Sources: PTT Analysts, PIRA Dataset

Total Oil Demand in 2015 = 92.87 MMBD
Current market situation:

DEMAND: Capacities Shifting to Asia and Middle East

Annual Regional Capacity Expansion

Note: Includes Condensate Splitter Capacity based on Firm + Probable Case by PIRA’s Data

Sources: PIRA World Oil Datasets
Current market situation: Refinery Margins

**Sources:** PTT Analysts, Reuters, Energy Aspects

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Singapore Gross Refinery Margins</th>
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<tbody>
<tr>
<td>Q1</td>
<td>4.27</td>
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<tr>
<td>Q2</td>
<td>4.56</td>
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<tr>
<td>Q3</td>
<td>3.86</td>
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<tr>
<td>Q4</td>
<td>3.37</td>
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LNG

Petroleum

Petrochemical

SG Dubai GRM - Cracking 2015
SG Dubai GRM - Hydroskimming 2015
SG Dubai GRM - Cracking 2014
Crude oil outlook
SUPPLY: Surplus market with better demand in 2015

2015 DEMAND = (Non-OPEC + OPEC NGLS/Condensate) = Call On OPEC crude

Source: PTT Analyst
According to PRISM assumption: 2015 Brent price will average at $94.00/BBL and with Brent-Dubai spread at $2/BBL, we have come to a consensus that Dubai will average at $92.00/BBL in 2015.

Dubai Price will continue to trade within $80-$90/BBL during the 1H of 2015

- Global economy will strengthen, propelled by the US economy
- Geopolitical tension in MENA persists but will not affect oil production
- Oil markets will have to be rebalanced via price
- Over supplied crude market continues with a minimum cut in OPEC production

Source: PTT Analysts and PTT PRISM (4.11.2014), IMF, Reuters Polls
Crude Oil Outlook: What’s the PRICE FLOOR? Who goes first?

According to production costs, non-OPEC countries are likely to get hit first.

IEA – "Some 98 percent of crude oil and condensates from the United States have a breakeven price of below $80/bbl and 82 percent had a breakeven price of $60/bbl or lower."
Crude Oil Outlook: Will shale oil take a hit from lower price?

WITH LOWER OIL PRICE, US OIL SHALE PRODUCTION IS STILL GROWING!!

U.S. SHALE CRUDES AND CONDENSATE PRODUCTION
MILLION BARRELS PER DAY

PIRA’s Reference case $92/bbl Brent

PIRA Cases

<table>
<thead>
<tr>
<th>Lost Growths in KBD</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
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<tbody>
<tr>
<td>$92/BBL</td>
<td>(100.00)</td>
<td>(200.00)</td>
<td>(350.00)</td>
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<tr>
<td>$80/BBL</td>
<td>(130.00)</td>
<td>(280.00)</td>
<td>(500.00)</td>
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<tr>
<td>$70/BBL</td>
<td>(200.00)</td>
<td>(400.00)</td>
<td>(700.00)</td>
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</table>

- The hampering effect of low oil price starts initially and compounded into higher downside pressure as time goes.
- Low oil price will lessen development/equipment cost due to slowdown in CAPEX and diminishing cash-flows.

* Source: PIRA 2014
Crude Oil Outlook: *Dubai price bull case scenario*

**LNG**

**High sensitivity of oil shale production to price and supply disruptions in MENA**

- Lower oil price curtails shale oil production
- Strong US economy boosting World Oil Demand
- Iraqi oil production in the South is disrupted by IS
- Iranian barrels remain offline to the market

**2015 WORLD GDP (YoY)**

- 3.80%

**OIL DEMAND GROWTH (YOY)**

- 1.4 MMBD

**NON OPEC SUPPLY + OPEC NGL GROWTH (YoY)**

- 1.3 MMBD

Source: PTT Analysts and PTT PRISM (4.11.2014), IMF, Reuters Polls
Crude Oil Outlook: *Dubai price bear case scenario*

Supply gluts in the oil market; financial liquidation and geopolitics ease

- US shale gas production is not disrupted from lower oil price due to production hedging
- Strong dollar suppress China export and EM economy
- Minimum geopolitics drama with oil production remain stable.

Source: PTT Analysts and PTT PRISM (4.11.2014), IMF, Reuters Polls
Countries are taking opportunity of lower products’ prices to revise their subsidy policies

Level 4: Fully Subsidized
- Prices set by Government Decree and kept stable throughout the years

Level 3: Heavily Subsidized
- Prices set by Government/NOC, kept relatively stable with some reviews

Level 2: Partly Subsidized
- Controlling mechanism such as Price Caps/Thresholds

Level 1: Lightly Controlled
- Prices set by Retailers with light mechanism to control the frequency

Level 0: Market Price
- Prices moves in accordance to the World’s market price.

World’s Average Price
- \( \frac{\sum Price \times Volume}{\sum Volume} \)

*Sources: PTT Analysts, PIRA as of Jul. 2014
Trend
Indonesian Price Subsidies: Subsidy Reforms will improve the budget

*Sources: PTT Analysts, Reuters*
Trend
India Price Subsidies: Subsidy Reforms will improve the budget

*Sources: PTT Analysts, Reuters
• Slower global economic growth and dollar appreciation putting pressure on commodities prices

• Global refining capacity growth continues to expand led by Asia and the ME, resulting in increased product exports – particularly middle distillates

• Even with OPEC cutting production during its Annual meeting on 27 Nov’14. Pricing mechanism will act as a rebalancing factor

• US, as Non-OPEC Producer, becomes the world largest liquid producer backing its light-sweet crude import from WAF to Asia

• According to our base case assumption, the forecast average Dubai Price in 2015 is in $90-$95/BBL range

• Countries are taking opportunity of lower products prices to revise their subsidy policies
Petrochemical

Presented By: Khun Ekachai Sirithammasasan
Division Manager
Commercial Risk Management
## Ethylene/PE in Uptrend

- Ethylene/PE capacity growth concentrates in low cost high demand regions i.e. North America, Middles East, and China
- Nearly 2.1 million ton of naphtha crackers will be permanent shutdown by 2016
- U.S. greenfield capacity is likely to be delayed, then no capacity additions before 2017
  - 10 greenfield ethane projects announced, but only four companies (Chevron Philips, Exxon Mobil, Dow Chemical and Occidental Chem/Mexichem) has been commenced construction.
- China’s CTO/MTO projects still have several challenges such as low profitability of MTO projects, technical issues, environmental issues

### 2015 Ethylene demand growth outpace new capacity

<table>
<thead>
<tr>
<th>Year</th>
<th>Americas</th>
<th>W.Europe</th>
<th>Middle East/Africa</th>
<th>Global OR</th>
<th>Demand Growth</th>
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<td>2012</td>
<td>85.6</td>
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<td>87.6</td>
<td>88.0</td>
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Source: IHS

### PE Operating Rate remain high in 2015

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<th>Year</th>
<th>Americas</th>
<th>W.Europe</th>
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<td>2016</td>
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Source: IHS
**Olefins Outlook:**
Ethylene/PE: Continue in Uptrend, U.S. Crackers to be Delay

**PE Operating Rate remain high in 2015**

**Ethylene and PE Margins Continue Strong**

**Prepare for Ethylene/PE Up-Trend in 2015**

- **High cost producers in Asia and Europe planned to permanent shutdown in 2015.**
  - Sumitomo Chemical, Japan: Capacity 415 KTA in May
  - CPC No.5, Taiwan: Capacity 500 KTA (uncertain schedule due to shutdown since Apr 14)
  - Total, France: Capacity 400 KTA in 2H
  - Ineos, UK: Capacity 330 KTA in 2H

- **However, higher export volume from Middle East will be challenges in Ethylene/PE prices**
  - Startup of Saudi Arabia’s Sadara Chemical in 2H-15 (1.5 million Ton ethylene, LDPE 350 KTA, LLDPE 375 x 2 KTA)
Olefins Outlook:
Propylene: New On-purpose Units Pull Operating Rate Down

Propylene capacity additions mainly from Asia, particularly from China

On-purpose production unit, Coal-based and PDH drive Asia propylene

Propylene Fundamental

• 2015 global operating rate will decline to 79.5% from 80.7% in 2014 due to capacity addition of propylene still outpace demand growth

• Capacity additions driven by on-purpose production unit, coal-based and PDH, mainly in China

• However, these on-purpose units still have many challenges
  • PDHs mostly rely on propane import from Middle East and US. Normally propane prices being highly seasonal therefore they will be run in marginal.
  • China’s CTO/MTO projects still have several challenges such as low profitability of MTO projects, technical issues, environmental issues
Olefins Outlook:
Propylene: New On-purpose Units Pull Operating Rate Down

Ethylene up cycle and recover demand support Propylene price ratio

Propylene Fundamental

- 2015 global operating rate will decline to 79.5% from 80.7% in 2014 due to capacity addition of propylene still outpace demand growth
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Propylene Price will be pressure from China self-sufficient

Propylene/Ethylene Price Ratio

USD/MT

Source: Actual data from ICIS, Forecast data by PRISM

Source: PRISM, Oct2014 and PTTGC
Aromatics Outlook: New PX Capacity Pressures Margin

More Capacity to Come in 2015

New Paraxylene Capacity in 2015

<table>
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<tr>
<th>Unit</th>
<th>Nameplate</th>
<th>Effective</th>
<th>Startup</th>
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<tr>
<td>Lotte Chemical 1</td>
<td>(200)</td>
<td>(200)</td>
<td>Q1</td>
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<tr>
<td>JSC KazMunaiGas</td>
<td>469</td>
<td>352</td>
<td>Q2</td>
</tr>
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<td>Sinopec Hainan</td>
<td>600</td>
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<td>Q2</td>
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<tr>
<td>Reliance Industries No.4</td>
<td>2,250</td>
<td>750</td>
<td>Q3</td>
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<td>PTTGC</td>
<td>120</td>
<td>40</td>
<td>Q3</td>
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<td><strong>Subtotal</strong></td>
<td><strong>3,239</strong></td>
<td><strong>1,392</strong></td>
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<td>Carry Over from 2014</td>
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<td><strong>Total</strong></td>
<td><strong>3,985</strong></td>
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Source: PCI

PX Price Outlook

Factors to be Watched in 2015

- Impacts of Shale Oil and Gas:
  - Higher octane value in U.S., as a result of surplus light naphtha, discourages using reformate to produce aromatics -> Minimal impact
  - Falling crude prices make operating cost lower

- Economics
  - China’s economy still sensitive which may impact polyester demand

Source: PRISM, October 2014
Aromatics Outlook: BZ Remains Strong Thanks to Shale Gas

Changing to Lighter Feedstock Reduces BZ Output

Changing to lighter feedstock limits benzene production. The U.S. and Europe need to import more benzene.

NEA Turns to be Balanced, U.S./Europe Imports More

Regional Benzene Net Trade

Factors to be Watched in 2015

- **Impacts of Shale Oil and Gas**: Changing to lighter feedstock limits benzene production; U.S. and Europe need to import more benzene.

- **Trade Flow**: North East Asia turns to be more balanced due to China’s demand for SM, phenol, cyclohexane; Japan’s cracker closure.
Thank you

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Proved Reserves  - Proved reserves are defined as those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations.

Probable Reserves  - Probable reserves are defined as those unproved reserves which analysis of geological and engineering data suggests are more likely than not to be recoverable.

Contingent Resources - Contingent resources are defined as those quantities of petroleum which are estimated, on a given date, to be potentially recoverable from known accumulations, but which are not currently considered to be commercially recoverable. The reasons for non-commerciality could be economic including market availability, political, environmental, or technological.
Q & A