Future Gas Supply & Pricing: The Importance of Asian Demand and North American Supply

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Themes

• Current Market Situation

• Major Future Global Gas Uncertainties

• Scenario Modelling Outcomes

Based on the Following Research:


Europe’s Hybrid Gas Market – UK & German Gas Prices Jan 2001 – September 2011

Source: BAFA, Platts

European Trading Hubs & Connectivity

Source: BAFA, Platts
Demand in Key Global LNG Markets

- Europe Gas Demand
  - 2009 vs 2008: -5.8%
  - 2010 vs 2009: +8.1%
  - 2011 vs 2010 YTD: +6.3%

- Asia LNG Imports
  - 2009 vs 2008: -3.9%
  - 2010 vs 2009: +17.8%
  - 2011 vs 2010 YTD: +13.2%

US, Canada & Mexican Gas Demand

- 2009 vs 2008: -1.1%
- 2010 vs 2009: +5.6%
- 2011 vs 2010 YTD: +2.0%

Niche and New LNG Market Imports

Asian LNG Prices – 2004 – September 2011

- Source: IEA Monthly Data, EIA, Waterborne LNG
- Source: Argus Global LNG
Asian LNG Spot Prices vs NBP and JCC
Jan 2010 – December 2011

Source: ICIS Heren

Global LNG Deliveries: Jan 2010 – Oct 2011

Source: Waterborne LNG
The Future: Major Uncertainties

- Asian Natural Gas and LNG Demand.
- Production versus pricing policy for European pipeline gas suppliers post oil-indexation.

Asian Demand Growth

Low Demand Growth (IEA WEO 2010 New Policies Scenario Demand)  High Demand Growth (IEA Golden Age of Gas Scenario Demand)
Asian LNG Imports

EIA Outlook to 2035 – US Gas Supply

Natural gas production by source, 1990-2035 (trillion cubic feet)

- History
- 2009
- Projections

- Total
- Shale gas
- Tight gas
- Lower 48 onshore conventional
- Lower 48 offshore
- Alaska
- Coalbed methane
US Shale Production by Play

Shale Play Well Performance – Importance of ‘Sweet Spots’

The Barnett Shale Play has contracted to small core areas

- Less than 10% of the play has the potential to be commercial (areas in red).
- Even within the core areas, well performance is uneven and considerable commercial risk exists.

Source: Arthur E Berman
US Production Hypothetical Trajectories

Potential North American LNG Export Projects

<table>
<thead>
<tr>
<th>Terminal / Project - US</th>
<th>Commercial Partners</th>
<th>Capacity (bcma)</th>
<th>DOS Status</th>
<th>FERC Status</th>
<th>Possible Start-up</th>
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<tbody>
<tr>
<td>Sabine Pass</td>
<td>Cheniere</td>
<td>22</td>
<td>Approved</td>
<td>Under Review</td>
<td>2015</td>
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<td>Freeport</td>
<td>Freeport LNG, Macquarie</td>
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<td>Approval Expected 2011</td>
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<td>2016</td>
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<td>Sempra</td>
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<td>Not Yet Applied</td>
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<tr>
<td>Cove Point</td>
<td>Dominion</td>
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<td>Not Yet Applied</td>
<td>Not Yet Applied</td>
<td>2016+</td>
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<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>100.8</strong></td>
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<table>
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<th>Terminal / Project - Canada</th>
<th>Commercial Partners</th>
<th>Capacity (bcma)</th>
<th>Environmental Approval</th>
<th>Other Approvals</th>
<th>Possible Start-up</th>
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<td>Kitimat</td>
<td>Apache, EOG Resources</td>
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<td>Approved</td>
<td>Underway</td>
<td>2015</td>
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<td>BC LNG</td>
<td>LNG Partners, Haisla First Nation</td>
<td>2.6</td>
<td>Not Yet Applied</td>
<td>Not Yet Applied</td>
<td>2016+</td>
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<td><strong>Total US &amp; Canada</strong></td>
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<td><strong>134.2</strong></td>
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</table>

Source: Waterborne LNG, A. Flower OIES
Global LNG System Low US Production

- **Global LNG System Balanced, North America Imports LNG**
- Niche Markets (Dominican Republic, Costa Rica, S America etc.)
- Asian Markets (Japan, Korea, Taiwan, China, India)
- Hub-Indexed Pipeline Contracts / direct hub sales
- Additional Capacity / Minimum Supply Floor
- Pipeline Imports

**Arbitrage has lead to convergence between US Price and European Price**

**Global LNG Supply**

- Domestic Production
- European LNG Buyers & Suppliers of Flexible LNG
- Domestic Imports
- Pipeline Imports
- Upstream Sellers
Low US Production, High Asian Demand

Global LNG Consumption

- 50% probability of uncertain future non-North American projects

North American LNG Imports/Exports

Regional Prices

Russian Pipeline Exports to Europe

Low US Production, Low Asian Demand, European Pipeline Suppliers maintain Price Target

Global LNG Consumption

- 50% probability of uncertain future non-North American projects

North American LNG Imports/Exports

Regional Prices

Russian Pipeline Exports to Europe

Regional Prices
Low US Production, Low Asian Demand, European Pipeline Suppliers Maintain Export Target

Global LNG Consumption

North American LNG Imports/Exports

Regional Prices

Russian Pipeline Exports to Europe

Low US Production Scenarios

• With High Asian Demand:
  – Russia comfortably above today’s Take or Pay level to 2025.
  – US prices rise to above NBP around 2015 (to attract LNG imports)

• With Low Asian Demand:
  – To maintain hub prices, Russia shuts in exports to below today’s ToP level, or
  – Maintaining today’s ToP level results in periodic low European, US and Asian LNG spot prices.
High US Production, High Asian Demand, European Pipeline Suppliers Enforce Price Target

Global LNG Consumption

North American LNG Imports/Exports

Regional Prices

Russian Pipeline Exports to Europe

50% probability of uncertain future non-North American projects, plus North American LNG
High US Production, High Asian Demand, European Pipeline Suppliers Maintain Export Target

50% probability of uncertain future non-North American projects

Global LNG Consumption

North American LNG Imports/Exports

Russian Pipeline Exports to Europe

Regional Prices

High US Production, Low Asian Demand, European Pipeline Suppliers Enforce Price Target

50% probability of uncertain future non-North American projects

Global LNG Consumption

North American LNG Imports/Exports

Russian Pipeline Exports to Europe

Regional Prices

Japan LNG Contracts (JCC)

Asian LNG Spot

NBP

Henry Hub

Japanese LNG Contracts (JCC)

Asian LNG Spot

NBP

Henry Hub
High US Production, Low Asian Demand, European Pipeline Suppliers Maintain Export Target

Global LNG Consumption

North American LNG Imports/Exports

Regional Prices

High US Production, Low Asian Demand, European Pipeline Suppliers Maintain Export Target

20% probability of uncertain future non-North American projects

High US Production Scenarios

• With High Asian Demand:
  – North America exports LNG, rising to 70 bcma by 2025. Henry Hub rises to $3.50 below European hub price levels.
  – To maintain European hub prices, Russia exports to Europe fall below today’s ToP levels post 2020.

• With Low Asian Demand:
  – To maintain hub prices, Russia shuts in exports below today’s ToP level from 2015, or
If Oil Indexation Survives?

• Economic Viability of Midstream buyers of Russian gas unlikely on following scenarios:
  
  – High US Production, High Asian Demand (2020+)

Conclusions

• The Past: European Gas Security of Supply = focus eastward on Russian supply capability and transit issues.

• The Future: What happens to US Production and Asian LNG Demand is at least as important.

• And these factors also challenge:
  
  – Russia (in a post oil-indexation world – price vs volume)
  – Midstream buyers of Russian Gas if oil indexation survives
  – In the ‘High US, Low Asian Demand Scenario’ – the sustainability of the JCC paradigm for Asian LNG contracts.

• The recent surge of LNG which ‘rattled’ the European market a foretaste of things to come ?

• NB These are scenarios to explore system dynamics; not predictions.
Thank You for your attention.

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