North American LNG Exports: How Disruptive for How Long?

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Agenda

• A Disruptive Proposition
  • North American Drivers and Impacts
  • Global Market Implications
New Trade, New Terminology

“Pacific Shale Spread”
The difference between low US prices and Pacific prices historically indexed to oil

“Atlantic Shale Spread”
The difference between low US prices and “hybrid” European prices that oscillate between oil benchmarking and gas hub pricing
LNG Export Window of Opportunity

**Shale Spreads**

- Atlantic shale spreads still over $6
- Pacific shale spreads over $12

The window of opportunity for North American LNG exports is wide open.

**Continuity or Collapse?**

- How long can this last?
- Will the North American LNG exports collapse the shale spreads and close the window?
- If so when and to what extent?
“America is Shaking Things Up”…

A high level of North American LNG exports could be a game-changing force in the industry

“America is shaking things up…Japanese, Korean, and Chinese buyers are pulling back from supporting pricey ...LNG projects that need the old Asian pricing formula to turn a profit…”

- March 4, 2013, Bloomberg citation of Hartland Shipping Services

“We want to create a system that serves as a new indicator, reflecting the true supply-and-demand conditions of LNG and to stabilise its price.”

- April 3, 2013, AFP citation of an official from the Japanese Minister of Economy, Trade, and Industry

“What we are trying to do is to introduce alternative pricing benchmarks to the complete oil-indexed [contracts, enabling us] to negotiate prices of the current contracts more equally.”

- January 21, 2013, Koichiro Age, General Manager of LNG Trading Department, Osaka Gas
The LNG export policy debate focuses on domestic price increases and their economic impacts:

- **Export Permit Studies**: Typically presume flat shale cost curves and nimble production responses to exports of 6 to 12 Bcfd (45 to 90 MMtpa) → for most LNG export scenarios price impacts are small and/or short-lived.

- **DOE Sponsored Study**: LNG price export impacts never exceed $1.11 per MMBtu, even if constrained US exports reach 12 Bcfd (90 MMtpa).

- **Industrial Study**: Posits a combination of steeper shale curves, high industrial demand, and very high LNG exports up to 35 Bcfd (262 MMtpa) → price impacts could reach $4 per MMBtu.

**…But Remains Indecisive**

US price impacts alone are **NOT** as critical an issue as the Shale spread impacts that will drive both industrial and LNG export economics

So far, the LNG export debate lacks realistic, integrated analysis of North American shale production economics and global LNG market responses
Industry Questions
How much LNG will be exported and will this impact liquidity and pricing?

Underlying Issues
How much demand growth and LNG exports can shale sustain at low prices?

Industry Questions
How will LNG exports impact shale spreads, demand, GDP, and jobs?

Underlying Issues
How will global supply respond and can LNG demand absorb more supply?

Bottom line
The sustainability of shale production and the scalability of global LNG demand will drive Shale Spreads and thus LNG export economics.
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• Global Market Implications
Drillers Fleeing Low Demand and Prices

As shale production boomed and prices collapsed, drillers first retrenched to “wet” or NGL-rich plays, but have recently reduced drilling there as well.

By January 2013 record shale production represented over 40% of the total 65 Bcfd net dry gas production in the lower 48.
LNG Exports Could Double “Demand” Growth

An moderate 7 Bcfd of LNG exports could almost double domestic demand growth

US Gas Consumption Scenarios – 2025*

- Carbon dioxide emission costs drive switching from coal
- Chemical sector expansions and higher economic growth
- Fuel switch from fleet, commercial and military vehicles

As conventional production declines, shale production will have to supply over half the market

* BRG base case forecasts are calibrated based on AEO 2013 early release. This is an un-integrated, exogenous demand scenario for each sector.
LNG Export Ambitions are Large

Including Canada, at least 9 Bcfd of LNG export capacity is under construction or in advanced development, with another 33 Bcfd of capacity proposed.

Note: Existing and Under Construction refers to the projects with permits and advanced commercial development including contracts and financing; Advanced Development refers to 6 projects with permits and commercial development including contracts; Under Development refers to 21 projects with permits or filed permits only.

Source: FERC, March 20, 2013; DOE, March 7, 2013; Global LNG Info
Can Shale Handle It?

Our Shale Resource Potential (“ShaRP”) model divides plays into several classes of wells with differing productive features and economics – the Class I “sweet spots” and Class II “economic” wells account for almost half of total reserves.

Class I Wells – Average Cost by Play

Class II Wells – Average Cost by Play

Note: The gross costs include environmental capex, capital / drilling costs, other non-drill costs, direct operating costs, royalties and production taxes. The net costs equal to gross costs minus total NGL revenue.
Sweet Spot Surrender?

The output for Class 1 “sweet spot” wells is still growing but could peak by the end of the decade, giving way to greater focus on the economic Class 2 wells.
LNG Export Price Impacts

With 6 Bcfd more North American LNG exports, HH price impacts could approach $1 around 2020, but then subside while “sweet spot” shale production remains high.
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• Global Market Implications
Global Industry Drivers

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<th>Global Supply Drivers</th>
<th>Global Demand Drivers</th>
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<tr>
<td>• US Export Growth</td>
<td>• Regas Terminals for New Markets</td>
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<td>• Australian Production Delays</td>
<td>• Chinese Shale Production</td>
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<td>• East Africa and East Med LNG</td>
<td>• Japanese Nuclear Policy</td>
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Global supply-demand balances and increased supply liquidity could impact pricing practices, especially in East Asia and Europe.

In 2015-25 in the JKT markets, 60% of LNG contracts (8 Bcfd or 61 MMtpa) will expire, enabling buyers to drop oil-indexed supplies.
Global Production Implications

North American LNG exports compete favorably with more expensive Australian LNG projects and greenfield East African and East Mediterranean projects.

North American Impacts on Global LNG Supply

Lower North American LNG Exports

Higher North American LNG Exports

5.7 Bcf/d
Increase in North American exports

minus

2.5 Bcf/d
Liquefaction delays or cancellations (Australia, East Africa, East Med)

equals

3.2 Bcf/d
Net supply increase
China and Japan Demand Wildcards

By 2025, China and Japan could add LNG imports of up to 12 Bcf/d – or 9 Bcf/d and 3 Bcf/d, respectively.
Emerging Market Upside

The emerging LNG markets could add over 10 Bcfd – with almost 6 Bcfd from South/Southeast Asia and over 4 Bcfd combined from Eastern Europe and Latin America.

**East Europe**

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<th>Range</th>
<th>Est. Demand</th>
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<tr>
<td>Low</td>
<td>0.6</td>
</tr>
<tr>
<td>High</td>
<td>2.7</td>
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**Central & South America**

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<th>Range</th>
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<tr>
<td>Low</td>
<td>1.4</td>
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<tr>
<td>High</td>
<td>1.9</td>
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**South/Southeast Asia**

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<tbody>
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<td>Low</td>
<td>4.2</td>
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<tr>
<td>High</td>
<td>5.7</td>
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Note: Low range includes the projects under construction, engineering, and planning. High range adds speculative projects. The estimated consumption yields an average capacity utilization for new regas terminals of approximately 65%.
Substantial Demand Uncertainty

The 6 Bcfd variation in LNG demand scenarios doubles the 3 Bcfd supply uncertainty.

LNG Global Demand and Supply Scenarios

Demand Scenarios
- Middle East
- Atlantic Basin
- Pacific Basin
- LNG Demand-High Range

Supply Scenarios
- Middle East
- Atlantic Basin
- Pacific Basin
- LNG Supply-High Range
Can Demand Absorb the New Supply?

Substantial surpluses could develop if demand is low, but if demand is robust then markets could remain tight through 2015 and then rebalance in 2020-2025.

Global Supply / Demand Balance Scenarios

**Balanced Scenario**
(High Supply / Demand)

**Surplus Scenario**
(Low Supply / Demand)

- **Surplus: 2.8 Bcfd**
- **Surplus: 8.8 Bcfd**
How Much Shale Spread Shrinkage?

Even if not “needed” for consumption, North American LNG is “wanted” to reduce prices and/or stimulate new spot markets.

**Note:** US DES Prices to Japan = HH*(1+15% Trading Margins) +$3 Fixed Fees for liquefaction costs & Terminal Fuel + Shipping Costs to Japan + Panama Canal toll fees.

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**Game Over?**

Lower shale spreads would erode LNG export drivers.

~$6/MMBtu Uncertainty in Japanese LNG prices

~$0.9/MMBtu Uncertainty in HH prices
THANK YOU

Please let us know how we can help

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