American Gas to the Rescue?

The Impact of US LNG Exports on European Security and Russian Foreign Policy

Summary of Report by Trevor Houser (Rhodium Group) & Jason Bordoff (Center on Global Energy Policy)

September 22, 2014
New York, NY
Hyperbole Over LNG in Debate About Western Response to Russia

"The ability to turn the tables and put the Russian leader in check lies right beneath our feet, in the form of vast supplies of natural energy.”
House Speaker John Boehner

"It’s time for America to hit Russia where it hurts; namely, in its wallet. How? By immediately increasing the number of liquefied natural-gas export permits the administration approves.”
Ohio Rep Bill Johnson

"American natural gas exports would help Ukraine free itself from Russian energy and Putin's political manipulation”
US Sen John Barrasso

“[LNG exports] would reassure our allies and send a message to Putin”
US Rep Ed Royce

"Today, the U.S. has the leverage to liberate our allies from Russia's stranglehold on the European natural-gas market.”
US Sens John McCain and John Hoeven
America’s Natural Gas Turnaround
From Major Importer to Major Exporter
US Gas Production Boom Reflected in Lower Domestic Gas Prices

US Natural Gas Production and Price

- Production (Left Axis)
- Wellhead Prices (Right Axis)

Source: Bureau of Economic Analysis, EIA
US Not Massive LNG Importer as was Expected

Net US natural gas imports
Billion cubic feet per day

Source: EIA AEO 2005, EIA AEO 2014
US Natural Gas Prices Diverged from Europe and Asia

Global Gas Prices
$ per MMBtu

- Asia (Japan CIF)
- Europe (NBP)
- US (Henry Hub)

Source: BP Statistical Review of World Energy 2014
Europe’s Natural Gas Dilemma

Gas-intensive and Import Dependent
EU is Heavily Reliant on Imported Natural Gas

Share of Total Energy Consumption met Through Imported Gas
% of total consumption

Source: BP Statistical Review of World Energy 2014
EU is Heavily Reliant on Imported Natural Gas

The EU imports 2/3rd of its gas consumption

...and nearly half of imports are from Russia

| Source: BP Statistical Review of World Energy |
Benefits of the US Shale Boom

Freeing up LNG supply previously planned for US market
Gazprom Price Premium Over Gets Squeezed

European gas prices, spot vs. Gazprom
$/MMBtu

- Gazprom Realized Price in Europe ($/MMBtu)
- NBP ($/MMBtu)
- Spread (%)

Source: BP, Gazprom
Competitive Gas Pricing Gains Ground in Europe

Wholesale Gas Price Formation of Traded Natural Gas Volumes
Bcm/year, gas-on-gas competition % of total

- Gas-on-Gas Competition
- Oil Indexed & Other

North America
- 2007: 100%
- 2013: 100%

Europe
- 2007: 16%
- 2013: 48%

Asia Pacific
- 2007: 16%
- 2013: 15%

World
- 2007: 26%
- 2013: 39%

Source: IGU Wholesale Gas Price Survey
Benefits of US LNG Exports

Larger, more liquid, more diverse global gas market
US LNG Exports Lower Gas Costs for Consumers...

Change in Annual Natural Gas Expenditures by Value Relative to Reference
Billion 2011 USD

<table>
<thead>
<tr>
<th>Region</th>
<th>Change in Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>2.1</td>
</tr>
<tr>
<td>Europe</td>
<td>2.9</td>
</tr>
<tr>
<td>Japan</td>
<td>-20.9</td>
</tr>
<tr>
<td>South Korea</td>
<td>-39.0</td>
</tr>
<tr>
<td>China</td>
<td>-1.6</td>
</tr>
<tr>
<td>India</td>
<td>-1.0</td>
</tr>
<tr>
<td>Other Asia</td>
<td>-1.9</td>
</tr>
</tbody>
</table>

US LNG Export Volume
- 9 bcf/d
- 18 bcf/d

Source: CGEP, Rhodium Group
...and Lowers Export Revenue for Most Producers

Change in Annual Natural Gas Export Revenue by Value Relative to Reference Billion 2011 USD

- Canada: $20 Billion
- Australia: $15 Billion
- Russia: $18 Billion
- Middle East: $18 Billion
- Africa: $18 Billion
- Latin America: $18 Billion

Source: CGEP, Rhodium Group
Limitations of US LNG

Not a solution to current crisis and won’t free Europe from Russian gas
## Bulk of US Export Capacity Comes Online Post-2018

<table>
<thead>
<tr>
<th>Terminal Project</th>
<th>Location</th>
<th>Non-FTA Capacity (Bcf/d)</th>
<th>DOE FTA Application Status</th>
<th>DOE Non-FTA Application Status</th>
<th>FERC Application Status</th>
<th>Targeted Export Start Date</th>
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<tbody>
<tr>
<td>Sabine Pass Train 1-4</td>
<td>LA</td>
<td>2.2</td>
<td>Approved</td>
<td>Approved</td>
<td>Approved</td>
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<tr>
<td>Freeport LNG</td>
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<td>1.8</td>
<td>Approved</td>
<td>Approved</td>
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<td>2018</td>
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<tr>
<td>Cameron LNG*</td>
<td>LA</td>
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<td>2017</td>
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<tr>
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<td>2019</td>
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<tr>
<td>Dominion Cove Point LNG</td>
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<td>Approved</td>
<td>Approved</td>
<td>Filed</td>
<td>2017</td>
</tr>
<tr>
<td>Jordan Cove LNG</td>
<td>OR</td>
<td>0.8</td>
<td>Approved</td>
<td>Approved</td>
<td>Filed</td>
<td>2018</td>
</tr>
<tr>
<td>Oregon LNG</td>
<td>OR</td>
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<td>Approved</td>
<td>Approved</td>
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<td>2019</td>
</tr>
</tbody>
</table>

* Goldman Sachs only expects Cameron LNG to start exporting in Q1 2020

Source: DOE, FERC
EU Reliance on Russian Gas Unlikely to Change Even with US LNG Exports

- Russia remains low cost supplier
- Russia has few alternatives (China sourced from new Eastern fields)
- US LNG will displace other high-cost sources of natural gas supply

Sources of European Natural Gas Import with US LNG

<table>
<thead>
<tr>
<th>Year</th>
<th>Russia</th>
<th>Central Asia</th>
<th>Middle East</th>
<th>Africa</th>
<th>Latin America</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>61%</td>
<td>13%</td>
<td>1%</td>
<td>33%</td>
<td>23%</td>
<td>2%</td>
</tr>
<tr>
<td>0 bcfd</td>
<td>53%</td>
<td>9%</td>
<td>7%</td>
<td>31%</td>
<td>29%</td>
<td>1%</td>
</tr>
<tr>
<td>9 bcfd</td>
<td>48%</td>
<td>4%</td>
<td>12%</td>
<td>29%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>18 bcfd</td>
<td>45%</td>
<td>4%</td>
<td>6%</td>
<td>26%</td>
<td>19%</td>
<td>0%</td>
</tr>
</tbody>
</table>

2020-2025

Source: CGEP, Rhodium Group
US LNG Crowds Out Other Potential Sources of Supply

Impact of 9 bcf/d of US LNG Exports on Global Gas Supply, 2020-2025
Billion cubic feet per day

No US LNG Exports

9 bcf/d of US LNG Exports

Source: CGEP, Rhodium Group
Russia Will Remain Cost-Competitive in Europe

EU marginal cost of various suppliers
$ per MMBtu

- Transportation
- Opex + tax
- Capex

Potential suppliers

EU spot: $10 per MMBtu

Source: Morgan Stanley
Natural Gas Export Revenue is a Small Share of Russia’s Energy Export Revenues

Russian GDP: $2,095 billion

- Oil Exports: $283 billion (14% of GDP)
- Gas Exports: $73 billion (3% of GDP)
- Other

Russian Export Revenues: $523 billion

- Oil Exports: $283 billion (54% of total export rev.)
- Gas Exports: $73 billion (14% of total export rev.)
- Other Exports

Source: BOFIT, Central Bank of Russia
European Side of the Ledger

US Should Approve Exports, But Additional Infrastructure & Policy Reforms Are Required in Europe
European Reforms to Reduce Vulnerability to Russian Supply Disruption

Capturing the benefits of US LNG exports will require European action as well:

- Invest in Infrastructure for Central and Eastern Europe
- Apply EU Competition Law to Promote an Integrated European Gas Market
- Expand Europe’s Underground Gas Storage Capacity and Pooled Reserves
- Increase European Gas Development
- Create Incentives to Boost Energy Efficiency and Cut Gas Demand

Combined with such energy policy reforms, US LNG exports (along with other new LNG supplies) will create a more liquid and diverse global gas market, giving European consumers more options and more leverage with Russia.
Summary of Findings

Benefits of US LNG

• US shale gas boom has already helped gas importers and hurt Russia by freeing up US-bound LNG volumes.

• Europe’s bargaining position vis-à-vis Russia has already improved.

• US LNG exports will further strengthen European negotiating power and provide Europe with more supply options.

Limitations of US LNG

• Not a solution to current crisis given years for terminals to come online.

• US LNG will not free Europe from Russia, which will remain dominant gas supplier due to Russia’s cost-competitiveness and US LNG’s displacement of other supply.

• Impact on Russian gas sales & prices will hurt Gazprom, but likely too small to change Russian policy.
Thank you

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