

Exporting the *American Renaissance*

Global impacts of LNG exports from the United States

A report by the Deloitte Center for Energy Solutions and Deloitte MarketPoint LLC



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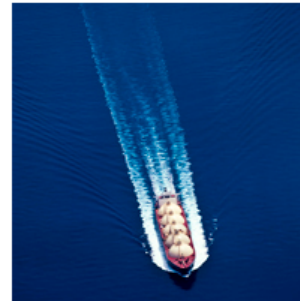
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## Exporting the American Renaissance: Global Impacts of LNG Exports from the United States

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In a startling about-face, natural gas market forces have reversed course over the past several years. Expectations that the U.S. would become a major importer of liquefied natural gas (LNG) have been replaced by the possibility of the U.S. becoming a major LNG exporter. As a result of a largely unforeseen surge in shale production, North American natural gas prices collapsed from over \$10/MMBtu in 2008 to under \$3/MMBtu at times during 2012. However, gas prices in Asia and Europe remain high, creating huge price spreads from the U.S. Large price spreads between the U.S. and other regions have enticed foreign buyers seeking lower cost gas to consider U.S. supplies, while U.S. producers yearn for higher prices seen in foreign markets.

*Exporting the American Renaissance: Global Impacts of LNG Exports from the United States* describes an objective, economic-based analysis of the potential impact of LNG exports from the United States on domestic and global markets. While much attention has focused on the impact of U.S. LNG exports on the U.S. market, this study from **Deloitte MarketPoint LLC** and the **Deloitte Center for Energy Solutions** analyzes the potential economic consequences of those exports on global markets. It attempts to estimate the potential price impacts, gas supply changes, and flow displacements if the U.S. exported a given volume of LNG to either Asia or Europe.

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# Key Questions

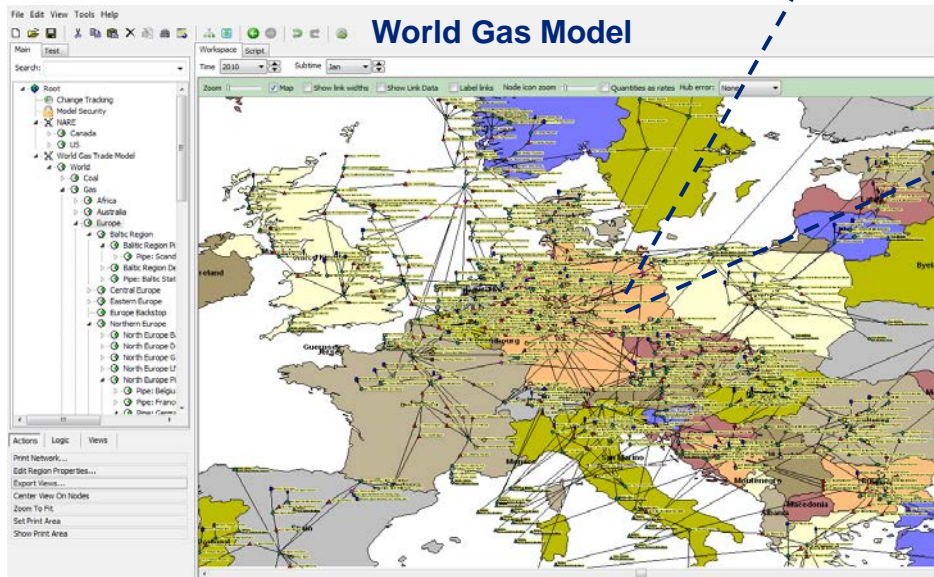
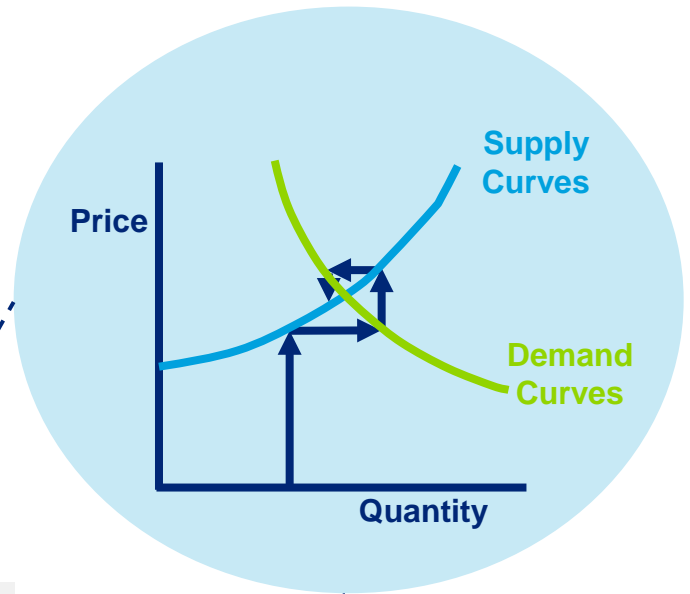
- What might be the impact of 6 Bcfd of LNG exports on global markets?
  - How much might they affect prices here and abroad?
  - What sources might they displace?
  - Which countries benefit and which ones might be hurt?
  - How might different market assumptions affect projected impacts?
- We analyzed the above questions using the Deloitte MarketPoint's World Gas Model (WGM).

# Key Findings from the WGM Projections

- Price impact is projected to be modest in the US, but greater in importing countries
  - US LNG exports will narrow the price spread between the US and export markets
  - Markets can determine economic level of US exports without government intervention
- US LNG exports benefit gas importers and hurt gas exporters
  - Gas importing countries benefit from gas supply cost savings
  - Gas exporting countries could suffer decline in revenues due to price erosion and/or supply displacement
- Global gas markets are likely to transition away from oil-indexed prices to competitively set prices and US LNG exports will hasten that transition
- Oil markets could also be affected due to gas substitution of oil for power generation

# MarketBuilder Models of Commodity Markets

- MarketBuilder models provide a fundamental view of future commodity markets and have been used by leading energy companies around the world over the past three decades.
- MarketBuilder uses an iterative algorithm to simultaneously solve for market clearing prices and quantities for every region and time point in the model.
- Each market agent seeks to maximize its own value, just like in the real market – this is the key differentiator from other solutions.



Equilibrium prices and quantities are computed for every market location.

# Study Analyzed the Impacts of US LNG Export to Different Destinations under Alternative Market Scenarios

We analyzed two market scenarios regarding pricing by current major gas exporters: a Business-As-Usual scenario assuming they adhere to oil-price indexation and a Competitive Response scenario in which they make some volumes available on market-based prices. In both scenarios, new market entrants were assumed to competitively price their supplies. More detailed description of the scenarios and assumptions can be found in the report.

|                                    | Business As Usual Scenario  | Competitive Response Scenario   |
|------------------------------------|---|---|
| <b>No Export Case</b>              | No LNG exports from US/<br>Prolonged oil-price indexation                 | No LNG exports from US/More competitively priced supplies                 |
| <b>Asia Export Case (6 Bcfd)</b>   | 2 Bcfd each to Japan, Korea, and India/<br>Prolonged oil-price indexation | 2 Bcfd each to Japan, Korea, and India/More competitively priced supplies |
| <b>Europe Export Case (6 Bcfd)</b> | 3 Bcfd each to UK and Spain/<br>Prolonged oil-price indexation            | 3 Bcfd each to UK and Spain/More competitively priced supplies            |



# U.S. LNG exports target large arbitrage opportunities

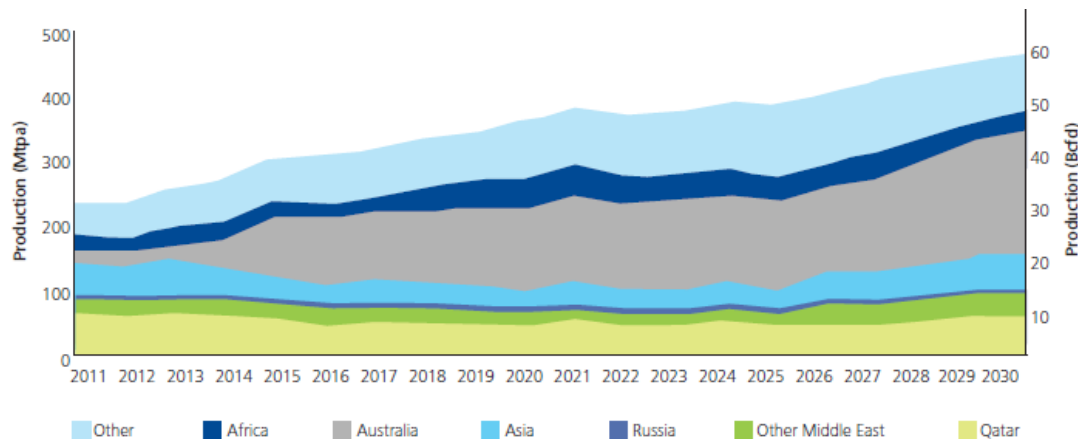
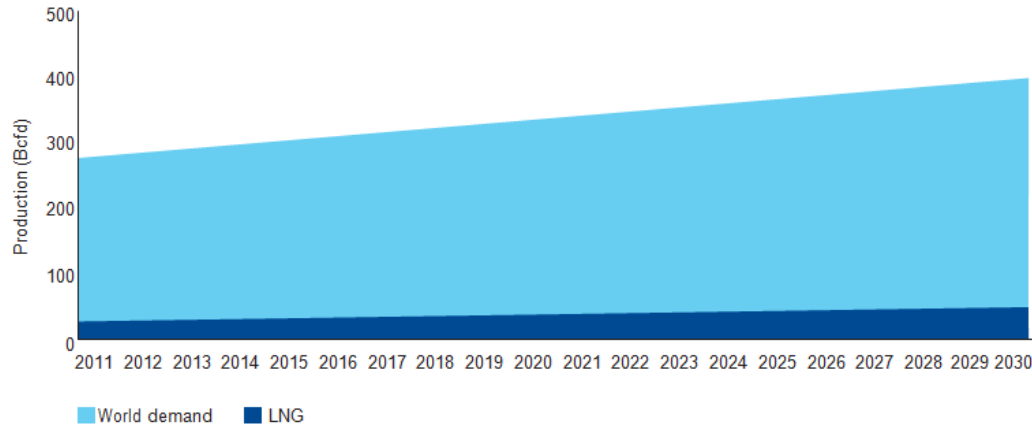
Federal Energy Regulatory Commission • Market Oversight • [www.ferc.gov/oversight](http://www.ferc.gov/oversight)

## World LNG Estimated April 2012 Landed Prices



Source: Federal Energy Regulatory Commission (FERC)

# Global LNG Production Is Projected to Continue Strong Growth but Still Comprise a Fairly Small Fraction of Total Global Gas Supply

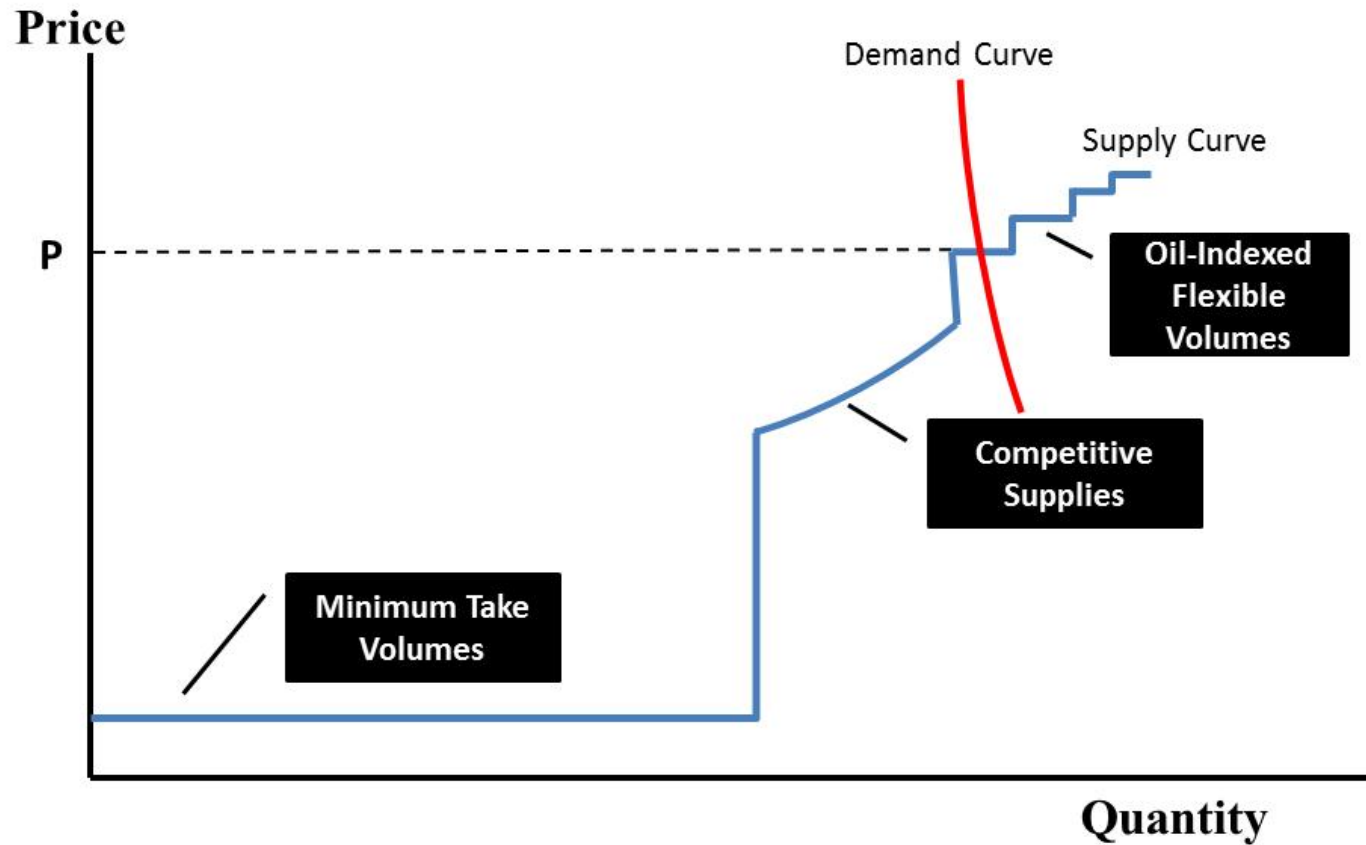


Source: World Gas Model Projections, October 2012 (No US Export)

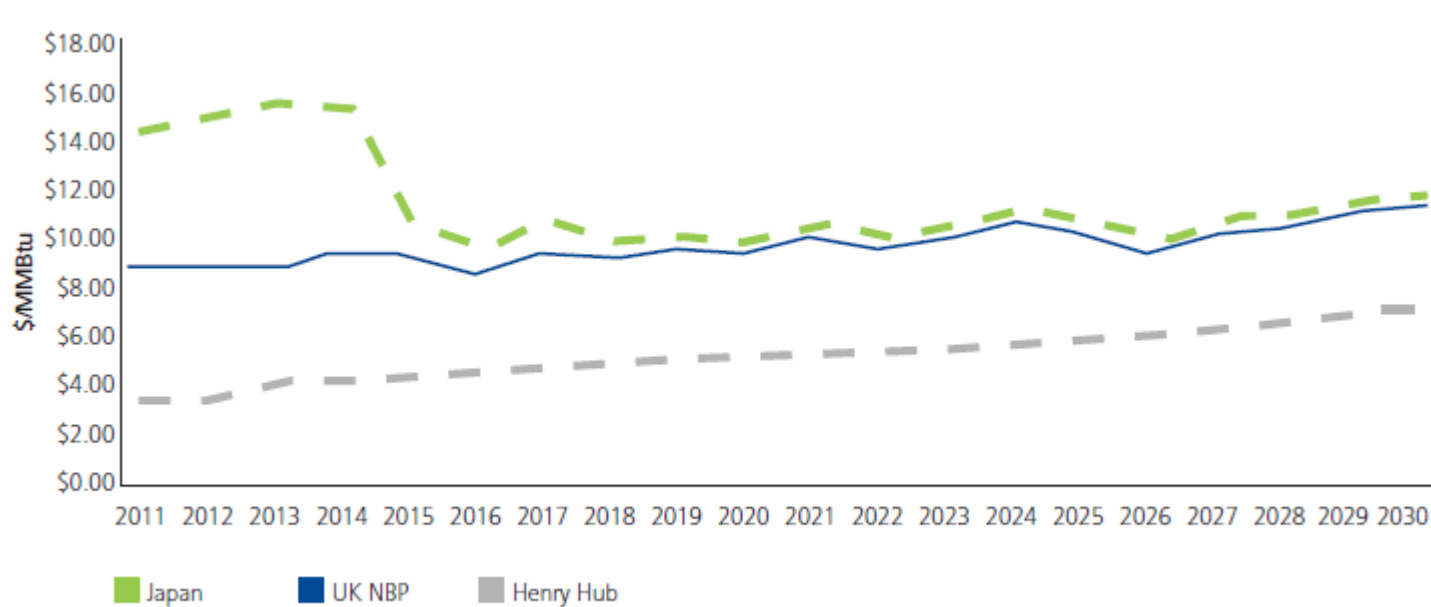


# Illustration of an Aggregate Supply Curve

The structure of long-term gas contracts in some global markets implies a steep supply curve

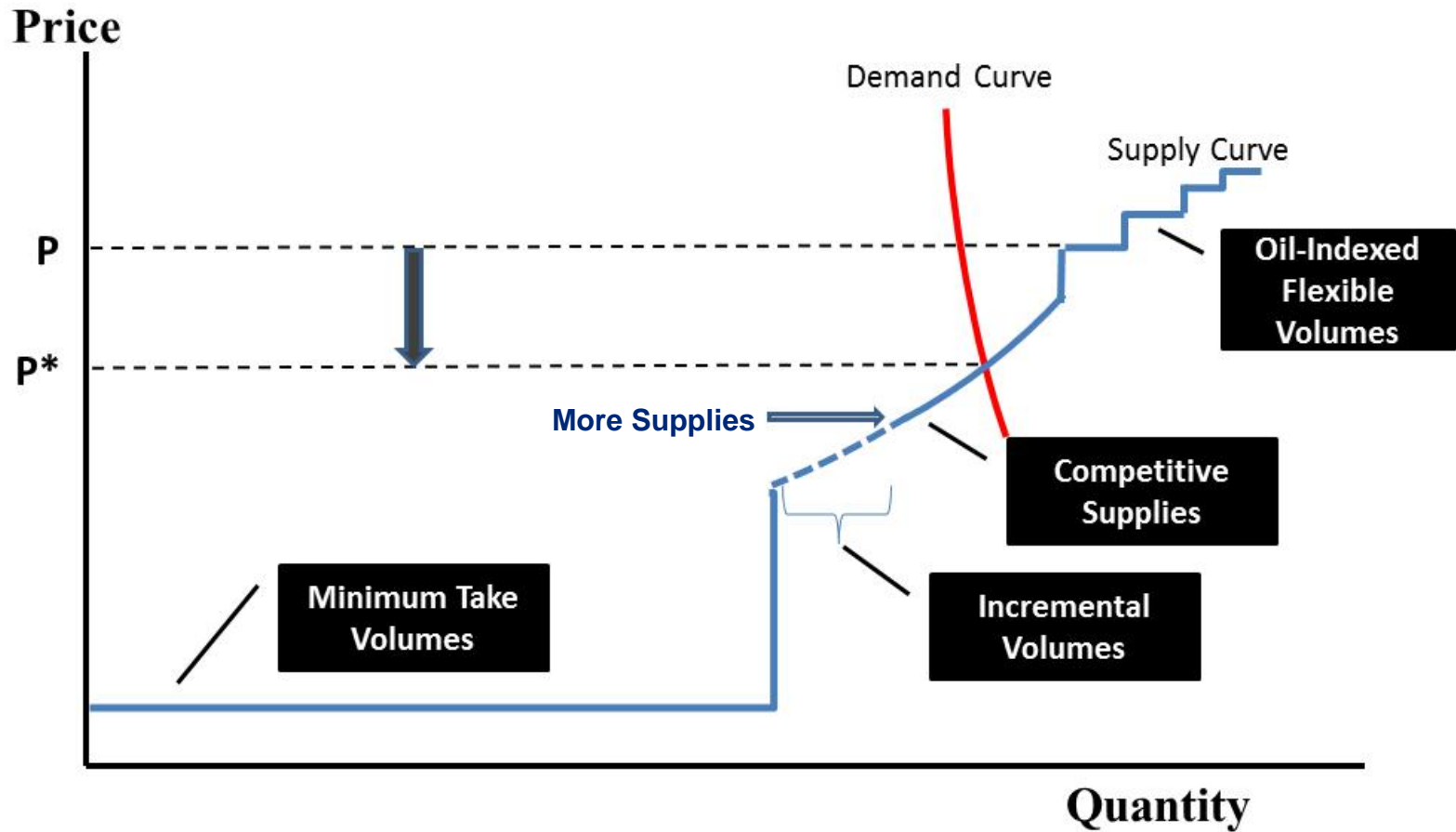


# Even in the Business-As-Usual Case, Japanese Gas Prices Are Projected to Moderate

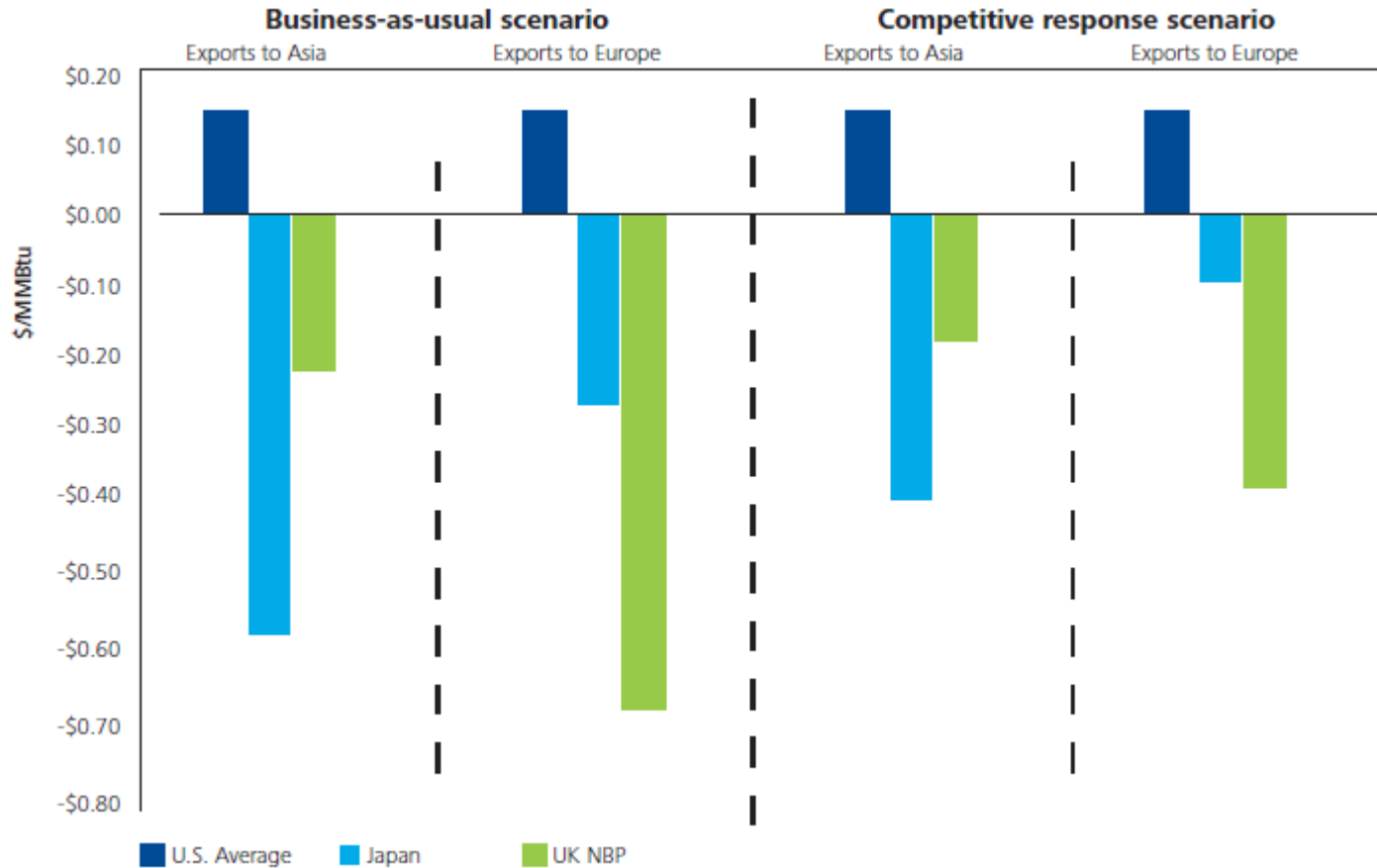


Source: World Gas Model Projections, October 2012

# Representation of Impact of Incremental Supplies on Prices



# Projected Price Change Due to LNG Exports

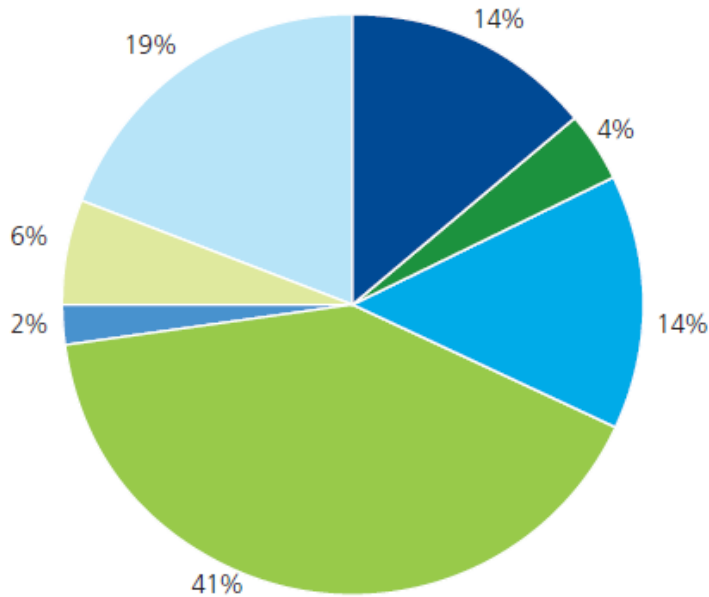


Source: World Gas Model Projections, October 2012

# Projected Displacement of Gas Production Volumes by US LNG Exports

**With U.S. LNG to Asia**

Percentage of displaced production



■ FSU

■ Europe

■ Middle East

■ Asia

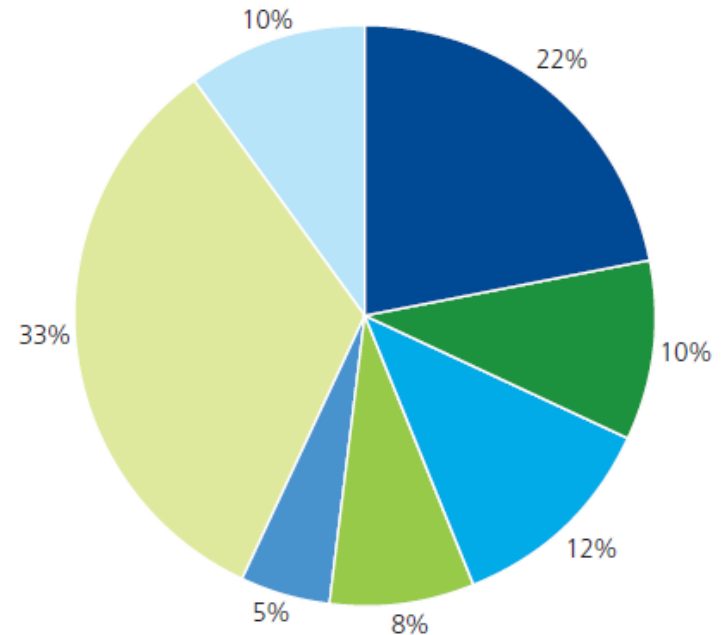
■ South America

■ Africa

■ Australia

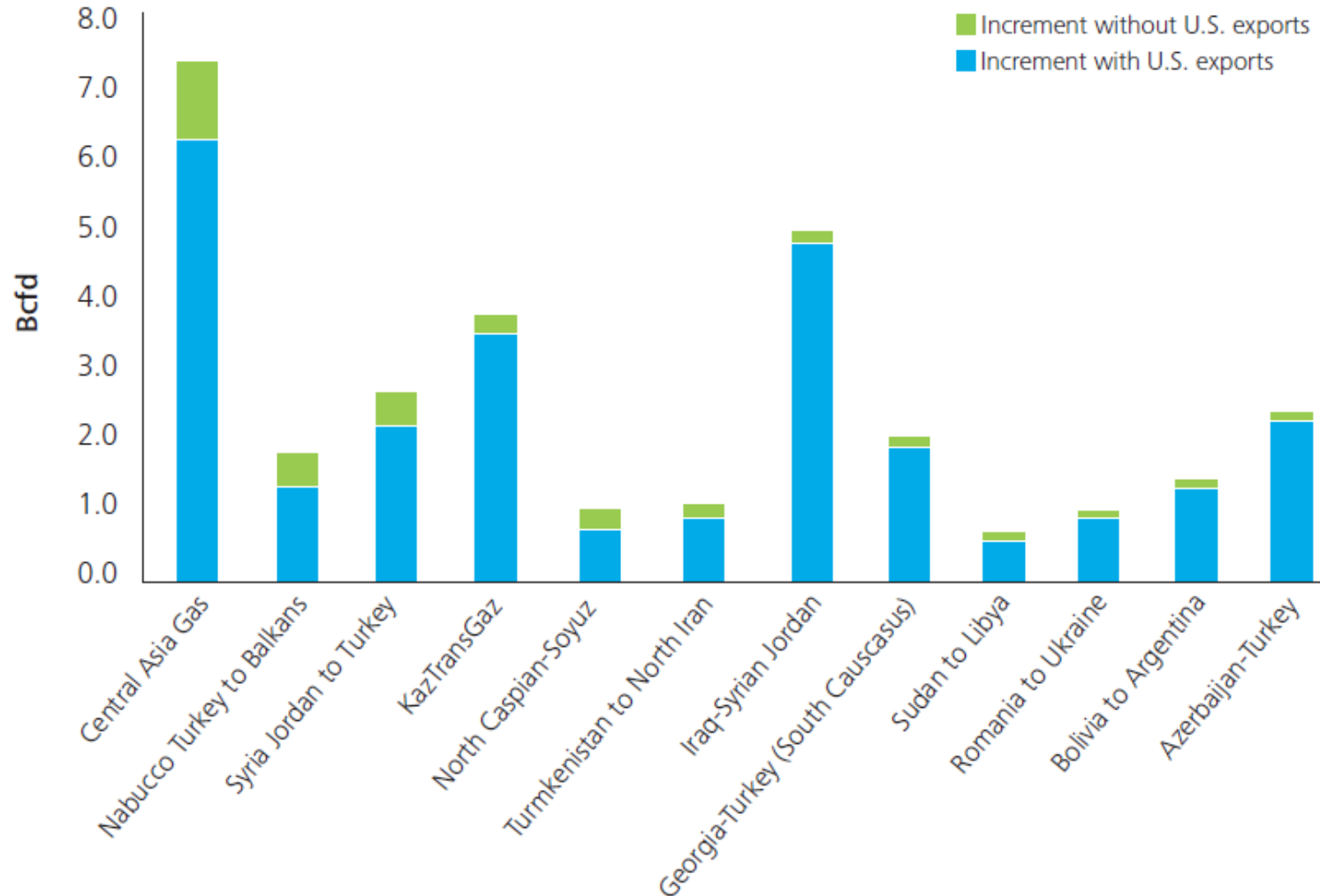
**With U.S. LNG to Europe**

Percentage of displaced production



Source: World Gas Model Projections, October 2012 (BAU Scenario)

# US LNG Exports Could Also Impact Potential New Projects and Supplies



# Bottom Line: US LNG exports could help gas importers and could hurt gas exporters

| Top Gas Importers in 2011 |                    | Top Gas Exporters in 2011 |                    |
|---------------------------|--------------------|---------------------------|--------------------|
| Country                   | Net Imports (Bcfd) | Country                   | Net Exports (Bcfd) |
| Japan                     | 10.3               | Russia                    | 18.5               |
| Germany                   | 7.0                | Qatar                     | 11.8               |
| Italy                     | 6.7                | Norway                    | 9.4                |
| US                        | 5.4                | Canada                    | 5.6                |
| South Korea               | 4.8                | Algeria                   | 5.0                |
| France                    | 4.3                | Other Africa              | 4.1                |
| Turkey                    | 4.0                | Indonesia                 | 3.7                |
| Ukraine                   | 3.9                | Netherlands               | 3.5                |
| United Kingdom            | 3.6                | Australia                 | 2.5                |
| Spain                     | 3.4                | Trinidad and Tobago       | 1.8                |

Source: BP Statistical Review (2012)

| Gas Exporting Countries Forum |                     |
|-------------------------------|---------------------|
| Algeria                       | Nigeria             |
| Bolivia                       | Oman                |
| Egypt                         | Qatar               |
| Equatorial Guinea             | Russia              |
| Iran                          | Trinidad and Tobago |
| Libya                         | Venezuela           |

Source: GECF website.



Questions?



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