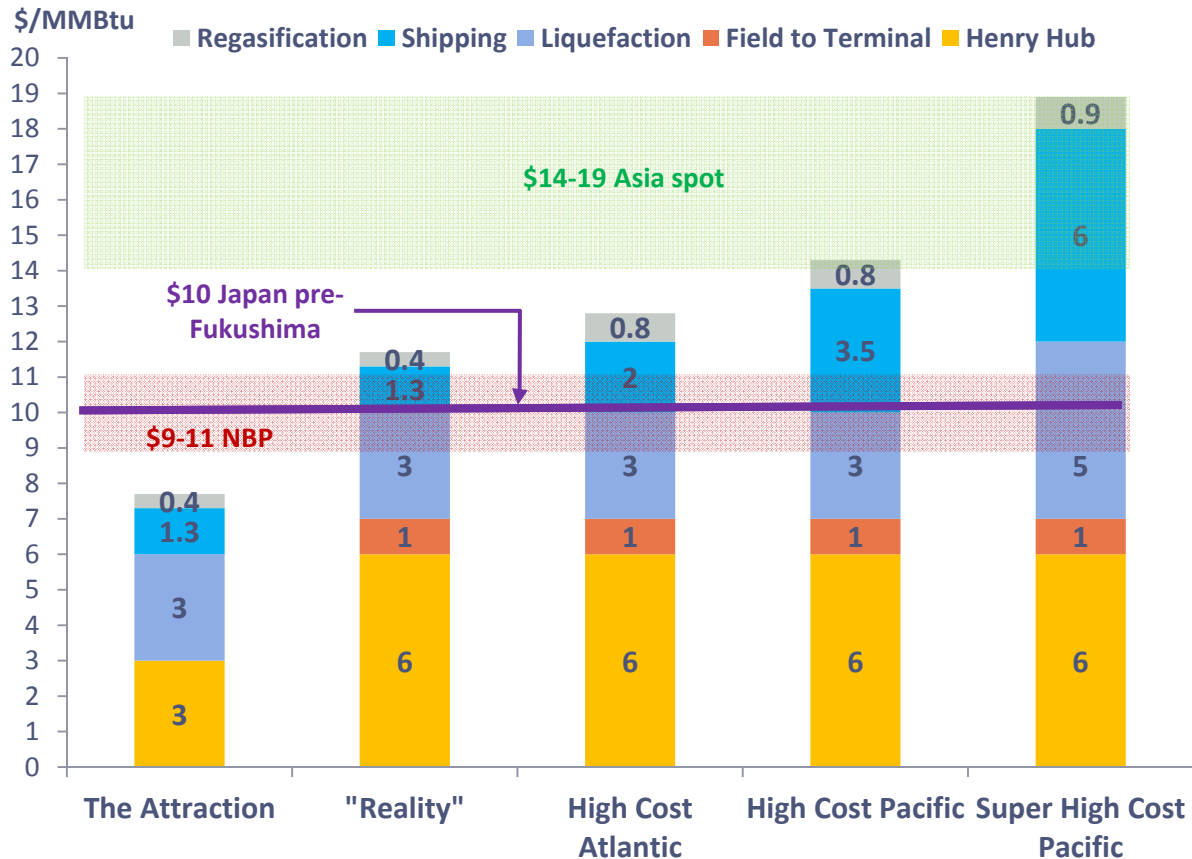


Is U.S. LNG Competitive?



We discuss five scenarios based on different gas prices and costs across the value chain. The Attraction case depicts the conventional wisdom for exporting LNG from the U.S. – low price at Henry Hub (HH), low liquefaction fee. But, HH can be higher than \$3 given expected demand growth and higher cost of producing more volumes; and there is a cost of delivering gas from fields to terminals (\$1), which is often ignored (“Reality”). Shipping costs distinguish High Cost cases. Finally, liquefaction costs can be higher – we use \$5 in our highest case; and shipping to Asia can be costlier due to higher charter rates, fuel costs and Panama Canal fees (Super High Cost Pacific).

- U.S. LNG starts losing its competitive edge in Europe at \$5-6 HH.
- At current spot prices (hence, demand) in Japan, U.S. LNG can compete in Asia but higher costs and/or a move towards pre-Fukushima prices would undermine its competitiveness.

A decline in oil price would only reinforce these conclusions (see “A 40 TCF Market?” for a discussion of oil and gas prices).

Our focus here is on U.S., Lower 48 projects. But similar development challenges are affecting Canadian projects as well. See page 2 for a summary.

Some Facts

- Five terminals (four in the Gulf Coast) received DOE permits for non-FTA exports (~8.5 bcf/d).
- Only one terminal is FERC-approved and has financing (2.2 bcf/d). First two trains are under construction since August 2012; first exports are expected in 2016.
- Another 24 facilities (almost all along the Gulf Coast) are seeking DOE and/or FERC permits (~30 bcf/d).
- EIA forecasts 7.5 bcf/d of exports by 2025.

Capital & Project Management Considerations

- CAPEX of liquefaction increased from \$300-400/ton to \$500-600; and further escalation to \$800+ expected. Total project costs have experienced significant cost escalation.
- CAPEX needs across the U.S. midstream and downstream are estimated at \$120-30 billion between 2014-2018, likely to be surpassed by the cost of drilling new wells (about 40,000 wells drilled in 2013).
- Capital and labor markets, qualified EPC contractors and sponsor companies' ability to manage large projects are challenged.
- Panama Canal expansion is experiencing significant cost overruns, delaying the completion of the project until at least the end of 2015; and is likely to cause an increase in transit fees if LNG ships are allowed to transit.

Global LNG Supply/Demand Considerations

- Pipeline exports still dominate natural gas trade. Pipeline and LNG trade both grew over the years and account for 21% and 10% of global natural gas consumption, respectively.
 - More growth: 16,000+ miles of 30+ inch gas pipelines scheduled for 2014+ in addition to 6,500 miles in 2012-13.
 - In 2012, internal use increased more than international trade; pipeline trade increased slightly and LNG trade fell.
- Slow economic growth (European LNG demand fell 6+ million tons in 2013 - ~3% of global trade).
- Japan might start re-opening nuclear plants given the high cost of imports.
- Traditional suppliers of natural gas are likely to try to protect market share.