

14th FIESP International Energy Conference

Promoting Reliable and Competitive Energy

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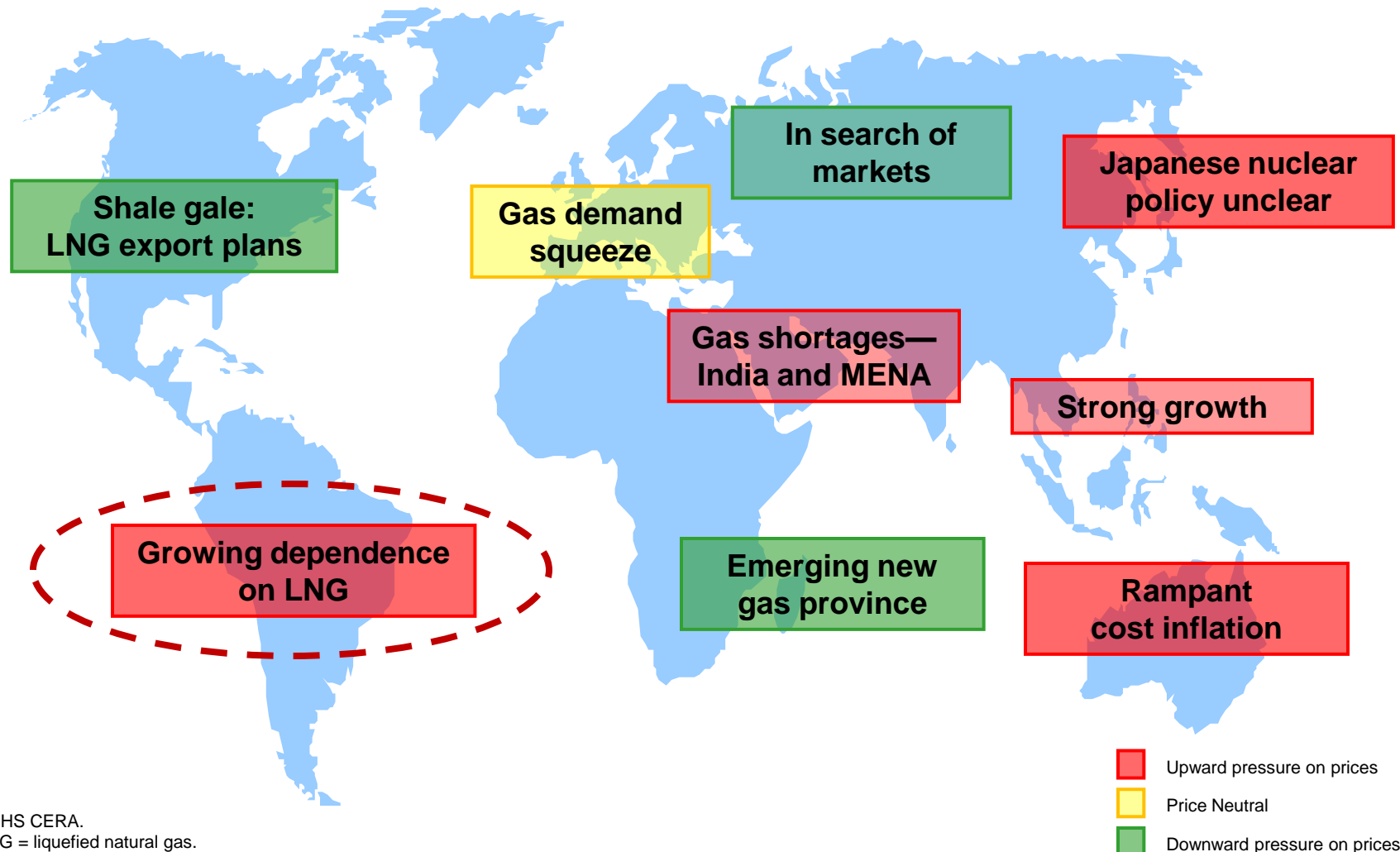
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IHS Energy Insight – Regional Messages



Source: IHS CERA.
Note: LNG = liquefied natural gas.

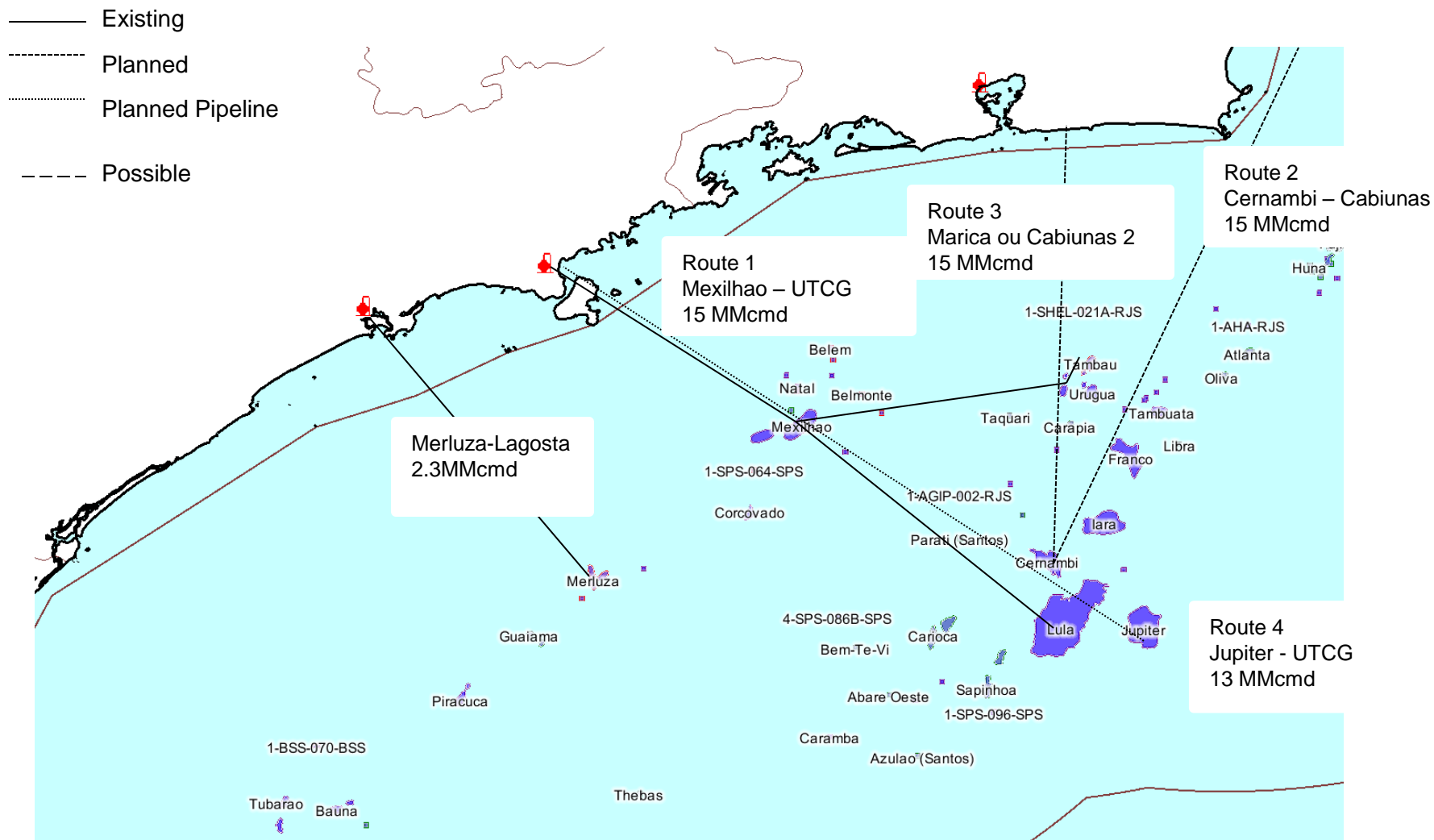
Outlook for Natural Gas Deficit Brazil

IHS Private Presentation

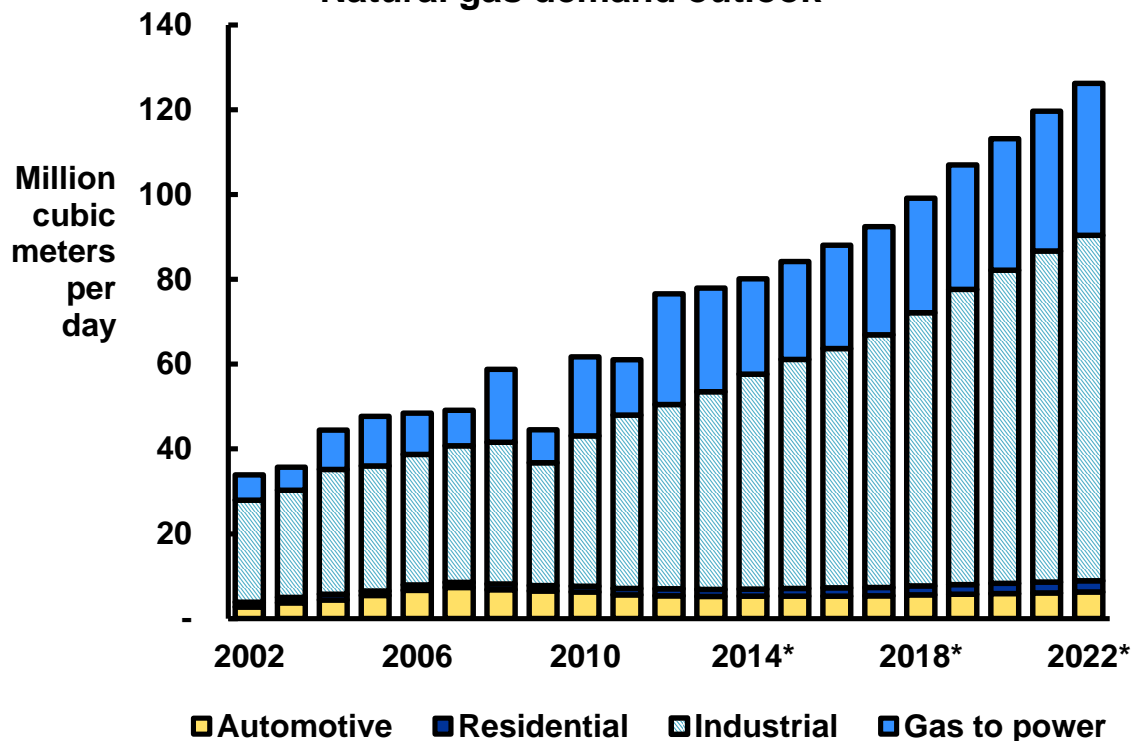


Brazil

Possible Pre-salt and Santos Basin Export Routes



Natural gas demand outlook



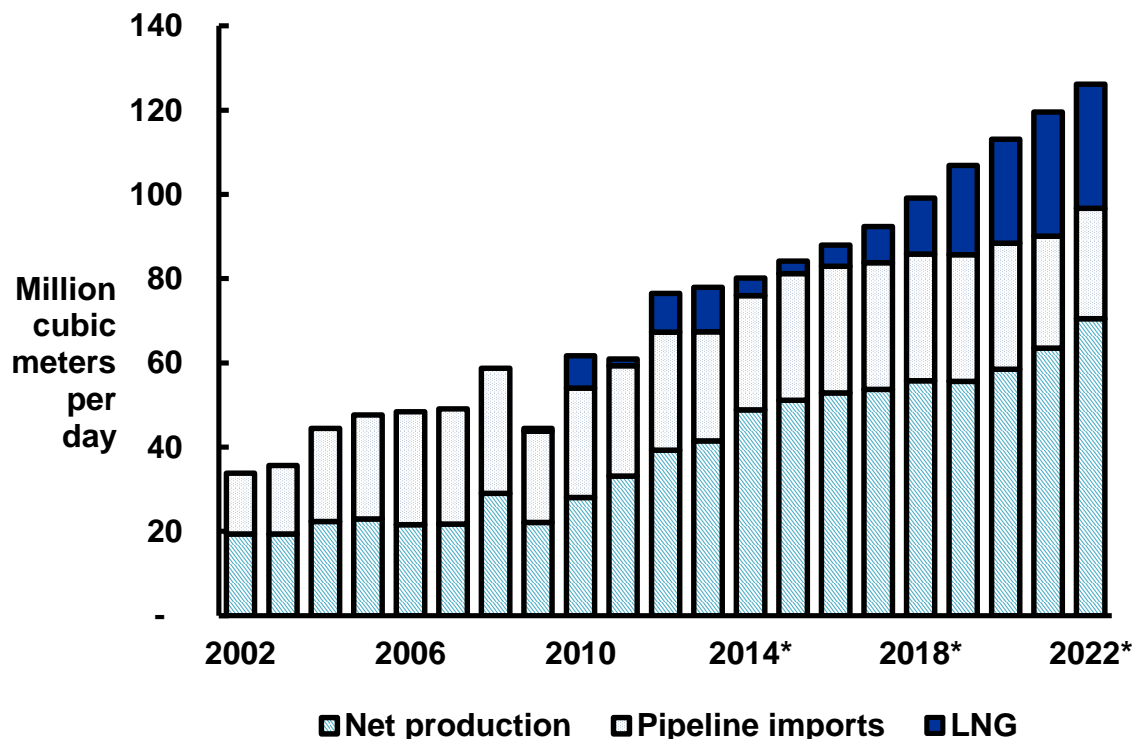
- Brazilian natural gas demand is predominantly from industries, thermal power plants, fertilizer plants, and refineries.
- Demand is set to rise led by the industrial and power sectors.
- Industrial demand will grow from increased economic activities and vertically integrated projects such as fertilizer plants.
- Gas demand for power generation will grow from increased installed capacity of gas-fired power generation used in Brazil to provide backup for hydro generation.

Demand growth is led by industrial and power sectors.

Source: IHS CERA.

*Estimated.

Natural gas supply outlook



- Natural gas is either domestically produced, imported from Bolivia, or imported from the global LNG market.
- Domestic production takes place mostly offshore and is for the most part associated with oil production.
- Domestic supplies will increase following the development of presalt fields with large gas-to-oil ratios despite gross-to-net ratios.
- Bolivian imports are likely to be renewed in 2019 but limited to the current import levels.
- LNG is likely to remain competitive and absorb remaining demand.

Limited imports from Bolivia pave the way for increasing LNG use.

Source: IHS CERA.

*Estimated.

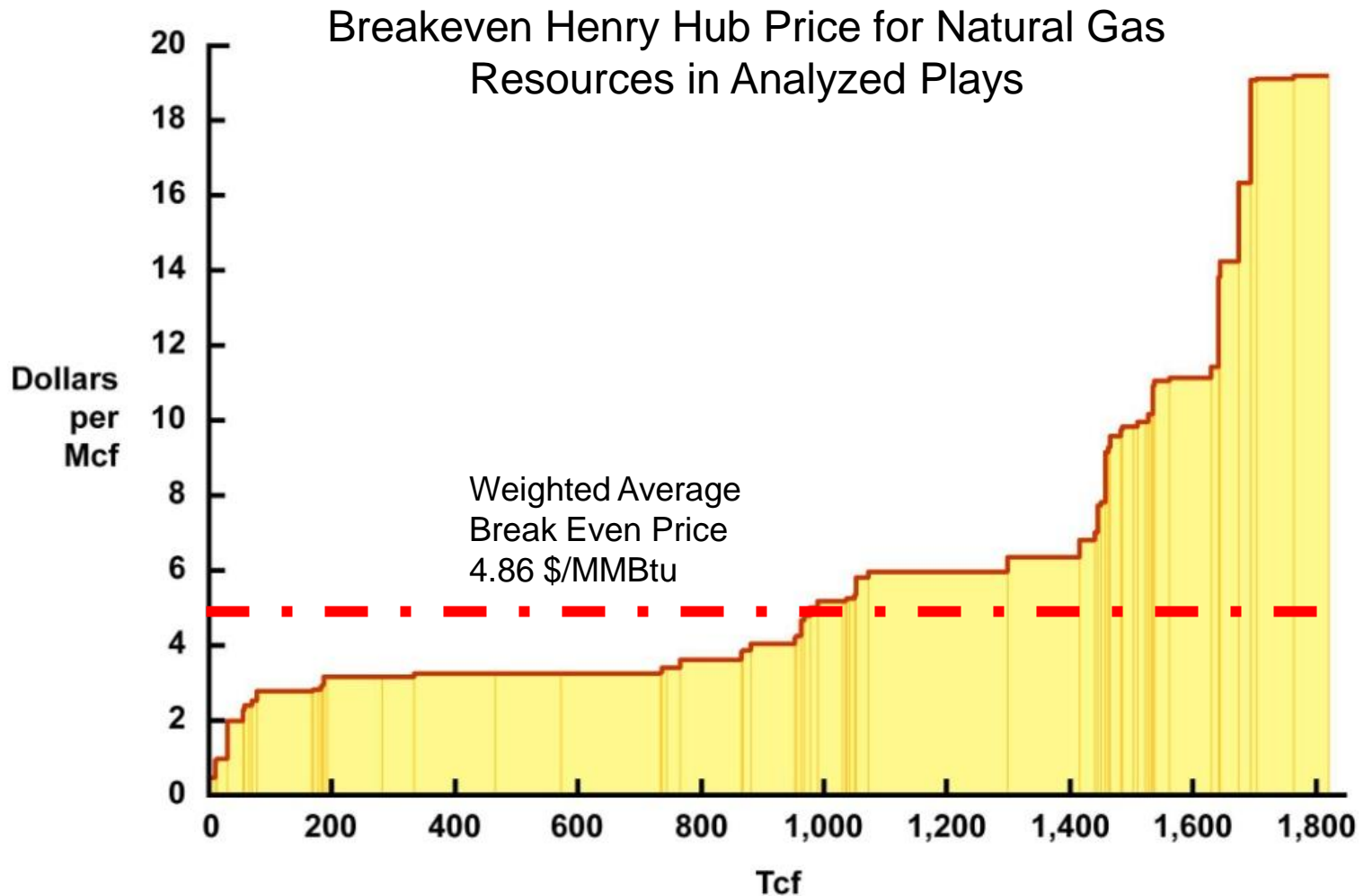
LNG Market Outlook

IHS Private Presentation



Plentiful and Low-Cost

North American Shale Gas Displaces Any Need for LNG

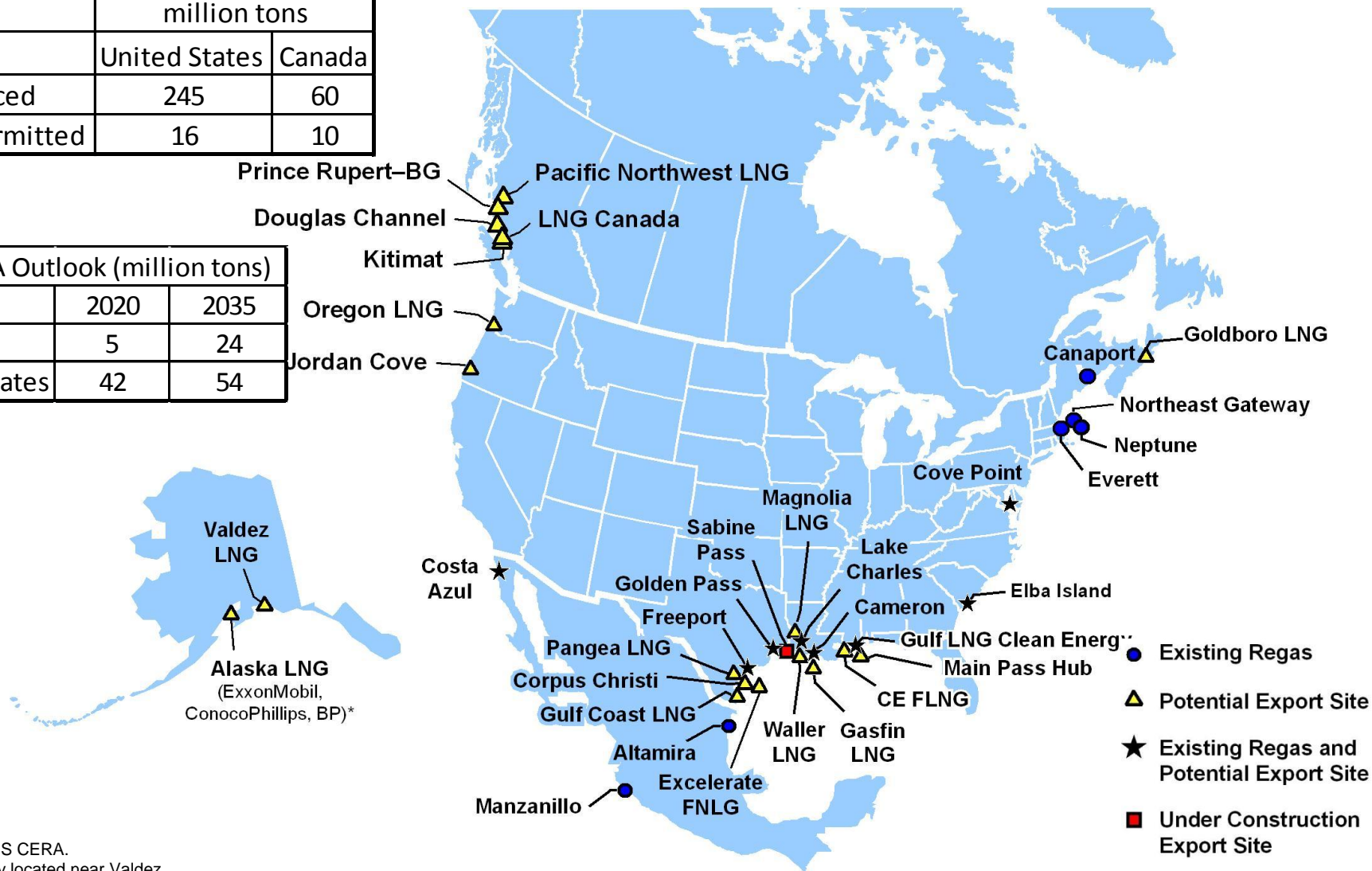


North American liquefaction

Taking advantage of the Arbitrage

	million tons	
Status	United States	Canada
Announced	245	60
Fully Permitted	16	10

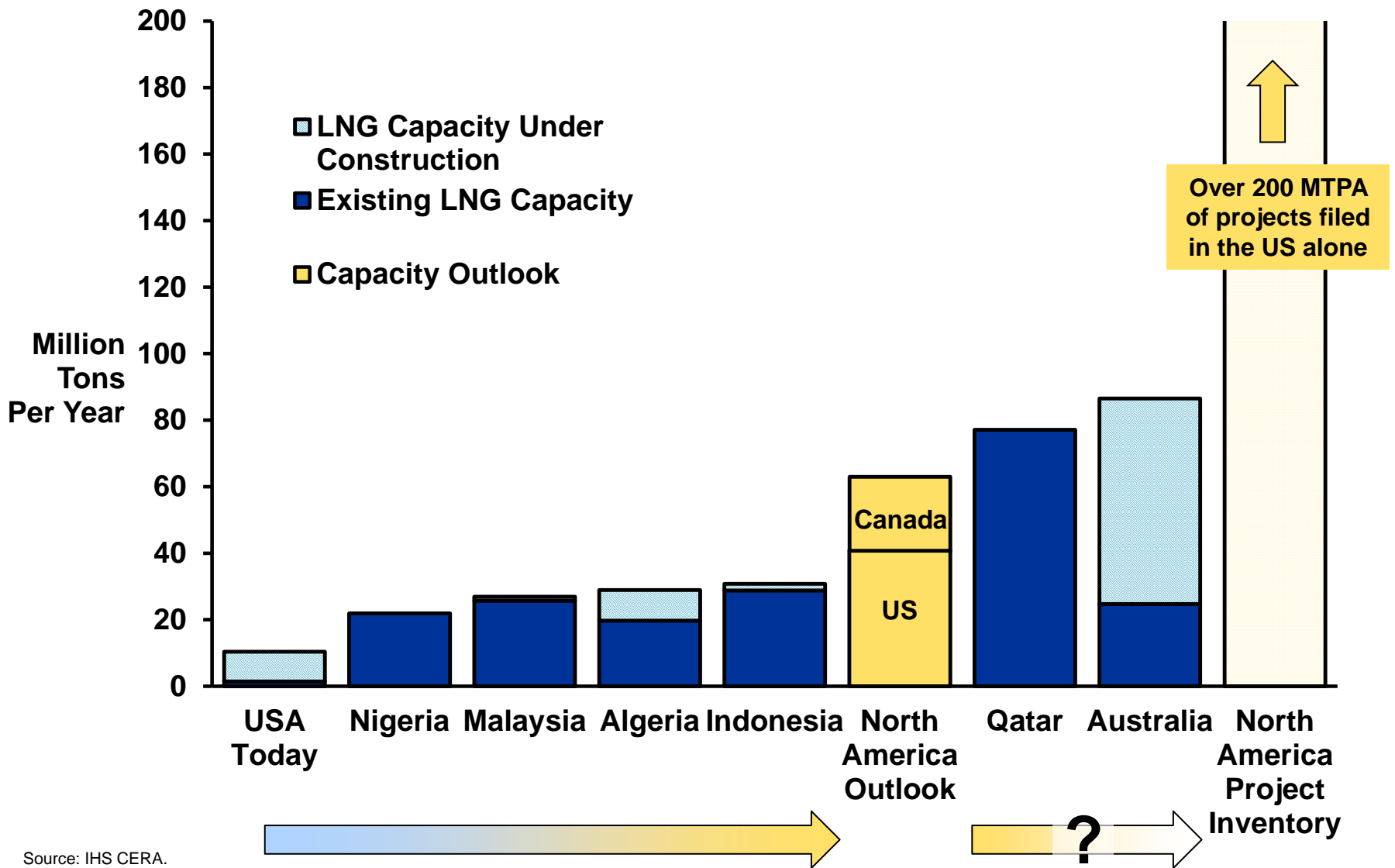
IHS CERA Outlook (million tons)		
	2020	2035
Canada	5	24
United States	42	54



Source: IHS CERA.
*Potentially located near Valdez.

Global LNG—Existing Supply and Potential

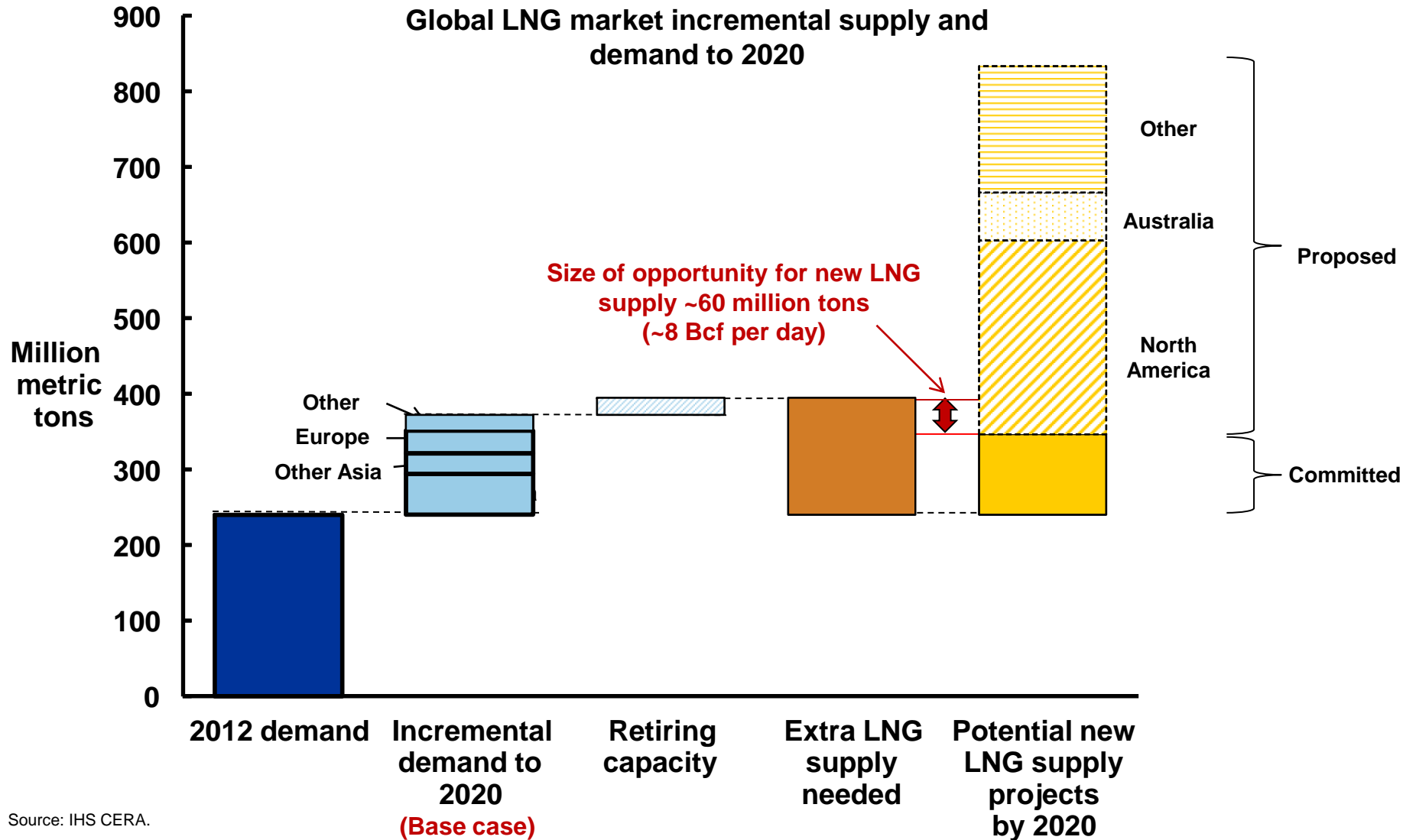
Future Role of North America



Source: IHS CERA.

North American export competitiveness:

...International competition will limit total capacity build



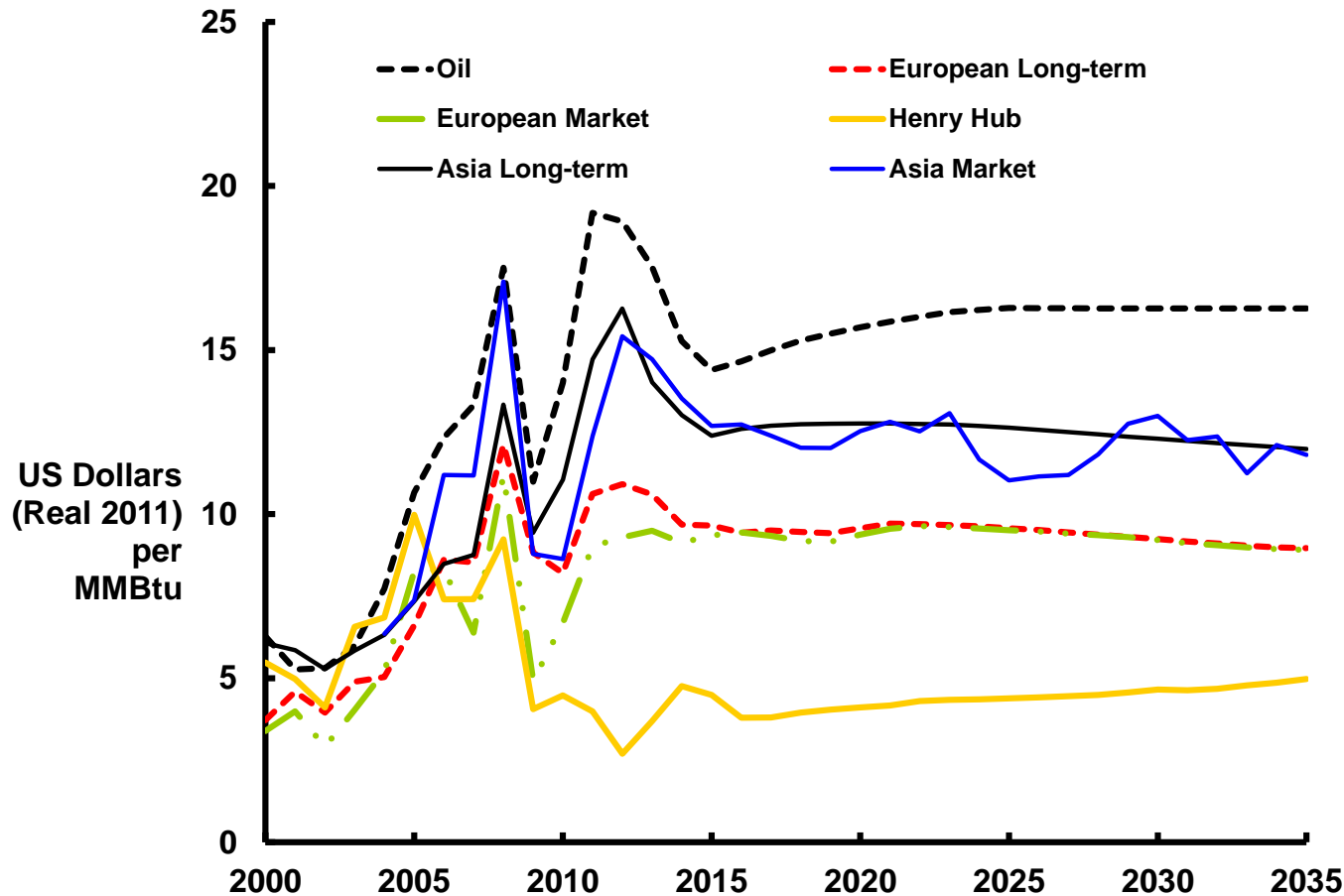
Source: IHS CERA.

Long-Term Price Outlook

Three-tiered system expected to persist

Prices are expected to remain separated

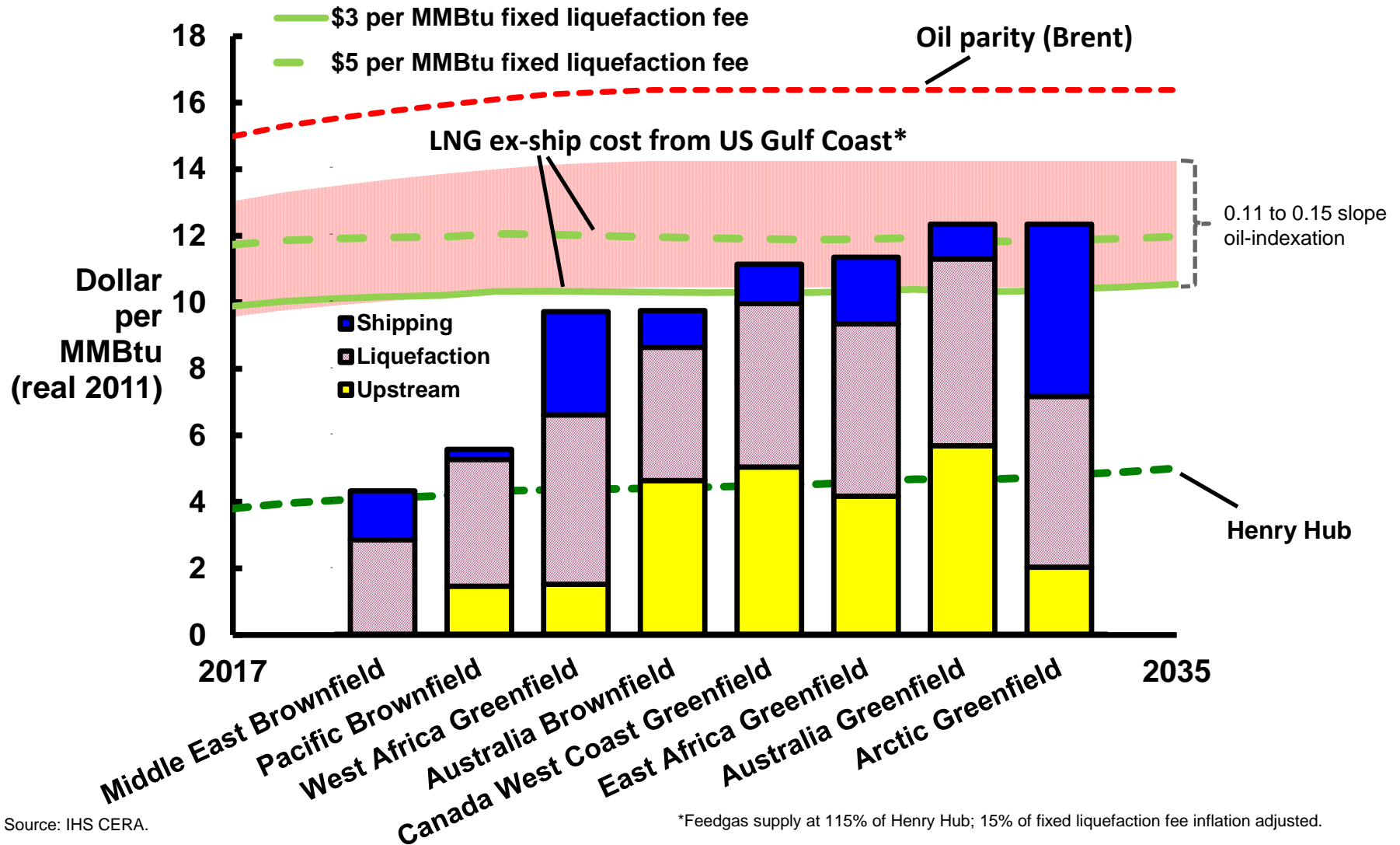
North American LNG exports insufficient to either raise US prices to global levels or lower global prices to US levels



Source: IHS CERA.

LNG exports from the US create strong competition for deliveries into Asia ...

(delivered to Japan)

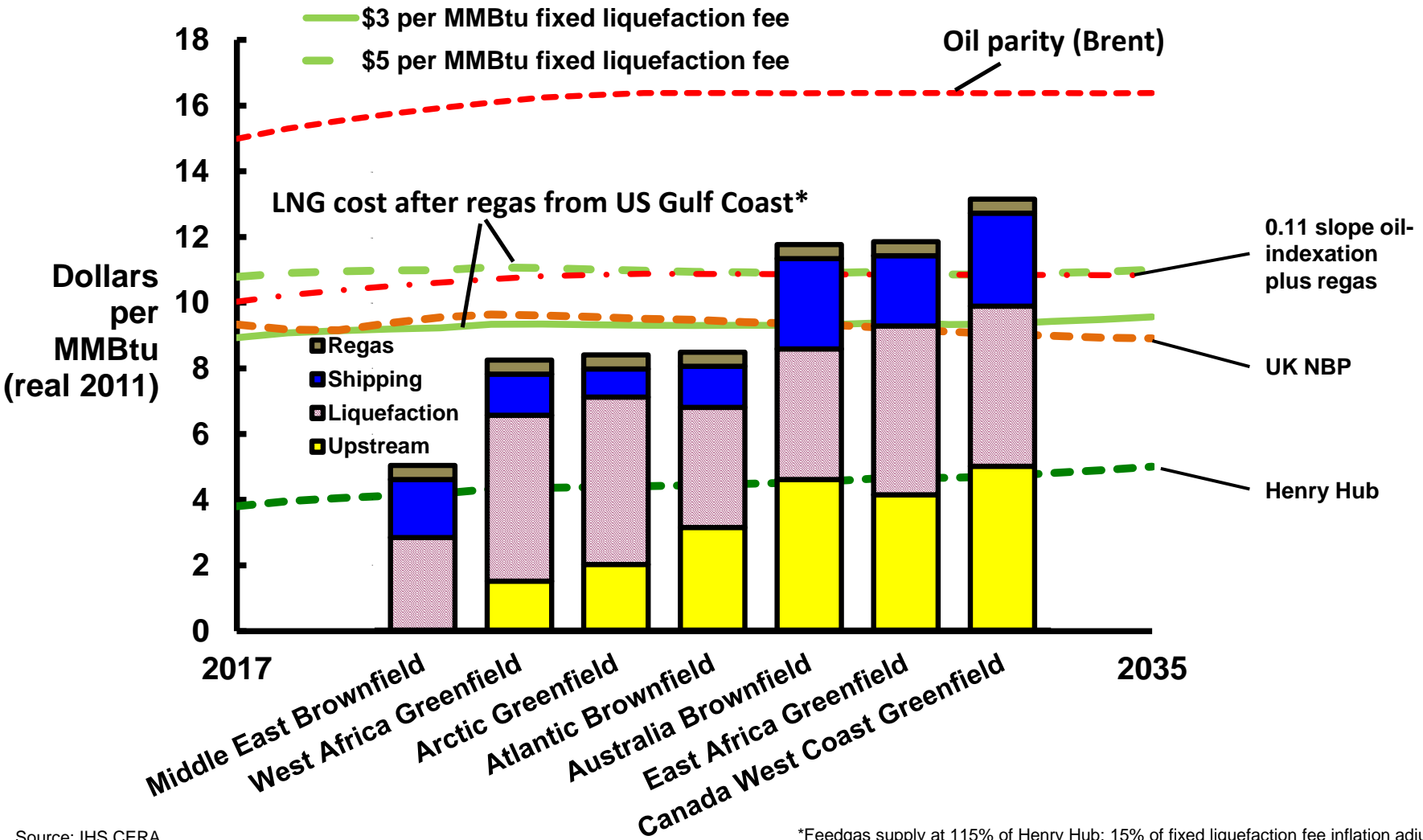


Source: IHS CERA.

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... but for deliveries into Northwest Europe prices are likely less favourable

(delivered to the UK)



Source: IHS CERA.

*Feedgas supply at 115% of Henry Hub; 15% of fixed liquefaction fee inflation adjusted.

Key Messages on Pricing

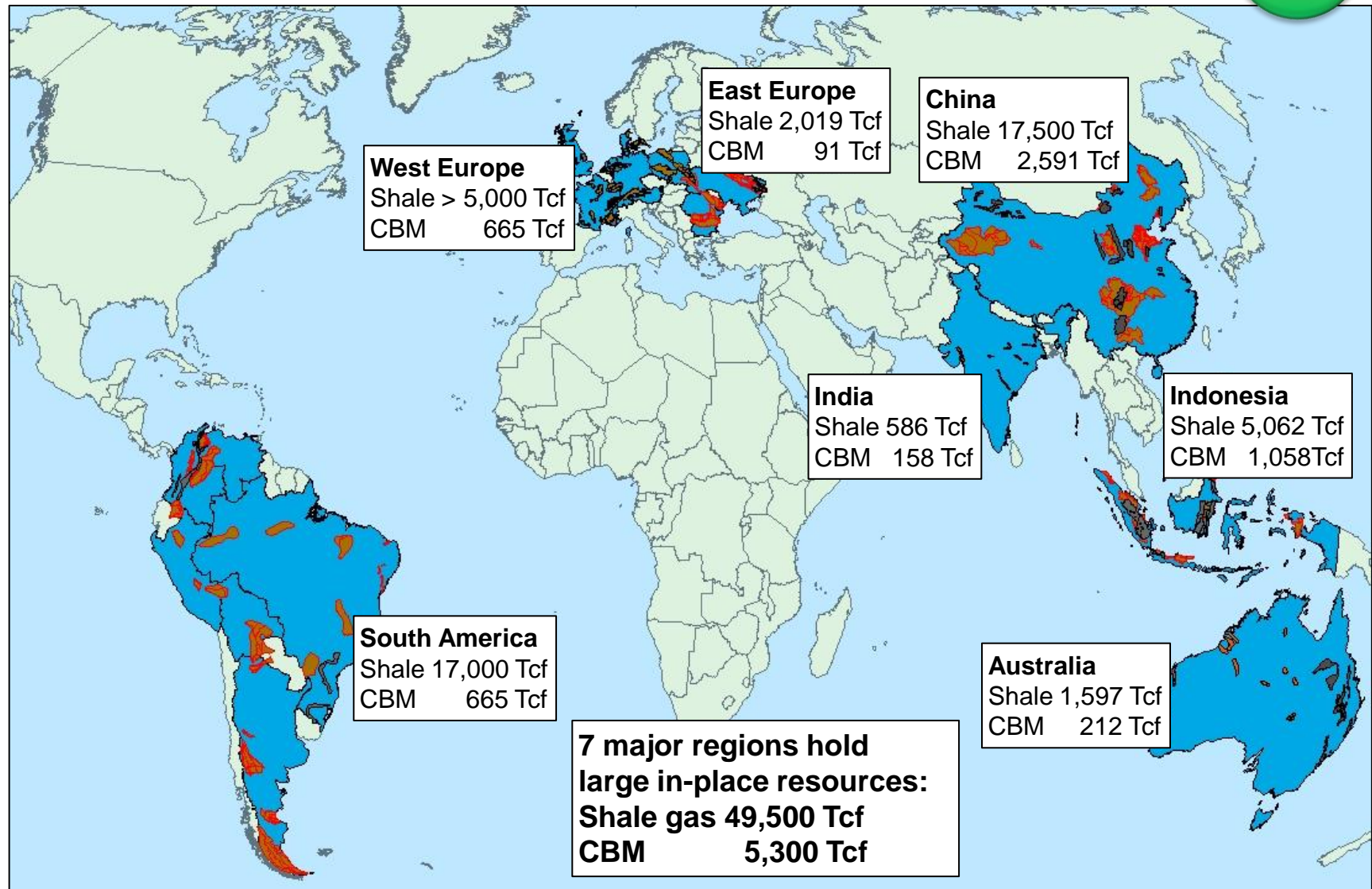
- Pressure on regional gas price differentials is growing
 - The introduction of Henry Hub linked LNG puts pressure also on the oil-indexed contract pricing in Asia
 - Growing flexible volumes, both LNG supply and shipping, will make arbitrage between the markets easier
 - Can Latin America become a price setter instead of price taker?
- Oil price will remain significant driver of LNG prices for deliveries into Asia
 - Oil indexation will remain for significant part of LNG deliveries into Asia
 - The development of a gas trading hub in Asia faces significant hurdles and requires a number of interrelated steps
- High capital costs for liquefaction projects
 - Even with US LNG exports with gas sourced at Henry Hub levels, the time of low cost projects is past. LNG price levels will need to reflect the significant investment costs.



Unconventional Frontier Study

Global Unconventional GIP Resources

Local-
ization



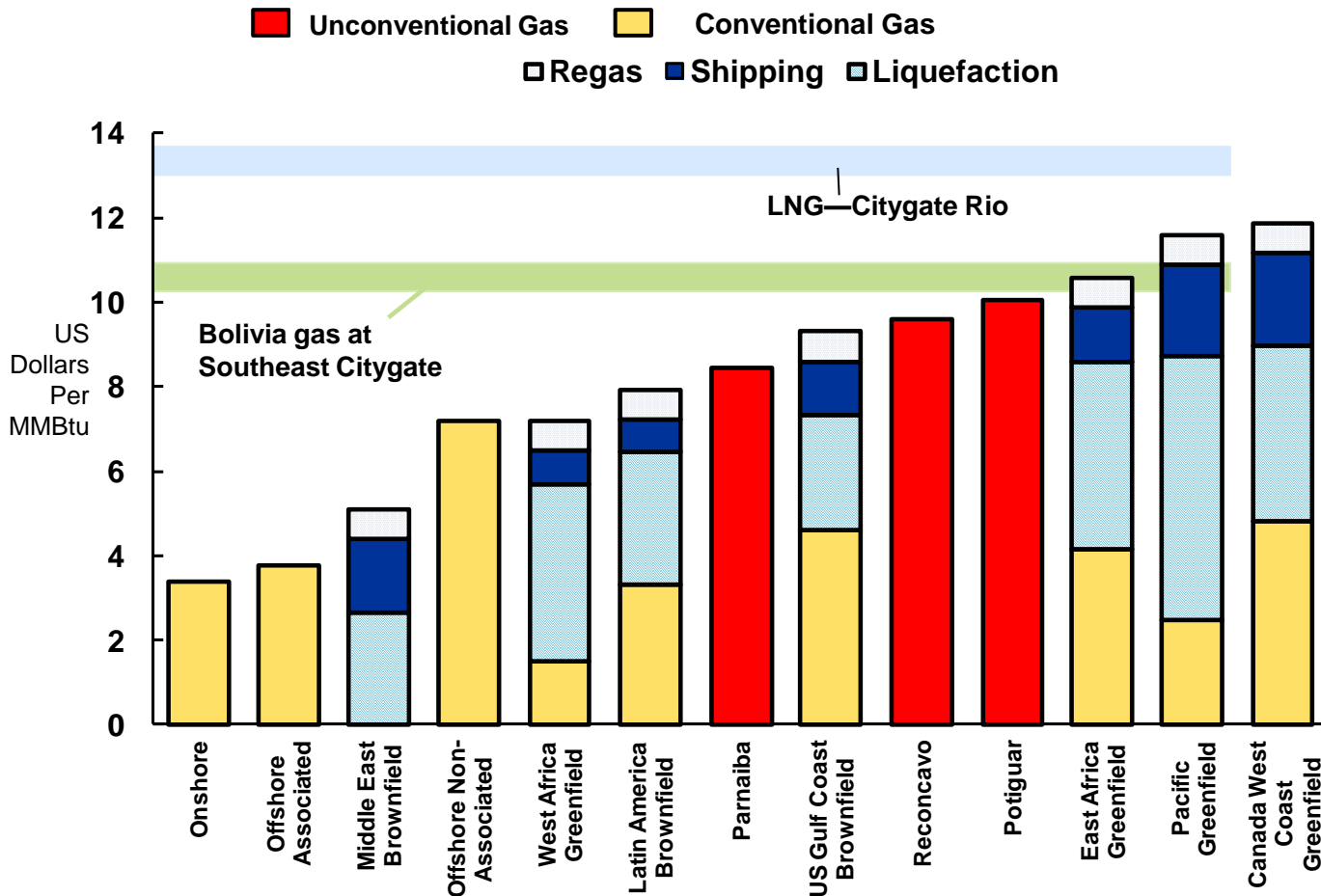
Source: IHS CERA. North America not included.

Outlook for Natural Gas Prices Brazil

IHS Private Presentation



Supply Costs Stacks in Brazil



- Supply of unconventional production from Parnaiba ranks very close to onshore conventional gas. It falls into the range of contracted LNG and Bolivian gas import price range in 2012.
- Unconventional gas from Reconcavo and Potiaguar are less competitive but still rank well versus current import prices.

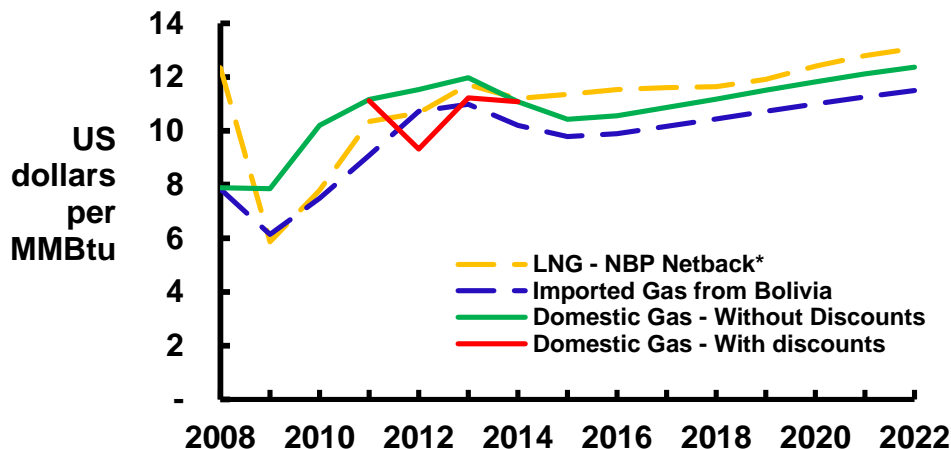
Source: IHS CERA.

Brazil:

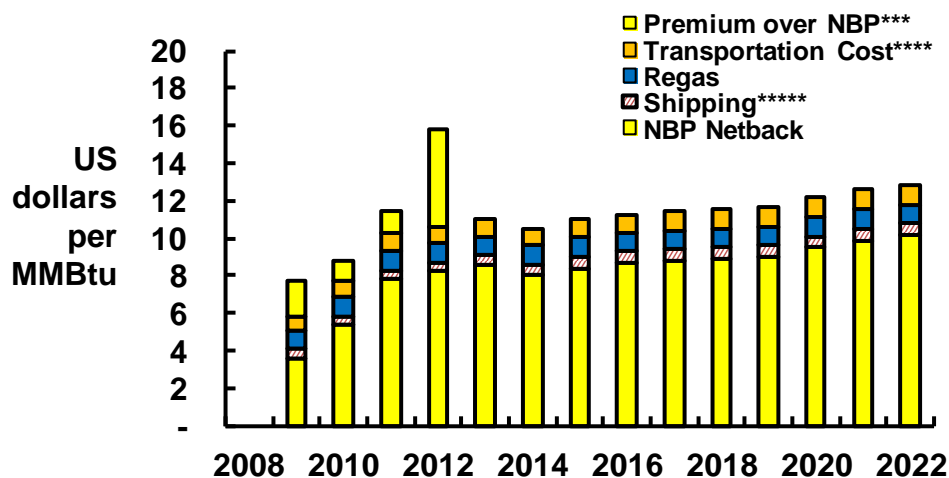
Natural gas price outlook



Natural gas price outlook, 2012–22



LNG NBP netback analysis



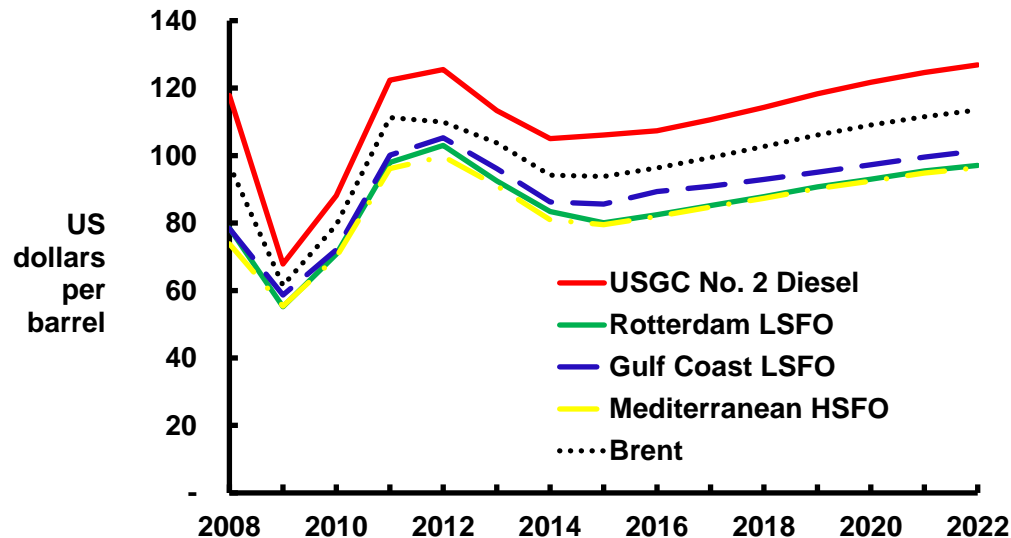
- **Brazilian domestic gas and Bolivian imports are likely to remain oil linked over the next 10 years.**
 - The price of domestic gas is expected to drop to US\$ 10.55 per MMBtu in 2016 owing to declines in global oil prices (see Appendix I).
 - Imported Bolivian gas is estimated to have averaged US\$11.17 per MMBtu in 2012 and is projected to drop to US\$9.89 per MMBtu in 2016 also from a decline in international benchmark prices.
- **In the midterm, LNG import prices will likely continue to follow NBP netbacks.**
 - In 2012, FOB price of LNG delivered at the Brazilian coast based on foreign trade data was US\$13.36 per MMBtu.
 - Meanwhile an estimate based on an NBP netback was US\$10.67 per MMBtu.*** The resulting premium over NBP was a result of tighter LNG market owing to the rise in Japanese LNG imports following the shutdown of nuclear power plants in 2011 post-Fukushima.
 - Considering the IHS CERA NBP outlook as well as the outlook for transportation costs in Brazil, 2016 LNG prices are projected at US\$11.53 per MMBtu, before a possible premium.

Source: Ministry of Development, Industry, and Trade; IHS CERA.

*Estimated; **For 2009 and 2010, LNG prices include the average free-on-board prices paid by Brazil, shipping costs, and an estimate of transportation costs to the Southeast citygate. ***Premium is calculated ex-post based on foreign trade data from Aliceweb Database (<http://alicesweb.desenvolvimento.gov.br>); ****Estimated transportation cost refers to the fixed component of the new pricing formula for domestic gas prices at the citygate; *****Shipping from the West African coast to Brazil.

Natural gas and power price drivers*

Refined products price benchmarks



- **Oil and refined products prices provide the basis for LNG price estimates for Chile, Brazilian domestic gas prices, Bolivian exports, and power contracts in the region.**
 - Brent prices surged in 2012, averaging US\$109.94 per barrel, reflecting the fear of a possible supply disruption across the Middle East and North Africa region.
 - In our planning scenario, Global Redesign, IHS CERA expects Brent to average US\$103.75 per barrel in 2013 and US\$94.20 in 2014, due to increased oil supplies from Iraqi and non-OPEC producers .

Source: IHS CERA.

Note: LSFO = low-sulfur fuel oil; HSFO = high-sulfur fuel oil.

*Estimated

Brazil:

Natural gas price outlook, 2012–22*



- **IHS CERA expects Brazilian domestic gas prices to average US\$11.98 per MMBtu in 2013 without discounts. Assuming that an informal price ceiling of 80% of the price of fuel oil continues to prevail, the actual price of domestic gas would average US\$11.22 per MMBtu this year.**
 - Petrobras has granted successively one-off discounts at varying percentages to citygate natural gas prices since May 2011. Discount percentages to date implicitly define a price ceiling for domestically produced natural gas at around 80% of the price of fuel oil.
 - Granting discounts is commercially attractive to the company because it preserves the competitiveness of natural gas against substitute fuels for industries.
 - Upon increases in the price of substitute fuels, the informal price ceiling for natural gas would rise. As a result, an increase in the price of gas would not decrease natural gas demand from industries significantly.



THANK YOU!

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