

Developments in Global Gas Markets: Implications for Latin America and Argentina

SPE Strategic Seminar

May 2018

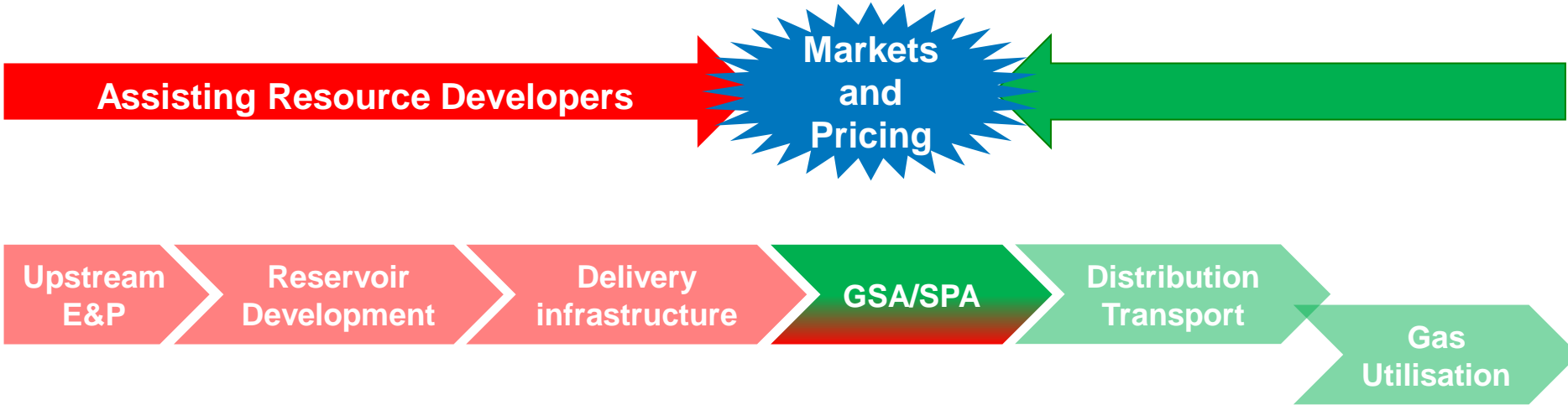
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Our gas group supports clients across the gas value chain on a range of technical, commercial, and strategic issues

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Acquisitions and Divestitures, Buyer and Seller Due Diligence

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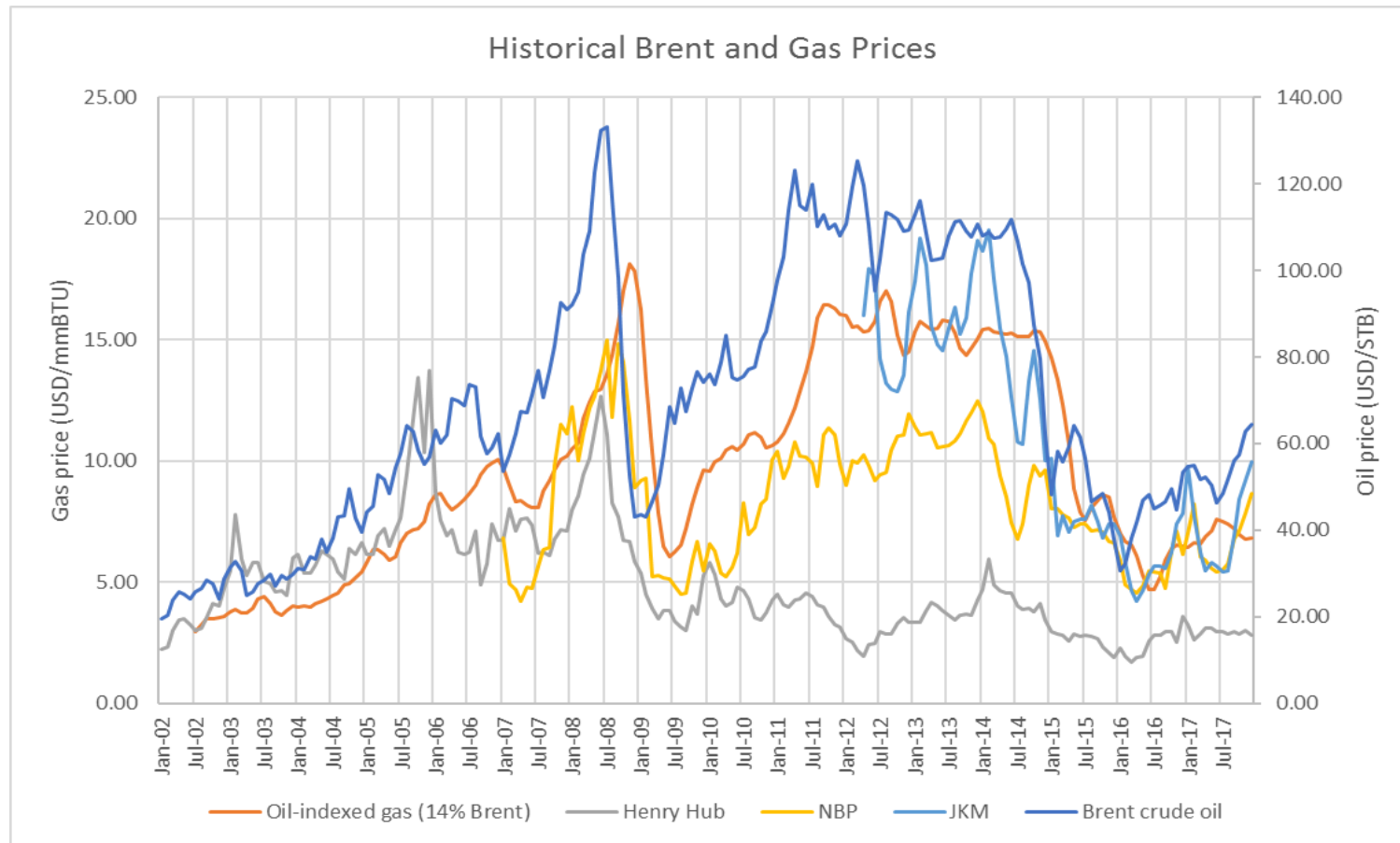
The Shale Gas story has been full of false starts...

- Evolving market and pricing structures
- Emerging wholesale market
- International investment



- Basin characteristics becoming well understood
- Strong liquids content
- Regional connections

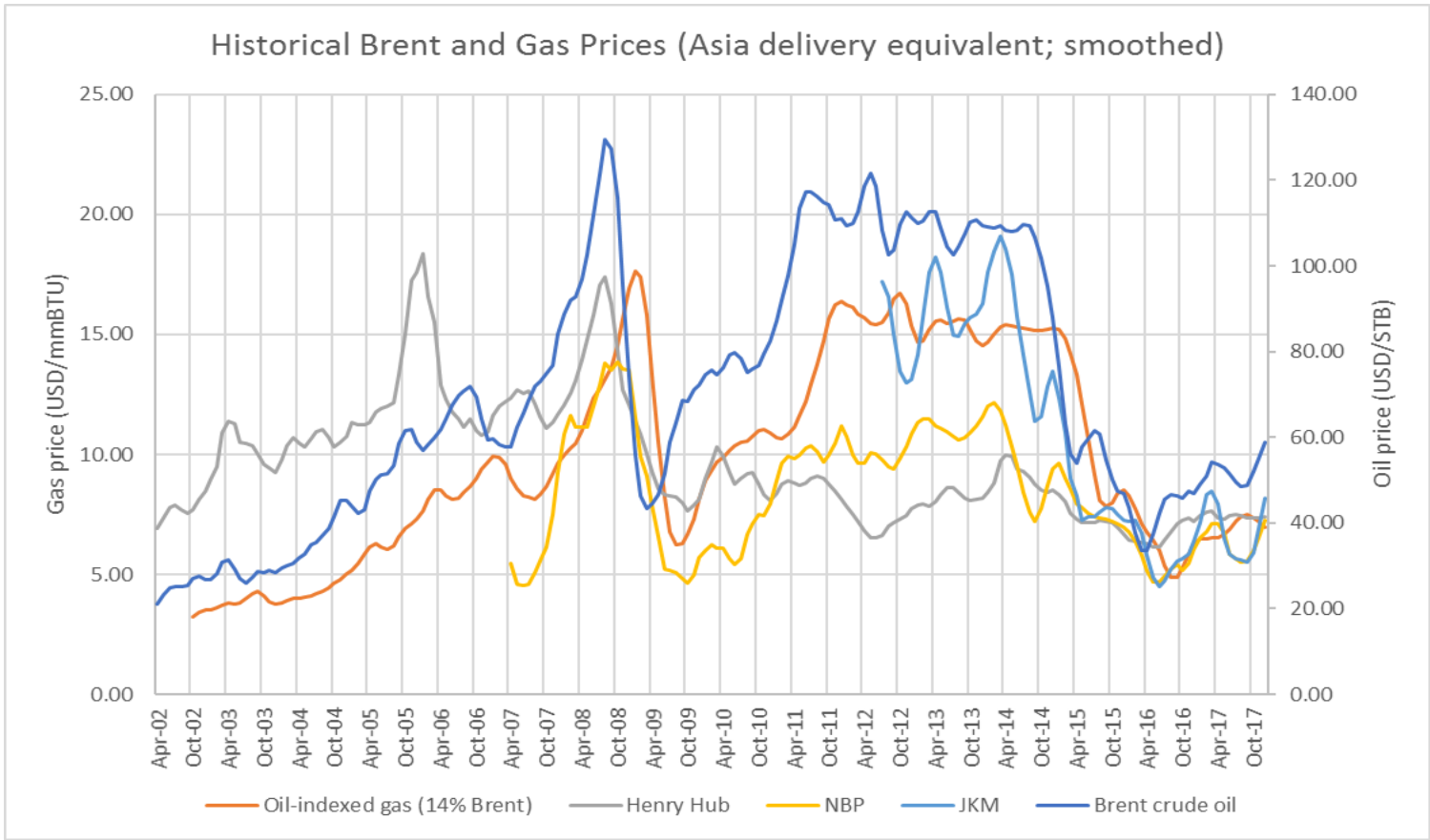
Global gas prices...



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...have historically seen only loose correlation

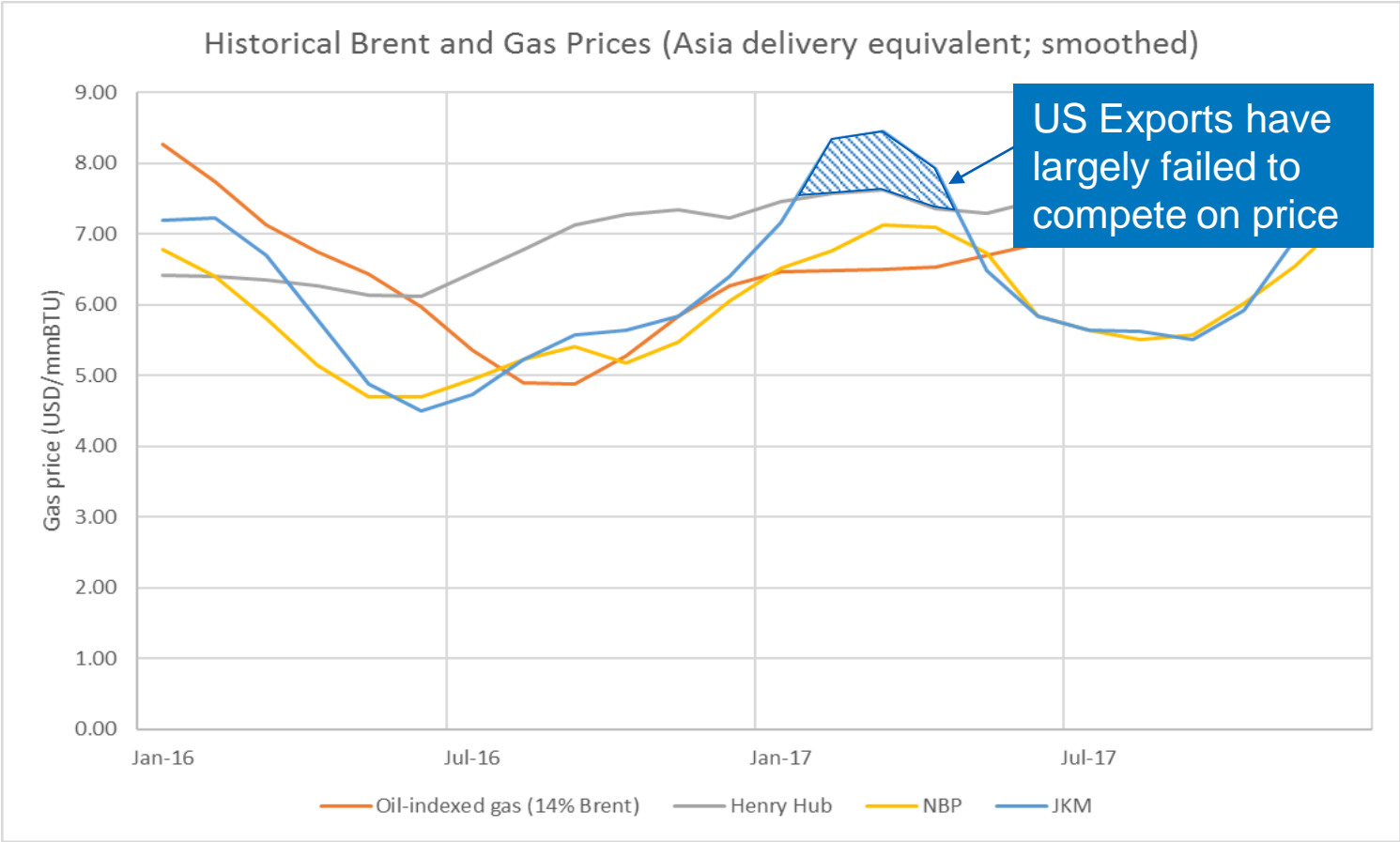
On an Asia delivery base...



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...convergence is clear

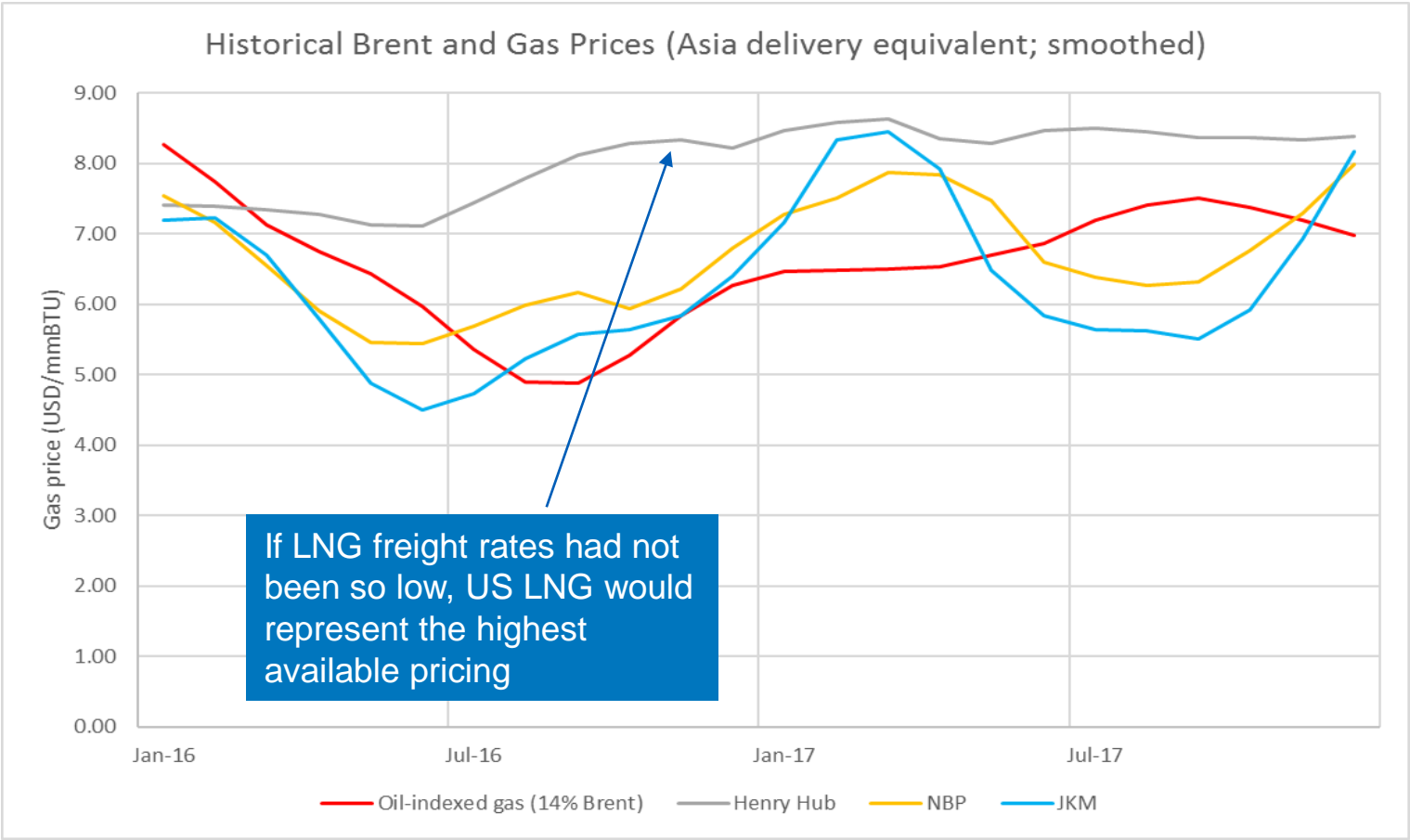
US and European LNG (freight adjusted)



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US LNG is not as competitive as first thought...

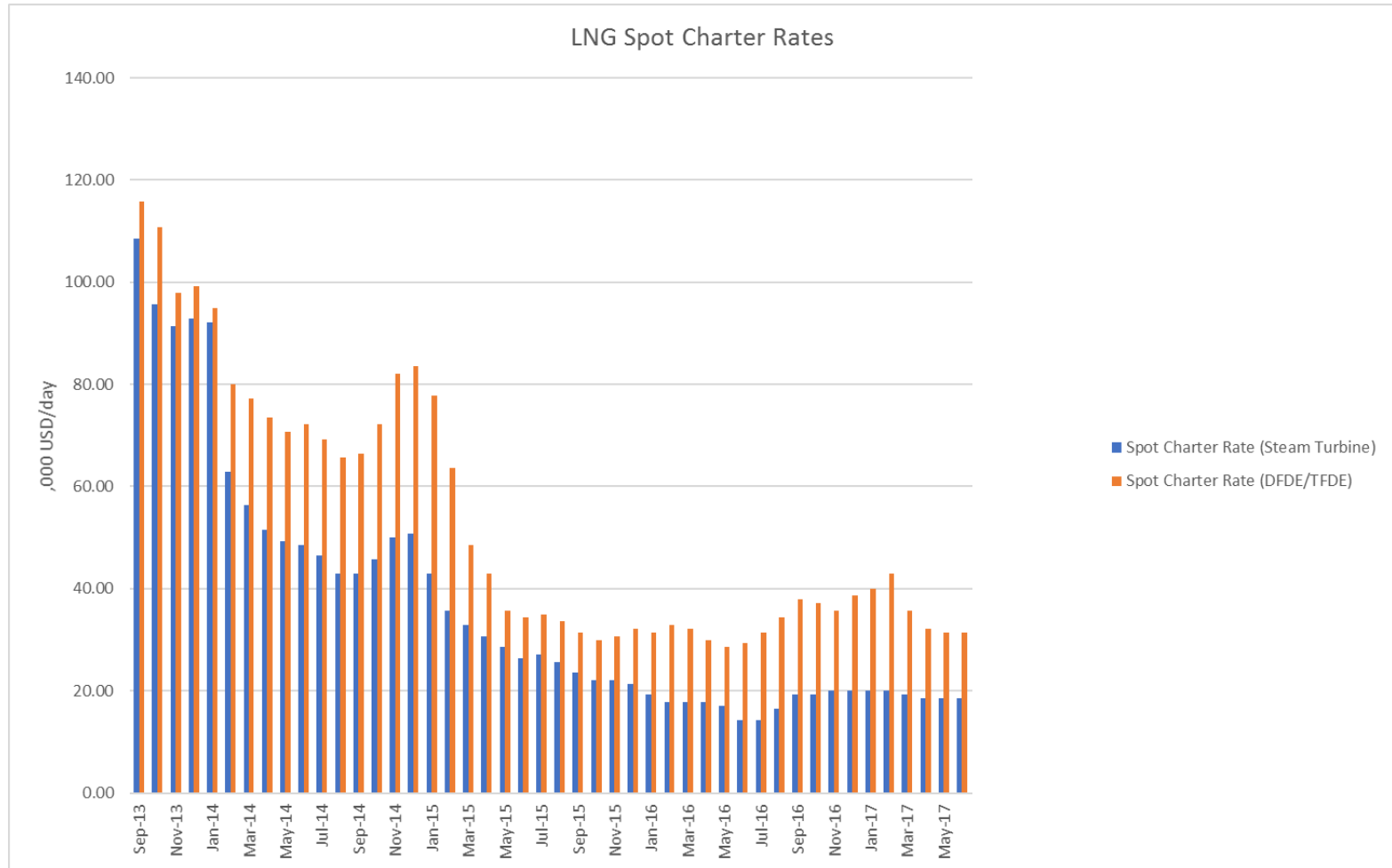
Higher freight could undermine US LNG...



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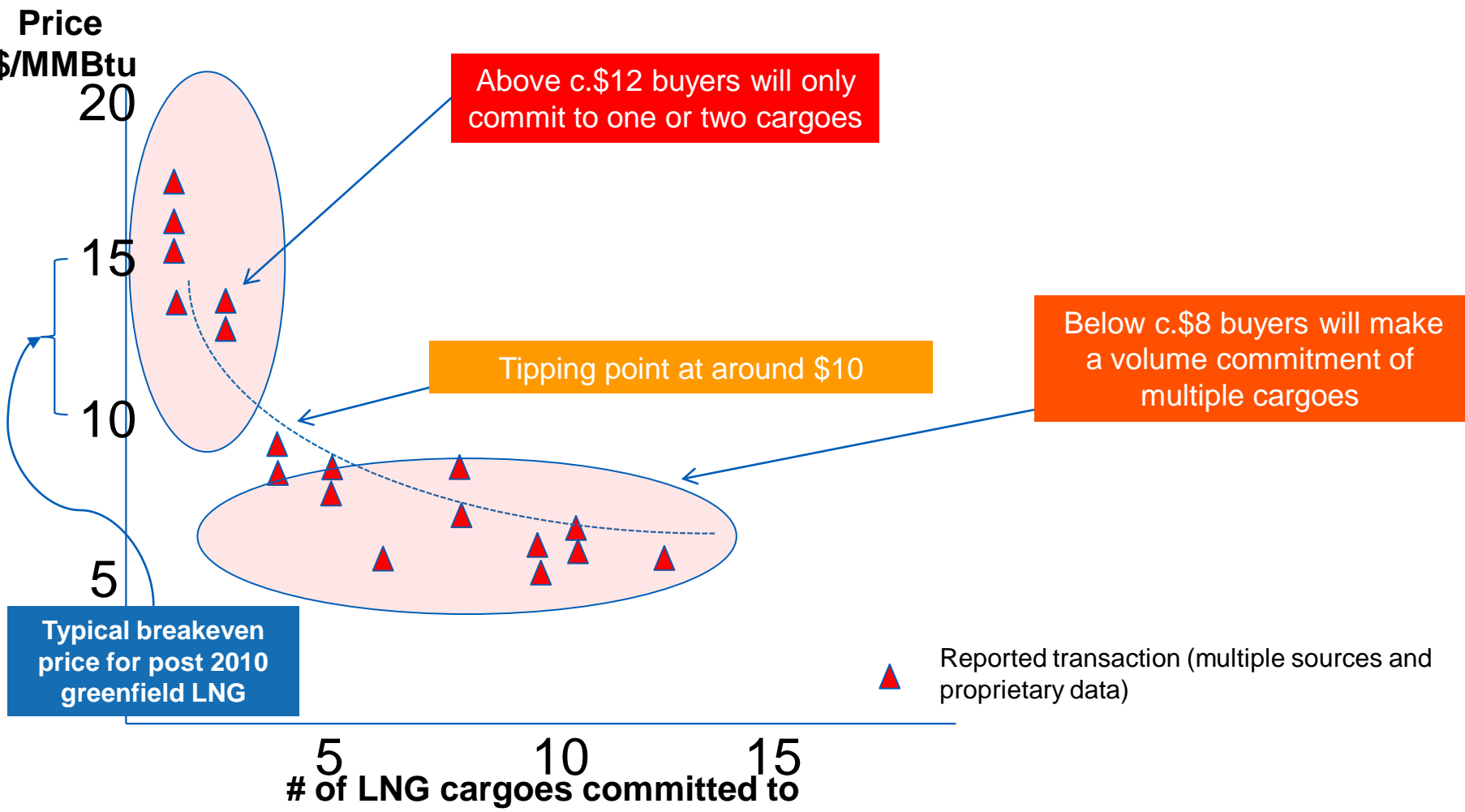
...but lower liquefaction toll may come to the rescue

LNG Freight rates have been on the increase...



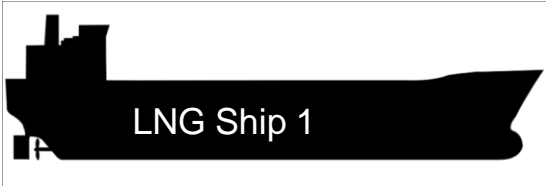
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Lower prices are fueling LNG demand



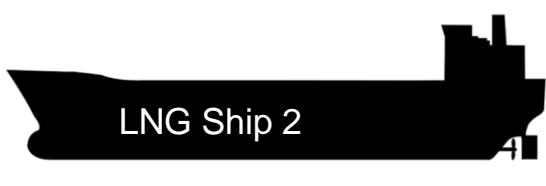
An extended period of low LNG prices seems less likely

The LNG cargo dilemma for buyers



- ☐ Delivered under LT ToP
- ☐ Oil indexed pricing
- ☐ Buyer obliged to purchase

c.\$40-45m



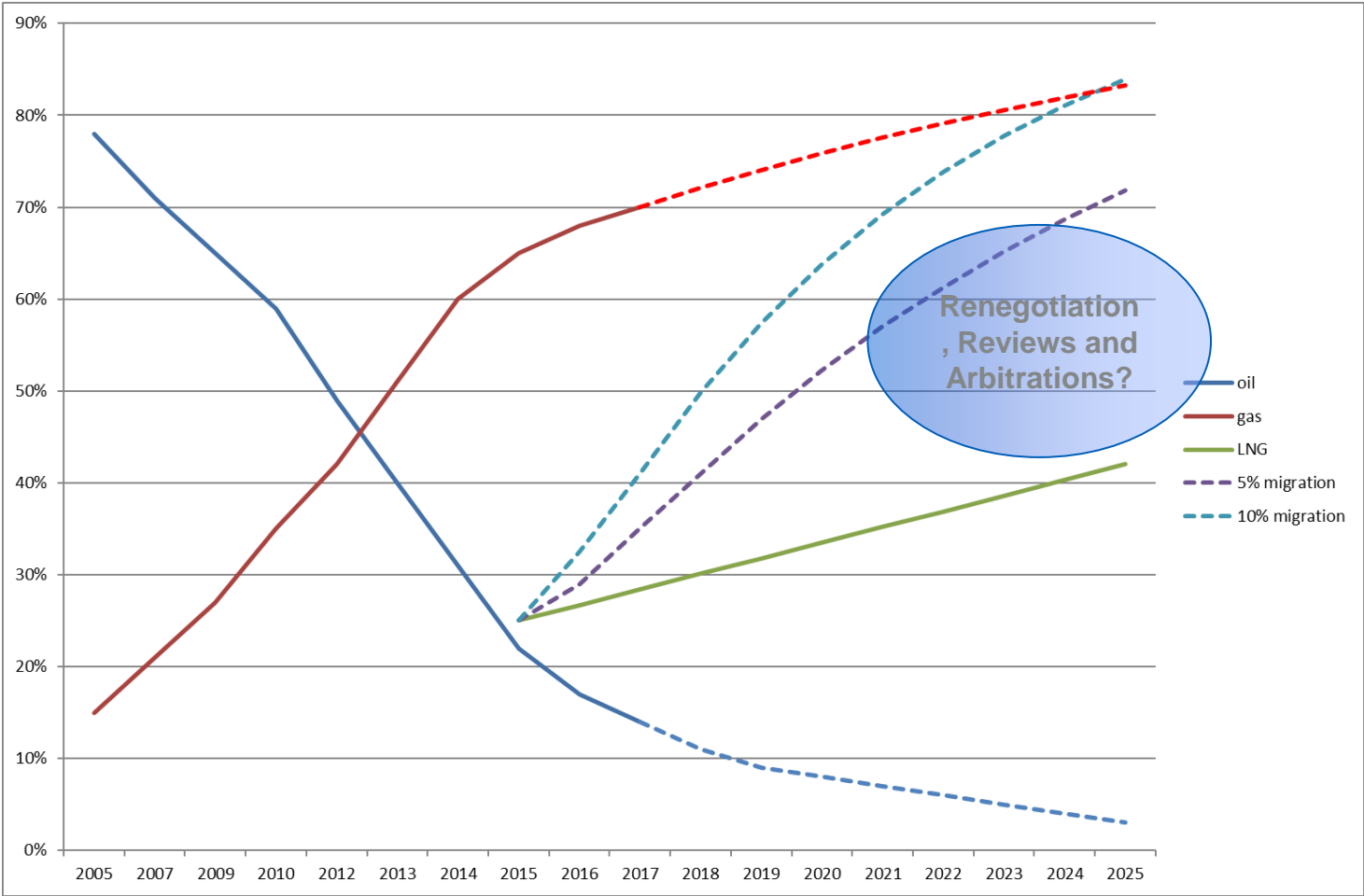
- ☐ Available on spot market for delivery anywhere
- ☐ Price negotiable, market

c.\$30m

REVIEW? ACCOMMODATE? DISPUTE?

* Based on a 160,000 cu.m carrier at an May 2018 Brent curve and Spot Asian prices

Migration towards “Gas on Gas” pricing



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The strange tale of the LNG Carrier “Gaselys”

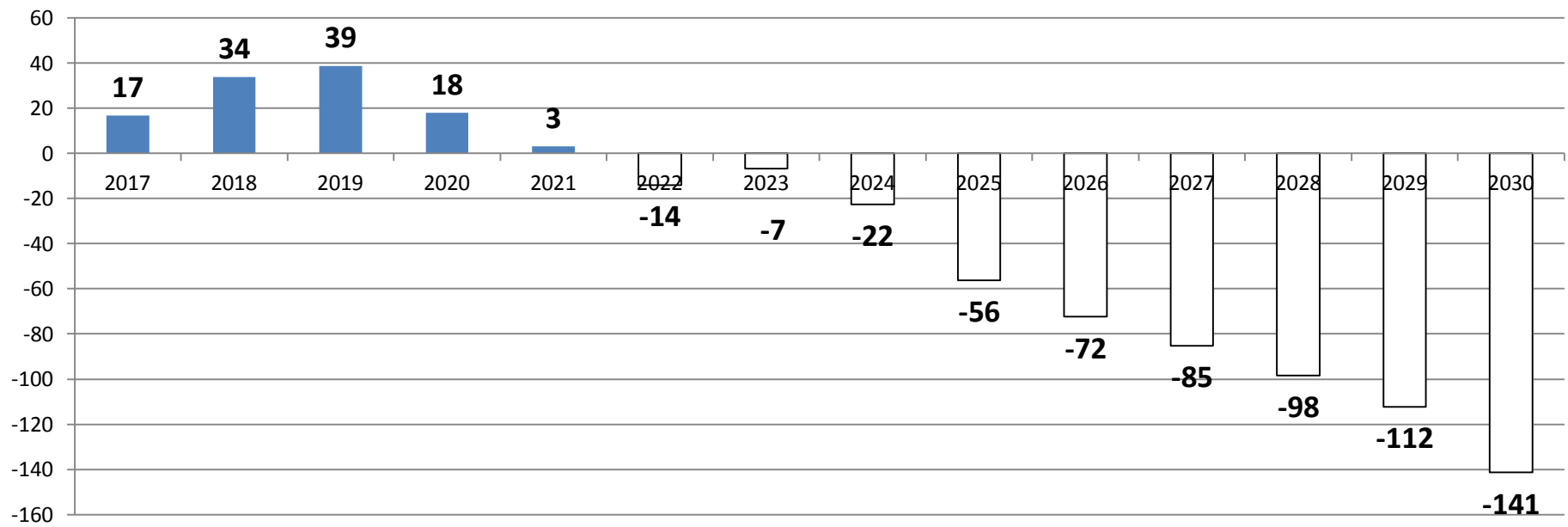
- ❑ First cargo from Yamal LNG in Russia in early December
- ❑ Should have gone to China
- ❑ Went to the UK
- ❑ Malaysian trader
- ❑ Bought by French
- ❑ Delivered in the US in late January



Global LNG Supply/Demand: High Demand Case Forecast

GCA Current Growth Forecast					
Country	2016	Cases	2017-2021 (%)	2022-2026 (%)	2027+ (%)
India	19 MMTPA	Base	10%	10%	5%
		High	15%	10%	3%
China	27 MMTPA	Base	10%	10%	5%
		High	15%	10%	3%

LNG Supply Demand Balance (+ve = over supply in market) vs High Case Demand

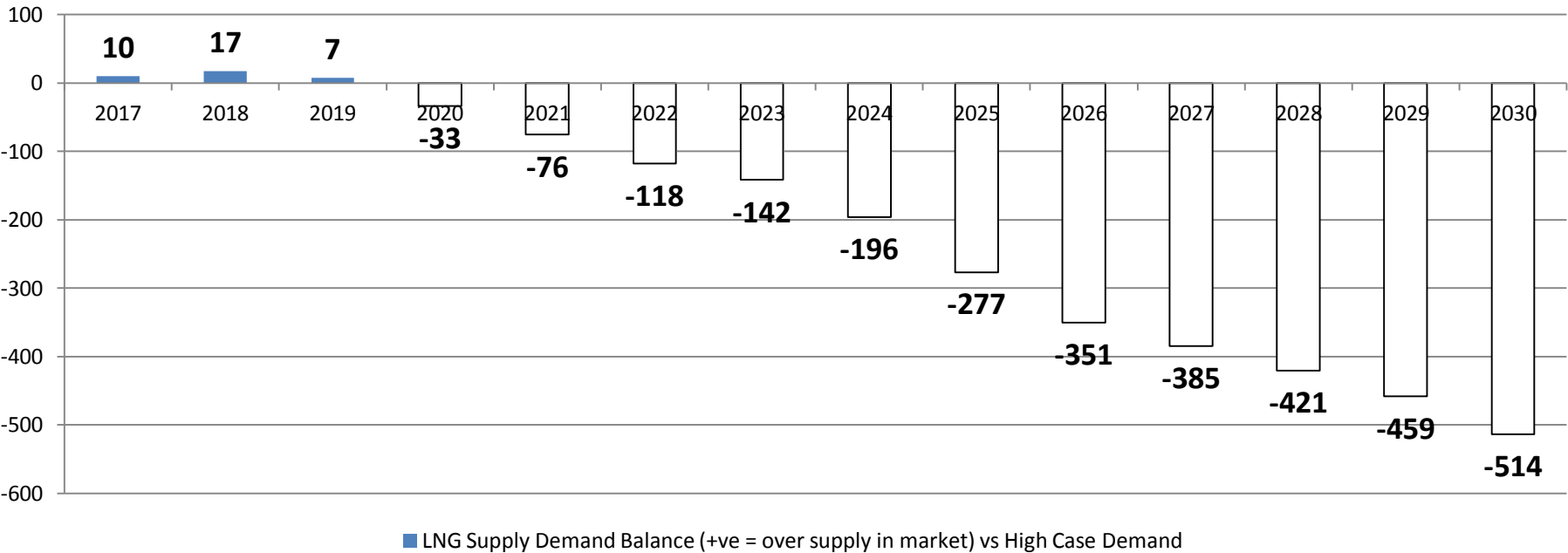


■ LNG Supply Demand Balance (+ve = over supply in market) vs High Case Demand

Global LNG Supply/Demand: LNG Growth Rate Increase in India and China

Scenario: Increased Rate of LNG Demand Growth in India & China					
Country	2016	Cases	2017-2021 (%)	2022-2026 (%)	2027+ (%)
India	19 MMTPA	Base	20%	20%	10%
		High	30%	20%	6%
China	27 MMTPA	Base	20%	20%	10%
		High	30%	20%	6%

LNG Supply Demand Balance (+ve = over supply in market) vs High Case Demand



After PlanGas is phased out...where will prices stabilise?

- ❑ The features that will drive where prices in Argentina stabilise include...
 - LNG global market clearing price
 - Freight adjusted price to Argentina and region
 - Regional LNG regas economics and transmission tariffs
 - Likely basis differentials between Vaca Muerta and GBA
 - Winter / Summer effects
 - ...and potential reductions in Vaca Muerta breakeven costs

If US LNG sets the global long run marginal price...

- ❑ US LNG is likely to set a ceiling on long term global LNG market prices
- ❑ Other than the variability in Henry Hub, other charges are relatively fixed

LNG import price equivalence for various HH prices					
All prices in US\$/MMBtu					
HH	\$ 3.00	\$ 3.50	\$ 4.00	\$ 4.50	\$ 5.00
Fuel charge	\$ 0.45	\$ 0.53	\$ 0.60	\$ 0.68	\$ 0.75
Liquefaction charge	\$ 2.75	\$ 2.75	\$ 2.75	\$ 2.75	\$ 2.75
Shipping to Bahia Blanca	\$ 1.45	\$ 1.45	\$ 1.45	\$ 1.45	\$ 1.45
Regas charge	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75
Gas into system total	\$ 8.40	\$ 8.98	\$ 9.55	\$ 10.13	\$ 10.70

The next generation of liquefaction may result in lower liquefaction tolls
Current freight rates reflect about half this
Assumes some winter / summer seasonality

Currently TGS/TGN determine transmission tariffs

- ❑ Base load tariff from Bahia Blanca to Buenos Aires is 26c/MMBtu
- ❑ Base load tariff from Neuquén to Buenos Aires is ~ 70c/MMBtu
- ❑ Resulting basis at Neuquén should be 44c/MMBtu less than landed LNG
- ❑ Seasonality and swing accentuates the difference

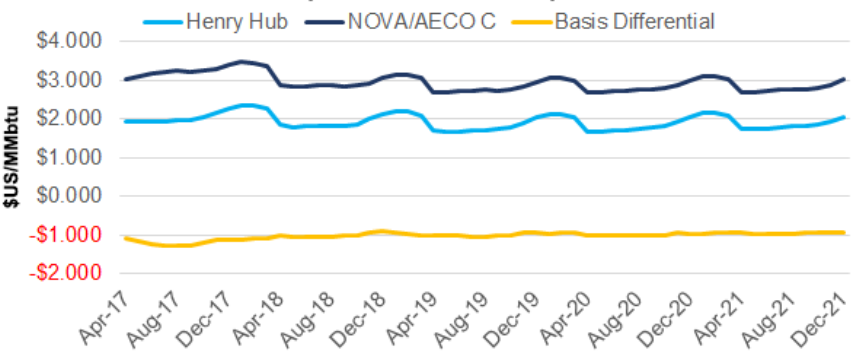
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Gas netback in Neuquén	\$ 7.94	\$ 8.54	\$ 9.11	\$ 9.69	\$ 10.26

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Current freight rates reflect about half this
Assumes some winter / summer seasonality

...however, longer term basis will be set by secondary market in gas and transportation capacity...

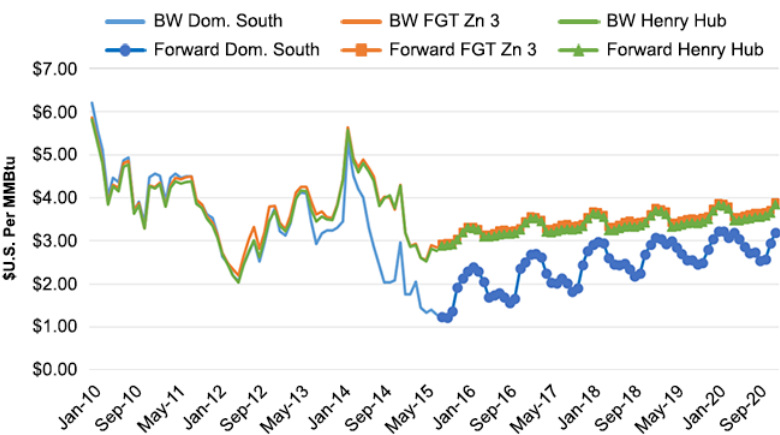
- ❑ The AECO / HH basis differential has stabilised at approximately \$1/MMBtu
- ❑ The Marcellus / HH differential has been volatile, representing transmission bottlenecks
- ❑ Ranges from \$0.80 to \$1.50 / MMBtu
 - Stabilising at around \$1.20 / MMBtu on a seasonally averaged approximation going forward

Monthly AECO/NOVA C Basis Differential, Apr. 2017–Dec. 2021
(Data as of 3/20/17)



Source: NGI's Forward Look. NGI calculations

Dominion South, FGT Zone 3 & Henry Hub Historical Bidweek Prices
And Forward Price Curves Jan 2010 to Dec 2020



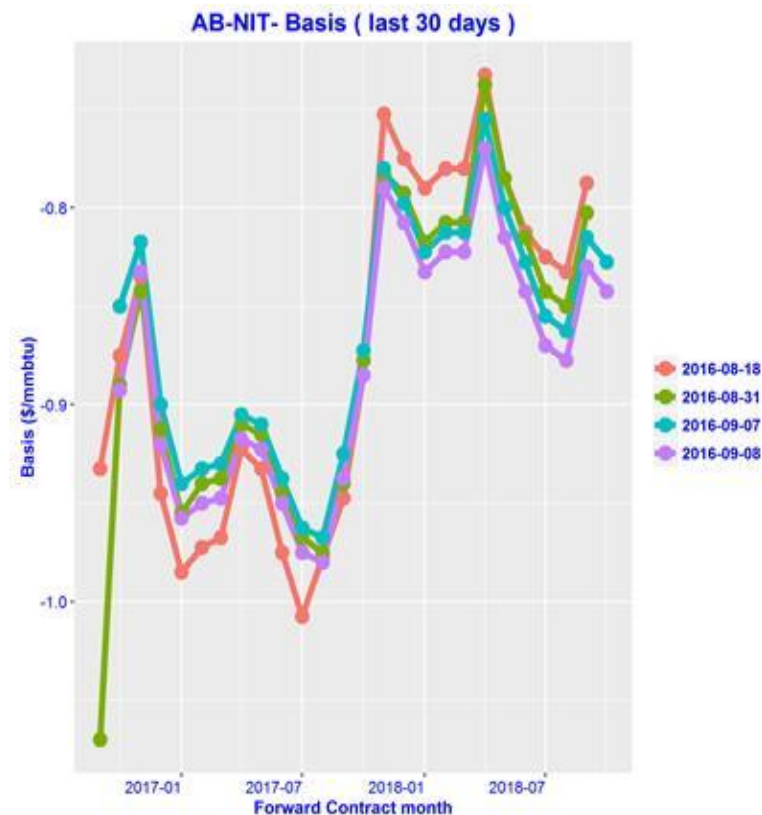
Source: NGI's Bidweek Survey, NGI's Forward Look Issued July 22, 2015

Where might the Neuquén /GBA basis settle down?

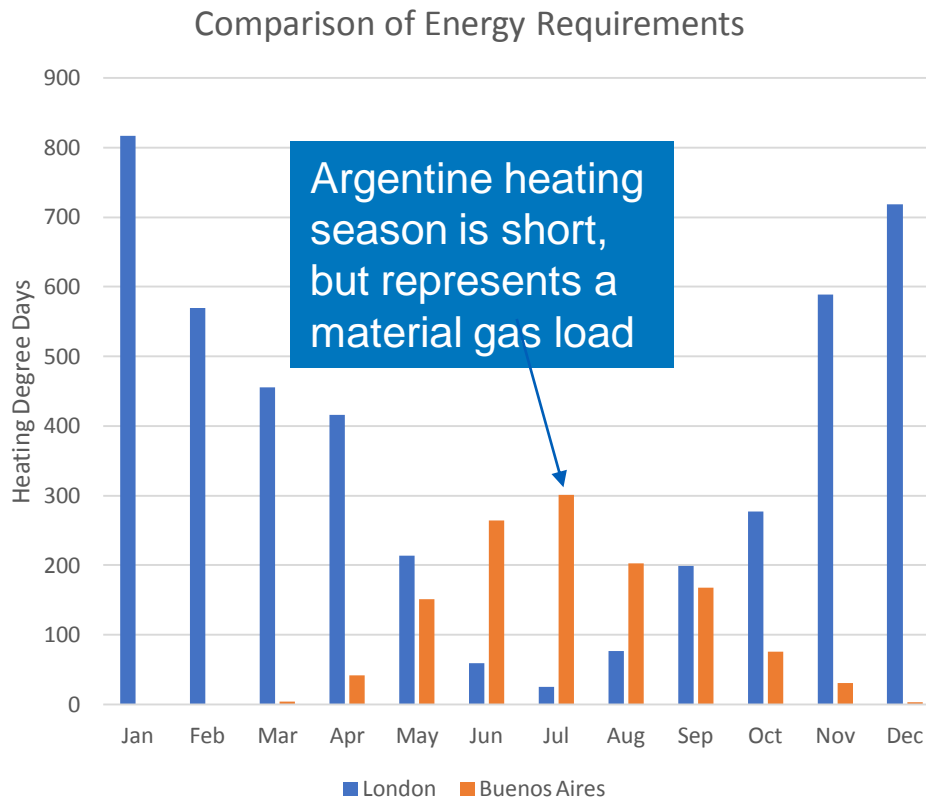
□ Basis differential is partly related to distance, but also to imbalance between production and consumption:

- Neuquén to Buenos Aires....about 1100km,
- AECO approx. \$1 for approx. 3500km
- Marcellus approx. \$1.20 and approx. 2200km
- AECO and Chicago, approximately 2200km basis differential forward curve is sitting between 80c and \$1,
- Correlation is not so much distance as degree of imbalance between centres of supply and demand
- Liquidity in secondary market for transmission is key

Current forward curve for AECO-Chicago basis differential:



Energy Requirements: London vs. Buenos Aires



- ❑ As Vaca Muerta production increases, LNG imports will become increasingly seasonal
- ❑ Regas tariffs will continue to reflect full charter costs of FSRUs
- ❑ Winter gas prices are likely to become increasingly volatile
- ❑ Storage project economics will vie with LNG imports
- ❑ Winter netbacks to Neuquén are likely to increase
- ❑ Potential for LNG swaps and reloads

Other opportunities for gas utilisation...

- ❑ Growth in power generation demand
 - In tandem with renewables obligations
- ❑ Substitution of LNG imports in regional pipeline export markets
- ❑ New utilisation avenues:
 - Petrochemicals
 - Small scale LNG
 - Gas for transportation
 - Small scale LNG
- ❑ Transoceanic LNG exports?