Gaffney, Cline & Associates

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

SPE Strategic Seminar

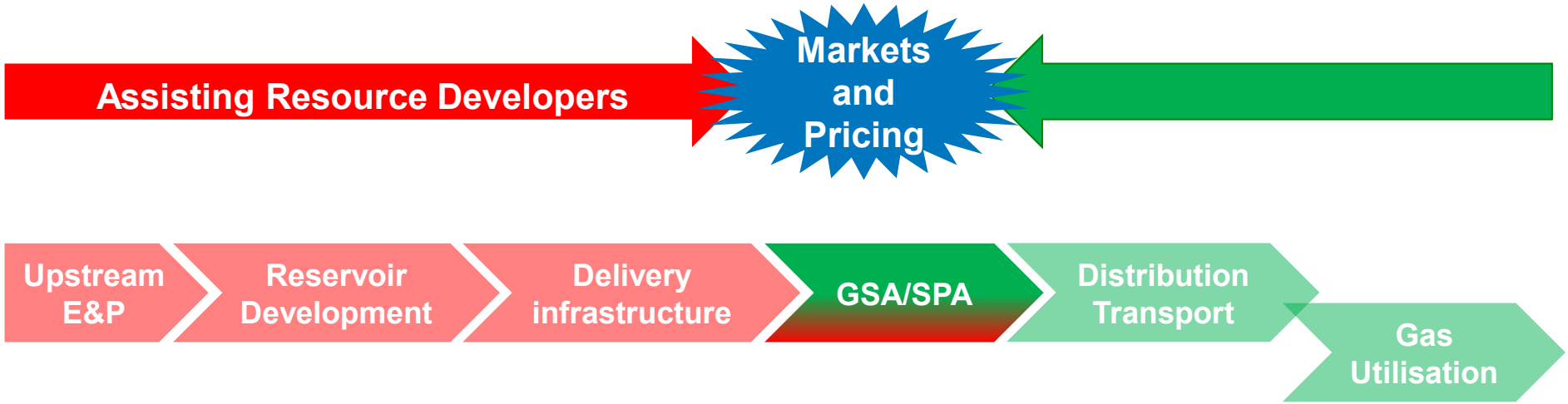
May 2018

Global presence in the Americas, Europe and Asia Pacific

Our consultants have an average of 26+ years industry experience and have worked in most oil and gas centers globally

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

Gaffney, Cline & Associates Gas & LNG Services



- Strategy, Market Analysis, Opportunity Identification and Screening
- Gas Monetisation, Master Plans, Regulatory and License Support
- Asset Valuation, Project Economics and Financing, Fiscal Terms
- Acquisitions and Divestitures, Buyer and Seller Due Diligence
- Risk Identification, Quantification, Management, and Review

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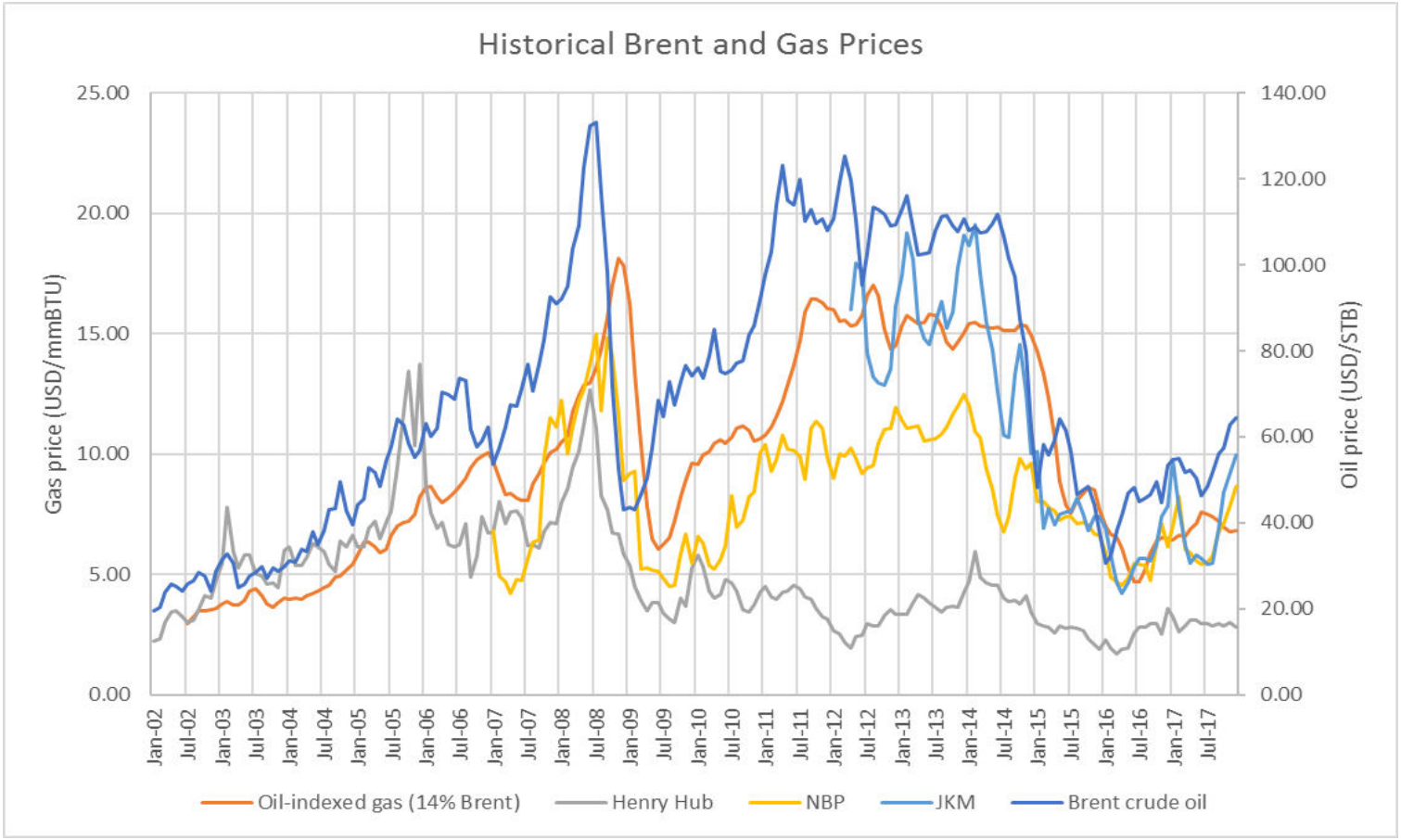
The Shale Gas story has been full of false starts...

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

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

Global gas prices…



…have historically seen only loose correlation

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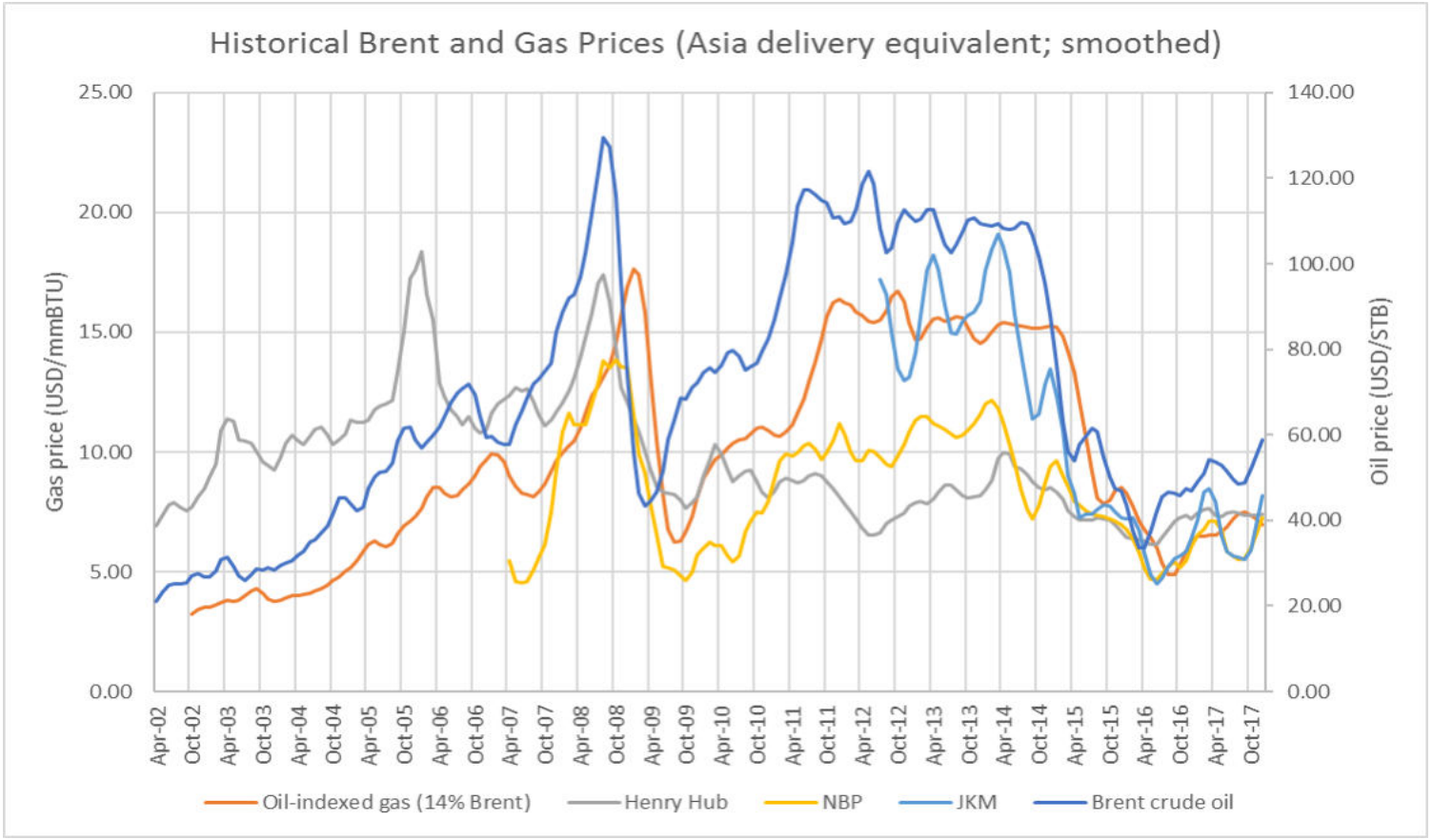
On an Asia delivery base…



…convergence is clear

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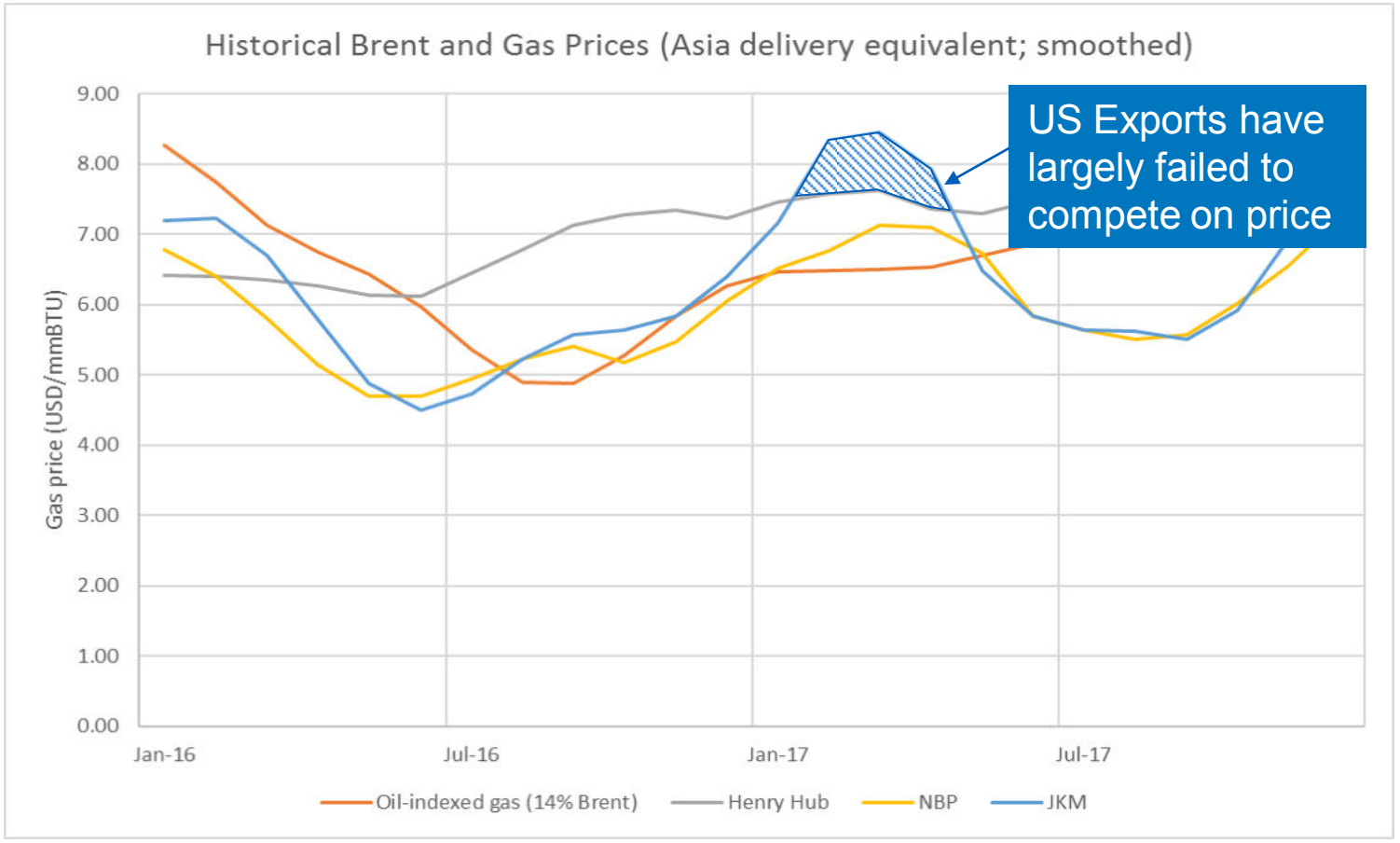
US and European LNG (freight adjusted)



US LNG is not as competitive as first thought…

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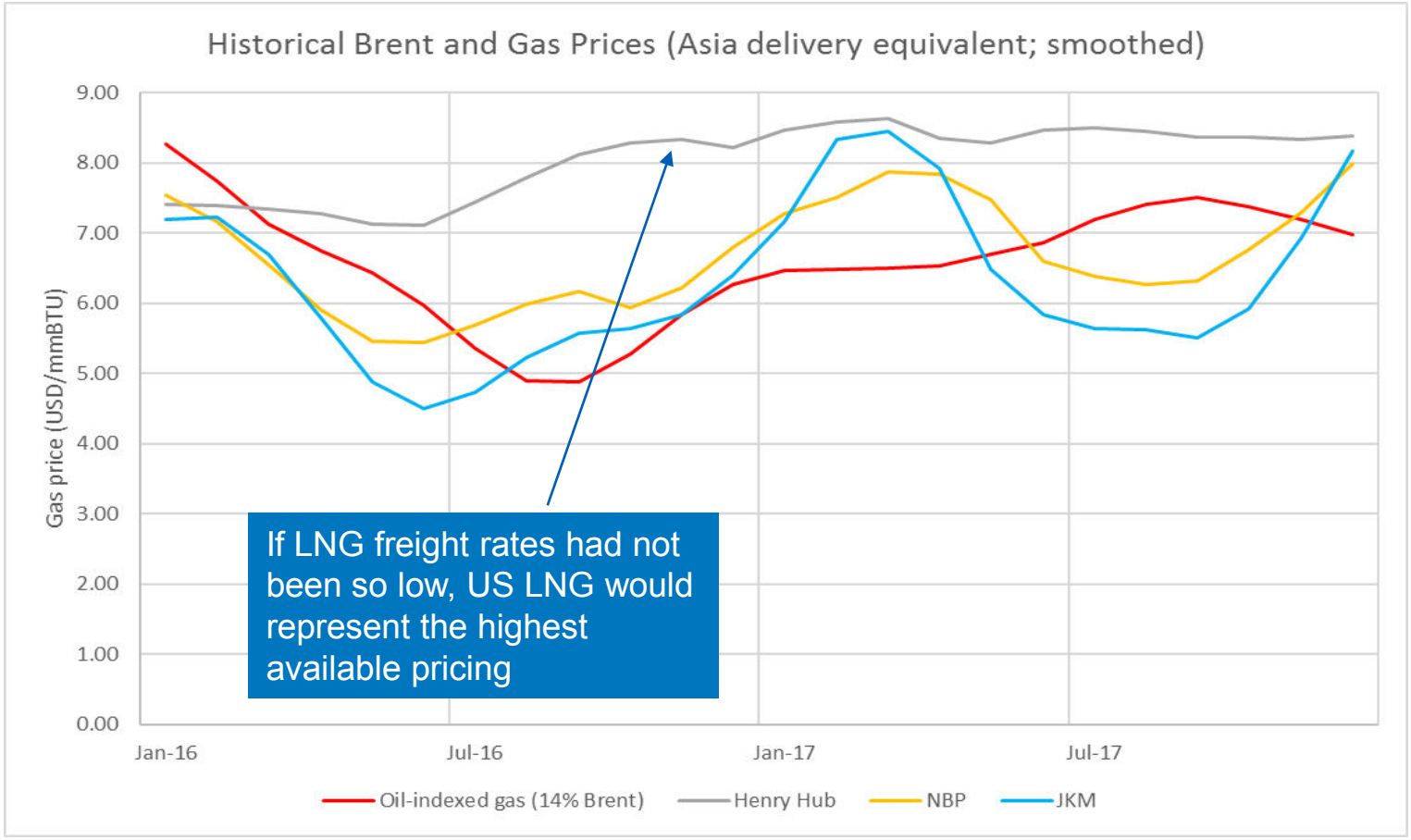
Higher freight could undermine US LNG…



…but lower liquefaction toll may come to the rescue

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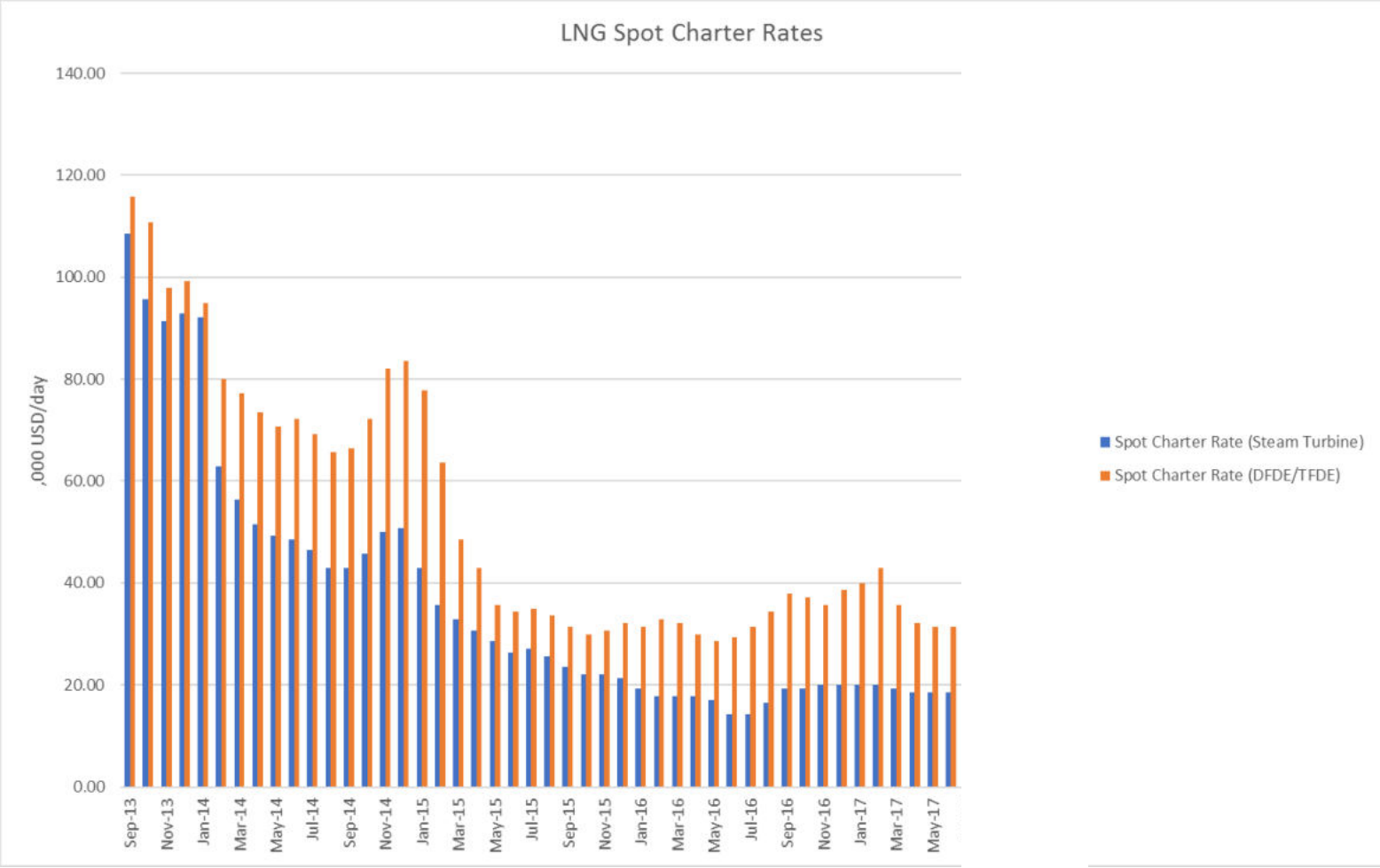
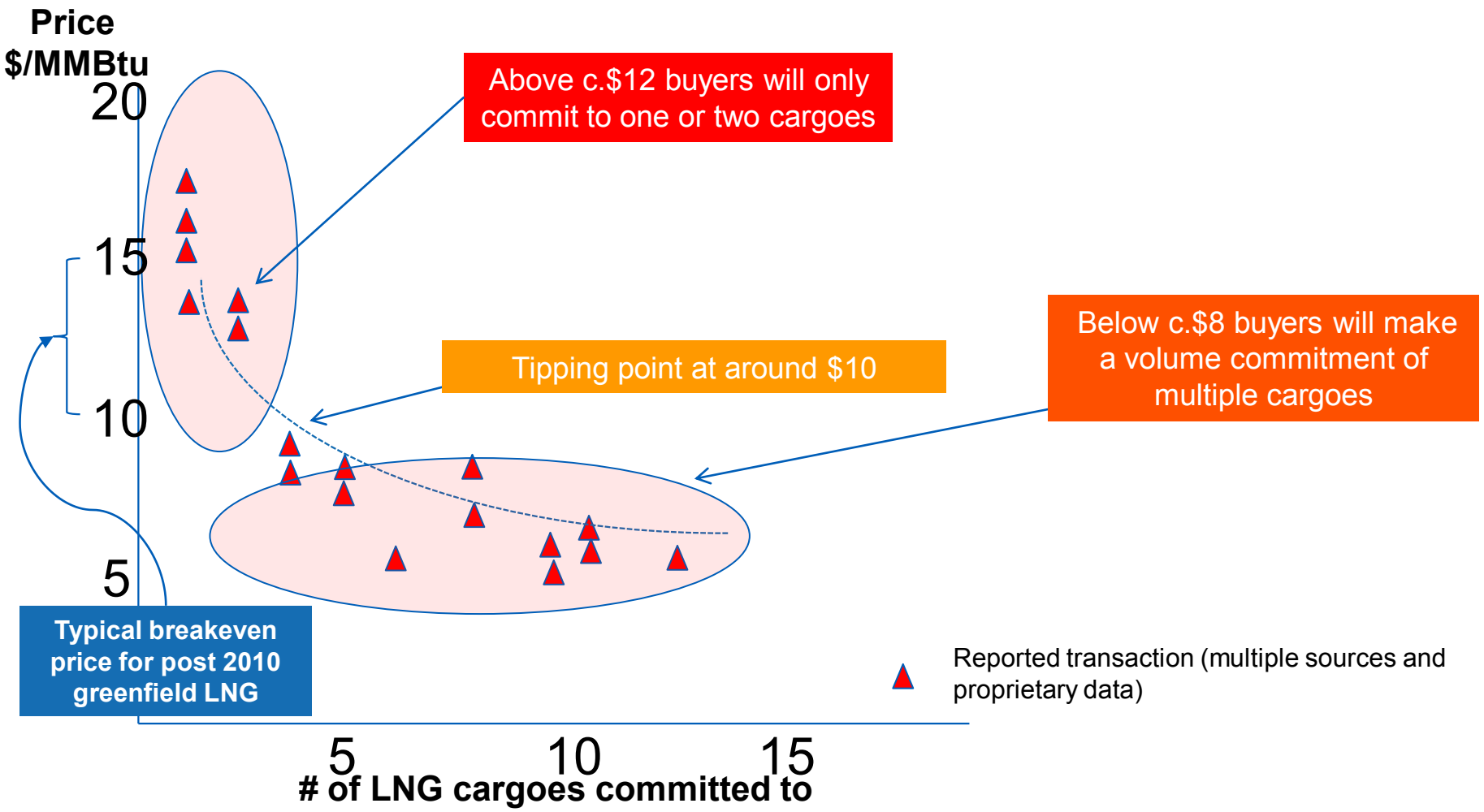
LNG Freight rates have been on the increase…



Lower prices are fueling LNG demand



An extended period of low LNG prices seems less likely

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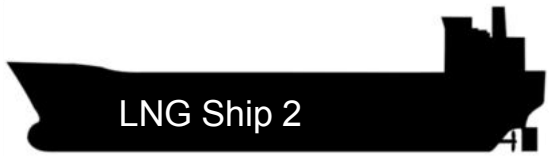
Source: GCA analysis of estimated deal price vs duration

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

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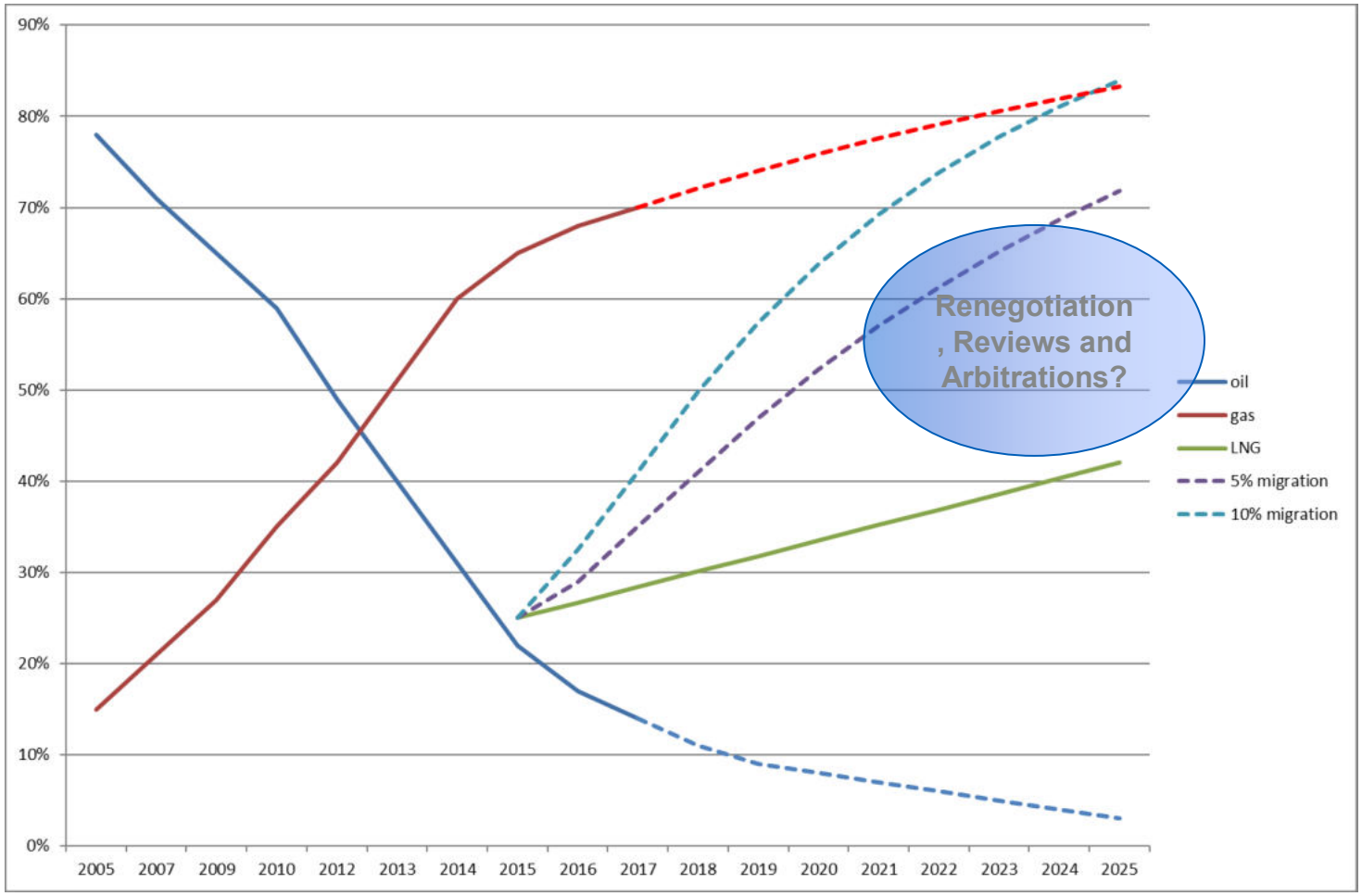
Migration towards “Gas on Gas” pricing



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%
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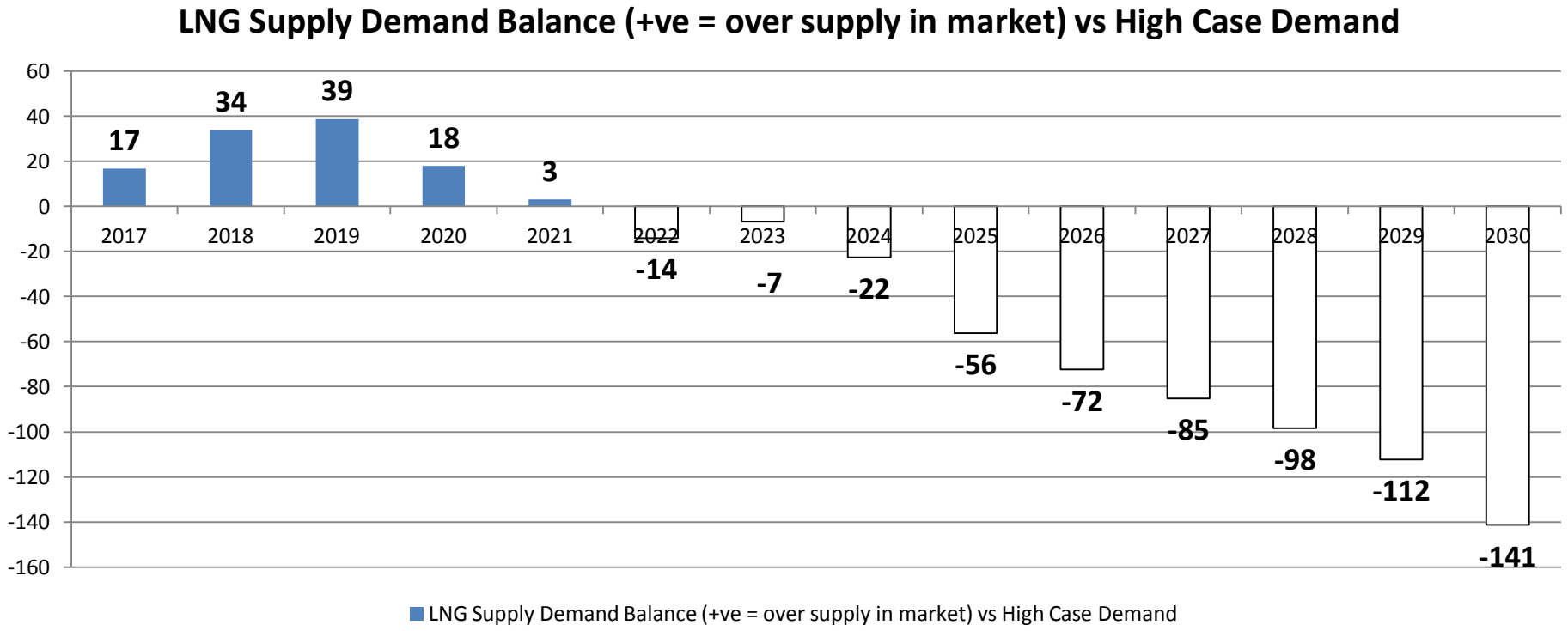

Global LNG Supply/Demand: LNG Growth Rate Increase in India and China

Scenario: Increased Rate of LNG Demand Growth in India & China					
Country	**2016**	**Cases**	**2017-2021 (%)**	**2022-2026 (%)**	**2027+ (%)**
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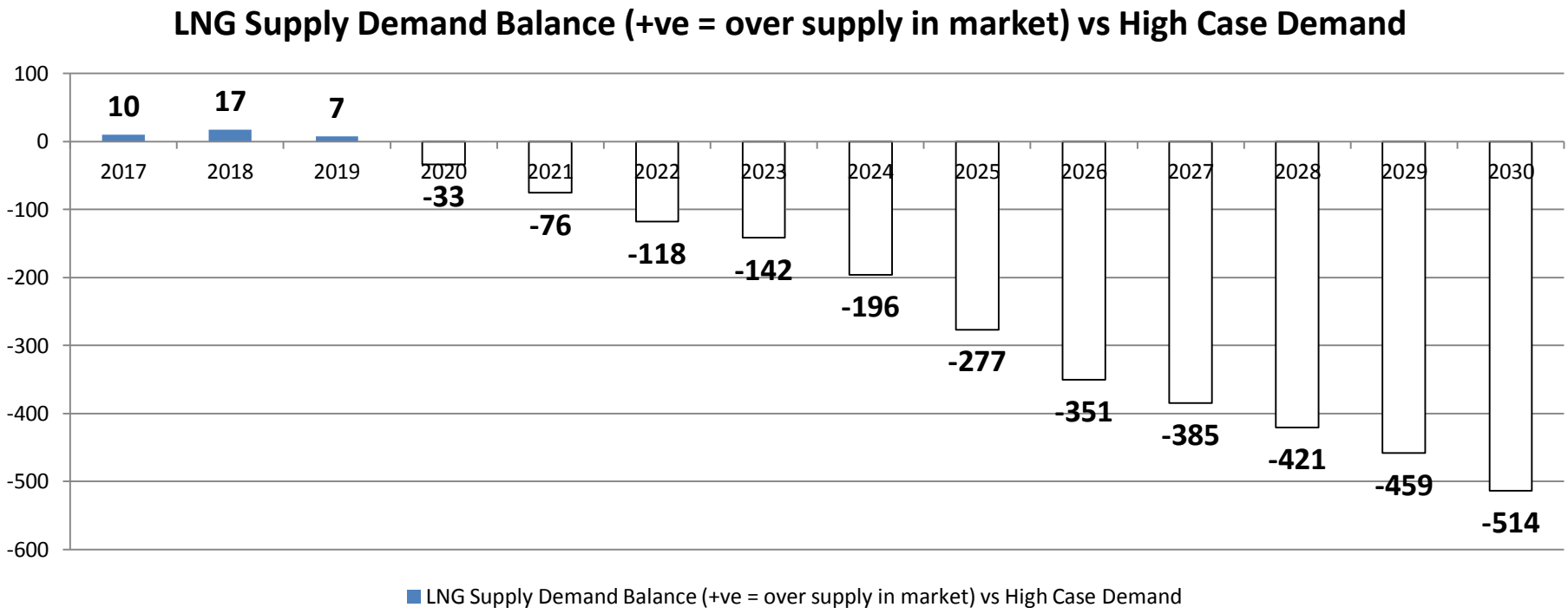

After PlanGas is phased out…where will prices stabilise?

- 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 into system total	***$ 8.40***	***$ 8.98***	***$ 9.55***	***$ 10.13***	***$ 10.70***
Gas netback in Neuquén	***$ 7.94***	***$ 8.54***	***$ 9.11***	***$ 9.69***	***$ 10.26***

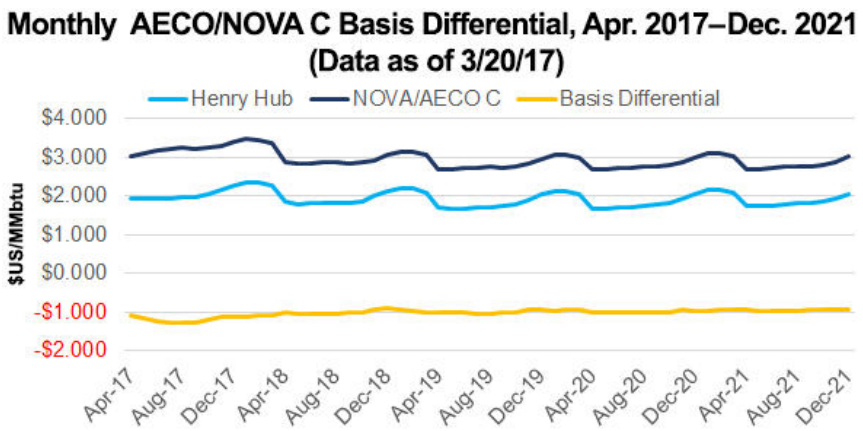
The next generation of liquefaction may result in lower liquefaction tolls

Current freight rates reflect about half this

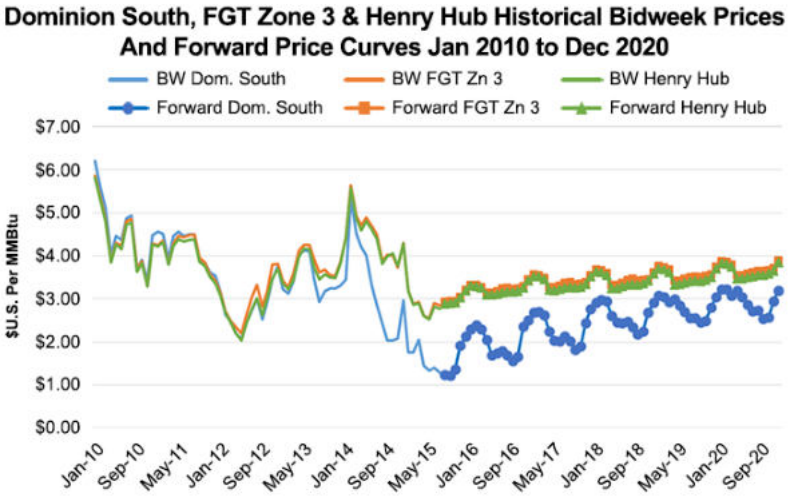
Assumes some winter / summer seasonality

...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



Source: NGI's Forward Look. NGI calculations



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

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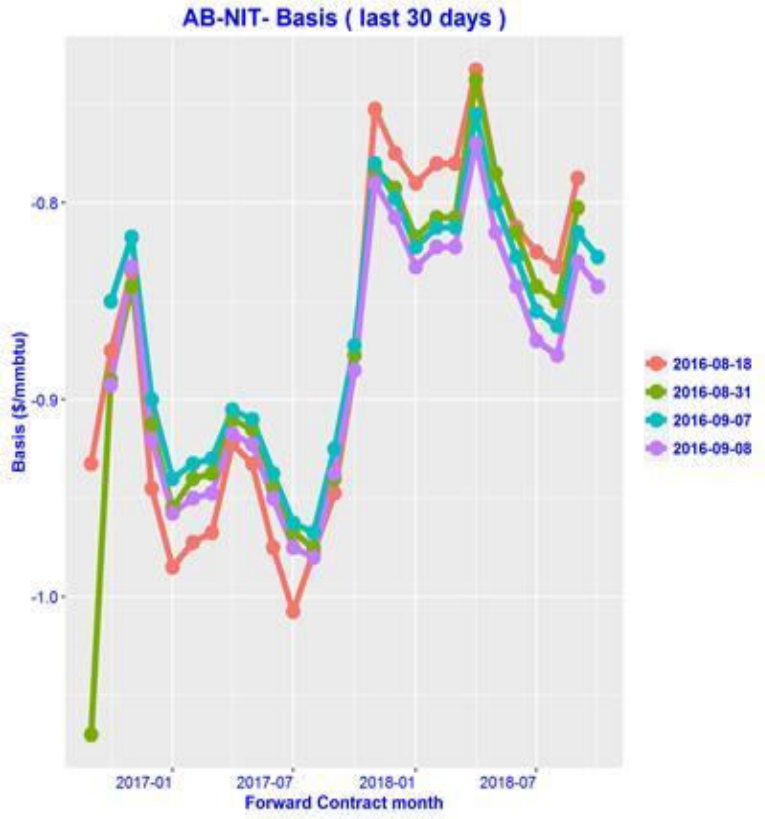
Source: NGI's forward look, NGI calculations, GCA analysis and interpretation

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:



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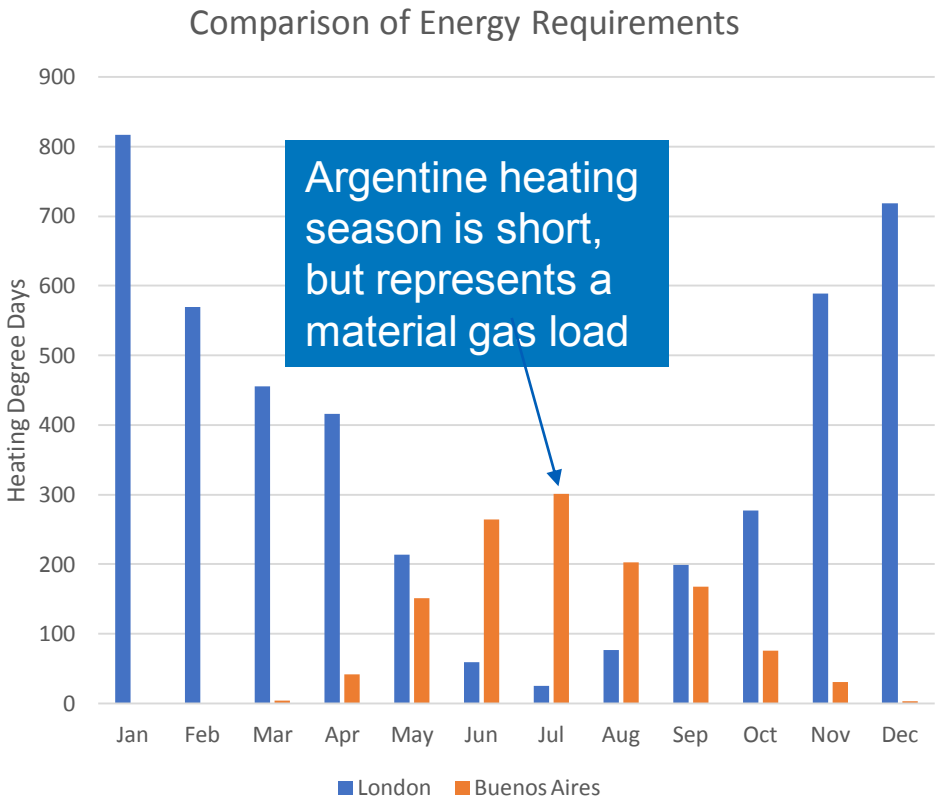
Energy Requirements: London vs. Buenos Aires



- 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?