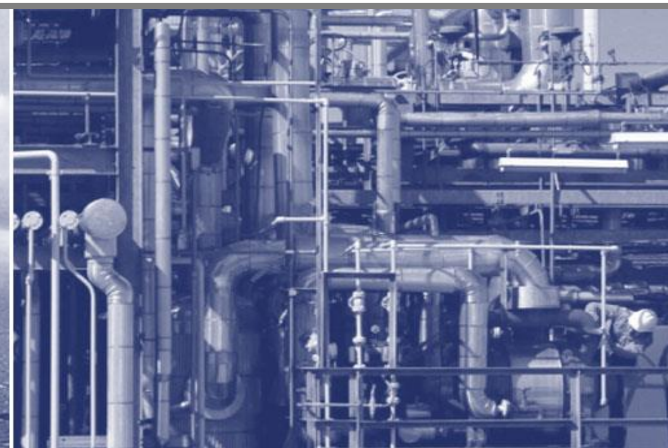
Price and Risk Management in LNG Markets

Energy Trading Risk Summit

POTEN & PARTNERS



Jason Feer

Global Head of Business Intelligence

Poten & Partners

October 24, 2019

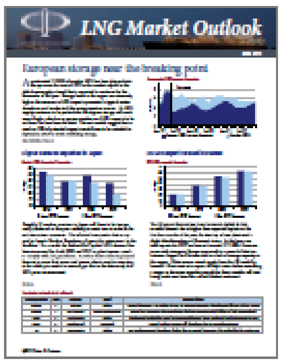
Houston, TX

Poten & Partners: The leader in LNG business services

Insightful market and industry business intelligence, forecasts and data

LNG Market Outlook

Actionable short-term market intelligence



- Country-level forecasts
- Global arbitrage analysis
- Detailed data on future trade flows

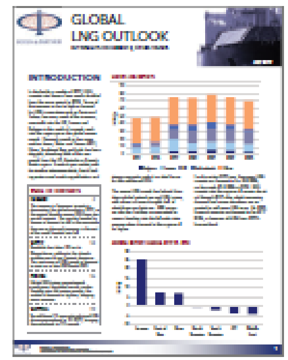
LNG in World Markets

Insight on LNG markets, contracts and projects

- Unrivaled insight on LNG contracts
- Tracking global LNG projects
- Trusted analysis of market and industry trends

Global LNG Outlook

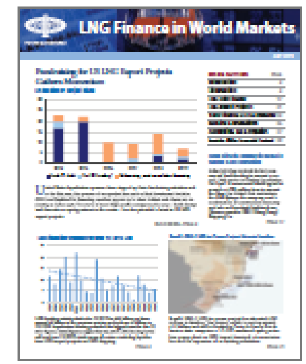
A 10-year price, supply and demand forecast



- 10-year projections
- Bottom-up demand forecasts
- All LNG imports and exporters included
- Special focus on shipping and EPC

LNG Finance in World Markets

Analysis on LNG finance across the value chain



- Annual ranking of LNG lenders
- Detailed analysis of project lending
- Intelligence on project finance structure
- Insight on lending to the shipping sector

Trusted advisors to the LNG industry for more than 40 years

The big picture in LNG markets

- The transition between the legacy point-to-point model and a more commoditized market (like oil) is proving to be rocky
- The market is over supplied and will be for at least a couple of years
- Demand is hard to predict and it appears to be getting harder
- Infrastructure is constrained
- Basis risk and volatility is rising as pricing mechanisms, trade flows change
- Risk management tools are limited, expensive and illiquid
- Markets are sending unreliable price signals
- Structural shifts having an impact on LNG projects
- LNG freight markets are also experiencing significant change and volatility

Building a commoditized market is challenging

- LNG was an elegant and lucrative solution to the problem of stranded gas
  - It took an asset with no value (a lot of gas in the wrong place) and …
  - … produced 10-12% returns, financed with debt and with very little market or other risk
  - Supply was only built after long-term, take-or-pay contracts guaranteed demand
  - Point-to-point structure reduced price competition and allowed for efficient use of infrastructure
  - Oil-linked, long-term contracts facilitated project finance and fit oil companies' business models
  - Buyers were credit worthy end users that generally didn't care about price due to passthroughs

- That model is falling apart
  - Legacy contracts that built the industry are expiring over the next decade
    - Buyers have little interest in renewing them
  - US FOB tons are highly flexible but even DES volumes are becoming more flexible
  - Energy market deregulation means buyers care about the price they pay for fuels
  - Proliferation of pricing mechanisms creates basis risk and volatility and fragments liquidity
  - Spot and short-term markets are growing but are not producing clear, reliable price signals
  - Some new buyers are less credit worthy and less capable

- Today's market is increasingly made from parts that weren't designed to work together

Global market challenges

Supply

- Supply growth is locked in – new projects will run except in extreme cases
- Large project developers building capacity without long-term contracts
- Mechanisms used to manage supply in other markets do not work well in LNG
  - Shut ins, floating storage, third-party storage are not practical in most cases
- Lifters won't cancel cargoes because of mixed market signals
  - European gas markets have signaled that US lifters should take cargoes even as storage has filled and prices have fallen
- Russia won't cut gas supply to keep market share (it wouldn't raise prices anyway)

Demand

- LNG demand remains inelastic
- Some markets that were expected to provide growth (India, Latin America) have not
- Chinese demand growth is slowing
- There is lots of gas in the world
  - New gas discoveries mean some countries (Egypt, Argentina) will export LNG or reduce demand
- Renewables/low carbon economy
  - Emerging economies look to renewables first, then gas
  - Regulators, environmentalists increasingly don't accept gas as a bridging fuel

Global market challenges continued

Infrastructure

- LNG’s elegant infrastructure was not designed for a commoditized market
  - Importers built the storage they needed for their long-term contracts
- Not enough LNG storage capacity to manage seasonal demand swings or take advantage of market structure
- The limited excess storage capacity that exists is not utilized efficiently
- Not enough ships to make floating storage viable
- LNG gear is expensive to build and/or operate

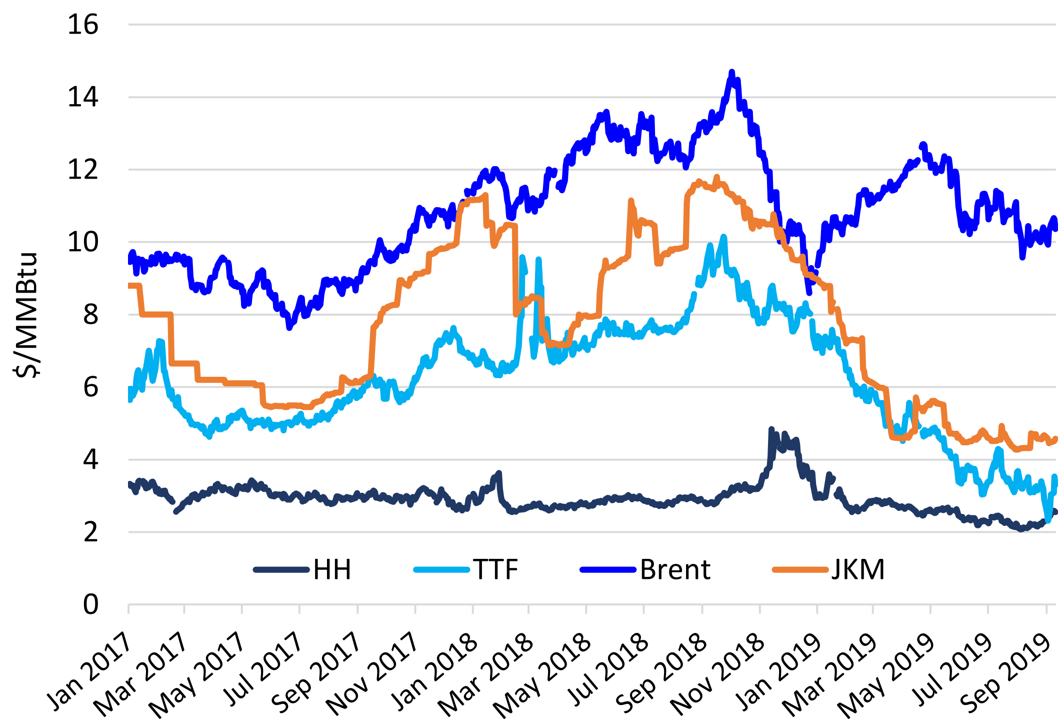
Market

- Market still dominated by rigid commercial structures
  - Fundamental mismatch between oil-linked, long-term contracts and the markets that are developing now
- Disconnected markets have produced unreliable price signals
- Indexation - and accompanying risk-management tools - have been slow to develop
- Diversity of pricing is creating risks
  - Basis risk has become a big problem
  - De-linking of Brent and gas/LNG indices
  - Proliferation of non LNG pricing formulas

Pricing relationships are changing

- LNG and gas pricing likely to continue to delink from oil
  - Gas prices in US may have inverse relationship to oil prices
- LNG prices increasingly set by natural gas and LNG dynamics
  - Oil prices most LNG but spot market is increasingly detached from oil
- These changing relationship are creating new risks that are difficult to manage
  - Few risk management instruments available
  - Markets are illiquid
  - Hedging is expensive

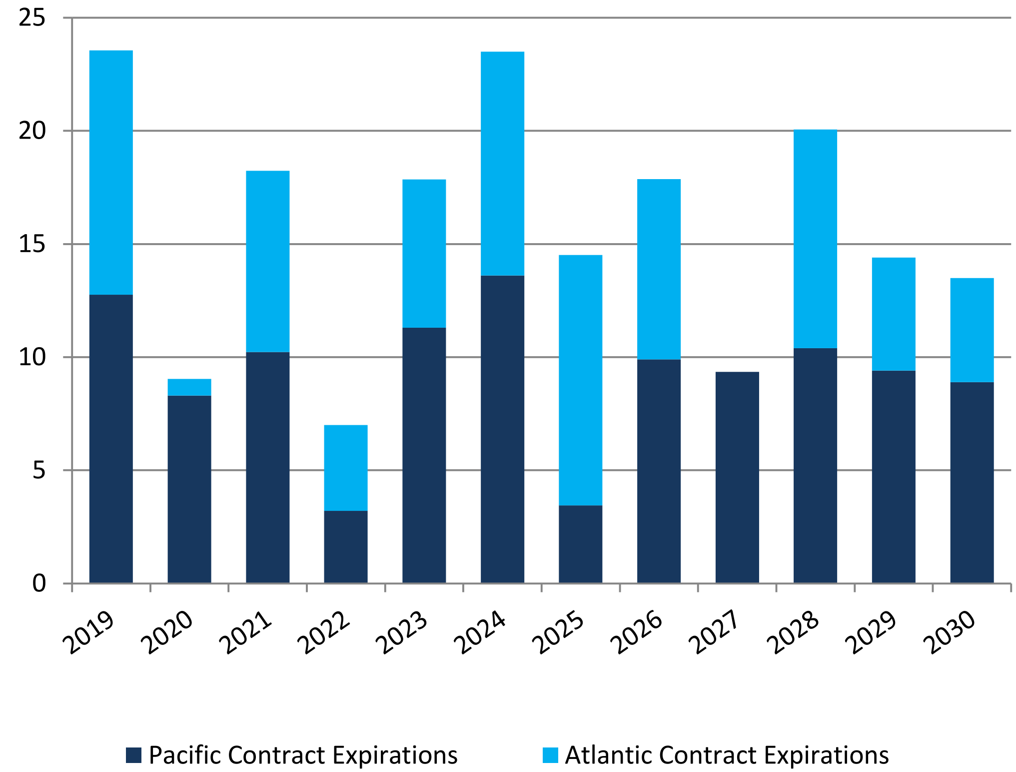
Major LNG and natural gas prices



Contract expirations will drive market change

- 190 MMt/y of contract expirations through 2030
  - Mostly long-term supply
  - About 55% of expirations in Asia-Pacific and Middle East, rest in the Atlantic
- This will result in a fundamental reordering of the LNG market
  - Many contracts will be replaced by more flexible, shorter, smaller volume deals
  - Buyers will enter markets more frequently, and may be sellers occasionally
  - Traders, aggregators and producers will all be more active participants in the markets
  - Producers will have to be highly competitive to secure long-term commitments

Global contract expirations (MMty)

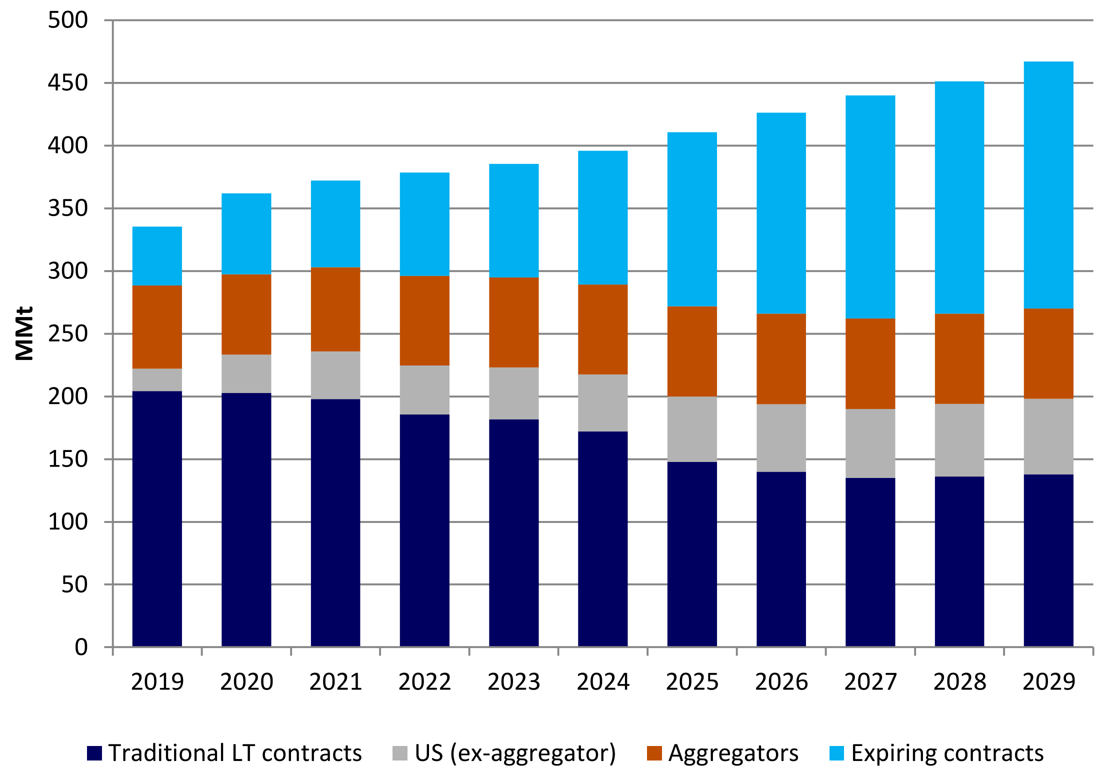


Source: Poten & Partners' Global LNG Outlook

LNG market structure is changing

- More LNG supply will be available for sale under terms other than traditional long-term contracts
- Aggregator and US volumes are sold initially under long-term contract but will be resold
- By 2029, as much as 70% of global LNG could be available for sale under more flexible terms

Evolution of LNG market structure

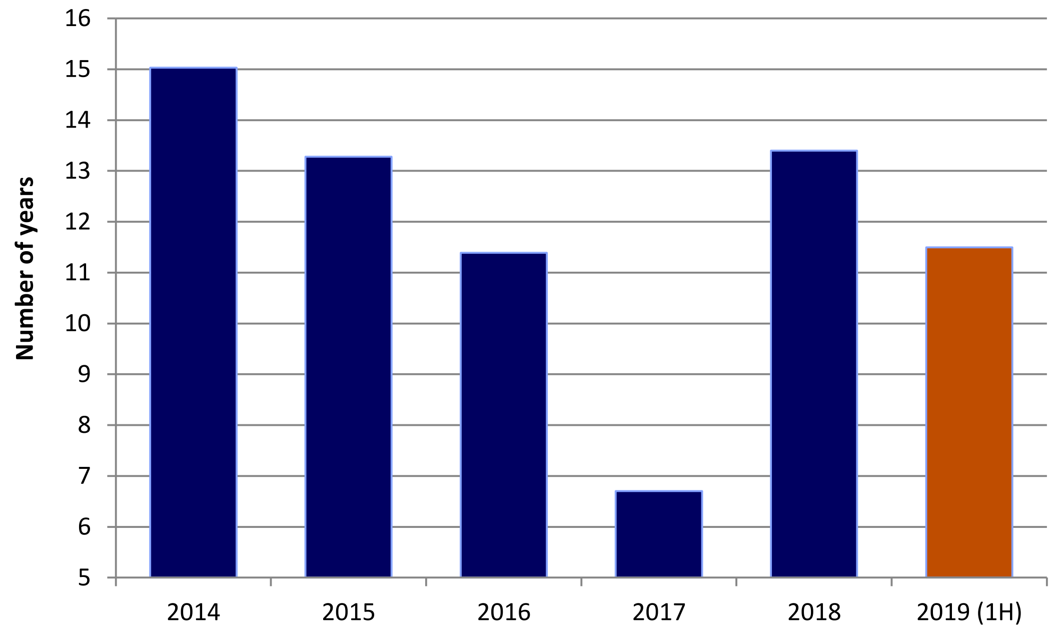


Source: Poten & Partners' Global LNG Outlook

Some long-term contracts in 2019 …

- Long-term contracts with projects (VG, Moz) kept average up, but lower than 2018
- Average in 2018 affected by large surge in contracts with sponsors of new projects
  - 15 contracts for 22 MMt signed with new projects
    - There was one for 1 MMt in 2017
    - Signals buyers are choosing winners among projects
  - Average length of contracts with new projects is 18 years
- Long-term contracts are still required by project sponsors needing financing

Average term of signed SPAs (longer than two years)



Source: Poten & Partners' LNG in World Markets

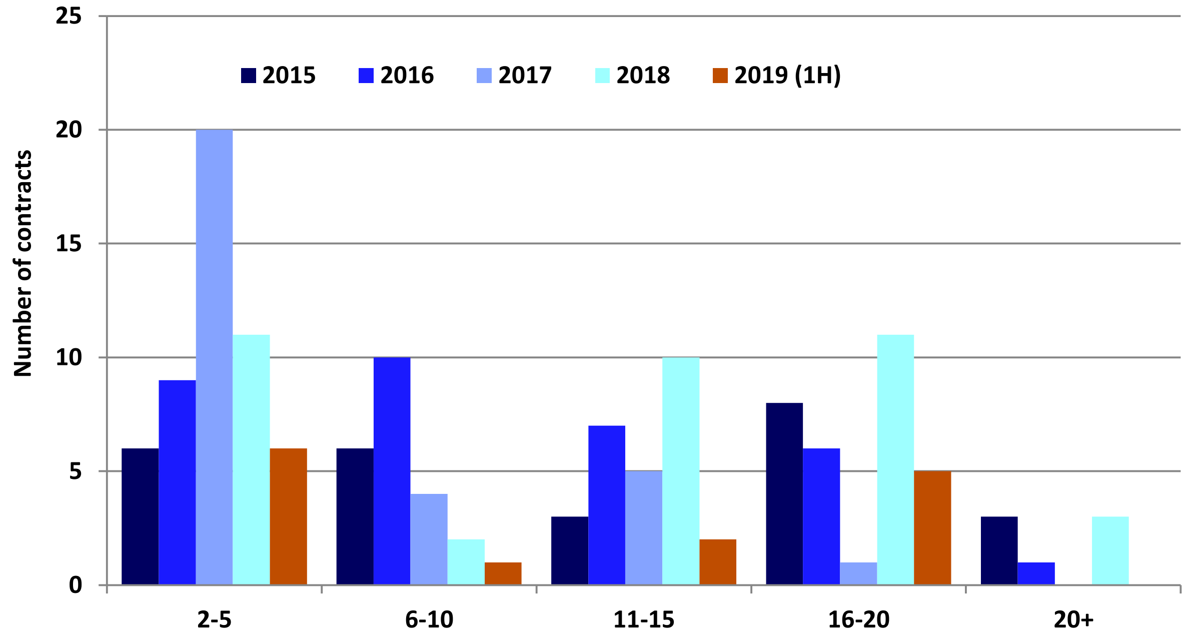
… But shorter contracts remain popular

- Contracts of 2-5 years remain popular, especially as end users build more diverse supply portfolios

- Mid-term contracts continued to lose ground
    - Pricing is not advantaged
    - Most buyers either want short-term or long-term

- Deals of 10-15 years seen as long-term
    - Banks willing to live with a portfolio length of 15 years

Duration of signed SPAs over time



Source: Poten & Partners' LNG in World Markets

Multi-tiered market is a big structural challenge

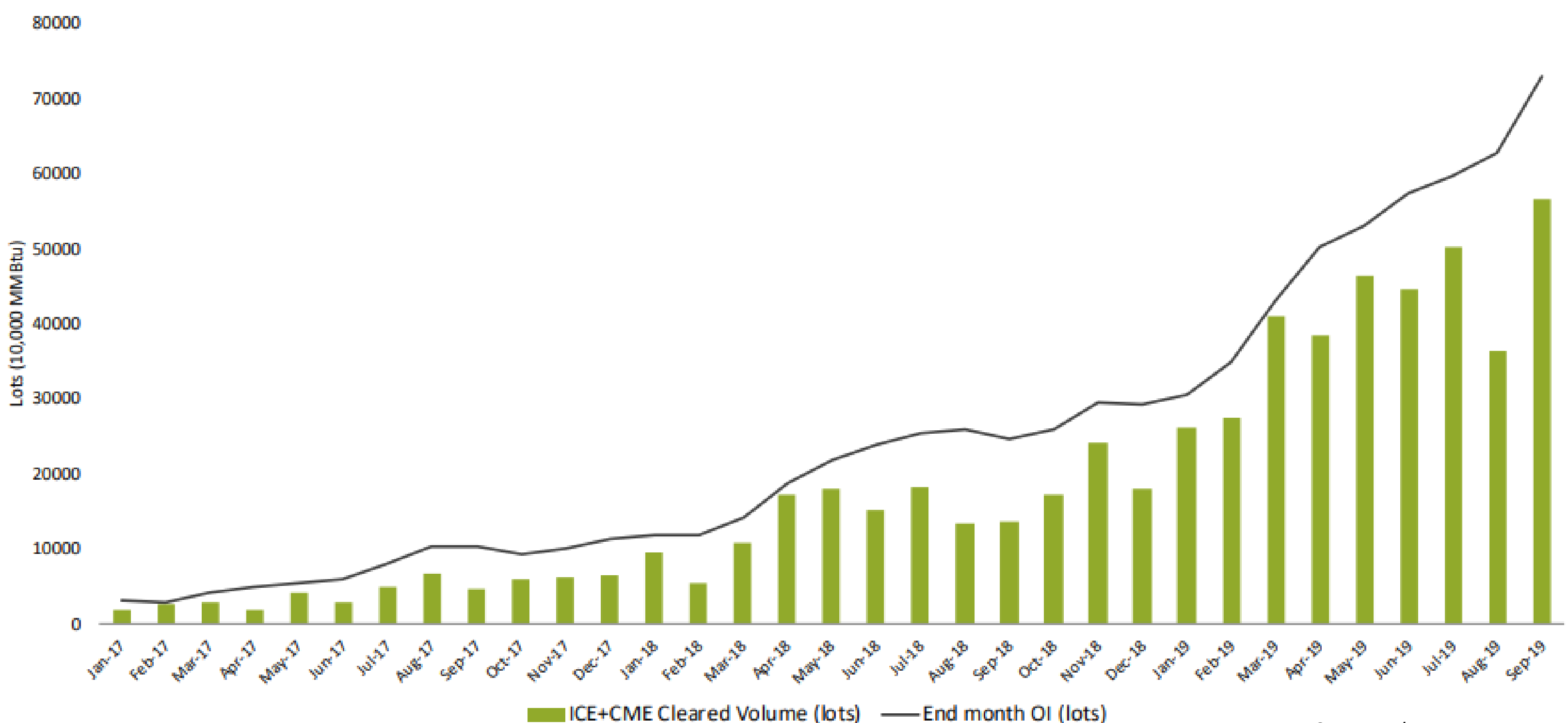
- Large volumes sold under legacy Brent and JCC contracts are inflexible
  - Legacy contracts are not market responsive. No ability to keep them in line with market
  - Will compete against newer, lower slope oil-related contracts
  - Also will compete against indexed, fixed-price and gas-linked spot and term supplies
  - Brent is favored now because traders, majors prefer it for ease of risk management
    - But it is facing a very uncertain future

- Why is this a problem?
  - Some end users and traders have walked on expensive commodity contracts in the past
    - Asian coal, iron ore and LPG have all seen this
    - Undermines faith in markets, heightens counterparty risk
    - Strains business relationships, can result in expensive and time-consuming arbitration and litigation
  - A large percentage of liquidity is removed from actively traded market

- Financial markets have solutions
  - Contracts for differentials (CFDs) and other instrument can be used to lock in spreads
  - In other markets (Asian LPG) swaps markets exist that manage spread between market prices and official selling prices
  - Better pricing (i.e. indexation) needed to develop these tools

LNG financial instruments gaining liquidity

JKM futures trade and open interest volumes



Source: Platts

- A lot of the growth is from financial players, not naturals with physical exposure
- US Gulf Coast LNG futures contract has not traded and is not based on actual deals

Concerns about pricing

- LNG pricing is very fragmented
  - Too many pricing mechanisms
  - Difficult and expensive to manage basis risk between markets
  - Most LNG priced off of other markets with different fundamentals

- Fragmented pricing creates basis risk
  - There is no natural connection between Henry Hub and crude
    - There may actually be an inverse relationship
  - Buying on a Brent basis and selling on some other basis is risky

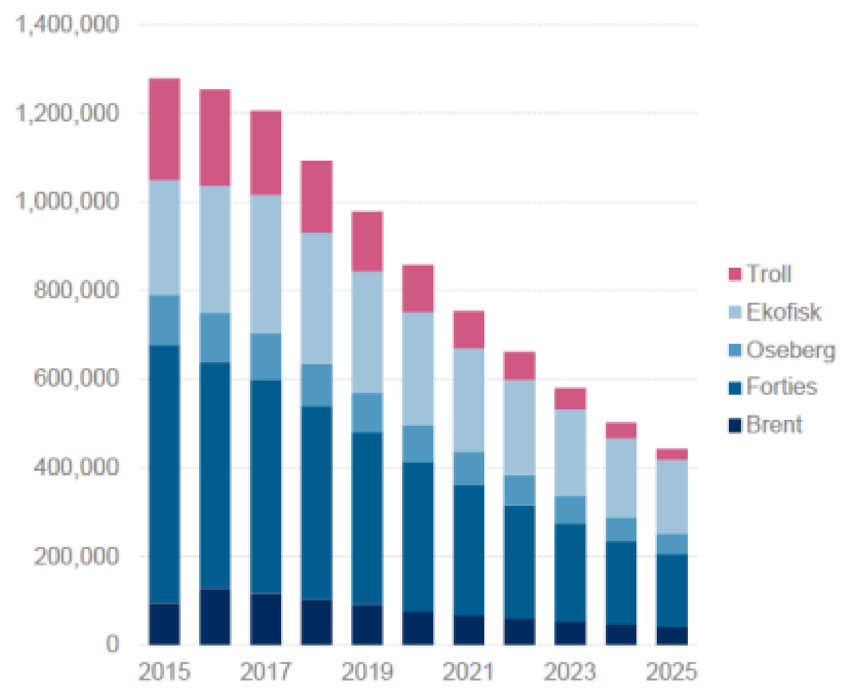
- Alternatives have yet to gain critical mass
  - JKM is closest the world has to a global LNG price
  - No widely accepted Atlantic LNG or Middle East LNG price

- Brent is a problematic benchmark

Beware of Brent!

- It isn't really Brent anymore
  - Five grades make up 'Brent' today
  - Lowest price each day sets the price
  - Almost always Forties because it is heavier and more sour
- N. Sea production is falling
  - Output to fall to less than one cargo a day (600,000 b/d) by 2022 or 2023
- Platts is working furiously to save it
  - Has added four fields into the N Sea price assessment process
  - Adopted partials trading
  - Is including CIF Rotterdam cargoes
- It is looking at adding US and W. African crudes to price discovery
  - This could inject volatility, new risks

Output of Dated Brent basket (b/d)



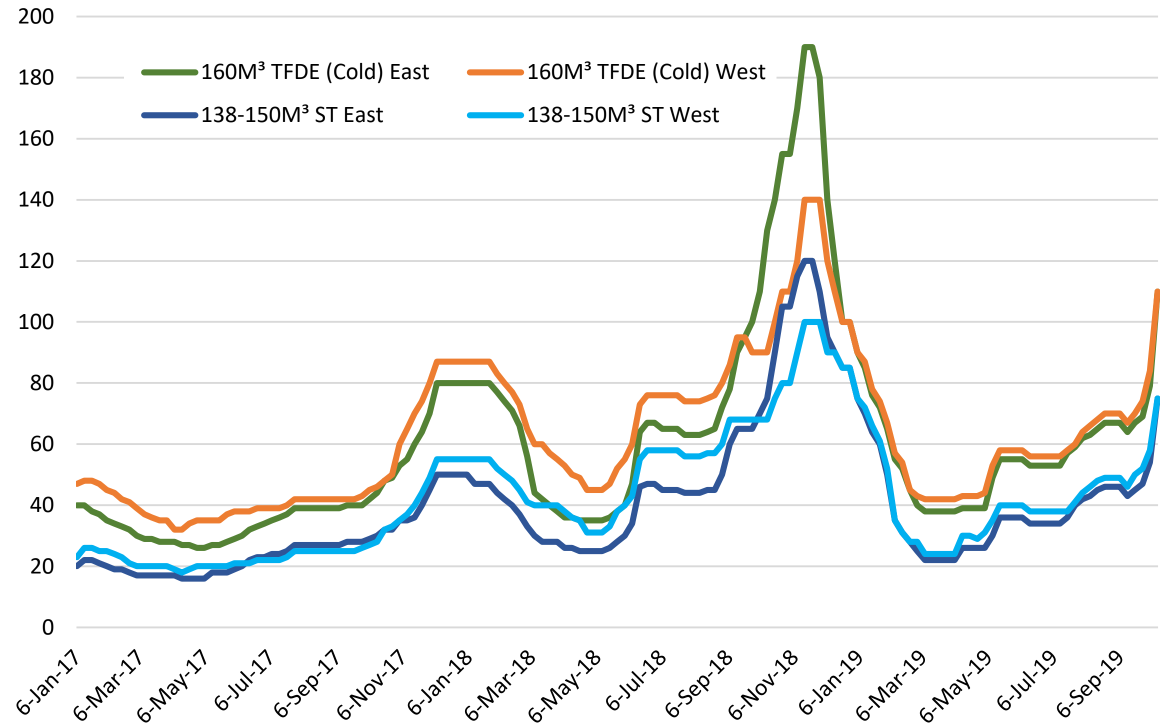
Source: Platts

LNG Shipping

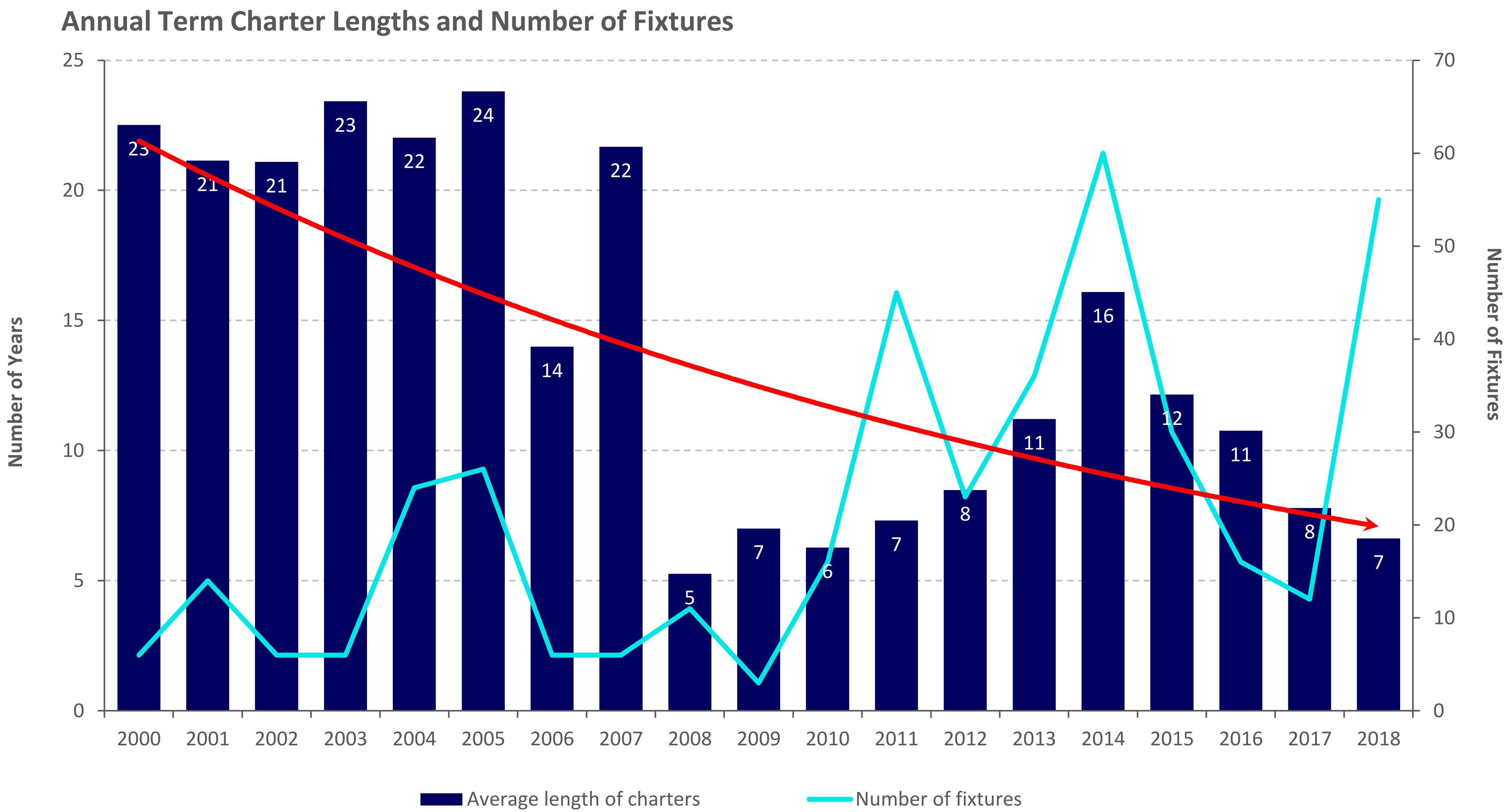
Volatility in freight rates is rising

- Surplus of vessels disappeared last winter as traders and Chinese buyers took positions
- At height of 2018-2019 spike, there were only a couple of vessels available
- History is repeating itself
  - Physical build up of product at sea is pushing rates up, reducing availability
  - Vessel availability is already very low heading into winter

LNGC day rates (1,000US$/d)



Structural change in freight as charter lengths fall



Note: Statistics are annual averages of fixture durations greater than 1 year and exclude vessels < 65,000 m^3, FLNG, FSRUs, FSUs,

Takeaways

- Transition from highly structured, legacy market to a more commoditized market will have impacts for years to come
- Contract expirations, growth of US supply and expanded role of aggregators is changing the structure of LNG market
- Basis risk and volatility is rising as pricing mechanisms proliferate and trade flows change
- Current pricing mechanisms and risk management tools are not up to the job
- Markets will continue to send unreliable price signals until they gain more liquidity and transparency
- LNG infrastructure constraints – including shipping - will hinder market development until more capacity is built and existing infrastructure is utilized more fully

CONSULTING | REPORTS & PUBLICATIONS | ONLINE SERVICES

SHIP BROKERAGE | COMMODITY BROKERAGE | PROJECT DEVELOPMENT | CAPITAL SERVICES

Thank You

HOUSTON | NEW YORK | LONDON | ATHENS | SINGAPORE | GUANGZHOU | PERTH

Poten & Partners

Business Intelligence	US Sales	EMEA Sales	Asia Pacific Sales	Consulting
Contact: Jason Feer	Contact: Tiara Reyes	Contact: Michael Walter	Contact: Ashrafe Hanifar	Contact: Steve Thompson
Email: jfeer@poten.com	Email: treyes@poten.com	Email: mwalter@poten.com	Email: ahanifar@poten.com	Email: sthompson@poten.com
Tel: +1 713 344 2367	Tel: +1 713 263-3408	Tel: +44 20 3747 4834	Tel: +65 6922 7208	Tel: +1 713 263 3386