

LNG Markets in Transition The Great reconfiguration

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The authors

- OIES and KAPSARC brought together international experts from the industry and academia to create this book



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Looking back at the past 2 years

- Mid 2014: we started thinking about the LNG book
 - ‘Only’ 100 mtpa under construction, including 1 US project
 - Asia still considered as the bottomless premium market for LNG
 - Oil prices at ~\$100/bbl
 - Many planned projects ready to take FID

How is the LNG business going to be affected by these changes?

- May 2016: we finalize the book
 - 150 mtpa to come over 2015-20 (64 mtpa in the US)
 - Asian LNG demand growth uncertain (down by 2 percent in 2015), buyers in search of flexibility
 - Sellers looking at new markets
 - Oil prices at around \$40-50/bbl, gas spot prices at ~\$4-6/MMBtu
 - Who will take FID?

Towards a reconfiguration?



Moving away from the “cosy” club

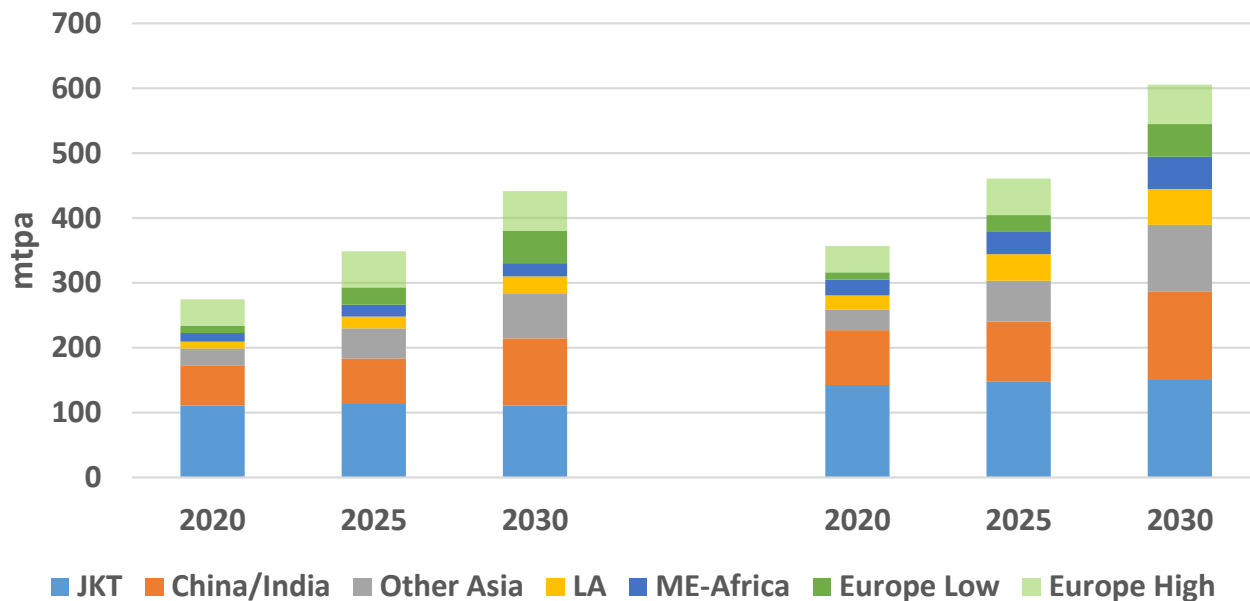


- Multiplication and diversification of players in the liquefaction, shipping and regasification businesses
- Aggregators are increasing their role, buyers are going upstream, traders want to participate, and new entrants to take market shares (even in Asia)
- More companies alliances on the buyer side



Where is LNG demand heading?

Regional LNG demand outlooks

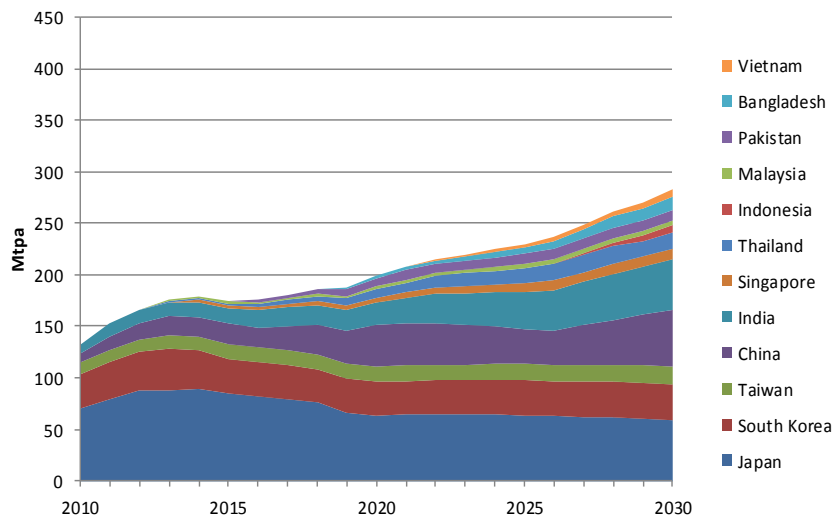


- Considerable regional uncertainty
- Europe will play a balancing role, absorbing unwanted volumes in the low demand case and letting LNG go to other markets in the high demand case
- Potential upside in the transport sector

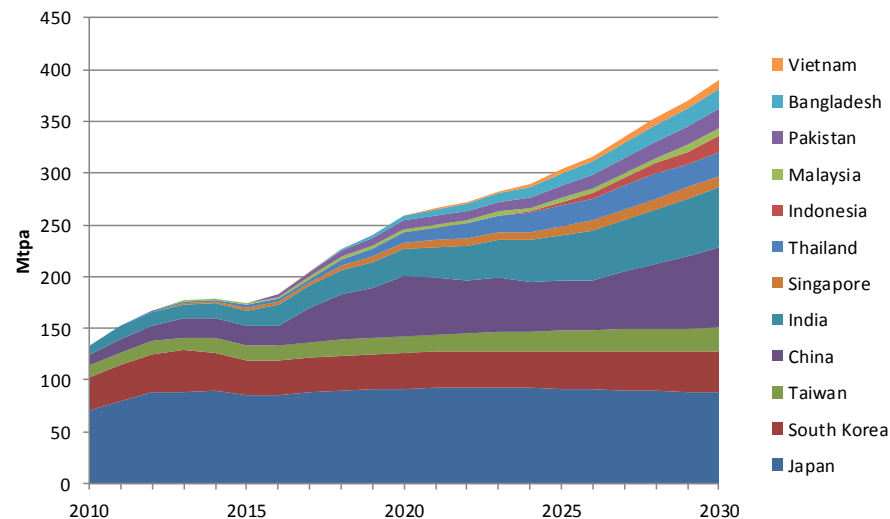


Focus on Asian LNG demand

Low case



High case



- Asia will remain the largest LNG importing region
- Evolution of domestic production, policies on nuclear, coal and renewables and levels of domestic gas prices can result in very different outlooks for Asian countries



Mature Asian markets

Japan:

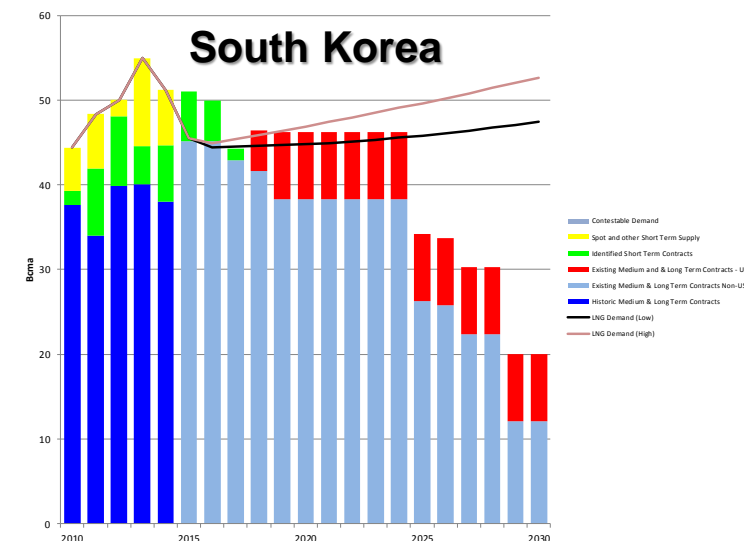
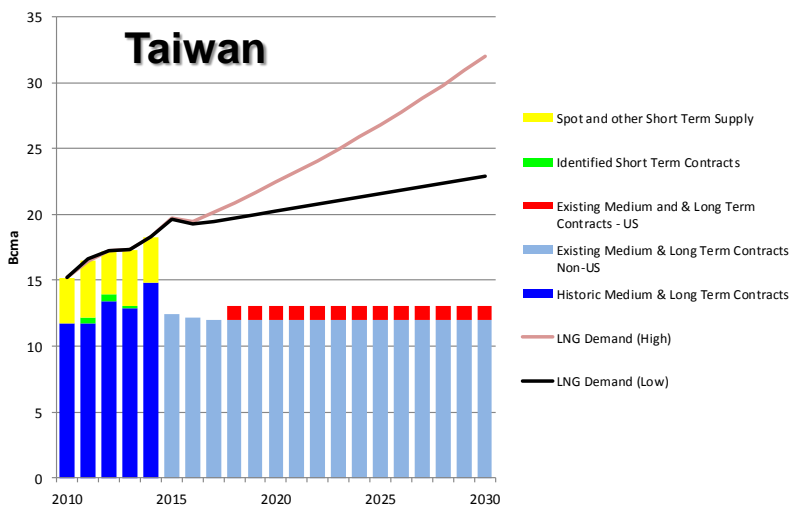
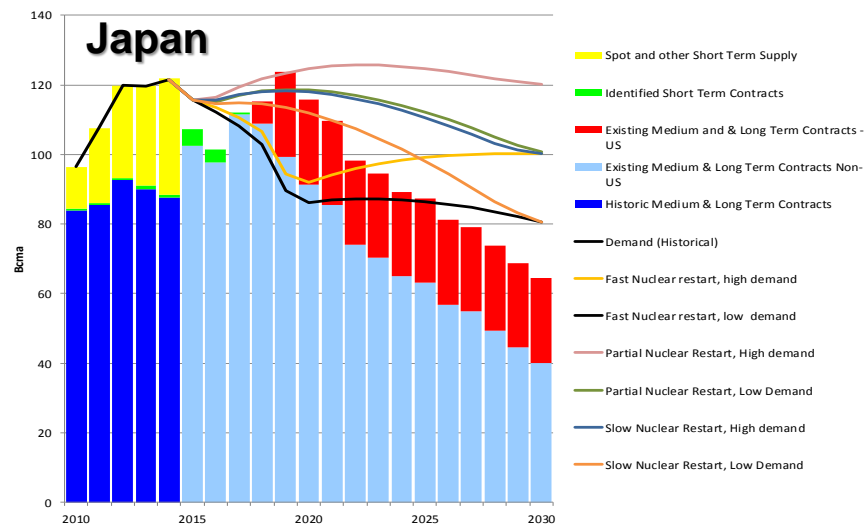
- Huge uncertainty range driven by a) pace and extent of nuclear re-start and b) achievement of energy efficiency policy.

South Korea:

- Future LNG demand growth muted by government policy to limit LNG in power sector, hoping to offset coal GHG's by renewables and nuclear.

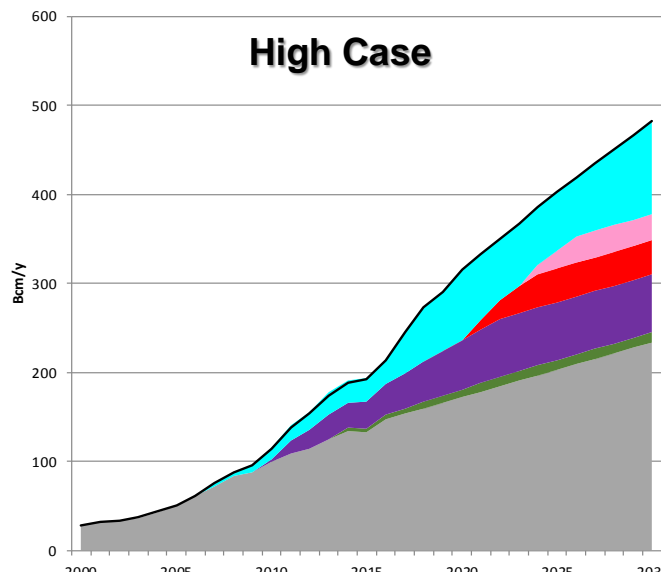
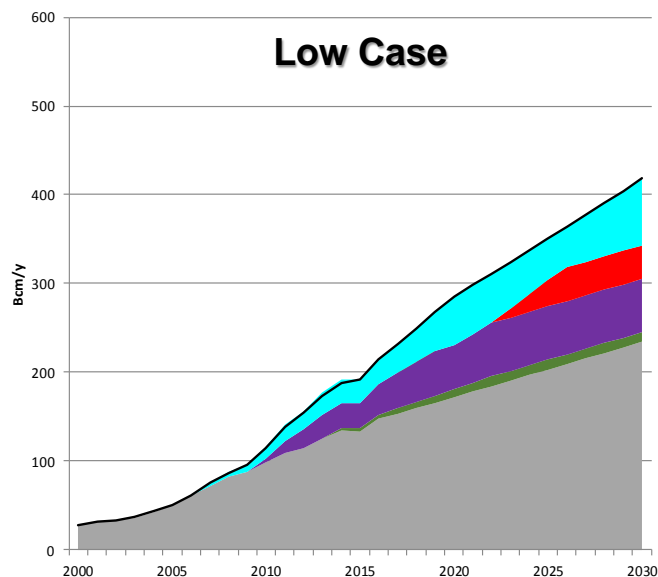
Taiwan:

- LNG the beneficiary of government commitment to phase out nuclear in the 2020s while containing growth of coal.
- Future power demand growth also a large uncertainty.



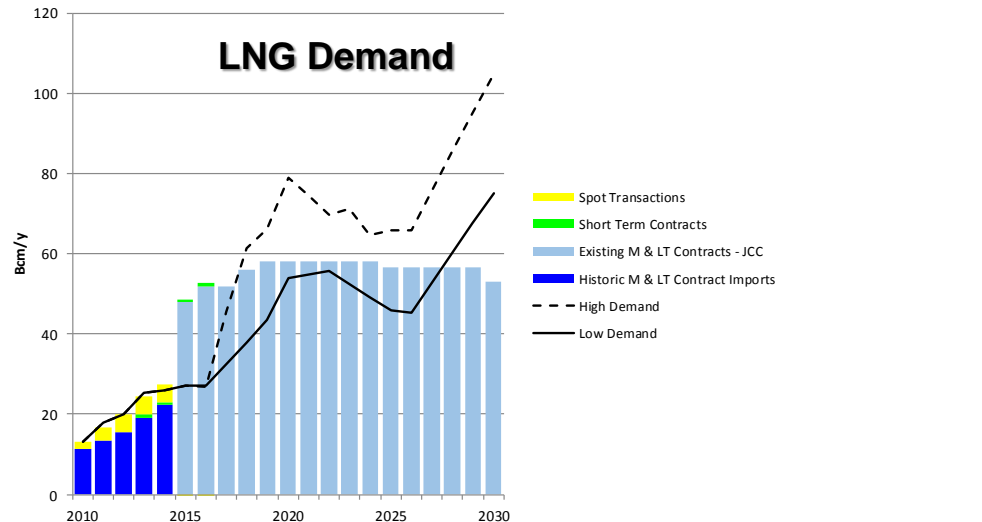


China



China:

- Gas demand growth subject to:
 - Changed patterns in the 'New Normal'.
 - Success of policy to displace coal with gas in power generation, space heating in Industry – 100 bcma in 5 years ?
- Growth of domestic production dependent on shale gas success.
- Scale of Central Asian imports expandable and timing and number of Russian pipeline projects uncertain.
- LNG imports therefore lie in a wide range: 75 to 105 bcma by 2030.





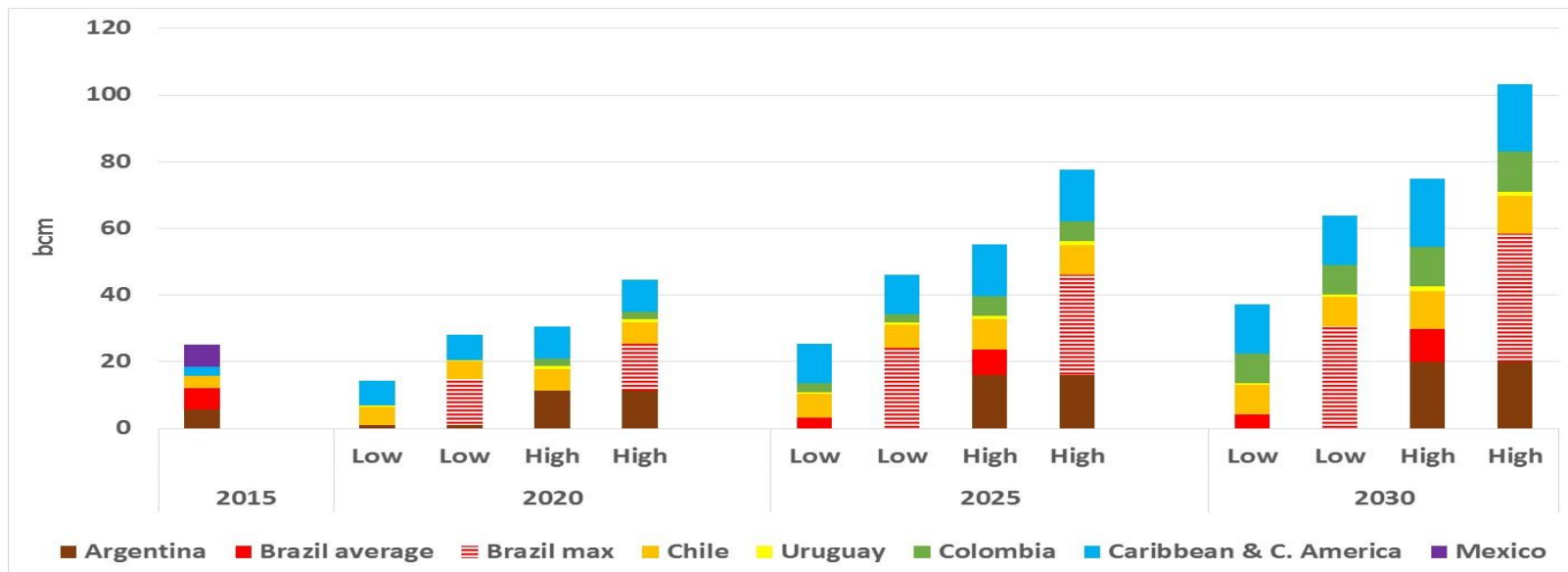
The role of LNG in Europe

- Europe is acting as the swing market for LNG: the region is expected to help absorb the LNG surplus coming to the market in the second half of the 2010s and early 2020s
- But the region is facing major uncertainties:
 - The future role of natural gas in the whole energy system is in question, primarily as a result of greater governmental support for renewables
 - The region will face a decline of its indigenous (conventional) production. Increasing unconventional gas and biogas production will have little impact on the decline.
- Despite low demand growth, declining indigenous production means that Europe will have to increase its gas imports, but how much and from which sources is unclear
 - In 2015, most of the gas imported arrived in the form of pipeline gas (88% of total demand) with a predominant role of Russia (33% of total demand), the main competitor to LNG

“Europe” = EU28 + Albania, Bosnia and Herzegovina, Macedonia, Norway, Serbia, Switzerland, and Turkey



Latin America: substantial potential for additional LNG imports



- Energy demand (and in particular power demand) is growing
- The development of local resources is taking more time than expected
- Natural gas has a role to play as a clean and efficient complementary source of firm energy to hydropower and intermittent renewable sources, but flexibility of supply will be an important element
- In 2030, the region is expected to need 37-103 bcm of LNG (including a great variability of LNG demand in Brazil)



Middle East and Africa: more than a niche market?

- Currently a very small market representing 10 mtpa
- Both regions are overall exporters, but intraregional pipeline trade has proven difficult to put in place or expand
- Middle East
 - Many countries facing gas shortages struggle to develop new generation of gas fields
 - Currently four countries importing, more looking at LNG imports
 - Most ME countries have low – but increasing – wholesale gas prices
- Africa
 - Egypt started importing in 2015, but scale and duration highly depends on future domestic production
 - At least 8 other countries are looking at importing LNG for variable durations
 - Most of them opt for FSRUs (except for Morocco)
 - Many issues related to financing, need to provide regulatory certainty to prospective sellers, affordability and payment issues



Prospects for LNG use in transport

- Low oil prices make the financial case harder
- The environmental case is primarily driven by legislation.
- The benefits from reduced GHGs are less than other emissions though methane slip can be reduced/eliminated through technical enhancements
- Initial prospects are stronger in marine than in road apart from China
 - Already established for LNG tankers
 - Greater scale (1 ferry \cong 1,300 buses)
 - Legislation in place
 - “LNG ready” a no regrets step for some new build
 - Easier to establish refuelling facilities
 - Norway has demonstrated what is possible
- Could be a significant market by 2030



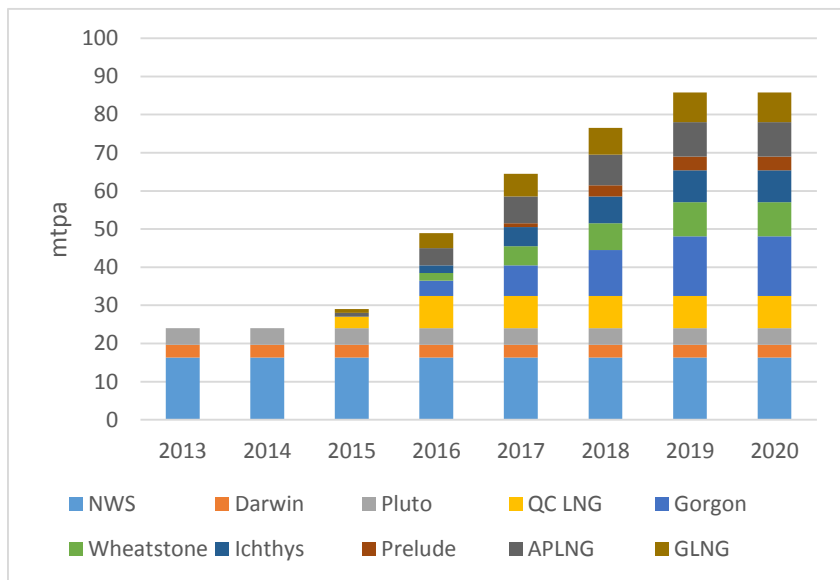
Who will provide new LNG supply?

- Well documented upsurge in output underway (+150 mtpa)
- Some declines in existing producers
- Qatar a continuing constant
- Economics of new projects very challenged – will there be new FIDs in the US, Australia, Russia, East Africa before 2020?
- Canada has missed the short-term window – no output until well into 2020s
- Opportunities for new producers are politically as well as commercially difficult
- Portfolio aggregation can help to support some projects
- Brownfield expansion in politically stable areas the most likely source of new LNG post 2020

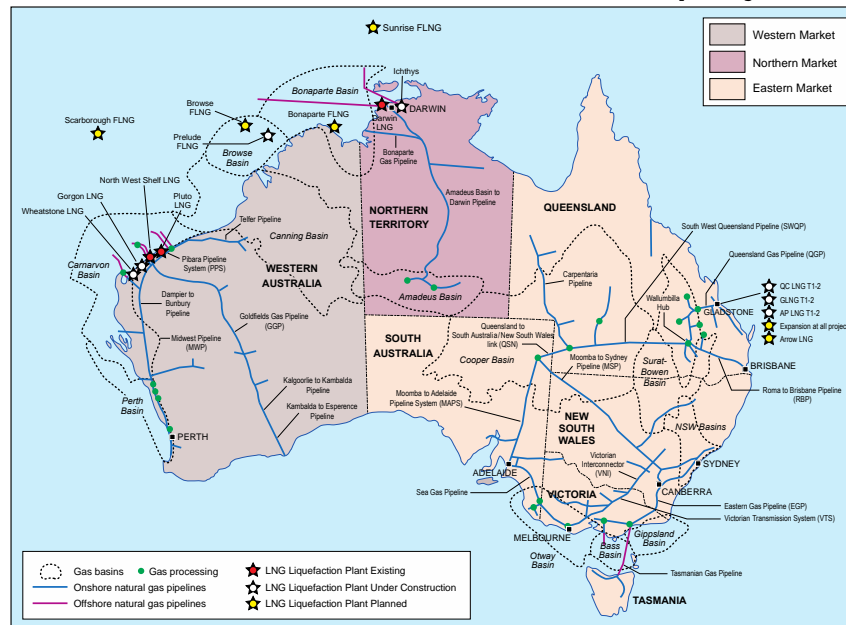


Australia LNG

Outlook for Australian LNG



Location of Australian LNG projects



- Australia ramp up well under way, despite low prices
- Some delays, but set to overtake Qatar by 2019
- Cash costs low, especially in Asia

- Potential for new projects very limited, despite falling costs
- Some brownfield expansion possible in 2020s
- An extra 20 mtpa of capacity by 2025?



North American LNG

Summary of North American LNG projects

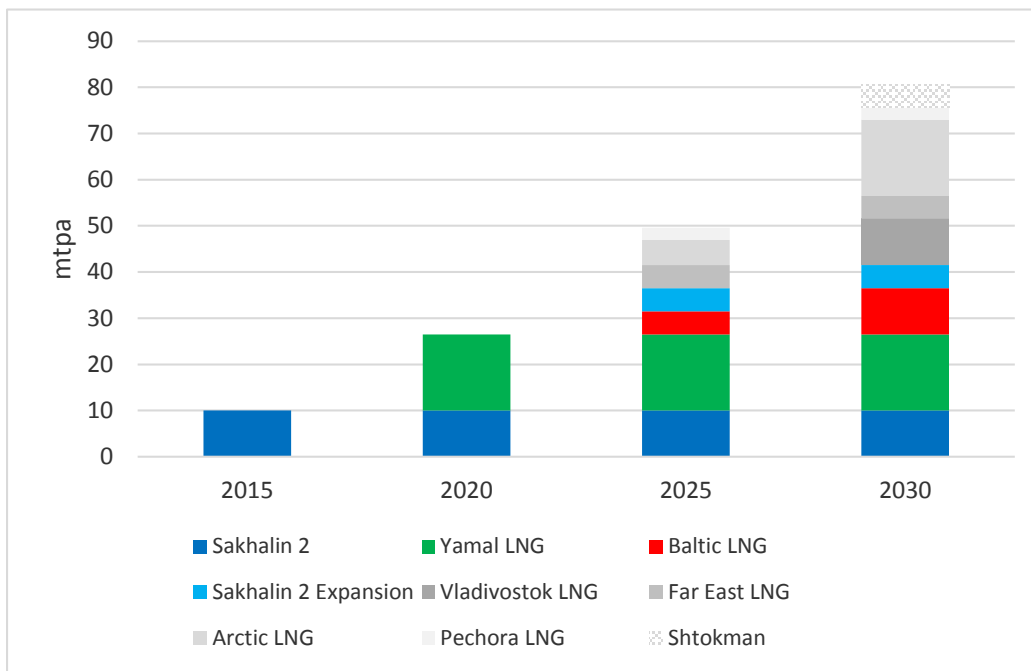
Region	Total number of projects	Total capacity Including under construction (mtpa)	Number of projects under construction	Capacity (mtpa)
United States				
US Gulf and East Coasts	35	364	5	64
Oregon	2	16.6	0	0
Alaska	1	18	0	0
Canada				
British Columbia	18	301	0	0
Eastern Canada	5	52	0	0

- US project output ramping up towards end of decade, but impact being felt in global LNG market
- Is there any incentive for new project development, or could current projects default?
- Will there be any Canadian LNG projects within the next decade?



Russian LNG

Outlook for Russian LNG

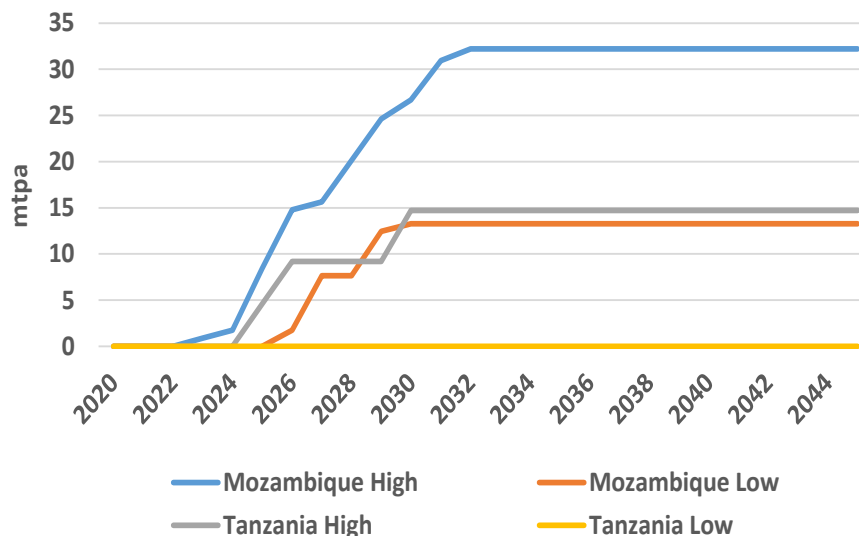


- Yamal LNG to start up in 2017, fully online by 2020
- Sakhalin 2 expansion logical but (politically difficult so) and not before 2021
- Baltic LNG – 5-10 mt or a limited project for bunker market and Kaliningrad?
- Other projects significantly delayed



Eastern Africa LNG

Scenarios for Eastern Africa LNG developments



- Prospects for Eastern Africa undermined by low prices
- Regulatory, legislative and fiscal issues also major hurdles
- Tanzania could fail altogether
- Mozambique reserves very large, but timing of output in doubt



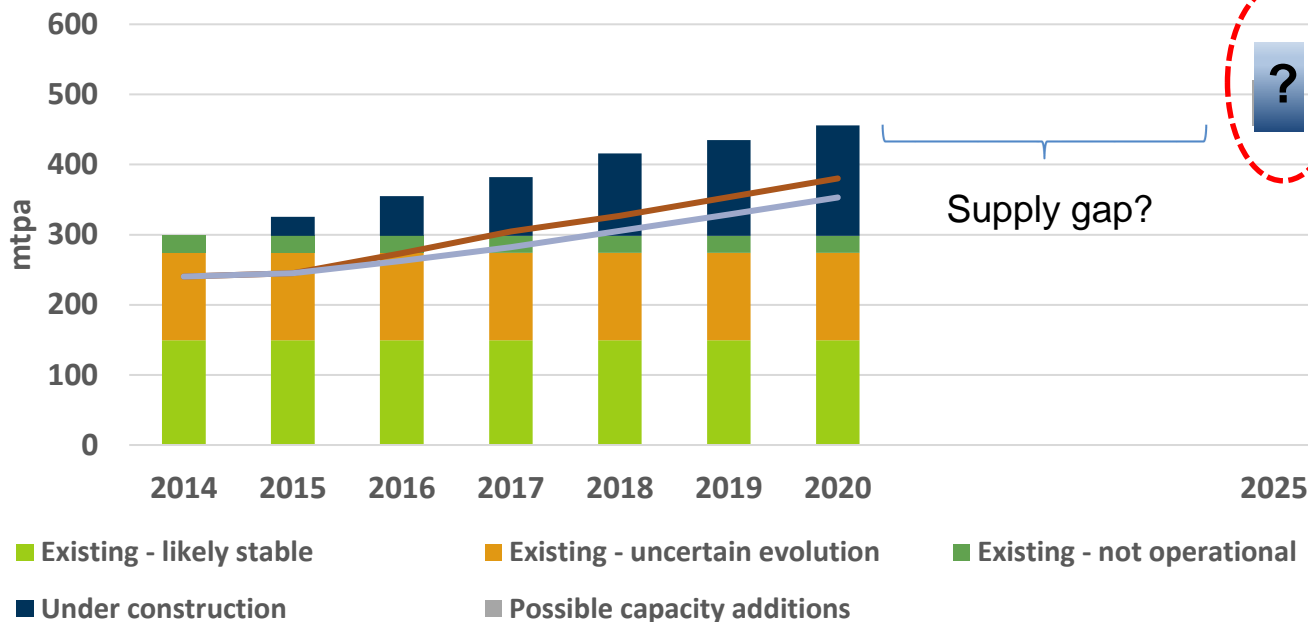
Prospects for FLNG

- Prospects
 - In addition to 7 in construction - 17 mtpa
 - 17 in study phase – 56 mtpa
 - If 50% of these proceed then 45 mtpa
 - 18% of 245 mtpa global production in 2015 – significant market share
- Outlook
 - First FLNG in production late 2016
 - More in construction – some on speculative basis – new builds and conversions
 - Option to lease reducing capital outlay
 - Opportunity to deliver lower cost plants (similar to US Gulf Coast) to high cost areas e.g. Australia, Eastern Africa, Canada in under 3 years – enabling earlier and higher revenue stream
 - More major offshore leasing companies looking to enter the market increasing competition



When will markets rebalance?

LNG supply and capacity outlook



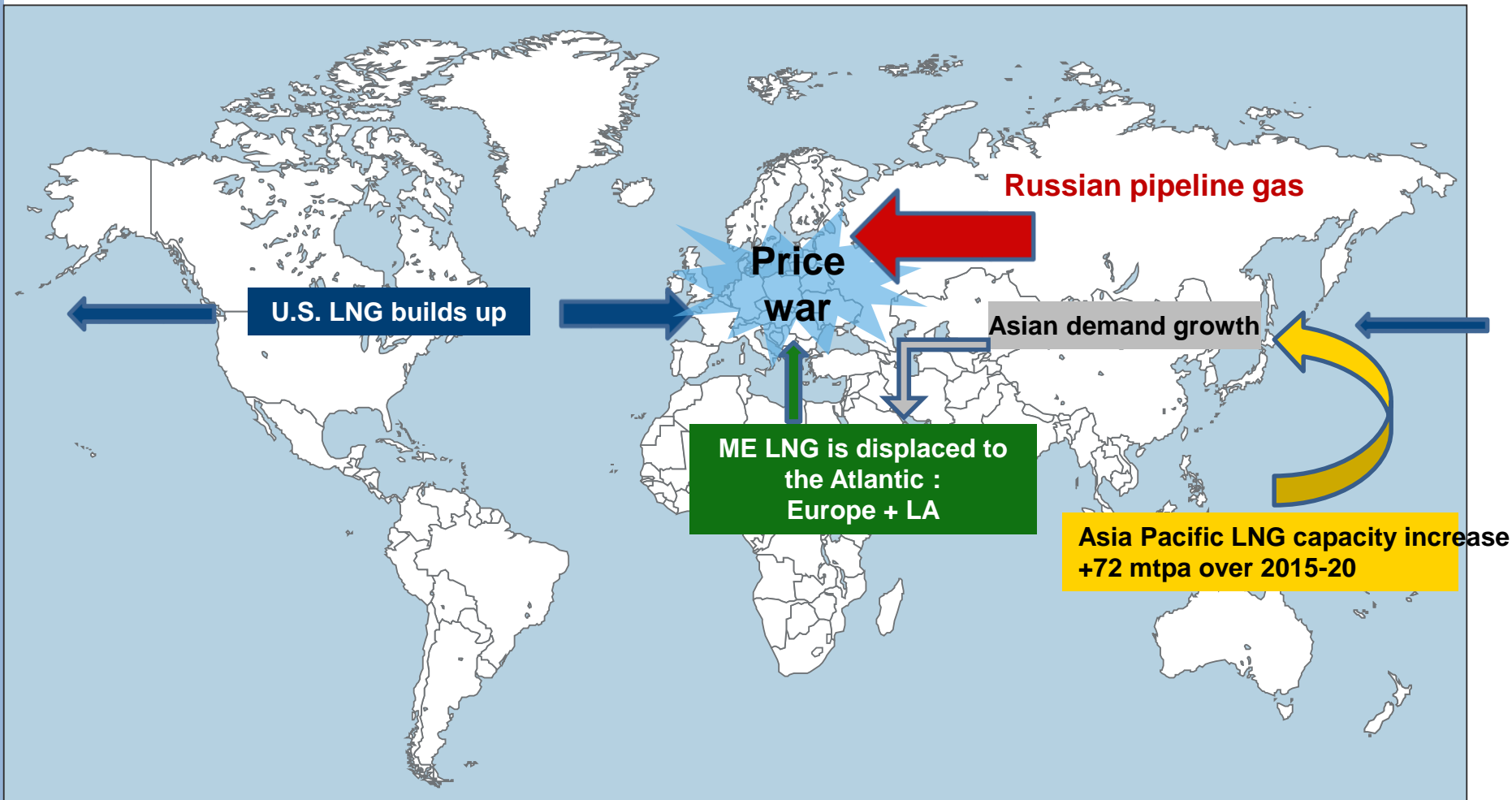
1000 mtpa planned
 North America
 Russia
 Eastern Africa
 Qatar
 Others

Supply gap?

- Project sponsors will take FID depending on their views on the timing of market rebalancing, future prices and cost reduction



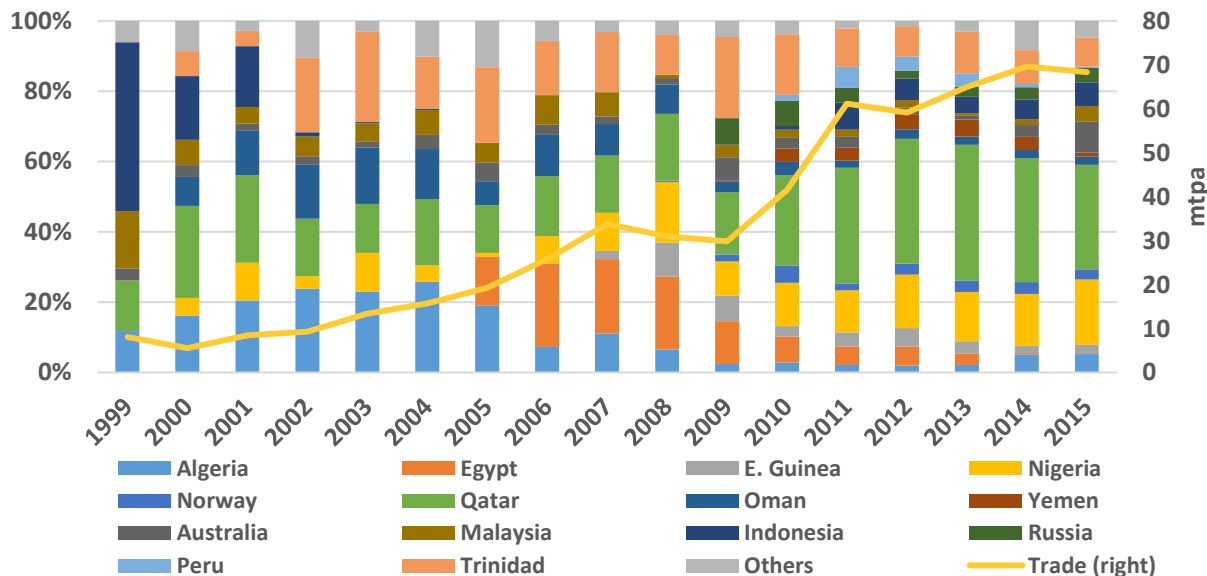
Price war in Europe?





The evolution of spot and short-term LNG trade

Spot and short-term LNG trade, 1999-2015



- Drivers behind the growth of spot and short-term LNG trade
 - Supply side developments (uncommitted LNG capacity, ramp-up volumes, volumes redirected and portfolio LNG)
 - Demand side developments (demand shocks, creation of liquid hubs, TPA to infrastructure, end of final destination clauses (Europe) and change in the nature of buyers)



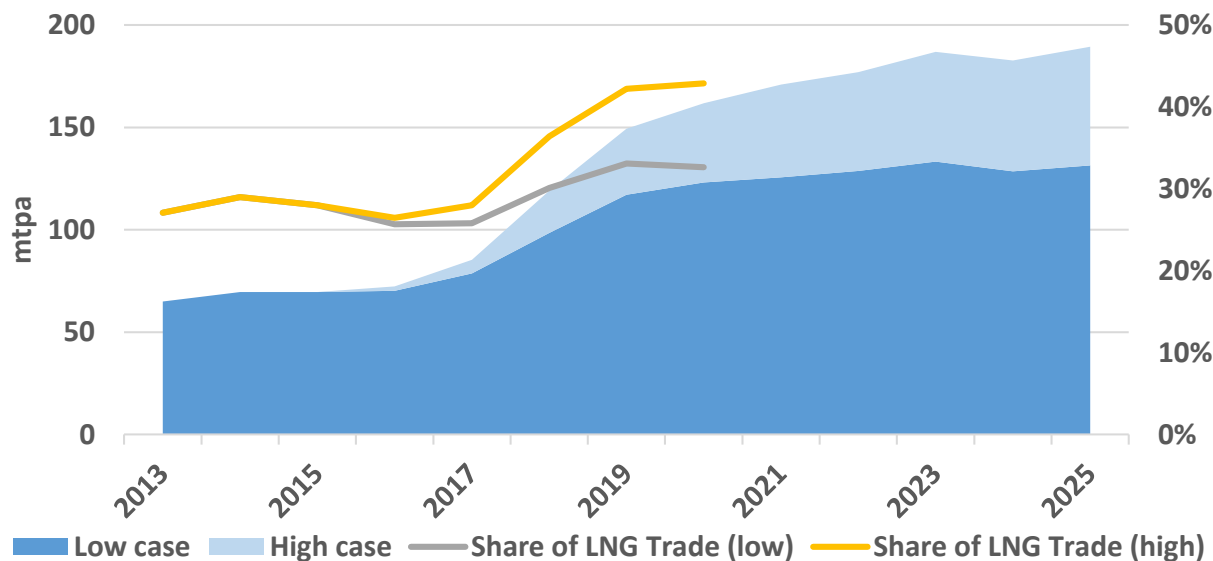
The buyers' dilemma

- Future gas demand over the next 10-20 years is uncertain
 - Economic growth
 - Competitiveness of gas against coal
 - Development of renewables and
 - Evolution of nuclear policy
- Liberalisation processes in Asia means higher competition on the markets
- Difficulties to pass through LNG costs to end-users in periods of high(er) prices
- **How to commit for 20 years?**



Towards 43% of total LNG trade by 2020

Evolution of spot and short-term LNG trade

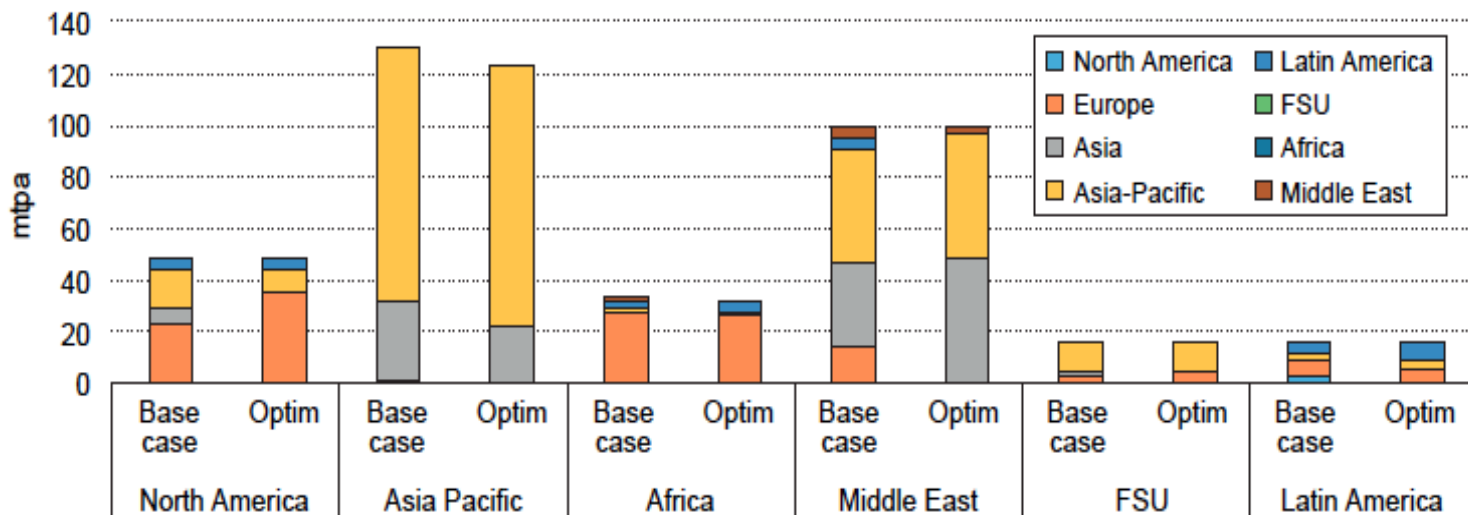


- Further growth of spot and short-term LNG trade will be supported by uncommitted LNG, limited contracts extension and renegotiation at lower volumes, portfolio LNG and the role of Qatar and US LNG
- Potentially some upside in the short term depending on ramp-up volumes



Tackling a \$2bn/y inefficiency

Optimising shipping



- If we were to optimize shipping based on the shortest route, we could save \$2bn/y
- Unrealistic? Margins are low! It is time for collaboration...



Implications for long-term contracts

- Existing LT contracts:
 - Increased pressure on price and flexibility terms
 - This could be exacerbated by discontinuity between term and spot prices, financial distress of buyers
- LT contracts supporting new LNG plants:
 - Moving without the support of LT contracts seems a bridge too far at this stage
 - For that to happen, we would need
 - Spot LNG trade to become the norm
 - Reliable price benchmarks
 - Support/agreement from banks
 - And a substantial drop in LNG costs for project sponsors to take that risk



Evolution of pricing mechanisms

- North America and Europe price gas at hubs
- Asian LNG prices are still largely JCC-based but this has diminishing market logic
- By early 2016, important status quo players (eg JERA) begin to openly speak about the need for transition to market prices – recalls start of the transition in Europe
- May 2016: METI LNG Strategy makes transition to hub pricing `official policy`
- Asian hubs may evolve over the next decade and this could be accelerated by:
 - Over-supply of LNG up to 2020
 - Increasing spread between JCC and spot prices (if oil prices increase beyond \$50/bbl)



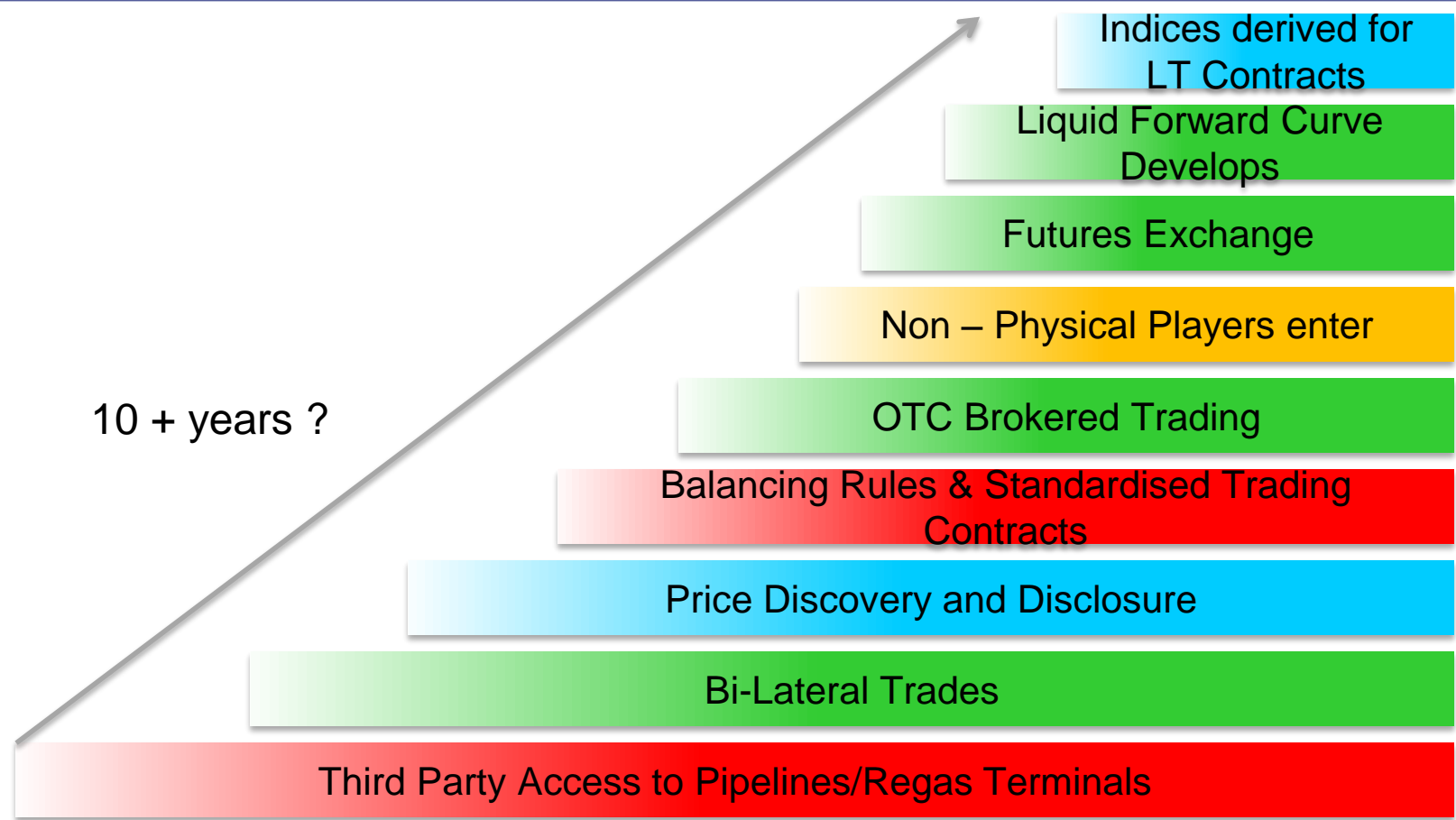
Price formation mechanisms which could replace JCC

- Henry Hub or European (NBP/TTF) hub prices
- Asian spot price Index (eg JKM, RIM, Argus, JOE): too few cargos (at least currently) on which to base long term contracts
- Prices at an Asian hub or hubs
- Average Japanese/Korean LNG import prices – JLC/KLC
- `Hybrid pricing` – a mixture of all of these + JCC/oil+ electricity +.....

Which of these mechanisms best reflects gas supply/demand conditions in Asian countries



Establishing a liquid hub takes time and commitment



Based on Experience in US, UK and Continental Europe:

- This could take 10 years in Asia
- It requires the commitment of government, suppliers and system operators
- An over-supplied market with strong competition accelerates the process



The Exchanges: how much progress?

SINGAPORE:

- 2015 the SGX LNG Index Group creates the `Sling' price, first derivative contract reported in early 2016

SHANGHAI:

- Petroleum Exchange trades small volumes of LNG but
- is overly dominated by Chinese market players and hence not a neutral body for market trading

TOKYO:

- TOCOM and Gingga Energy – created the JOE LNG forward platform in 2014 to become a futures market
- Has traded very little LNG since creation (first contract August 2015)

Progress still very much in early stages



METI's May 2016 LNG Strategy

- `Develop an internationally accepted trading hub...by the early 2020s' which will..strengthen the power to negotiate prices for the nation as a whole
- `important for both parties to permit anonymous information disclosure to an agreed PRA from the perspective of developing better indices
- LNG trading contracts using price indices will be positively taken into account for evaluation of national interest by JBIC, NEXI and JOGMEC
- Rules concerning TPA to LNG terminals and information disclosure to be formulated (consider best practice in Europe)

METI can facilitate but **it will require Japanese market players to make this happen!**



Asian markets do not need to adopt the same price mechanism

- SINGAPORE: an LNG trading location which develops a regional price for South East Asia
- CHINA: a Shanghai citygate benchmark price reflecting domestic/international gas prices, and prices of competing fuels (fuel oil and LPG)
- JAPAN: a hybrid/spot JCC/JKM/HH/NBP price developed by competition which could evolve into a hub

These prices will have a relationship with each other and in time will create a “messy transition” to a converged Asian composite price; meanwhile expansion of spot pricing will put continued pressure on JCC-based long term contracts, especially if oil prices increase



Why a reconfiguration?

- The supply/demand balance will look significantly different in 5 years from now and there is great uncertainty about the future supply
- There is increasing pressure from the buyer's side for more flexibility and a change in price formation, from oil indexation to hub indexation, to address:
 - Uncertainties around future gas demand growth
 - Market liberalization in Asia
 - Maintaining gas competitiveness versus coal
- Long-term contracts under threat from flexible LNG supply
 - Buyers looking for shorter-term commitments
 - Share of spot trade to increase from 28% in 2015 to about 43% by 2020



So where does this leave us?

- Companies realizing that they have to **adapt** to the new market environment
- Companies have to change the way they operate
 - Cost is king; innovative and cost-competitive projects could proceed
 - Lots of potential in new markets ... as long as LNG is 'affordable' and competitive
 - Changes in pricing formation are coming, but there is resistance
 - Collaboration necessary
 - Existing projects to accept more flexible contract structure,
 - New projects will require some form of LT commitments unless conditions are fundamentally different
 - Contract sanctity?



Thank you for your attention