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New Players, New Models

A research think piece

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NATURAL GAS PROGRAMME



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- Sources are detailed in the last slide with number references in the slides



The 'old model' has changed

The changes have led to increased uncertainty and the need for greater contractual flexibility

Firm long-term supply contracts were needed to underpin LNG supply security



Middle East LNG supply growth globalised the LNG business



2011 Fukushima disaster and subsequent Japanese fiscal deficits drove the need for market change



Low cost US shale growth and subsequent development of US liquefaction capacity gave an alternative supply and contract choice



Market driven change led to new ways of contracting

- China and SE Asia market growth
- Price & volume sensitive market growth
- Liberalisation of the Japanese market



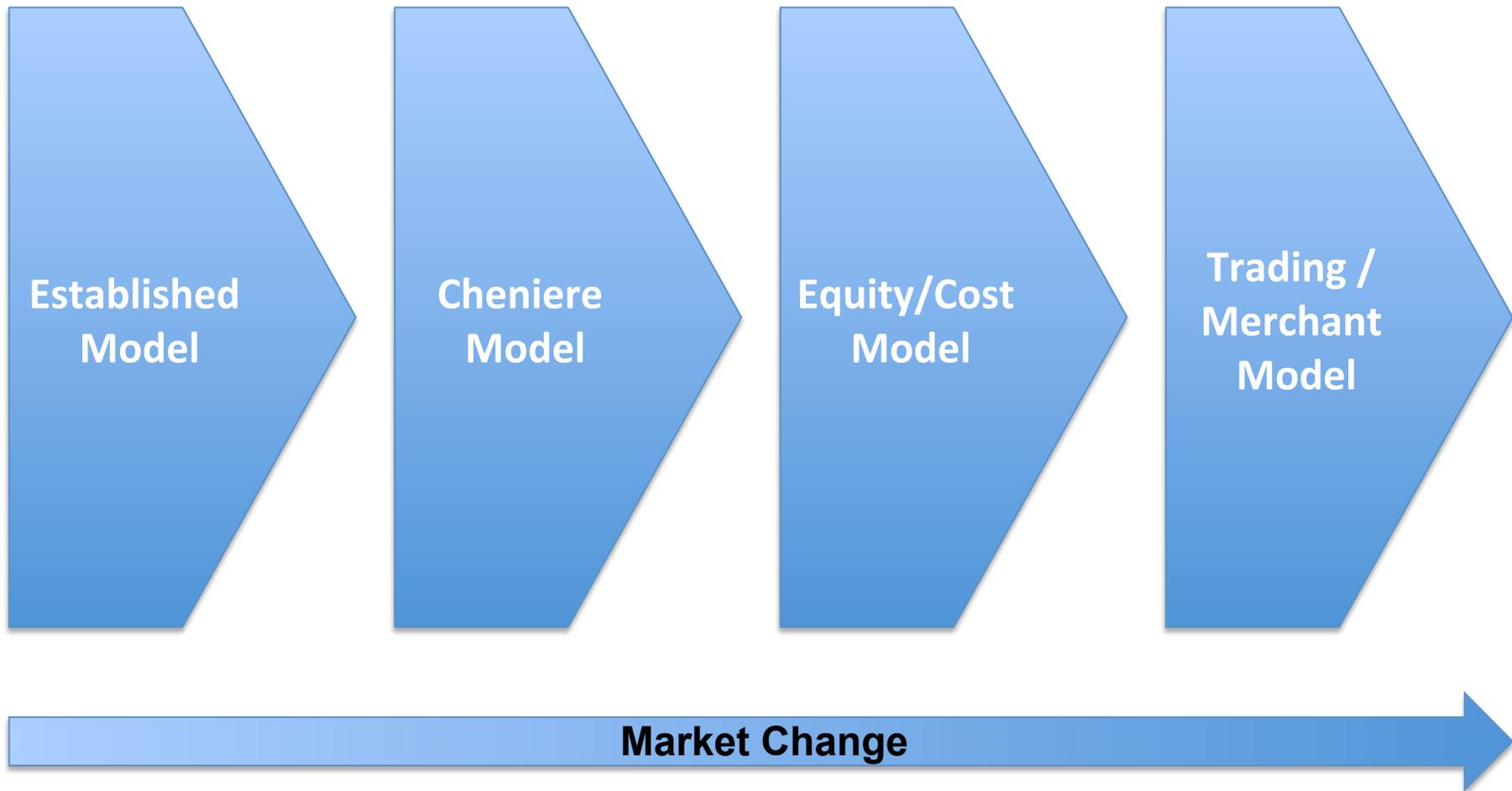


Hypothesis

- The LNG business has evolved from its original security of supply based 'Established Model' that was based on fixed links between the LNG supplier and the LNG buyer
- New players and changes in the structure of the LNG market have driven the LNG value chain model to one where new and existing players can introduce an adaptive LNG chain where different linkages can operate more independently of each other
- This has been made possible by the presence of high credit (AAA or AA) intermediaries underpinning offtake agreements
 - Seen most recently in the US model and FLNG structures
- Will these aggregators/portfolio companies/intermediaries have the financial and commercial capacity to underpin the next wave of LNG liquefaction capacity?
- In response to this uncertainty new players are creating new models. The question is – will these models work?



The path to a truly traded/merchant model from the established liquefaction model has several steps





The path to a truly traded/merchant from the established liquefaction model has several steps

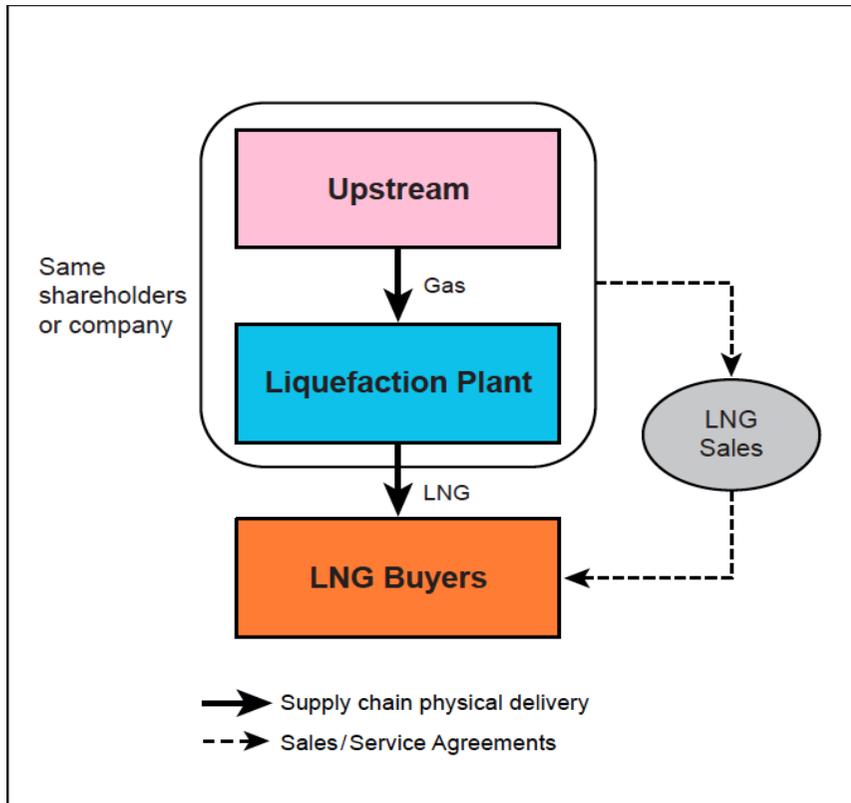
- Four Models
 - The 'Established Model' used in the liquefaction plant developments of the 1980-1990s was based around fixed linkages within the LNG chain. The move to tolling agreements in the 2000s* gave the first steps towards cargo optimisation and trading
 - The innovation of the Cheniere tolling model to the US market, based on low cost of US feedgas, saw US hub priced LNG with greater operational flexibility of LNG cargoes, but the structure is still based around long-term contracts
 - The equity/cost model seeks to move further towards a merchant model, but still requires large equity investments to be made, which in themselves mean only large companies with large portfolios are able to be involved. This structure also requires medium to long term contracts to underpin the large investments
 - In a truly traded market the ability of the market to act as a home for LNG cargoes, at the market price, means that the chain can fully disaggregate, contracts can be flexible, and new liquefaction plants can be financed without any volume risk. All finance is based on market based prices
- This paper compares the different models on the way to this fully traded market and challenges how, in the intermediate period before we reach this market, new liquefaction capacity can be developed

* Indonesia did use tolling structures before this but still based around the fixed point-point LNG supply structure

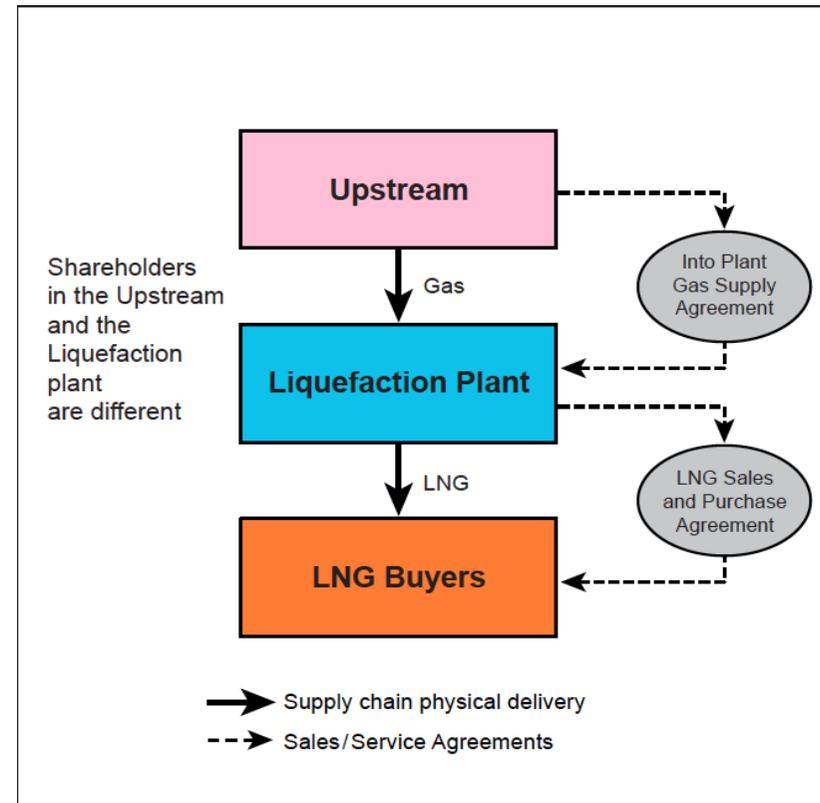


The 'Established Model' had a clear delineation of activities

Integrated project structure



Transfer pricing project structure



Source: OIES, 'LNG Markets in Transition, The Great Reconfiguration'¹⁵, Chapter 3, Ledesma



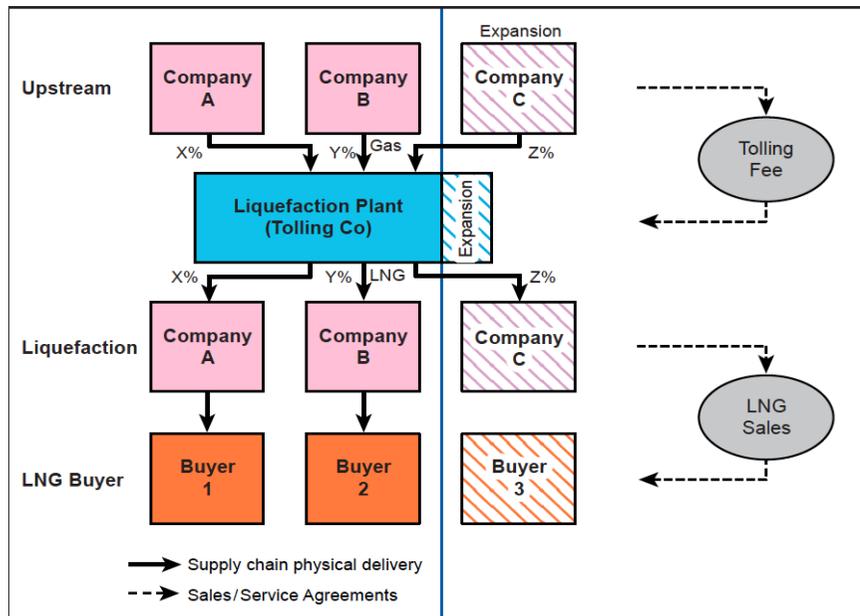
The 'Established Model' had a clear delineation of activities that supported investment but limited flexibility

- The established model used integrated and transfer pricing structures (with a few using the tolling structure). Long term supply contracts between sellers and buyers underpinned the development of capital intensive upstream gas reserves and liquefaction plants
- Project structuring usually included a few companies involved from wellhead to LNG delivery at the LNG buyers facility
- Projects were onshore, large scale, with increasingly bigger LNG trains
- Buyers were often end-user utilities or gas companies who sold gas into regulated markets where the energy costs were passed through to the end buyer
 - LNG sales were mainly made on a delivery ex-ship (DES) basis
 - Limited contract flexibility with limited, if any, cargo diversions
 - LNG was priced on an oil related basis, based on the Japan Crude Cocktail (JCC) oil price. The formula was fairly standard: $JCC \times 14.85$ (the slope, where 17.1 represent oil/gas parity) plus a constant usually representing the shipping cost
- Projects structured with joint venture companies as sellers using limited/non recourse project financing that allocated risk to maximise financing and often optimize the finance capacity of the gas supplying country

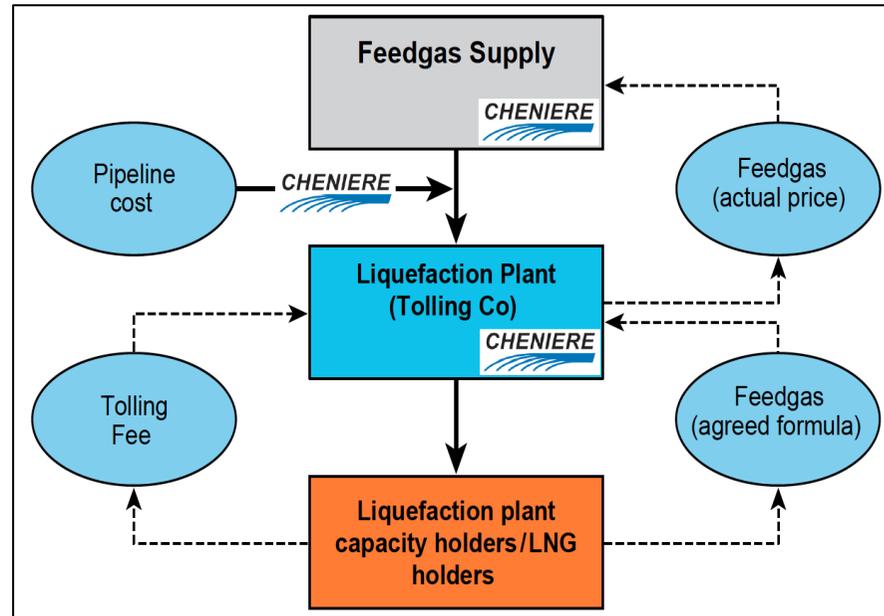


The 'Cheniere Model' took the tolling model and adapted it for the North American gas market

The established tolling structure



Cheniere's modified transfer pricing structure



Source: OIES, 'LNG Markets in Transition, The Great Reconfiguration'⁵, Chapter 3, Ledesma

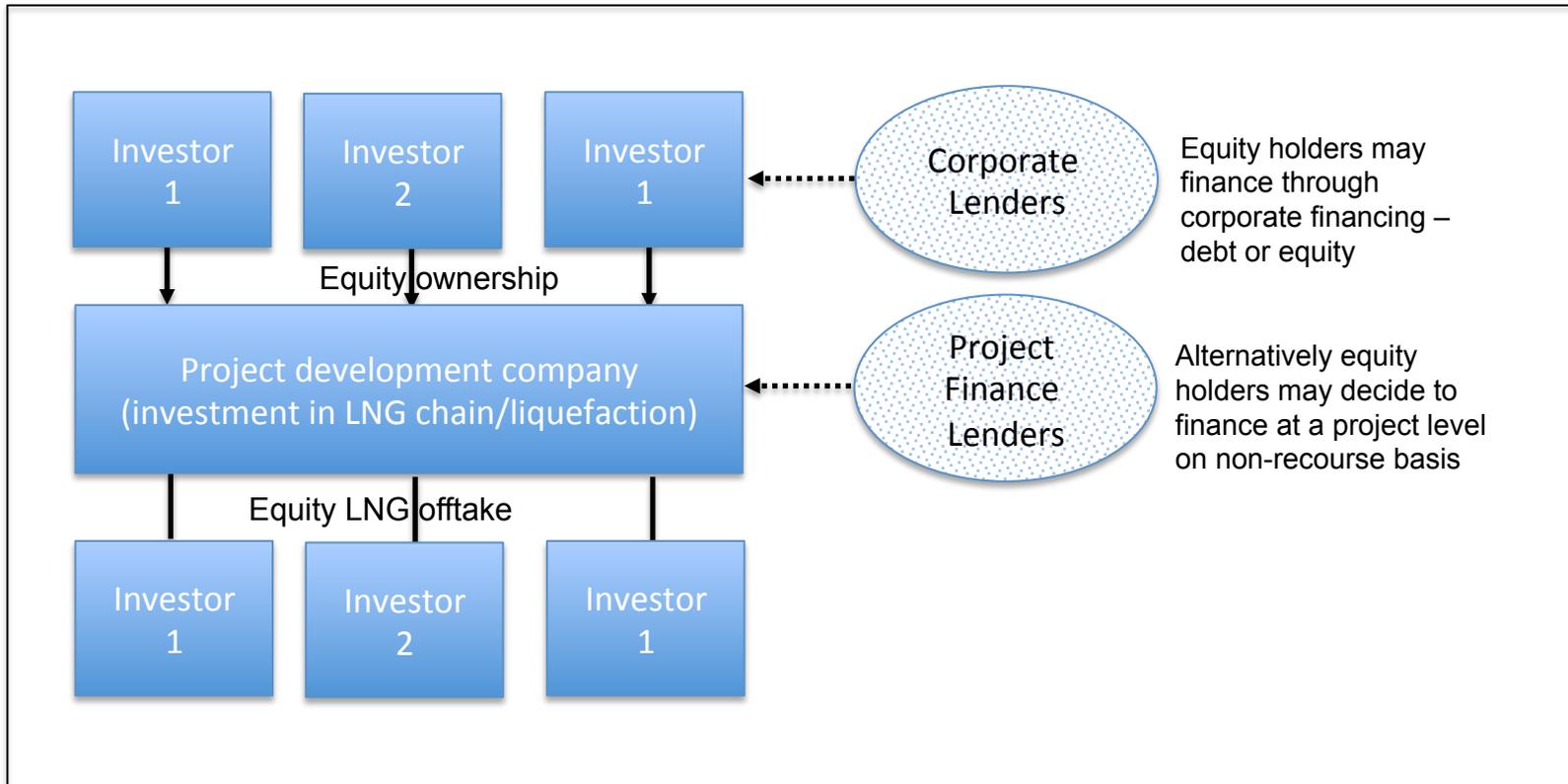


The 'Cheniere Model' took the tolling model and adapted it for the North American gas market

- The established tolling model allowed for the same company to operate in the upstream and LNG sales parts of the chain with a third party owning and operating the liquefaction plant
 - Long term tolling contracts secured dedicated gas reserves from upstream companies to use the liquefaction plant capacity
 - These contracts, with high credit rated companies, underpinned the plant financing
- LNG was sold by the upstream companies, that tolled through the liquefaction plant, not the joint venture company. In Egypt, this enabled the development of 'Branded LNG' where LNG is sold in the name of the seller company
- Buyers would buy LNG from the upstream companies. Large IOCs or companies with multiple supply contracts could offer LNG from their portfolio rather than a specific supply source. This was the start of aggregator LNG and real cargo diversions
 - LNG sales could be on varying contracts and under different pricing mechanisms
 - LNG was sourced FOB for cargo flexibility.
- The 'Cheniere Model' adapted the tolling model further to source feedgas from the large low cost US gas market (not dedicated reserves), sell tolling capacity with feedgas supply and pipeline supply capacity at cost, separated from the tolling.
 - The unbundled model removed destination restrictions and gave volume flexibility



The 'Equity/Cost' model seeks to secure equity investors to fund new liquefaction and supply equity LNG



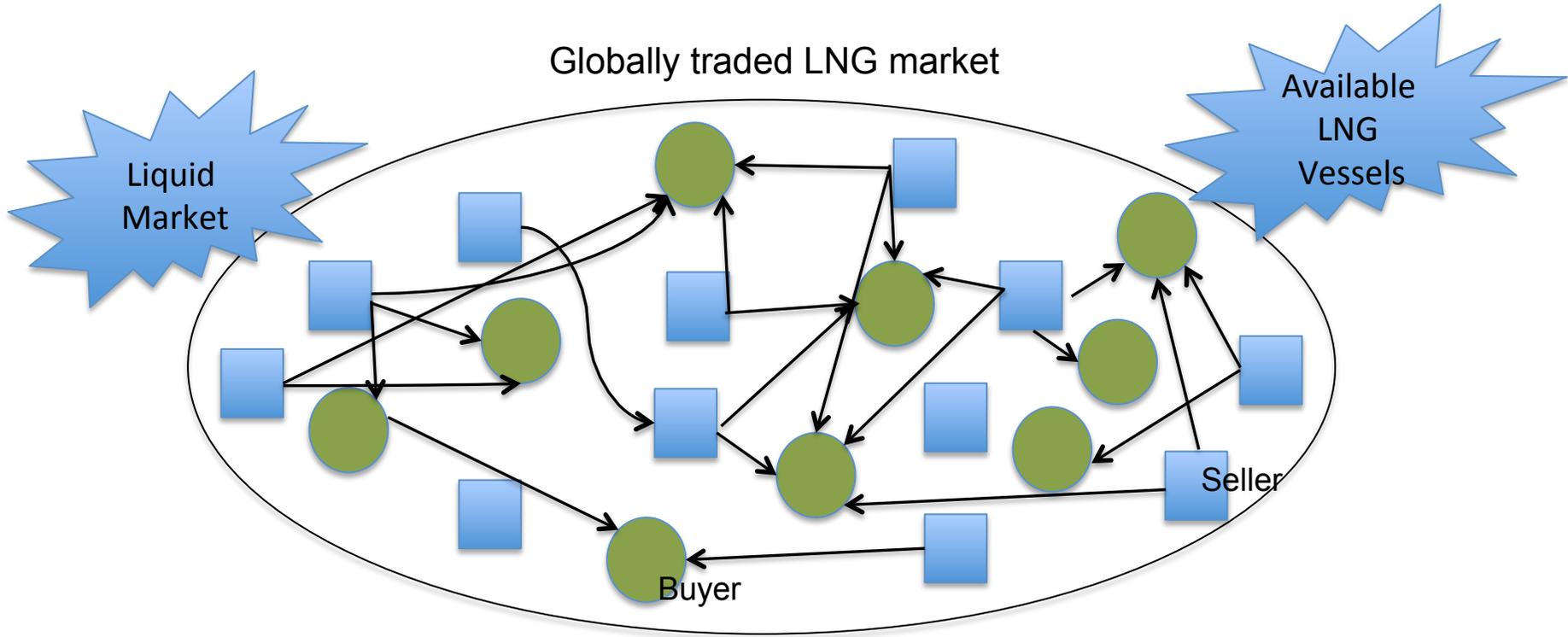


The 'Equity/Cost' model seeks to secure equity investors to fund new liquefaction and supply equity LNG

- Project company shareholders fund the liquefaction plant (and potentially the upstream) through their own equity. LNG offtake is based on equity shares - all LNG is destination free and completely flexible
 - Equity holders are responsible for sourcing their own gas and securing pipeline capacity to move gas to the liquefaction plant
 - The investor receives equity LNG at ship loading flange of the liquefaction plant at cost
- Project equity holders take the LNG into their own portfolios and manage the marketing risk
 - LNG may be sold from the project company to the equity holders own LNG marketing company
 - LNG on-sold under contracts of varying lengths and different contract prices and terms
- LNG Canada took FID with this project structure in October 2018
- Tellurian's Driftwood LNG project has adapted this model further to offer equity in the project (while project financing is around 66%). LNG buyers buy equity and receive LNG in proportion of that equity amount
 - The project is managed and operated by a proven developer and operator. Any cost-overruns will be born by the equity holders. Project finance companies will likely need security of offtake and some form of construction completion guarantees



The end game 'Trading/Merchant' model will negate the need for long-term contracts and enable full market flexibility



PLUS MULTIPLE REALES

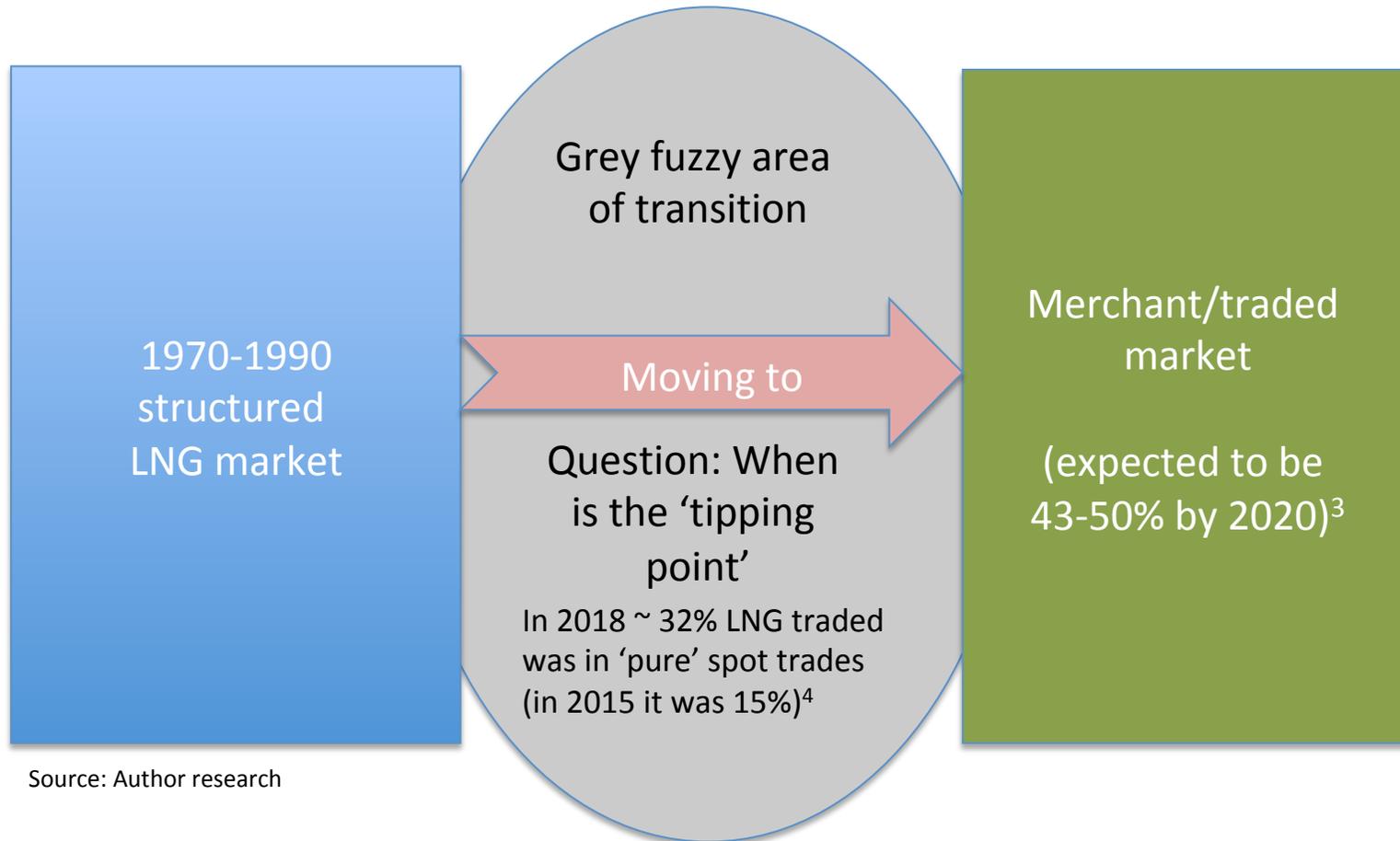


The end game 'Trading/Merchant' model will negate the need for long-term contracts and enable full market flexibility

- A truly merchant market will mean multiple LNG sellers, buyers, traders and independents can freely trade LNG on the basis of global or regional LNG price indices with 'basis differentials' between these indices equal to supply/demand LNG
 - Trade on common contracts
 - Buyers are confident that there will always be LNG cargoes available to meet their demand thus ensuring security of LNG supply
 - Volume risk has disappeared and risk has totally been transferred to the price (i.e. take or pay is 100% as the buyer knows that it can always place the cargo on the market)
- All LNG is flexible, no long-term contracts (though some buyers may secure 1-5 years for ease of operations). Volume offtake risk is removed by market liquidity
- Lenders are happy to lend, and investors to invest, on the basis of the economics of a project and the LNG price level, not volume risk (long-term contracts may not be required to underpin their investments)
- Equity investors will seek to maximize leverage and each segment of the LNG chain can be financed independently



But the LNG market is in transition between a structured and fully flexible/liquid structure. Operating in the grey transition period between these end states creates uncertainty



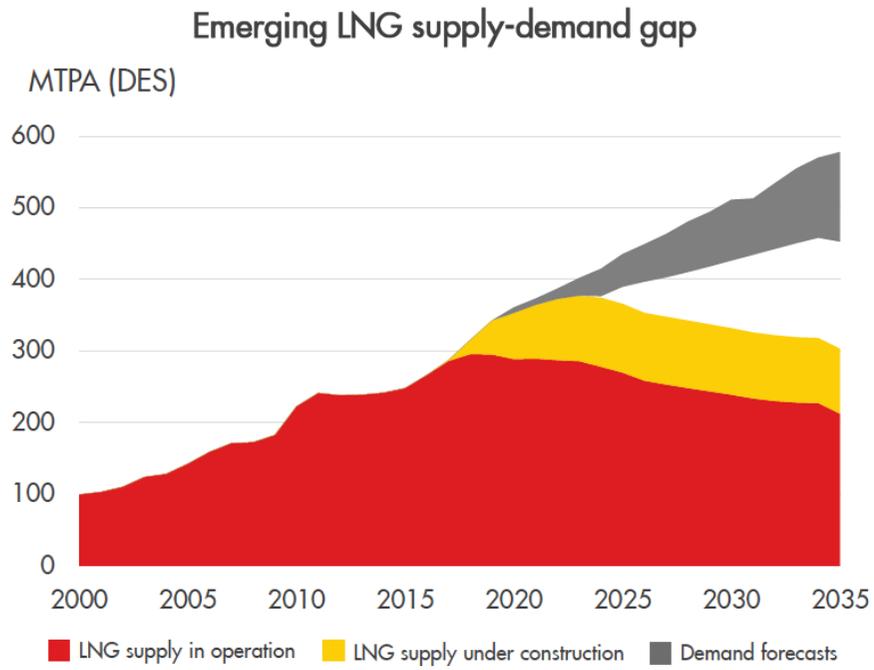


As the market changes towards a fully liquid business, the way that LNG is traded is changing

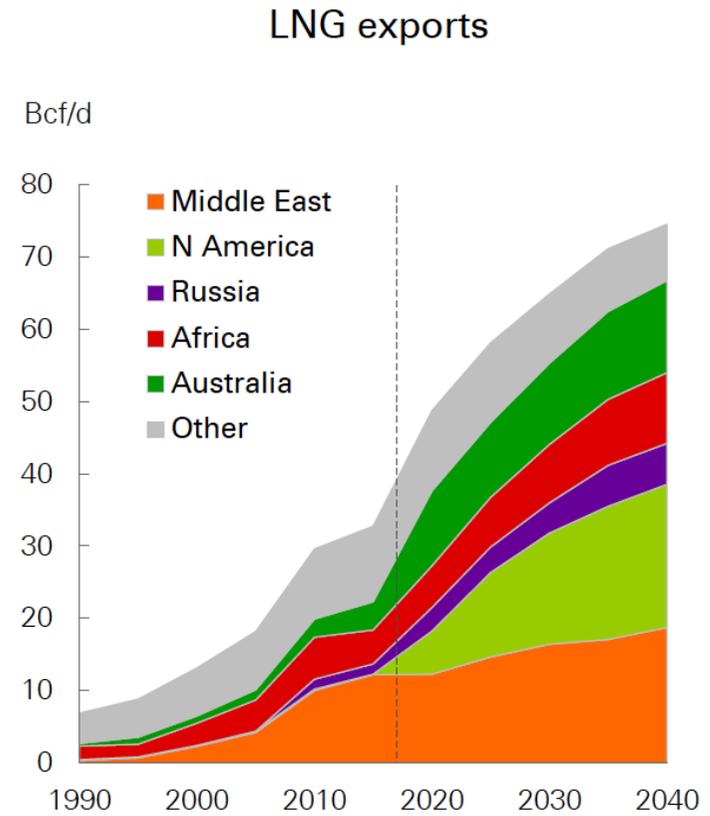
- When the market is fully merchant and liquid, then LNG can be traded under short-term/spot contracts confident that there is a market that cannot be manipulated. Lenders can lend money without the requirement for long-term offtake/capacity agreements without impacting on gearing levels
- The path towards a fully traded LNG market is unstoppable, the question is when will the 'Tipping Point' be (i.e. when a cargo can be delivered into multiple liquid trading markets without limit)
- Increased volumes of LNG are available without contractual destination restrictions
 - The volume of Pure Spot Trades increased to 32% LNG in 2018⁴
 - By 2020, 70 cargoes/month will be supplied from the US with 24 different lifters creating real FOB
- The volume of LNG traded by aggregators and traders is increasing
- Increasing volumes of LNG are being sold from term buyers and sellers using the LNG spot/short-term market to cover disposal and sourcing of short-term volumes
- End-user buyers are sourcing LNG through a portfolio of long, medium, short-term and spot cargoes to manage gas offtake risks and price exposure



Market estimates are that ~ 150-170 million tonnes additional LNG capacity is required by 2030? How will this supply-demand gap be met?



Source: Shell LNG Outlook 2018¹



Source: 2018 BP Energy Outlook²



~ 150 million tonnes additional LNG capacity is required by 2030? What is the capital cost? What is the value of the required LNG investment?
Companies will be expected to underpin this investment and LNG offtake

- An additional 150-170 mtpa LNG capacity is required by 2030 which means that an estimated \$150bn investment is needed between 2019-2025 in liquefaction, associated facilities and ships*. (assuming a cost of \$600/MT + associated infrastructure costs and ships). Over 6 years this equates to \$25 billion/year
- In order to secure financing, and support this level of investment, project developers will need to secure offtake agreements to underpin the investments

- Assuming an LNG price of \$6/MMBtu, this contractual commitment is equivalent to ~ \$46 billion/year. At an LNG price of \$8/MMBtu this rises to \$62 billion/year*
- \$108bn investment in liquefaction and associated facilities equates to \$18billion/year
- Assuming gearing of 67% then ~ \$12bn. debt required each year

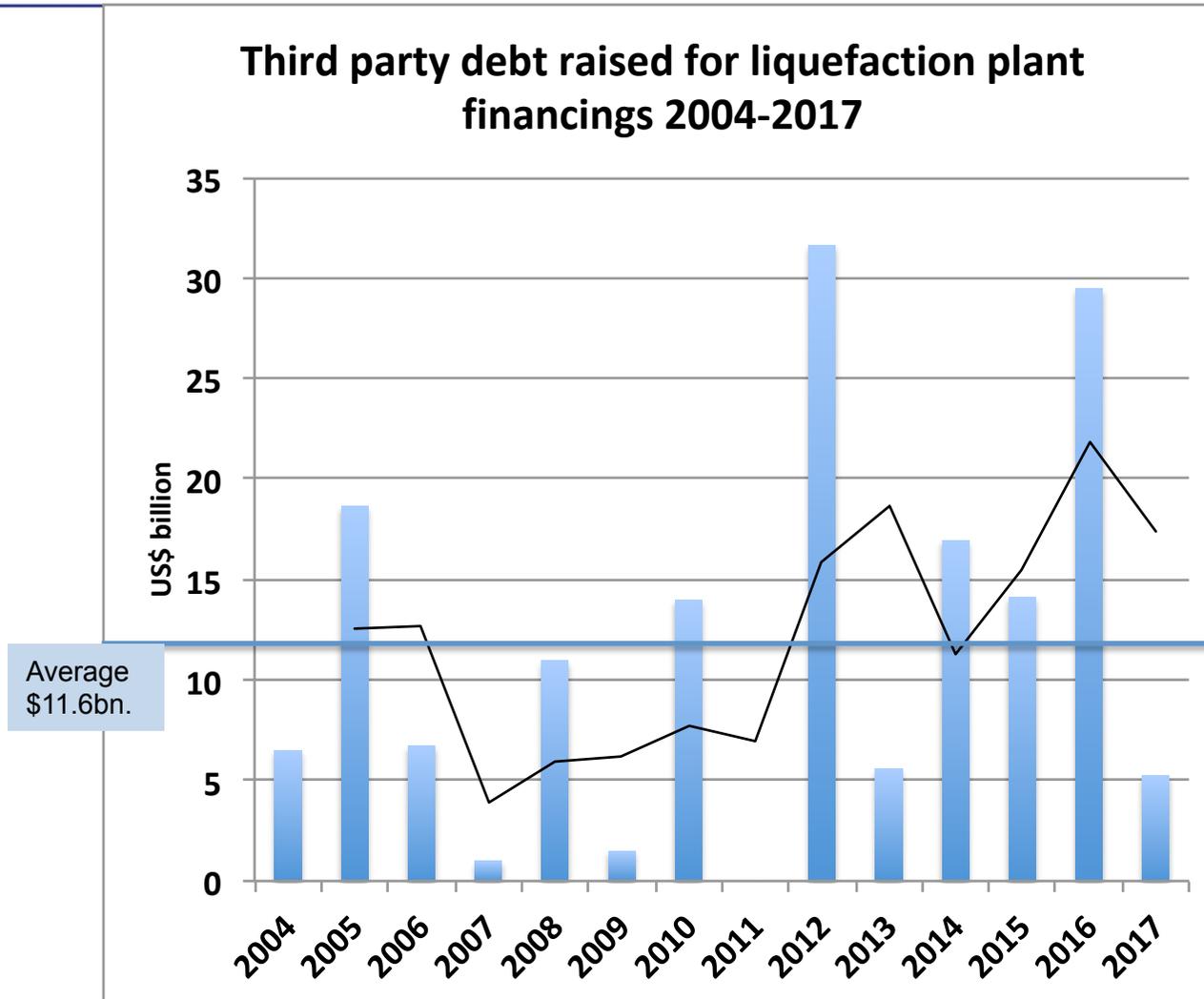
<u>Estimated capital investment required</u>			
150	million mt new capacity required		
Cost:			
600	Capex \$/MT	new capacity	
90	\$ billion	Total investment in liquefaction	
18	20%	associated costs for infrastructure	
108	\$ billion	Total shore costs (excluding upstream)	
214	No new ships	Shipping @ one ship carries 0.7 million mt pa	
43	\$ billion	@ \$200 million/ship	
151	\$ billion	TOTAL new investment required	

NOTE: The amount one vessel can carry/year: cargo: 62000 mt, 30 days round trip = 11.7 voyages/year (@350 days) =0.723 million mt

* 150 million mt @ 52 Tr Btu/million mt LNG = 7800 Tr Btu @ \$6/MMBtu = Cost LNG of \$46.8 billion/annum



Historically the volume of third party debt has averaged ~ \$12bn/year. With \$12bn debt required each year 2019-2025, there should be sufficient debt available to cover future requirements?



Source: Poten data, OIES analysis

NOTE: Third Party Debt includes commercial loans, export credit agency debt, multilateral debt, shareholder loans, bonds and sovereign wealth fund debt



The financing commitment for the next wave of LNG could be \$150 bn. Is there sufficient financing capacity available to support such a large investment requirement?

Banks say that they are flexible to changing contractual structures but are they?

- Lenders seek long-term stable revenue flow. Project finance to date has relied on long-term take or pay contracts from A+ buyers (often with government support)
 - Without a suitable financing package there will be recourse to shareholders and this limits the number and financial quality of companies which can develop projects
 - Immaturity of the spot LNG market still means that long-term commitments are needed
 - though banks say that period of 'long-term' has reduced
- It tends to be the smaller players who are offering contractual flexibility to smaller, lower credit rated buyers. Lenders see this as increasing project revenue uncertainties
- Aggregators can bundle buyers of different credit ratings
 - Risk slicing buyers of different credit ratings can optimise financing levels
 - Aggregators can also offer to develop domestic infrastructure
- Lenders must get comfortable with the risks to optimise debt packages and that spot & short-term cargoes can be sold at a 'market level' but...they need a liquid market
- Access to new capital sources is only possible if risks are clearly defined
 - Shorter-term contracts are OK in mature economies that have a liquid debt market
 - New sources of funds still need clear risk allocation
 - Equity investment is the most expensive source of funds



Buyers and Sellers increasingly have different contract objectives when negotiating new sales & purchase agreements

	Buyers requirements	Sellers requirements
Pricing	Lower levels and varying indices to mitigate changing market structure	Stable pricing acceptable to lenders, that supports project economics
Volume	Flexible volume clauses to enable management of market risk	Manageable flexibility to support financing
Contract period	Short/medium (3-10 years) with price reviews	Medium/long term (7-15 years) to support security of offtake to support financing
Destination restrictions	Flexible destination to enable buyers to divert cargoes for optimization and market reasons	Limited destination flexibility with sharing of any financial upside
Risk sharing	Current US model where buyer takes volume and price risk not sustainable	Limited reallocation of risks so as to support financing
Financing	Limited/manageable financial support in the case that buyer is not suitably credit rated	Buyers need to be of suitable credit rating to support financing
Partner selection	Flexible approach, if the contract is not economic/fit for purpose at all times then a review may be necessary	Need to ensure that buyer will take the offtake throughout the contract period and not seek contract review



But there is an impasse between LNG buyers and sellers. Buyers are seeking greater contractual flexibility in order to meet their domestic gas demand uncertainties

- Price - buyers are looking for different pricing indices to mitigate their risks
 - Reports that some smaller buyers are looking to buy LNG using a formula linked to fertiliser prices, steel prices and focusing on short-term requirements rather than long-term markets which are so uncertain (it is viewed that sellers are unlikely to agree to this)
- Volume - market liberalisation and the need to be competitive in their changing markets has led to domestic gas demand uncertainty and LNG buyers seeking smaller contract amounts, greater volume tolerances, shorter contract periods and cargo destination freedom so they can divert cargoes in case they are not required in their home market
- The threat of price disputes/arbitration means that sellers feel at risk that their contracts may be challenged in the future despite contractual provisions. This removes the traditional 'market trust' and commoditizes the LNG market.
- The US model that has been used for LNG export projects to date passes price and volume risk to the buyer – this model is not sustainable for the next round of LNG FIDs as buyers are being asked to take on too much risk
- This leads to the question - what are the possible evolutionary paths for LNG pricing and contracts that can match the requirements of both LNG buyers and sellers?

Source: Input from Heren 30/3/17



Buyers and Sellers increasingly have different contract objectives when negotiating new sales & purchase agreements

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But there is an impasse between LNG buyers and sellers. Sellers need security of offtake/revenues that are found in a structured market but are not in a market in transition

- LNG liquefaction project costs are falling but economics dictate that they may need to fall further in order to support the low price levels that buyers seek
- This is compounded by the low market gas prices and buyer price formula aspirations that together challenge overall project economics
- Buyer's wish for short-term offtake or capacity contracts gives concerns to lenders and sponsors that revenues may not be as high as required to support the required economics. This risk is exacerbated as the LNG market is not fully liquid
- The newer markets that are underpinning LNG demand growth often have a poor credit rating. This challenges the value and reliability of LNG sales revenues that are required to underpin financing
- Projects require large upfront infrastructure requirements, the question is – who pays? The economics of new greenfield projects may not support such large expenditure and some governments are not able to pay or give the necessary tax incentives to support the investment
- Sellers and lenders have concerns that if they commit to sell LNG long-term and the market moves to be more merchant/traded, the buyer may seek a review outside the terms of the contract because they 'have' to. Partner and buyer selection is becoming even more key



The challenge facing the industry is securing FIDs for additional LNG capacity. What factors are needed to enable commitments to be made?

Economic
low cost
project

- Cost is key
- New markets need lower prices

Low
technical &
operating
risk

- Reductions in capital costs required
- Project needs to start-up on time
- Reliable operations

Guaranteed
creditworthy
offtake

- Prior to market reaching its 'tipping point' buyer take or pay required
- Low cost projects give some structuring flexibility

Acceptable
finance
structure &
terms

- Suitable security package is required to support financing
- Lenders need to give greater flexibility as the market changes
- New finance structures need to fit new market realities



The challenge facing the industry is securing FIDs for additional LNG capacity. What factors are needed to enable commitments to be made?

- An economic, low cost LNG supply project
 - Cost is key, low cost feedgas, liquefaction, shipping and liquids credit if possible
 - Tolling fees are coming under pressure, the ‘old days’ of \$3-3.50/MMBtu for US LNG projects have gone, \$2-2.25/MMBtu tolling fees are what new capacity offtakers are seeking
 - LNG must be able to be delivered to Asia for ~ \$6/MMBtu if new markets are to be opened⁸
 - Equity investment models reduce the requirement to raise project debt
- Low technical and operational risk
 - To mitigate project construction, infrastructure construction and financing risk
- Reliable LNG offtake or capacity commitment from a creditworthy buyer
 - Need to manage the maturing of the market as it goes through the different development steps from illiquid to when it reaches its ‘tipping point’ (ref slide 16) and is sufficiently liquid
 - Suitable contracts to support financing, but the financiers need to increase flexibility
 - The linking of low cost LNG means alternative pricing formulas can be offered
- Lenders who finance at an economic cost under acceptable terms – still required
 - Only lend money if the security package supports the level of debt
 - With greater flexibility of LNG contracts, lenders will have to adapt their debt packages to accept an increased amount of risk (see back-up slide)
 - Develop financing packages that balance the different risks of different offtakers



Stages to a traded/merchant model – Business Structure

Business Structure	Established Model	Cheniere Model	Equity/Cost	Trading/Merchant Model
Buyer	End user utilities	Intermediaries with some end users	Varied	Varies
Seller	NOC or NOC/IOC sponsored joint ventures (SPV)	Project developer	Varied, equity lifting, 'branded LNG'	Varies
Financing	Finance whole chain or liquefaction portion	Finance of liquefaction & some midstream pipelines	Varied (underpinned by some LT security or higher equity)	No volume risk, projects financed based on market
Equity	Minimised as structures often SPVs	Minimised due to maximum leverage strategy	Depends on sponsor financial position but likely max. leverage	Depends on sponsor financial position but likely max. leverage
Project scale	Onshore large trains	Brownfield and Greenfield	Brownfield, greenfield, smaller trains and FLNG	Brownfield and Greenfield
Gas chain	Involved in everything up to buyer flange	Liquefaction only	Combination/ unbundled	Liquefaction only
Project Developer	IOC/NOC with upstream interests	Independent developers, no upstream investment	Independent developers, no upstream investment	Independent developers, no upstream investment
Gas supply source	Dedicated gas reserves	No dedicated gas, but from the market	No dedicated gas, but from the market	No dedicated gas, but from the market



Stages to a traded/merchant model – Business Structure

- As the LNG market liberalises, the business structures change
 - The chain gets increasingly flexible
 - Gas resources can be flexible rather than from a specific field (especially in North America)
- Different companies operate under different business structures
 - Greater range of buyer and seller
 - Different companies operate along the whole disaggregated chain
- Project scale can determine company investment
 - Smaller scale liquefaction opportunities lower the barriers to entry to smaller investors
- Financing structures vary
 - Separate parts of the chain are financed separately
 - Changing structure of the market means lenders can rely on the market for guaranteed offtake rather than specific buyers
 - Disaggregated market enables innovative financing structures



Stages to a traded/merchant model – Contract Structure

Contract Structure	Established Model	Cheniere Model	Equity/Cost	Trading/Merchant Model
Destination	Point to point DES	No fixed destination FOB	Some restrictions with diversion upside	Flexible
Volume ACQ	Large	Small to Medium	Small to Medium	No LT contracts, liquid market removes volume risk
Volume flexibility	Limited	Large with penalty	Wider range without penalty	None for term, cargo max?
Duration	Long term – 20 years +	Long term 20 years	Shorter term - 10+ years with options	Varied, long-term contracts not required
Pricing	Oil indexation – delivered price	Unbundled – hub priced separate from liquefaction fee	Portfolio/hybrid of different indices (Oil, hub, Asia Spot)	Market based price
Take or Pay/ capacity payment	Yes at 95% ACQ (with make-up)	Only on liquefaction fee (no make-up)	Yes with reduced volume commitment	Take or pay 100%



Stages to a traded/merchant model – Contract Structure

- As the LNG market liberalises, contract structures will change
 - Contracts become increasingly flexible, passing through a hybrid stage until they become merchant type agreements
 - Contract duration reduces, ultimately to no long-term contracts once the market is fully merchant
 - In a merchant market no take-or pay is required as security comes from the market
- Different companies operate differently, but eventually a merchant market results in all players operating on a level playing field
 - Move towards market pricing and commonality of contracts
- Financing structures rely on the market
 - Market gives sufficient security of offtake, the primary risk is price level not volume



Conclusion 1

What are the issues that need to be resolved to enable FIDs to happen?

- **Compromise between buyers and sellers on contract terms** such that buyers agree to terms that support sellers project economics and sellers give flexibility to manage buyers market uncertainties
- **Lenders must develop funding packages that support changes in the LNG market structure**
 - Projects must have credible financeable buyers/capacity holders to underpin offtake/capacity contracts
 - Sufficient financial capacity must be available to meet LNG funding requirements
 - Projects must be structured correctly
- **Acceptance that medium/long-term contracts are required** (until LNG market has sufficient liquidity such that LNG can be traded without periods of extreme volatility and that cargoes can always be bought or sold in the market). Could this be post 2020 when ~ 40-45% LNG sold globally will be under flexible contract terms⁵?
- **Managing market uncertainties** - Buyers will likely purchase new LNG on a portfolio basis on a variety of pricing indices with different contract terms as a means to manage risk
- **Market liquidity and trusted pricing indices** - We are on the path to a merchant/traded LNG market, but there is still a long way to go. A major blocker is the availability of an independent LNG pricing indices.



Conclusion 2

Where are we today?

- **The three 2018/19 FIDs were enabled by creditworthy company equity/offtake agreements**
 - LNG Canada in October 2018 (14 mtpa) was based on an equity offtake structure that supports financing through shareholder equity and corporate financing
 - Tortue FLNG in December 2018 (~2.4 mtpa) was underpinned by BP's offtake for all capacity
 - Golden Pass in February 2019 (15.6 mtpa) was based on an equity offtake structure
- **While other projects can use the equity offtake model (e.g. Mozambique Area 4), other greenfield projects, such as Mozambique LNG (Area 1), require project financing**
 - Lenders still need greater security of LNG offtake
 - Whether this project proceeds will be a key indicator as to how the market is developing
 - 'Equity/Cost Model', can make economic sense for companies with low cost of capital
- **The market is not yet liquid enough to give sufficient comfort to lenders to not require long-term offtake agreements to underpin debt**
 - Lenders must give more value to spot, not committed cargoes, than they currently do. If not, it will be a major limiting factor for project development
 - If this is not resolved, then new LNG projects can only take FID if funded by shareholders (equity LNG model) or buyers support long-term LNG offtake. This will likely happen, but it will reduce the number of companies investing and therefore development of the market
- **Expansion projects can use corporate debt, but depends on the state of financing of the original project, performance of the plant and strength of the shareholders**



Bibliography/Sources

1. Shell LNG Outlook 2018, <https://www.shell.com/energy-and-innovation/natural-gas/liquefied-natural-gas-lng/lng-outlook.html>
2. 2018 BP Energy Outlook, <https://www.bp.com/en/global/corporate/energy-economics/energy-outlook.html>
3. “LNG Markets in Transition, OIES, 2016 estimates 43% & Cheniere conference presentations estimate 50%
4. “The LNG Industry GIIGNL Annual Report 2019”, GIIGNL, March 2019. “Pure” spot trades (PST) are cargoes delivered within 3 months of the transaction date.
5. ‘LNG Markets in Transition: The Great Configuration’, Ed. Anne-Sophie Corbeau and David Ledesma, p574, OIES 2016, OUP, <https://www.oxfordenergy.org/shop/lng-markets-in-transition-the-great-reconfiguration/>
6. ICIS Global LNG Markets, 8th March 2018 “Shell tops up a further 1 mtpa with US Venture Global”
7. Japan's JERA in talks for LNG contract with no destination limits”, Reuters 11th October 2017, <https://www.reuters.com/article/us-commodities-summit-jera/japans-jera-in-talks-for-lng-contract-with-no-destination-limits-idUSKBN1CGOSR>
8. Stern, J (2017). ‘Challenges to the Future of Gas: unburnable or unaffordable?’, OIES NG125, <https://www.oxfordenergy.org/publications/challenges-future-gas-unburnable-unaffordable/>
9. Ledesma presentation to OIES Natural Gas Programme Sponsors, 25th April 2017, ‘Long term LNG supply – the challenges of investing for 2025’
10. Reuters 14th March 2018, ‘Tokyo Gas to renew Malaysia LNG purchases from Petronas unit”, <https://af.reuters.com/article/commoditiesNews/idAFL3N1QW2GH>
11. Tellurian Corporate Presentation, 1st October <https://ir.tellurianinc.com/presentations>
12. <http://www.cheniere.com/terminals/corpus-christi-project/liquefaction-facilities-midscale-trains/>
13. <https://www.macrobusiness.com.au/2018/03/energy-crisis-deepens-gas-reserves-evaporate/>
14. www.ventureglobalng.com and <https://www.federalregister.gov/documents/2017/12/05/2017-26139/venture-global-calcasieu-pass-llc-transcameron-pipeline-llc-notice-of-schedule-for-environmental>
15. The Principle of Project Finance, Rod Morrison, Gower Publishing 2012, Chapter 16 Project Financing LNG Projects, David Ledesma



Glossary / Definitions

1. The security package can include the equity investment of sponsors made prior to loan disbursement, engineering, procurement and construction contracts, sponsor completion guarantees, availability of start-up working capital, implementation of a trustee revenue account offshore (i.e. escrow account), prioritisation of insurance proceeds, any liens over property, sovereign assurances (if applicable) and prioritisation of fund allocation (the cash 'Waterfall')
2. 'Tipping Point' as defined in this paper - the point in the market at which a cargo of LNG can be bought and sold and can be delivered into multiple liquid trading markets without limit and having a major impact on the market price
3. Definitions
JV – Joint Venture
LT – Long-Term
SPV – Special Purpose Vehicle
IOC – International Oil Company
NOC – National Oil Company
High credit (AAA or AA) – highest credit rated companies that can trade usually without bank or parent company guarantees