The dynamism of LNG markets as seen from the business front

For the IEEJ

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LNG –Worldwide Ltd

CONTEXT : Japan is and will remain the largest LNG importing country through the next decade – but has a lot of uncertainties to manage

Japan

- **Committed to "Getting the import price right"**
- **Driving commercial changes in LNG procurement**
- **Structural changes in the downstream utilities sector**

- **Japanese LNG demand uncertainties**
  - Nuclear restarts when and how many ?
  - 18Mtpa of Australian projects – uncertain start up efficiency
  - 16Mtpa US LNG projects - start up, economics, how much for Japan?
  - 30Mtpa of expiring contracts need to be managed

What Japan does next
Affects the wider
Global LNG business

Global Uncertainty

- Oil price development
- Global LNG supply: demand: pricing fundamentals more unpredictable

Much more uncertainty
More LNG competitors

2020 LNG Business environment

- **Will change significantly !**
  - More market liquidity
  - More players – Japan will have several new competitors
  - More commercial choices
  - More commercial risks to evaluate

Different motivations

Structure of the presentation

1 The current business environment

2 Global LNG supply and demand "Base Case"

3 Supply issues - detail

4. Demand issues - detail

5 Trends in regional prices, impact on the Asian Hub concept

6 Are these changes good for Japan's LNG industry?

1 The Current Global Business Environment

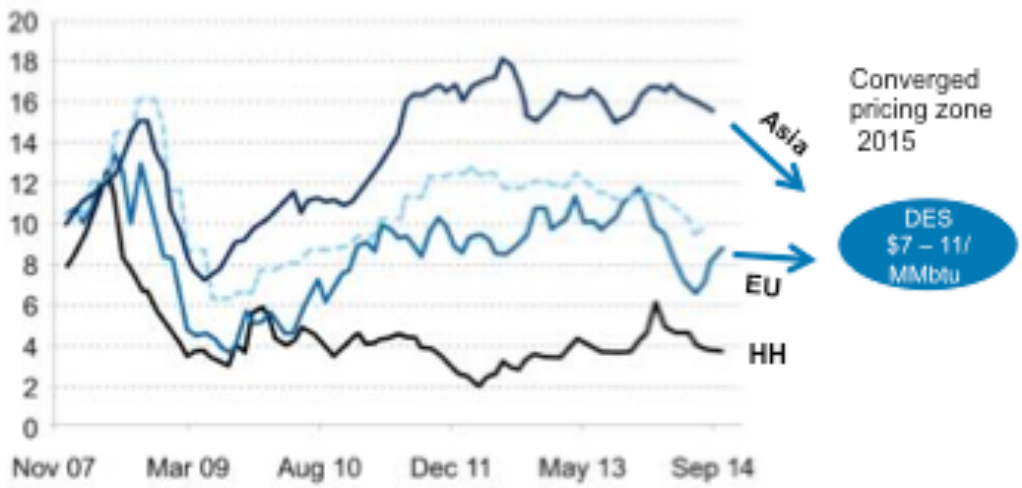
Oil Price	Fallen 49% in last 6 months	Unstable outlook - Current planning range appears:- $45-75/bbl in 2015 $70-120/bbl longer term
Oil supply	Higher than demand	Weakening global economy - No immediate plans to cut back supply
US Shale	No significant cutbacks	Up 1.2Mbd in 2014, global demand only up 0.8Mbd
OPEC	Holding output up	Projected to be 1Mbd higher than its 2015 demand
US export policy	Relaxed ban on condensate exports	Congress would need to lift it These will target Asia and compete the oil price lower
Effects of lower prices	Short term	May not result in more demand – but allows Governments to reduce subsidies
	Longer term	New markets intending to switch from oil may not be incentivised New markets with Govt support to switch to gas may start to grow quickly
Oil price setting mechanism	Unclear	Who will ultimately set the oil price? i) OPEC? ii) Independent US shale oil producers ? How long will it take to get to a stable mechanism?

The effects of low / unstable oil prices on LNG

Low oil prices short term are good for buyers, big loss of early cash flow for new LNG start-ups

Short term	$70/bbl oil price	Good for buyers	1. Term Asian DES LNG ~ $10/MMbtu NBP ~ $8/MMbtu 2. LNG Plants will operate at full capacity 3. Start up of new Australian / Asian LNG - helps balance Asia - downward pressure on short term LNG prices. - regional market prices tend to converge

DES market prices($/MMbtu) converging in 2015

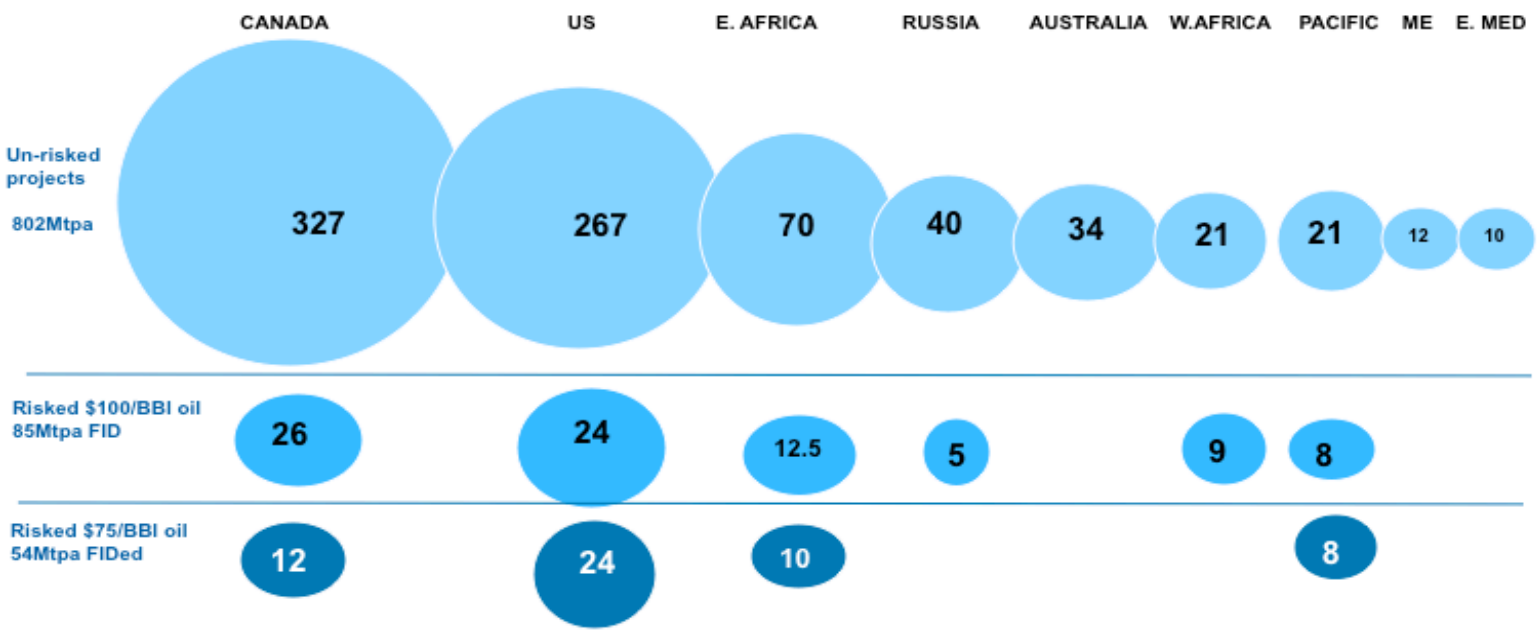


The effects of low / unstable oil prices on new LNG development

Low and uncertain oil prices slow down at least 30Mtpa of new projects from taking FID

2015/16 FIDs Conventional projects	Big negative impact	Sponsors/ lenders likely to test economics at $50-75/bbl oil Most DES cost stacks marginal at $75/bbl oil Greenfield projects worst affected – delays or cancellations expected Brownfield expansions – likely to be robust Equity off-take model is the most robust
2015/16 FIDs US tolling projects	Advanced projects Robust	Projects with signed SPAs and well advanced with permitting likely to proceed. Less mature projects face delay / cancellation Less buyers willing to take oil:HH oil spread risks and large volumes

2015/2016 FIDs for new supply capacity are impacted



2 Global Supply demand "Base Case" 2015 – 2020

Several supply and demand uncertainties to consider

135 Mtpa LNG supply start ups include

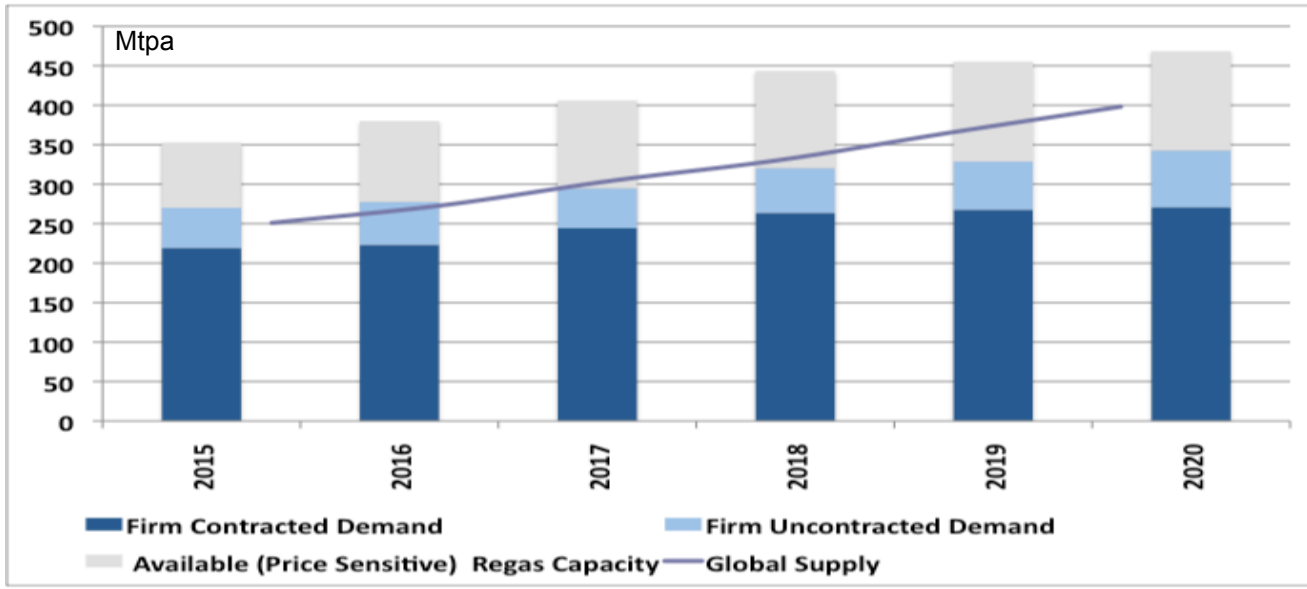
- 14 Australian trains (61.8Mtpa)
- 10 USLNG trains (45.6Mtpa)
- 3 Russian trains (16.5Mtpa)

52Mtpa Expiring contracts

- 42Mtpa expiring in Asia by 2020
- 10Mtpa expiring in the Atlantic Basin by 2020
- Rolled over – remarketed- or retained domestically

New Capacity FIDs in 2015

- 54Mtpa potential – only half on stream by 2020
- USLNG looks set to dominate
- Brownfield expansions likely
- Will Canada & Mozambique take the plunge ?



Nuclear competition

Japanese LNG demand

S. Korean LNG demand

Coal and pipeline gas competition

Chinese LNG demand

Oil switching demand

Less incentive to switch to LNG at lower oil prices

Price sensitive LNG demand

India and Indonesia could grow quickly (10Mtpa each) if

Govt. supported

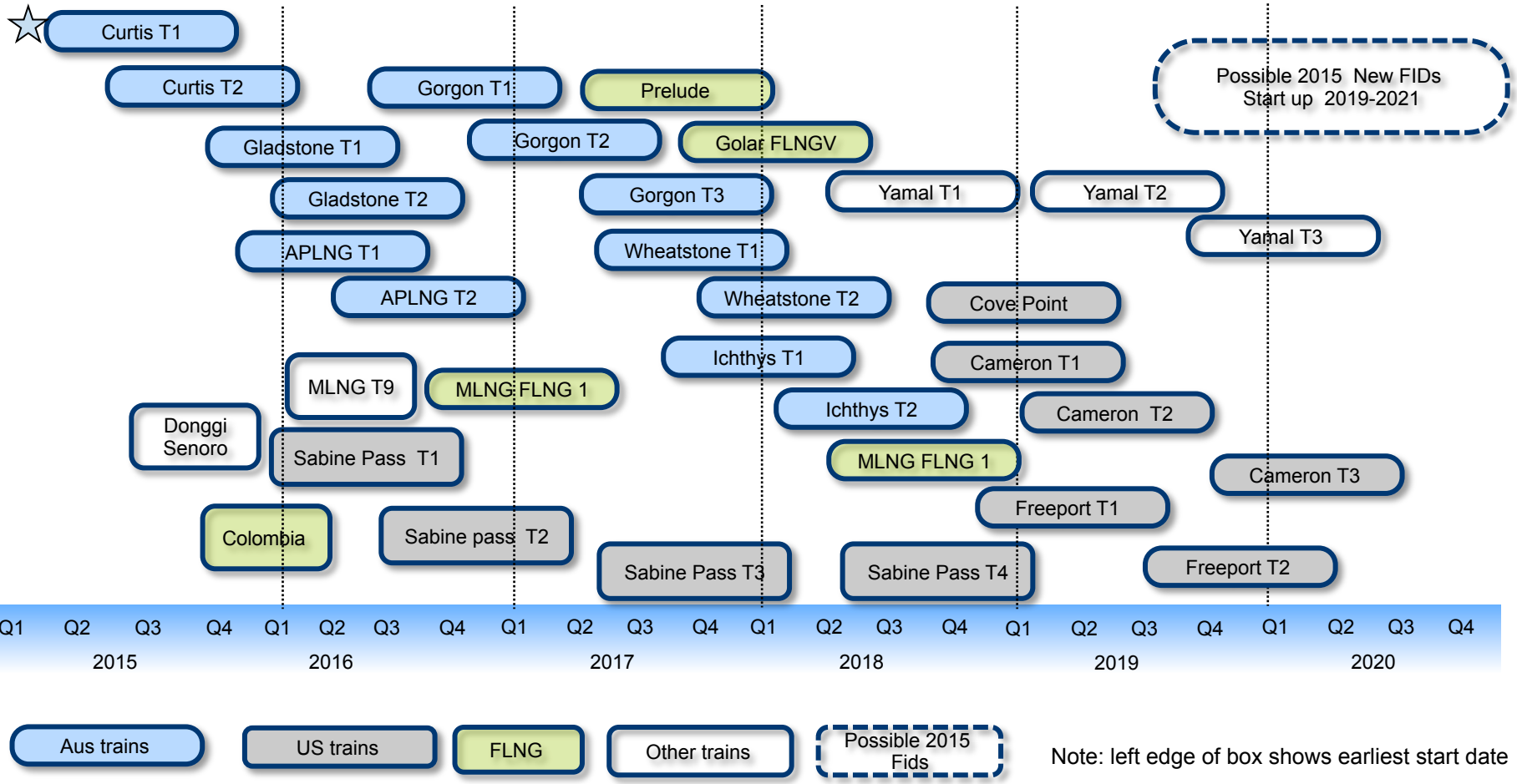
"Sudden" LNG demand

Eu response to any Russian pipeline disruptions

Severe weather effects

3 Global Supply:- an unprecedented build up of 135 Mtpa new capacity

Exact phasing uncertain
Not all committed long term , > 50Mtpa can be diverted by the buyer/ off-taker
Delays will increase Asian short term demand - Japan has committed to 35Mtpa from Australia and up to 14Mtpa from the US



Aus trains | US trains | FLNG | Other trains | Possible 2015 Fids

Note: left edge of box shows earliest start date

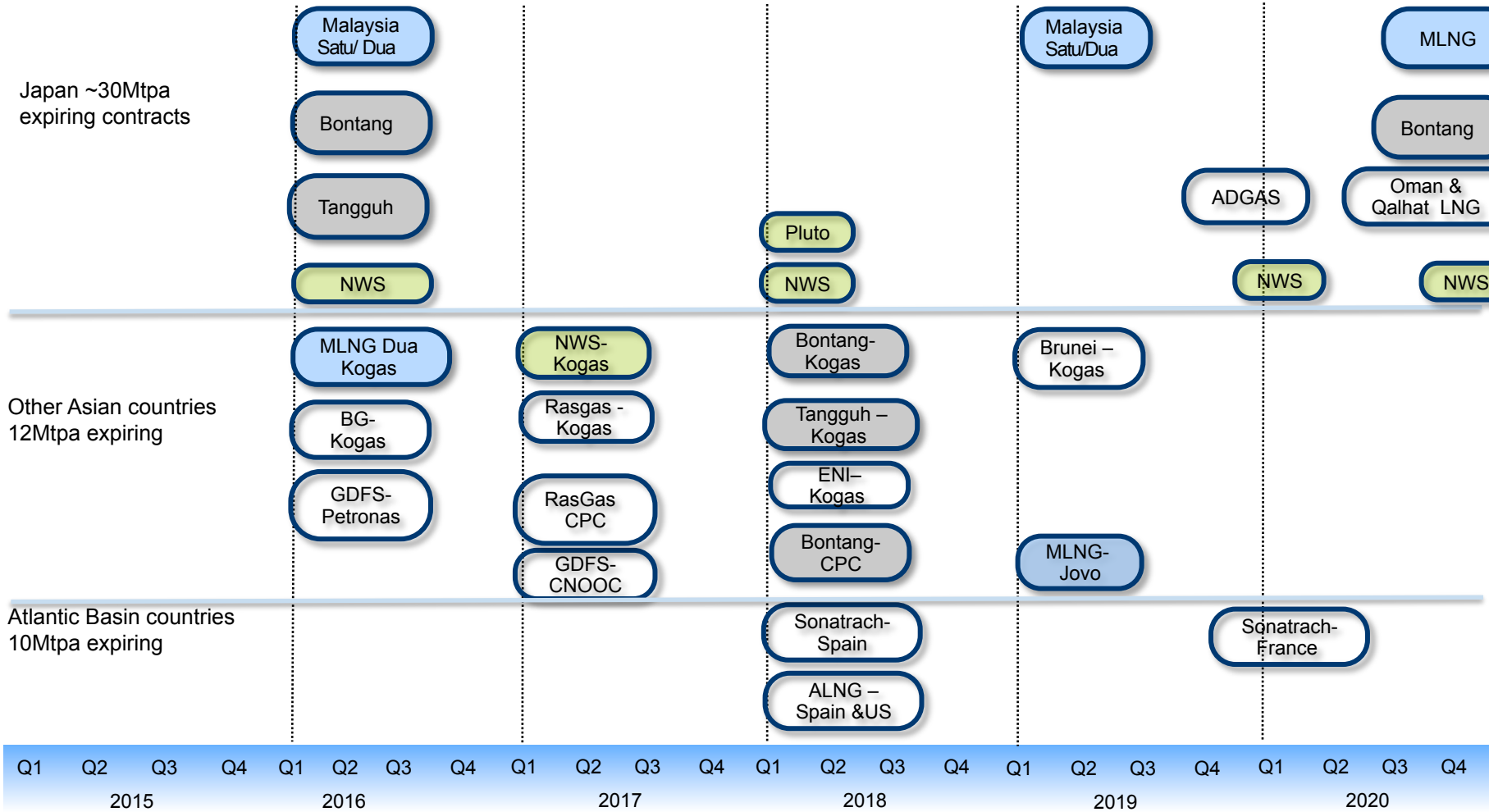
☆ 1st cargo loaded end December 2014

Global Supply:- 52mtpa of expiring contracts before end 2020

Japan has ~30Mtpa of term contracts expiring before the end of 2020. Malaysia and Indonesia account for approximately half of the volumes

Seller's will want to re-contract available volumes – but US and flexible contracts mean much more LNG- on –LNG competition

Some sellers will retain the gas for domestic use

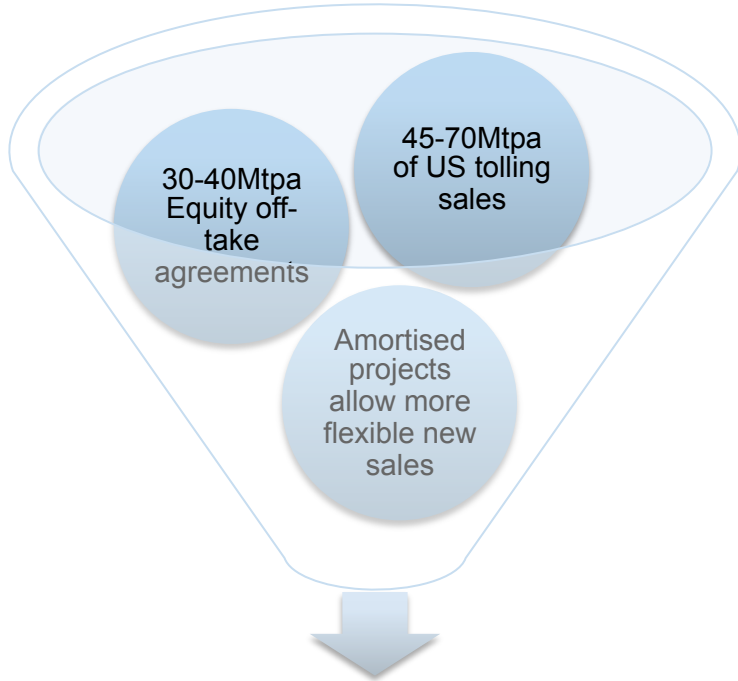


Global Supply:- By 2020 the LNG supply pool has a lot of new flexibility

New supply models have flexible features – but pass on several operational and pricing risks to buyers/ off-takers

See more LNG on LNG competition in the regional markets.

We will have to learn how to quantify and value flexibility in new LNG contracts



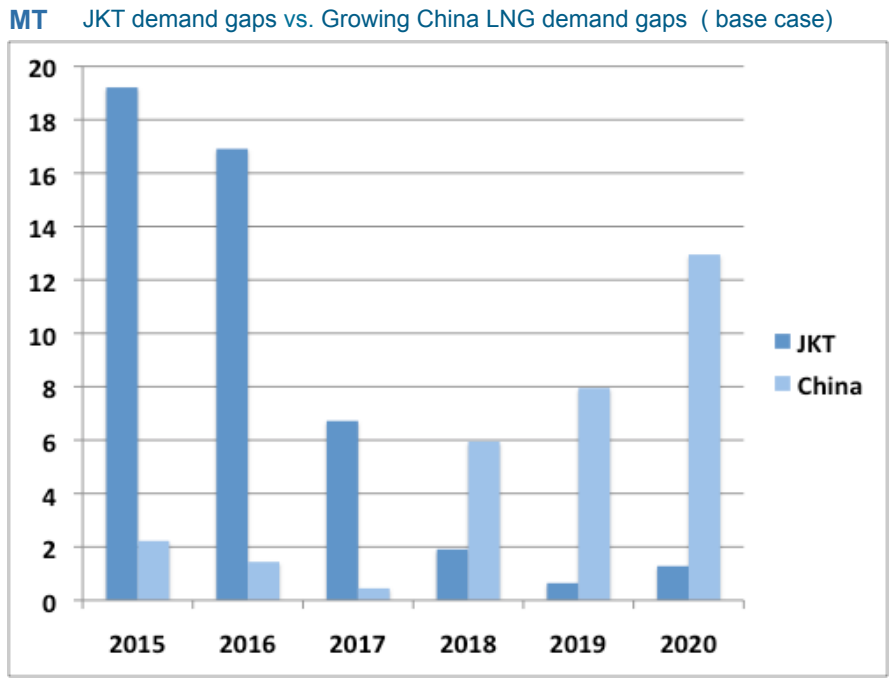
2020 Global supply pool~ 400Mtpa

100Mtpa of new flexible LNG controlled directly by buyers, portfolio players and LNG sellers who can be more flexible in their sales

Pool may grow - depending on success of 2015 FIDs

4 Global demand:- China's LNG demand is a big issue to watch

Mature Asia's new LNG demand falls significantly by 2020, whereas China's grows



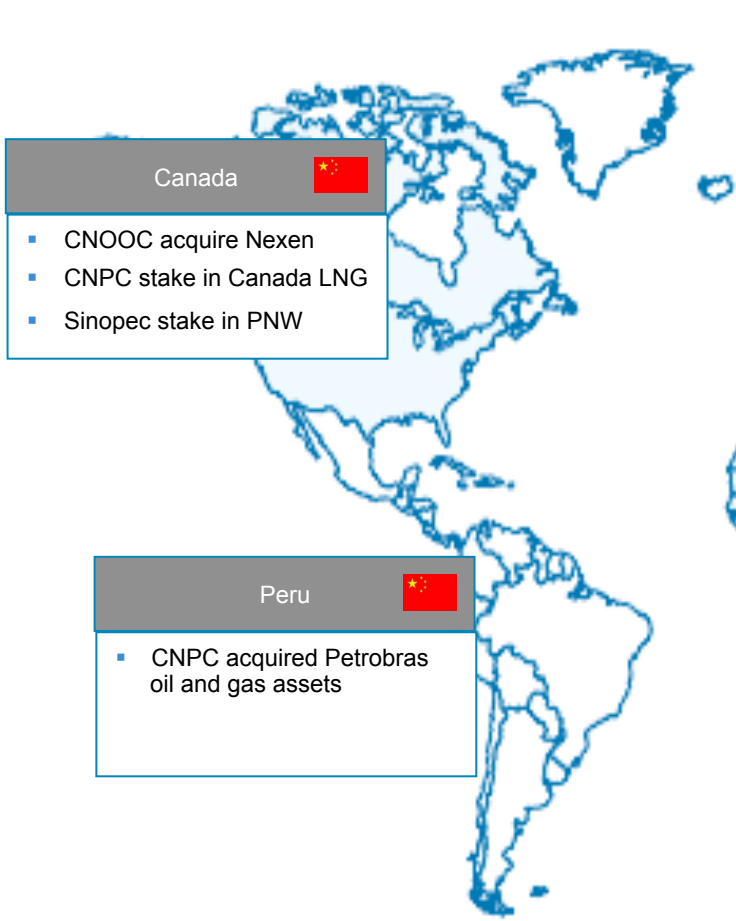
Big change: Dominant Asian buyer is likely to be China

Big responsibility for the Chinese Government to-

- Leverage large Government - Government energy deals
- Elect which countries/ companies to support to develop new LNG supply and when

What China does will impact the rest of the Global LNG business

China's Geopolitics will have a strong influence on its LNG development



Canada

- CNOOC acquire Nexen
- CNPC stake in Canada LNG
- Sinopec stake in PNW

Russia

- Russian – Chinese energy cooperation
- CNPC equity in Yamal LNG and financing
- Pipelines will compete with LNG 38bcma Pipeline deal, expandable to 62bcma

30bcma Altai Pipeline HOA

Peru

- CNPC acquired Petrobras oil and gas assets

Mozambique

- CNPC buys equity stake from ENI
- HOAs with China for LNG purchase from Moz LNG

Australia

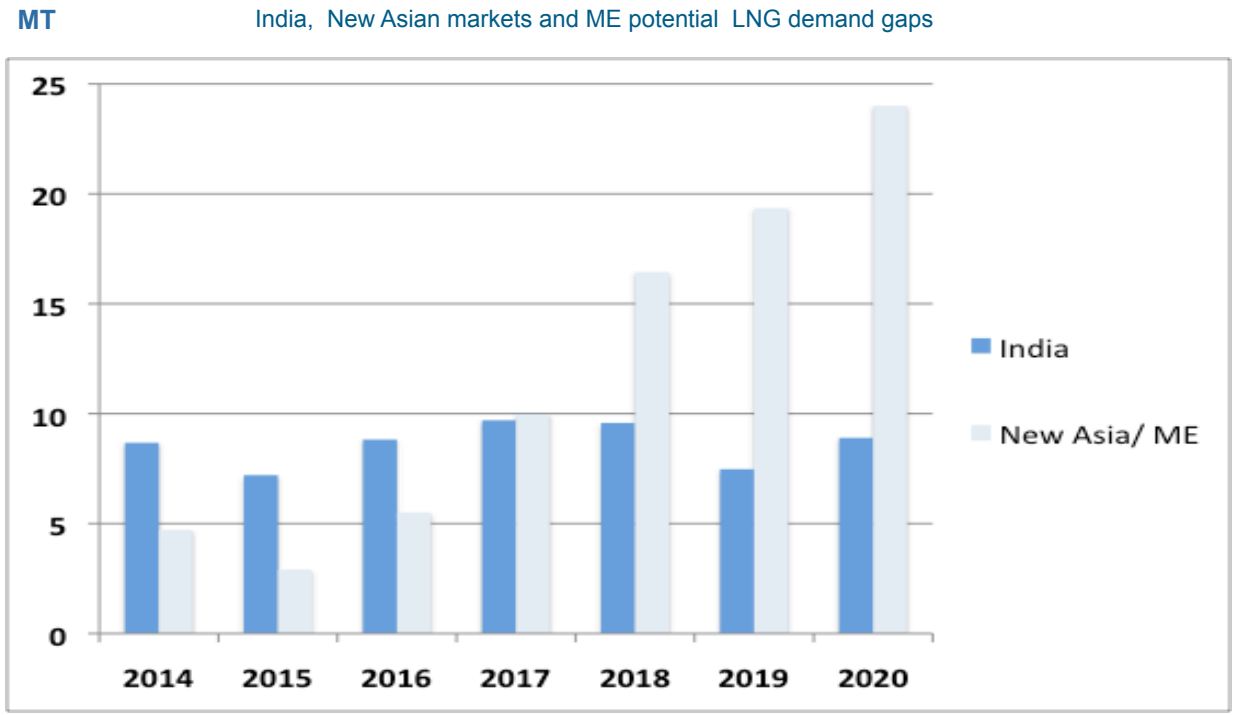
- CNOOC equity in QCLNG
- Sinopec equity in APLNG
- CNPC/ Shell Arrow JV
- SPAs from other Aus projects

China has the biggest single country LNG demand growth to 2020 which is as yet un-contracted (approx 15Mtpa).

Its procurement is directed by geopolitics and preference for an equity off-take LNG business model – Note the lack of direct engagement with USLNG

Global demand:- Other new demand growing in Asia

Mostly price sensitive demand – India and Indonesia are the ones to watch if DES Asia prices stay around $10/MMbtu .



New competitors for Japan also include India and Indonesia

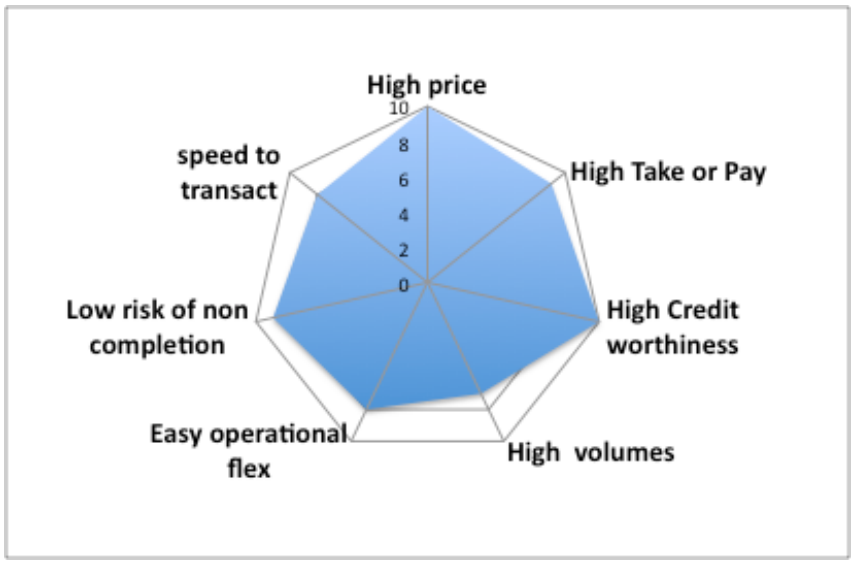
Big decisions for the Indian and Indonesian governments regarding their commitment to long term LNG imports at full international prices.

Currently the base case does NOT include the full effects of their demand potential

Global demand:- Changing characteristics of new LNG buyers

Generally new buyers will become more challenging for Sellers

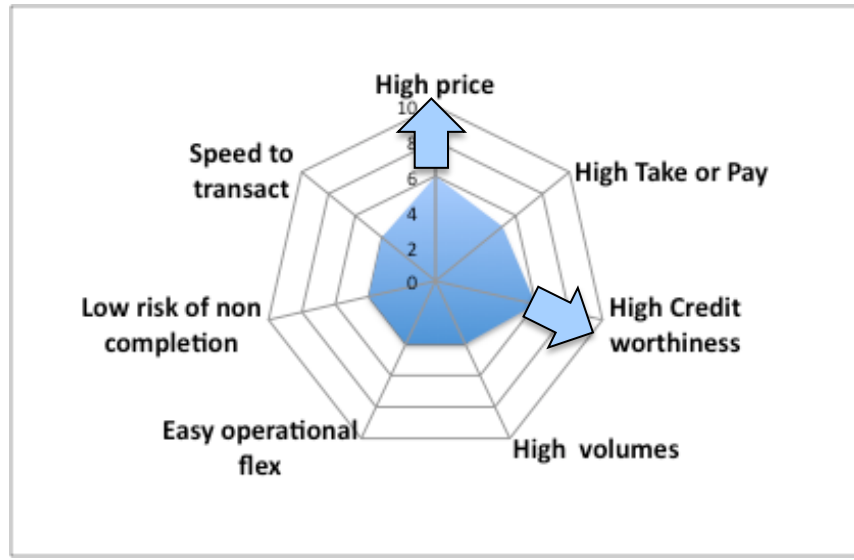
Mature Markets characteristics



Mature Buyers in Asia have helped the industry grow using a balanced risk reward investment model

But have committed most of their new demand to US and Canadian projects

New and emerging markets characteristics



Markets displacing oil may pay higher prices

Markets with State Owned co may be credit worthy

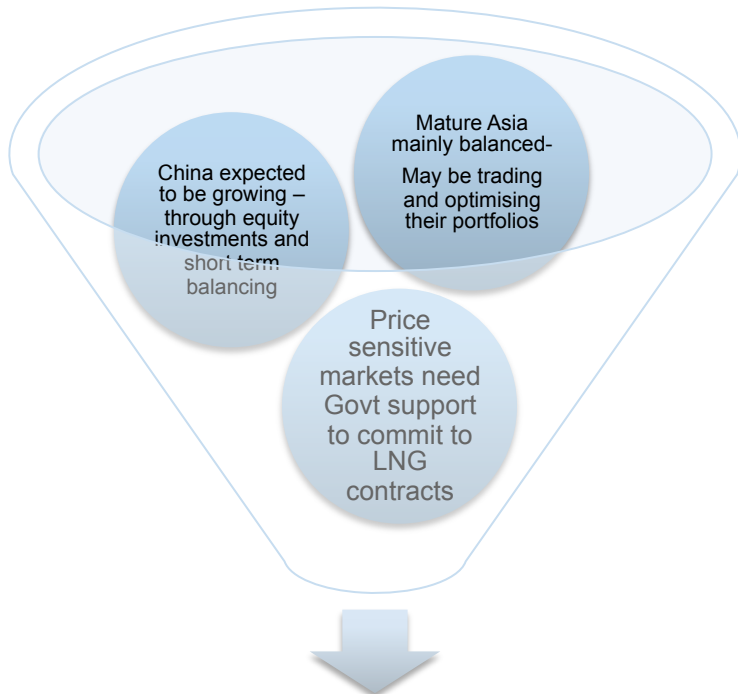
Innovative commercial contracts will be needed to supply these new buyers

Global Demand:- By 2020 LNG buyers are more diverse and demand much more flexibility

New LNG tolling models have more flexible features – but pass on several operational and pricing risks to buyers/ off- takers

Overall , they are likely to create more LNG on LNG competition in the regional markets.

We will have to learn how to quantify and value flexibility in new LNG contracts



Sellers need to respond to the new characteristics of buyers.

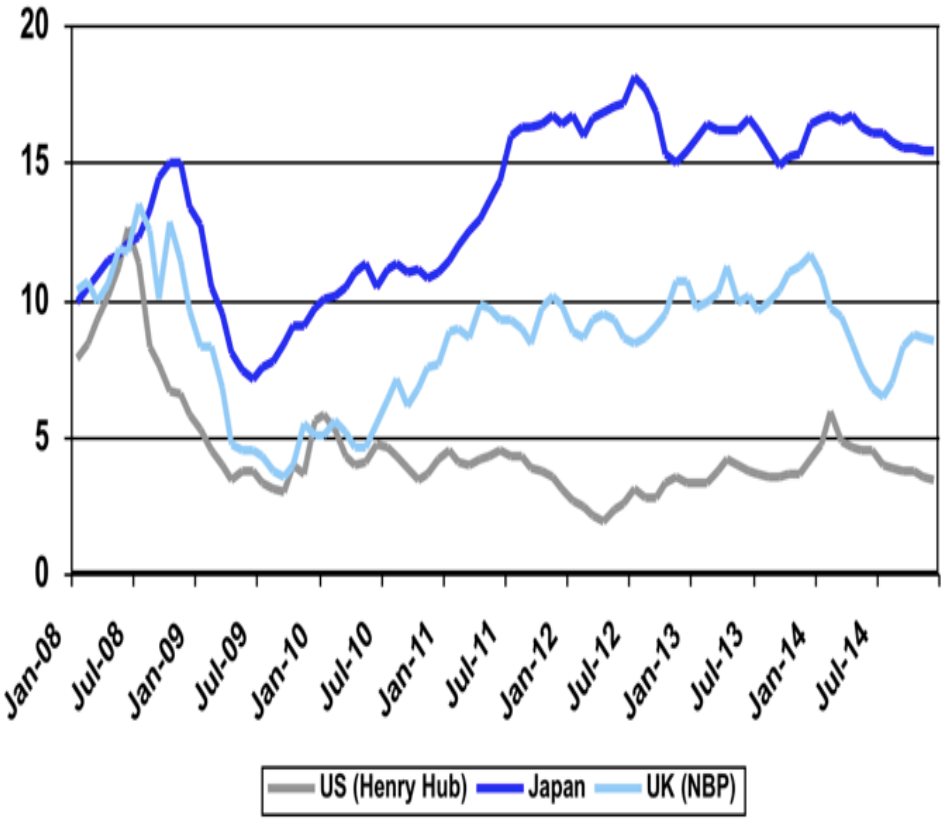
They will look for niche markets (in Asia , S . America, Europe)

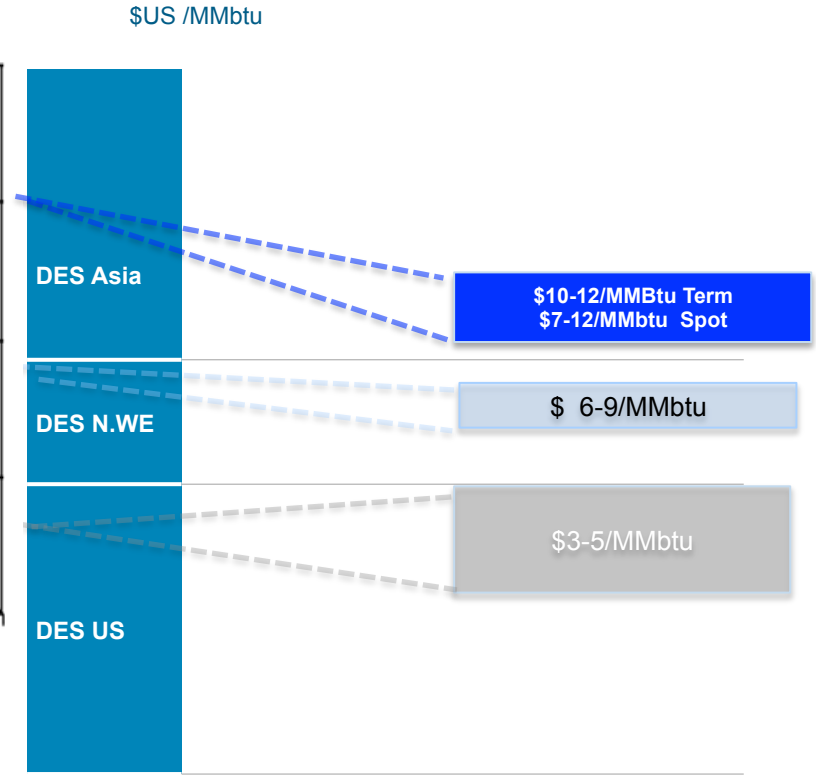
but ready to trade short term

N.WE likely to be the balancing market for marginal LNG

5 Where might regional LNG pricing head ?

Pricing History | Trends | 2015 | 2020





Assumptions

LNG supply demand base case (Slide 7)

Oil price minimum $45/bbl (2015 short term low)

Rising to $80/bbl by 2020

Do we need an Asian LNG hub – or simply a more dynamic Asian price?

Base Case assumptions	More market liquidity is developing More short term transactions likely More operational flexibility likely from sellers competing for sales	**Dynamic, market responsive pricing is the key for Asian buyers** **The market dynamics are now pushing in this direction**
A HUB location	**A lower oil price world does not easily support the economics of entrepot storage/ reloading of vessels** - **Better to freight directly to end user markets** - **Arbitrage plays generally reduce as market balances** - **Expect short term imbalances and weather effects** - **Terminal reloads capability can promote arbitrage trading**	**May not be needed formally** **But Singapore offers operational flexibility**
New pricing indexes	- US FOB LNG quotation likely to develop if US LNG becomes traded - New Asian indices also likely	**A virtual hub with a spot Asia LNG price such as JKM or OTC quotation is achievable** **A desired 'Normal " range of prices would be NBP+$1/MMbtu (minimum) to Term Asia DES price (maximum)**
Current 2020 Outlook	- Europe is the natural LNG trading hub - Pipelines / LNG infrastructure - flexible sinks or source of LNG - N.WE already has market liquidity - N.WE has secondary markets to clear gas daily	**May see companies taking Eu regas capacity as a global LNG trading option**

6 Are the changes good for Japan's LNG industry?

		Overall perspective
1 **Oil price fall**	• Good short term for buyers • Damages early cash flow for new projects	✔ For Japanese buyers ✖ Japanese Equity investors
2 **Oil price instability**	• Will delay or cancel at least 30Mtpa projects in 2015 • Can Canada or Mozambique launch without price floors? • Short term US not affected – difficult to find sales for 2016+ FIDs	✖ Global capacity growth Slows down *
3 **Short term sales**	• Confidence in liquidity - leads buyers more short term • Amortised projects can sell short term	✔ More liquidity to manage short term imbalances
4 **Long term sales**	• Industry needs LT sales around $12-15/MMbtu for new projects • Buyers will need more responsive pricing/ operational	✔ Unclear how many new LT sales Japan needs – but can leverage its position
5 **LNG on LNG competition**	• Innovation from sellers to secure sales to top tier buyers. Flexibility is NOT free - will be quantified – costed into transaction • More choices for buyers – but BEWARE the risks!!	✔ Asian price ranges Floor : NBP linked Ceiling: Term contract linked
6 **New Business Models**	• US Tolling Model will be a significant component of new LNG sales • Some buyers will become global portfolio players • Equity off-take model appears attractive both for sponsors and buyers	✔ Japanese buyers need to manage their supply more dynamically
7 **More diverse LNG community**	• New Asian buyers more dominant • More Buyers assuming the portfolio player role • More LNG traders • More risk managers • More transparency	✔ Good for large energy Companies ✖ Small, inflexible, inexperienced Players disadvantaged

- Can a slowdown force innovations to LNG construction costs??

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- LNG supply / demand and pricing Analysis and Forecasting
- LNG Commercial agreements – advice, negotiation and evaluation
- Expert witness for commercial disputes
- CWC – School for Energy Commercial skills Lead trainer
- CWC Group LNG World Series conferences- Chairman and associate Director
- Tullett Prebon LNG Trading consultancy And co-author to subscription Monthly market reports
- CASS business school London Lecturer / Examiner MSc Energy/ Trade/Finance

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