Developments in global gas markets & the impact on Asia
LNG - my flexible friend in the face of uncertainty

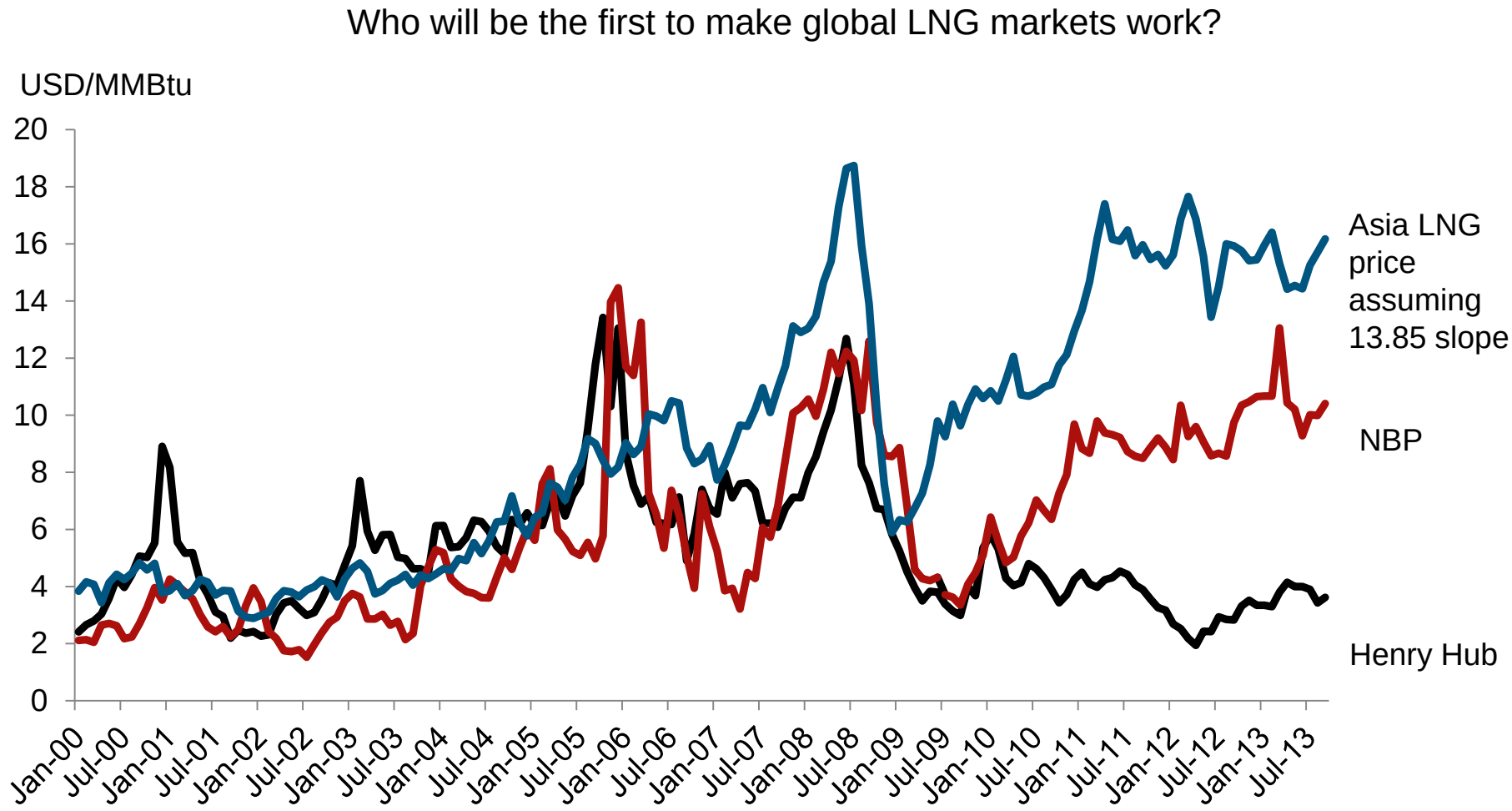
Neil Semple – Singapore Round Table October 2013

THE LANTAU GROUP
strategy & economic consulting

Key takeaways

- Post Fukushima Japan has been a sledgehammer on the LNG market
  - Huge value on flexibility
  - Big player in the diversion market
  - Buying power to gain access to US LNG supplies
- US LNG is entering a new phase in terms of potential impact on Asia
  - Not as cheap as might be expected
  - But very flexible
- Flexibility is becoming much more important and valuable throughout Asia
  - China and India are still behind, but
  - SE Asia is poised to reap benefits if regulatory and policy settings will allow

That thing that everyone now knows? Well, its still around….



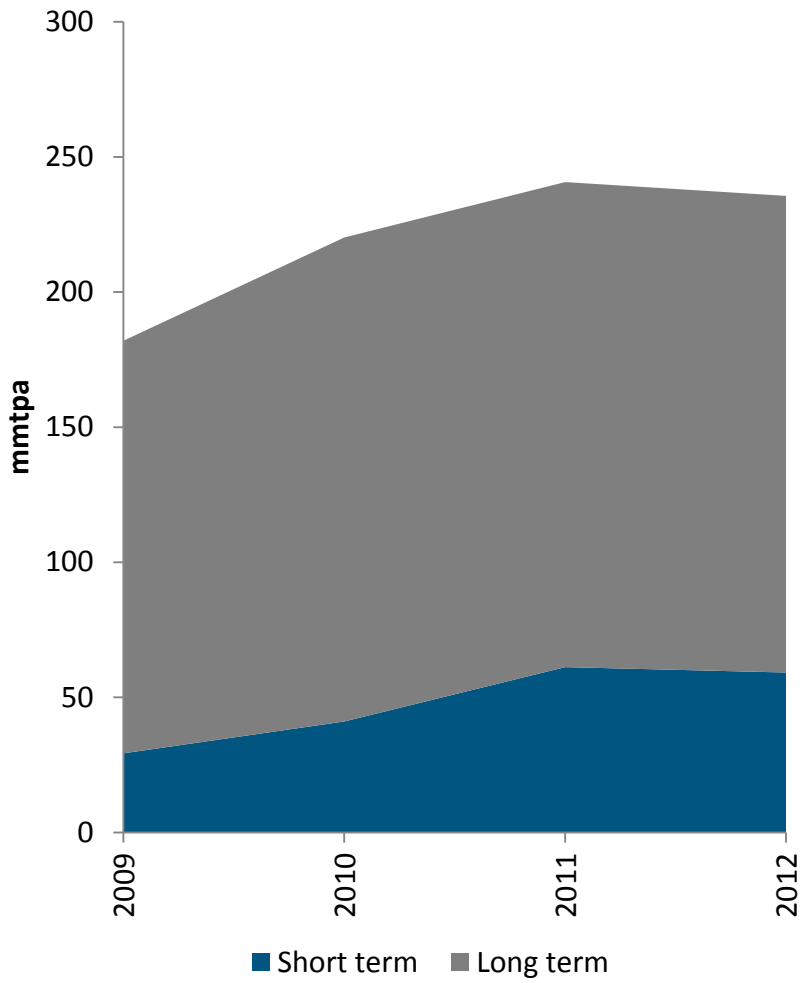
Source: NYMEX, UK DECC, TLG

JAPAN?

Why Japan?

- Huge impact on the diversions market
- Increase in volumes last two years mostly from short-term LNG
- Going after US LNG export capacity – which is delinked from oil
- Faces almost unheard of fuel procurement uncertainty
- Premium on flexibility

Trend in short term cargoes

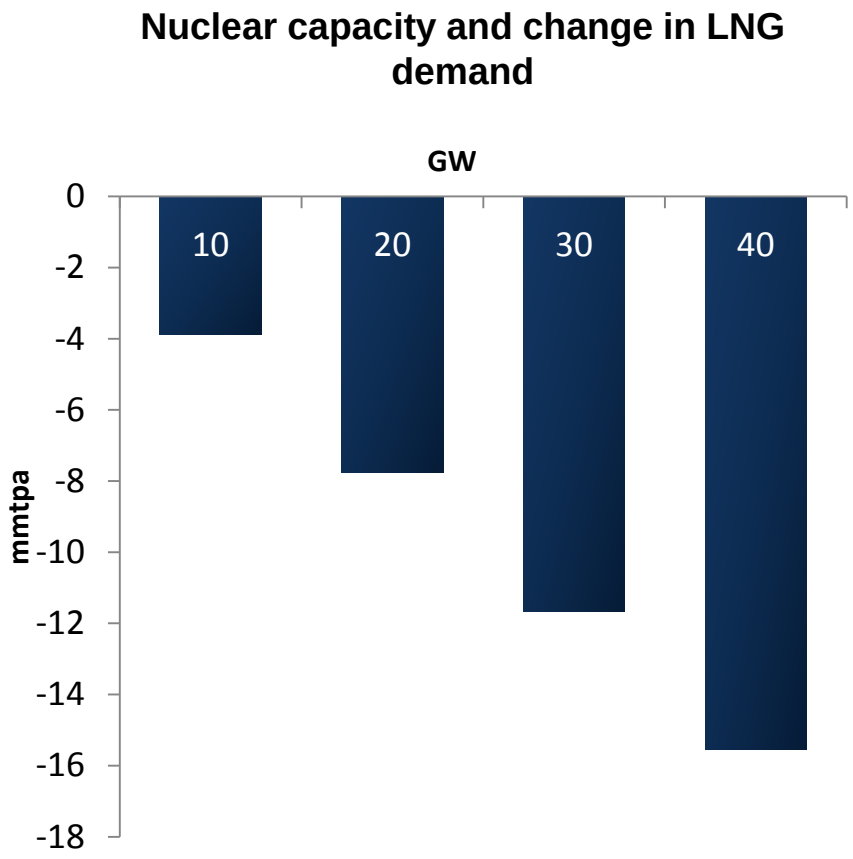


- The recent rise in short term cargoes has been driven by the need by Japan for LNG and the decline in demand for LNG in Europe.
- This was to a large extent forced on the industry but does highlight what we believe will be a growing trend.
- This is driven on the supply side by US LNG which is call on the very large pool of US gas.
- And on the demand side by uncertainty on the level of demand by buyers.

Will some of Japan's nuclear units restart? If so, how many and when?

- The nuclear reactors that have applied to restart so far are all on the west coast and total 10.6GW
  - Tomari
  - Takahama
  - Ohi
  - Ikata
  - Sendai
- In addition TEPCO has aired the possibility that it would like to restart its Kashiwazaki-Kariwa facility which is also on the West coast

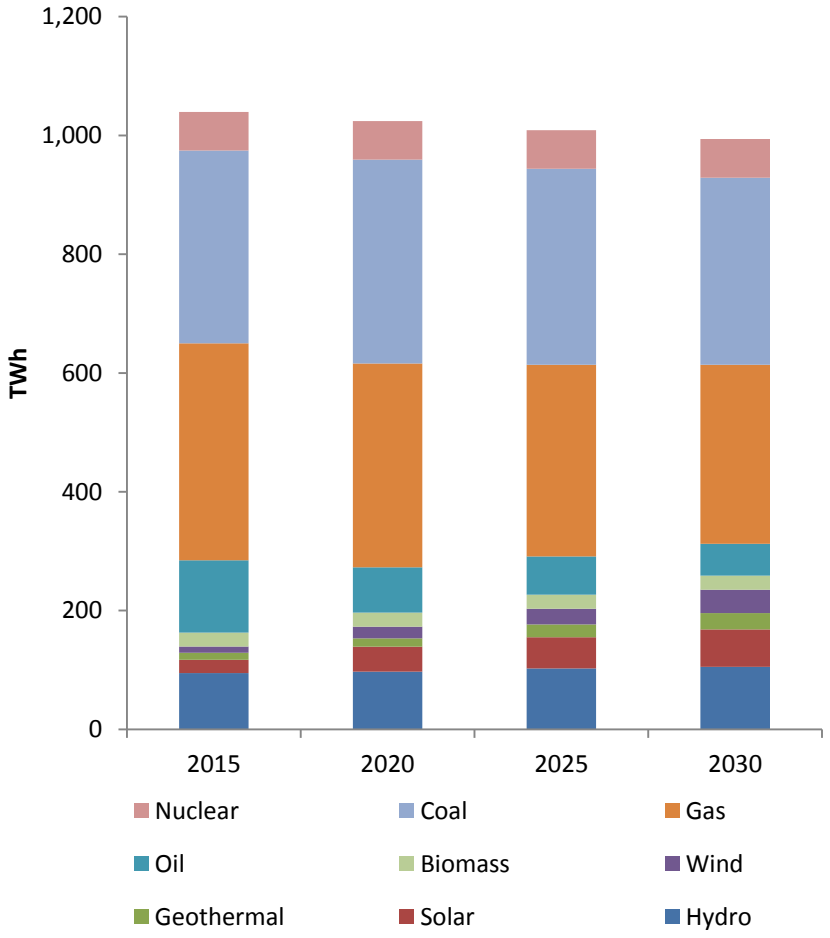
The more nuclear restarts, the less LNG imports require – flexibility on LNG is key



- Half of Japan's post Fukushima fuel response has come from LNG and a quarter from fuel oil and a quarter from crude oil
  - Japan has turned LNG into a flexible fuel source like oil
- For every ~10 GW of nuclear restarts LNG import requirements fall by about 4 mmtpa
- But how much and when?
- **Uncertainty requires flexibility!**

Japan's renewables uptake is another story

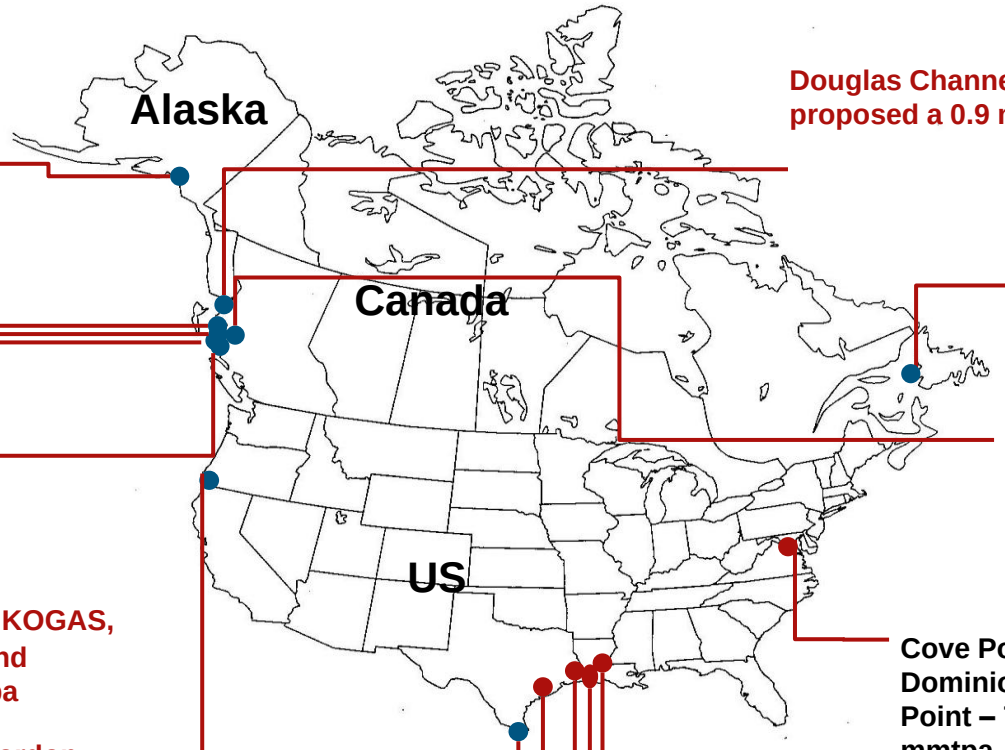
Power generation by fuel type



- Avoiding higher oil and LNG import costs makes renewables more attractive
- Factoring in environmental benefits – particularly carbon – can make more renewable projects throughout SE Asia economic if the renewables output displaces at least some oil or LNG through peaking units
- Japan has proceeded aggressively – having attracted 3.5 GW of solar power to date
- While these have extra value due to environmental and a fuel displacement economics – they also require flexible system support
- **More uncertainty and more need for flexibility!**

US LNG: THE “FLEXIBILITY ENABLER”

The many LNG export projects planned in the US and Canada could further disrupt global LNG pricing, depending on timing and demand



Valdez LNG by Alaska Gasline Port Authority and others – 18 mmtpa

Kitimat LNG Chevron, Apache – 10 mmtpa

Prince Rupert – BG - 14 mmtpa project

West Coast Canada – ExxonMobil - 10 mmtpa project, expansion to 30 mmtpa

LNG Canada Shell, KOGAS, Mitsubishi, CNPC and Petrochina 12 mmtpa

Jordan Cove by Jordon Cove Energy – 8.7 mmtpa

Gulf Coast LNG by Gulf Coast LNG Exports– 23 mmtpa

Freeport by Freeport LNG and Macquarie Energy – 9 mmtpa; Expand by another 10 mmtpa by using FLNG

Sabine Pass T1-4 by Cheniere – 18 mmtpa, with T5-6 adding another 9 mmtpa

Cameron by Sempra – 12.4 mmtpa

Lake Charles by BG & Southern Union – 15 mmtpa

Cove Point by Dominion Cove Point – 7.8 mmtpa

Pacific Northwest - Petronas and Inpex - 12 mmtpa

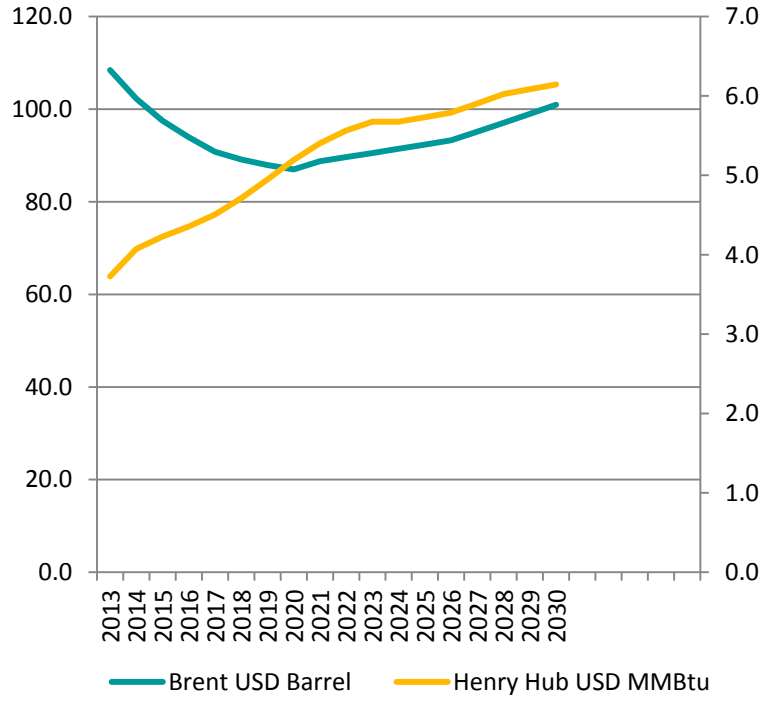
Pieridae Energy 10 mmtpa

Douglas Channel Energy Partnership proposed a 0.9 mmtpa

- Existing terminals with proposed liquefaction
- Greenfield proposed liquefaction

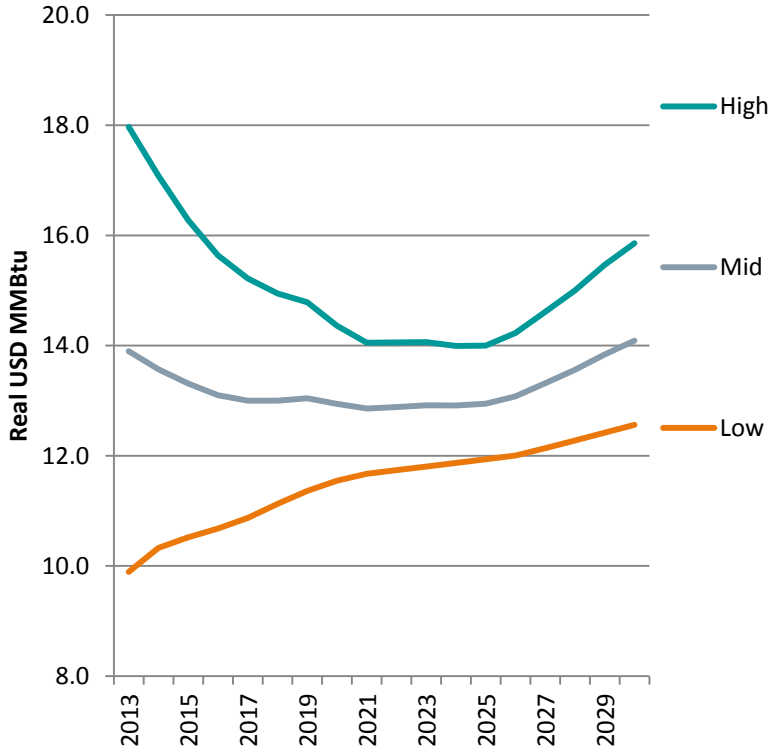
Brent and Henry Hub forecast

- Key commodities
  - Brent futures indicate a fall in real terms to 2020 due to a rise in oil production and exports from the USA. But we forecast a recovery from 2020 onwards.
  - Henry Hub slowly makes a recovery to a level to justify investment in non-liquids shale gas, that will be needed to supply local and export markets.
  - These two somewhat divergent trends have an impact on LNG price scenarios.



US LNG is cheaper than oil-linked LNG, but not perhaps as cheap as often thought

- High Case
  - This reflects the premium that we believe reliable safe established sellers such as Qatar and Australia will aim to achieve: a slope of near 15 linked to Brent. Australia also needs this kind of price formula to justify investment in new LNG plant.
- Mid Case
  - This is set by suppliers such as East Africa who will be new to the game will have to price themselves into the market. We assume a 13.5 slope half linked to Brent and the other half to Henry Hub.
- Low Case
  - This is Gulf Coast USA Henry Hub times 1.15 and liquefaction of USD 3 mmbtu. For shipping we have assumed half goes via Panama and half goes east. This Low Case rises through to the middle of next decade as Henry Hub recovers even as Brent falls.



Both the mid case and low case after regasification would give piped gas to Singapore gencos a run for its money

US LNG – it's not about the price as much as it is about the flexibility….

A NEW MODEL

US LNG buyers contract for liquefaction capacity. When they want LNG they buy it at Henry Hub prices. Then they can take it anywhere they want – resell or for own use. Tap can be turned on and off at will. The LNG price is not linked to oil.

AROUND FOR THE LONG TERM

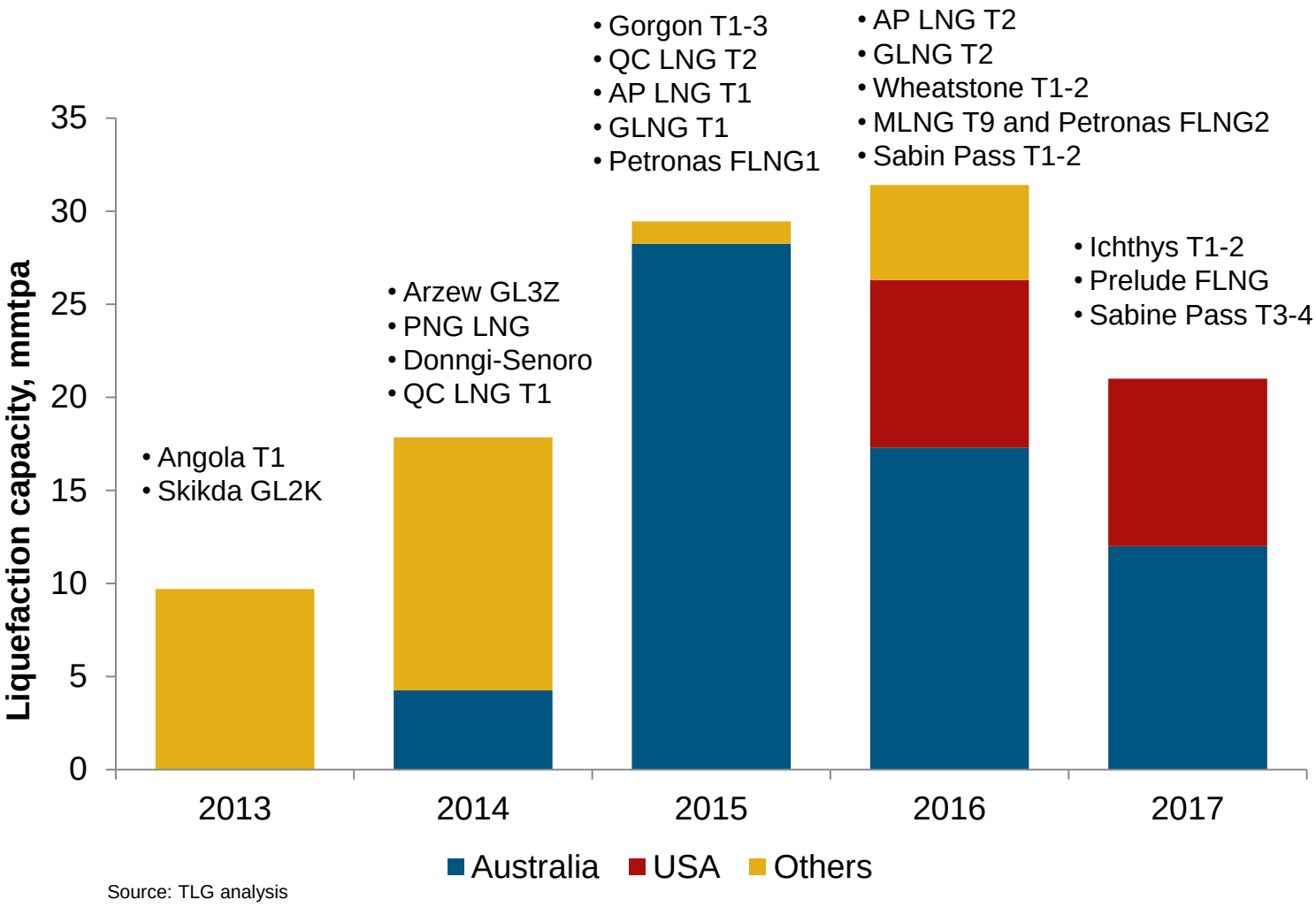
US domestic demand for natural gas is close to 24 Tcf/year and the nation has recoverable resources of some 2,200 Tcf, according to EIA data.

NOT EASILY REPLICATED

This contrasts with the Western Canadian LNG projects which are more typical in that they specify a source of gas, will build dedicated new long pipelines to get the gas to the coast, and develop liquefaction plants and then sell the LNG. Projects have some buyer participation but at the moment are led by traditional LNG majors and aspirants. Pricing might be oil linked or linked to AECO (Canadian version of Henry Hub).

Australia developing traditional LNG for Asia, with US LNG coming a few years later

LNG liquefaction projects under construction/reached FID, 2013-2017



Source: TLG analysis

- The near term LNG capacity will be mainly from Atlantic basin, which used to export LNG to Europe and US. With the low demand in Europe and no demand in US, most of the new Atlantic LNG is expected to be directed to Asia.
- Large amount of new committed LNG volumes from Australia will start to enter the market from 2015 onwards.
- US LNG will start to export to Asia from 2016

The flexible and swing segment of the Asian LNG market reaches nearly 30% of new capacity by 2017

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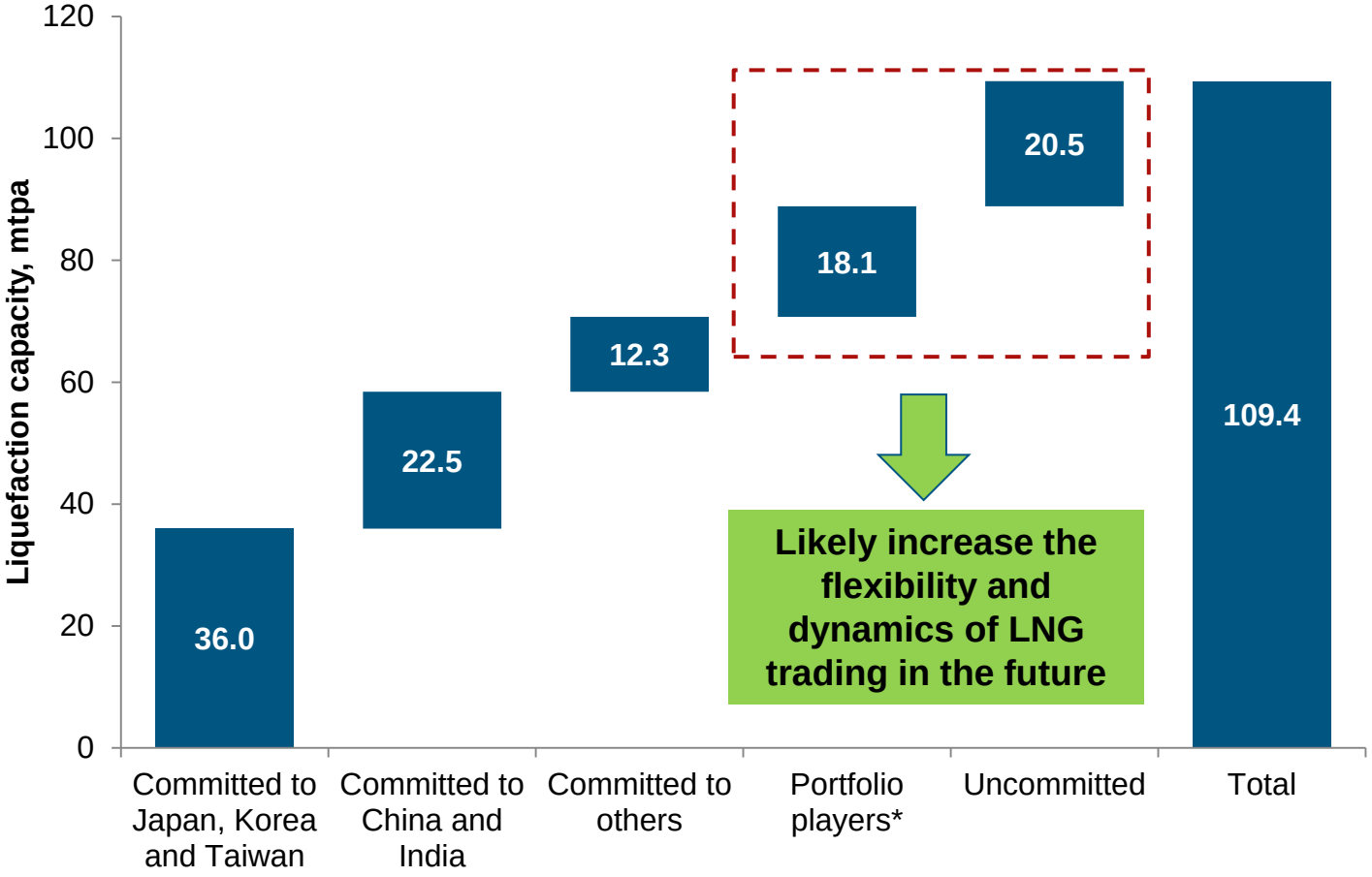


Note: Portfolio players' share exclude the volumes that are committed to buyers in a specific project
Source: TLG analysis

- Portfolio players (such as BG, BP, Shell and Total etc) have contracted 18.1 mmtpa of LNG from the committed LNG capacity, which have no firm destination.
- 20.5 mmtpa of LNG is also uncommitted for the committed LNG liquefaction capacity.
- **All these could lead to more flexible LNG trading in the future**

Out of the total of about 200 mmtpa of capacity applied to the DOE, 46 mmtpa has been approved for export to non-FTA countries

Group	Project	DOE application				FERC application			Capacity, mmtpa	
		Requested volume, bcfd	FTA approved	Non-FTA application submitted	Non-FTA approved / DOE order	Pre-filling completed	Filing completed	Filing approved	Terminal total	Group total
Non-FTA approved	Sabine Pass 1-4	2.2	✓	✓	✓	✓	✓	✓	18.0	46.4
	Freeport 1-2	1.4	✓	✓	✓	✓	✓		8.8	
	Lake Charles	2.0	✓	✓	✓	✓	✓		15.0	
	Dominion Cove Point	1.0	✓	✓	✓	✓	✓		4.6	
Non-FTA pending, filed with FERC	Freeport 3	1.4	✓	✓	1	✓	✓		4.4	45.5
	Cameron	1.7	✓	✓	2	✓	✓		12.0	
	Jordan Cove Point	1.2	✓	✓	3	✓	✓		6.0	
	Oregon LNG	1.3	✓	✓	4	✓	✓		9.6	
	Corpus Christi	2.1	✓	✓	5	✓	✓		13.5	
Non-FTA pending, pre-filed with FERC	Excelerate	1.4	✓	✓	6	✓			8.8	30.4
	Southern	0.5	✓	✓	8	✓			2.5	
	Gulf LNG	1.5	✓	✓	9	✓			2.1	
	Sabine Pass 5-6 Total	0.3	✓	✓	14	✓			2.0	
	Sabine Pass 5-6 Centrica	0.2	✓	✓	15	✓			1.8	
	Sabine Pass 5-6 Uncommitted	0.9	pending	✓	19	✓			5.3	
	CE FLNG	1.1	✓	✓	10	✓			8.0	
Non-FTA pending, no FERC pre-filing	Gulf Coast	2.8	✓	✓	7				20.6	73.2
	Golden Pass	2.6	✓	✓	11				15.6	
	Pangea	1.1	✓	✓	12				8.0	
	Main Pass	3.2	✓	✓	13				24.0	
	Venture	0.7	pending	✓	16				5.0	
Only applied for FTA license	Waller	0.2	✓						1.3	6.8
	Magnolia	0.5	✓			✓			4.0	
	Gasfin	0.2	✓						1.5	

The North America LNG projects in 2018-2025 are poised to amplify the disruptive influences of Japan (demand uncertainty) and Australia, East Africa (new supply)

LNG Liquefaction Capacity, mmtpa

	Under Construction or reach FID (2013-2017)	Likely projects (2018-2025)	Other announced projects
Australia	61.8	12	36.0
US	18	53.8	130.5
Canada		17	52.6
Africa		30	41.4
Other countries	29.6	15	86.8
Total	**109.4**	**127.8**	**347.3**

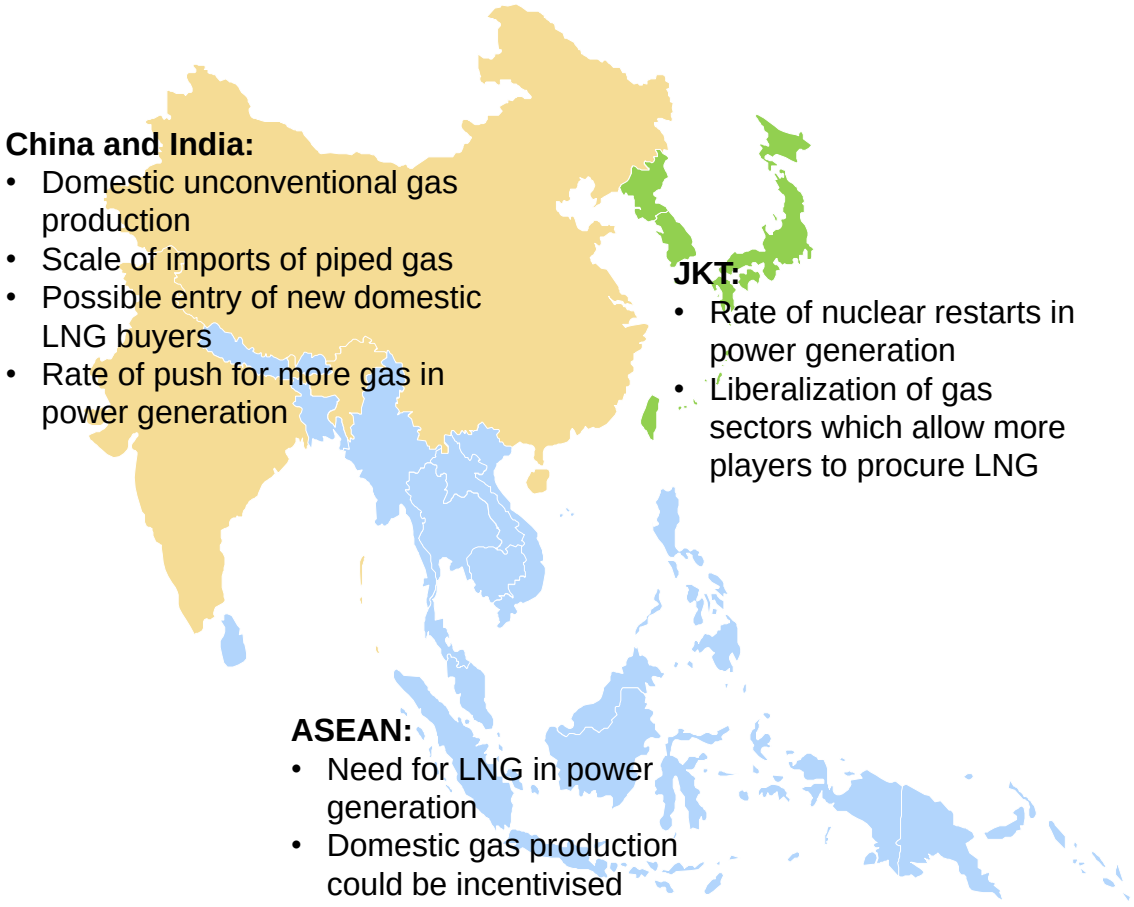
- US LNG exports will be free on board and so be more flexible on destination restrictions and allowing re-exports and diversions.
- Canadian LNG exports will be more like traditional LNG projects with developers investing from upstream, pipelines and liquefaction plant.

- Buyers have bought 30% in the Mozambique LNG (2x10 mtpa) project

The large volume of potential flexible Henry Hub-linked LNG from US and maybe Canada could have disruptive force in long term LNG trading, new contract negotiation and re-negotiation of existing contracts.

FORCING CHANGES

With uncertainties in future fuel mix, regulation and domestic gas production, most Asia countries are looking at LNG



China and India:
- Domestic unconventional gas production
- Scale of imports of piped gas
- Possible entry of new domestic LNG buyers
- Rate of push for more gas in power generation

JKT:
- Rate of nuclear restarts in power generation
- Liberalization of gas sectors which allow more players to procure LNG

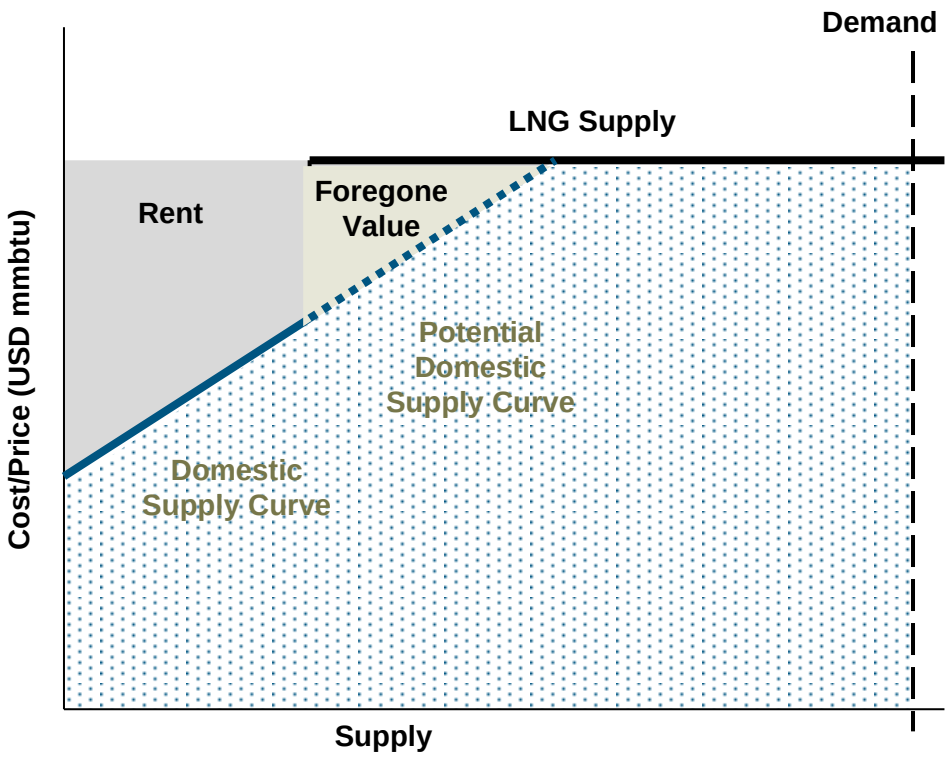
ASEAN:
- Need for LNG in power generation
- Domestic gas production could be incentivised
- Regional Hub LNG trading

There are many inherent uncertainties in the buyers' domestic gas sector, which could incentive the buyers to negotiate for **more volume flexible and shorter term LNG contracts**

- **LNG Demand uncertainties.** In countries that have significant domestic gas production such as China and India, LNG demand in the long term would depend on how successful their unconventional gas production will be, and also by piped gas imports.

- **Liberalization of the gas sector in the domestic buyers' market**. It is possible that some buyers will have a more liberalized gas and power sectors in the medium and long term, which allow more domestic players to procure LNG. Thus, the risks of over-contraction could be high for the current incumbent LNG buyers committed to a 20 or 25 years long term contract with little volume flexibility.

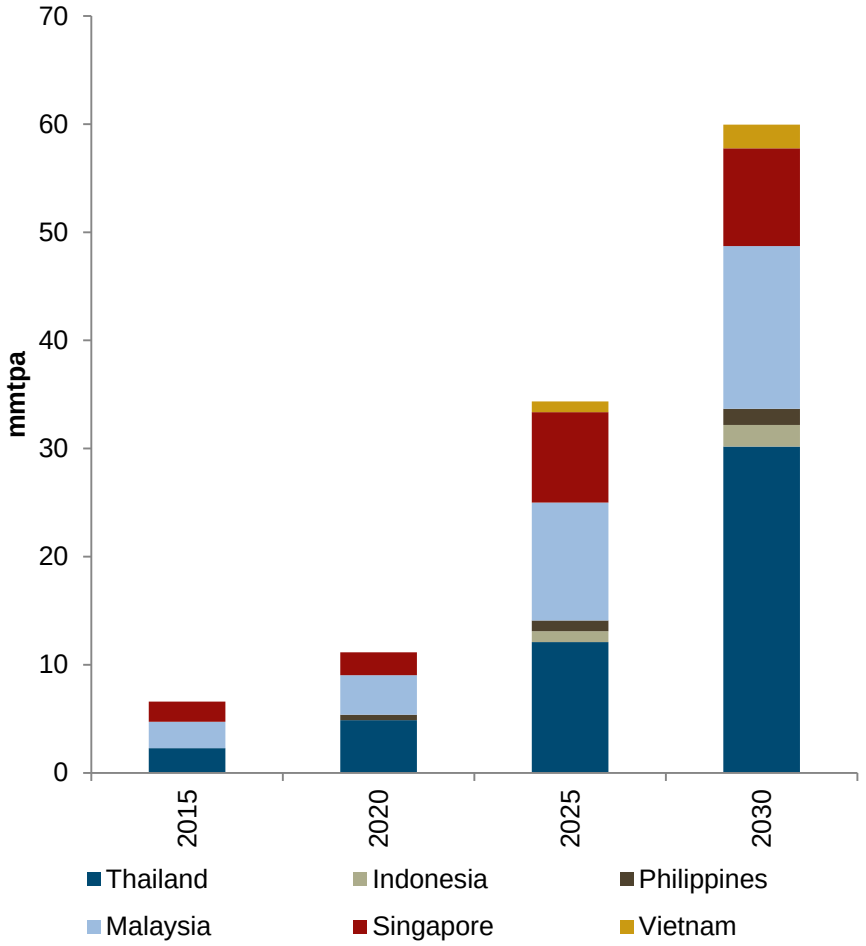
But in many cases there is still domestic gas in the ground that would happily leap to market if it could access the Asian LNG price…..



- Across many parts of the developing world and in Asia there is often the cry “shortage of gas”.
- But more often than not it is due to a breakdown in the pricing signals, or sometimes due to the incumbent monopoly blocking gas transportation.
- Or else a strong adverse reaction by the local government to lift local prices to encourage production.
- Often we see dis-continuous price / cost curves all across Southeast Asia, with the exception of Singapore.
- **How quickly will they disappear?**

Huge volume uncertainties for which emerging LNG supply infrastructure capability is poised to assist

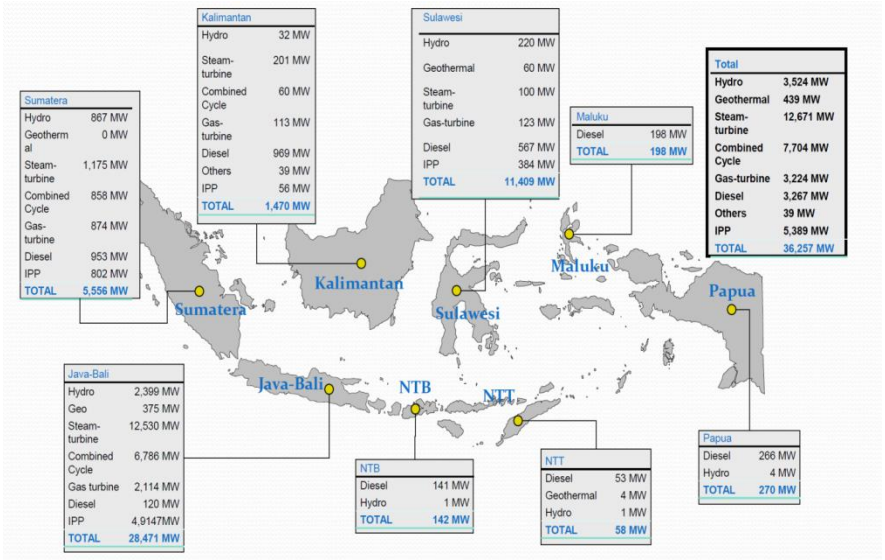
LNG demand by country



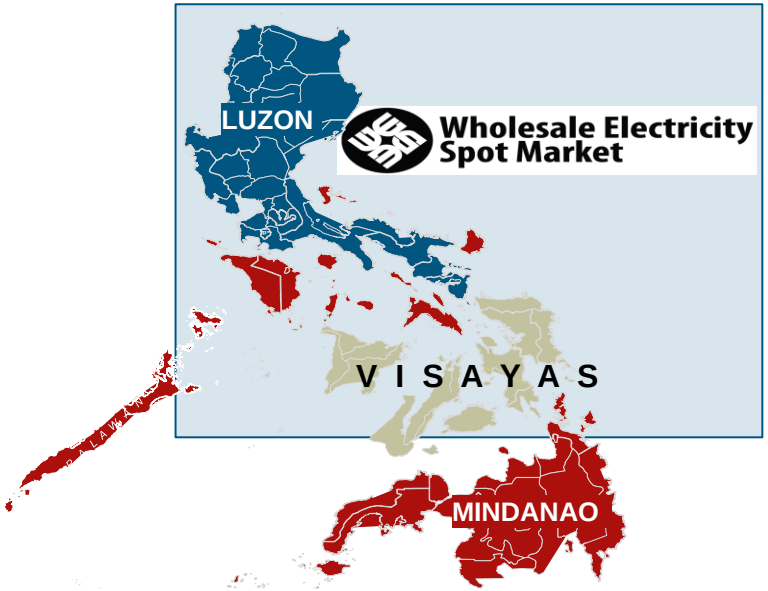
- Thailand could probably delay the steep rise in LNG imports by offering a higher price for domestic piped gas.
- Philippines might start importing limited quantities by 2020 which would be affected by seasonality and rate of coal build which would require flexibility in supplies.
- Malaysia demand could be hampered by delays in domestic gas pricing reform.
- New supplies of LNG to Singapore might undercut the price of contracted supplies.
- **All of which adds up to uncertainty which will require flexibility.**

New markets for LNG can even take higher LNG prices if necessary – the key is flexibility and lower volumes

- Indonesia
  - There is about 2,000 MW of effective diesel-fired power plants outside the island of Java.
  - These consumer the diesel equivalent of over 3 mmtpa of LNG
  - If only the infrastructure could serve them, the savings against diesel would likely pay for smaller scale and break-bulking type operations



- Philippines
  - The Philippines has 3,000 MW of on-grid diesel and fuel oil power stations
  - Furthermore, off-grid and micro-grid capacity exists given the isolated nature of some regions
  - These oil-fired plants consume the equivalent of nearly 1 mmtpa of LNG.

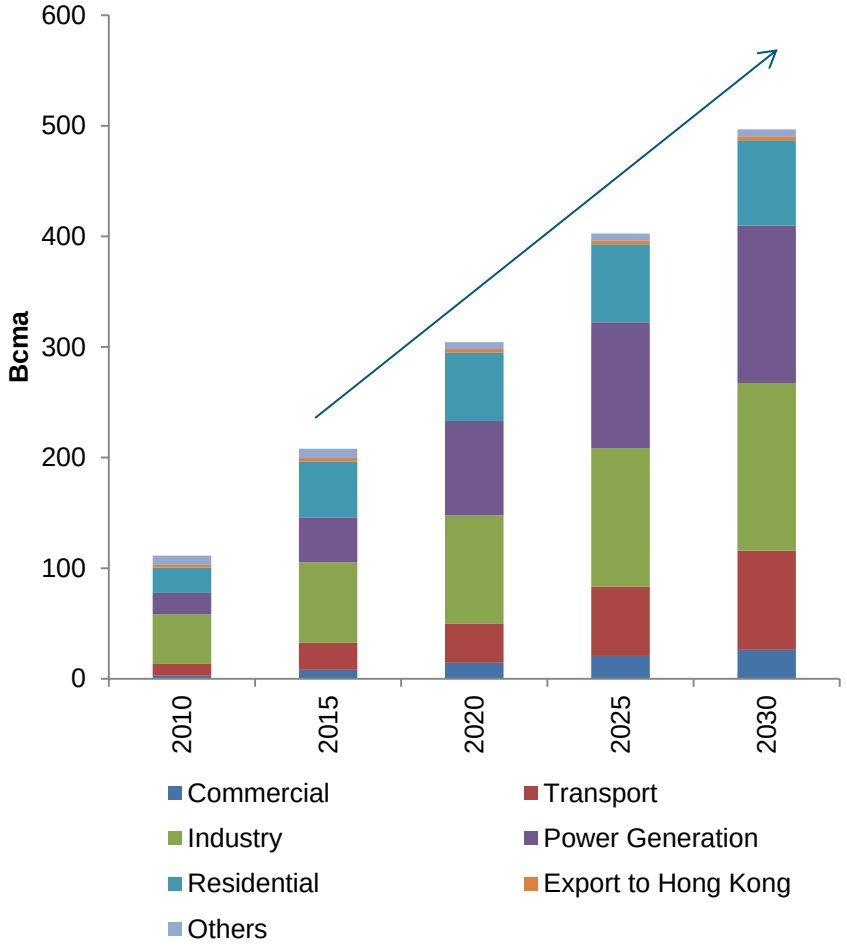


China is learning quickly about the price of gas – but it has a long way to go to develop the full required infrastructure and arrangements needed

Note: City gate prices for incremental gas supplies under the new pricing mechanism, USD/MMBtu

China's power sector is not poised to be a big gas player until power sector reforms take place – we still see this as years away (it's a big job)

Natural gas demand by sector



- Demand could accelerate further especially from power generation.
- If power pricing is reformed to give mid-merit gas fired power a price that makes them profitable then demand for gas should rise.
- A further push could come from policy response to lessen pollution in cities coupled with carbon pricing.

	2020	2025	2030
Bcma	23.1	34.7	49.2
mmtpa	17.0	25.5	36.1

Summary

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  - Huge value on flexibility
  - Big player in the diversion market
  - Buying power to gain access to US LNG
- US LNG is entering a new phase in terms of potential impact on Asia
  - Not as cheap as might be expected
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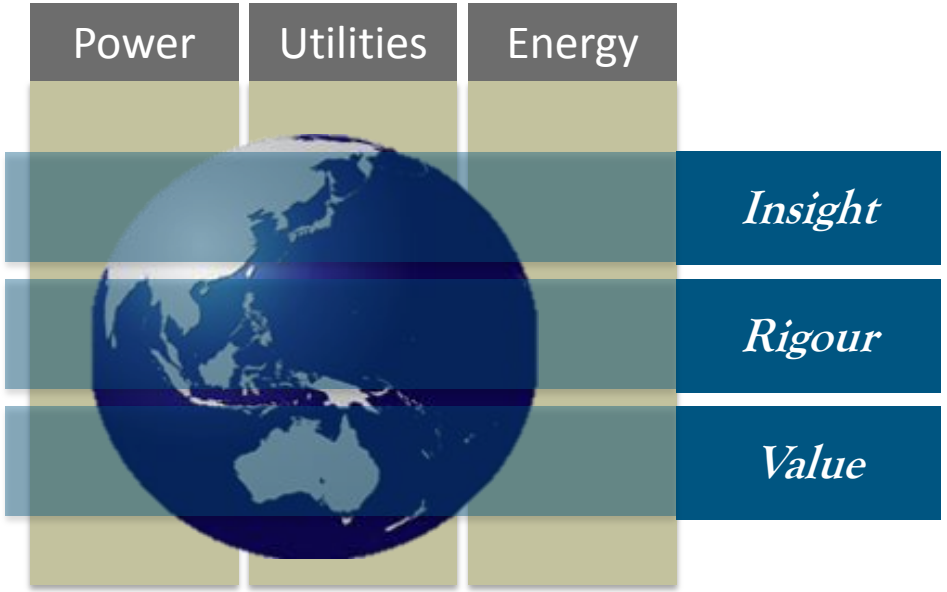

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