



# Natural Gas and LNG Market in Thailand

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# Overview

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## 1 Overview of the industry structure

2 Domestic gas supply

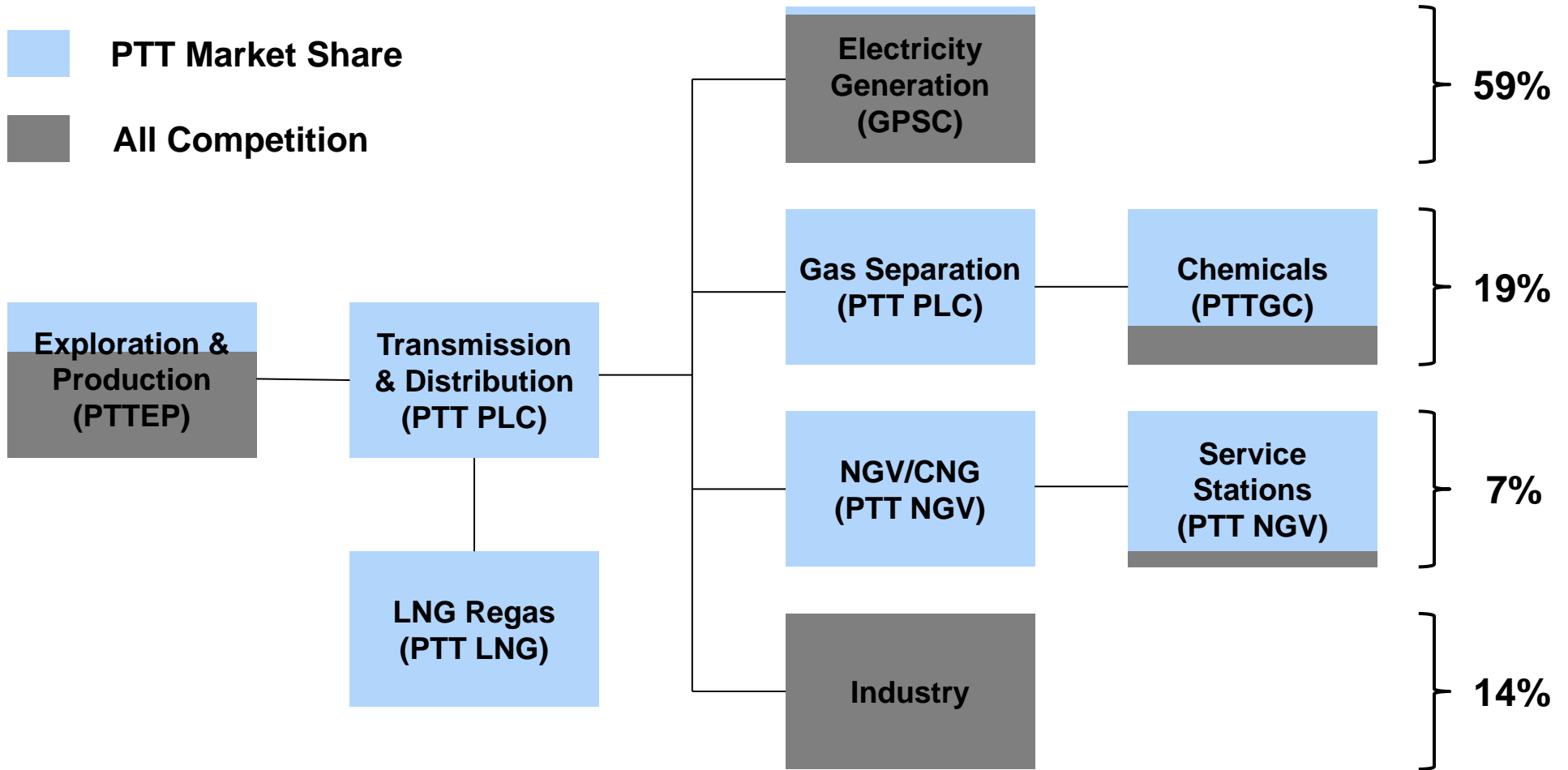
3 LNG market outlook

4 Economics of gas supply

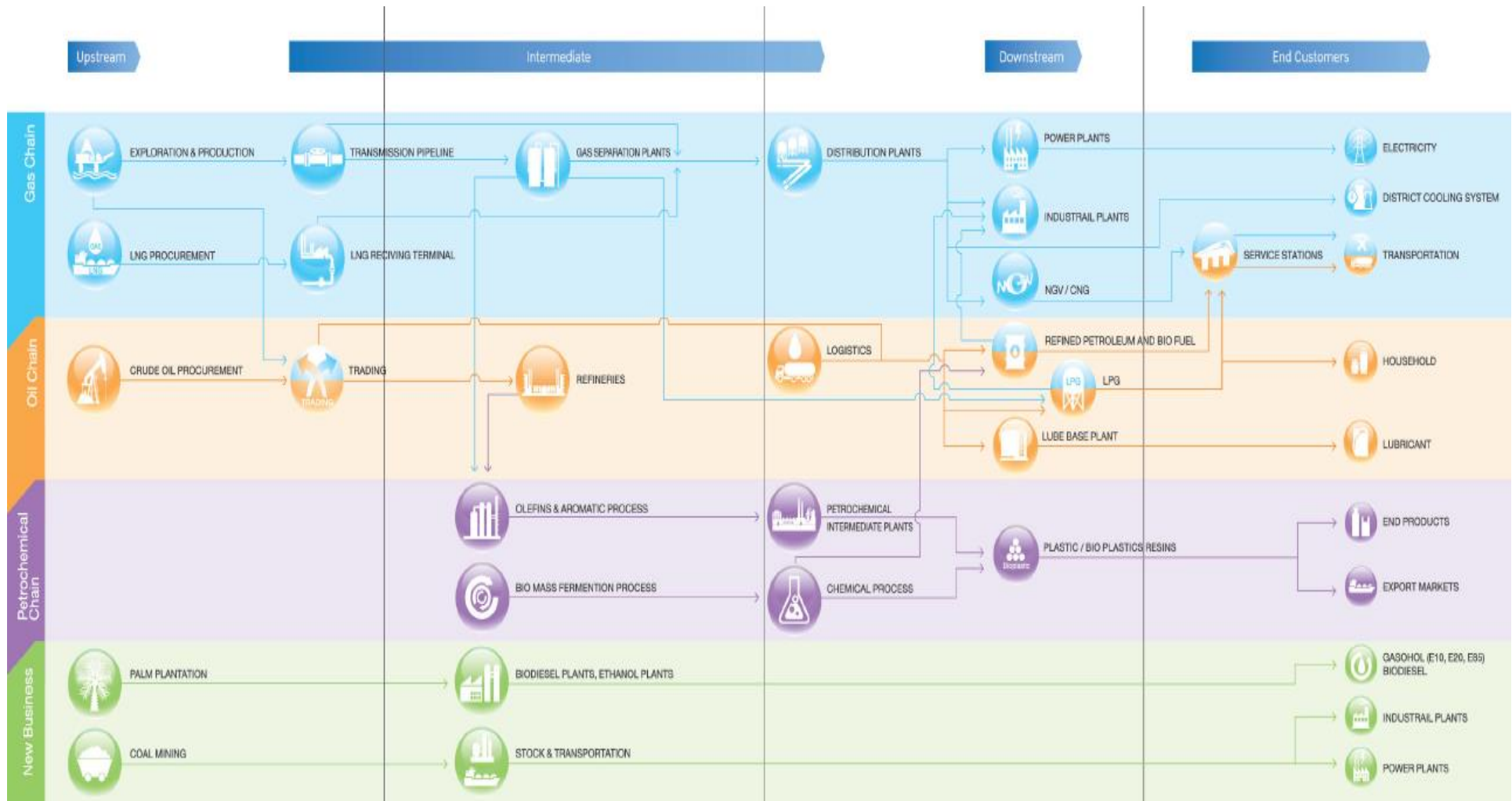
5 Open access possibilities

6 Conclusions

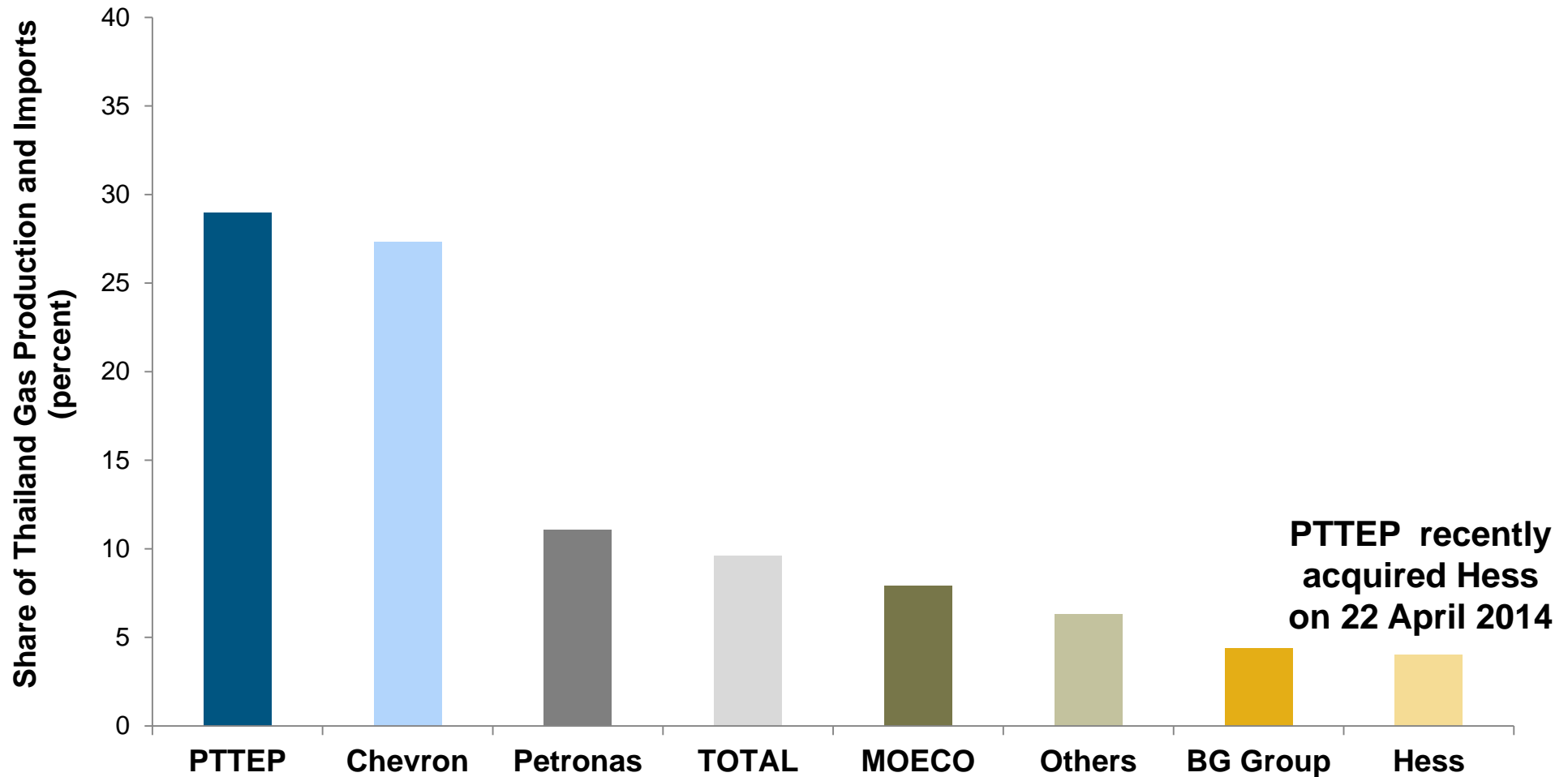
# PTT has a dominant position in virtually all aspects of the natural gas value chain



# PTT's value chain also extends across the oil and petrochemical sectors



## PTTEP is the largest producer of natural gas selling to PTT PLC



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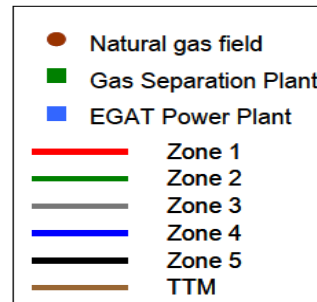
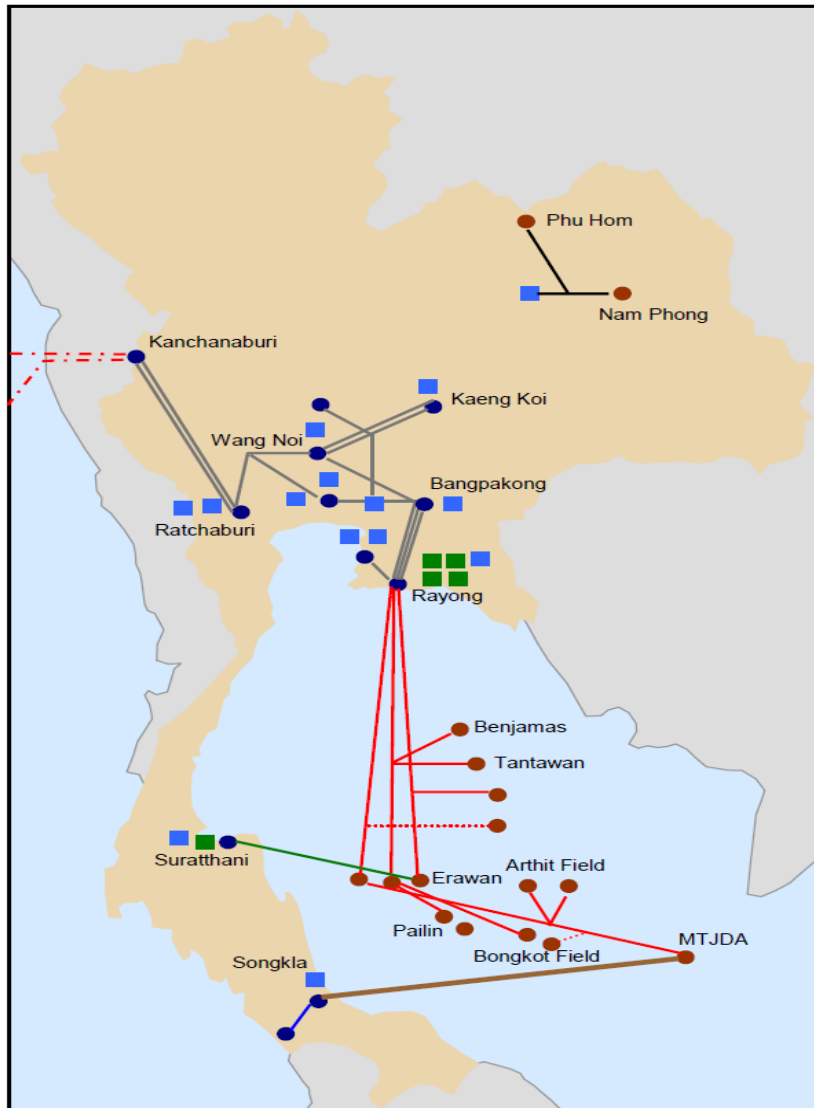
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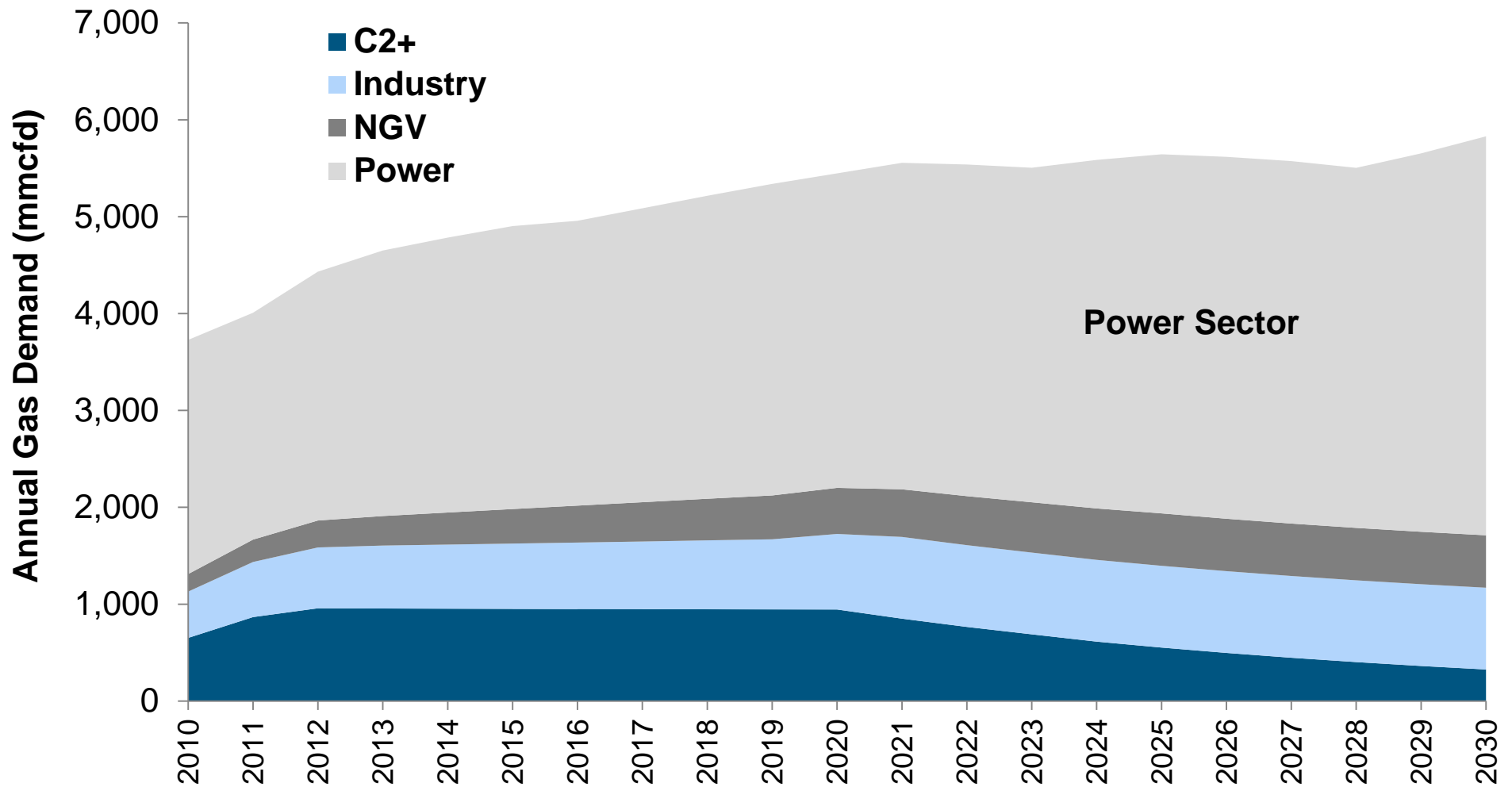
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# Thailand's gas comes from the Gulf of Thailand, Myanmar, and LNG imports



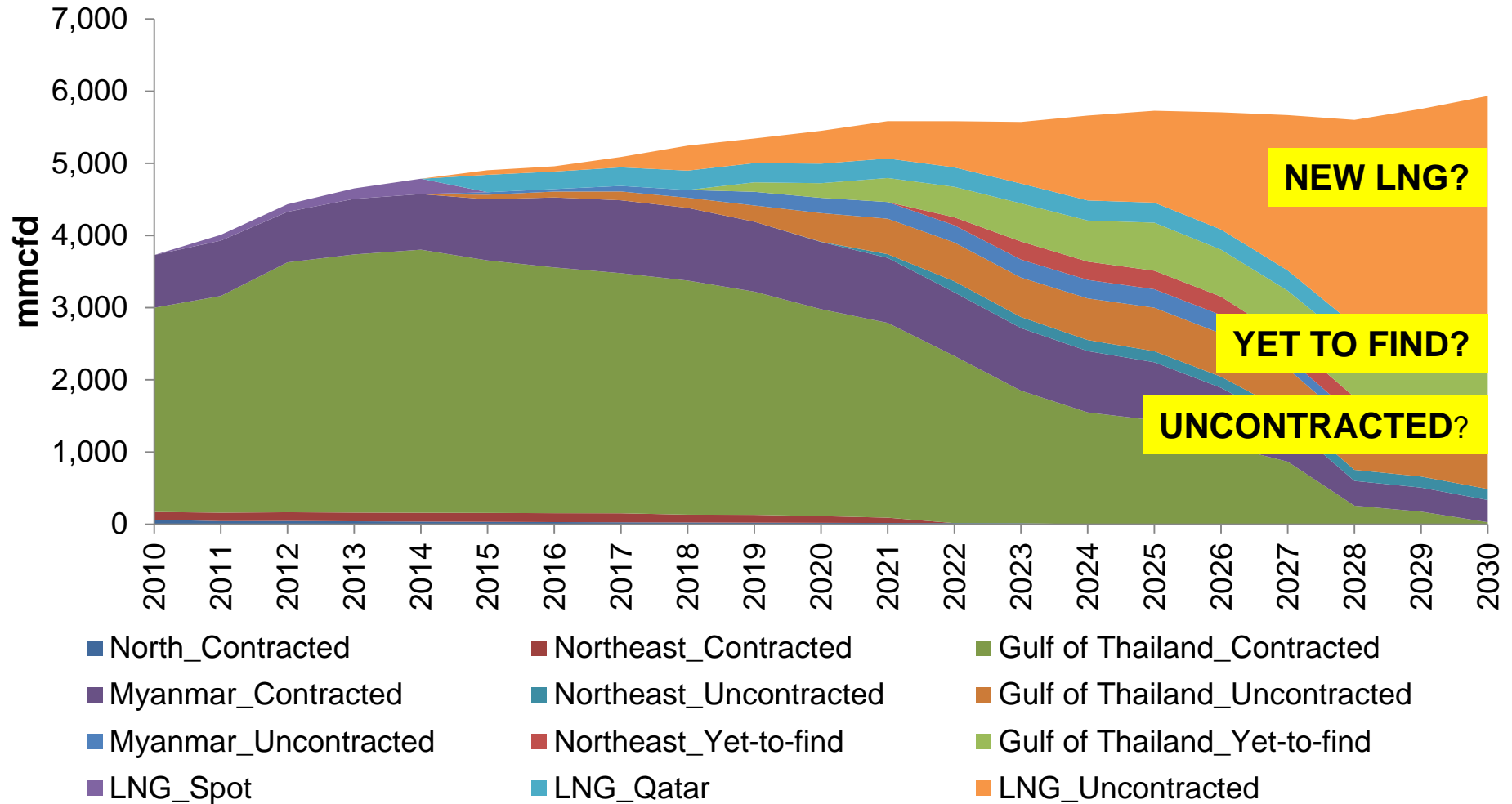
- Pool 1 – “Legacy gas” coming from the Gulf of Thailand and JDA – is dedicated to PTT’s gas separation plants
- Pool 2 – all remaining wellhead gas plus LNG imports – is primarily directed toward the power sector
- Gas in zone 5 (northeast Thailand) is not part of the pooled pricing system

## Led by the power sector, gas demand will grow steadily for the next decade

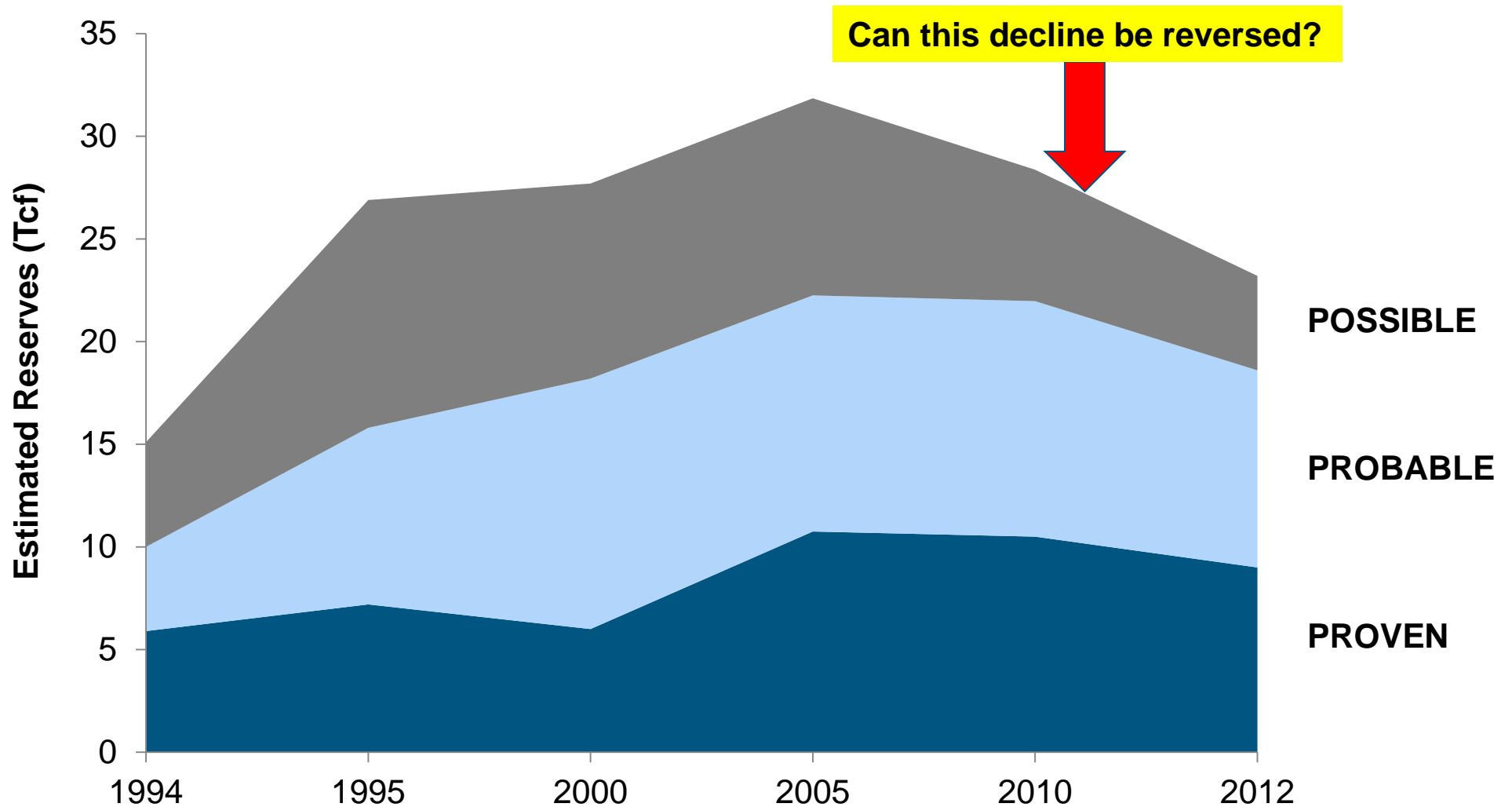




# Where will future supply come from?



## Reserves estimates have shrunk by 25 percent since 2005



## Yes! If gas prices were higher, more reserves might be economic

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- Hydrocarbon reserves are estimates, based on two parameters, each of which is an estimate, subject to substantial uncertainty – **and dependent on price!**

$$\text{Reserves} = \text{GIIP} \times \text{recovery factor}$$

- Gas initially in place (GIIP)
  - An estimate of the volume of oil or gas in the field or reservoir before production commences
- Recovery factor
  - An estimate of the percentage of the hydrocarbons in-place which will be produced under **a set development plan**
- Under a different development plan, perhaps incentivised by higher gas prices, the size of the reservoir could be larger, as marginal pockets of gas become economic, and the recovery factor could increase as more advanced techniques are used to exploit more gas.

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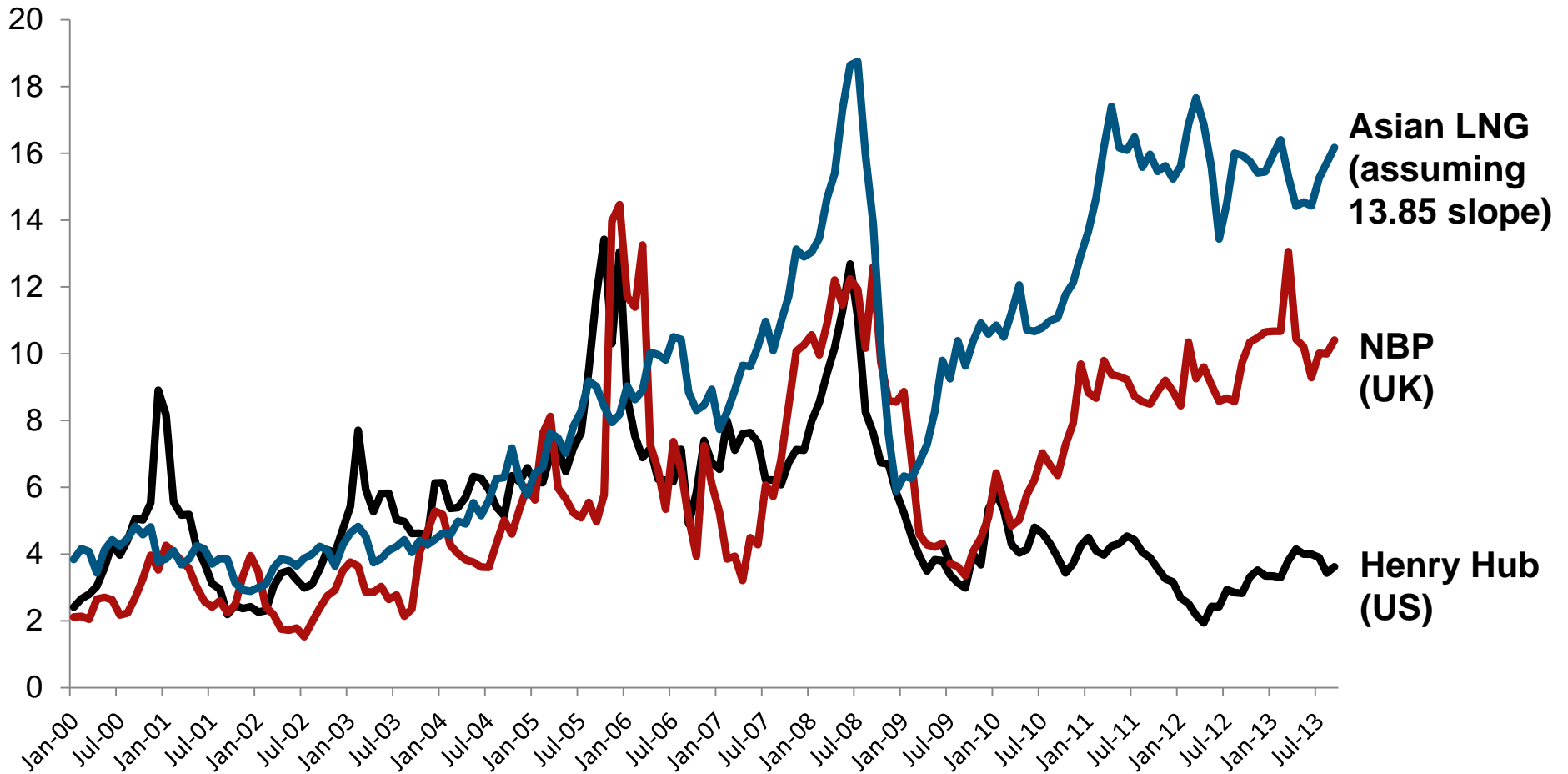
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# Gas is not yet a global market... but prices offer incentives to integrate

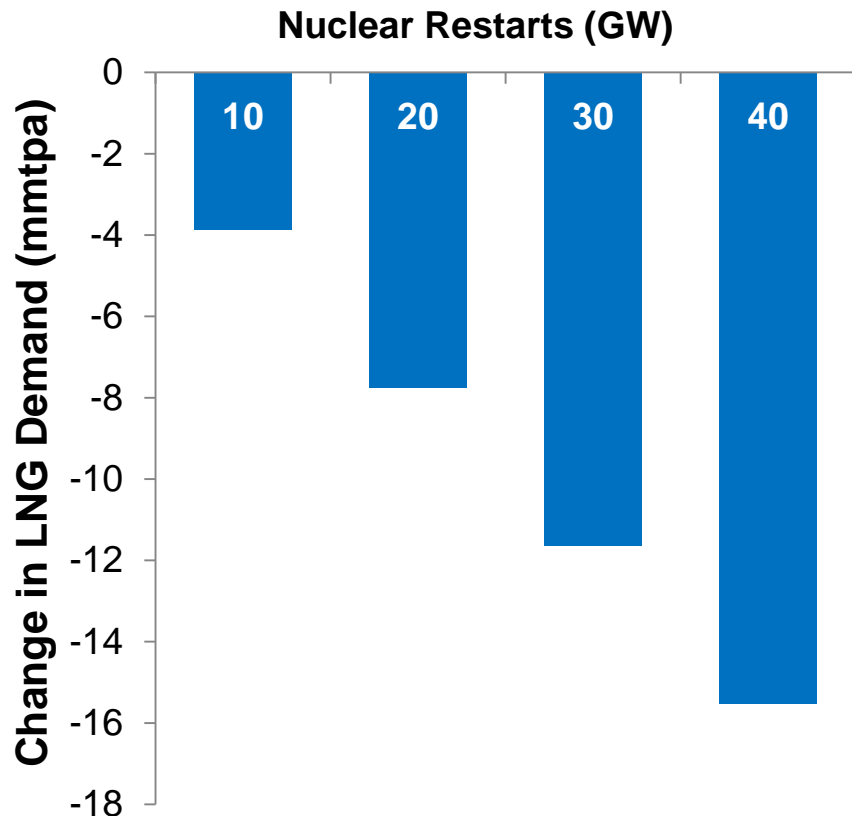
USD/mmbtu



Source: NYMEX, UK DECC, TLG

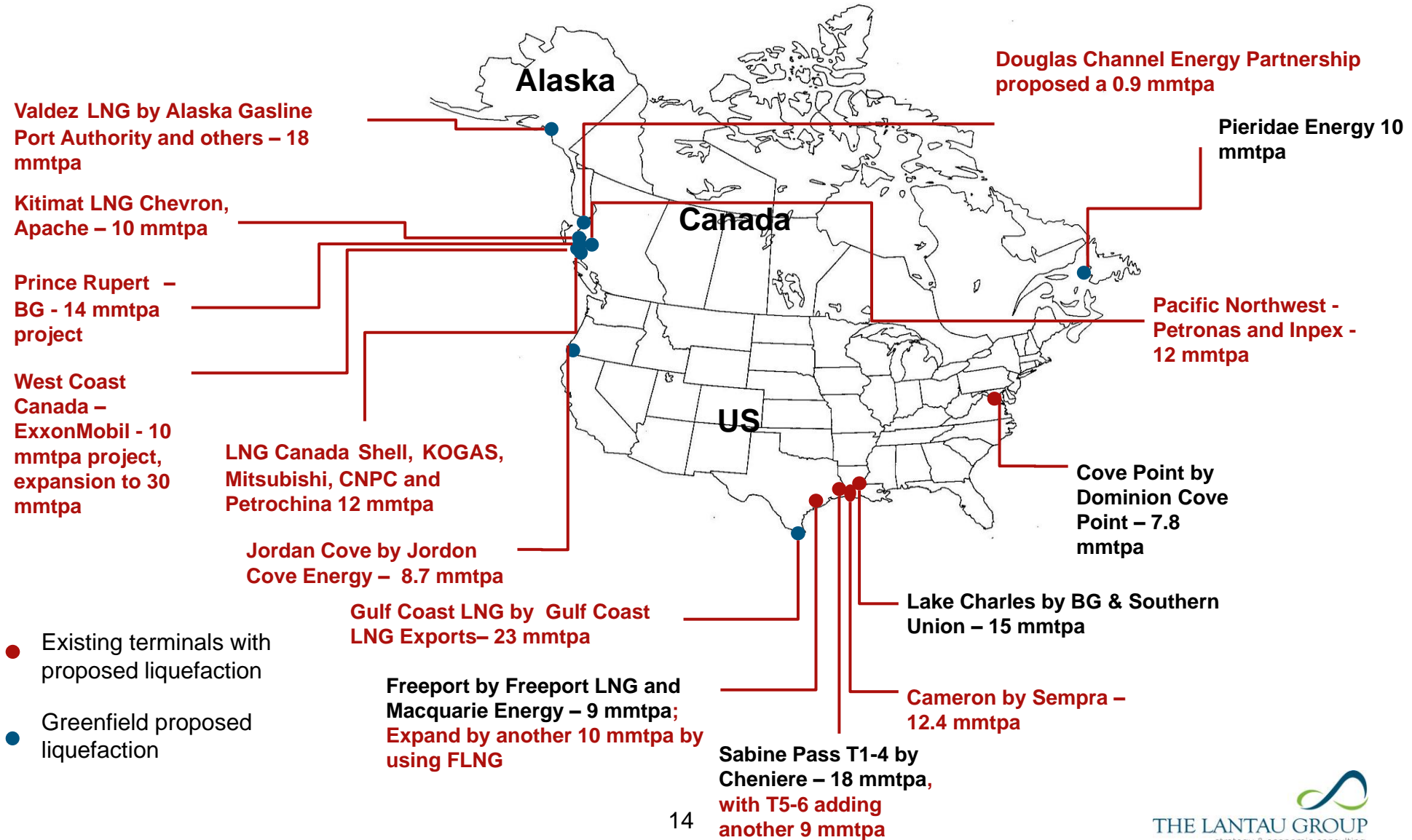
# Post-Fukushima Japanese LNG demand has exacerbated high Asian prices

## Nuclear capacity and change in LNG demand



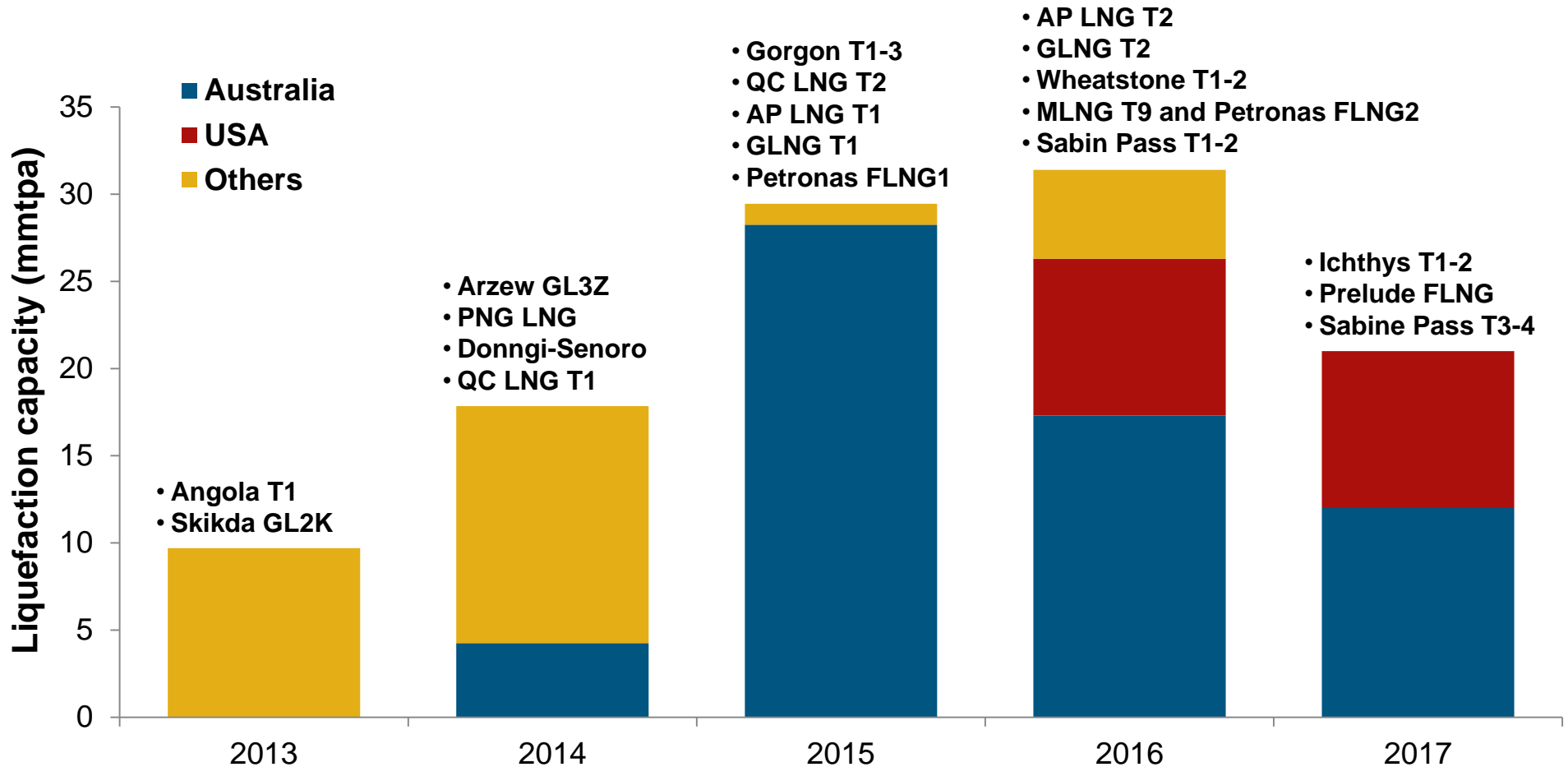
- Half of Japan's post-Fukushima fuel response came from LNG, a quarter from fuel oil, and a quarter from crude oil
- This response highlights the option value of having LNG available
- If nuclear restarts, the LNG will revert to be available for other demands
- For every ~10 GW of nuclear restarts LNG import requirements fall by about 4 mmtpa
- **But how much and when?**

# The USA is being eyed as a key source of low-cost, flexible gas for Asia



# Australia is also developing traditional LNG for Asia – but delays are rife

## LNG liquefaction projects under construction/reached FID

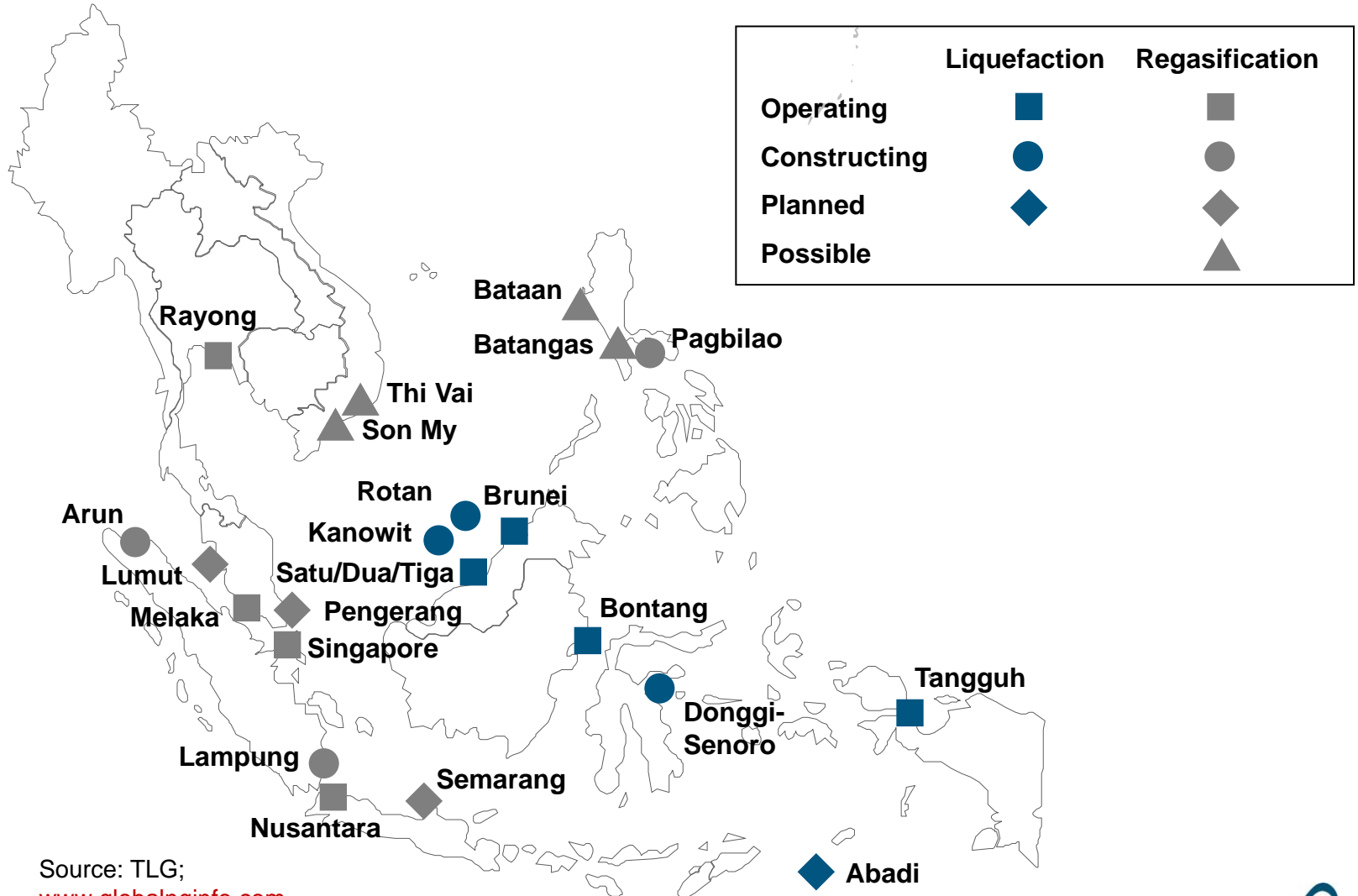


Source: TLG analysis



# Development of LNG regasification is a popular activity in SE Asia...

## 2014 Data



Source: TLG;  
[www.globalnginfo.com](http://www.globalnginfo.com)

## SE Asia regasification will expand greatly in this decade

Project	Location	Online Date	Capacity (mmtpa)
Map Ta Phut	Rayong, Thailand	2011	5 (to 10)
Nusantara FSRU	Jakarta, Indonesia	2012	3
Singapore	Singapore	2013	3 (to 6)
Melaka	Melaka, Malaysia	2013	4
Lampung FSRU	South Sumatra, Indonesia	2014	3
Arun	Arun, Indonesia	2015	3
East-Central Java FSRU	Semarang, Indonesia	2016	3
Vietnam	Thi Vai, Vietnam	2017	1 (to 2)
Vietnam	Son My, Vietnam	2019	2 (to 6)
Philippines	Pagbilao	?	3
Pengarang	Malaysia	?	?

Source: TLG compilation from various online sources

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## Domestic versus LNG price...or..... “Why is Thailand importing LNG?”

- Our estimates suggest the current domestic Thai gas price is close to USD 9/mmbtu and piped Myanmar gas around USD 10/mmbtu
- Landed LNG is closer to USD 16.85/mmbtu
- It is likely that significant new domestic projects would be attractive at LNG prices
- Domestic gas supply has several additional benefits even if priced at LNG parity – including royalties, petroleum corporate tax, more local employment, and more business for domestic support industries
- **So why is Thailand importing LNG?**

More of this?

US\$ 9 -10 mmbtu

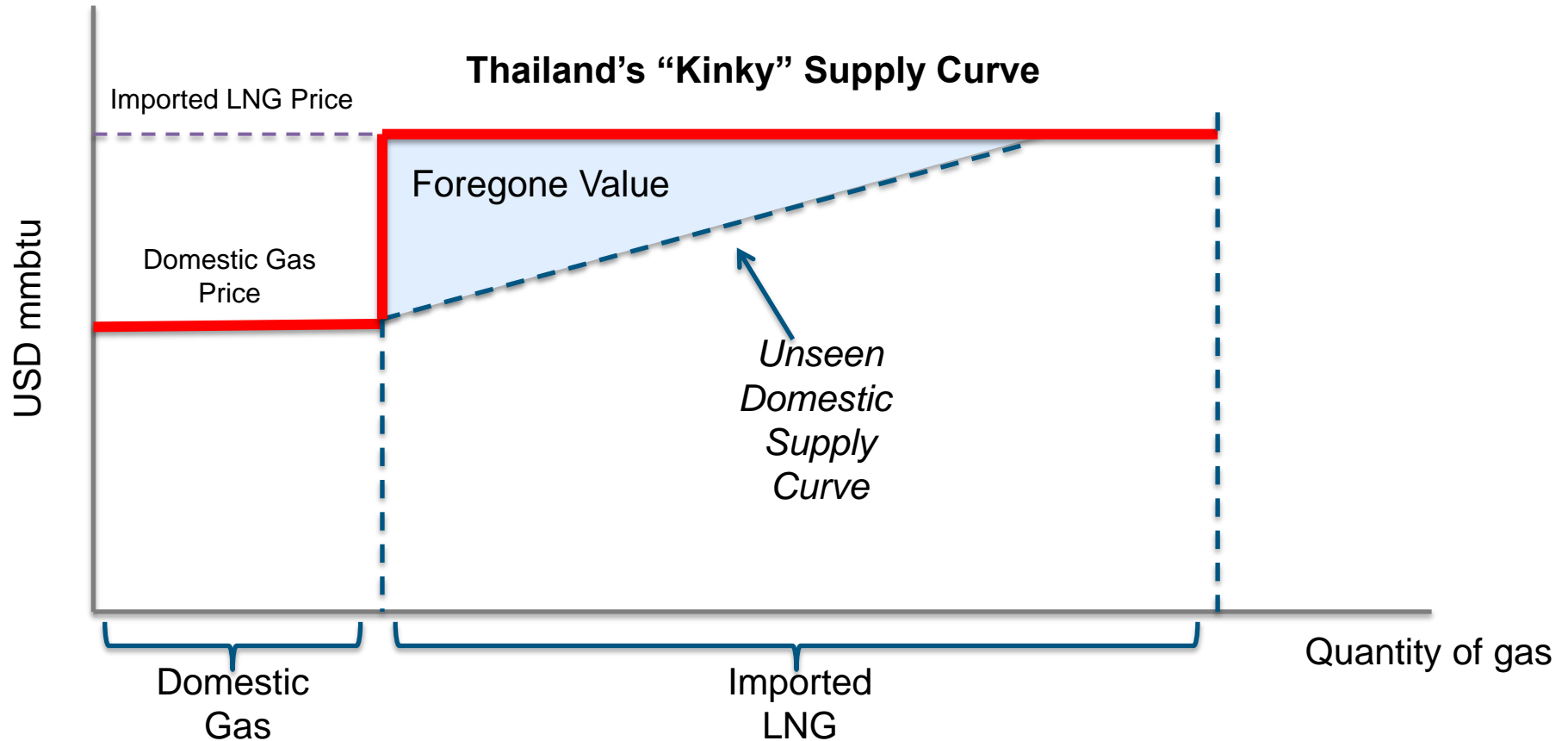


Or more of this?

US\$ 16 – 17 mmbtu

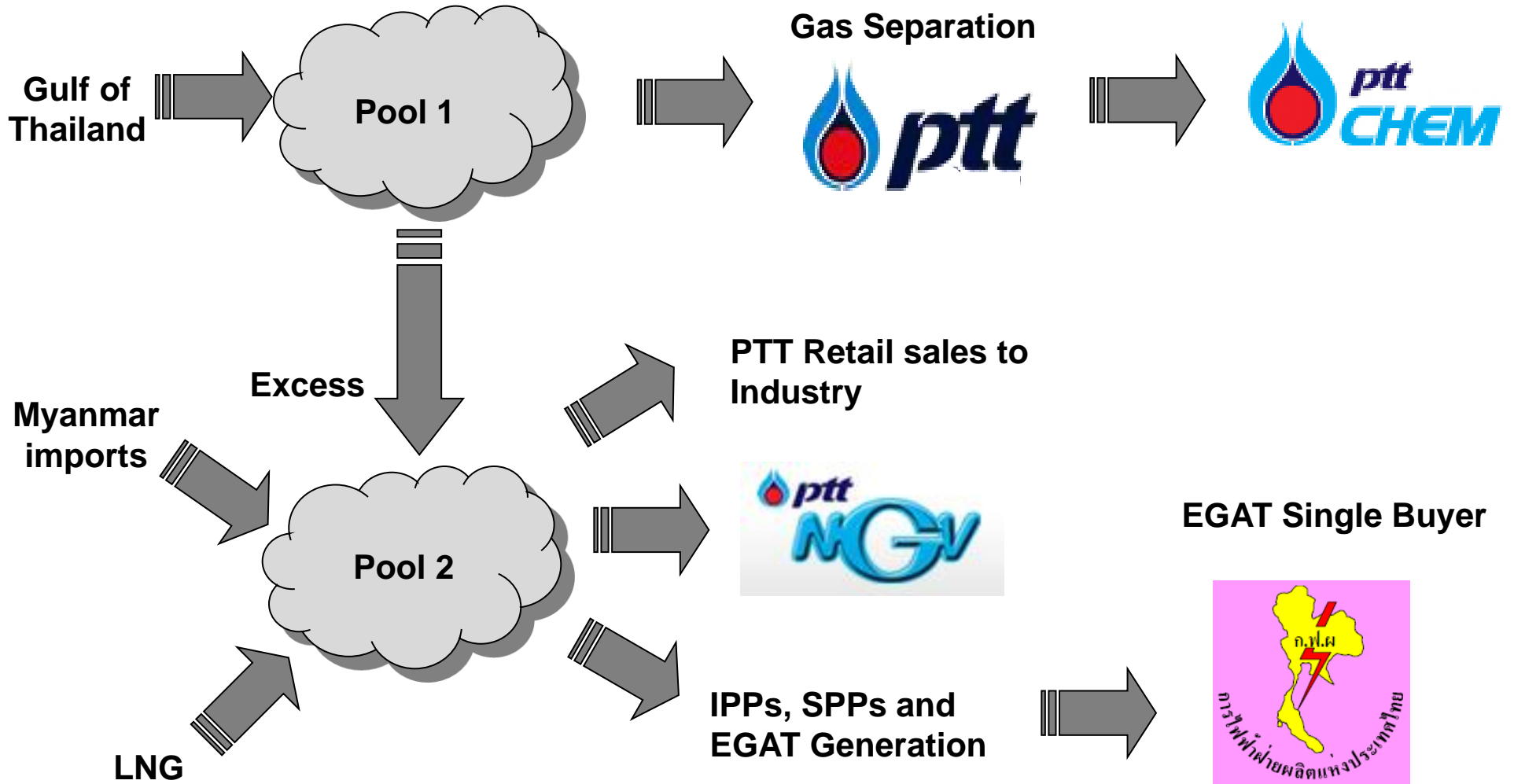


One possible explanation is that PTT is unwilling to set a precedent by signing domestic contracts at higher prices – so Thailand must import more LNG

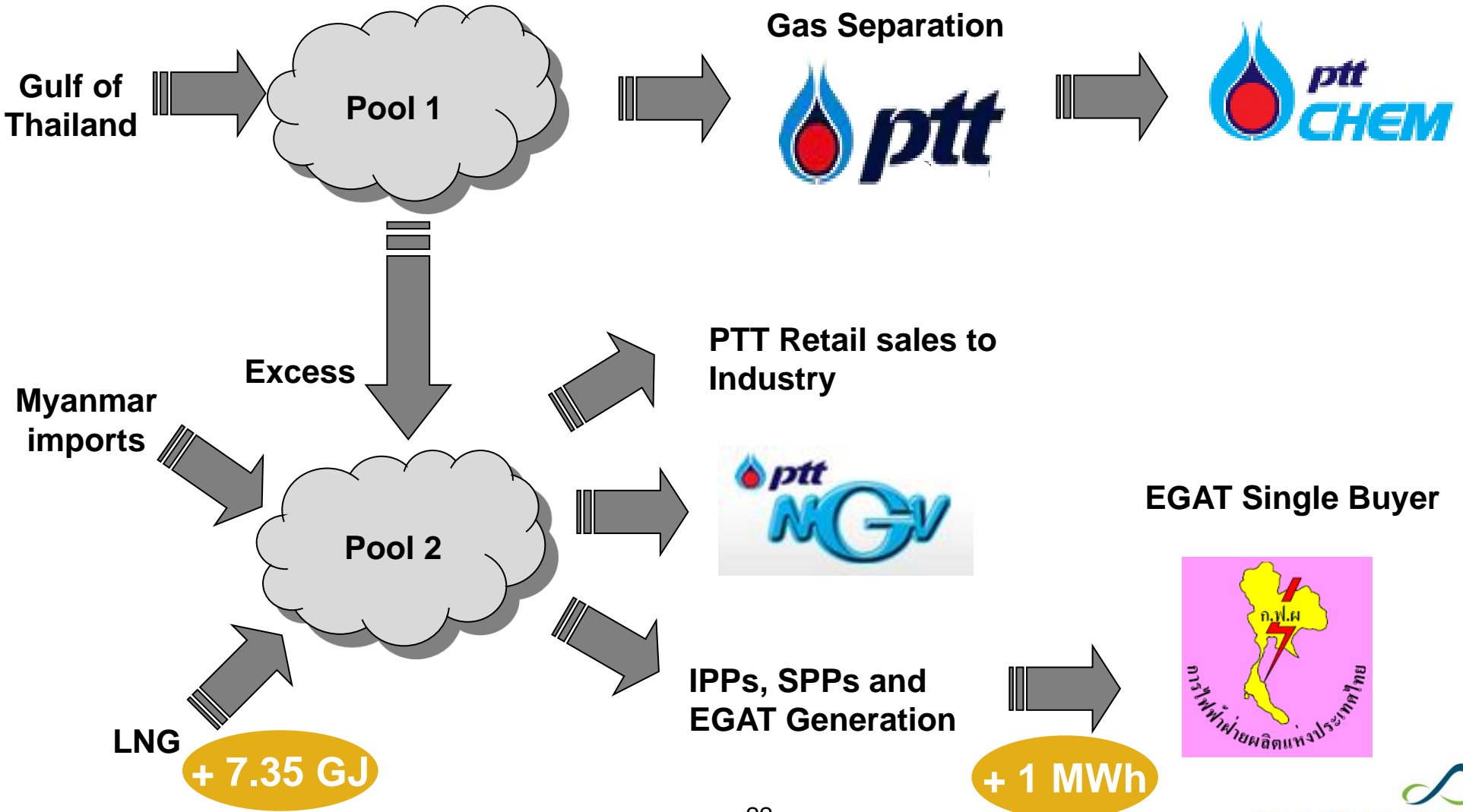


But lower cost domestic gas is available! The result is foregone value.

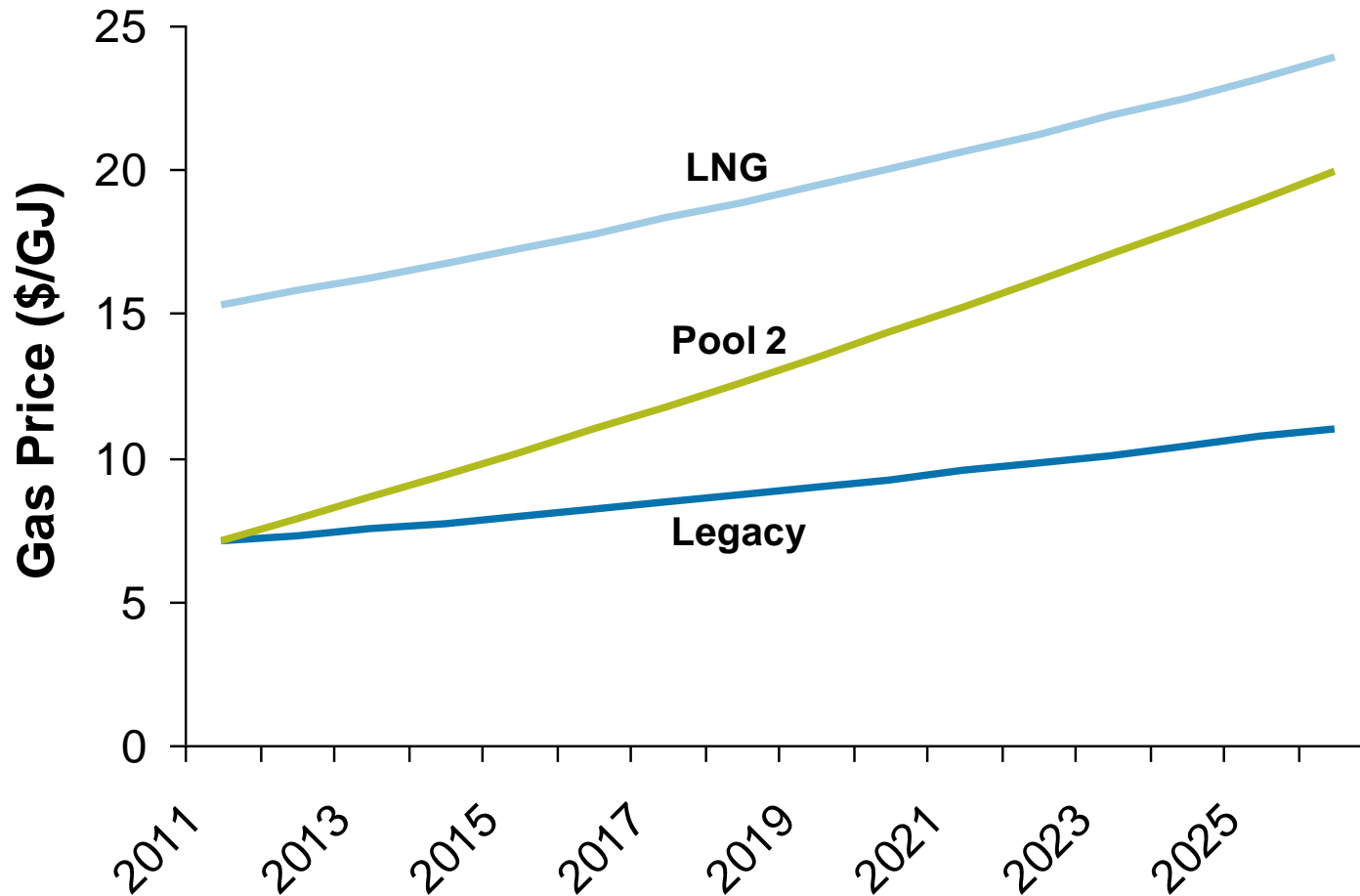
# Gas “pooling” hides the impact of these LNG prices



Despite pooling, the marginal cost of power generation is still set by LNG price



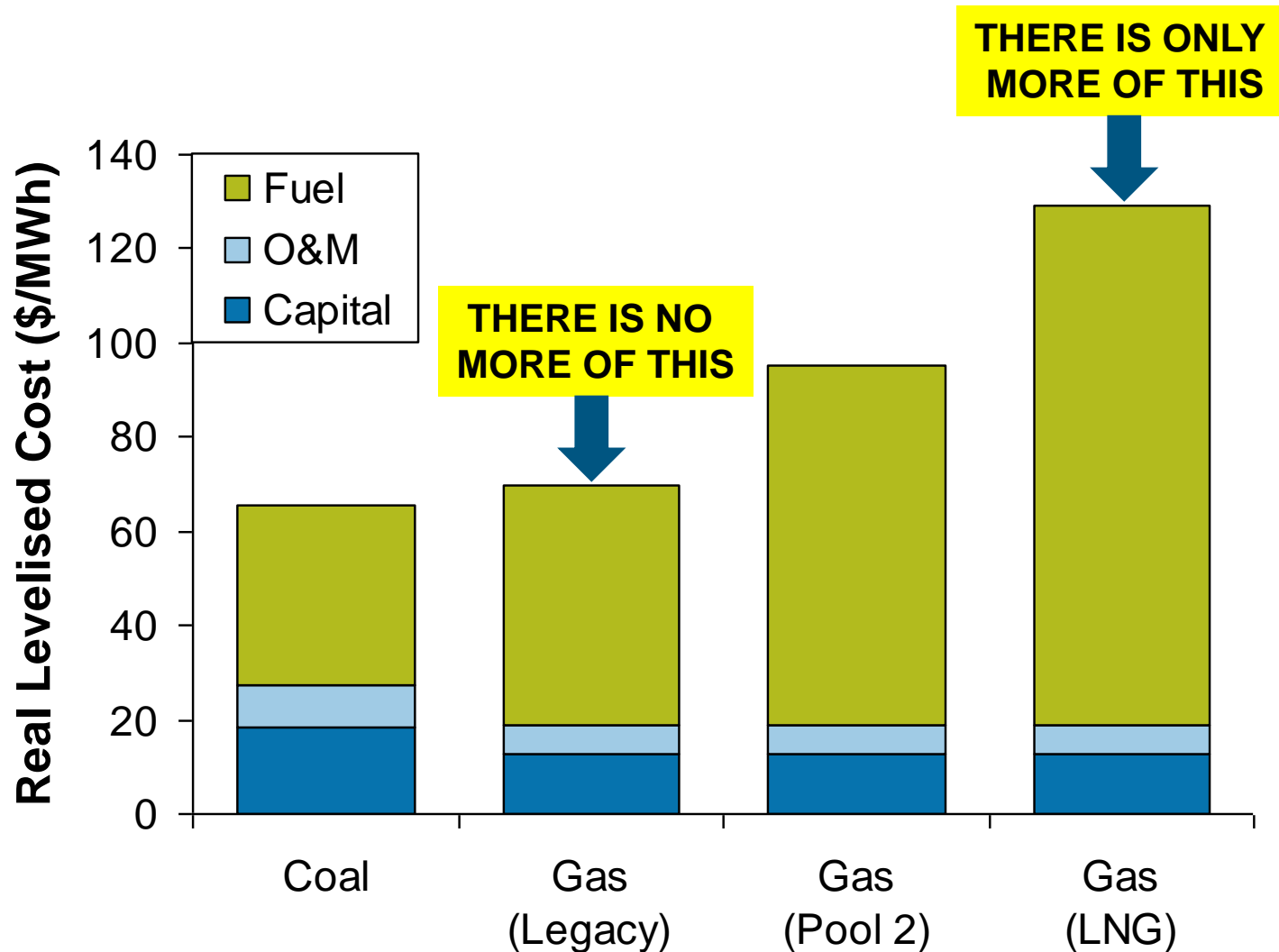
Pooling creates a transition mechanism, but the weighted-average implications are clear – average prices will approach the LNG price over time



Source: TLG analysis



# Pooling is fine so long as it is not allowed to distort incremental investment decision-making



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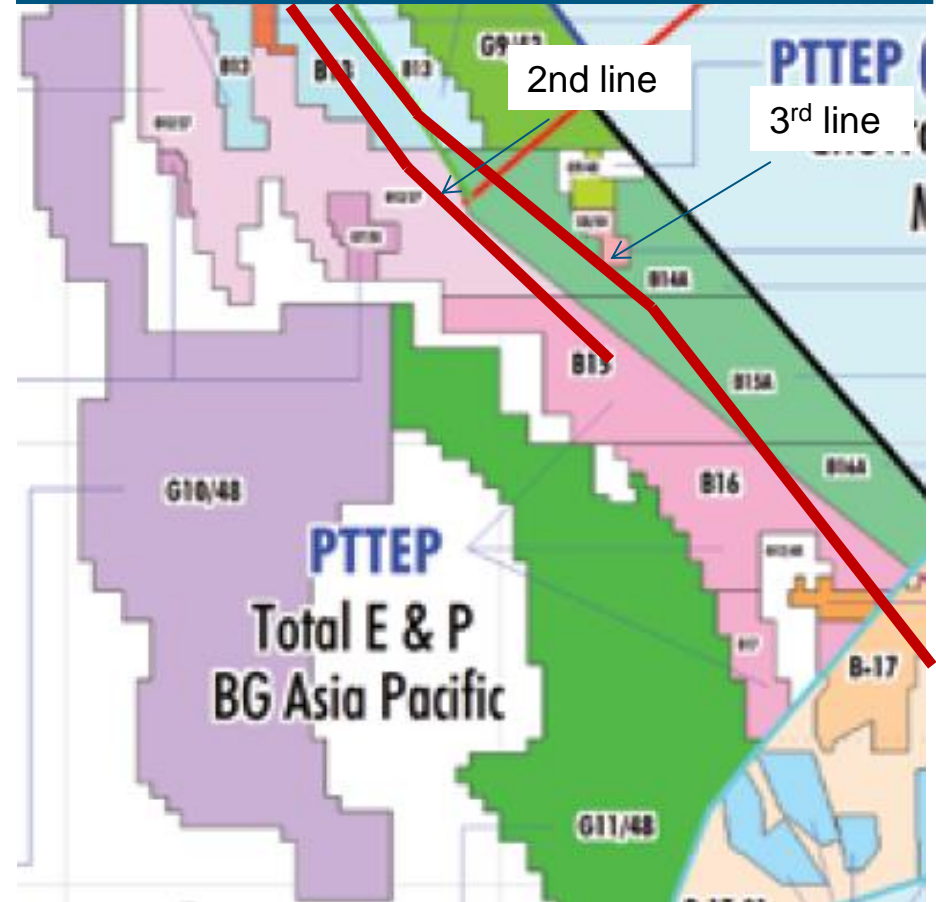
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## What would get more players into the gas market?

- Currently, gas producers are unable to share existing gas pipelines to bring gas to shore, resulting in expensive additional pipeline development
- Open access is an obvious solution
- But open access regimes take time to develop. In the meantime, a focus on access to gathering lines may be sensible at least

How to get from G11/48 and G10/48 to 2<sup>nd</sup> and 3<sup>rd</sup> offshore gas transmission lines?



## Open access versus negotiated access



- Open access is the norm in the US and EU
- Open access has been key to US gas market success under FERC and State rules and laws for inter- and intra-state pipelines
- Open access was imposed under EU rules, but some legal challenges remain, and fines have been imposed on those deemed to have colluded to restrict access.
- Negotiated third party access is more about negotiation than access
- The experience of Europe, USA and other nations is that negotiations tend to be long and drawn out
- Negotiated access was introduced in Peninsular Malaysia – wait to see how this works out

Negotiated access sounds easy – but experience suggests it is hard!

## Open access could bring a number of benefits

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- Clarity through separation of transmission cost from commodity cost – this unbundling also aids in regulation of the transmission function
- Potential support for choice and competition among suppliers – customer choice is at the heart of US and EU energy market liberalisation
- Flexibility of grid development flexibility – while providing a safe and stable return to the transmission business (via traditional regulated asset base and allowed revenues ratemaking)
- Standardization of gas specification – which is essential to allow injection by any gas company anywhere on the network

But powerful vested interests may cause open access to remain a tempting illusion!

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## SE Asia faces a new “natural gas reality”

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- Many SE Asia countries use natural gas extensively for baseload generation
- As domestic supplies dwindle, or domestic production costs rise, they are importing LNG (or planning to do so) to meet incremental gas demand
- Other than the Philippines, most countries have “Single Buyers” that can make direct infrastructure investments and control gas pricing
  - Thailand (PTT)
  - Vietnam (PV Gas)
  - Malaysia (Petronas)
  - Indonesia (PGN)
- These Single Buyers can “roll in” the incremental cost of LNG to their weighted-average cost of gas (WACOG) and thereby mitigate price increases
- But WACOG pricing does not change the fundamental marginal-cost economics – baseload gas-fired generation is no longer economic (even after carbon accounting)!

## Mid-merit LNG-fired generation is the wave of the future!

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- Across Asia, coal, nuclear, and renewables will edge out gas as a baseload generation resource on an economic basis
- Gas, however, continues to be competitive in the mid-merit segment of the merit order, with lower capital costs off-setting higher fuel prices for low capacity factors
- Use of gas in mid-merit is value-added: it lowers overall system costs as well as making best use of an expensive yet clean resource



## But mid-merit generation cannot support the existing LNG economic value chain

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- Mid-merit LNG-fired generation will be subject to daily load variation, seasonal swings, and long-term capacity factor uncertainty
  - Cannot support high load factor for LNG terminals
  - Cannot live with inflexible take-or-pay commitments
  - May not even be able to sign bankable long-term supply contracts
- LNG terminals will be forced to recover their costs primarily via capacity reservation charges, rather than throughput charges
  - Throughput capacity will vary with circumstances
  - Sizing of terminal storage capability will be the key design variable
  - Break-bulk shipping and LNG trucking – both inherently more flexible – will supplant new gas pipelines
- LNG aggregators will act as financial intermediaries between LNG liquifaction projects and downstream customers (e.g., mid-merit CCGTs)
  - Buying shares in liquifaction projects
  - Taking positions in LNG tankers
  - Securing LNG storage capacity

## A new paradigm is required

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- Trading and hubs to support flexible purchasing
- Smaller ships to support smaller demands
- Open access to existing pipelines
- Use of FSRU's and FLNG to allow monetization of smaller gas finds and smaller gas demands
- Increased participation of the private sector.



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