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FLNG – A Nice Niche?

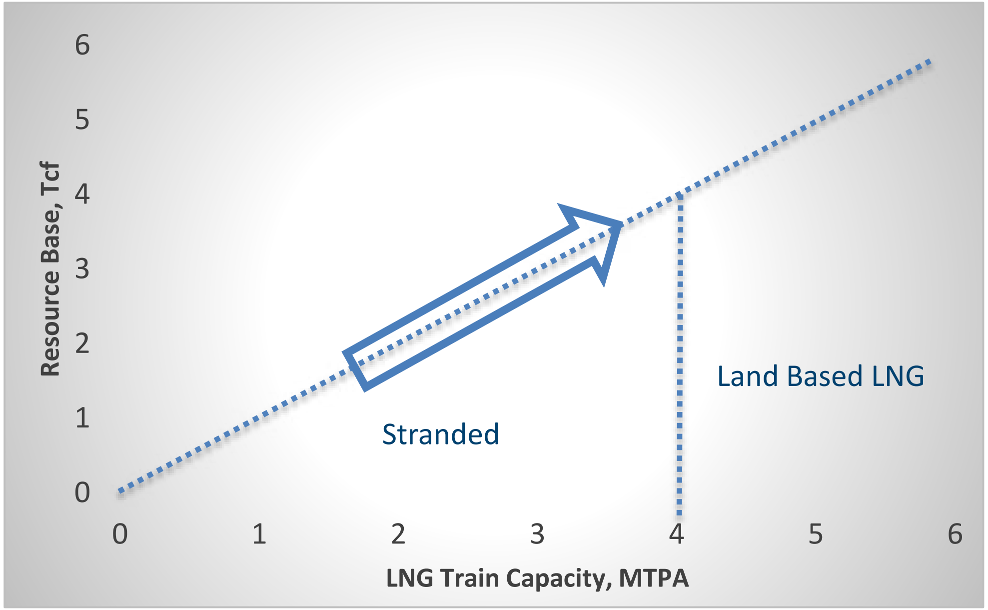
Martin Wilkes

What we'll cover

- The space for FLNG in the development arena
- LNG Market dynamics and how changes may help the development of FLNG
- Similarities between FLNG and FPSO development
- Opportunities and challenges for Australian producers
- A possible future for FLNG

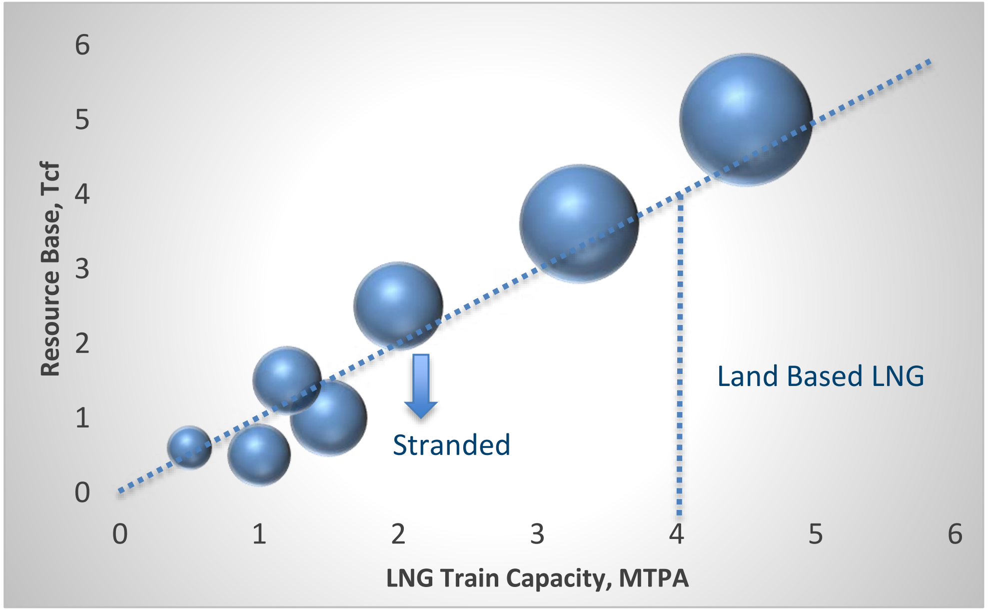
Traditional LNG Development has left a gap

- Land based developments have adopted economies of scale
- Increase in minimum economic field size



Floating LNG offers options to fill the space

- Potential to reduce minimum economic field size
- Access stranded resources



Different approaches being taken

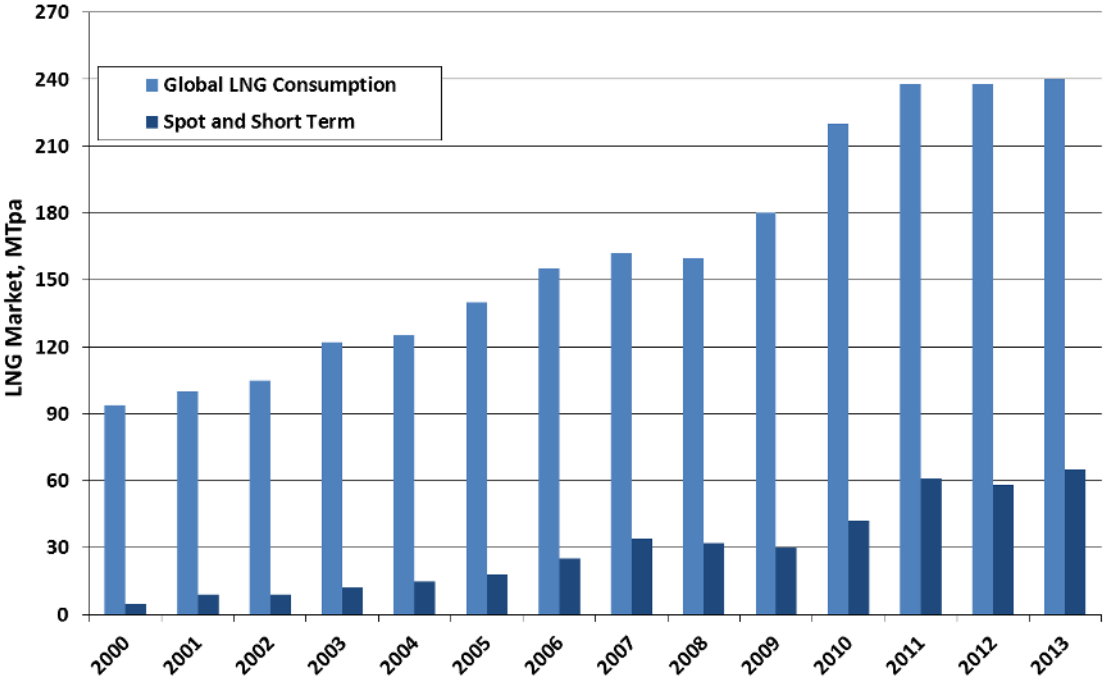
Project	Proponent / Operator	Capacity MTPA	Technology / Design Features	Anticipated Start-up
Caribbean (F)LNG	Pacific Rubiales/ Exmar	0.5	Black & Veatch Prico™, SMR. Tethered barge with separate storage. Feed gas from onshore	2015/16
PFLNG1 (Kanowit)	Petronas	1.2	Air Products AP-N™ Nitrogen expansion. Permanent turret mooring.	2015/16
Prelude FLNG	Shell	3.6	Shell C3MR, Steam systems, Permanent turret mooring, LPG and condensate export	2016
PFLNG2 (Rotan)	Petronas	1.5	Air Products AP-N™ Nitrogen expansion, Permanent turret mooring.	2018
Cameroon FLNG*	Perenco / Golar	1	Black & Veatch Prico™, SMR. Converted Moss Carrier "Hilli".	2017
Fortuna FLNG* EG Block R	Ophir / Golar	2	Black & Veatch Prico™, SMR. Converted Moss Carrier "Gimi".	2019

*FLNG Vessel conversion has been sanctioned, project has not

Exmar sanctioned a 2nd barge in December 2014 – project unknown

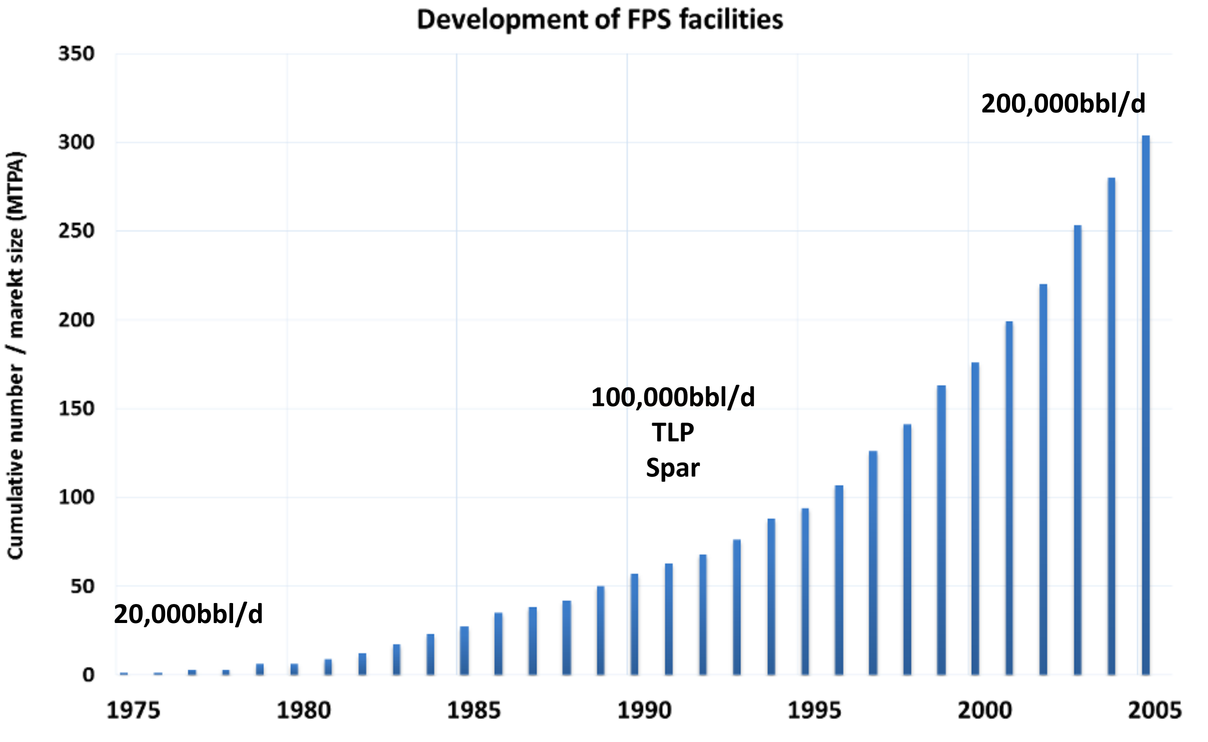
Significant changes in LNG Market

- LNG development traditionally supported by long term contracts
  - Small resources unable to commit to long term contracts
- Strong growth in LNG market
  - Significant increase in short term trade
- Development of short term market means buyers less reliant on long term contracts
  - Security of Supply through diversification
- Increased diversity and more liquidity
- Increased confidence in sales



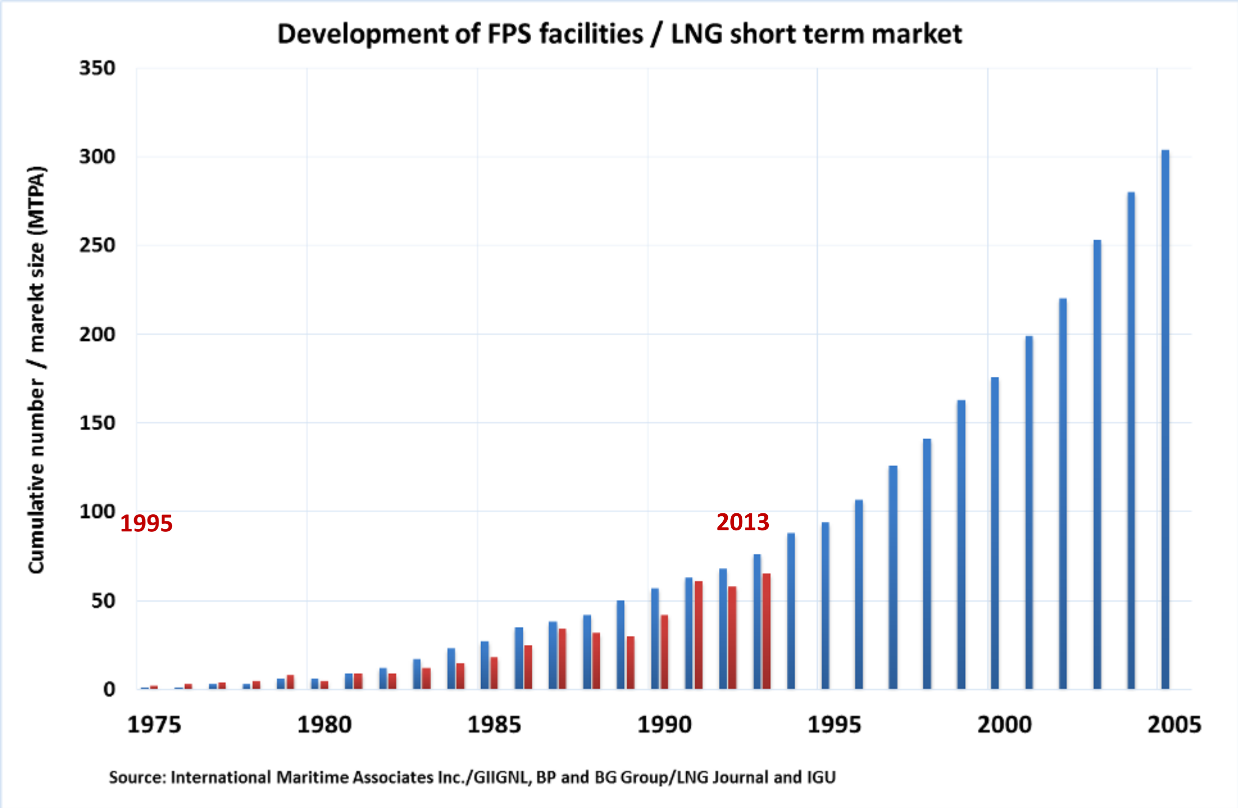
Sources: GIIGNL, BP and BG Group

Historical Development of FPS facilities

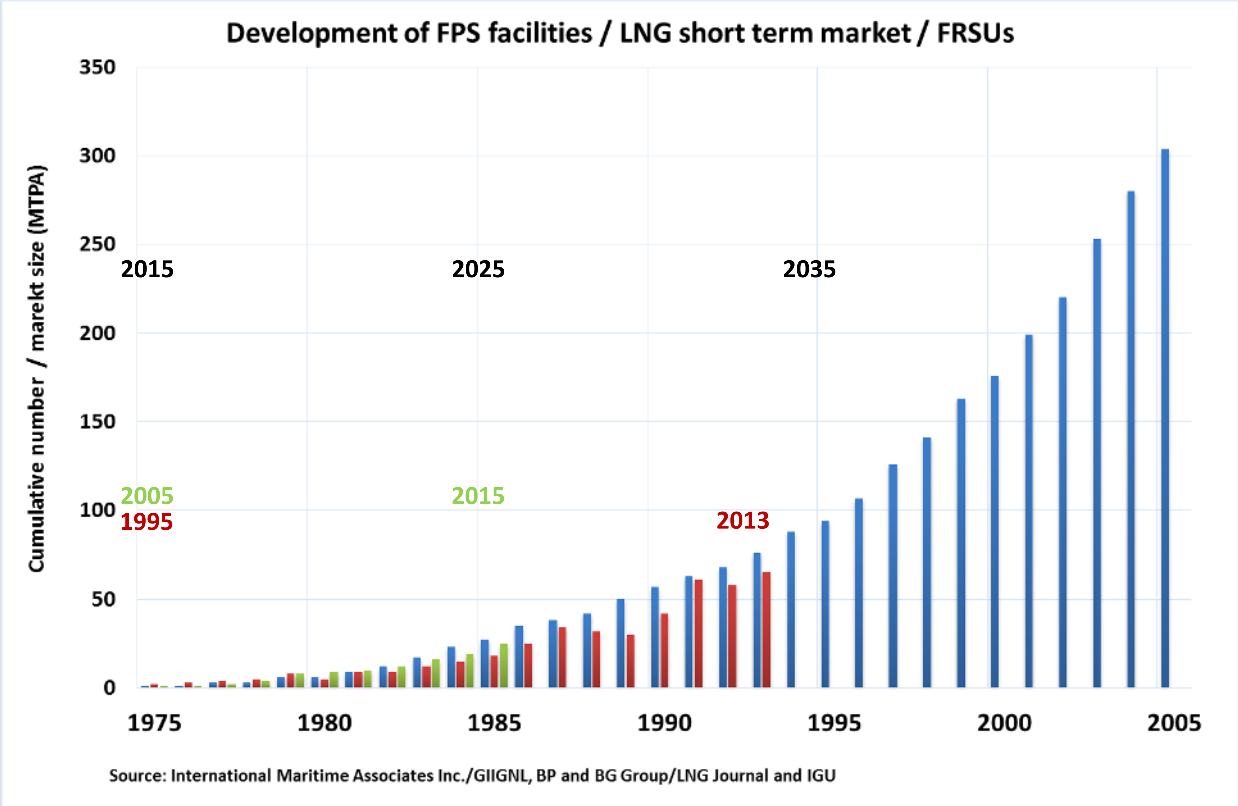


Source: International Maritime Associates Inc./GIIGNL, BP and BG Group/LNG Journal and IGU

A lesson in History?



A lesson in History?



What does the future hold?

FLNG becomes “mainstream”

- Competition and cost reduction
- Smaller less expensive facilities
  - Development of smaller resource pools
  - RISC analysis indicates FLNG may be viable for ~0.5Tcf

Australian Context

- Australia already has 1 sanctioned FLNG project
- RISC is aware of at least 8 other projects that are or have considered FLNG
  - All of them >2Tcf

Australian Future

RISC analysis of “Yet to Find” gas in 3 Australian Basins*

- Most new finds will be smaller than those already discovered

Size Range	0.5-2 Tcf	>2Tcf
Possible number of discoveries in next 15 years	4-15	0-5

- This will be repeated worldwide
  - Many more opportunities in smaller developments
  - Ability to develop small fields will be key

*For further information please see Nick Eustance’s presentation on Wednesday afternoon

Challenges

- Successful development of the technology
  - Not new in the E&P industry
  - Long history of innovation and adaption
  - Clear indication of progress in adaptation of existing knowledge
- Financing, particularly of early projects
  - Involvement of IOC/NOCs
  - World Bank and CEIB providing funding to Caribbean FLNG
  - Ultimately, lower development costs and smaller environmental footprint should make FLNG attractive

Summary

- FLNG poised to become the next generation of the floating industry
- Challenges are not dissimilar to those that the industry has previously overcome
- Continued strong growth in LNG, and even stronger growth in short term trades indicates the potential for development of smaller resources
- History supports a growth both in development and in technology choices

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