



decisions with confidence

FLNG – A Nice Niche?

Martin Wilkes



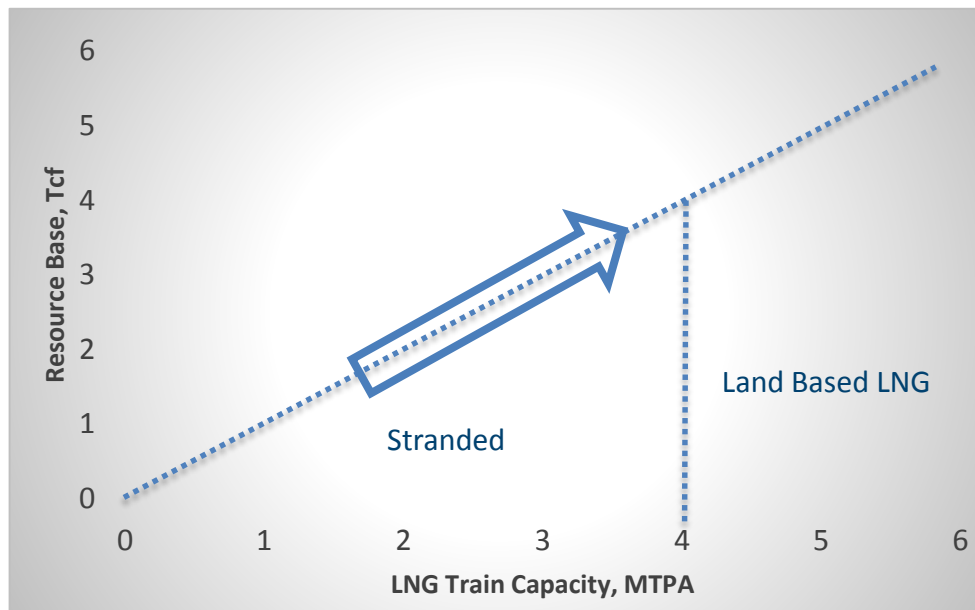
What we'll cover



- 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

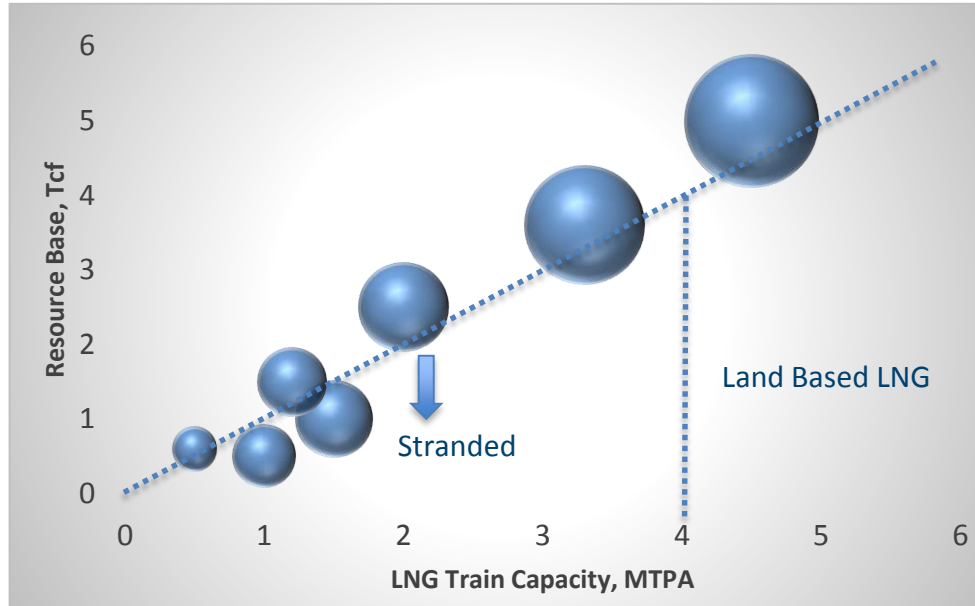
Traditional LNG Development has left a gap

- 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

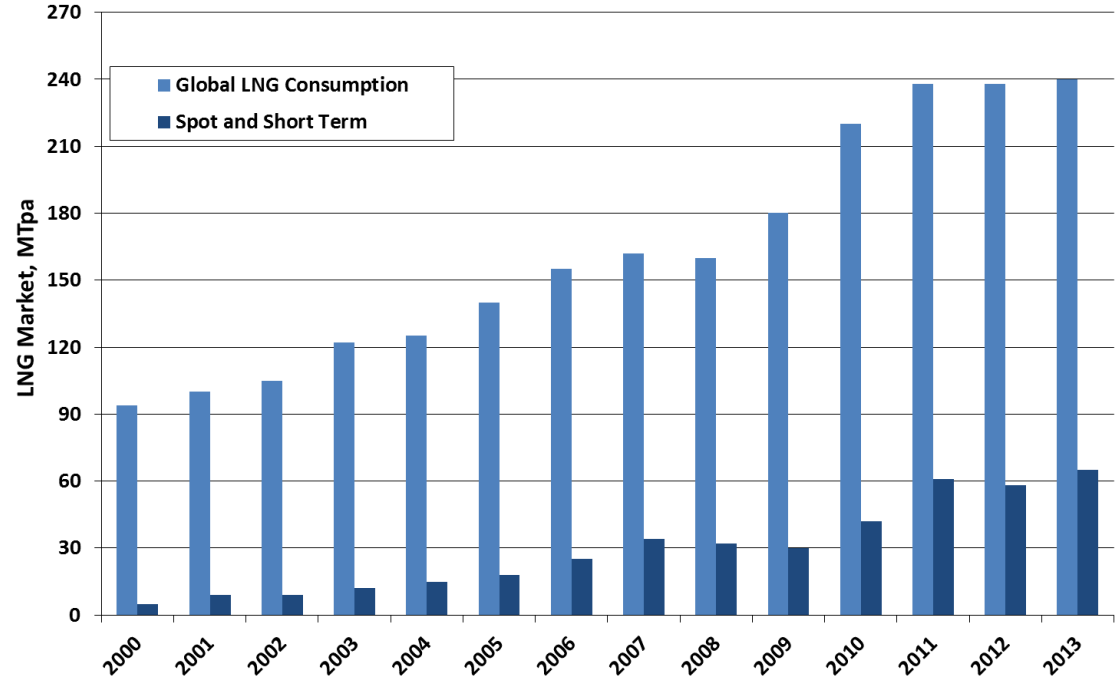


| Project | Proponent / Operator | Capacity MTPA | Technology / Design Features | Anticipated Start-up |
|-----------------------------|-------------------------|---------------|---|----------------------|
| Caribbean (F)LNG | Pacific Rubiales/ Exmar | 0.5 | Black & Veatch Prico™, SMR. Tethered barge 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

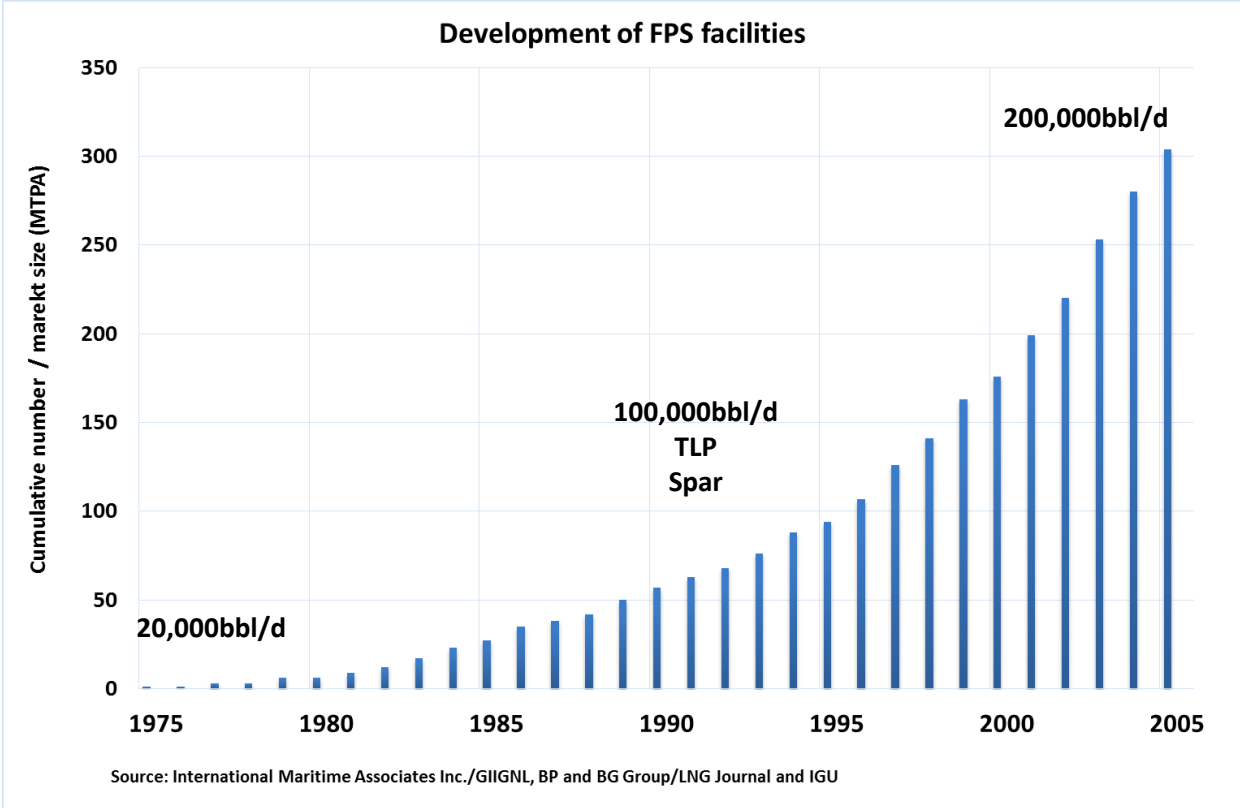
Significant changes in LNG Market

- 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

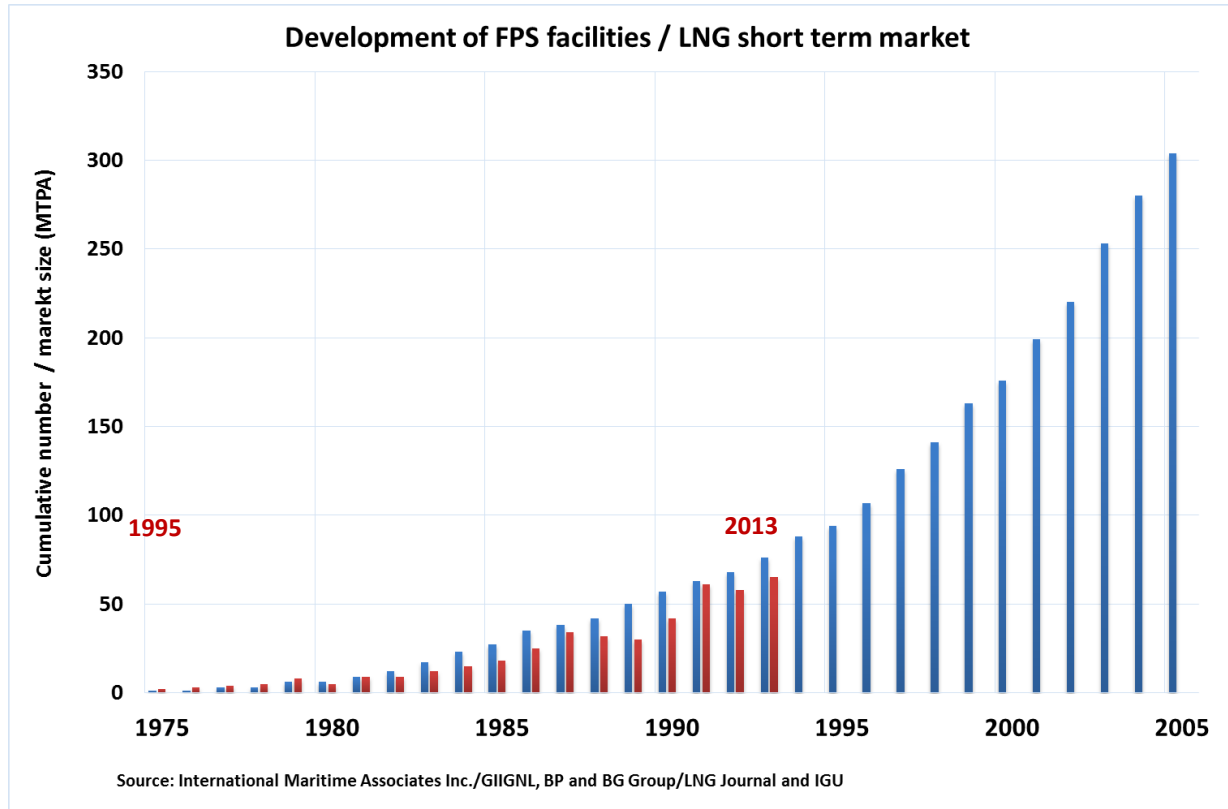


Sources: GIIGNL, BP and BG Group

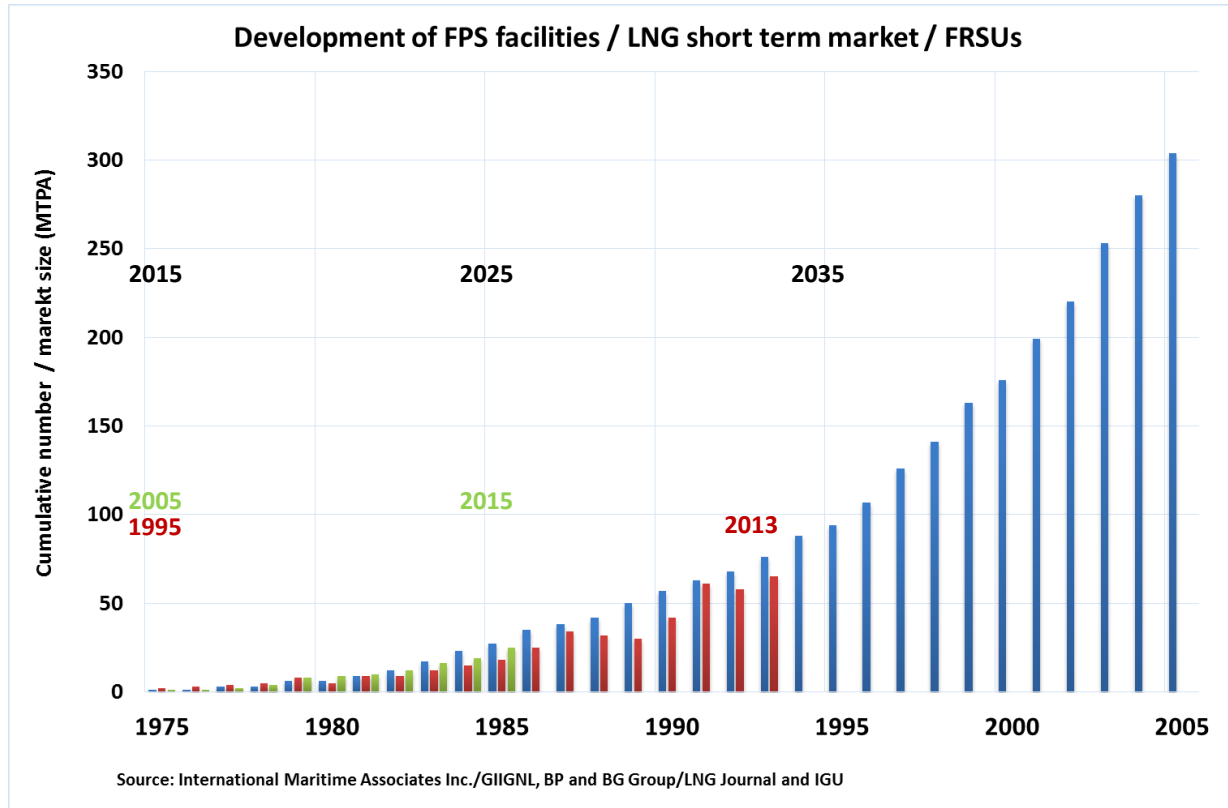
Historical Development of FPS facilities



A lesson in History?



A lesson in History?



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

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

- Successful development of the technology
 - Not new in the E&P industry
 - Long history of innovation and adaptation
 - 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

- 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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