Access to Gas – Revisiting the LNG Industry's Big Challenge

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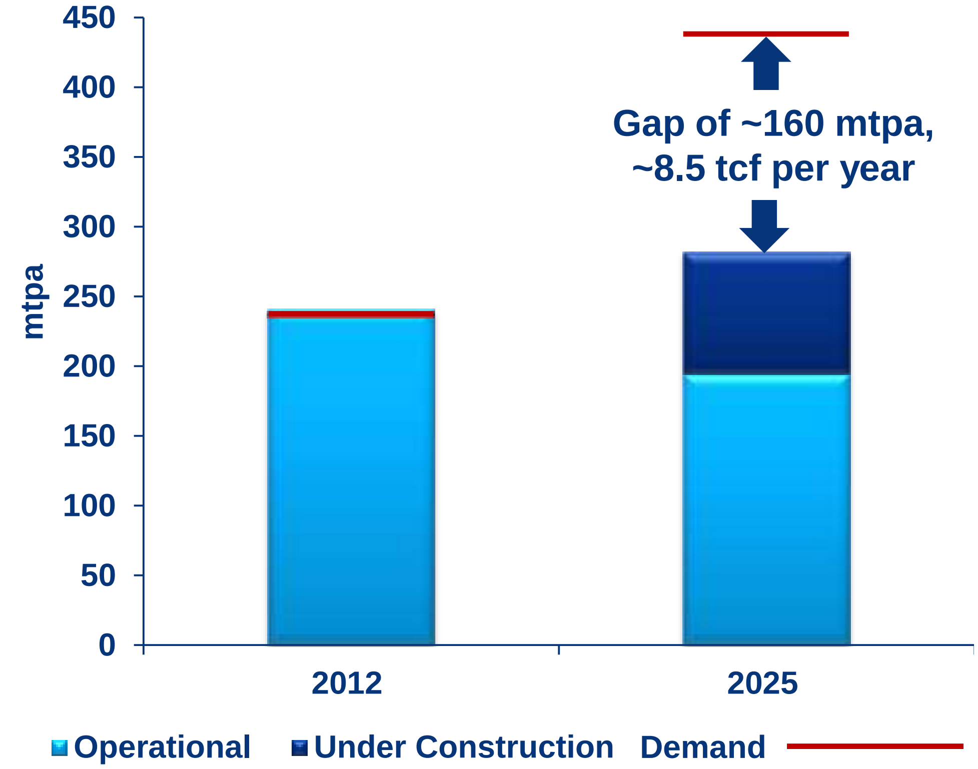
Accessing gas feedstock for LNG projects has been a consistent challenge for the industry

- At LNG 15 we considered the challenges associated with accessing NOC controlled gas resources, and forecast a shift towards exploration by the IOCs
- At LNG 16 we looked at the challenges of using unconventional gas to feed LNG plants as players began to develop projects utilising gas from coal-seams or coal-beds (CSG/CBM) and from shale
- Today, at LNG 17, we revisit those challenges and consider where the industry goes from here

The industry needs a lot of extra gas to support LNG production

- Demand is set to nearly double by 2025
- Need to factor in loss of production from existing plants (which tends to be under-estimated)
- Gap in 2025 of ~160 mtpa equates to ~180 tcf of gas feedstock to support 20 year production

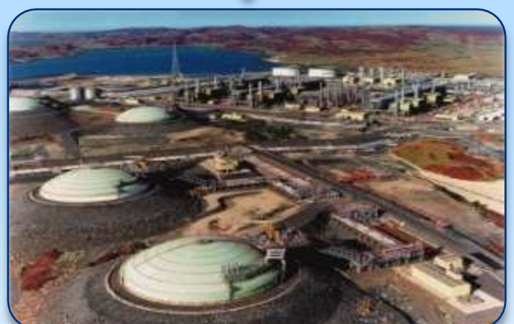
Additional LNG Requirement (2025)



Source: Wood Mackenzie

That gas is expected to come from a combination of three types of resource

Unconventional gas: from shale and/or coal



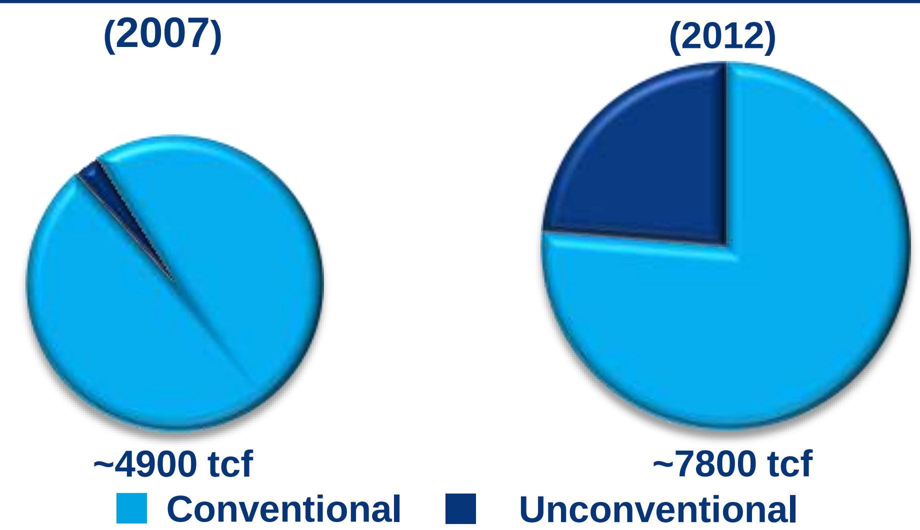
Already discovered conventional gas - NOC and/or IOC controlled

Exploration for additional conventional gas

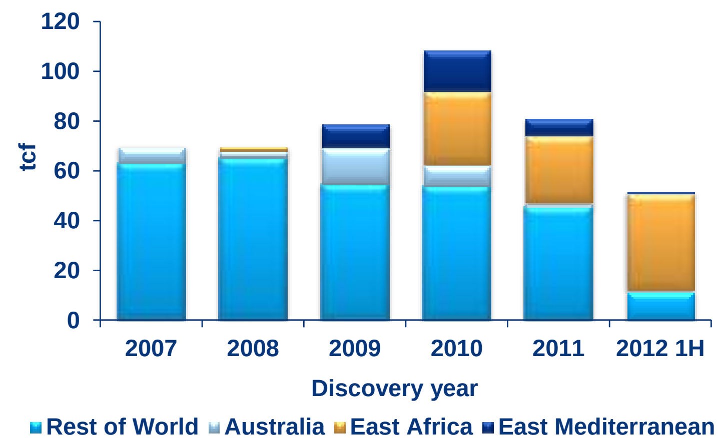
The gas resource base has grown massively since LNG 15…

- Unconventional gas in North America has been huge
- Exploration has also been a major focus and opened up East Africa to the LNG industry

Global Gas Resource



Conventional Gas Resource Additions via Exploration (2007 – 2012)

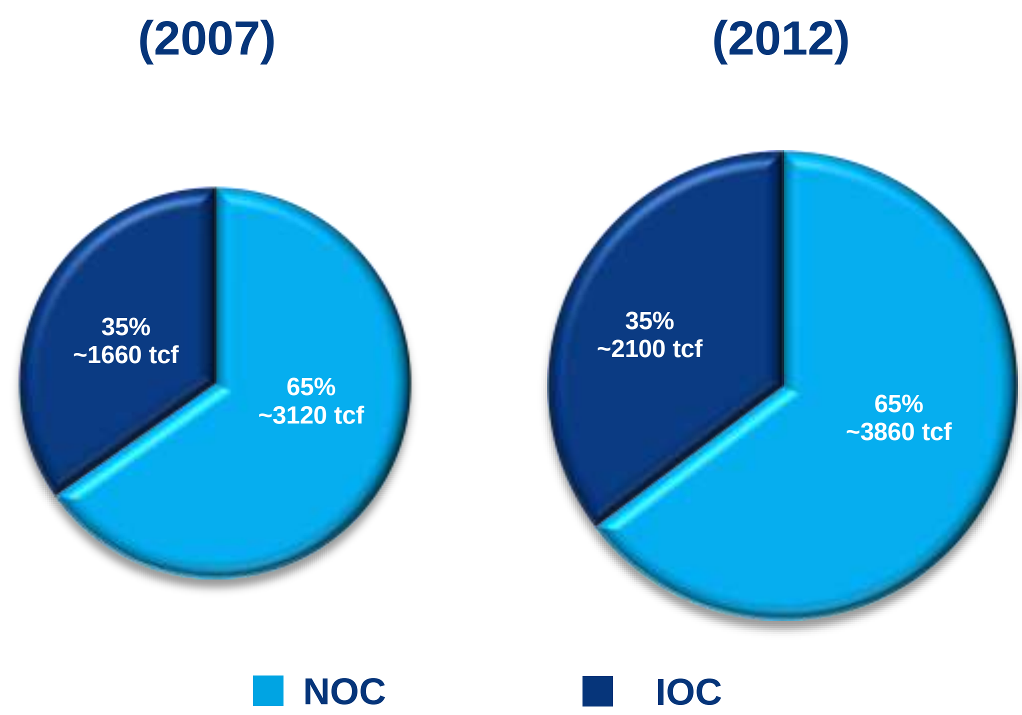


Source: Wood Mackenzie

…and IOCs now have access to more resource opportunities, without the need for NOCs

- IOCs have discovered a lot more gas via exploration
- NOCs have upgraded reserves
- But most unconventional gas is controlled by the IOCs
- So, critically, IOCs now have more gas to play with therefore a greatly reduced need to focus on NOC opportunities

Conventional Gas Resource – NOC vs. IOC



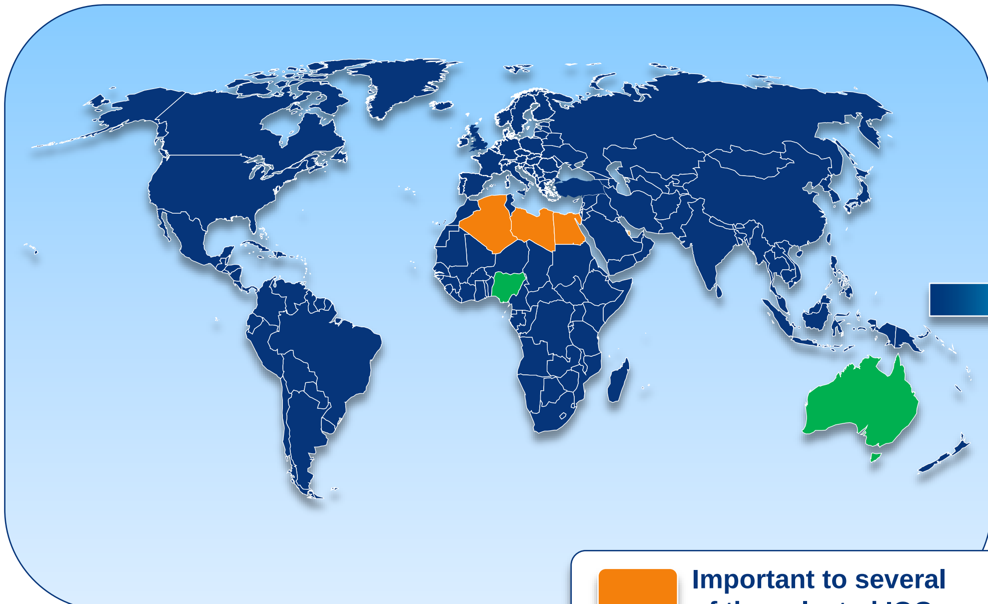
Source: Wood Mackenzie

We expect IOCs to pursue a mix of unconventional gas, discovered conventional gas and exploration

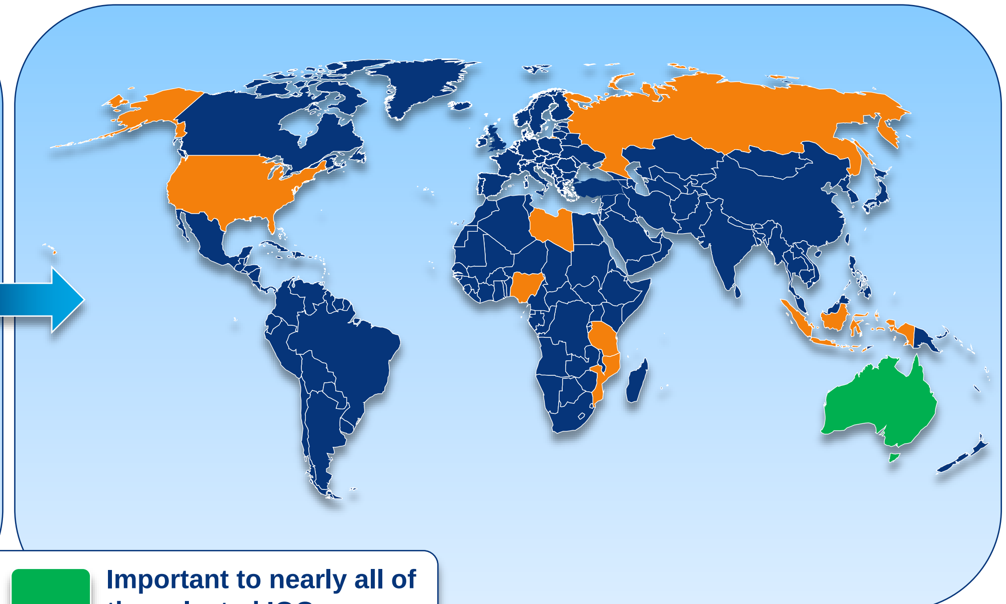
- While the volume of unconventional gas potentially available has increased massively, there are limits on its use as LNG feedstock
- So in addition, IOCs will focus on the conventional resources that they control, with East Africa increasingly supplementing Australia
- Players will continue to explore, but careful focus will be required to ensure that gas can be commercialised

This mix is reflected in the evolving portfolios of selected IOCs that are big players in LNG

Gas Resource for LNG Supply – Focus Countries Early 2007



Gas Resource for LNG Supply – Focus Countries Early 2013



Important to several of the selected IOCs

Important to nearly all of the selected IOCs

- Focus has broadened in the last six years, to encompass less NOC opportunities, exploitation of discovered gas, exploration plus unconventional

Source: Wood Mackenzie

LNG Project Developers also have to take buyers' preferences and requirements into account

- In aggregate, these suggest that the current focus on North America is appropriate, and that East Africa could prove to be a harder sale

Source: Wood Mackenzie

Conclusions

Conclusions

Lots of gas needed to meet demand growth and to replace lost capacity

Good news is that the resource base has grown massively

Challenge now is less about how to access gas, more how to combine options

It appears that this will comprise a mix of unconventional, IOC controlled conventional gas and more exploration, as reflected in IOC gas portfolios

- NOC controlled gas is the big loser

Developing LNG projects will never be easy, but perhaps we should all now feel a little more comfortable

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