



IHS Markit™

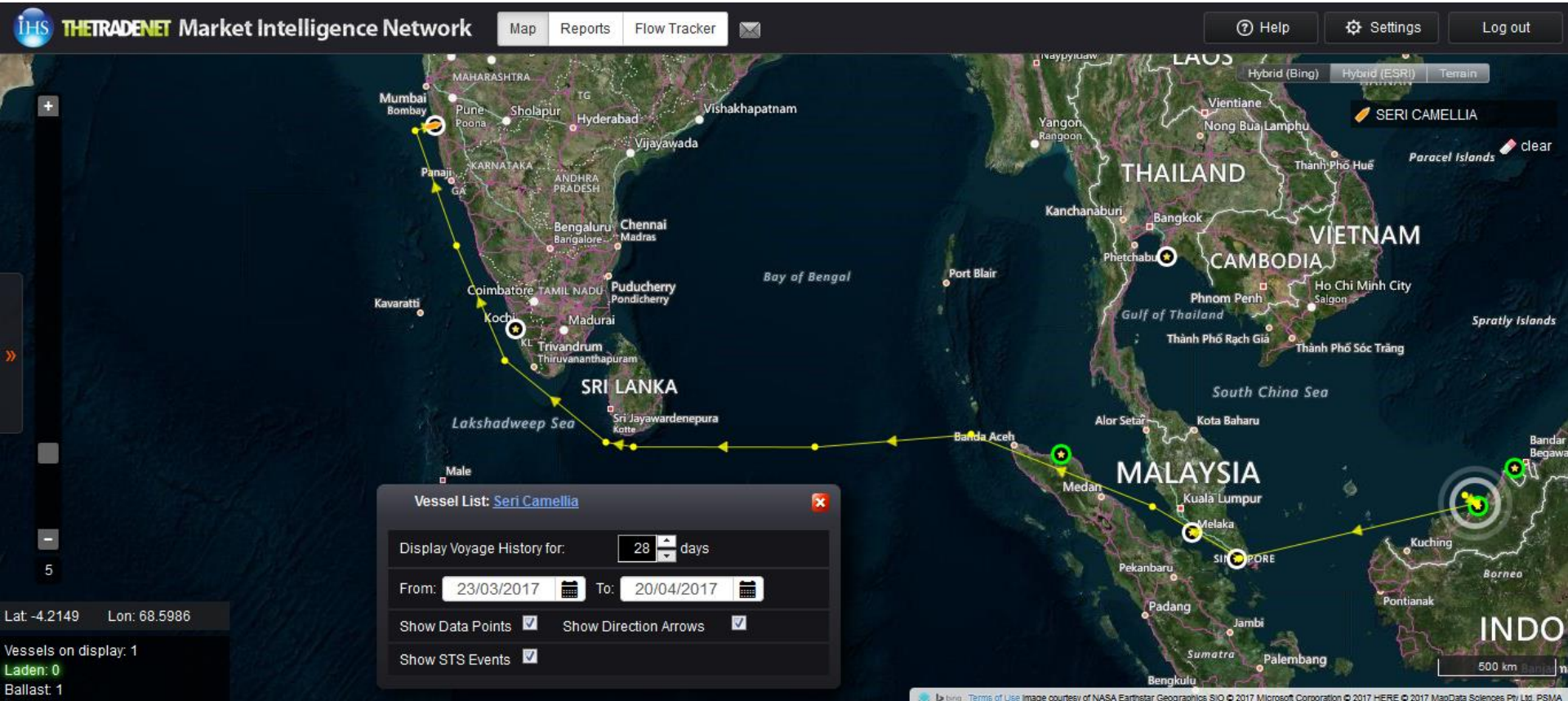
FLNG market analysis: where will new opportunities arise? Update on projects, models, players and costs

FLNG Global Conference, Hotel Okura, Amsterdam

8 May 2017

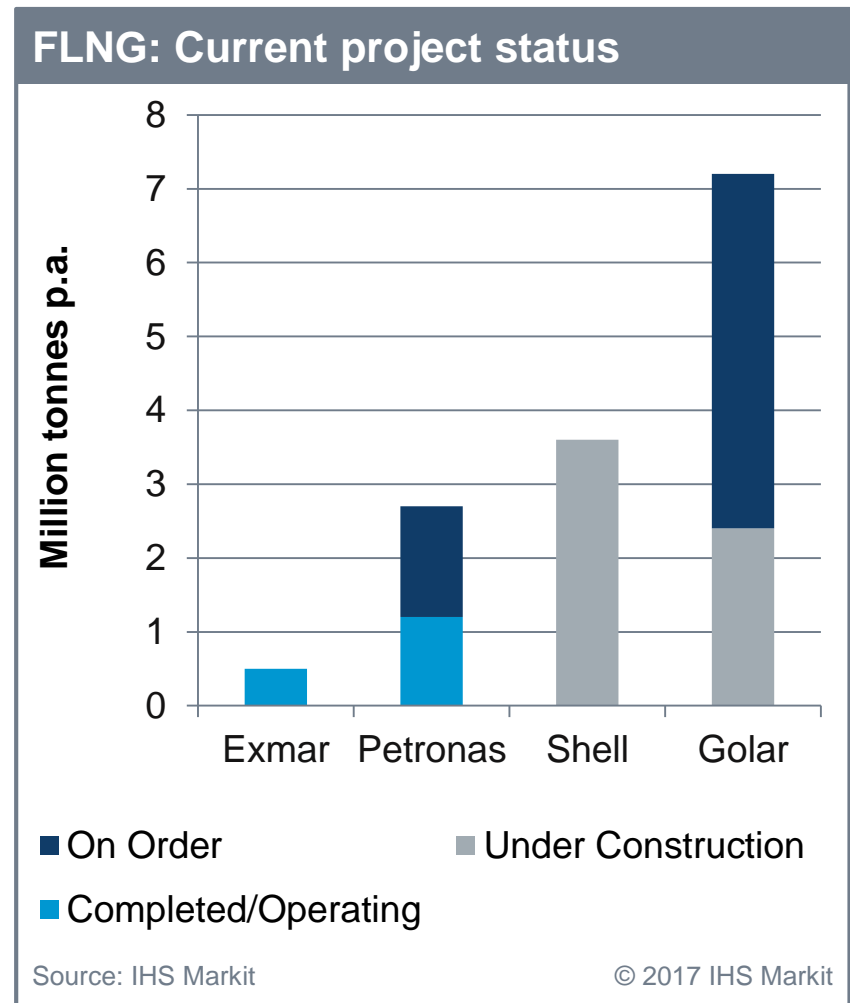
FLNG's Major Milestone

Petronas loads the world's first FLNG cargo on 1 April 2017



Operating and Under Construction FLNG Capacity

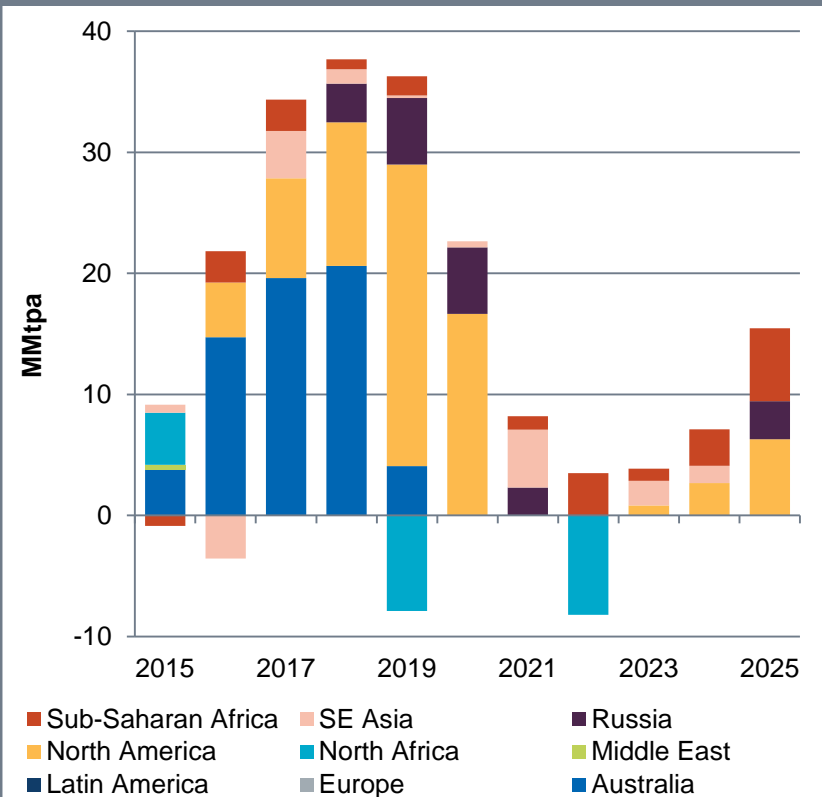
- Exmar Caribbean FLNG vessel available for deployment.
- PFLNG Satu vessel commenced operations in early 2017 while Petronas has pushed the delivery of its second FLNG unit back to 2020.
- Shell Prelude FLNG vessel is scheduled to commence operations in late 2017 early 2018
- Golar has three FLNG vessels under various stages of development – all are converted Moss LNG carriers:
 - > *Hilli* – scheduled to commence commissioning in September 2017 for the Cameroon LNG project.
 - > Conversion options with Keppel for *Gimi* and *Gandria* with the latter earmarked for the Fortuna LNG project.



Global Liquefaction Capacity Growth by Country

- In early 2017, global liquefaction capacity is 306 MMtpa.
- Near to medium-term increase in supply will come from under construction capacity in Australia and the US which account for more than 75% of the 123 MMtpa of capacity currently under construction.
 - > Smaller additions from Malaysia will come online over the next year, and starting in 2018, new floating capacity in West Africa will enter the market after the 2015 FID at Cameroon FLNG.
 - > Several other African FLNG projects have the potential to be wild card additions to supply.
- Post-2021, capacity growth will likely slow.

Net additions to global liquefaction capacity by region



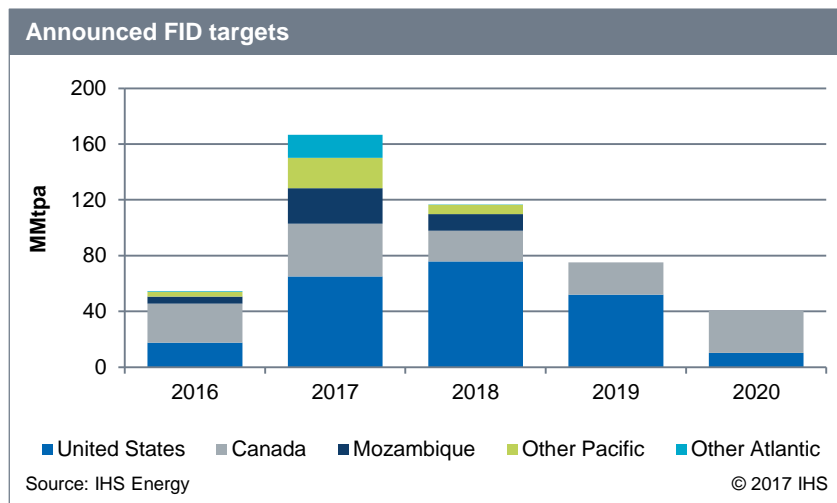
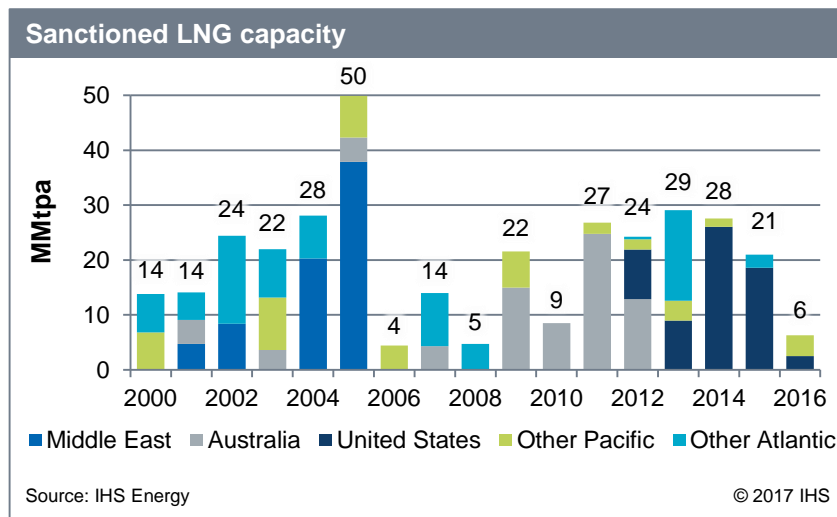
Note: Negative additions are the result of decommissioned plants in Indonesia and Algeria and an outage at Angola LNG.

Source: IHS Energy

© 2017 IHS

Slowing Pace of Gas Liquefaction Project FIDs

- As the LNG market heads into an extended period of oversupply, and many companies continue to cope with the sharp drop in oil and LNG prices, project sanctioning activity has slowed considerably.
 - > Only one project, the 3.8 MMtpa Tangguh LNG T3 in Indonesia, reached a formal FID in 2016.
 - > Although a formal FID has not been announced, Elba Island LNG is assumed to have been sanctioned in Q4 2016 as it achieved all regulatory milestones and onsite construction began.



LNG Project Sanctioning Outlook for 2017

- As the LNG market heads into an extended period of oversupply, and many companies continue to cope with the sharp drop in oil and LNG prices, project sanctioning activity has slowed considerably.
- Progress at large-scale integrated projects has slowed as companies seem reluctant to reach FID amid uncertain prices and demand. With CAPEX spending increasingly being slashed, it is unlikely that any large-scale, onshore project will reach FID in the near term.
- Project sanctioning is not expected to completely stop in 2017, but activity is likely to remain low.
 - > Coral FLNG in Mozambique is expected to take FID imminently as several project partners have secured approval from their boards.
 - > Best-positioned projects are smaller-scale proposals, including Fortuna FLNG (2.2 MMtpa) which is modeled similarly to the Cameroon FLNG project sanctioned in 2015.

FLNG: Enablers and Constraints

Enablers

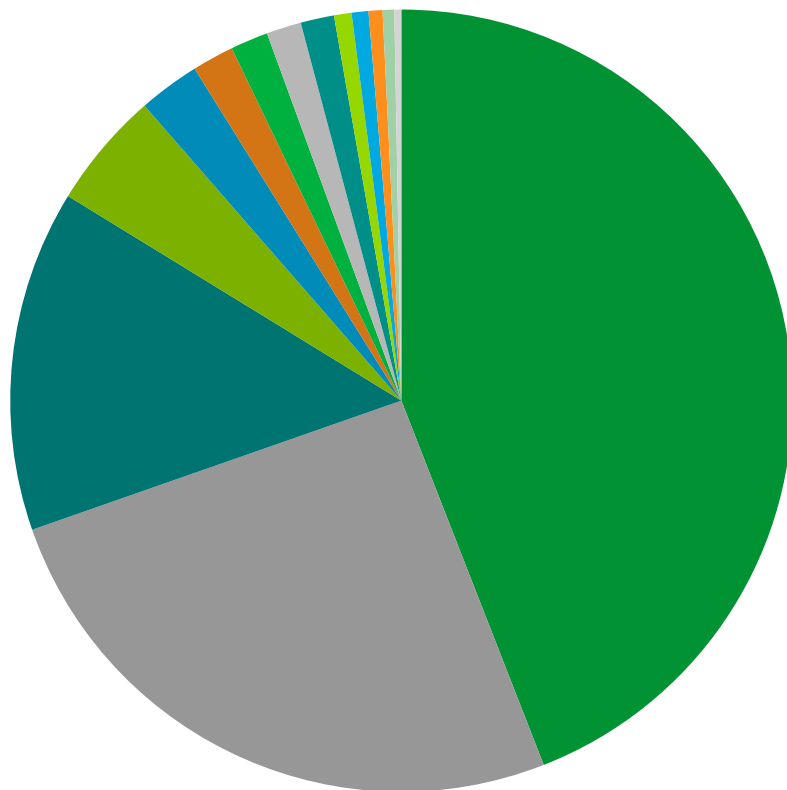
- Allows monetization of stranded gas
- Potentially avoids certain construction cost escalations
- FLNG conversions purportedly much lower cost than current construction wave
- Small-scale FLNG creates opportunity to commercialize smaller reserves, and allows more nascent buyers to enter market with smaller offtake requirement

Constraints

- Yet to be proven commercially, both in large-scale and small-scale formats
- Runs risk of cost overruns since untested, especially at newbuild FLNG vessels
- Uncertainty about scalability

Proposed FLNG Capacity is Significant; >170 MMtpa

Total proposed FLNG projects



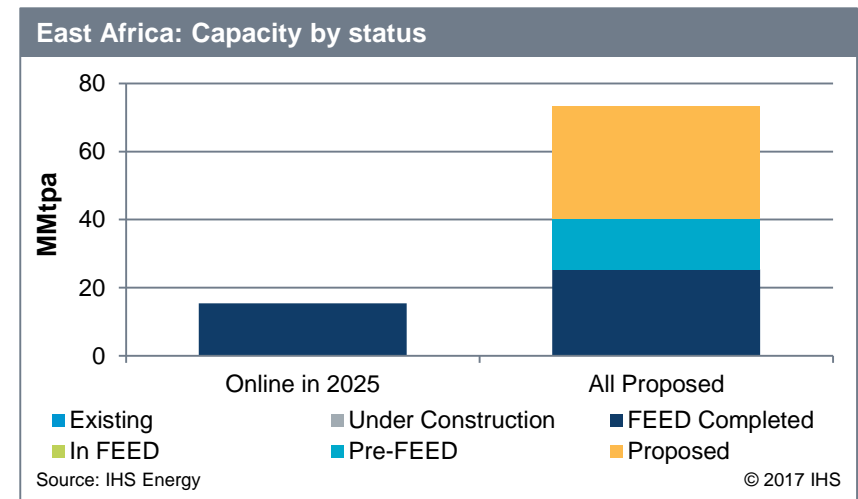
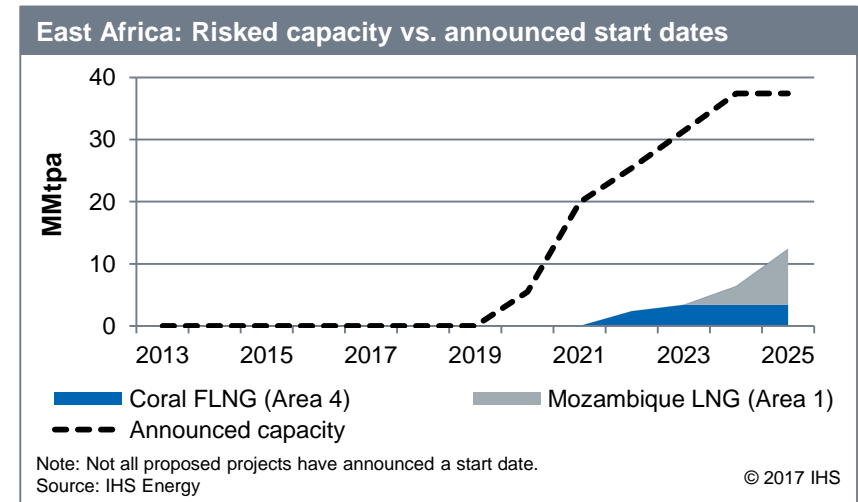
- US, 76.5, 42%
- Canada, 44.4, 27%
- Australia, 24.5, 15%
- Mozambique, 8.4, 5%
- Eq. Guinea, 4.4, 3%
- Djibouti, 3, 2%
- Malaysia, 2.7, 2%
- Mauritania, 2.5, 2%
- Cameroon, 2.4, 1%
- Russia, 1.3, 1%
- Congo (Rep.), 1.2, 1%
- PNG, 1, 1%
- Indonesia, 0.8, 0%
- Iran, 0.5, 0%

Source: IHS Markit

© 2017 IHS Markit

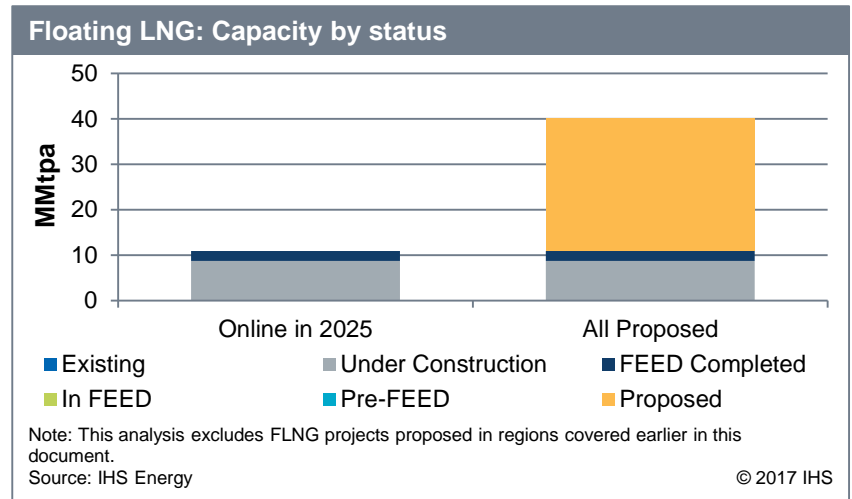
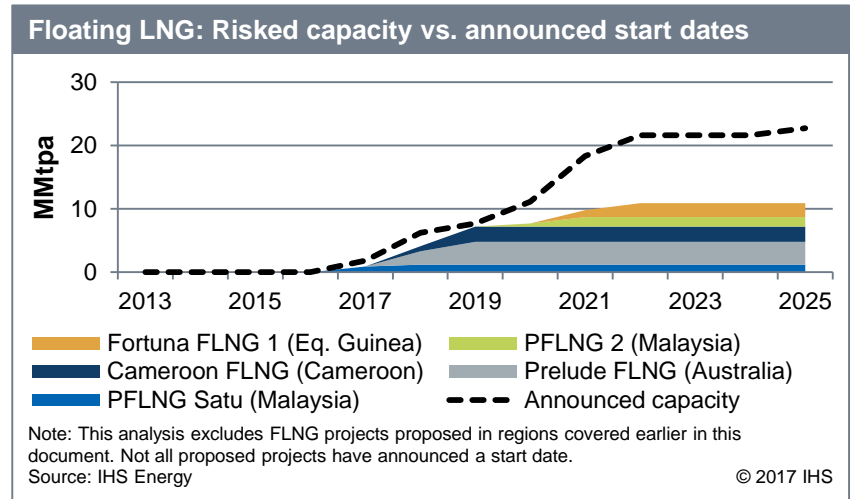
East Africa: Gas Liquefaction Capacity Outlook

- East Africa’s prolific resource discoveries have created major LNG opportunities for companies in the region’s offshore blocks, and could translate to even higher liquefaction potential than what has been proposed.
- Previously ambitious timelines were not met, but two projects have advanced.
 - > BP’s SPA with Coral FLNG was finalized in 2016 with FID expected to be announced imminently as several of the partners’ have approved the project.
 - > Anadarko’s project in Area 1 is farther behind, as the government still needs to approve some legal and commercial frameworks as well as ratify the resettlement plan before binding offtake contracts and financing can be secured.



Capacity Outlook for Other FLNG Projects

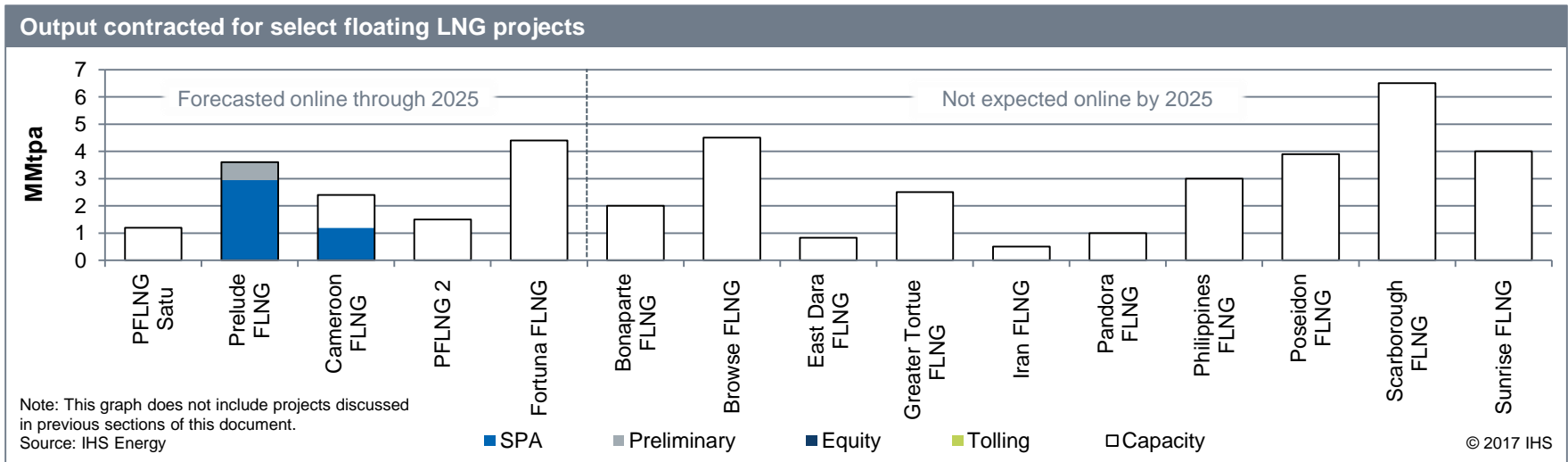
- Performance will be a critical determinant of the scale of FLNG adoption.
- FLNG proposals have been trending smaller, and several companies have dismissed their large-scale concepts for smaller-scale FLNG plans.
 - > Fortuna FLNG in Equatorial Guinea is based on a vessel conversion.
 - > Smaller-scale FLNG plans are being considered for Browse
 - > Relaxed Iran sanctions have revitalized LNG export discussions with Exmar’s newly-built 0.5 MMtpa FLNG barge (previously intended for Colombia) being considered for Iranian LNG exports.



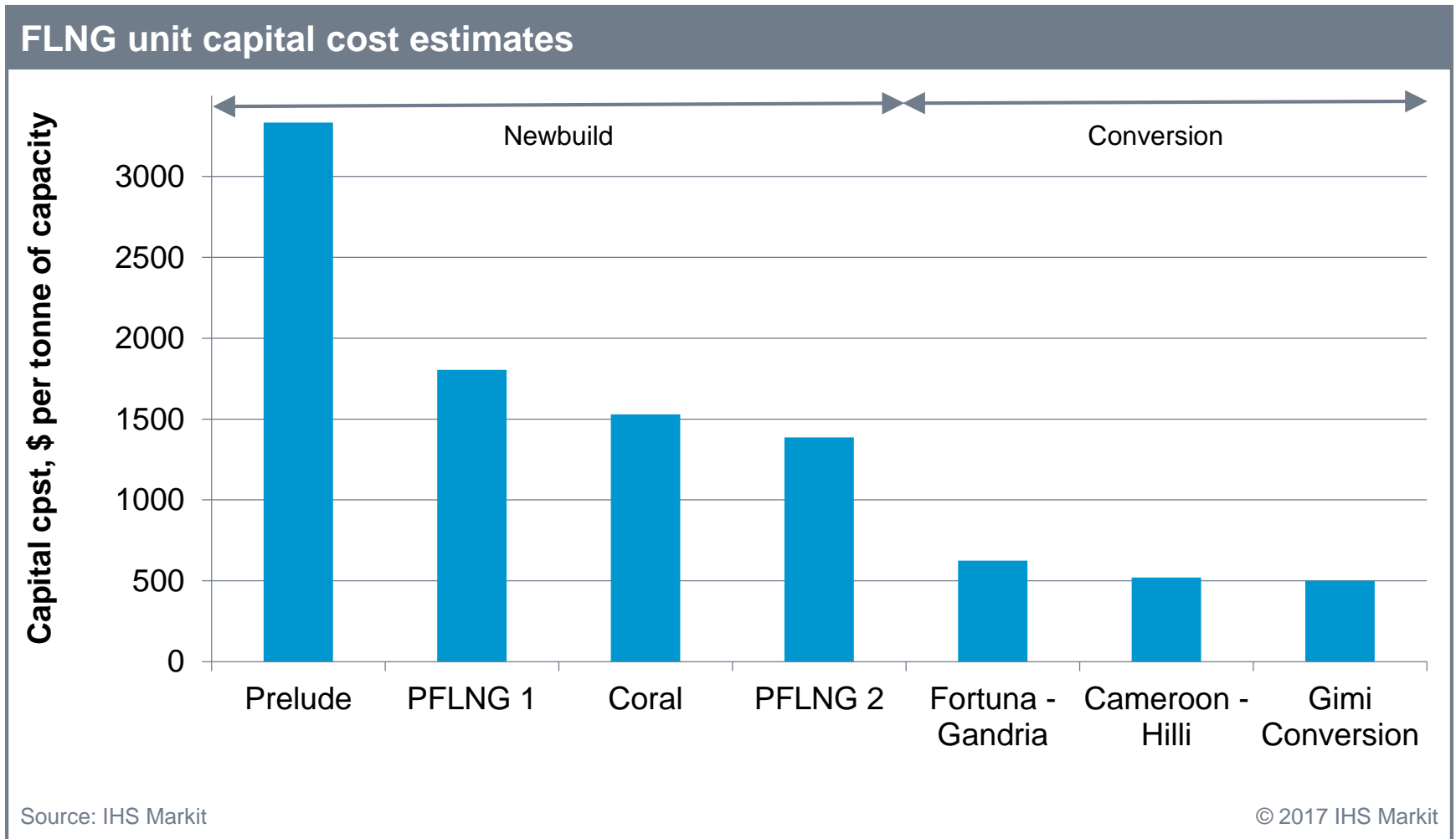
Note: To avoid double-counting projects, this analysis does not include projects discussed in previous sections of this document.

Level of Contracting for Other FLNG Projects

- Only two under-construction FLNG projects have signed offtake contracts so far.
 - > Shell and INPEX will market all of the produced volumes from Prelude.
 - > Cameroon FLNG has also signed a firm offtake deal, with Gazprom Marketing & Trading.
- PETRONAS is expected to market capacity from its two PFLNG projects.
- Even before the weak LNG market fundamentals in 2015–16, buyers have been hesitant to sign up for FLNG offtake until commercial operations are proved.



Few FLNG Capital Cost Data Points Exist



Concluding Remarks

- A major milestone has been met with the loading of the first LNG cargo in April 2017 from PFLNG 2.
- New FLNG capacity coming onstream over the near term will serve to prove that FLNG technology is a feasible gas commercialisation option.
- The current market environment makes it challenging for project developers to take FID on new gas liquefaction capacity.
 - > But a couple of FLNG projects are well placed to take FID in the near term.
- Currently more than 170 MMtpa of FLNG capacity is being proposed, mainly in the US, Australia and Canada.
 - > Most of these projects have made negligible progress to date.
 - > Some smaller West African projects could progress first.
- Old LNG carrier conversions appear to offer a cost effective solution when compared to new build FLNG and onshore liquefaction plant costs.