

# LNG Evolution

*Times have changed significantly for the LNG industry over the past decade to include a growing focus on spot sales, small LNG and hybrid solutions*

## Global Trading

A decade ago major volumes of available liquid natural gas (LNG) supplies, including those from African facilities, were bound for Asia and North America, with expectations those volumes would increase. However, with the US natural gas production boom and its subsequent transition to a net exporter for the first time in over half a century, world trade patterns look quite different.

Asia still imports significant volumes of LNG as does North America, but the latter's volumes are not bound for the US, rather Mexico receiving the bulk of it. In 2017 US net exports reached 1.94 billion cubic feet per day (Bcf/d) up from 0.5 Bcf/d in 2016, according to the Energy Information Administration (EIA).

Waning also are long-term supply contracts with LNG increasingly being sold via short-term contracts or on a Spot basis. Traders are becoming increasingly weary of the tedious, time consuming process of Master Sales Agreements (MSAs), and analysts are predicting a shift from MSAs toward a system more like that of oil trading.

Increased volumes are available on a daily basis, with Cheniere Energy founder Charif Souki, now chairman at US LNG developer Tellurian Inc., saying long-term contracts in the LNG sector would soon be a thing of the past. "The market has become sufficiently liquid today that a buyer does not need to enter into a long-term contract," Souki was quoted as saying in a Platts article in May.

## The New Look of LNG

While sales solutions are being sought, so too are technology solutions, especially in light of global trading changes. Significant volumes of natural gas are stranded around the globe, with some of these reserves found in small pockets not economically viable for a large commercial LNG facility, or in very remote locations without the viability of ship-to-shore infrastructure.

Finding a solution to monetize these valuable resources once thought of as a nuisance byproduct that was either flared or reinjected, became paramount to many resource holders. With the nature of supplier and buyer changing over the past decade, some LNG producers are looking for replacement markets to monetize their LNG production. Meanwhile, those with marginal or stranded natural gas supplies are looking at small scale monetization solutions. Enter floating LNG, or FLNG.

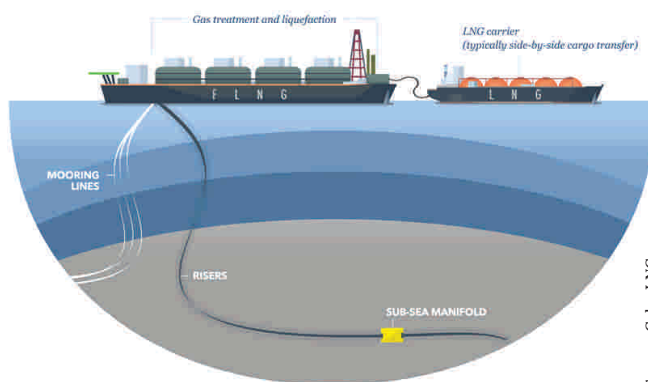


Source: Petronas

*World's first floating LNG development, the PFLNG SATU*

On December 5, 2016, Petronas' PFLNG SATU offshore Malaysia, became the world's first FLNG unit in operation. Located in 200 meters water depth, the 365-meter facility is producing 1.2 million tons per annum (mtpa) of otherwise stranded natural gas reserves, and will continue to do so until at least 2036. The Malaysian company is developing another FLNG facility, PFLNG2, which has a scheduled start date in 2020.

A number of other FLNG projects are either underway or under consideration, none more prolific than the Shell Prelude FLNG project.



Source: Golar LNG

*FLNG to LNG*

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The Prelude, once expected to be the world's first FLNG plant, is the largest offshore facility ever constructed. The vessel arrived at its location at the Prelude field, in Western Australia, in July 2017 and is expected to come online later this year. According to Shell, this FLNG facility will produce at least 5.3 mtpa of liquids: 3.6 mtpa of LNG, 1.3 mtpa of condensate and 0.4 mtpa of liquefied petroleum gas.

Africa has its own FLNG ambitions as well that will add to the established LNG producers' totals in the continent i.e. Algeria, Egypt, Equatorial Guinea, Libya and Nigeria (Angola also has a facility, but it has been plagued with issues since the onset). More and more natural gas discoveries are being made in frontier areas where the countries lack the infrastructure or even the funding to support conventional onshore LNG facilities. FLNG is set to provide solutions.

Africa's first completed FLNG unit arrived offshore Cameroon in late November 2017. It is also the world's first converted FLNG unit. LNG shipping company Golar had a large LNG carrier converted into a FLNG vessel. Golar announced in March that production of LNG had started from the new vessel *Hilli Episeyo*, for project partners Perenco and Société Nationale des Hydrocarbures (SNH), Cameroon's state oil company. This makes Africa home to just the second operational FLNG facility in the world. The *Hilli Episeyo* will produce 1.2 million tons annually which for the next eight years will be sold to a Gazprom affiliate.

### FLNG Hilli Episeyo

- Africa's First FLNG Unit
- World's first FLNG conversion
- 14-15 million man-hours to completion
- 1,200 km of cabling
- 250 MW of power on board
- 4,300 people on board to complete conversion

Much read about in the pages of *Petroleum Africa* over the past few years is the Fortuna FLNG, the most well known of Africa's planned FLNG projects. Equatorial Guinea's Fortuna FLNG was expected to be Africa's first FLNG development, but like Shell's Prelude, it was beat out by another African project. Fortuna entered FEED in July 2015 and project lead Ophir Energy says FID is expected once the financing solution has finalized with the first production forecast for 2021. The field is expected to produce 2.2 mtpa when online. The project has recently seen a snag with one of the One LNG joint operating company partners pulling out due to delays in securing necessary financing. According to Ophir, production is expected to be around 330 Mmscf/d with a plateau of 30 years when the project gets going.

Equatorial Guinea, already an LNG producer, is looking to export small scale LNG to its African neighbors. Citing the need to bring down expensive import bills for fuel to power African nations, Minister of Petroleum, Gabriel Mbaga Obiang Lima said that the answer is Equatorial Guinean small scale LNG. "We are already working with Togo and



ENI's Mozambique operations

Source: ENI

Ghana to deliver small scale LNG. We prefer our LNG go to Africa than EU. It saves money for Africans..."

This ambition is already being partly realized with the April MoU signed with Togo that creates a framework for Togo to import LNG produced in Equatorial Guinea. The agreement is part of the LNG2 Africa initiative, in which Equatorial Guinea is promoting the utilization of LNG within Africa, using gas sourced and processed in Africa. Togo will study the import, regasification of LNG, and its use for power generation.

The abundance of natural gas discovered off the coast of East Africa will lead to multiple LNG developments, including a FLNG development off the coast of Mozambique. ENI will be developing Mozambique's first FLNG project on its Area 4. The project achieved a major milestone for the Coral South FLNG project in December when operator ENI and its Area 4 partners saw their multi-sources project financing achieve financial close. A Sale and Purchase Agreement was signed in 2016 for the sale of 100% of the LNG production to BP.

Coral South FLNG targets the production and monetization of the gas contained in the southern part of the Coral gas reservoir. The FLNG plant will have a capacity of 3.4 mtpa. The Coral facility will be fed by six subsea wells and is expected to produce up to 5 Tcf of gas, with an anticipated start-up in mid-2022.

At one time FLNG had been floated as a possibility in Tanzania for its considerable reserves, along with a conventional LNG facility, but internal governmental issues regarding the country's energy ministry have partly contributed to a stall in plans progressing smoothly. It is almost a given that LNG is in Tanzania's future, but when is the question.

### Summing Up

It is clear that the global LNG industry is ever changing with new technologies and solutions continually emerging, while trading patterns continue to morph as demand shifts from various geographic locations. This pattern will continue as importers come up with new solutions such as renewable energy, exploiting their own resources if available, and becoming more energy efficient. These developments are sure to keep LNG at the forefront of industry discussion for years to come. 