

LNG

Sub-Saharan Africa pushes forward with LNG

Several sub-Saharan African countries are preparing to develop gas reserves, primarily for export as LNG, but also for domestic consumption. Robert Stokes reports.

In a world increasingly hungry for natural gas, recent foreign investment in liquefied natural gas (LNG) projects has raised the likelihood that the substantial gas reserves of some sub-Saharan African nations will make it into global markets in the decade ahead.

In its scenario based on the likelihood of growing demand and resulting additional investment in LNG infrastructure, the Paris-based International Energy Agency (IEA) in its *World Energy Outlook 2017* saw net exports of natural gas from sub-Saharan Africa rising from 29bn cubic metres (bcm) in 2016 to 48 bcm in 2025, and to 106 bcm in 2040. This, the IEA calculated, would represent gas exports' annual share in total production within sub-Saharan Africa to be around half.

Of course, the governments of these African countries with reserves want to see their gas – whether on or offshore – also being tapped to catalyse downstream economic and social development. It could be used to make chemicals, fertilisers and plastics, for example. And even where there are no pipelines to distribute it widely in and between African countries, which is often the case, it could be converted into forms transportable by road and rail.

It could also be used instead of oil to fuel power generation in a region with a growing and urbanising population, and with rising demand for energy in general, and for natural gas for residential and commercial buildings. The IEA says that Africa's own future demand for gas is closely linked to efforts to establish or revive domestic gas markets.

Michael Fulwood, Senior Research Fellow at the Oxford Institute for Energy Studies (OIES) advises analysing current gas developments in sub-Saharan Africa under two separate headings: *export plays* and *import plays*.

'As an export play, the development of reserves is focused on LNG exports which in many cases should have spin-off impacts



The Greater Tortue Ahmeyim project will produce gas from an ultra-deepwater subsea system and mid-water floating production, storage and offloading vessel (left), which will process the gas for transfer to a floating liquefied natural gas facility at a nearshore hub located on the Senegal/Mauritania maritime border.

Photo: BP

for growing domestic markets; for example, in Mozambique and Senegal/Mauritania,' he told *Energy World*.

The import play is very different and relies on gas displacing oil in the power generation market and enabling growth of electrification, he added. 'For places like Cote d'Ivoire, then LNG imports can supplement static or declining domestic production or, for Ghana, [supplement] rising demand over and above domestic production and pipeline imports.'

And while Ghana does not need LNG until the early 2020s, according to Fulwood it has been preparing. In late 2018, it announced plans to build a \$350mn LNG terminal for the port of Tema, setting it on course to become the first sub-Saharan nation to purchase LNG.

With private equity backing from companies such as Africa-focused private equity firm Helios Investment, the scheme's operator Tema LNG has signed deals with Chinese engineering and shipyard companies who will build the infrastructure at the port and deliver a floating storage and regasification (FSRU) unit. The first LNG imports at Tema are scheduled for the first half of 2020.

Mozambique, Senegal, Mauritania

This, and news from other sub-Saharan LNG projects dovetails with expected trends in LNG markets in the next few years. 'We

believe 2019 could be the largest year ever in terms of LNG project capacity sanctioned. Over 60mn tonnes per annum are likely to enter construction... as companies race to meet a projected LNG supply gap in the early 2020s,' said Giles Farrer, Director Global Gas and LNG at Wood Mackenzie last December after BP announced a final investment decision (FID) for phase one of the Tortue LNG project offshore Senegal/Mauritania.

With capital and operational costs in the global oil and gas industry still below pre-2014 levels in the 'lower-for-longer' oil price era, some operators are keener than for some years to sanction projects and appoint contractors at favourable rates that, given the industry's history of cost inflation during upswings, may not last forever.

There has been recent progress too in Mozambique. The start last September of construction on a floating LNG production facility (FLNG) unit for the Coral South FLNG project in the Rovuma basin offshore northern Mozambique highlighted the commitment of Italian field operator Eni and its partners to a project which is slated to start LNG production by 2022 after the vessel is delivered in 2021. Coral South, which contains about 450 bcm of natural gas will be the first project to monetise the gas resources discovered in the Rovuma basin's offshore area 4.

Meanwhile, US-based exploration and production major Anadarko is developing the country's first onshore LNG plant, to support development of the Golfinho/Atum field within the country's offshore area 1, also off northern Mozambique, in the Rovuma basin, whose exploitation was approved by the government last March.

An FID has been expected in the first half of 2019 for the offshore project, which took a significant step forward in late 2018 when a TechnipFMC and VanOord consortium was named as the preferred tenderer for the

engineering, procurement, construction and installation (EPCI) of the offshore subsea system.

Liquefaction offshore

The onshore LNG choice in Mozambique is unusual currently. In an era of low gas prices, bringing offshore natural gas onshore for liquefaction in the absence of expensive underwater pipelines is less appealing to operators than producing the liquefied form offshore and offloading it directly onto LNG carriers. The availability of technologies including FSRU and FLNG, which are cheaper, quicker and more flexible options for responding to changing market conditions amid lower gas prices in an increasingly global market are helping projects to secure FIDs.

This is because the cost of the LNG technologies allows the vessel operators to offer attractive rates for gas liquefaction over the lifecycles of projects. This helps to counter the other side of the equation: cost over-runs; royalties to governments; currency, regulatory, political and terrorism risks, particularly in the country of operation; and the always possible threat of global economic decline or shocks to global financial markets.

For oil and gas field operators, and for governments, FLNGs based on existing ships, and particularly if the vessel owners build them on a speculative basis, offer quicker, cheaper solutions to realising the value of gas reserves that might otherwise be 'stranded'.

New vessel options

In another example of cost being taken out of liquefaction, Golar LNG's *Hilli Episeyo*, the first ever FLNG vessel developed by converting an existing LNG carrier, entered full commercial operation offshore Kribi, in southern Cameroon, last summer for Perenco Cameroon and Société Nationale des Hydrocarbures. Golar LNG stressed how converting the carrier built in 1975 adds value through speeding up time to first LNG production and through cost-competitive pricing.

Hilli Episeyo started commercial production less than four years after speculative contracts were signed with the Keppel Shipyard, in Singapore, compared with typically much longer lead times for onshore LNG plants.

After Shell's much larger capacity *Prelude*, an FLNG on a scale that many industry observers expect never to see again, *Hilli Episeyo* is only the second FLNG to start operating. However, it will soon be joined by more off sub-Saharan Africa. In February, Golar LNG



announced that its subsidiary Gimi MS had landed a 20-year lease and operate agreement with BP for the charter of an FLNG unit, *Gimi*, to service the Greater Tortue/Ahmeyim project located offshore Senegal/Mauritania.

This will once again involve conversion at the Keppel Shipyard of a laid-up LNG carrier at a cost of approximately \$1.3bn, excluding financing costs, Golar LNG disclosed.

Expected to commence production in 2022, FLNG *Gimi* will liquefy gas as part of the first phase of the project. It will be located at a nearshore hub on the Senegal/Mauritania maritime border. The vessel is to use Black & Veatch Corporation's PRICO refrigerant technology, which the US maker pitches as a cost-effective design for a broad range of LNG plant capacities.

LNG for export

While the LNG investment floods into sub-Saharan Africa, much of the liquefied gas will initially be exported to other countries, despite the potential benefits in developing downstream processing.

Indeed, Mozambique looks set to enter 'the global league of LNG producers' sometime in the next decade, according to an in-depth risk analysis by Anne Frühauf, Senior Vice President with political analysts Teneo Intelligence, writing in the January 2019 issue of *Forum*, a quarterly journal of the OEIF.

Despite Anadarko's onshore LNG plant plans, however, question marks remain over the extent and pace of any midstream developments in Mozambique itself. In her article, Frühauf notes that while a 2016 Mozambique government tender attracted 14 proposals from a range of companies, of these projects, 'only Shell Mozambique's plan for a 38,000 barrel per day gas-to-liquids plant seems to be making tentative progress'.

Meantime, Mozambique's heavily-indebted government faces external and mounting internal criticism over massive sovereign debts built up in expectations of an oil and gas bonanza. In 2018, its

Floating LNG production facility the *Hilli Episeyo*
Photo: Golar LNG

creditors offered a rescheduling of debt so that the payments will be based on gas revenues when the gas starts to flow.

In Frühauf's view, high debt levels and falling energy prices will drag on Mozambique's gas industry for a decade, giving LNG producers influence over the current government which is naturally keen to avoid any more delays in the development of its Rovuma basin natural gas reserves.

Ghana and West Africa

Similarly, on the other side of the continent, the government of Ghana has designs on leveraging its national offshore hydrocarbon resources to boost economic and social well-being for more of its citizens.

It has ambitions for its western region to become a petroleum hub by 2030. Its vision includes new refineries and processing, storage and distribution facilities to meet demand in West Africa. The wish list involves new ship-to-ship and bunker zones near Tema and another port, Takoradi.

However, this vision of a new petrochemical industry, and the long-term government contribution needed for infrastructure projects and processing plants, 'has to be regarded with scepticism in Ghana's highly competitive political environment' – the last government changeover was in December 2016. This is according to Monika Skaten, associate professor at the Western Norway University of Applied Sciences.

Her opinion underlines longstanding scepticism over the difference between what sub-Saharan African governments often say they hope to achieve with oil and gas wealth, and the reality that stems from a complex combination of market conditions, competition for international investment, national politics and business practices, and a chronic lack of supportive infrastructure.

In time, the LNG projects may help to change things if they support the development of skills and infrastructure hubs, but the jury is out on whether they will. ●

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