

# Flame



## The Impact of LNG on Africa

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# Section 1

Mozambique

# MOZAMBIQUE SNAPSHOT



Found **150-200 Tcf** since 2010 offshore northern Cabo Delgado, equivalent of **26-36 bn bbl**.



**Fifth licensing round** now signed and **sixth licensing round** reported to be launched next year.



Young country.  
**Independence 25 June 1975.**

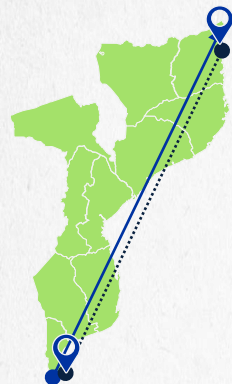


**Civil war** 30 May 1977 - 4 October 1992, with Cabo Delgado hit hard.



Producing **onshore gas** since 2004, through Sasol.

## Geography



**2,800km long**

Afungi site is  
**2,750km**  
from capital city (Maputo).



**Same distance as....**

New York

to

Houston

London

to

Casablanca

Paris

to

Moscow

**One of world's poorer countries.**

Debt to GDP around 100%. In sovereign default since 2016, official debt recently rescheduled with unofficial debt still in default<sup>4</sup>



# OUR COUNTRY LNG HYPOTHESIS



## FLNG

- Coral FLNG (3.4 MTPA)
  - FID June 2017, First Gas June 2022

## Onshore

- Mozambique LNG (12.9 MTPA)
  - FID targeted **18 June 2019**, Fully Commissioned 2024
- Rovuma LNG (15.2 MTPA)
  - FID 3Q 2019, Fully Commissioned 2025
- Unitised Trains (15.2 MTPA)
  - FID 2024, Fully Commissioned 2029
- Prosperidade LNG (12.9 or 15.2 MTPA)
  - FID 2024, Fully Commissioned 2029

## Domgas Projects

- Expected - Gas to Liquids ("**GTL**"), Fertiliser, Independent Power Projects ("**IPPs**"), Small-Scale LNG ("**SSLNG**"), LNG Bunkering, Methanol to Olefins ("**MTO**")

The **30 year EPCC term is limited** and **includes**, through the Decree Law, a **tight interim deadline** (all PODs must be submitted by December 2023, 10<sup>th</sup> anniversary of EPCC Commercial Assessment Period). This means Sponsors must use it or lose it. Can the country's execution capacity match this market obligation?

# AREA 1 - MOZAMBIQUE LNG



Our current understanding of Mozambique LNG is as follows:



On **8 May 2019**, Anadarko **publicly committed** to an FID of the 12.88 MTPA project on **18 June 2019**.



Since 2017, **significant progress** has been made:

- “Marine Concessions” agreed, finalising the marine facilities.
- The site resettlement process kicked off in November 2017 and joined by Area 4.
- In February 2018, the Council of Ministers (“**COM**”) agreed Area 1’s POD
- In November 2018, Technip/VanOord were selected as offshore EPCI contractor



On 13<sup>th</sup> May 2019, Anadarko announced they have now signed 11.1 MTPA of SPAs.

Signed SPAs have now been announced with Bharat, CNOOC, EDF, JERA/CPC, Pertamina, Shell, Tokyo Gas/Centrica and Tohoku



The **first two trains will also provide 100 MSCFD of Domgas** which will contribute towards the supply for the three Initial Domgas projects selected by the GOM (GL Energy - IPP; Yara – fertilizer and Shell – GTL). We envisage **developing Domgas projects at Afungi will likely require bespoke port and access arrangements.**

A Debt Wire story of 28<sup>th</sup> March reported that **major progress** has been made with raising **USD 12.5 – 13bn** debt financing, specifically the receipt of credit-approved offers from banks

## AREA 4 - ROVUMA LNG



ExxonMobil



Coral FLNG achieved FID in June 2017 and is under construction.

Our current understanding of Rovuma LNG is as follows:



Initial technical work assumed Rovuma LNG was 10-12 MTPA. Area 4 now plans to develop Rovuma LNG through “**Mega-Trains**” (first outside Qatar), with a target plant capacity of **15.2 MTPA** and Standard Bank assumed cost of around **USD [30] bn.** The POD was submitted in July 2018.



An **increased capacity** means **significant onshore and offshore technical work is needed.** We expect finalized EPC bids in 2Q 2019. Noting this, we would expect **FID in 3Q 2019.**



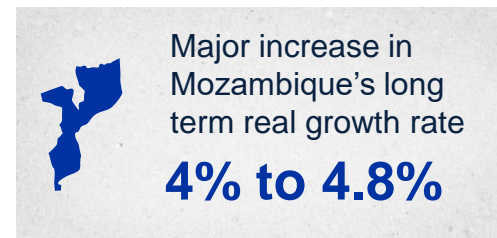
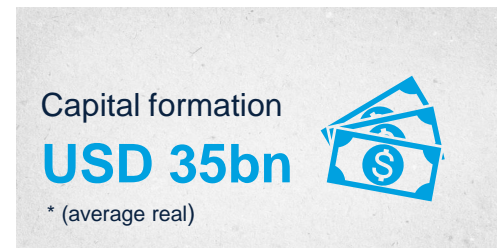
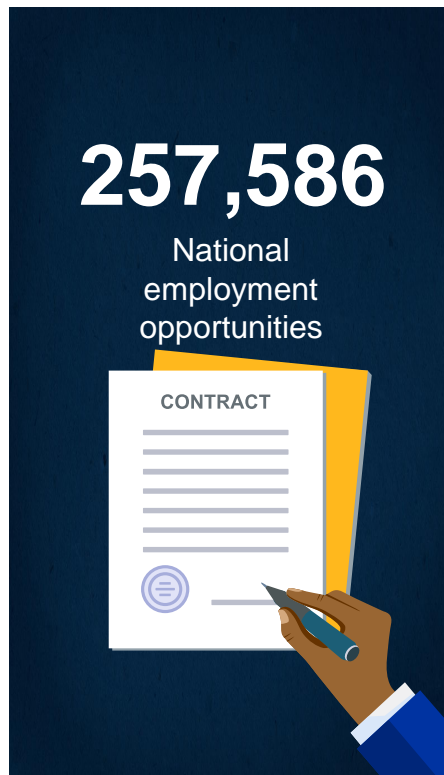
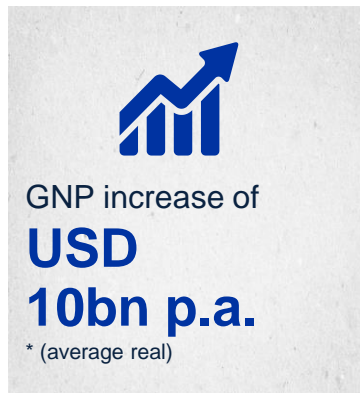
In December 2018, Area 4 confirmed it has secured commitments (TBA MTPA) to **sell output to affiliates**, subject to documentation and approval by the GOM. This is likely to **increase the speed of executing RLNG’s targeted project financing.**

Separately, a **key issue** to negotiate with the GOM will be the **volumes (and price) of Domgas RLNG will voluntarily provide** to supply new Domgas-fed industrial projects.

# ROVUMA LNG – HIGH CAPEX & REINVESTMENT SCENARIO



Key Project benefits include:

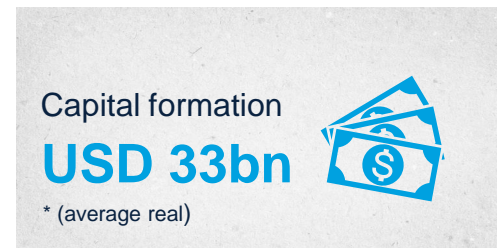
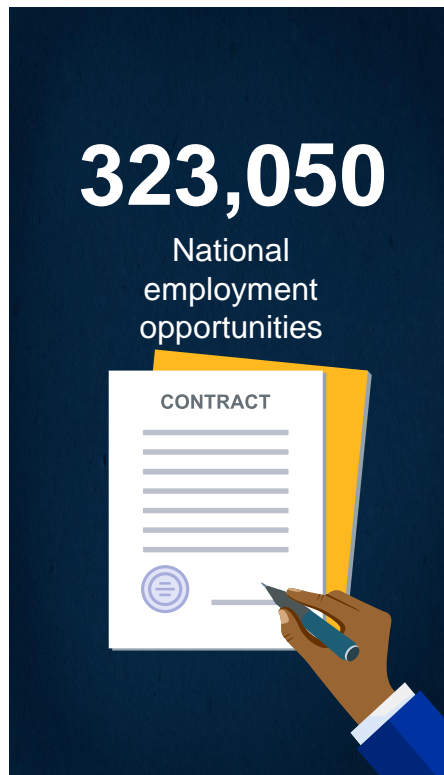
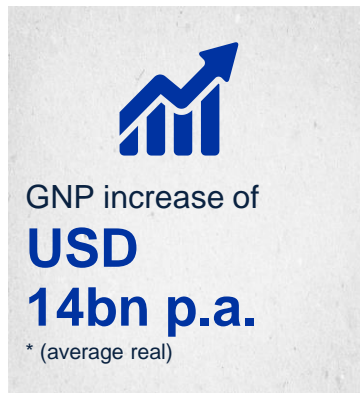




# ROVUMA LNG – LOW CAPEX & REINVESTMENT SCENARIO



Key Project benefits include:



[illegible]

By 2024, Mozambique could have **operational 4 onshore LNG trains** and **1 FLNG ship**. We expect 4/5 additional onshore LNG trains could be **operational by 2029/2030**, partly driven by the underlying EPCC/Decree Law requirements. This will **trigger a second wave** of Domgas projects.



# USD 128 billion

## FID by 2025

By 2024, Mozambique could have **operational 4 onshore LNG trains** and **1 FLNG ship**. We expect 4/5 additional onshore LNG trains could be **operational by 2029/2030**, partly driven by the underlying EPCC/Decree Law requirements. This will **trigger a second wave** of Domgas projects.

# KEY NUMBERS



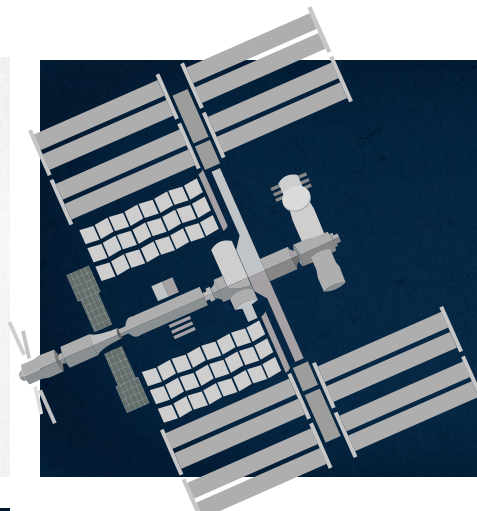
**USD 65bn**

of **FIDs** by 3Q 2019 in a  
**USD 14bn GDP**  
(with 100% external debt  
to GDP)

World's most expensive  
object: **Gorgon LNG**



**USD 54bn**



World's most expensive  
object ever: **International  
Space Station**

**USD 100bn**

*...but it is in the sky*



From 2019,  
the **Afungi site**, with

**USD 55bn FIDs**

will be the **world's most  
expensive real estate** since  
time began, and will be a  
building site for the next  
decade.



The overall  
**USD 128bn**

investment is scheduled to  
take place in a provincial  
**GDP of USD 550m.**

The only Cabo Delgado  
parallel we can think of is  
Guangdong Province,  
China (USDbn) (13% p.a.)



**1978 GDP – 11**

**2017 GDP – 1,332**



# FOLLOW-ON OPPORTUNITIES

This feeds onto major opportunities across the:



Power & Infrastructure



Consumer



Agricultural



Industrial



Services



Transportation



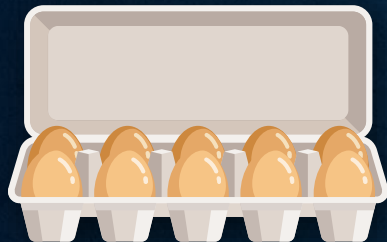
Financial Services



sectors in  
Mozambique



A **major greenfield value chain** must be created in a remote area from a standing start. As one example, to build four (4) LNG trains in parallel needs among others:



**2 million**

eggs a month to feed the workers, thus



**60,000**

(not for eating) chickens  
laying **1.2 eggs** per day



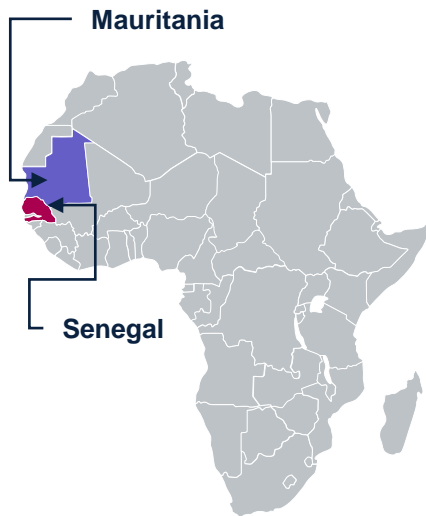
## Section 2

Senegal & Mauritania

# SENEGAL & MAURITANIA (1/2)



In Mauritania/Senegal, BP/Kosmos (partnering Petrosen and SMHPM) have had **multiple exploration successes** (c 40 Tcf) as follows:



Highlights include 15 Tcf of recoverable gas discovered in the Greater Tortue Complex and 15 Tcf discovered in the Yakaar-1 well;



In December 2018, the Greater Tortue Aymehim development (2.5 MTPA Tortue FLNG) announced FID, thus a broad parallel with Guyana (in that case oil), with only four years from first discovery to FID.



Production will come from four wells connected to a FPSO (to remove liquids) to then be connected 100kms by pipe to a breakwater-protected, nearshore 2.5 MTPA FLNG unit.

## SENEGAL & MAURITANIA (2/2)



In Mauritania/Senegal, BP/Kosmos (partnering Petrosen and SMHPM) have had **multiple exploration successes** (c 40 Tcf) as follows:



The market is proximate to Europe and Latin America, in each case around 50% of the shipping distance of US LNG. However, given ultra deep-water status (up to 2850 metres) and greenfield nature, costs will need to be optimized for LNG to compete within the US-influenced Atlantic Basin.



The current development envisages an adapted vessel not a new build (targeting lower costs). Noting its Cameroon development is now operational, Golar is carrying out the FEED and the intention is to convert an existing 125,000 m3 vessel for a conversion. First Gas is expected in 2022 with sole offtaker being BP Gas Marketing Company.



Per media reports, a second FLNG unit First Gas is also possible by 2024 and a third by 2025/2026, targeting a total FLNG production of 10 MTPA. Local gas supply is explicitly envisaged as part of each deal





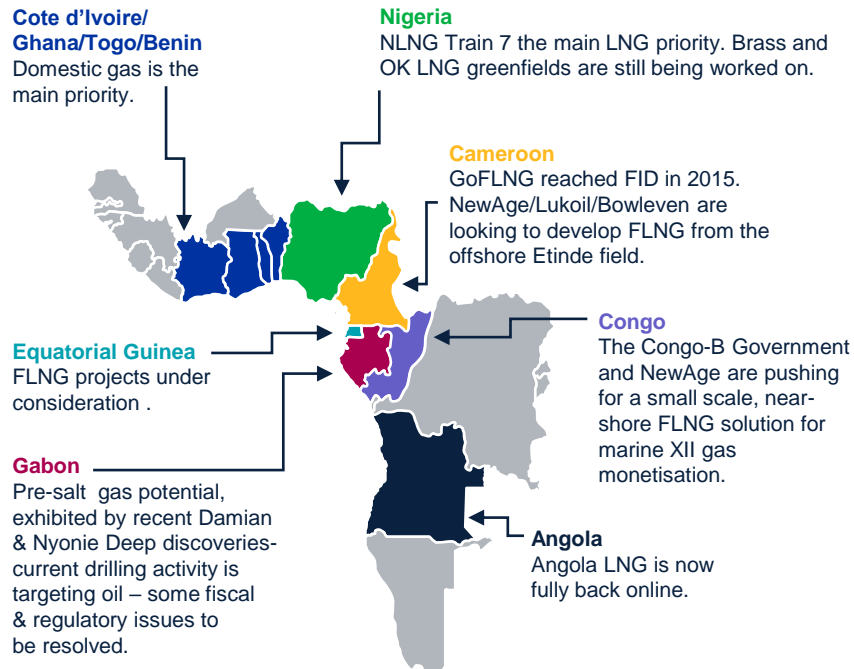
## Section 3

West Africa

# WEST AFRICA OVERVIEW



**West Africa** offers stranded gas and benign sea conditions that mean FLNG is an option. Per Woodmac, West African FLNG projects have a potential breakeven price of below US\$8/MMBTU (nominal, discounted 12%). As a result West African FLNG is apparently competitive with brownfield US LNG landing in Europe.



**Cameroon's** shallow water GoFLNG became the first African FLNG project when it was sanctioned in 2015, with a 1.2 MTPA vessel size. The Project is selling to Gazprom at an oil indexed FOB price. The first converted FLNG vessel, Hilli Episeyo, was delivered to Golar by Keppel in November 2017 and started to flow gas in March 2018. Currently, NewAge Energy is looking to develop 1.3 MTPA FLNG from the Etinde Field with a target First Gas of 2023 (inclusive of Domgas and condensate).

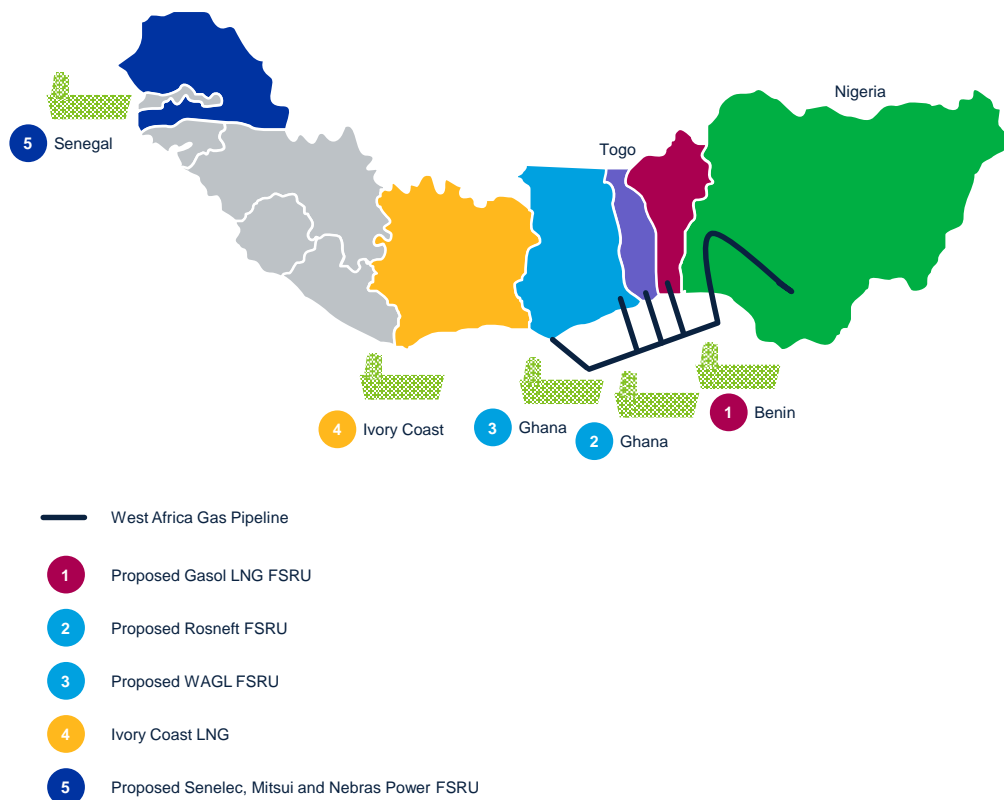
**Equatorial Guinea**, through Ophir, was planning to develop the 2.2 – 2.5 MTPA Foruna LNG. Noting JV partner Schlumberger pulled out of the JV with Golar, funding options became uncertain. Ophir announced in early 2019 its withdrawal from the project after the license expired on 31 December 2018.

**Angola** LNG restarted 2Q 2016, rejoining **Equatorial Guinea** and **Nigeria's** Nigeria LNG as existing African LNG exporters. The Project is understood to be targeting new gas fields to secure long-term incremental supplies.

**Nigeria** LNG has selected FEED candidates to develop its Train 7 expansion project (in the order of 8 MTPA), with a parallel investment into supplying fields to assure long-term feedstock adequacy. FID is expected from later 2019 onwards.

In **Congo Brazzaville**, NewAge Energy is reportedly in talks with CNOOC surrounding a SPA for its planned FLNG project. Subsequent reports indicated the Marine XII field was targeted for sale.

# WEST AFRICA OVERVIEW



Source: Interfax; Woodmac; Petroci; Senelec; Standard Bank

In **Cote D'Ivoire**, an initial Abidjan-located FSRU to power development led by Endeavor Energy was seemingly replaced by one led by Total in 2016. This has remained under negotiation for some time, with no signs of imminent FID or cancellation.

In **Senegal**, state-owned utility Senelec has signed a preliminary deal with Japan's Mitsui and Qatar's Nebras Power to build an FSRU and 400 MW power station. Given BP/Kosmos FLNG FID, there appear natural synergies to pursue.

**Ghana** was the first country in SSA to consider importing LNG. Two FSRU projects were initially proposed at Tema: Quantum Power and WAGL (Sahara/NNPC), each involving Golar. A Gazprom-led consortium subsequently replaced the above two projects for an import terminal, before in turn being replaced by Rosneft supplying LNG to GNPC. A Helios-backed consortia, Tema LNG, is now building the FSRU. LNG supply is due to start in 2020 for a period of 12 years.

Similarly, in **Benin**, London-listed Gasol has previously signed a long-term cross-border agreement to supply 2.8 million cubic metres of gas per day to Ghana's Volta River Authority from an FSRU in Cotonou. More recently, a tender was issued for LNG proposals to the Maria Gleta gas-fired plant.

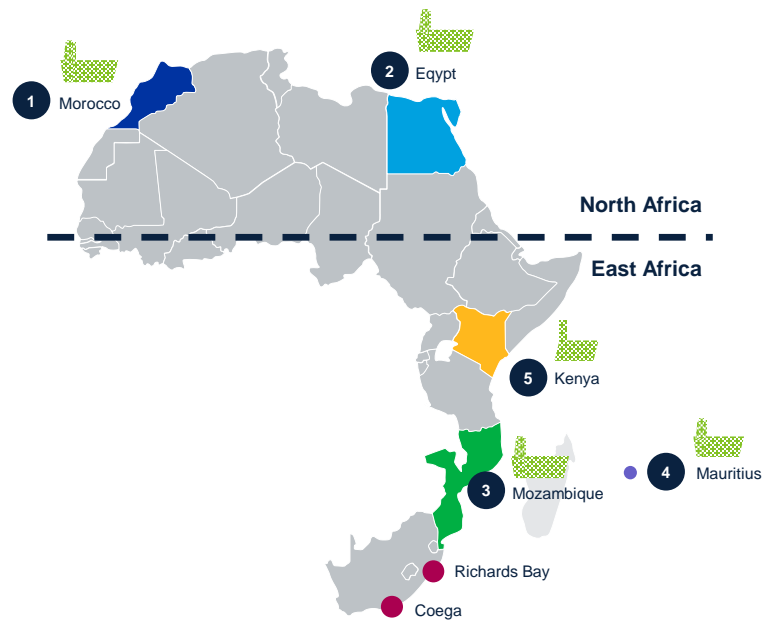


## Section 4

Other Africa



# OTHER AFRICA OVERVIEW



- 1 Proposed FSRU at Jorf Lasfar
- 2 FSRU at Ain Sokhna
- 3 Proposed FSRU at Matola
- 4 Proposed FSRU at Port Louis
- 5 Proposed FSRU at Mombasa

Algeria's Sonatrach presently supplies 640 mcm of gas to **Morocco** through a pipeline that passes through Northern Morocco under a 10-year contract that started in 2011. Morocco had plans to import 2 MTPA of LNG (from 2020), with a second phase expected to comprise 3.5 to 4 TPA by 2025. Morocco is currently deciding between a land-based LNG terminal or the renting of a FSRU unit.

**Egypt** began importing LNG in April 2015 in order to ease its chronic natural gas feedstock shortages. Subsequently, as the major Zohr field has ramped up production, Egypt has ceased LNG imports in October 2018 and is now starting to re-feed its two LNG plants (at Idku and Damietta).

**Mozambique** may introduce in time a nationwide SSLNG scheme involving gas to power and LNG as fuel, which could anchor demand in neighbouring markets

**Mauritius** is also looking to import LNG and the Mauritius Ports Authority hired RoyalHaskoningDHV to look into possibilities for a Port Louis site to import LNG. In June 2017 the Central Electricity Board issued a RFI for the importation of natural gas to power a 105-120 MW CCGT power plant.

**Kenya** recently revived plans for the construction of its first natural gas-fired power project, with a FSRU planned for Mombasa, which may be preceded by LPG. Kenya is also exploring the possibility of importing LNG from Mozambique.

**South Africa** has explored the possibility of importing LNG through two separate ports, Richards Bay and Coega. An Information Memorandum was issued although progress is slow



# Section 5

Discussion Points

## DISCUSSION POINTS (1/2)



Per **BP's 2019 energy outlook** and **Shell's 2019 LNG outlooks**, the demand for LNG is expected to **increase to**

**c 650 MTPA in 2040**

(from 319 MTPA trade in 2018).

By our count,

**twenty two (22)**

African markets are either **producing LNG**, **developing LNG exports** or considering an **LNG import project**.



For **East African LNG**, **Anadarko** has signed over

**9 MTPA of SPAs**

(and FID is expected 18 June)

ExxonMobil is ramping-up on the development of **Rovuma LNG** and FID is also **expected in 2019**. **Coral FLNG** is now **nearly 2 years into construction**.



## DISCUSSION POINTS (2/2)



Southern Africa has identified LNG imports as a means to relieve term

**electricity shortages.**

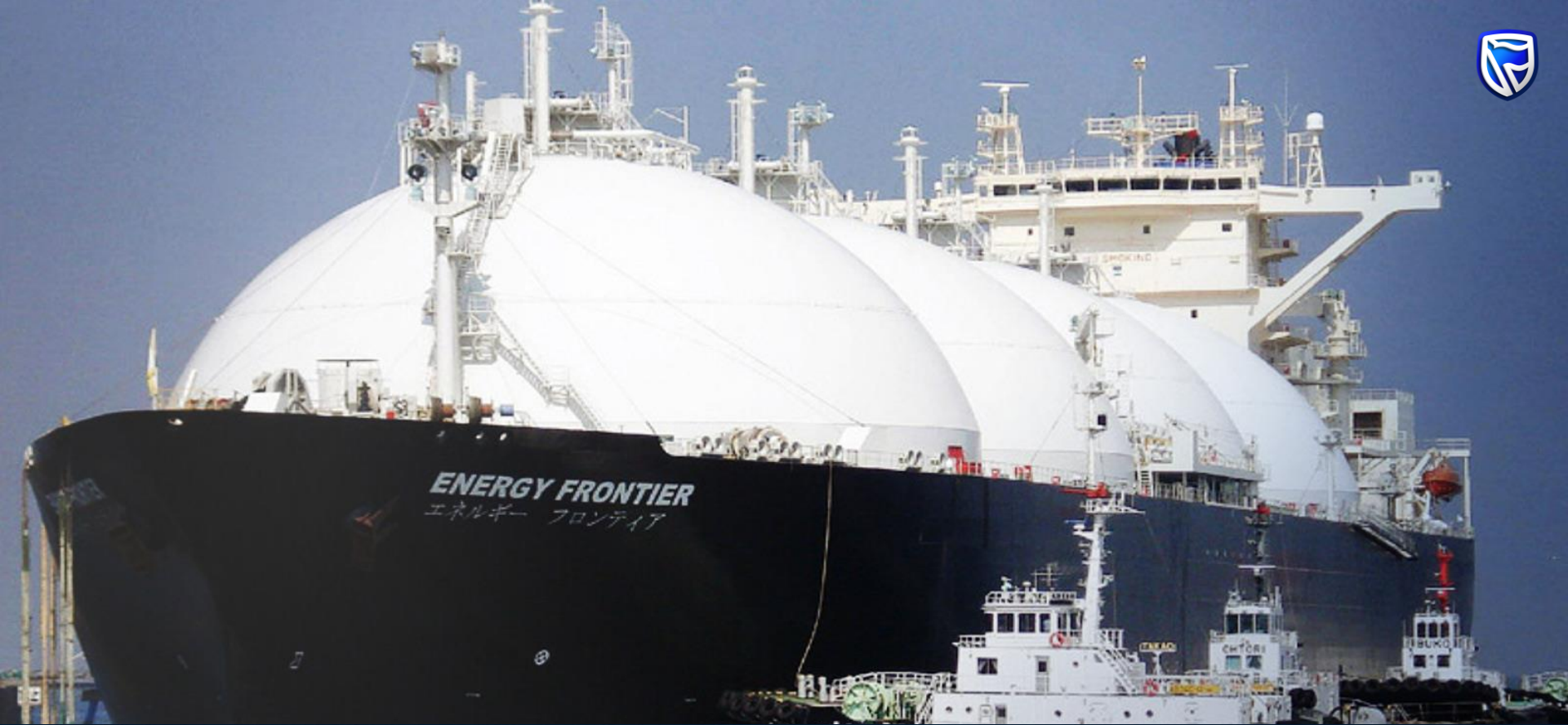
FSRUs/FSUs have been floated in South Africa, Mozambique, Kenya, Mauritius and Namibia. All are moving slowly.

**Interestingly, West Africa offers a combination of multi-market onshore, FLNG and FSRU projects:**

- **Nigeria, Equatorial Guinea and Angola** are existing onshore LNG producers. Mauritania/Senegal have now taken FID on Tortue FLNG, with NLNG Train 7 FID **possible in 2019**;
- **Cameroon's first FLNG cargo has been shipped in 2018** although Equatorial Guinea's FLNG development process has paused; and
- FSRU developments may occur in **Benin, Cote D'Ivoire, Ghana (the frontrunner) and Senegal**, with Congo also considering FLNG.







 **Thank You**

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