

UNU WIDER

Inclusive Growth in Mozambique: conference

Maputo, Nov 27th. 2018



RYSTAD ENERGY

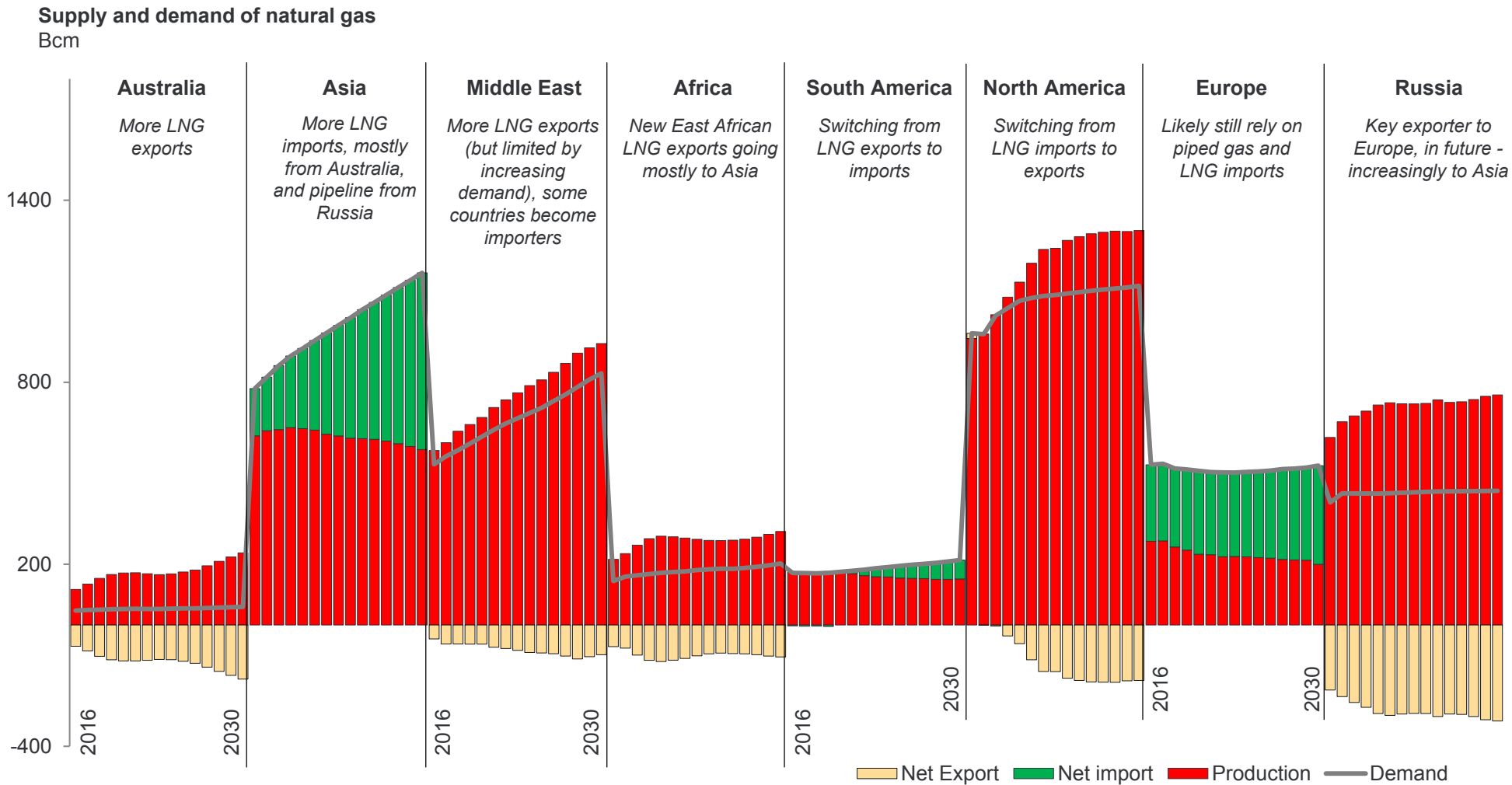
THE GLOBAL LNG MARKET OUTLOOK - OPPORTUNITIES AND CHALLENGES FOR MOZAMBIQUE

BY HENRIK M. POULSEN
RYSTAD ENERGY

Agenda

- The global LNG market outlook
- Mozambique's:
 - ✓ Resource potential
 - ✓ Production forecast
 - ✓ E&P economy, government take and economic implications
- Resource governance – an important factor to attract investments

Longer distances between supply and demand of natural gas to facilitate more LNG trade



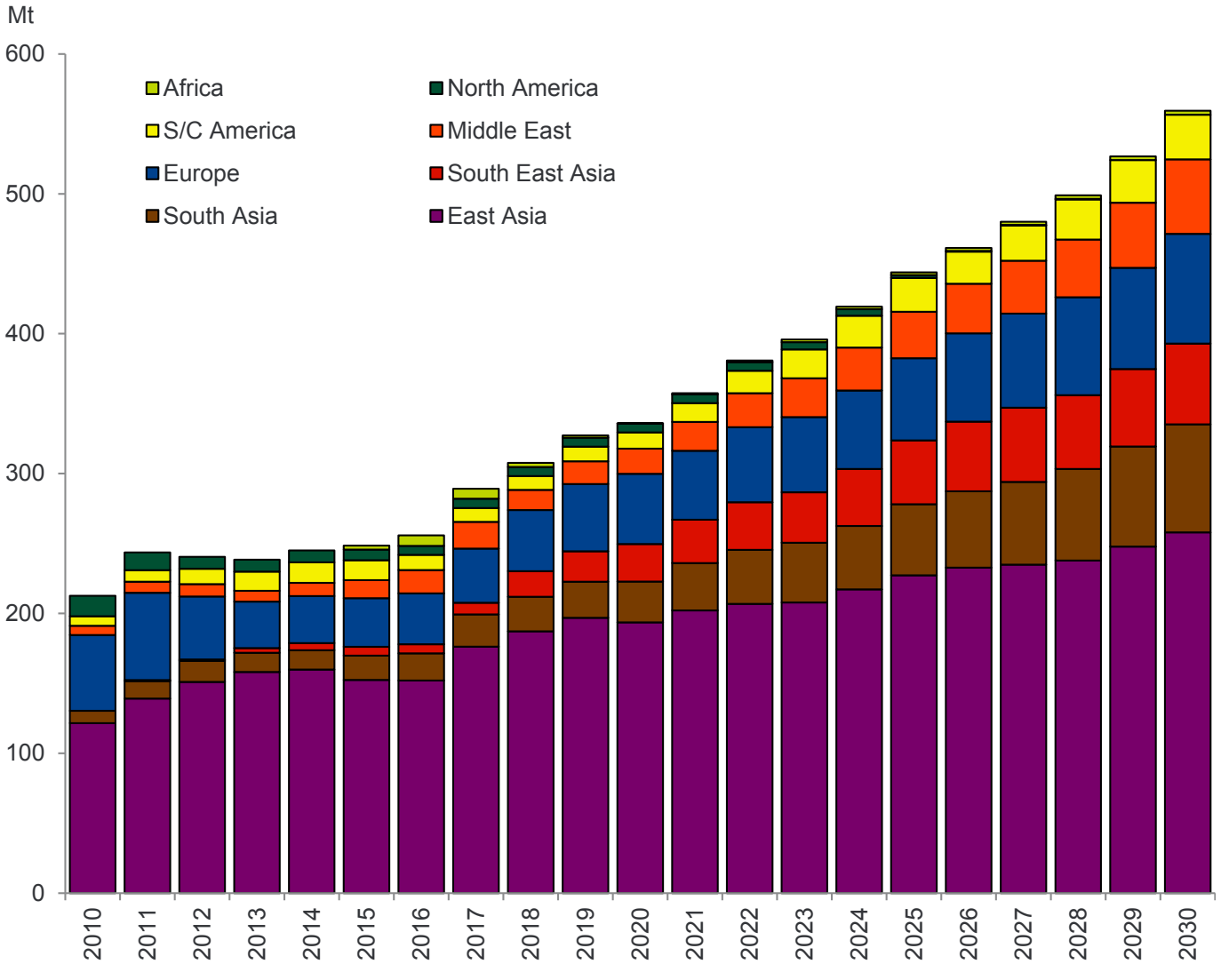
Source: Rystad Energy GasMarketsCube (Pilot), Rystad Energy research and analysis

Global LNG demand to reach 560 Mt by 2030

Rystad Energy forecasts global LNG demand to increase from 289 Mt in 2017 to 559 Mt in 2030 due to longer distances between supply and demand. China will drive East Asian demand up from 176 Mt in 2017 to 258 Mt in 2030 with its target to increase the use of natural gas in its energy mix. South Asian LNG demand is set to increase from 23 Mt in 2017 to 77 Mt in 2030. India is increasing its share of natural gas in its energy mix, while Bangladesh and Pakistan are offsetting declining production domestically.

LNG demand in the Middle East is set to grow from 19 Mt in 2017 to 53 Mt in 2030 driven by Turkey, Kuwait and Bahrain.

Global LNG demand by region

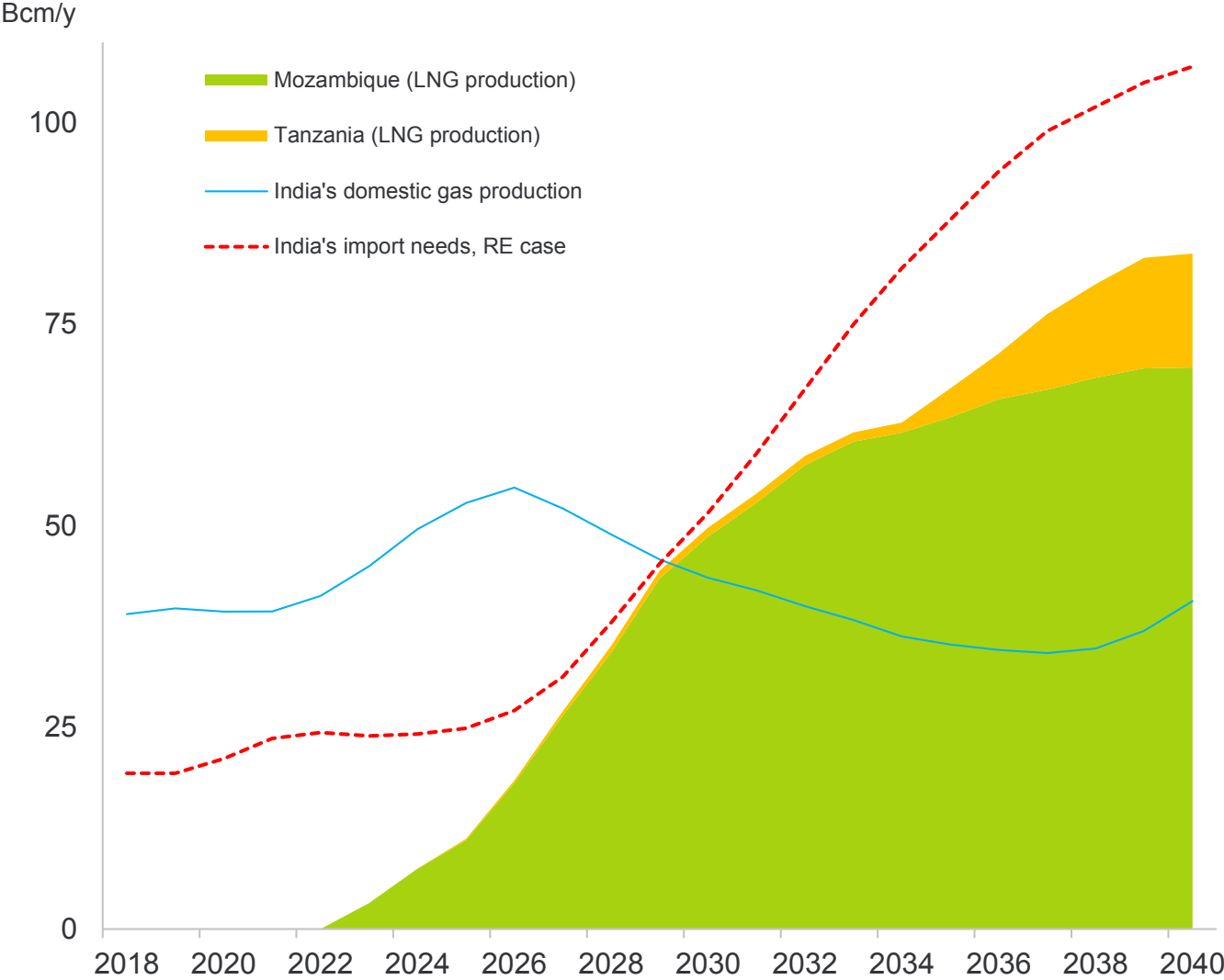


Source: Rystad Energy GasMarketsCube (Pilot)

India is a possible future taker of East African LNG

The expected surge of India's need to import LNG fits very well with the predicted ramp up of East African LNG supply. It is expected that India will more than double its LNG import from today's level at 20 Bcm/y to 50 Bcm/y in 2030. Another doubling to > 100Bcm/y is expected by the 2040

India's future needs for LNG import versus predicted East African supply



Source: Rystad Energy analysis and research and UCube

Sanctioned liquefaction capacity to reach 473 Mtpa in 2025 driven by US and Australia

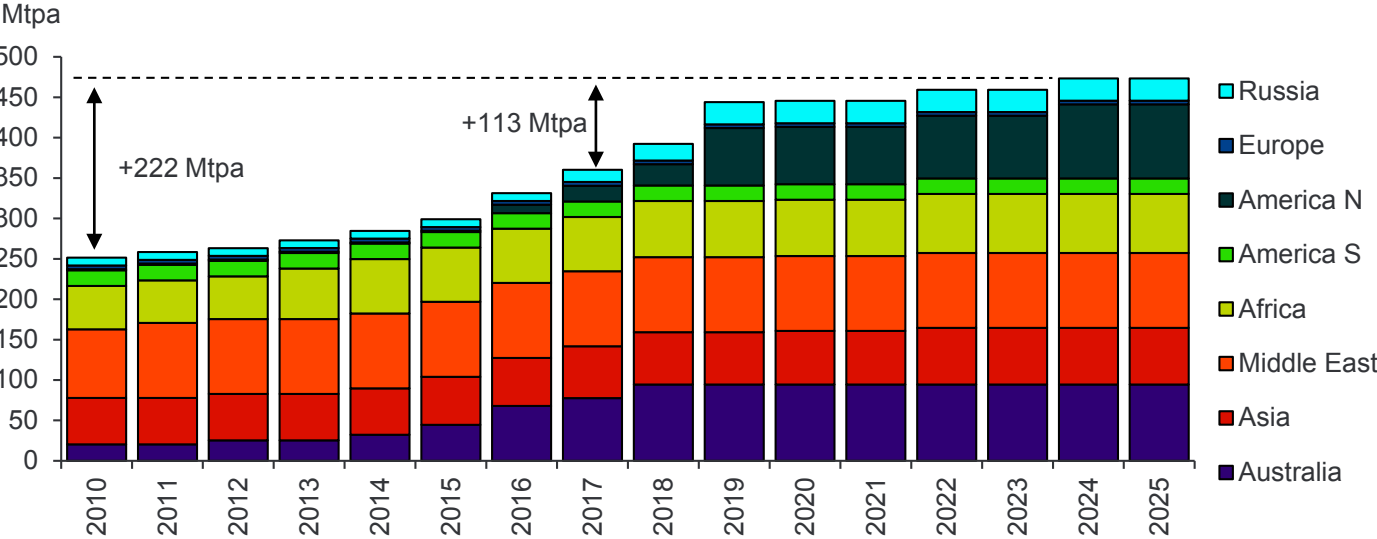
Global sanctioned liquefaction capacity will reach 473 Mtpa by 2025. This reflects a 222 Mtpa increase from 2010 and 113 Mtpa increase from 2017. Australia has been driving the capacity additions in the current LNG wave.

By the end of 2018, the US will have 26 Mtpa of its sanctioned capacity operational while another 45 Mtpa of capacity is scheduled to start in 2019.

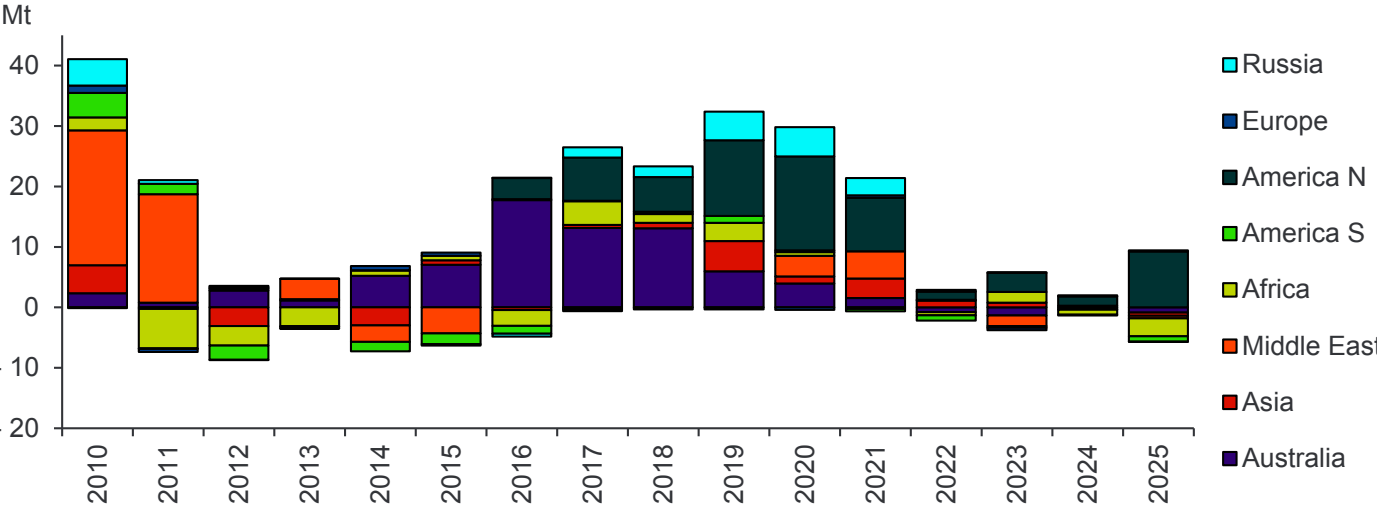
Indonesia, Malaysia, Mozambique and Russia will add another 22 Mtpa of export capacity by 2022.

Despite seeing a significantly tighter LNG market in 2018, Rystad Energy expects to see a ramp-up in US LNG production to cause a looser market in 2019 and 2020.

Liquefaction capacity by continent



Change in sanctioned LNG production by continent, y/y



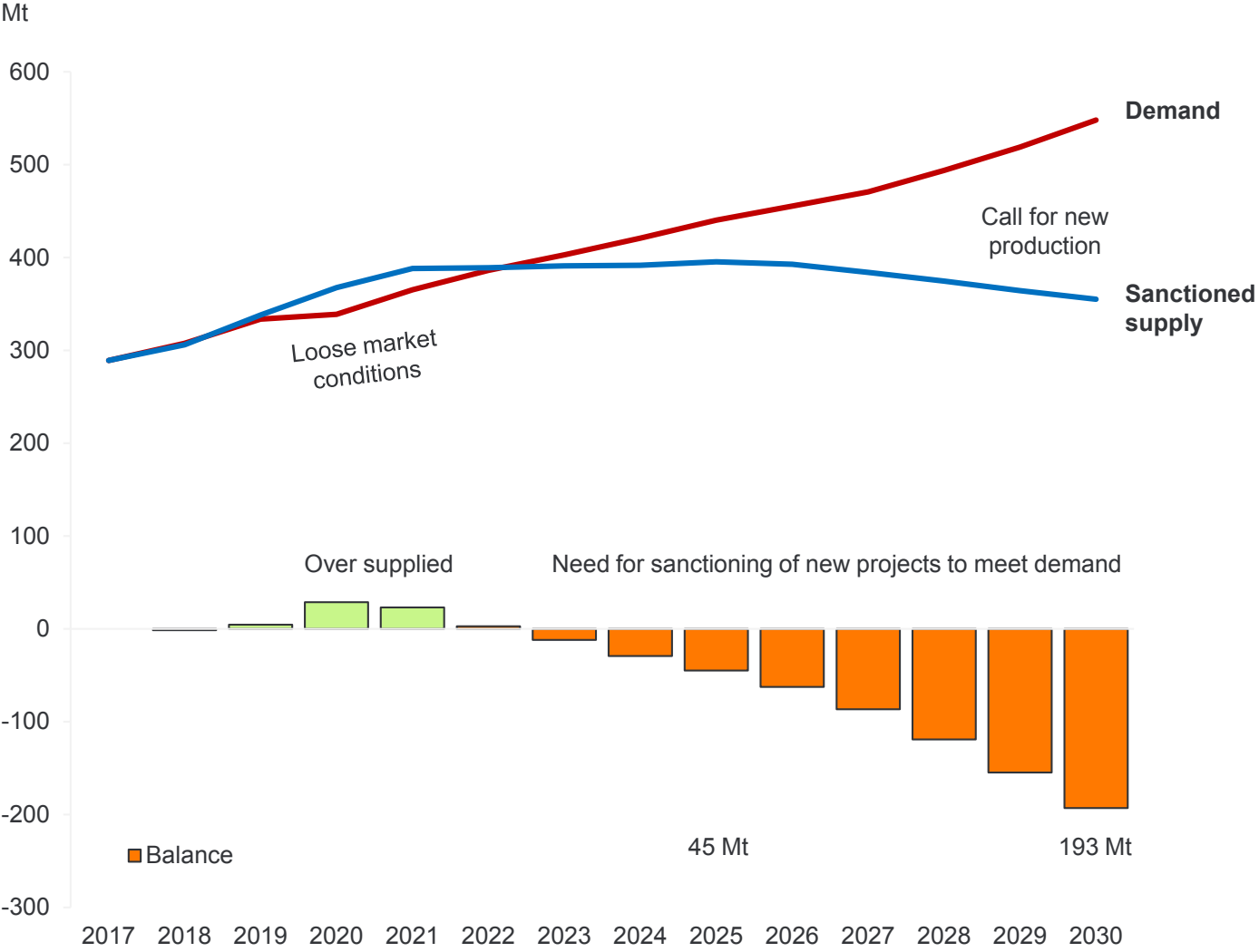
Source: Rystad Energy GasMarketsCube (Pilot)

LNG market to tighten in 2022/2023, 45 Mt of new LNG production needed within 2025

Ramp up of new LNG production towards 2020, primarily from US and Australia is expected to result in loose market conditions in 2020/2021, followed by a call for new supply of ~45 Mt within 2025 and further 193 Mt within 2030.

Without any new investment decisions for liquefaction facilities, we could see a quick turnaround in the market with the balance tightening significantly post-2022. However, there is more than 600 Mt of new liquefaction capacity proposed through new projects, which could meet demand long term, but time is running out to avoid a LNG shortage in the short term. To meet the growing deficit starting in 2022 and 2023, new LNG projects needs to be sanctioned in 2018 with a construction period of less than five years. Further delays in FIDs could cause a shortage.

LNG sanctioned supply and demand balance



Source: Rystad Energy GasMarketsCube (Pilot)

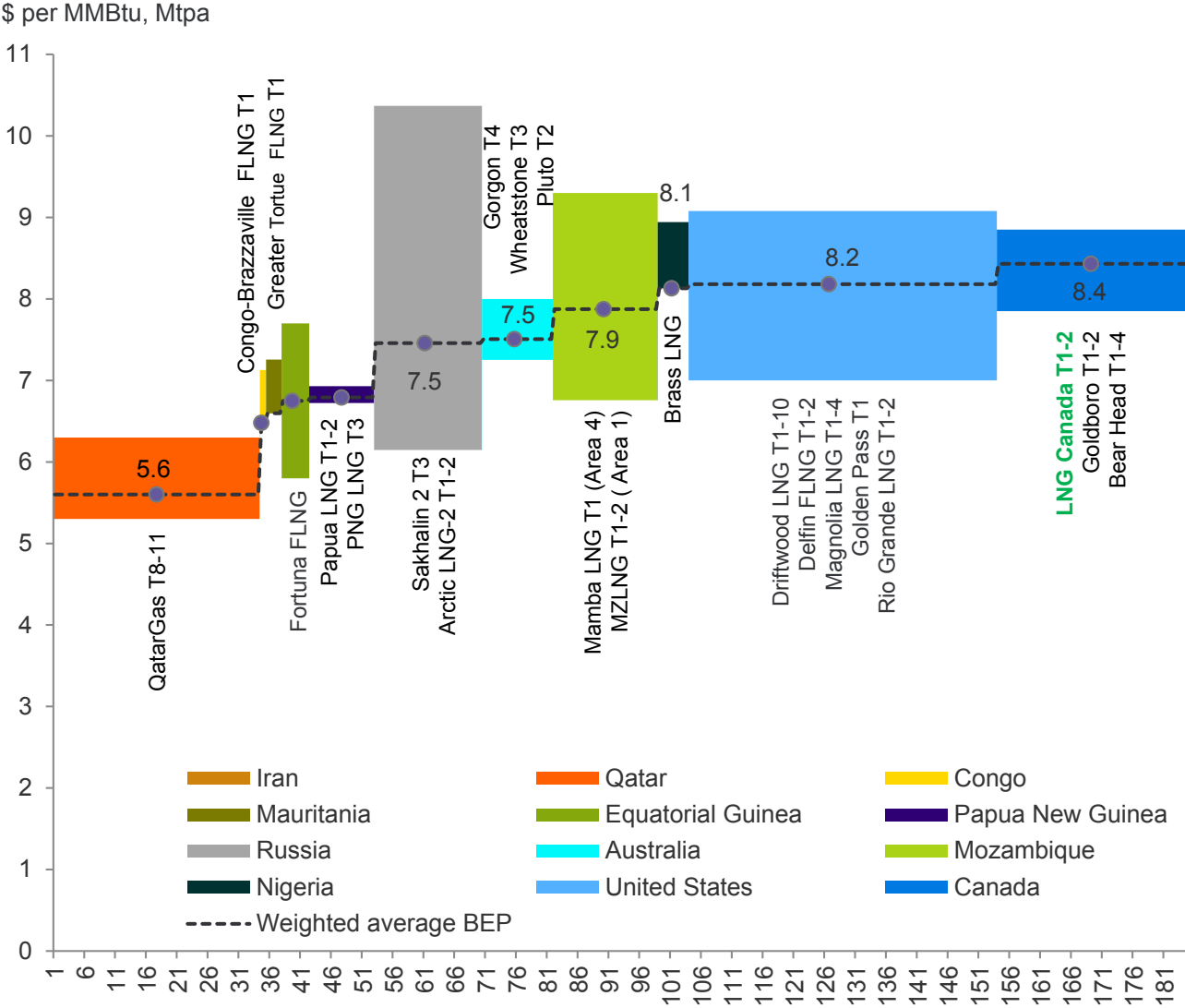
Over 180 Mtpa of LNG projects with BE prices under \$8.4/MMBtu to compete for 2025 startup

Of the proposed projects, projects in Qatar have the lowest breakeven price, sourcing gas from the major North Field. Qatar has the potential of seeing four new trains with a total capacity of 45 Bcm (33 Mtpa) starting production by 2025, however, it is not certain that all four will start up by 2025. We estimate Qatar's breakeven price (BEP) to be around \$5.5 per MMBtu.

Mozambique is working on the last approvals and contracts to make an FID on the Area 1 LNG project operated by Anadarko. The first two trains have a total capacity of 14 Bcm (10 Mtpa) and a BEP around \$7.8 per MMBtu. In Australia, the proposed expansion of Gorgon, Pluto and Wheatstone can add 12 Mtpa of LNG by 2025.

Overall, there are significantly more LNG export projects proposed than demanded, and we expect to see a lot of delays and cancellations over the next years. LNG sellers need to offer competitive contracts to attract the right buyers, including destination flexibility, hybrid contract structures, and competitive slopes in the oil-indexed contracts.

Volumes and breakeven prices* for unsanctioned LNG projects, 2025



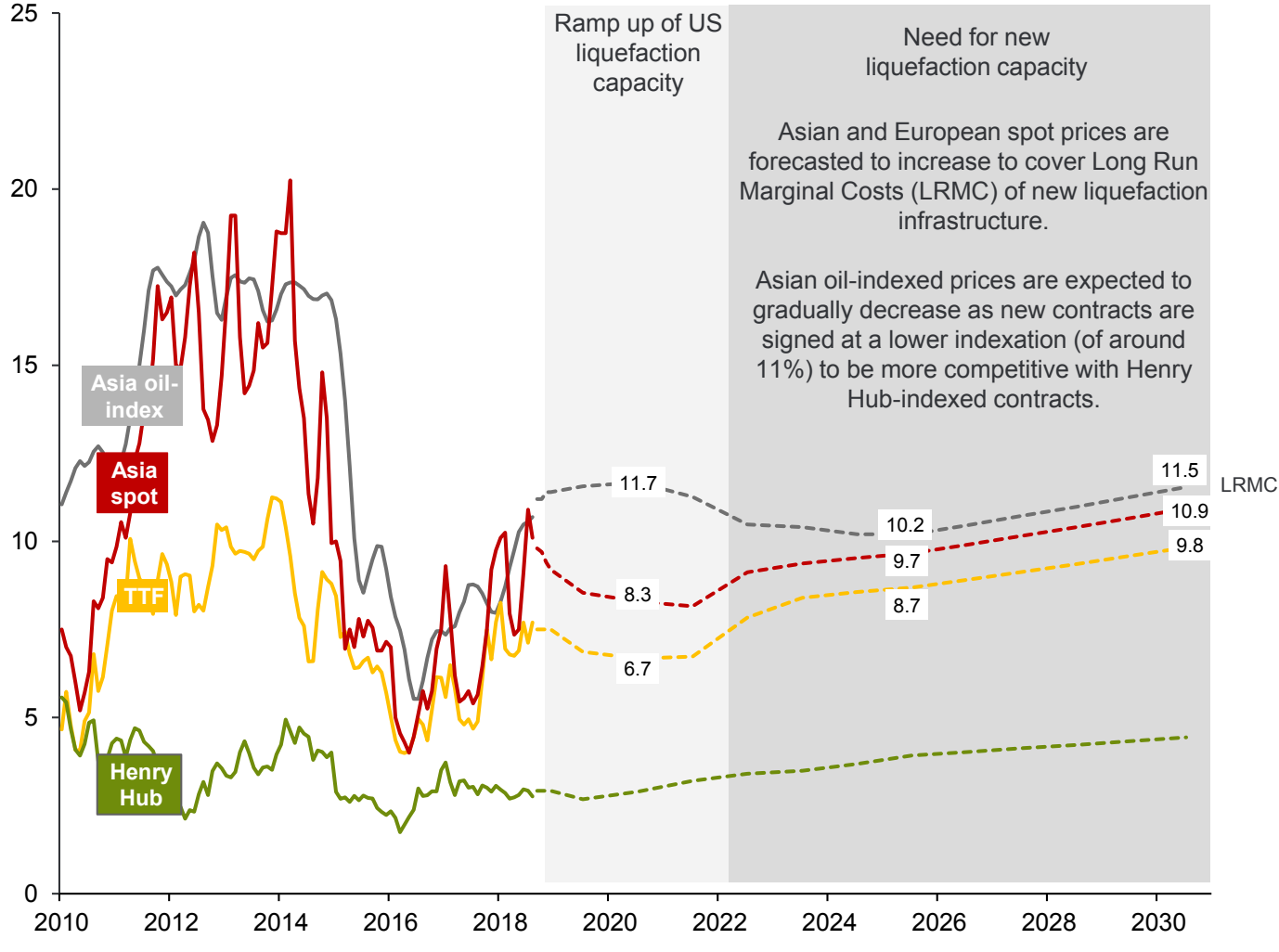
* The breakeven price is in real 2018 US dollars and includes project costs, feed gas costs and transportation to the Asian market. Source: Rystad Energy GasMarketsCube (Pilot)

Asian and European gas prices to increase post 2022 as the LNG market tightens

We have recently increased our forecast for Europe (TTF) and Asia slightly in the medium term due to higher oil and coal prices and stronger demand from Asia in particular.

The drivers for US Henry Hub price forecast remains unchanged. Rystad Energy's US Henry Hub price forecast is driven strong production growth in the Permian and Appalachian basin in combination with delayed LNG and pipeline export infrastructure, which will result in downward pressure for Henry Hub towards 2020.

Historical gas prices and Rystad Energy base-case natural gas price forecast
 \$ per MMBtu (nominal)

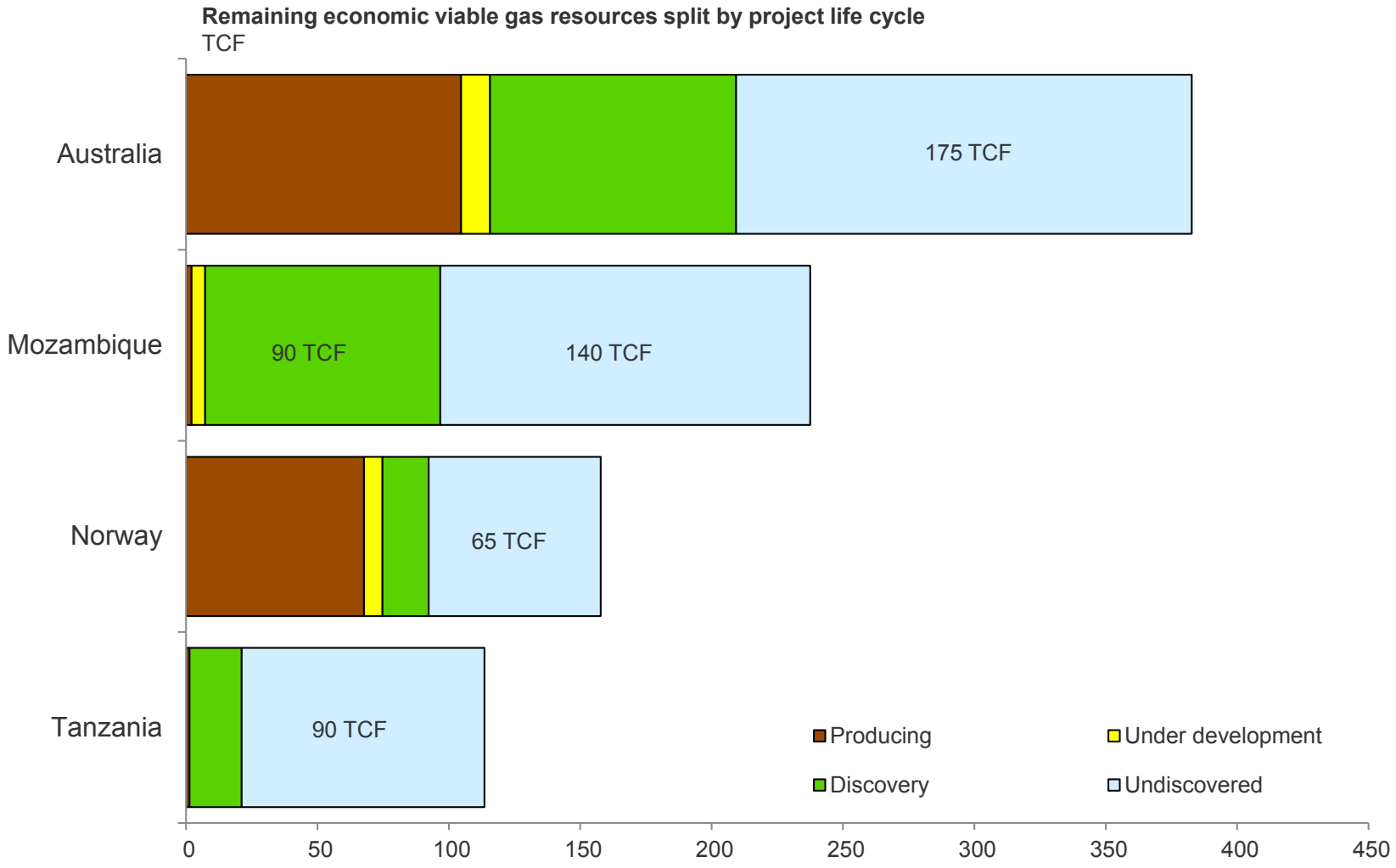


Source: Rystad Energy GasMarketsCube (Pilot), Thomson Reuters, Rystad Energy research and analysis

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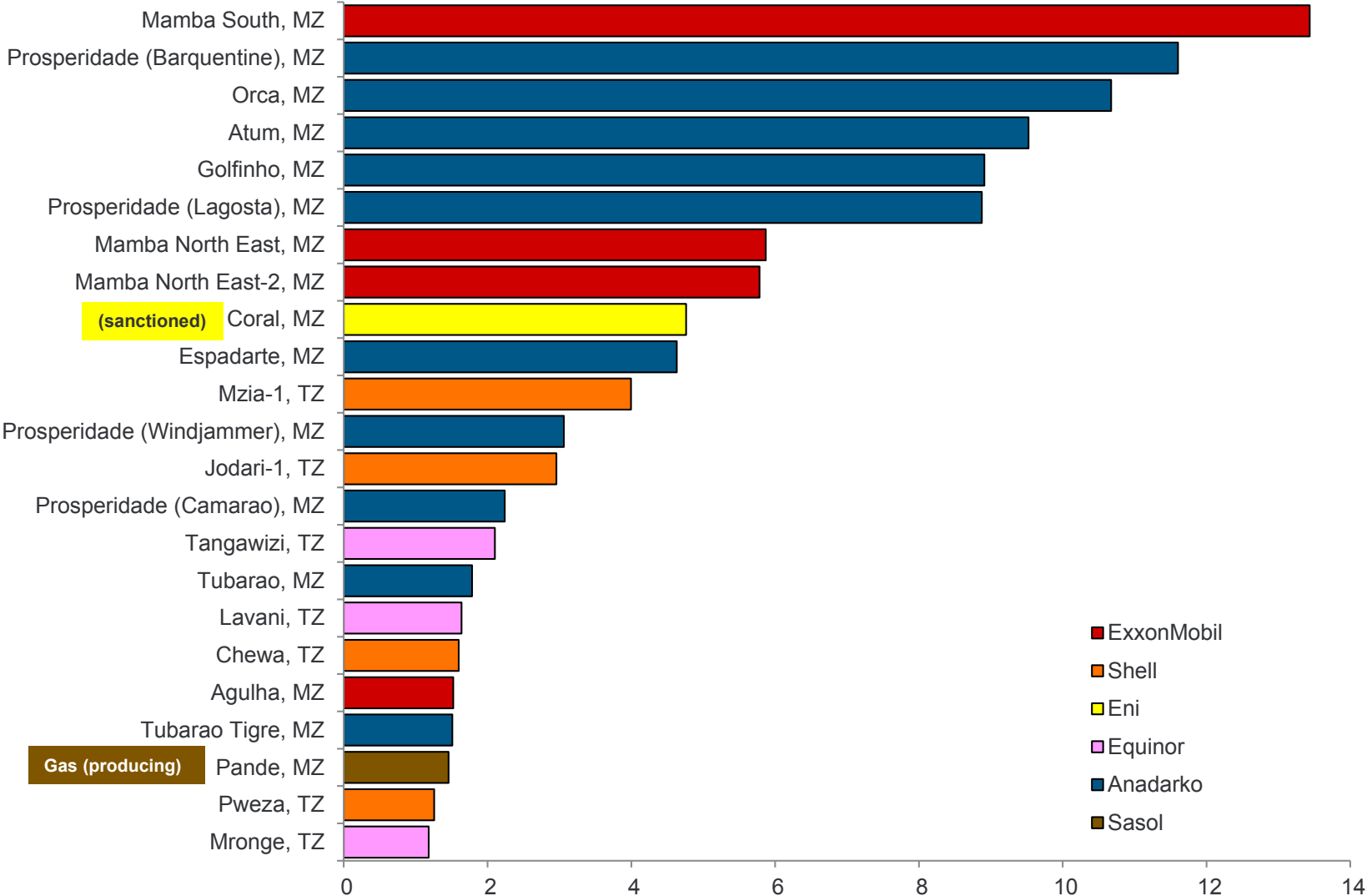
The remaining conventional economic viable gas resource potential in Mozambique is estimated to be close to 250 TCFs. Somewhere between Australia's and Norway's



Source: Rystad Energy UCube

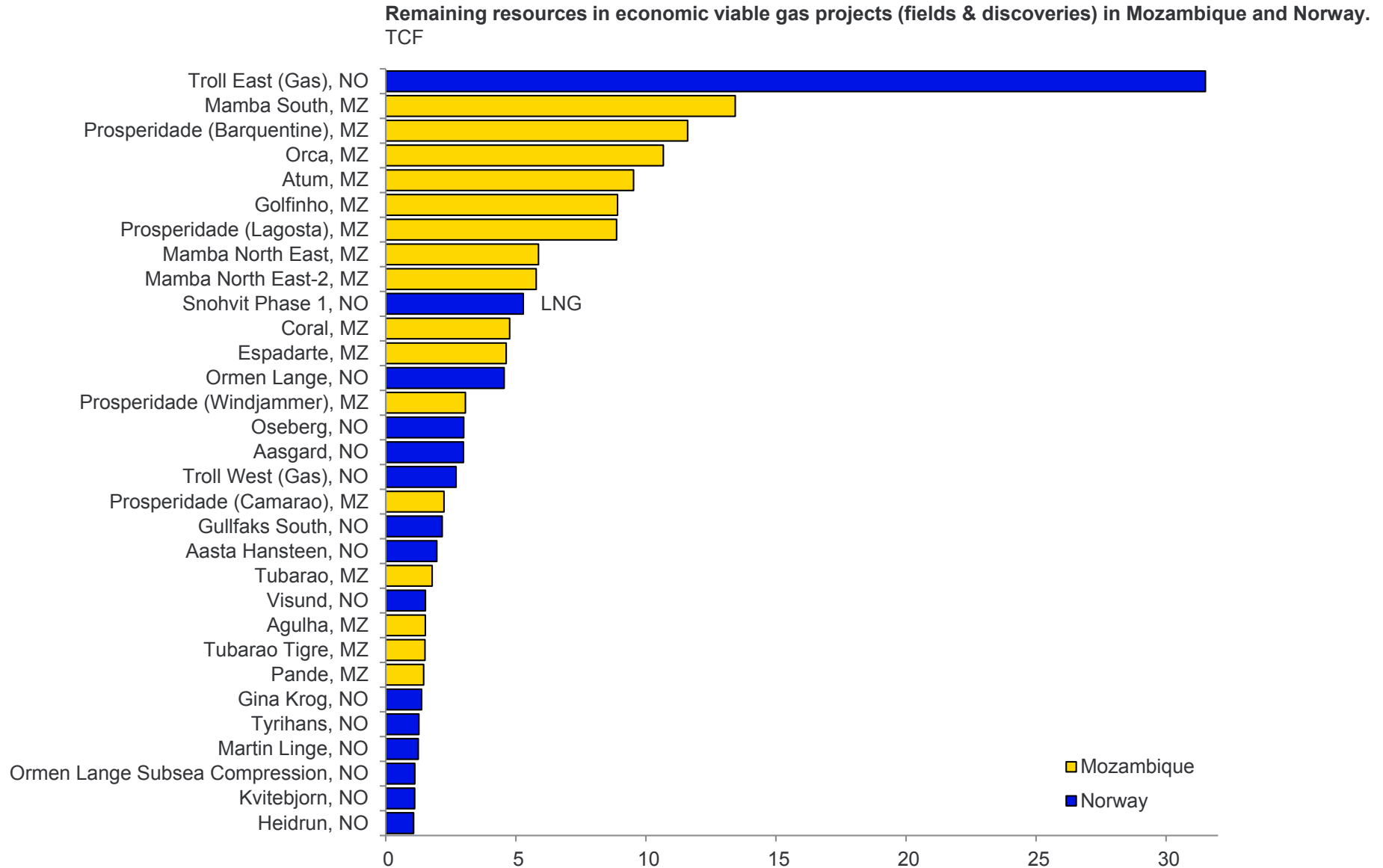
The discoveries in Mozambique are in a different league of size than those in Tanzania

Remaining resources in economic viable gas projects (fields & discoveries). Color represent operator.
TCF



Source: Rystad Energy UCube

The sum of the remaining discovered gas resources in Mozambique and Norway is about equal



Source: Rystad Energy UCube

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Mozambique to 'save' the African gas production as Egyptian and Nigerian gas production decline in the 20's

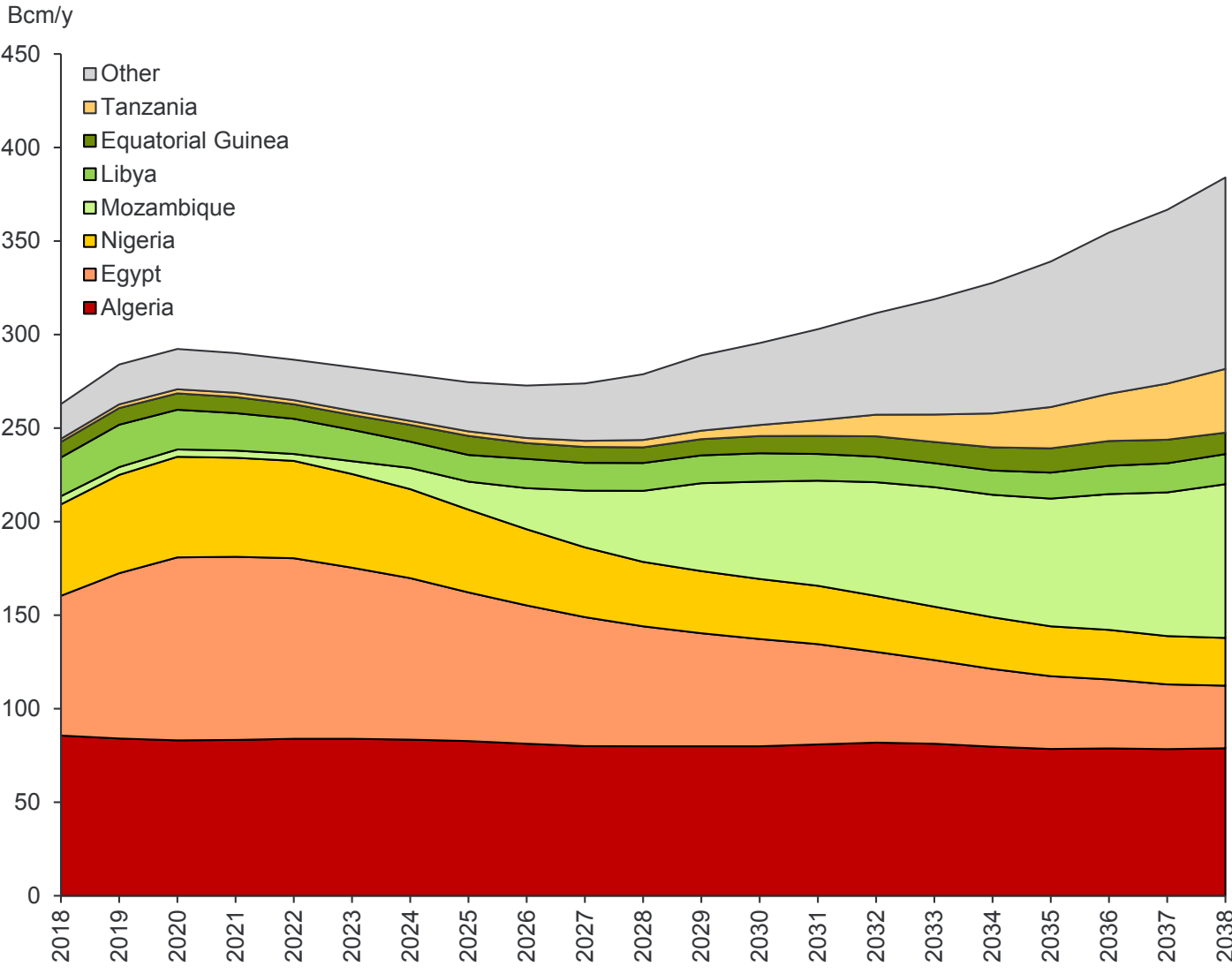
In the next two 20 years, we predict gas production in Africa to increase almost 50% from 260 to 380 Bcm/y in 2030..

The traditional three largest gas producers in Africa are Algeria, Egypt and Nigeria. Algeria has been the main driver behind the growth from the mid-1990s, however, between 2010 and 2030 the gas output from Algeria is forecasted to remain relatively stable at around 80-90 Bcm.

Egypt and Nigeria are both expected to increase their gas output until 2020, which is causing a temporary African gas peak in 2020.

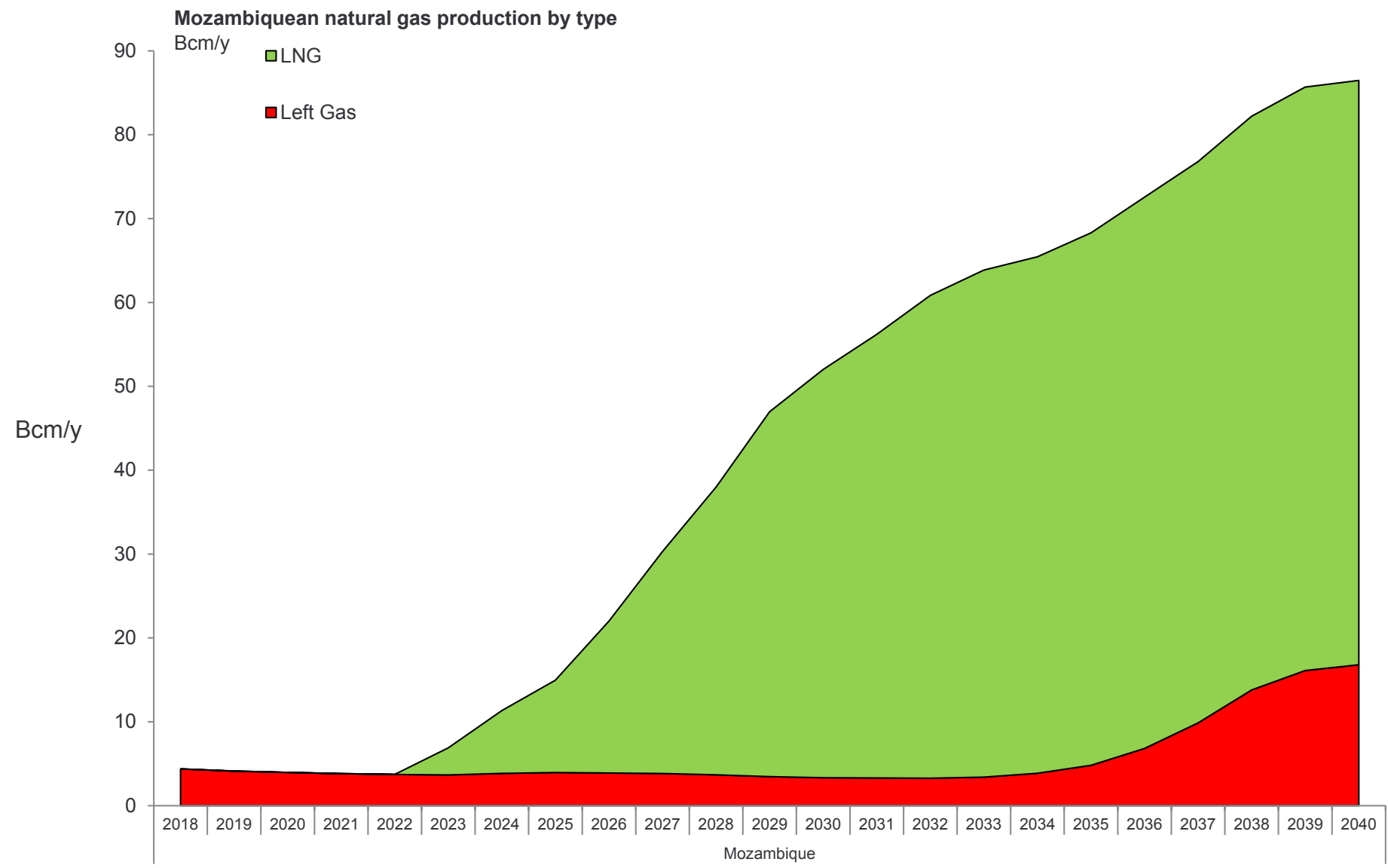
On the other hand, Mozambique's many new startups are set to boost gas production after 2020, which will offset the production drop in Egypt and Nigeria. The new fields in Mozambique are part of the LNG expansion that will place the country among the largest LNG exporters in the world.

African natural gas production by country



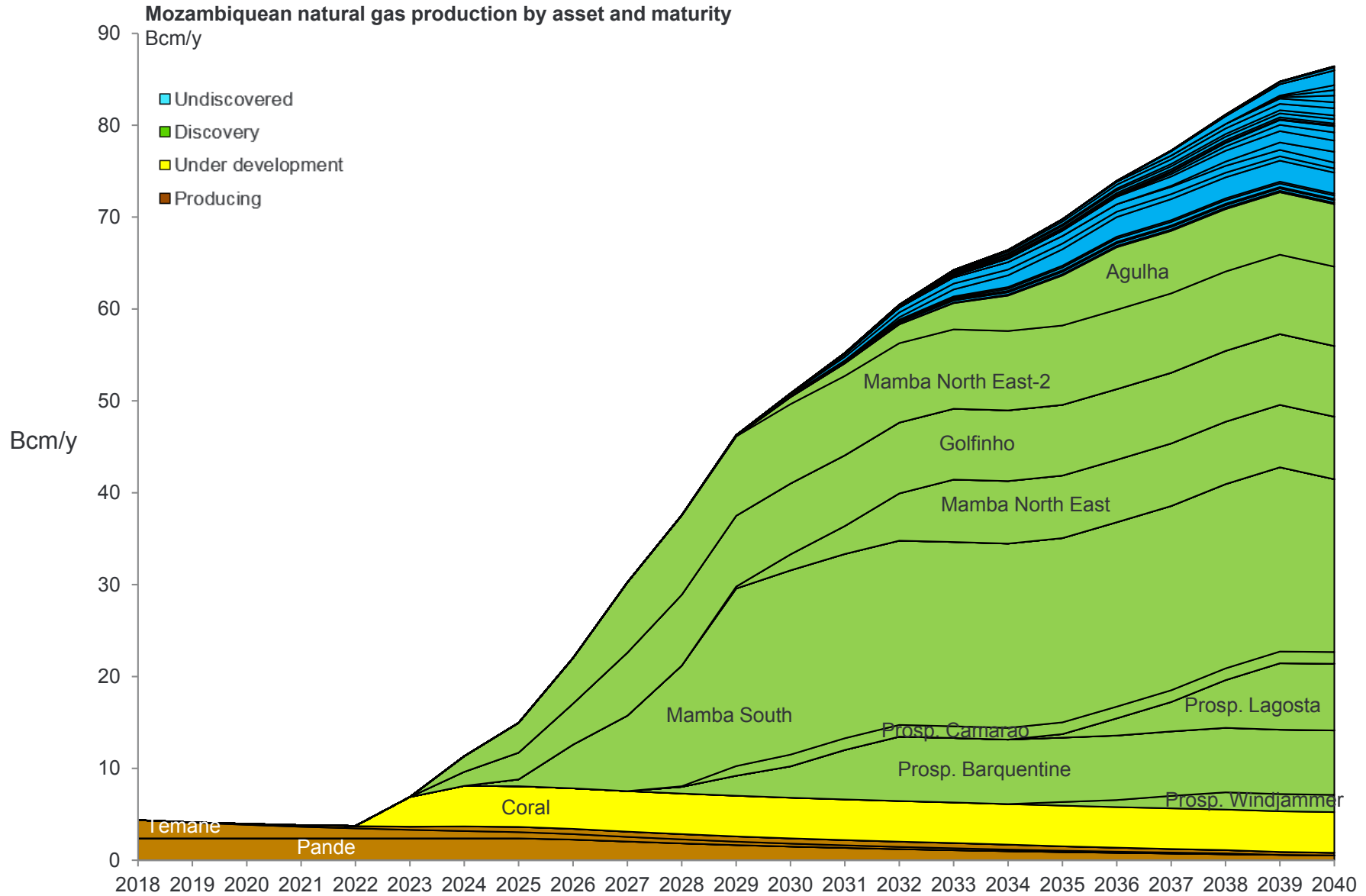
Source: Rystad Energy GasMarketsCube (Pilot)

Mozambique is predicted to reach a gas production at 50 Bcm/y by 2030, dominated by LNG for export



Source: Rystad Energy UCube

Current discoveries and producing fields have a production potential of approximately 70 Bcm/y



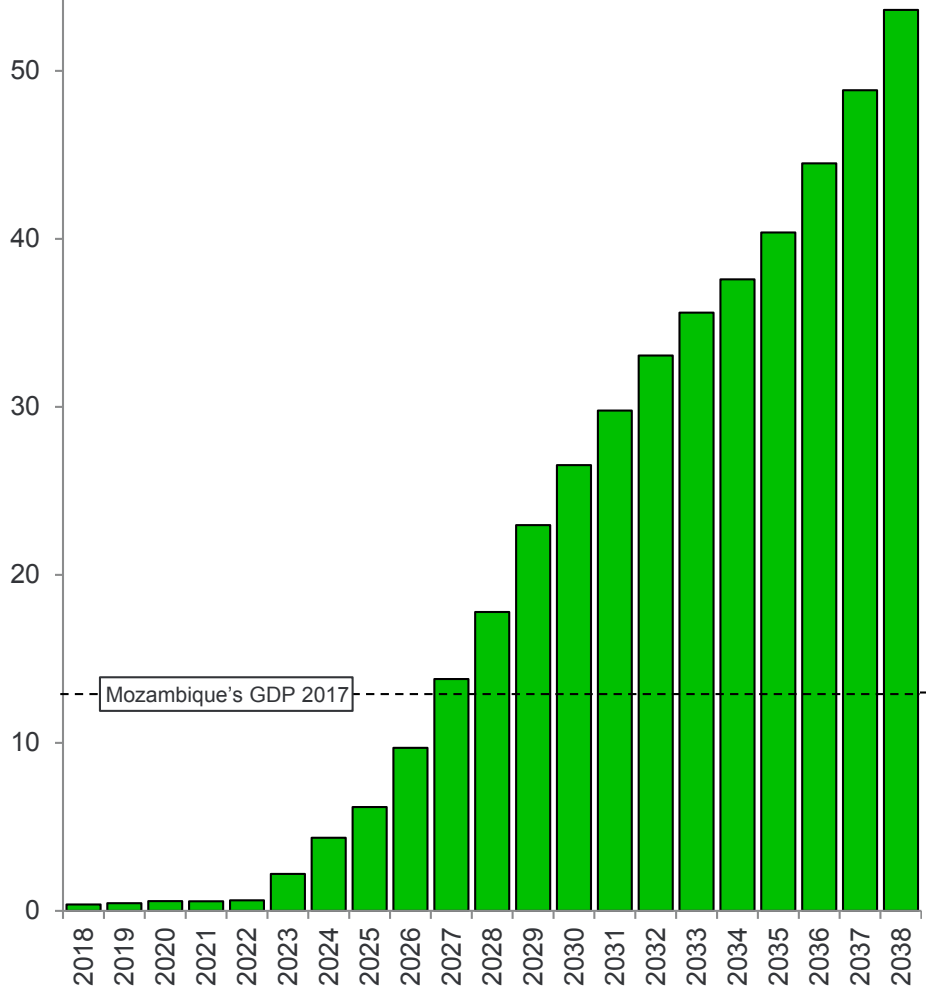
Source: Rystad Energy UCube

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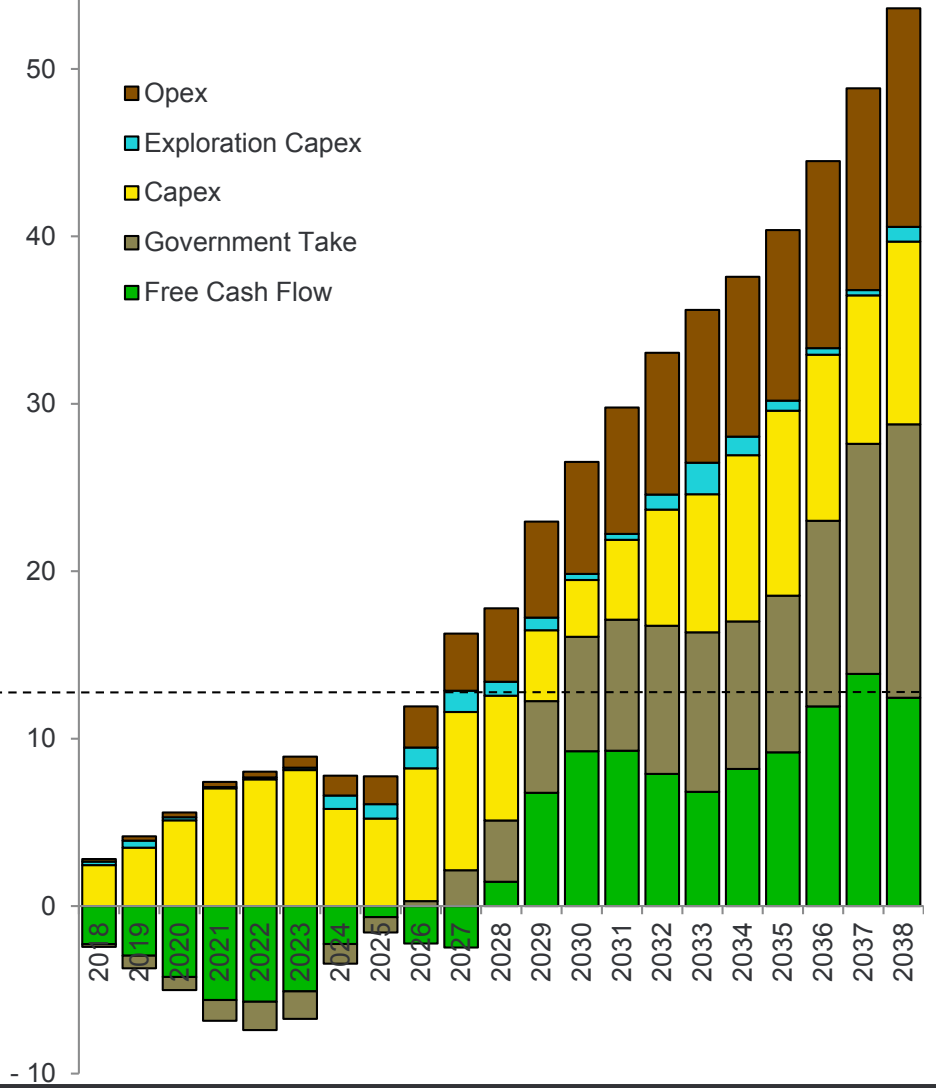
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Annual E&P Economics in Mozambique 20 years ahead. The total petroleum economy is expected to exceed the current GDP within 10 years

Total petroleum economy, production multiplied by price
BUSD

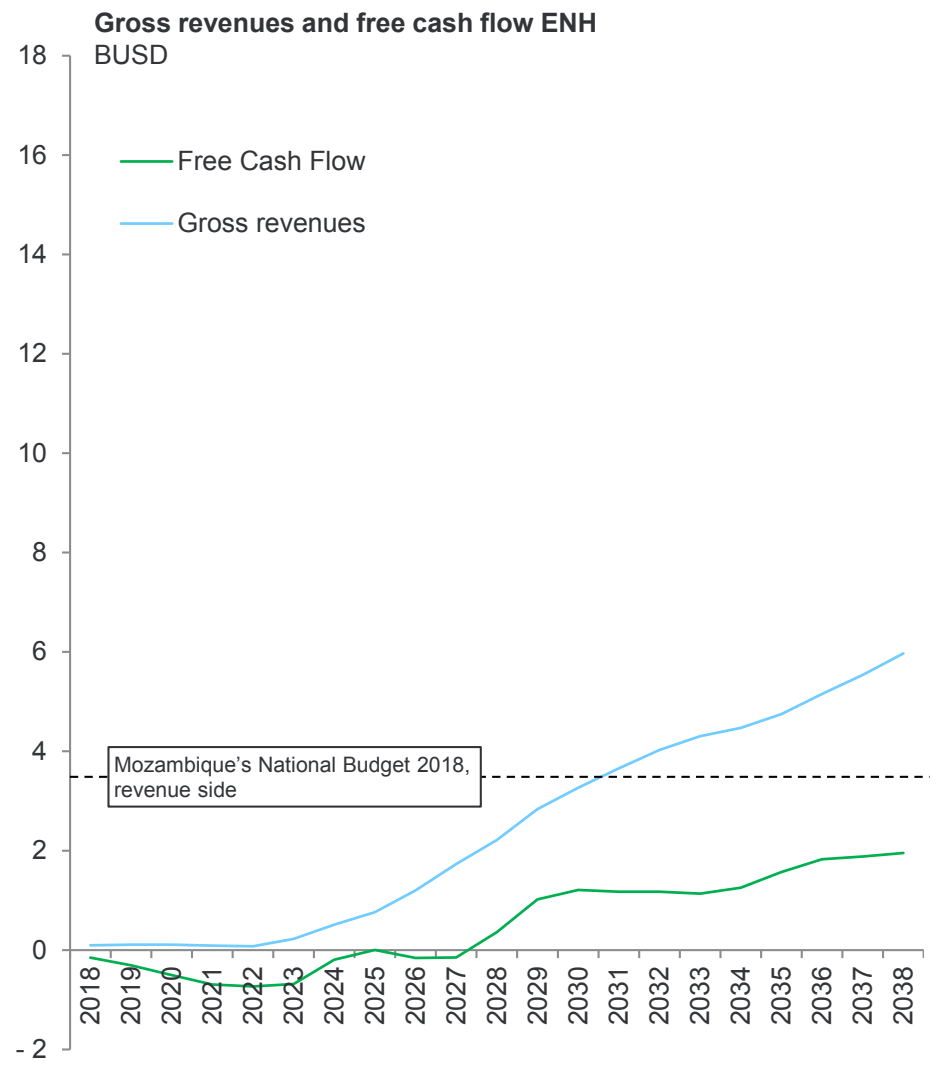
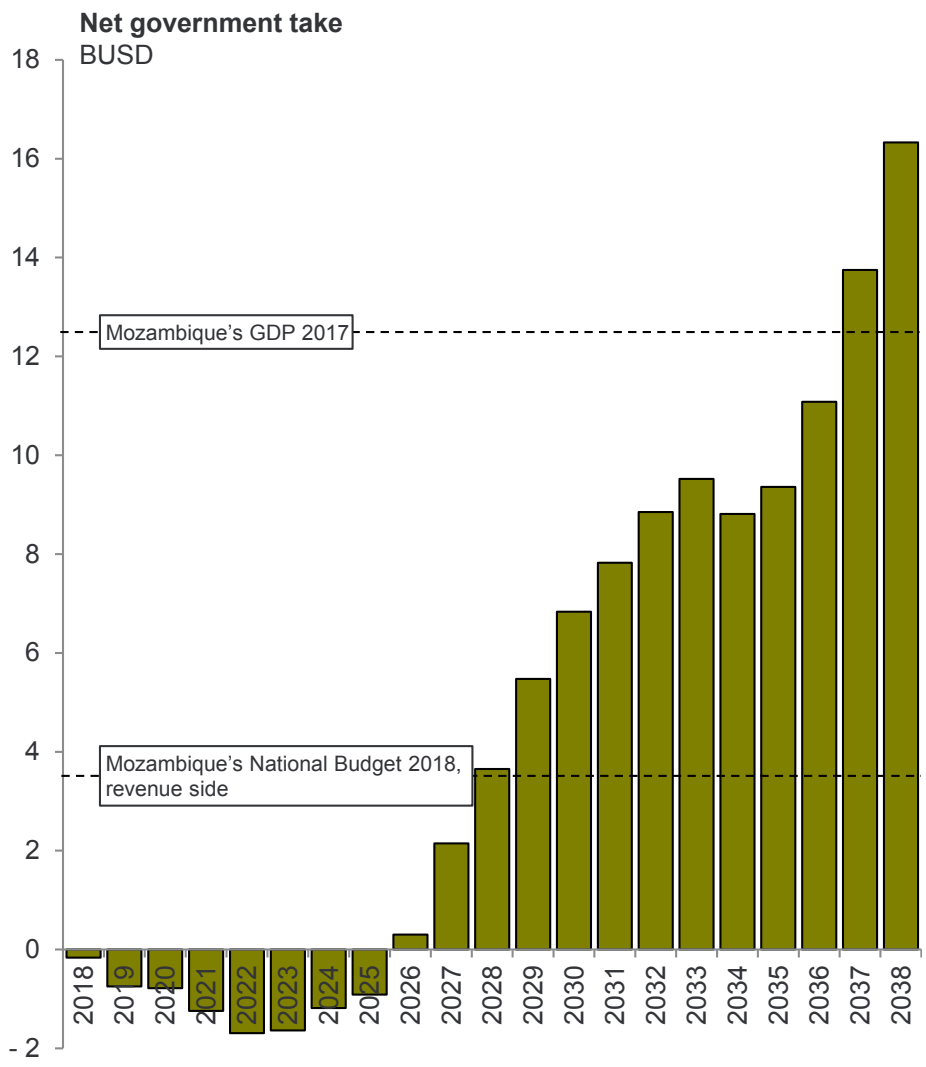


Total petroleum economy, split by costs, investments and net revenues
BUSD



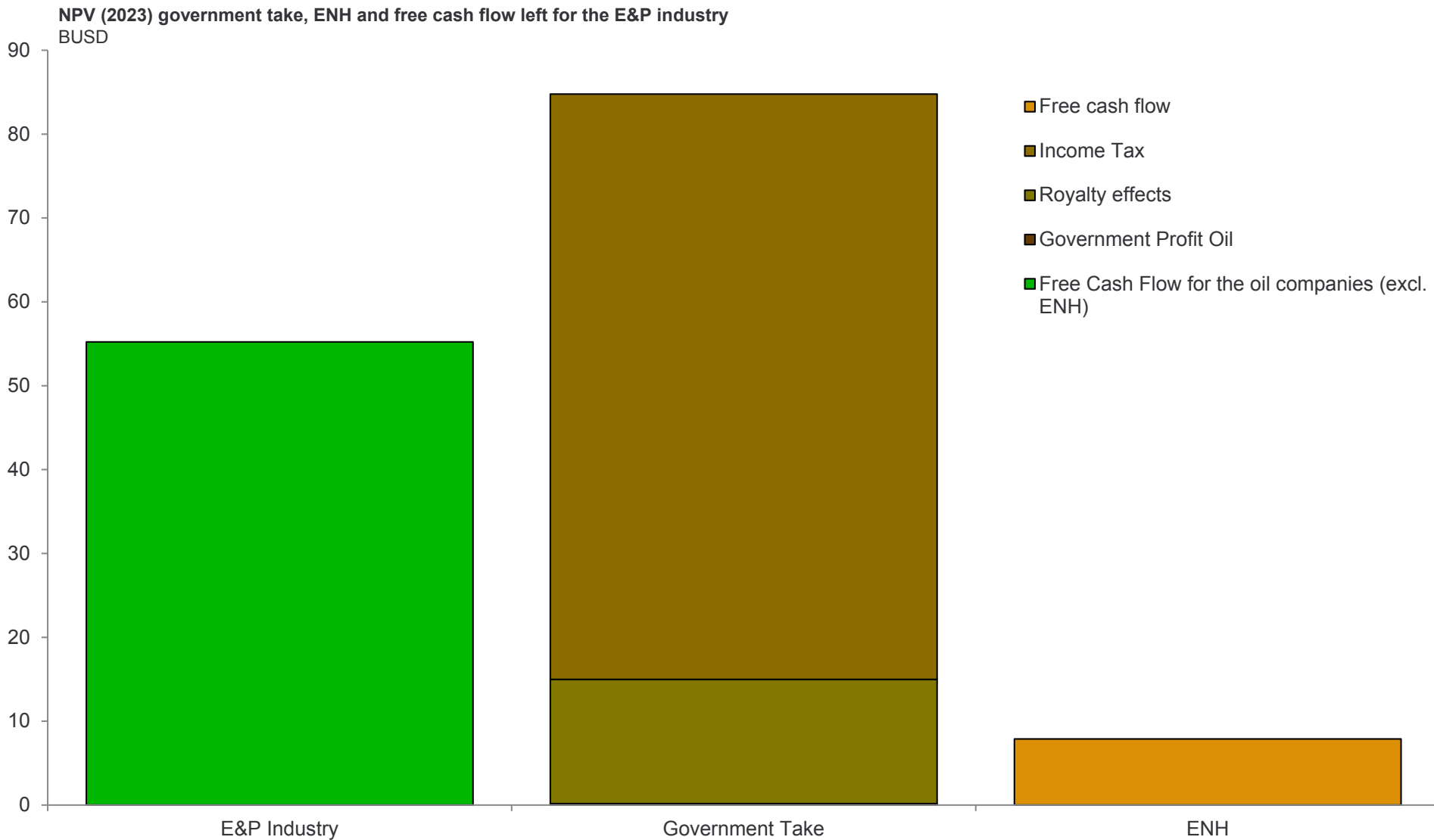
Source: Rystad Energy UCube, IMF

Net government take revenues will exceed the current GDP level in 20 years, and the revenue side of the national budget in 10 years



Source: Rystad Energy UCube, IMF & Mozambiquean Government

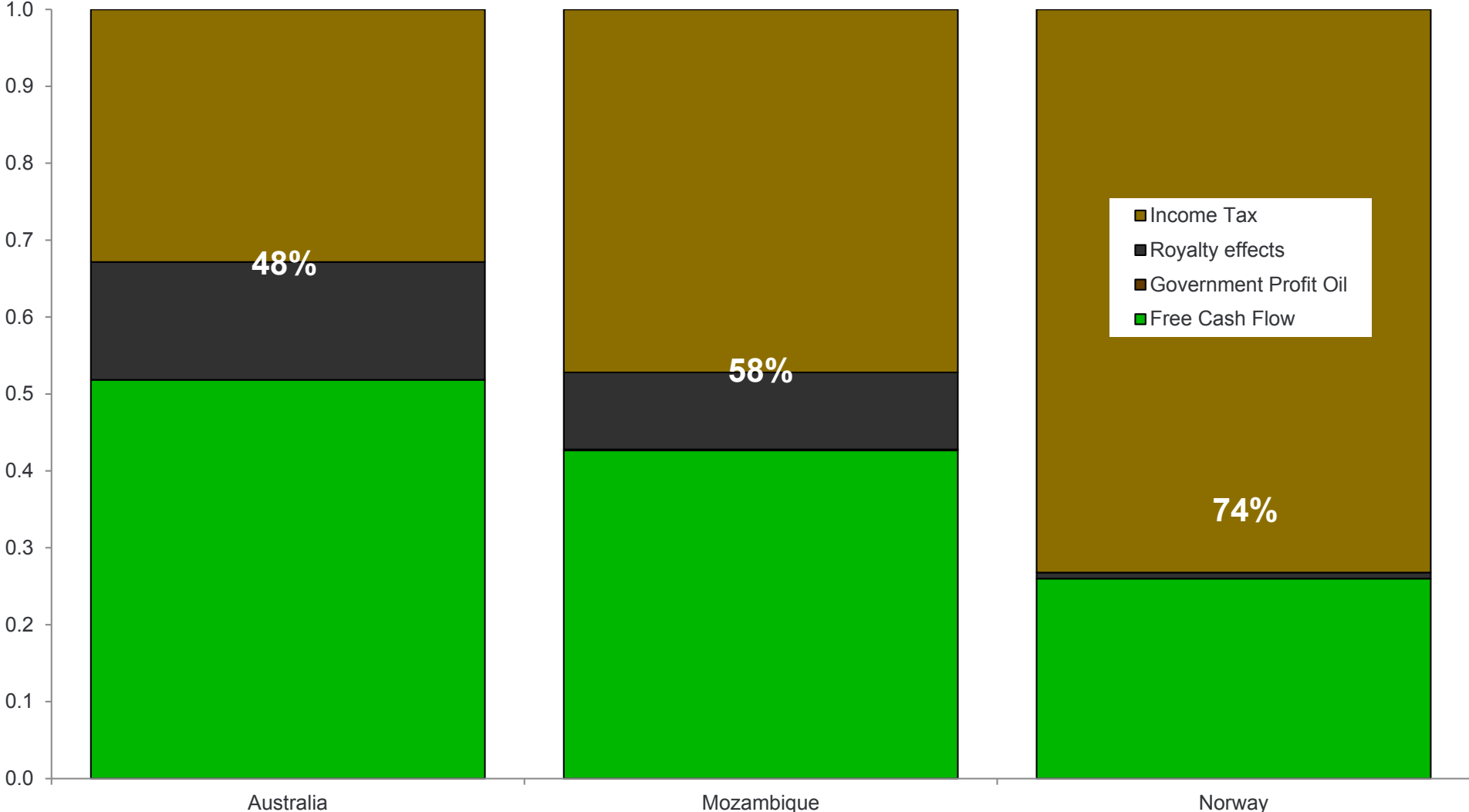
NPV (2023) at 85 BUSD of Mozambique's government take, in addition comes ENH's NPV of Free Cash Flow at 8 BUSD



Source: Rystad Energy UCube

Mozambique has overall a more benign tax level than Norway, but gross taxes are higher

NPV (2023) calculation of government take and free cash flow left for the E&P industry split fraction



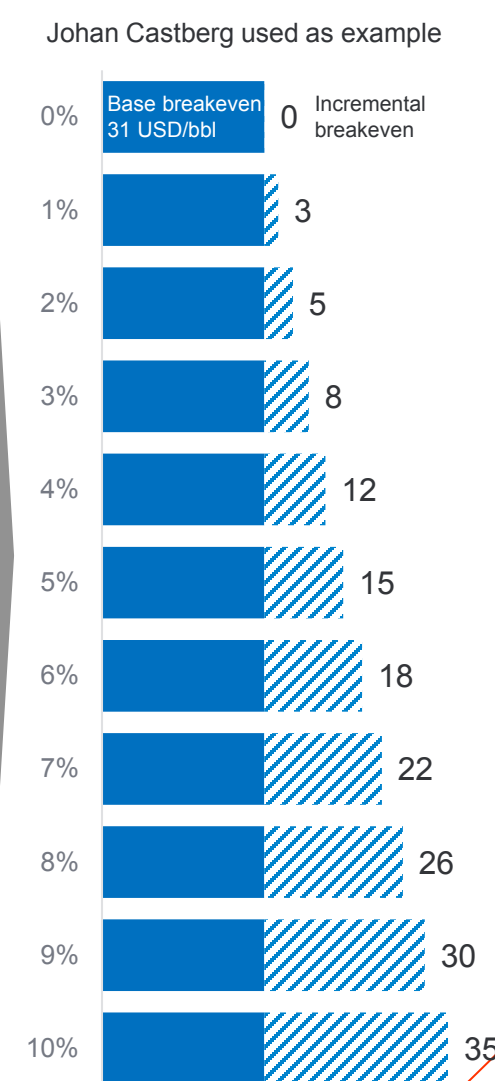
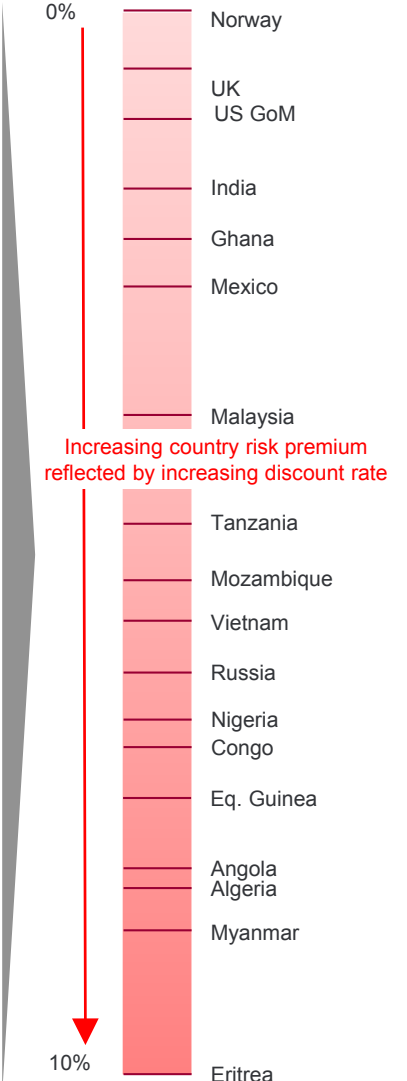
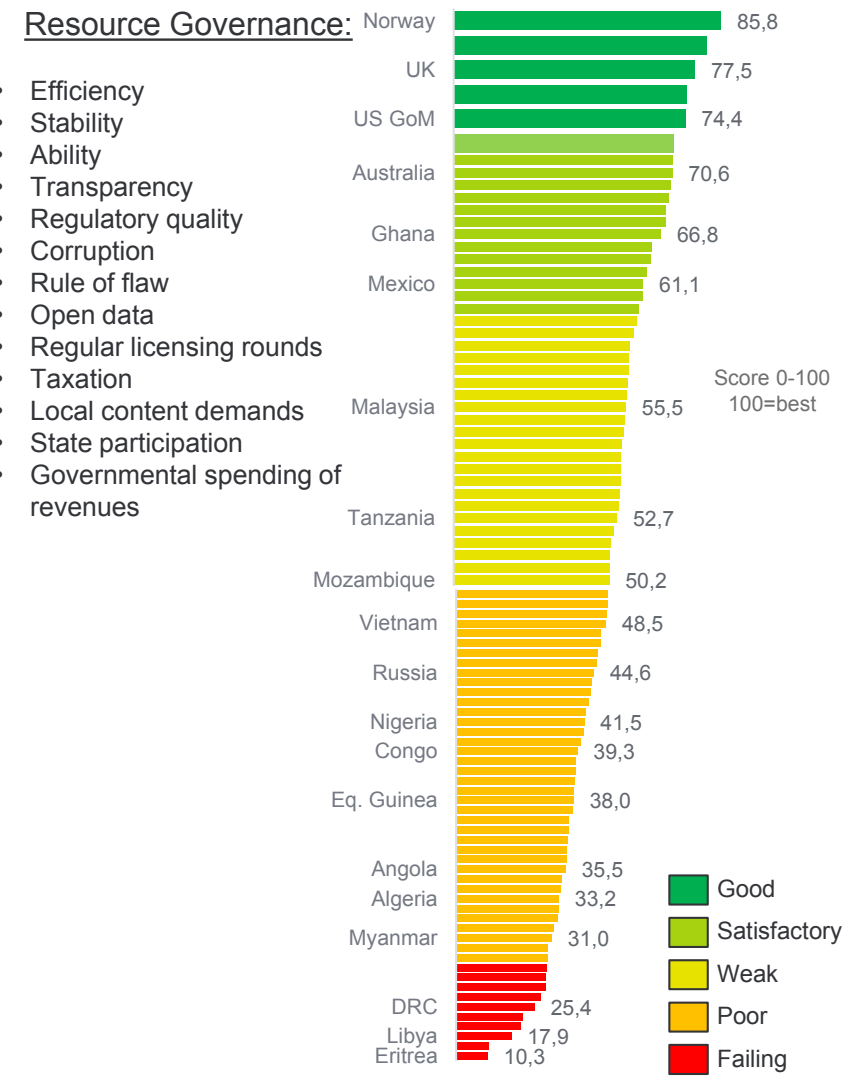
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The Resource Governance Index – Increasing risk premiums will be added to a project’s breakeven price

Resource Governance Index*
Country risk premium
Incremental breakeven at rising risk premiums



Conceptual
Not for practical use!

Source: Rystad Energy research and analysis. *National Resource Governance Institute,