

EA Papua New Guinea as an Exploration Destination*

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Abstract

Papua New Guinea (PNG) is in a strong position to increase its LNG export capacity, provide industry with new fiscal terms to support national growth through revenues and local participation, and it could see a new wave of explorers take aim at untested hydrocarbon potential outside of proven fairways. Support will need to cross each stakeholder sector to maintain PNG as a positive exploration destination and continue economic growth.

The content of this article was compiled in January 2020. Outlooks and forecasts may require revision at the time of publishing.

Exploration Focus

Over 7,000 MMboe has been discovered across PNG ([Figure 1](#)). Field size distribution analysis suggests yet to finds within the proven fairways could be tens of Tcf. Around 40% of reserves are allocated to just three fields, which were discovered between 1987 and 2006. This less than mature profile extends to current production which is restricted to 30% of the discovered reservoir units and just over 20% of the proven plays from the Lower Cretaceous to Lower Jurassic clastics. Looking ahead, 85% of the country's discovered resources remain to be produced and the gas production forecast appears competitive as rates could double in the next 10 years from those same plays and reservoirs.

However, without new production being sanctioned, the current gas and condensate production is due to maintain at a plateaued rate of around 190 Mboe/d until 2025 ([Figure 2](#)). At this point, bringing tie-in fields onstream could temporarily lift production until an eventual decline from around 2028. It is therefore a requirement that new proposed LNG developments are sanctioned to shift from a declining trend to a growth pattern.

Despite proposed development options and legislation, near to mid-term production could still be curbed to the existing producing partners in the absence of additional transport infrastructure and processing facilities. Under the government's proposal to provide third party access to

infrastructure and promote development from stranded assets, the ullage will be an important consideration with currently proposed new LNG projects being able to produce above the current observed gas and condensate production rates until around 2045. At this time, new supply from the existing LNG joint venture partner assets could hold production above present rates until past 2055 (pending project sanctioning and reserve certification post completed appraisal programmes of discoveries).

Of the total number of exploration wells drilled, just 10% lie outside of the Papuan Basin, which have tested a range of targets from fractured igneous and volcanic basement plays to reefal structures and clastics. Options to diversify the basin, play and reservoir production base includes Miocene carbonates and a move offshore for the first time, but the step-up to include other, untested potential reservoirs will require a new level of exploration. Currently, there are only several operators which continue to hold acreage, mature prospects and plan for exploration drilling in frontier or underexplored basins.

Untested basins (by means of subsurface drilling) across PNG include the Eastern Plateau and New Ireland Basin which contain active exploration programmes which maintain the potential of discovering a new hydrocarbon province. However, opportunities have been missed in the past where exploration has failed to meet expectations. This can be seen in the Trobriand Sub-Basin and broader Cape Vogel Basin where exploration licences expired with commitments unfulfilled. In the Buna Sub-Basin, several exploration licences also expired missing multiple opportunities to test plays which are estimated to hold multi-Tcf potential in structural traps comprising Miocene carbonate build-ups overlying a significant Mesozoic section. The Buna structure, currently held by Dondonald Ltd remains one of the largest untested offshore structures in PNG.

The impact of non-complete work programmes is reflected in the fairly contained exploration observed and is perhaps exacerbated by licence awards to non-exploration focused companies. Not all planned exploration activities will be completed due to a lack of suitable target identification and subsequent licence relinquishments. Financial support is also critical in PNG where there is a risk of around 40% of well commitments not being completed unless operators secure suitable farm-in partners. This could rise to 65% across work programmes which are at risk of completion without financial or technical assistance within the allocated licenced time frames resulting in work programme variations, licence extension applications or relinquishment.

Competitiveness of PNG

The royalty-based system of PNG, under the Oil and Gas Act 1998 (and subsequent amendments), has provided competitive fiscal terms on a global comparison, reducing the economic impact for operators and raising the E&P attractiveness to be aligned with other countries such as the United Kingdom and China.

The five-year outlook remains difficult to predict with the State and local provincial governments looking to capture increased value from PNG's resources and developers needing to offset the high costs of operating in PNG to remain commercially attractive. Proposed legislative changes to pave the way for new projects include an increase in government take and revenue shares for provincial governments and landowners, and a domestic supply obligation for gas and an increase to local content assurances.

It is likely that 30-40% of current reserves could support a change in regime for new project developments. Production rates could peak at approximately 100 Mboe/d lower than the combined production from projects falling under the current system, but with significant changes to the terms issued for the producing PNG LNG project.

From an exploration perspective, historic success makes PNG a world leader with a 48% success rate per new field wildcat and just over 30% in the last 20 years. The inclusion of all exploration wells moves the success rate far higher over the past 40 years. Extending this further still, 150% more reserves have been added in the Papuan Basin compared to the Australian Browse Basin since 2010 presents a world class exploration story.

However, to remain as an attractive exploration destination, the support for activities seen at the fiscal level needs to extend to reduced regulatory burden and increased government support for growing opportunities by operators looking to test the potential for new hydrocarbon provinces. More financially or technically restrained operators have been active in recent years, yet the impact on exploration, compared to periods with increased number of international operators in country, is low. Since 2015, exploration based on the number of new field wildcats drilled is the lowest across any 5-year period since the late 1980's - in line with many frontier and slow developing countries in Sub-Saharan Africa and Latin America.

LNG

PNG's production recovered from a declining 32 Mboe/d in 2013 to >240 Mboe/d post 2014 and the startup of the PNG LNG project. When considering LNG marketing in the context of future exploration, supply vs demand forecasting and pricing, forecast evolutions, flexible markets, world events, and of course the ever-changing country policies on energy transitions, all play a vital role in preferred target options.

In the short-term, new exports could impact the LNG markets from around 2026, with first production from the Papua LNG project. If development remains on target, this would equate to a 16-year turn-around from discovery to a financial investment decision (FID). For P'nyang, the country's third largest resource, this could stretch out to around 36 years. Forecasting on these timeframes for any new project approvals holds uncertainties on top of those expected during the exploration phase.

Worldwide, large scale investments were seen in 2019, with new FIDs taken which will increase the global liquefaction capacity by around 70 MMtpa – the highest ever annual increase. This equates to enough supply growth in one year to meet the global incremental demand of 19-21 MMtpa over the next three years.

In estimating the unconstrained or maximum LNG supply based on existing projects to end-2019, an oversupply scenario could be in place up to 2026, at which point the markets could be back in balance – based on a structural demand outlook.

However, high number of FIDs could also now be seen in 2020 adding a further 60-65 MMtpa, including the Qatargas expansion and Rovuma LNG in Mozambique. By this measure, the markets could see an oversupply of LNG until 2030. Adding projects potentially taking FID in 2021 and beyond, the gap widens, albeit slower, with enough added supply in two years to meet the next six-year incremental growth. In

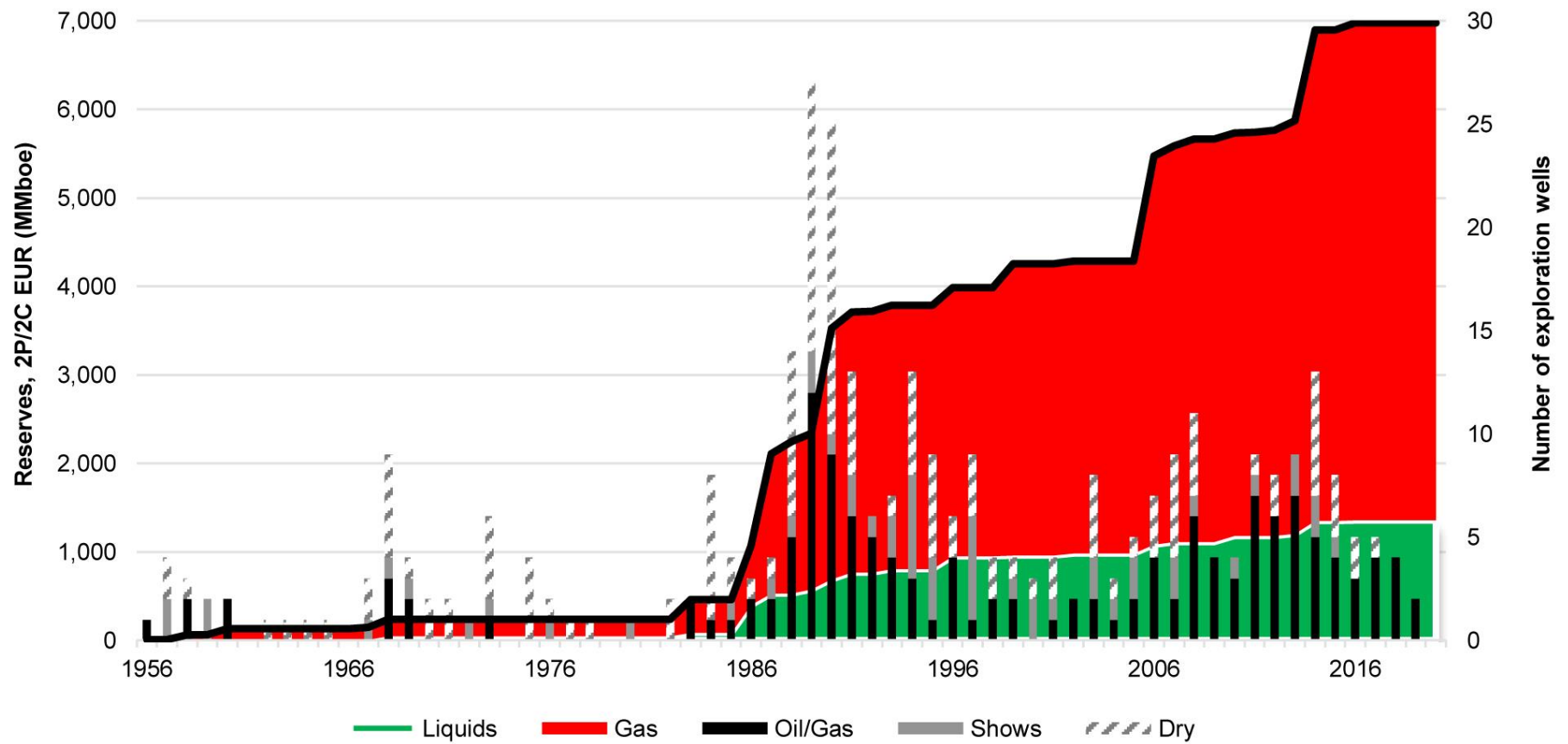
essence, the situation will be more liquefaction projects planned to go ahead than the market can absorb giving increased supply options for LNG buyers to contract.

Some majors are moving to portfolio-based marketing to avoid the requirement of initial long-term, project-based contracts, perhaps in part due to the demand of shorter-term contracts to better manage uncertain future needs. The increased risk by project developers could be supported by aggressive marketing to emerging markets, a look to grow LNG demand by supporting investments in importing capacity and through new technologies such as LNG as shipping fuel.

PNG is well positioned in being able to competitively supply emerging markets across Asia where a contract supply gap currently exists from around 2023, and by 2030, could be as high as 200 MMt. This is where the next wave of LNG supply from PNG could target with particular increase in the demand forecast across India, Thailand, Pakistan, Malaysia and China.

Support for bringing small-scale LNG projects towards development could fit the 10-year outlook for demand gap in 2030. Clearly, some of this will be filled by new supply but with increased focus on portfolio marketing and short term contracting, the spaces could remain open for fast-tracked developments.

Creaming curve Papua New Guinea

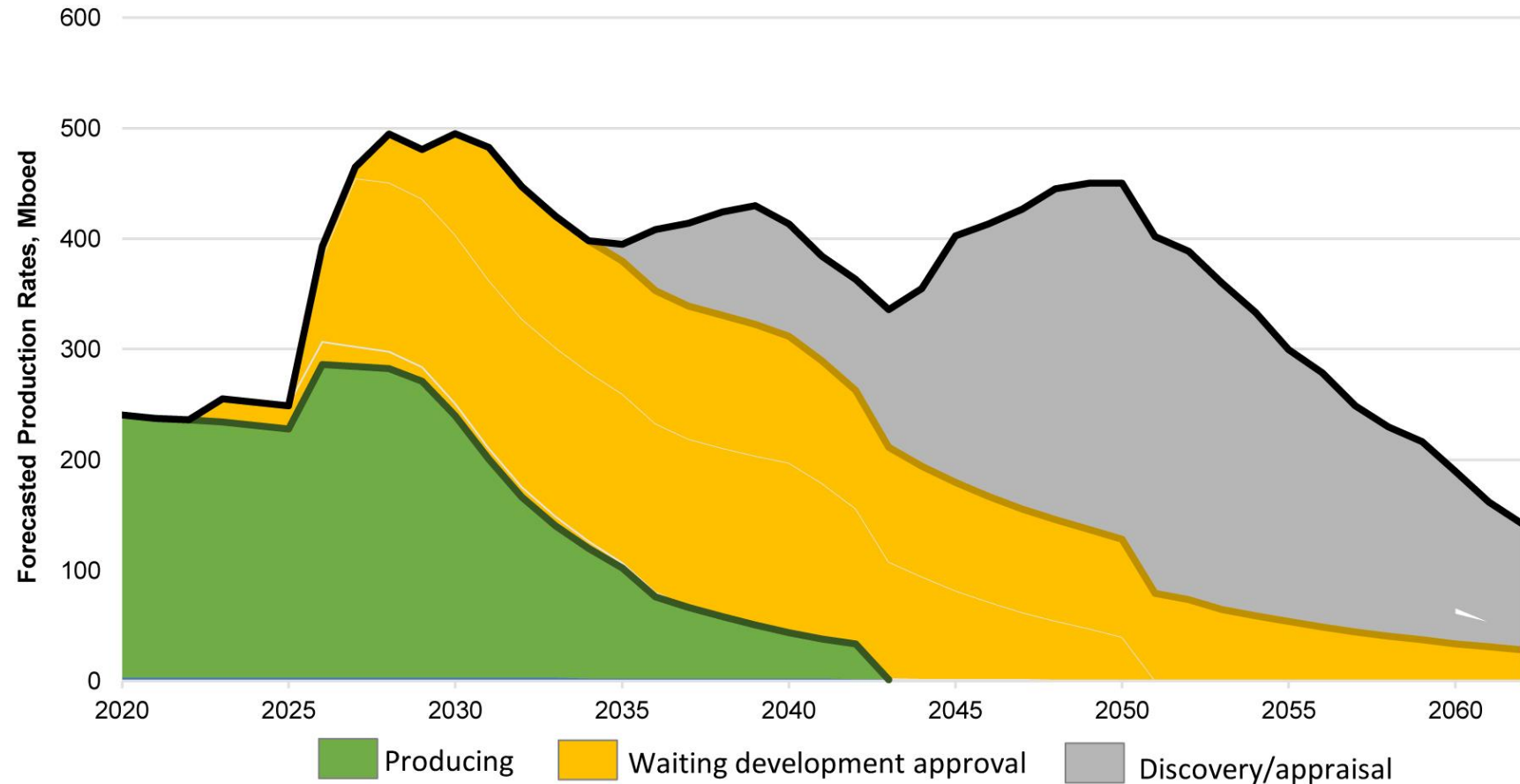


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Figure 1. A history of accumulated oil and gas volumes with exploration wells across Papuan New Guinea.

Production Forecast for assets in Papua New Guinea

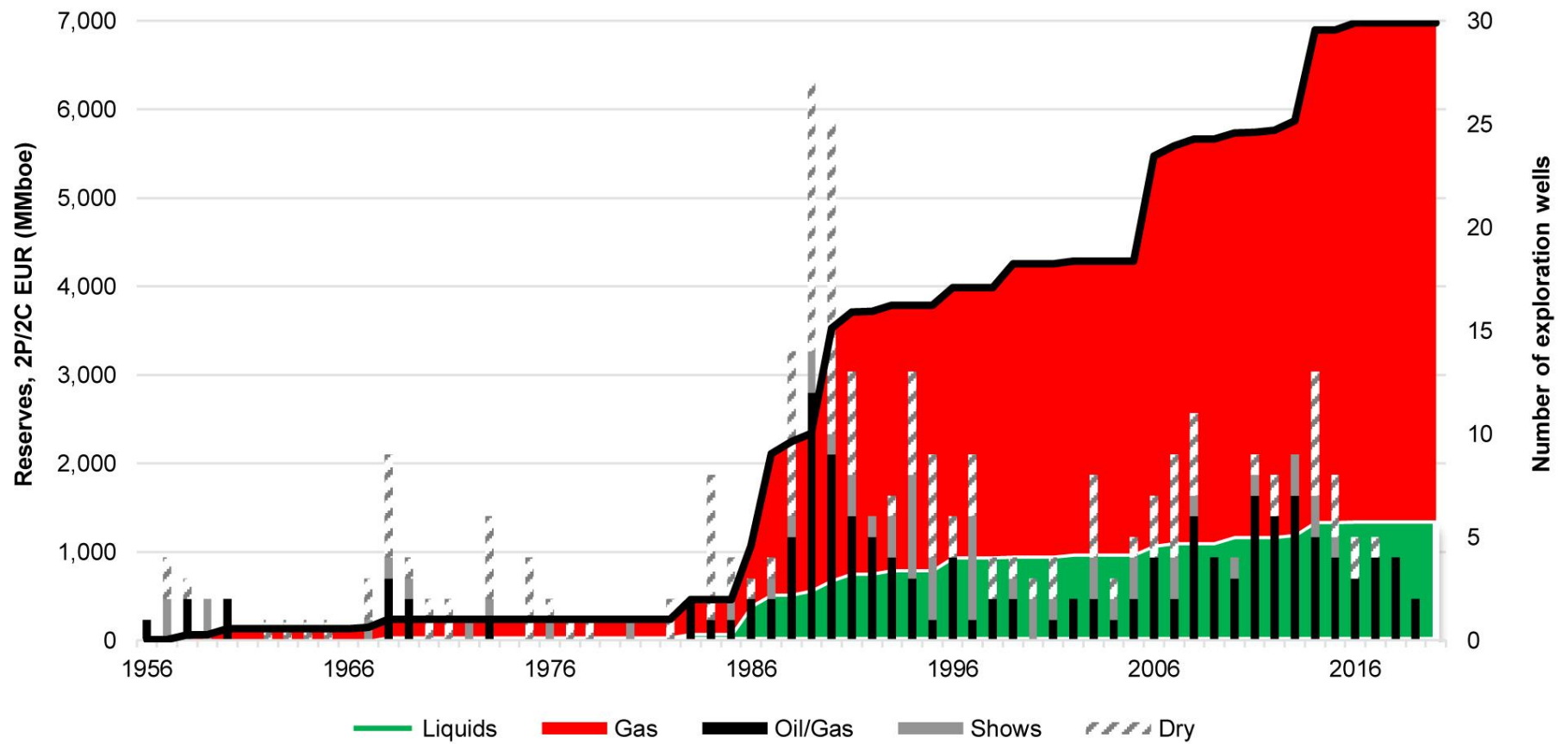


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Figure 2. Forecasted oil and gas production from assets in Papua New Guinea.

Creaming curve Papua New Guinea

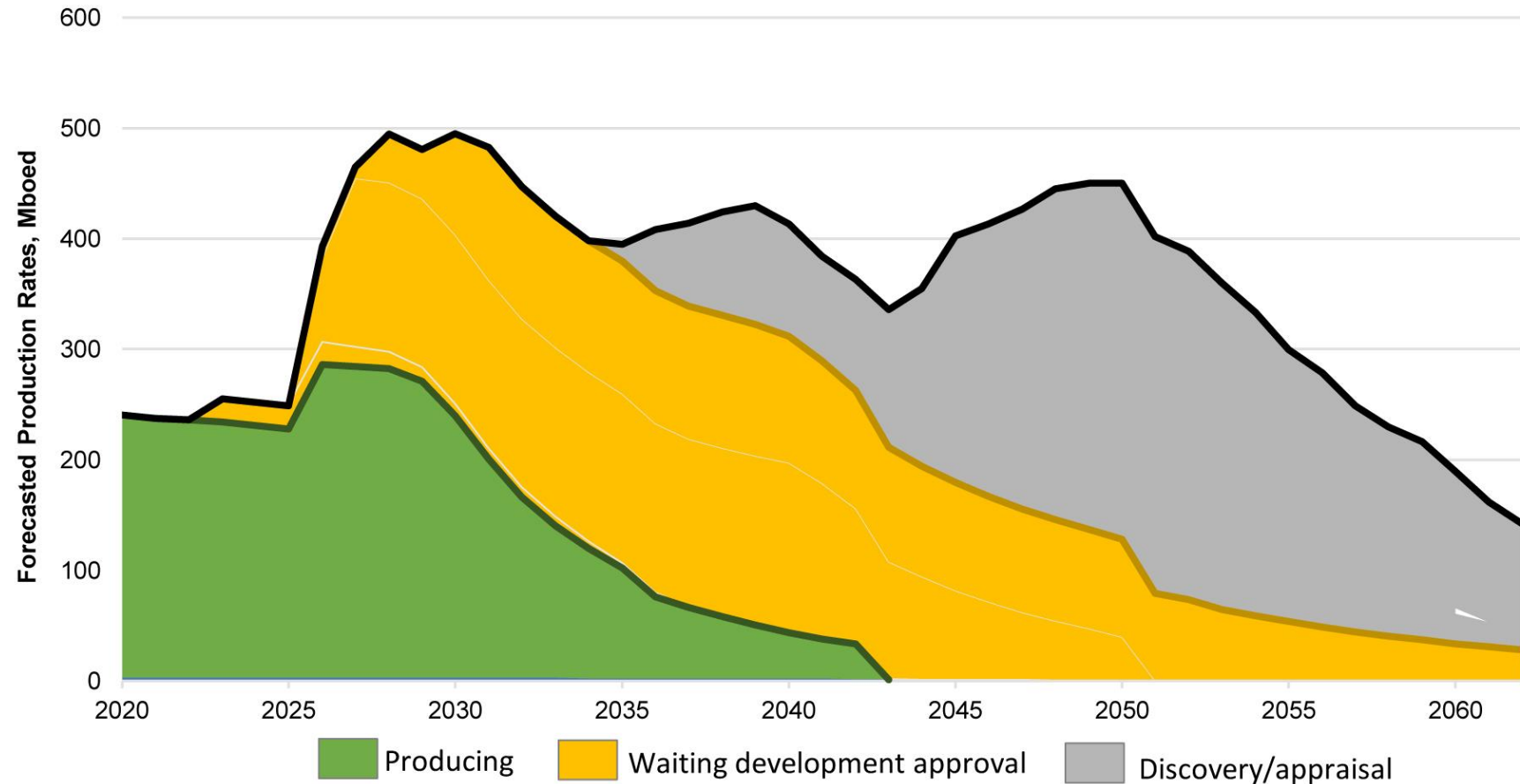


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