Shell's LNG strategy: Overcooked?



Executive summary

Shell plc is betting on a future where liquefied natural gas (LNG) plays a major role in the energy mix, particularly in emerging markets. Already the largest LNG trader in the world, the company has targets to grow its LNG business 20-30% by 2030.

Shell's LNG growth strategy is based on a bullish outlook for LNG demand – one that is far above all the International Energy Agency's (IEA) global LNG scenarios, including its highest emissions scenario which would result in 2.4 °C of warming. Whether this outlier position is a sound basis for a responsible LNG strategy, one that can deliver value for the company as the energy transition progresses, is tested in this research.

Our analysis finds a range of problems with Shell's LNG Outlook 2024. It appears founded on assumptions that emerging market policymakers will prioritise capital intensive, imported LNG over cheaper and faster-to-deploy renewables - an unlikely scenario, unless gas is priced below its lifecycle production cost. It also misinterprets the IEA's World Energy Outlook and other independent research in a way that exaggerates the future role of gas and makes its bullish outlook seem more mainstream.

These underlying flaws expose shareholders to the risk of Shell's LNG portfolio eroding shareholder value. We modelled Shell's LNG market position using Rystad data, finding it to have an unprecedented long LNG position, exposing it to downside risk should LNG demand, and hence price, fail to meet Shell's expectations.

With serious questions over Shell's bullish LNG outlook, its LNG book appears far from a sure bet.

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Key findings

- To be able to compete with renewables in Asian emerging markets, Shell's LNG prices would need to be so low that its LNG portfolio would erode shareholder value. To be competitive, prices would need to drop below \$5/MMBtu¹, which is significantly lower than LNG's typical \$8/MMBtu lifecycle cost as estimated by the IEA.
- Shell underestimates competition from renewables and the extent to which they are cheaper, lower in emissions, more modular and reduce the risks associated with a dependence on energy imports.
- Shell's LNG demand outlook significantly exceeds LNG demand in every one of the IEA's scenarios, including its highest emissions scenario, the Stated Policies Scenario (STEPS), which would result in 2.4°C of global warming.
- Shell misinterprets the IEA's scenarios in a way that makes its Outlook appear closer to a 1.5°C scenario than it actually is, and cites independent research in a way that appears to overemphasise the role of gas in decarbonising the Chinese steel sector.
- The misinterpretation of data and flawed assumptions raises major concerns around the oversight of the LNG strategy and the consequences for potential misallocation of capital. This is compounded by the fact that the remuneration structure is incentivising volume over value in integrating LNG growth targets this year.
- Shell has built an unprecedented long LNG position relative to peers. Its production profile and existing contract portfolio leave Shell with over a billion tonnes of uncontracted LNG between now and 2050. This exposure creates a strong driver for Shell to lobby to lock-in gas demand in emerging markets, where it gives limited insight into its lobbying activities.
- This long position exposes Shell to financial risk should LNG demand, and hence price, fail to meet its expectations. We estimate that the value of Shell's LNG assets drops by \$13 billion with each \$1/MMBtu reduction in gas price.

Shell's LNG Outlook 2024

Bullish - but is it credible?



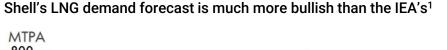
Shell's LNG demand outlook significantly exceeds LNG demand in every one of the IEA's scenarios - including the Stated Policies Scenario

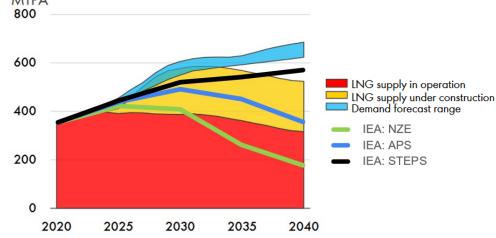
Shell's forecast LNG demand is higher than demand in the latest Stated Policies Scenario (STEPS), which:

- is the IEA's highest emissions scenario, resulting in 2.4°C of global warming above the pre-industrial era
- reflects a world where further emissions reduction policies are not implemented, even where countries have pledged to meet higher targets.

Shell sees LNG demand (midpoint) in 2040 exceeding:

- the NZE by 301%
- the APS by 92%
- the STEPS by 19%.





Source: Shell LNG Outlook 2024 overlaid with data from IEA World Energy Outlook 2024.

Shell's LNG forecast has remained unresponsive to recent dramatic changes in the global energy market

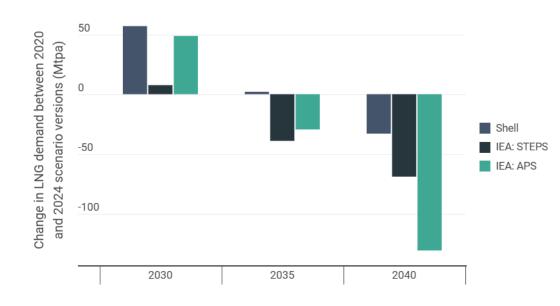
Over the past four years we've seen:

- unexpectedly steep declines in renewables and battery prices
- significant medium- and long-term demand destruction caused by an unprecedented shortterm spike in LNG prices following the Russian invasion of Ukraine, particularly for SE Asian customers who were priced out of the market
- nation-states starting to implement the Paris Agreement's 'pledge and review' mechanism, which requires countries to increase their climate ambition over time.

These changes have seen the IEA significantly reduce projected LNG demand beyond 2030.

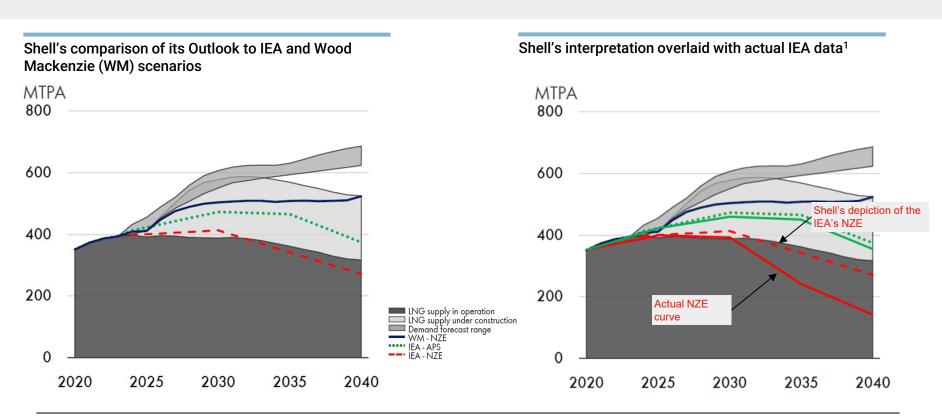
But Shell's LNG demand forecast has been unresponsive to these changes.

Shell's LNG outlook has not materially changed since 2020



Source: Shell's 2020 and 2024 LNG outlooks; IEA 2020 and 2024 World Energy Outlook.

Shell's LNG Outlook 2024 misinterprets LNG demand in the IEA's scenarios



Source: Shell LNG Outlook 2024; IEA 2023 WEO, extended data set.

^{1.} Slides 6 and 7 refer to the 2024 WEO, as that is the latest IEA data. This slide refers to the 2023 WEO, which is the latest IEA data that was available when Shell published its 2024 LNG Outlook.

Shell's misinterpretation of the IEA's data suggests its LNG outlook is closer to a 1.5°C climate outcome than it is

Shell's interpretation of the IEA's NZE incorrectly suggests LNG demand will:

- increase between 2025 and 2030
- be about 100% higher in 2040 than the actual IEA data projects.

Shell also marginally overstates LNG demand under the IEA's APS.

It's unclear why Shell presented the data this way. But it has the effect of understating how far Shell's LNG outlook is from the IEA's recommended 1.5°C scenario.

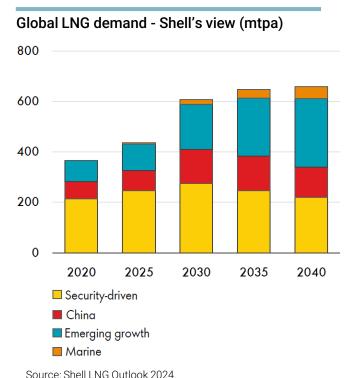
Shell is betting on LNG demand growth coming from a range of sources - but there are risks to these projections

According to Shell, changes to the world's LNG demand between 2025 and 2040 will come from:

- emerging markets (75% increase)
- China (18% increase)
- marine (19% increase)
- security-driven Japan, South Korea and Europe (12% reduction).

We see a range of risks to these projections:

- Renewables are outcompeting gas power almost everywhere and price-sensitive Asian consumers will revert to the lowest cost and lowest emissions sources.
- As gas, particularly LNG, is relatively expensive, it is only expected to play a balancing role in electricity markets.
- LNG price volatility has created energy insecurity in LNG importing countries and negatively impacted the reputation of this energy source's reliability.



Renewables are outcompeting gas power in emerging markets

Shell highlights the growing role for gas in Vietnam, the Philippines, Bangladesh and Thailand by pointing to an almost tripling of electricity generation and a recent surge in re-gasification capacity.

Most gas used in these countries is for power generation, but by 20302:

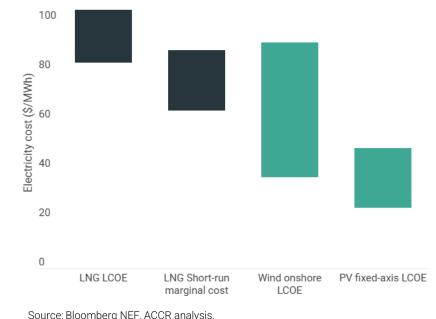
- the cost of building new solar photovoltaics (PV) will be half that of operating existing gas generators
- PV and wind will be cheaper than gas generation on a new build basis.

Renewables can also expand rapidly in emerging markets. For example, Pakistan imported the PV equivalent to 26% of its existing grid capacity in the last six months.¹

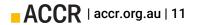
It is unclear why these countries would expand gas generation with LNG imports when it costs and emits more than domestically produced renewables.

For LNG to be competitive with PV generation, the cost would have to have to fall below \$5/MMbtu, significantly below its lifecycle costs. The financial implications of such a price environment for Shell are explored on slide 21.

Renewables are outcompeting LNG-sourced power in Vietnam, the Philippines and Thailand²



Godice: Bloomberg WEI , Moork di



^{1.} Pakistan Sees Solar Boom as Chinese Imports Surge, BNEF Says.

^{2.} Bloomberg NEF. LNG costs have been adjusted to \$9/MMBtu, assuming 60% combined cycle gas turbine efficiency. Bloomberg NEF does not provide data for Bangladesh. 2030 data used to reflect lead time for LNG infrastructure and Shell's long-term LNG portfolio.

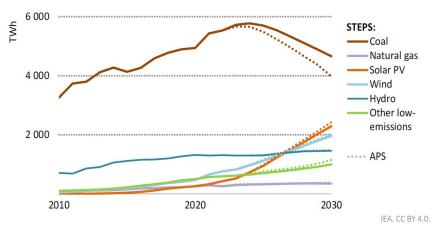
Shell sees gas switching as a demand driver, but this appears to be overstated

Gas is expected to play a relatively marginal, balancing role in the Chinese energy system (see chart). China is also prioritising domestically produced gas and piped gas imports for energy security reasons.

The relatively high cost of imported gas means there are significant barriers to demand growth elsewhere in Asia, where gas is also likely to only play a balancing role in energy systems. ¹

The Outlook claims LNG demand growth will in part be "driven by industrial demand in China". But the Outlook provides only one example of Chinese industrial demand for gas – the steel industry – and gas may not play as large a role in Chinese steel as Shell anticipates (see next slide).

The IEA expects renewables and energy efficiency to replace coal generation in China, with gas generation expected to flatline



Coal-fired electricity generation is set to decrease from the mid-2020 in the APS while solar PV capacity grows rapidly and passes 2 500 GW by 2030

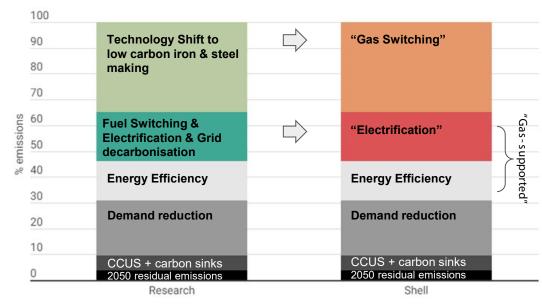
Shell appears to overstate the role of gas in China's industrial transition

Shell's 2024 LNG Outlook appears to mislabel independent research¹ on Chinese steel decarbonisation, to argue that Chinese industry will be a key driver of LNG demand (see chart).

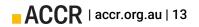
Shell's Outlook:

- relabels "Technology" as "Gas Switching", and "Fuel Switching & Electrification & Grid decarbonisation" as "Electrification"
- adds "gas-supported" labels to Electrification and Energy Efficiency
- Shell also said the research shows "a huge role for gas" in decarbonising Chinese steel by 2050.²
- However, the research does not appear to show gas switching at the level Shell states, nor that electrification and efficiency will be significantly supported by increased gas.

Shell seems to mislabel research to favour gas in China's steel decarbonisation



Source: Global Efficiency Intelligence & Lawrence Berkeley National Laboratory, "Net-Zero Roadmap for China's Steel Industry"; and Shell 2024 LNG Outlook.



^{1.} Global Efficiency Intelligence & Lawrence Berkeley National Laboratory, Net-Zero Roadmap for China's Steel Industry.

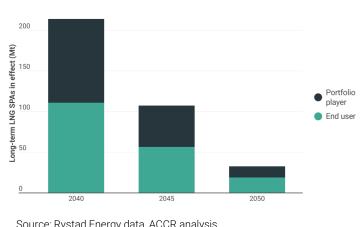
^{2.} Shell plc LSE:SHEL, Special Call on LNG Outlook, Wednesday, February 14, 2024 2:30 PM GMT, pp.4-5.

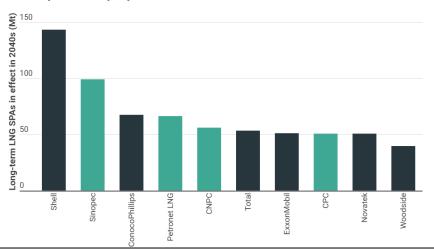
Shell suggests long-term LNG contracts are a sign of LNG demand, but many of these contracts are with portfolio players, not end consumers

Shell's LNG Outlook implies that long-term LNG offtake agreements are a signal of long-term confidence in LNG demand growth as "buyers pursue long-term supply for energy security", 1 but:

- of those LNG contracts extending beyond 2040, about half of the related LNG is being purchased by producers and traders (or 'portfolio players'), who have no intention of using the LNG.
- Shell itself is the largest LNG purchaser beyond 2040 and it does not consume LNG.

Half of the world's largest long-term LNG buyers are producers or portfolio players





Energy security concerns erode, rather than support, gas demand

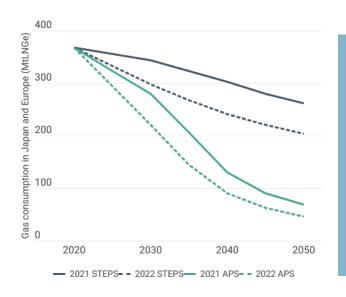
Shell's LNG Outlook shows a significant (though diminishing) level of security-driven LNG demand from developed economies.

But these countries have been reducing, not increasing, their gas consumption in response to the greatest energy security shock of recent decades - the Russian invasion of Ukraine (see chart).

LNG demand peaked in Japan 10 years ago² and may have also recently peaked in Europe.³

While Shell's LNG outlook does predict a reduction in security-driven LNG demand, the IEA predicts a much faster decline.

Energy security concerns have eroded gas demand in Japan and Europe¹





More low-carbon energy would have helped ease the crisis — and a faster transition from fossil fuels towards clean energy represents the best way out of it.

Fatih Birol Executive Director, IEA, 2022⁴

^{1.} Shell refers to EU, Japan and South Korea as being sources of security-driven demand. Our graph excludes South Korea, since IEA data is not available. We would not expect the conclusions to change if South Korea were added.

^{2.} IEEFA, Japan's largest LNG buyers have a surplus problem 3. IEEFA, European LNG tracker, September 2024.

^{4.} Birol F, Three myths about the global energy crisis, Sep 2022.

Shell's financial exposure to LNG markets

Shell has built an unprecedented long LNG position.

This leaves it heavily exposed should LNG demand, and hence price, fail to meet Shell's expectations.



While Shell has outperformed the energy sector over the longer term, oil and gas still underperforms the broader market

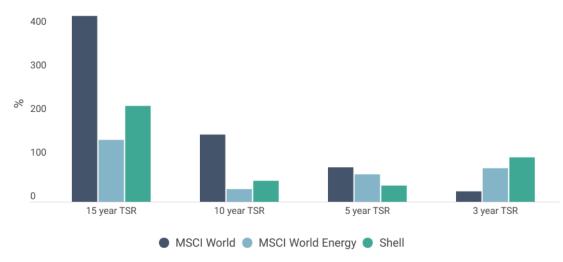
The oil and gas sector has underperformed the market for a sustained period (see chart).

The exception is the last three years, when the oil and gas sector was boosted by supply disruptions resulting from the Ukraine war.

Shell has outperformed the energy index over the longer term.

A return to focusing on oil and gas investment may therefore not result in superior returns, especially with the risk of the market entering structural decline.

Oil and gas has underperformed the broader market, except when supported by increasing oil prices¹



Source: Bloomberg Finance LP, Used with permission of Bloomberg Finance LP.

^{1.} Periods refer to financial years finishing on 30 June 2024. Calculated on a USD basis.

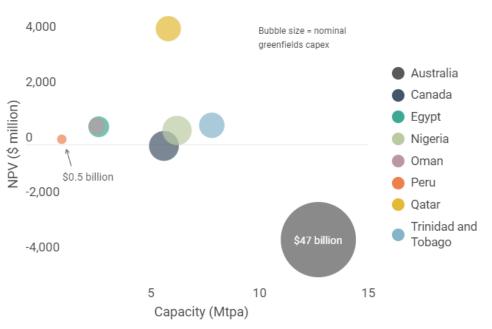
Note - All of the MSCI energy sector is oil and gas related sub-industries, except for 0.69%, allocated to 'coal and consumable fuels'.

Shell's LNG infrastructure investments have not always been profitable

Shell's performance when investing in LNG facilities is mixed:

- When accounting for country risk, we find that Shell's LNG assets would have eroded value, except for the strong performance of its Qatari assets.
- Shell's Australian and Canadian facilities, which make up over 70% of its LNG greenfields capex, have eroded value.

Shell's Australian and Canadian LNG facilities have eroded \$3.5 billion¹



^{1.} NPVs discount Rystad free cash flows (forward case) using a country-adjusted WACC to the FID year of each asset. Assets with an FID prior to 1990 are excluded.

Shell's financial exposure to LNG prices is expanding significantly

Shell's exposure to LNG prices is increasing rapidly because:

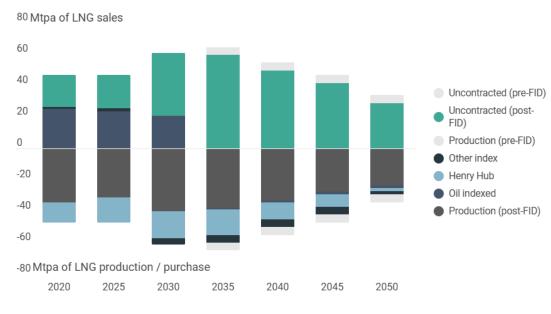
- its production and long-term purchases increase by 50% to 2035
- the vast majority of its long-term sales contracts expire by 2035.

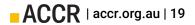
Its current exposure is \$13 billion in net present value (NPV) for each \$1/MMBtu change in LNG prices.²

Shell may sign contracts to shift the risk from gas spot prices to other pricing indices, but:

- this will not remove pricing risk from Shell's portfolio
- Shell may not be able to achieve favourable terms if the LNG 'glut' forecast by the IEA eventuates.

Shell's net LNG portfolio is forecast to increase by 50% to 20351





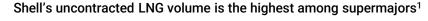
^{1.} Reflects a net production and trading position. 'Uncontracted' may include unannounced contracts, such as short-term contracts, and regasification capacity positions. Excludes spot purchases. See Appendix 1 for our modelling approach and reconciliation to Shell's data.

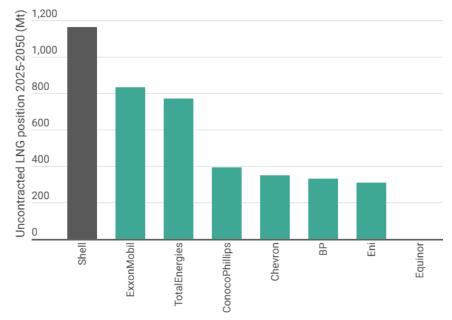
2. Assumes a 10% discount rate and 25% tax rate. Applied to LNG sales from 2025 to 2050 that are currently uncontracted.

Shell has the world's largest uncontracted LNG volume with over a billion tonnes to 2050

Shell is more exposed than any other company to a softer LNG market. A softer market seems plausible, based on:

- the IFA's scenarios
- our analysis of BloombergNEF's cost of electricity supply
- the current surge in LNG capacity from projects under development.





^{1. &#}x27;Uncontracted' may include unannounced contracts, such as short-term contracts and companies' regasification capacity positions. Excludes spot purchases. See Appendix 1 for our modelling approach and reconciliation of Shell's data.

Applying more conservative price assumptions would see Shell's LNG assets under construction destroying value for shareholders

To make LNG cost-competitive with renewables and coal in emerging Asia, where Shell sees most future growth, it needs to be <\$5/MMBtu (see slide 9).² In this price environment, Shell's:

- producing assets would have minimal value
- under construction projects would erode \$10 billion
- pre-FID projects would not be sanctioned.

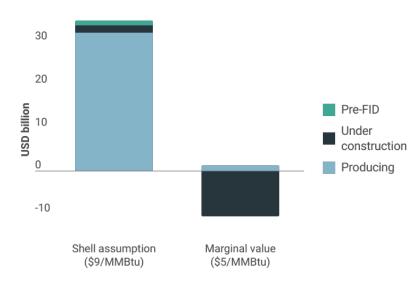
Even under Shell's gas price assumption, which is consistent with an Asian LNG price of \$9/MMBtu,³ Shell's LNG assets have minimal value beyond its operating facilities.

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Gas-importing emerging and developing economies would generally need prices at around USD 3-5/MMBtu to make gas attractive as a large-scale alternative to renewables and coal, but delivered costs for most new export projects need to average around USD 8/MMBtu to cover their investments and operation.

IEA, 2024 WEO

The NPV of Shell's LNG projects under different price scenarios ¹



^{1.} NPVs calculated using the Rystad Upstream Economic Model with country-adjusted WACC. Gas prices modelled by changing the 'East Asia LNG' price. LNG projects include LNG facilities and upstream fields linked to LNG facilities.

^{2.} Calculated using Bloomberg NEF LCOE model data, assuming 60% CCGT efficiency, for Vietnam, the Philippines and Thailand.

^{3.} Shell's \$4/MMBtu HH assumption, adjusted for liquefaction, shipping and regasification costs.

Shell's USA LNG tolling contracts, representing 22% of its portfolio, would erode value under IEA price projections

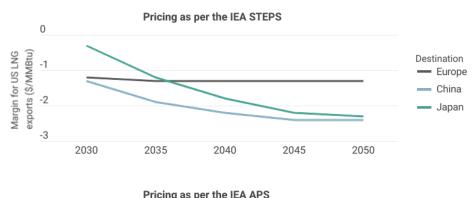
Exporting LNG from the US under Shell's average Henry Hub lifting contract¹ has a negative margin:

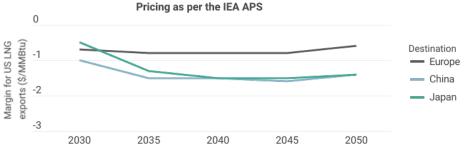
- under all IEA scenarios²
- for any market with pricing disclosed by the IEA (Japan, China and Europe)
- for all future time periods disclosed by the IFA

Our model of Shell's portfolio sees it sourcing 22% of its LNG using Henry Hub linked-contracts between 2025 and 2050.

While Shell does not disclose its regional pricing assumptions, it may be banking on larger regional spreads during periods of short-term volatility, such as that triggered by the Ukraine war.

Shell's LNG Henry Hub contracts would lose money under the IEA's scenarios





^{1.} Shell's average Henry Hub contract is 115% of HH pricing, plus a fixed fee of about \$2.50/MMBtu. This also assumes average shipping costs to Asia (\$2.63/MMBtu) and Europe (\$1/MMBtu). Regasification costs, which would increase losses, are not included.

2. IEA prices have been used for the USA, Europe, China and Japan. The NZE outcome is not graphed, but it also shows a negative margin.

Governance implications

The shortcomings in Shell's LNG Outlook raise concerns around governance, in particular:

- recent changes to Shell's investment framework, which encourages a less disciplined approach to capital expenditure
- a shift in the REM policy towards rewarding LNG sales, instead of lowcarbon products sales
- the incentive created by its LNG position for Shell to lobby to entrench demand in emerging markets, a concern exacerbated by insufficiently transparent lobbying disclosures.



Shell's investment framework and REM policy raise the risk of capital misallocation

Shell changed its investment framework in 2023 to:

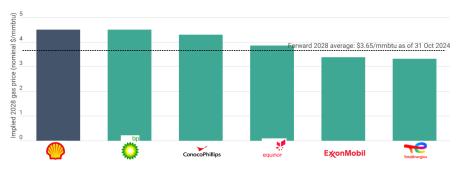
- lower its hurdle rates for upstream and integrated gas projects
- apply a higher gas price assumption than its peers.

The remuneration policy was changed in 2024 to now reward LNG liquefaction volumes instead of lower carbon product sales.

A 'volumes over value' approach raises the risk of capital misallocation.

Of the peers that disclose a gas or LNG hurdle rate, Shell has the lowest

Shell has the highest Henry Hub price assumption among peers



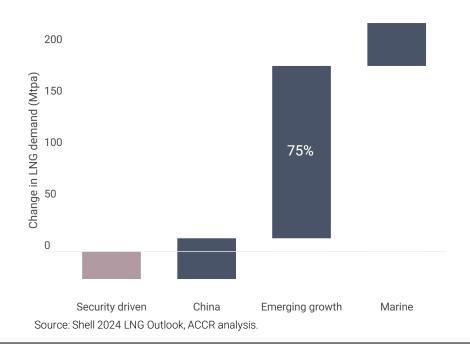
Source: Company FY 2023 reports, ACCR analysis.

Shell's LNG book incentivises it to lobby for LNG demand in emerging markets

Shell's outlook sees 75% of LNG growth from 2025 to 2040 coming from emerging markets (excl. China).

- With over a billion tonnes of uncontracted LNG, Shell's unprecedented exposure to the LNG market incentivises it to lobby policymakers to shore up buyers for that LNG.
- Gas growth relies on emerging markets making policy decisions to support the increased use of expensive, imported gas for power – likely at the expense of cheaper and more secure renewables

Shell sees emerging markets driving LNG demand growth from 2025-2040



Shell doesn't disclose a range of material lobbying in emerging markets

- To date, Shell has not disclosed lobbying spend or industry associations outside of a few advanced economies.
- Despite Shell's stated commitment to transparency, ACCR research found¹ numerous undisclosed associations in emerging markets where Shell is a member and often has leadership roles.
- In response to our findings, Shell will increase its disclosure of lobbying in a limited number of emerging markets.

Shell doesn't disclose associations in emerging markets, and its plans to improve are limited

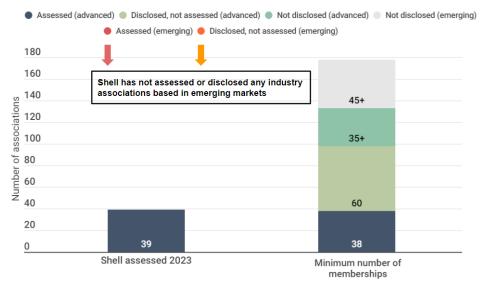


Chart: ACCR | Source: Shell reporting and ACCR research – note the right-hand column contains only 38 'assessed' (advanced) because one association Shell assessed, Queensland Resources Council, no longer appears on Shell's disclosed list

Shell is lobbying for LNG demand growth in emerging markets

Shell and its industry associations promote increased, long-term gas use.¹

- Shell has promoted increased investment in extraction and liquefaction projects, longer term LNG contracts, and the creation of new LNG markets in emerging economies.
- Shell is a leading member of influential industry associations in S/SE Asia whose lobbying for gas risks unsustainable lock-in of fossil fuel infrastructure and demand.

Shell has influential roles at numerous associations in S/SE Asia that are lobbying for gas demand



Greatly overstates the climate credentials of gas and advocates for gas to play a large, long-term role in the energy mix.



Advocates for lower tax on gas to stimulate consumption and new LNG markets to help create a 'gas-based economy'.



Shell is a member of numerous influential associations in SE Asia that promote long-term demand for gas.

Shell's lobbying may increase risk for investors, and threaten a timely and just transition

Shell's lobbying could limit its ability to meet commitments to:

- decarbonise its business
- work with its customers to reduce emissions in line with Paris

Emerging markets where Shell sees a high proportion of future production and/or demand growth generally have a:

- higher corruption risk
- lower climate policy maturity.

The World Bank & UNODC have identified corruption and energy company influence as risk factors that may slow climate policy progress in emerging markets with growing energy demand.

Corruption risk is higher in emerging markets where Shell production is expected

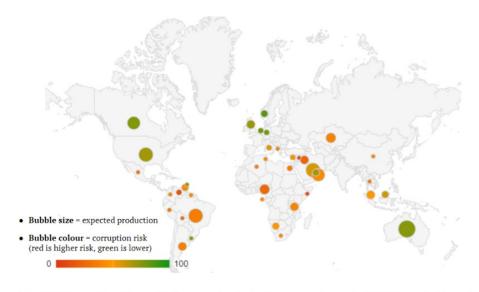
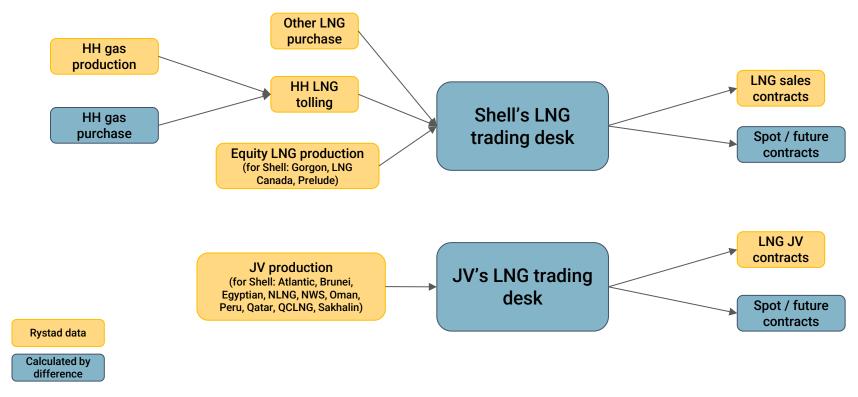


Chart: ACCR | Source: Rystad Energy (UCube, expected production), Transparency International (2023 Corruption Perceptions Index)

Appendix 1: Shell's LNG portfolio



How we modelled a company's LNG portfolio



Shell has additional exposure to JCC and Brent that is not publicly known

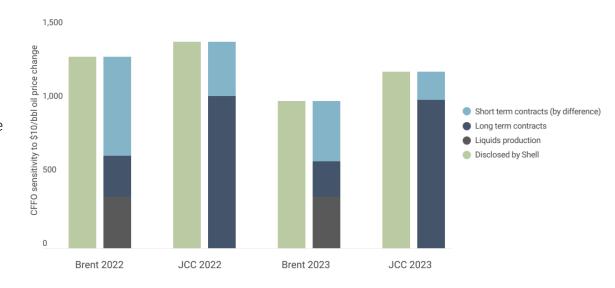
We reconciled our model against Shell's disclosed price sensitivity to Brent and JCC indexes for 2022 and 2023 for the Integrated Gas segment.

Based on Rystad production and contract data, we can account for 66% of the price sensitivity.

This implies an additional 22Mt of LNG exposed to these indices which is equivalent to half of the 'uncontracted' volumes in Shell's portfolio for those years.

If the discrepancy is described by short term contracts, then this is unlikely to impact our longer term analysis.

Rystad data implies that Shell has additional contracts indexed to JCC and Brent that is not publicly available



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