

Resiliency

Testing resiliency under the IEA NZE scenario^{1,2}

We have used the assumptions in the IEA NZE scenario to test the resiliency of our current portfolio even though the IEA acknowledges that society is not on the IEA NZE pathway.

Our testing methodology uses IEA's assumptions

We modeled a hypothetical business and investment portfolio based on the IEA NZE scenario and used a respected third party to conduct an independent audit and confirm the integrity of our model. The analysis included existing operations and future opportunities across our businesses in oil, natural gas, fuels, lubricants, chemicals, lower-emission fuels, hydrogen, and carbon capture and storage. We used IEA NZE assumptions relevant to these business areas to inform demand and pricing in our model:

- Oil prices decline to \$24 per barrel by 2050; natural gas prices decline to \$2-\$4.60 per million British thermal units depending on region (both in real terms, 2019 USD).
- Oil and natural gas demand declines from 53% of total primary energy in 2020 to 19% by 2050.
- Chemicals demand increases by 30% from 2020 to 2050, with 80% of production leveraging carbon capture and storage or hydrogen technology integration.
- Carbon prices increase to \$250 per metric ton in advanced economies, \$200 per metric ton in China, Russia, Brazil, and South Africa, and \$55 per metric ton in other emerging markets and developing economies (real terms, 2019 USD).
- Carbon capture and storage volumes expand rapidly from 40 million metric tons in 2020 to 7.6 billion metric tons in 2050, supported by a range of measures to increase investment.
- Lower-emission fuels, in which the IEA includes liquid biofuels, biogas and biomethane, and hydrogen-based fuels, increase from 1% of global final energy demand in 2020 to 20% in 2050.
- Hydrogen production increases by a factor of six, from 87 million metric tons in 2020 to 528 million metric tons in 2050.

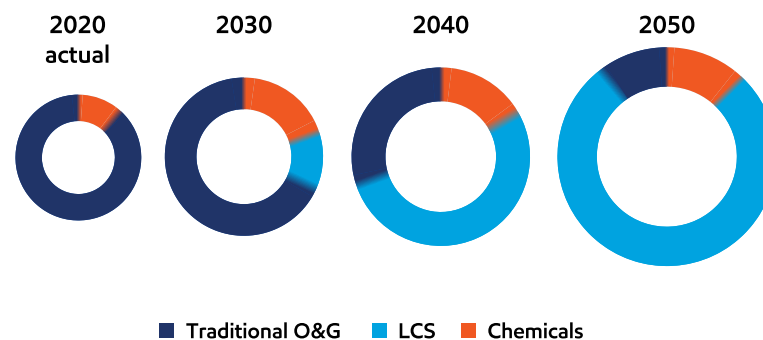
We developed additional assumptions consistent with the IEA NZE narrative as needed to estimate the performance of our portfolio. To use the IEA NZE price assumptions, we assumed that current prices decline to conform to IEA published prices by 2025 and that the path is linear between the price assumptions that IEA provided by decade thereafter. The IEA NZE scenario did not provide assumed margins for refining and chemical businesses. Therefore, for refining, we assumed margins decline to the lowest level needed to incentivize production required to meet IEA NZE oil demand. For chemicals, we modeled margins consistent with history, at a level sufficient to support the investment necessary to meet chemicals demand growth per the IEA NZE; the margins decline over time, partially offset by inflation.³ For our Low Carbon Solutions business, we used IEA NZE demand assumptions and assumed the business investments attract reasonable returns based on our historical averages for similar business lines and products. Our modeling assumes that the resulting market position for existing and new areas as a percentage of demand under IEA NZE is in line with our current market positions in existing businesses. We assumed investment to abate estimated greenhouse gas emissions from our businesses by 2050. Annual inflation was set to 2.5%. We also assumed total capital expenditures through 2050 starting with our 2020 trailing five-year average and moving forward on a real basis, which is sufficient investment to maintain market share. On this basis, the results further support the growth in cash flow from our Low Carbon Solutions business under the IEA NZE scenario. Our competitors and peers have different portfolios, strategies, markets, and regulatory realities that lend themselves to different approaches and may lead to different results that are not necessarily comparable across companies, especially for those who anticipate a production decrease or an exit from the oil and natural gas business as part of their plans.

Outcomes of our testing

The chart illustrates potential changes to our business portfolio through 2050 from the modeling. It demonstrates that, under the IEA NZE assumptions, we have flexibility to continue to grow cash flows over time through reduced investments in oil and natural gas and increased investments in value-accretive projects in chemicals, carbon capture and storage, lower-emission fuels, and hydrogen. We disclose estimated operating cash flows over time, broken out by traditional oil and gas, chemicals, and Low Carbon Solutions to address enterprise resiliency questions. We believe this is an industry-leading disclosure because it provides a clearer view of the resiliency and enterprise value of our portfolio, expertise, and opportunities than hypothetical noncash accounting measures dependent on asset-specific assumptions not provided by the IEA NZE.

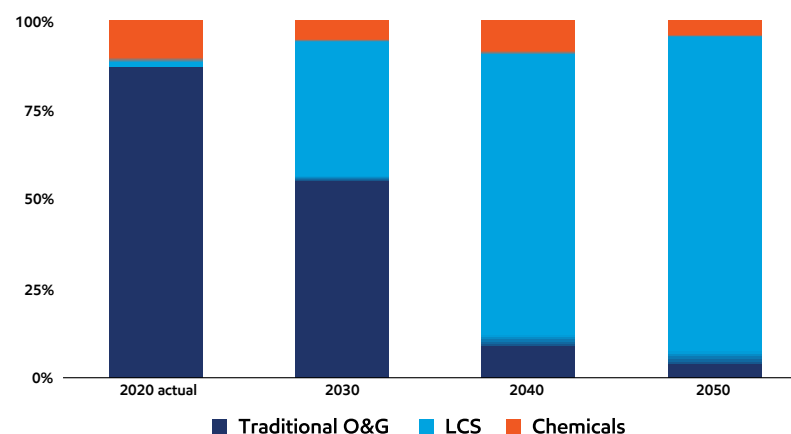
Operating cash flow modeled under IEA NZE 2050 scenario⁴

Trailing 5-year averages (nominal \$)



Capital expenditures modeled under IEA NZE 2050 scenario⁵

Trailing 5-year averages



Our modeling illustrates a number of considerations for our business in an IEA NZE scenario. Through 2030, the upstream portfolio would further focus on resources with competitive cost while accelerating options to improve greenhouse gas emissions intensity. Assets with shorter production cycles, such as unconventional developments in the Permian, and a lower cost of supply, like deepwater production in Guyana, would continue to attract capital and generate competitive returns.

The energy transition creates opportunities for our existing assets, which could provide additional business optionality. If the IEA NZE scenario's long-term decline in oil and natural gas demand and pricing were to materialize, we would respond by ceasing oil and gas exploration in new basins along with reduced spending on new developments. Longer-term, through 2050 in this scenario, this potentially reduced investment would result in lower overall production as natural depletion outpaces investment in new volumes, with a continued portfolio focus on cost-efficient assets with low greenhouse gas emissions intensity. Existing oil and natural gas production assets would be optimized and operated as long as economically justified, consistent with IEA NZE assumptions, which project that global production of approximately 24 million barrels of oil and 170 billion cubic feet of natural gas per day would still be needed to meet demand in 2050.

In our Product Solutions portfolio, as production of traditional refined products declines through 2030 under the IEA NZE scenario, manufacturing sites would be reconfigured to shift production to meet the demand for non-combusted products like lubricants, basestocks, and chemicals, as well as to meet growth in lower-emission fuels and provide additional optionality for these assets in the energy transition. Current examples include investments and partnerships to increase renewable diesel production and transport, such as at our Strathcona refinery in Canada or Slagen facility in Norway.

Demand growth for chemical products, many of which generate lower life-cycle emissions relative to available alternatives, would be supported by value-accretive investments in our chemicals business. Examples include expansions currently underway in the U.S. Gulf Coast and Singapore, and at our China chemical complex. Longer-term through 2050, we would continue to optimize and potentially expand our integrated sites with flexibility to produce lower-emission fuels and chemicals while reducing their operational emissions. Additional integration with carbon capture and storage and/or fuel switching with hydrogen technology would

further accelerate lowering greenhouse gas emissions intensity, with less advantaged sites potentially closed or converted to terminals.

Under IEA NZE, significant growth potential exists in the Low Carbon Solutions portfolio in lower-emission fuels, carbon capture and storage, and hydrogen. Our core capabilities and advantages, including subsurface expertise, scaling major projects, existing assets including infrastructure, and our people, would continue to position us to effectively compete. Throughout the modeled period, the increasing IEA NZE carbon price would support accelerating attractive investments that would increase cash flow in Low Carbon Solutions, offsetting reduced investment in traditional oil, natural gas, and fuels refining. Through 2030, we would focus on scaling lower-emission fuels options to meet the expected growing demand.

We would also pursue investments like the Baytown blue hydrogen project, acquisition of geologic storage to sequester CO₂, and participation in new potential industrial clusters that would advance new and existing infrastructure opportunities and position us as a partner of choice. Longer-term through 2050, the carbon price and demand for decarbonization options would continue to grow rapidly in the scenario, leading to a significant shift in our capital spend to further scale carbon capture and storage and hydrogen.

Third-party independent audit of ExxonMobil's modeling of IEA NZE

After an extensive search, we enlisted an independent third party, Wood Mackenzie Inc., to audit our portfolio model. The objectives of the audit were to confirm the integrity of the calculations and overall model functionality and to validate that the model accurately reflected the IEA NZE's assumption inputs, ensuring the output is a reasonable expression of the portfolio mix as defined by the model inputs.

The Wood Mackenzie audit included testing and confirming the integrity of the ExxonMobil Portfolio Model, including evaluation of each business under the IEA NZE. They also confirmed that the IEA NZE assumptions are accurately reflected in the portfolio model. Specifically, Wood Mackenzie validated the following:

- The IEA Net Zero assumptions are accurately reflected in the model.
- Model calculations are correct.
- There are no data translation errors.
- The output is a reasonable representation of portfolio mix as defined by model inputs.

As a global research and consultancy business with 50 years of experience, Wood Mackenzie partners with organizations to provide quality data, analytics, and insights used to power the natural resources industry.⁶ To view the 2022 Wood Mackenzie independent audit statement, [click here](#).⁷

Considering IEA NZE by 2050 scenario updates

The IEA NZE by 2050 scenario is back-cast, meaning that the outcome of net-zero CO₂ emissions in 2050 is fixed, with the scenario working backward to present one view of supply, demand, geopolitical, technology and market assumptions to achieve this set objective. While hypothetical, this type of rationale may be of use to consider the significant challenges present in an aggressive scenario. We directly leveraged the assumptions made by the IEA in their NZE scenario to assess our business and investment portfolio, with the outcome demonstrating our resiliency. Since the initial release in 2021, the IEA has continued to make updates to their NZE scenario.⁸

The IEA also continues to share updates on energy-related CO₂ emission levels⁹ as well as the critical technologies¹⁰ and clean energy investments¹¹ assumed necessary. These publications highlight that multiple key areas are not progressing as assumed in the NZE scenario. With these key areas lagging, updates to the back-cast NZE scenario must address an increased total amount of emissions reduction in a shorter time period to achieve the set 2050 net-zero objective.

Fundamentally, an update that increases improvements needed while shortening the time allowed means that each iteration of the NZE's methodology leads to assumptions that increase the importance of lower-carbon solutions. These NZE scenario updates have not changed the outcome of our assessment, which highlights resiliency through investment flexibility across options that are both needed and consistent with our core capabilities, including lower emissions-intensity oil and natural gas, chemicals, carbon capture and storage, lower-emission fuels, and hydrogen.

The differences that remain apparent between current progress in lowering emissions and the aspirational assumptions outlined by the NZE scenario updates point to further need for society to advance supportive policies, effective carbon markets, and technology solutions to enable progress. We are doing our part, building an entire Low Carbon Solutions business dedicated to reducing emissions – both our own and others – and spending billions of dollars on solutions that have a real, sustainable impact.

Assessing potential impacts

The following is intended to address the potential impacts through 2050 to our proved reserves, resources, evaluation of asset impairments, and other measures, considering the discussed scenarios' ranges of oil and natural gas demand.¹²

In assessing various aspects of resiliency, we believe taking a portfolio approach is the most appropriate way for ExxonMobil to provide transparency in our analysis of the potential impacts of any energy transition scenario, including the IEA NZE. Additionally, as an integrated company with assets around the world, we have seen that economic events and trends may have a negative effect on one asset and an offsetting positive effect on others, with a minimal net effect on the full portfolio. When individual subsurface and energy system assets are analyzed in isolation from the full portfolio, the analysis is vulnerable to misinterpretation of the interplay among assets in the market and the optionality that assets may have in a specific region in the energy transition. This may provide a misleading picture of our resiliency and enterprise value. While one group of assets may perform below expectations for a period of time, other assets may perform above expectations – such is the nature of this cyclical industry. Numerous examples have occurred over time, with Russia's invasion of Ukraine providing a recent example of the value of our diversified portfolio. While we experienced a loss of value from the expropriation of our Russian assets, the international sanctions contributed to a rise in global commodity prices, increasing the value of many of our other Upstream assets. We believe an analysis that fails to account for these details could both misrepresent the value of the portfolio and miss important macro factors such as energy reliability and security. We do not believe this approach provides meaningful disclosure to investors.

We believe the energy transition is likely to unfold at an uncertain pace with variation in technology and policy by region. The individual assets in our portfolio respond differently to economic signals, technology evolution, commodity prices, regional differences, government policies, and many other variables. Even where global benchmark prices are given, local prices, including differentials, are influenced by external factors that cannot be reliably predicted. Third-party scenarios offer some assumptions related to these variables; however, determining impacts by individual asset requires additional forecasts, projections, and cost estimates that cannot be reasonably predicted. Publicly providing individual asset modeling for remote scenarios risks conveying a false level of precision.

To further support our portfolio approach, we believe using the IEA NZE in a hypothetical individual asset impairment analysis is inconsistent with the principles outlined under U.S. GAAP, which specifies that impairment analyses should be based on assumptions that are "reasonable in relation to" our planning basis. Our planning basis is our Global Outlook, which is a projection of supply and demand through 2050. The assumptions in the IEA NZE significantly vary from our Outlook, and the IEA has acknowledged that its NZE is an extremely aggressive scenario, and that society is not currently on this pathway. Providing detailed asset-specific public disclosure regarding remaining useful lives, retirement costs, and potential proved reserves changes in an IEA NZE scenario could imply a higher degree of certainty or accuracy than exists. In addition, as the energy transition progresses, disclosing this type of detailed asset-level information could provide a competitively sensitive roadmap of how we might make adjustments in our portfolio. For these reasons, we do not provide hypothetical, individual asset accounting analysis using the IEA NZE. We believe looking at the evolution of our portfolio operating cash flows, which reflect how investment decisions may change under the IEA NZE, provides a better demonstration of our resiliency and enterprise value with less potential to confuse our stakeholders.

Use of sensitivity analysis

Sensitivity analysis provides greater perspective on how variations to our Outlook assumptions could affect projected energy supply and demand. Analyzing these sensitivities involves evaluating possible technology advancements and their potential impact on energy supply and demand. This results in a range of potential low- to high-demand outcomes for certain energy sources. The projections yielded by sensitivity analysis do not represent our viewpoint or the likelihood of these alternatives, but can provide context.

Proved reserves

Proved reserves are assessed each year and reported in our annual report on Form 10-K in accordance with rules of the U.S. Securities and Exchange Commission. Based on 2022 production schedules, a substantial majority of our year-end 2022 proved reserves are expected to have been produced by 2050. For the remaining year-end 2022 proved reserves that are projected to be produced beyond 2050, the reserves are generally associated with assets where the majority of development costs are incurred before 2050. While these proved reserves may be subject to more stringent climate-related policies in the future, technology advancements and targeted investments could mitigate production-related greenhouse gas emissions and associated costs. In addition, these mature assets generally have a lower risk profile given the experience and technical knowledge accumulated over many decades of production.

Resources

We maintain a large and diverse portfolio of undeveloped resources that provide flexibility to develop new supplies to meet future demand. We work to enhance the quality of this resource base through successful exploration, application of new technology, acquisitions, divestments, and ongoing development planning and appraisal activities.

The underlying economics of commercializing resources depend on a number of factors that are assessed annually. Decisions can range from developing the resource (which eventually moves to proved reserves), monetizing the resource by selling it to others, or exiting the resource. All investments are tested over a wide range of commodity price assumptions and market conditions. In

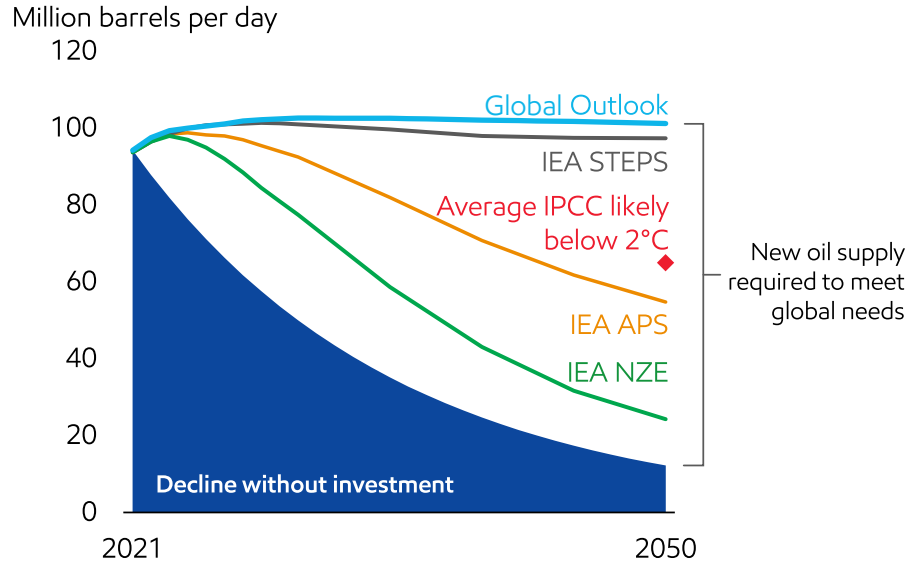
scenarios like the IEA NZE, higher-cost assets could become disadvantaged without active portfolio management.

In light of the multiple and dynamic factors that influence governments' diverse approaches to regulating resources and industry's decisions to commercialize undeveloped resources, it is not possible to identify which specific assets will ultimately be developed. For example, regional policies that constrain supply in one area could enhance returns in others. Alternatively, geopolitical conflict affecting resources in one region could advantage resources in another, making diverse long-lived assets a hedge against instability. Ultimately, we are confident in our ability to apply high-impact technologies to position our portfolio to compete successfully in a broad range of scenarios.

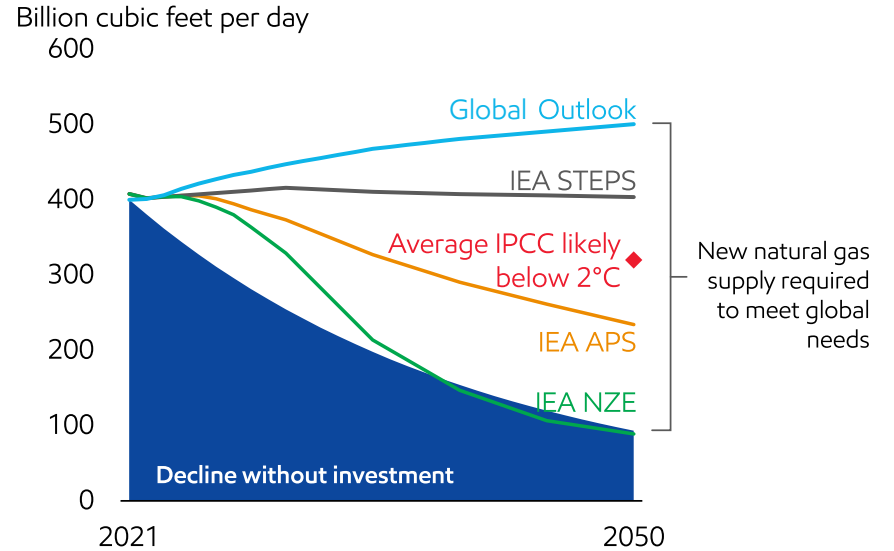
Significant investment still needed under Likely Below 2°C and IEA NZE scenarios¹³

In the IPCC Likely Below 2°C scenarios, average global oil demand is projected to decline from approximately 90 million barrels per day in 2021 to about 65 million in 2050. The IEA NZE scenario projects about 24 million barrels per day of demand in 2050. Without future investment, world oil production would be expected to drop to about 12 million barrels per day due to natural field decline. In the IEA NZE scenario, additional investment of approximately \$8 trillion through 2050 will be required in oil and natural gas to meet the world's energy demand.¹⁴ Even under IEA NZE, new discoveries will be needed to support energy security and reliable supply in the face of geopolitical uncertainty.

Global oil supply and demand



Global gas supply and demand



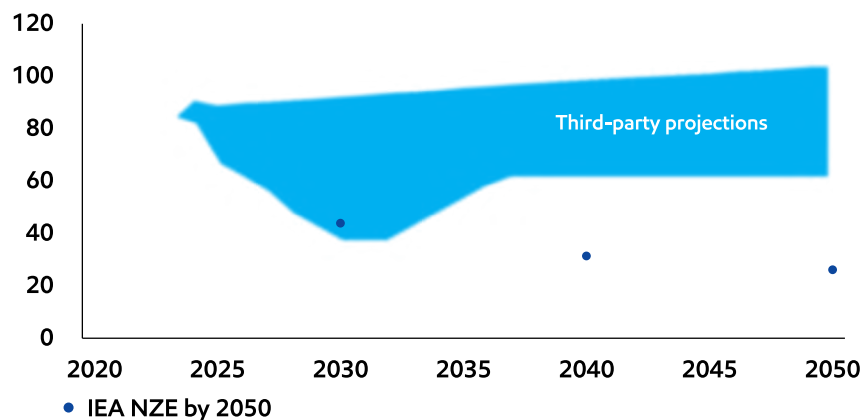
The supply gap to 2050

Significant investment would be needed to meet even the rapidly declining demand for oil and gas envisioned in the IEA's Net Zero Emissions by 2050 scenario. In 2050, IEA STEPS projects a price of \$83 per barrel and a U.S. natural gas price of \$4.3 per million British thermal units (prices in 2022 U.S. dollars).

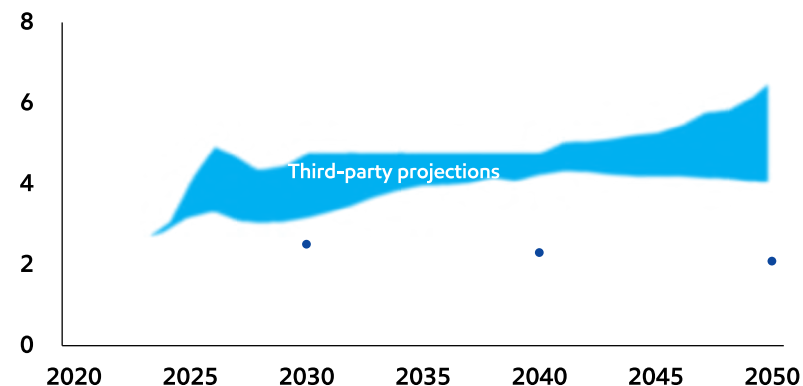
Our Outlook estimates energy-related CO₂ emissions in 2050 to have dropped by almost 25% versus 2021 to 25 billion metric tons per year – approximately 5% lower than IEA STEPS. Our Outlook projects higher future demand for oil and natural gas, partially based on a larger share of global economic growth coming from emerging economies, as they improve access to energy vital for human development. The Outlook also reflects higher growth of carbon capture and storage and low-carbon hydrogen based on our insights into these technologies, which are critical solutions for net-zero pathways.

Third-party price projections versus IEA NZE price¹⁵

Brent oil
2023\$/barrel



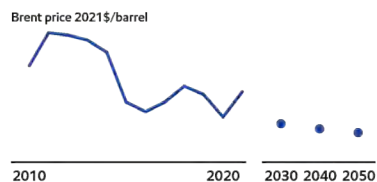
Henry Hub natural gas
2023\$/million British thermal units



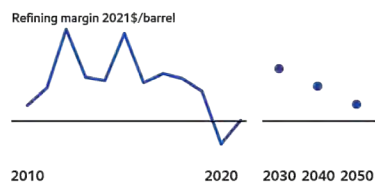
The company's projections for prices are proprietary. Our Global Outlook forms the basis of our business planning and is used for commercial decisions and economic evaluations. Our near-term prices are informed by market conditions. For mid- to longer-term, our prices are in the range of third-party projections published by reputable organizations with significant industry expertise. The pricing is also well within historical bands.¹⁶

Footnotes

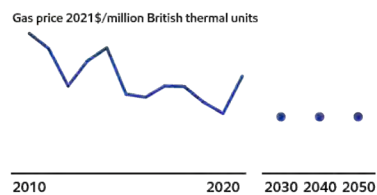
1. The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities – TCFD Knowledge <https://www.tcfhub.org/scenario-analysis/>.
2. The statements and figures contained in this section are hypothetical in nature, do not constitute a forecast of future company performance and are based on assumptions from International Energy Agency (2021), Net Zero by 2050, IEA, Paris.
3. Forward price and margin assumptions used in IEA NZE modeling; historical values provided for context.



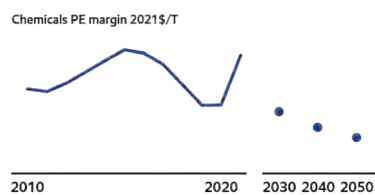
Source: historical – Platts Dated Brent; forward – IEA NZE by 2050 (2021)



Source: historical – Platts and ExxonMobil analysis, based on industry average Opex and ExxonMobil historical capacity; forward – ExxonMobil analysis incorporating IEA NZE by 2050 (2021) demand



Source: historical – Settled NYMEX Henry Hub; forward – IEA NZE by 2050 (2021)



Source: historical – IHS Markit, Platts and company estimates based on ExxonMobil capacity; forward – EM analysis incorporating IEA NZE by 2050 (2021) demand

4. ExxonMobil analysis, IEA NZE by 2050 (2021). Supplemental information for non-GAAP and other measures. This chart mentions modeled operating cash flow in comparing different businesses over time in a future scenario. Historic operating cash flow is defined as net income, plus depreciation, depletion and amortization for consolidated and equity companies, plus noncash adjustments related to asset retirement obligations plus proceeds from asset sales. The Company's long-term portfolio modeling estimates operating cash flow as revenue or margins less cash expenses, taxes and abandonment expenditures plus proceeds from asset sales before portfolio capital expenditures. The Company believes this measure can be helpful in assessing the resiliency of the business to generate cash from different potential future markets. The performance data presented in the publication and its associated supplement, including on emissions, is not financial data and is not GAAP data.
5. ExxonMobil analysis, IEA NZE by 2050 (2021).
6. Wood Mackenzie, <https://www.woodmac.com/about/our-story/>.
7. Note: 2022 opinion letter references page numbers from the 2023 Advancing Climate Solutions Progress Report.
8. International Energy Agency (2021), Net Zero by 2050, IEA, Paris; IEA NZE scenario per World Energy Outlook 2022, IEA, Paris; IEA Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach 2023 Update, IEA, Paris.
9. "Global energy-related CO₂ emissions grew by 0.9% or 321 Mt in 2022, reaching a new high of over 36.8 Gt." – [CO₂ Emissions in 2022 – Analysis – IEA](#).
10. "Of the over 50 components tracked, in the 2023 edition 3 are evaluated as fully "On track"" (vs. NZE scenario) – <https://www.iea.org/reports/tracking-clean-energy-progress-2023>.
11. "Scaling up clean investment is the key task for the sustainable and secure transformation of the energy sector" – <https://www.iea.org/data-and-statistics/charts/historical-investment-in-energy-benchmarked-against-needs-in-iea-scenarios-in-2030>.

12. For the purposes of this report, "proved reserves" means estimated year-end 2022 proved oil and gas reserves for consolidated subsidiaries and equity companies which was reported in the Corporation's 2022 Annual Report on Form 10-K. Proved oil and gas reserves are determined in accordance with Securities and Exchange Commission (SEC) requirements. Proved reserves are those quantities of oil and gas which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be economically producible under existing economic and operating conditions and government regulations. Proved reserves are determined using the average of first-of-month oil and natural gas prices during the reporting year. For the purposes of this disclosure, resources are total remaining estimated quantities of discovered oil and gas that are expected to be ultimately recoverable. The resource base includes proved reserves and quantities of oil and gas that are not yet classified as proved reserves.
13. IEA World Energy Outlook 2023, ExxonMobil analysis, ExxonMobil 2023 Global Outlook, IPCC Sixth Assessment Report, Likely Below 2°C scenarios refers to Category C3.
14. ExxonMobil analysis based on IEA World Energy Outlook 2023, Figure 3.22.
15. IEA NZE by 2050 (2021), Third-party oil price projection range includes:
 - a. FACTS Global Energy Group – Forecast of Crude Oil Prices and Differentials. (October 2023); Global Oil Market Outlook (July 2023).
 - b. Wood Mackenzie – Macro Oils Investment Horizon Outlook (October 2023).
 - c. Rystad Energy – UCube (October 2023).
 - d. S&P Global Commodity Insights – Energy Price Portal (October 2023). North American Crude Oil Markets Short-Term Outlook (October 2023). Global Fundamentals Crude Oil Markets Price Long-Term Outlook: 3Q2023 (September 2023).
 - e. U.S. Energy Information Administration – Short-Term Energy Outlook (October 2023). Annual Energy Outlook (March 2023).

Third-party gas price projection range includes:

 - a. Rystad Energy – UCube (October 2023).
 - b. Wood Mackenzie – Global Gas Investment Horizon Outlook (October 2023).
 - c. S&P Global Commodity Insights – Energy Price Portal (October 2023). North American Natural Gas Short-Term Outlook (October 2023). North American Gas Long-Term Outlook (August 2023).
 - d. U.S. Energy Information Administration – Short-Term Energy Outlook (October 2023). Annual Energy Outlook (March 2023).
16. For example, from 2010 to 2022, annual Brent crude prices ranged from \$112 a barrel to \$42 a barrel. For the same period, annual Henry Hub natural gas price ranged between \$6.45/mmbtu and \$2.03/mmbtu. Source: U.S. EIA Brent and Henry Hub Annual Spot Price; May 3, 2023 (nominal dollars). U.S. EIA Brent and Henry Hub Annual Spot Price; May 3, 2023 (nominal dollars).