



ADVANCING
CLIMATE
SOLUTIONS
2022 PROGRESS
REPORT





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CAUTIONARY STATEMENT AND SUPPLEMENTAL INFORMATION

This document provides disclosure on future emission-reduction plans and third-party models of potential future pathways and the implications to the Company's businesses. See Cautionary Statement on [Page 54](#) for a discussion of these forward-looking statements. See the Supplemental Information on [Page 54](#) of this publication for a discussion of important information either required by Regulation G for non-GAAP measures or that the company considers useful to investors like operating cash flow.



EXECUTIVE SUMMARY

The Advancing Climate Solutions - 2022 Progress Report, formerly the Energy & Carbon Summary, outlines ExxonMobil's commitment to driving emission reductions in support of a net-zero future.

The move to a lower-emission future requires multiple solutions that can be implemented at scale to address some of the highest-emitting sectors of the economy. This is where we are focused, leveraging our experience and long history of meeting vast, complex challenges.

INNOVATIVE SOLUTIONS MEETING SOCIETY'S NEEDS, DELIVERING VALUE

ExxonMobil leverages its core capabilities to meet society's needs for products essential for modern life, while addressing the challenge of climate change. Our strategy uses our advantages in scale, integration, technology and people to build globally competitive businesses that lead industry in earnings and cash flow growth across a broad range of scenarios. We plan to play a leading role in the energy transition, while retaining investment flexibility across a portfolio of evolving opportunities to maximize shareholder returns.

Our focus areas include: driving industry-leading safety and reliability; lowering greenhouse gas emission intensity; developing and sustaining lowest cost of supply through aggressive management of cost and capital efficiency; improving the mix and resiliency of our asset and

product portfolios with industry-advantaged technology and investments along with targeted divestments; and engineering new approaches and breakthroughs to reduce cost and accelerate large-scale deployment of lower-emission opportunities.

For more than 130 years, we've been a leader in innovation, supplying products people need to live healthy, prosperous lives in an ever-changing world. We're committed to continuing to provide these critical products, working toward the goals of the Paris Agreement, and creating value for all stakeholders.

NET-ZERO AMBITION

ExxonMobil aims to achieve net-zero emissions from its operated assets by 2050 and is taking a comprehensive approach centered on developing detailed emission-reduction roadmaps for major operated assets. This ambition applies to Scope 1 and Scope 2 greenhouse gas emissions. It builds on the Company's 2030 emission-reduction plans, which include plans to reach net-zero emissions in our Permian Basin operations by 2030, and ongoing investments in lower-emission solutions, including carbon capture and storage, hydrogen and biofuels.

ACCELERATING EMISSIONS REDUCTIONS

Our 2030 emission-reduction plans are consistent with Paris-aligned pathways, the U.S. and European Union's Global Methane Pledge, and the U.S. Methane Emissions Reduction Action Plan. Compared to 2016 levels, these plans are expected to achieve:

- 20-30% reduction in corporate-wide greenhouse gas intensity and an absolute reduction of approximately 20% (or approximately 23 million metric tons).
- 40-50% reduction in upstream greenhouse gas intensity and an absolute reduction of approximately 30% (or approximately 15 million metric tons).
- 70-80% reduction in corporate-wide methane intensity.
- 60-70% reduction in corporate-wide flaring intensity.

These plans are also expected to achieve World Bank Zero Routine Flaring by 2030.

Similarly, absolute flaring and methane emissions are expected to decrease by 60% and 70%, respectively. These emission-reduction plans cover Scope 1 and Scope 2 emissions from assets the Company operates. For non-operated assets, the Company works with its equity partners to advance greenhouse gas reductions to achieve comparable results.

INVESTING \$15 BILLION IN LOWER-EMISSION OPPORTUNITIES

Over the next six years, we plan to invest more than \$15 billion on initiatives to lower greenhouse gas emissions. A significant share is focused on scaling up carbon capture and storage, hydrogen and biofuels. Stronger policy further accelerates development and deployment of lower-emission technologies, and would provide ExxonMobil additional investment opportunities to reduce greenhouse gas emissions. The Company's robust research and development process, continued evaluation of emerging technologies, and global collaborations will be key to identifying and growing lower-emission opportunities.

ADVOCATING FOR SUPPORTIVE POLICIES

Sound government policies are needed to accelerate the deployment of key technologies at the pace and scale required to support a net-zero future. Supportive policies can provide direct investment and incentives in the same way they have accelerated growth for wind, solar and electric vehicles. We have long supported an explicit price on carbon to establish market incentives and provide the stability required for investments. In the absence of economy-wide carbon-pricing systems, well-designed, sector-based policy options to drive innovation and investment could also be an effective way to reduce emissions. We've also played a leadership role in advocating for high-impact policies to reduce methane emissions from oil and gas operations while implementing methane-reducing technologies and processes in our operations.

RESILIENT UNDER NET-ZERO PATHWAYS

This report includes an analysis of ExxonMobil's business and investment portfolio under the International Energy Agency's (IEA) Net Zero Emissions by 2050 (NZE) scenario. The scenario illustrates the dramatic societal changes and massive levels of investment required – in a very short period of time – to achieve net-zero emissions by 2050. Although governments are not implementing changes at the level and pace assumed in the IEA NZE scenario, the detailed assumptions contained in the report enable us to further test the resiliency of our businesses and strategy. The IEA's assumptions demonstrate the significant role ExxonMobil can play in the transition and the growth potential for chemicals, low-emission fuels, carbon capture and storage, and hydrogen. ExxonMobil is positioned to successfully compete in these businesses by leveraging its capabilities and repurposing assets. Throughout the modeled period, IEA NZE's assumed carbon price supports attractive investments in key growth areas that drive increases in cash flow. The Company's core capabilities, experience and advantages in scale, integration, technology, project execution and people would remain critical success factors in this assumed transition path. As the energy system evolves, ExxonMobil will continue to test the resiliency of its business strategy to ensure the Company can deliver shareholder value across a wide range of future scenarios.



INNOVATIVE SOLUTIONS MEETING SOCIETY'S NEEDS, DELIVERING VALUE

ExxonMobil leverages its core capabilities to meet society's needs for products essential for modern life, while addressing the challenge of climate change.

The Company's strategy is to use its advantages in scale, integration, technology, and people to build globally competitive businesses with industry-leading earnings and cash flow growth across a broad range of future scenarios. The Company plans to play a leading role in the energy transition, while retaining investment flexibility across a portfolio of evolving opportunities to maximize shareholder returns. The board continues to evaluate and evolve longer-term strategy beyond 2030.

Focus areas include:

- Driving industry-leading safety and reliability; lowering greenhouse gas emissions intensity.
- Developing and sustaining the lowest cost of supply through aggressive management of cost and capital efficiency.
- Improving the mix and resiliency of the Company's asset and product portfolios, with industry-advantaged technology and investments, along with targeted divestments.
- Maintaining flexibility to adjust investments and product offerings as technology, policy and markets evolve.

- Engineering new approaches and breakthroughs to reduce cost and accelerate large-scale deployment of lower-emission opportunities.
- Advocating for cost-effective, market-based policies to drive innovation and investment in emission reductions.
- Collaborating with universities, governments and the private sector to develop new lower-emission technologies.

For more than 130 years, ExxonMobil has been a leader in innovation, supplying products people need to live healthy, prosperous lives and thrive in an ever-changing world. The Company is committed to continue providing and improving these critical products while working toward the goals of the Paris Agreement, and creating greater value for all its stakeholders.



EXXONMOBIL'S NET-ZERO AMBITION

ExxonMobil aims to achieve net-zero Scope 1 and 2 greenhouse gas emissions from its operated assets by 2050 and is taking a comprehensive approach centered on developing detailed emission-reduction roadmaps for major operated assets.

The Company's roadmap approach identifies greenhouse gas emission-reduction opportunities and the investment and policy needs required to achieve net-zero. The roadmaps are tailored to account for facility configuration and maintenance schedules, and they will be updated as technologies and policies evolve.

Net-zero roadmaps for major assets, covering about 90% of the Company's greenhouse gas emissions, are scheduled to be completed by year-end 2022, and the remainder in 2023.

An example of an asset roadmap is ExxonMobil's Permian Basin operations, where the company announced groundbreaking plans to reach net-zero Scope 1 and 2 emissions by 2030. With the support of proven technology and sound policies, the Company plans to electrify operations with low-carbon power, which may include wind, solar, natural gas with carbon capture and storage, or other technologies. The Company also plans to expand and accelerate its methane mitigation and industry-leading detection technology, eliminate routine flaring, upgrade equipment, and employ emission offsets, which may include nature-based solutions. Achieving net-zero emissions in the Permian Basin will be a major contributor to the Company's efforts to support a lower-emission future, as the Permian accounts for more than 40% of ExxonMobil's net U.S. oil and natural gas production.

The Company's plans to reduce greenhouse gas emissions through 2030 compared to 2016 levels support its net-zero ambition. The plans are expected to result in a 20-30% reduction in corporate-wide greenhouse gas intensity, including reductions of 40-50% in upstream intensity, 70-80% in methane intensity and 60-70% in flaring intensity. These plans include actions that are expected to reduce absolute corporate-wide greenhouse gas emissions by approximately 20%, including an estimated 70% reduction in methane emissions, 60% reduction in flaring emissions and 30% reduction in upstream emissions. For non-operated assets, the Company works with its equity partners to advance greenhouse gas reductions to achieve comparable results.

ExxonMobil plans to achieve these additional emission reductions through actions that include:

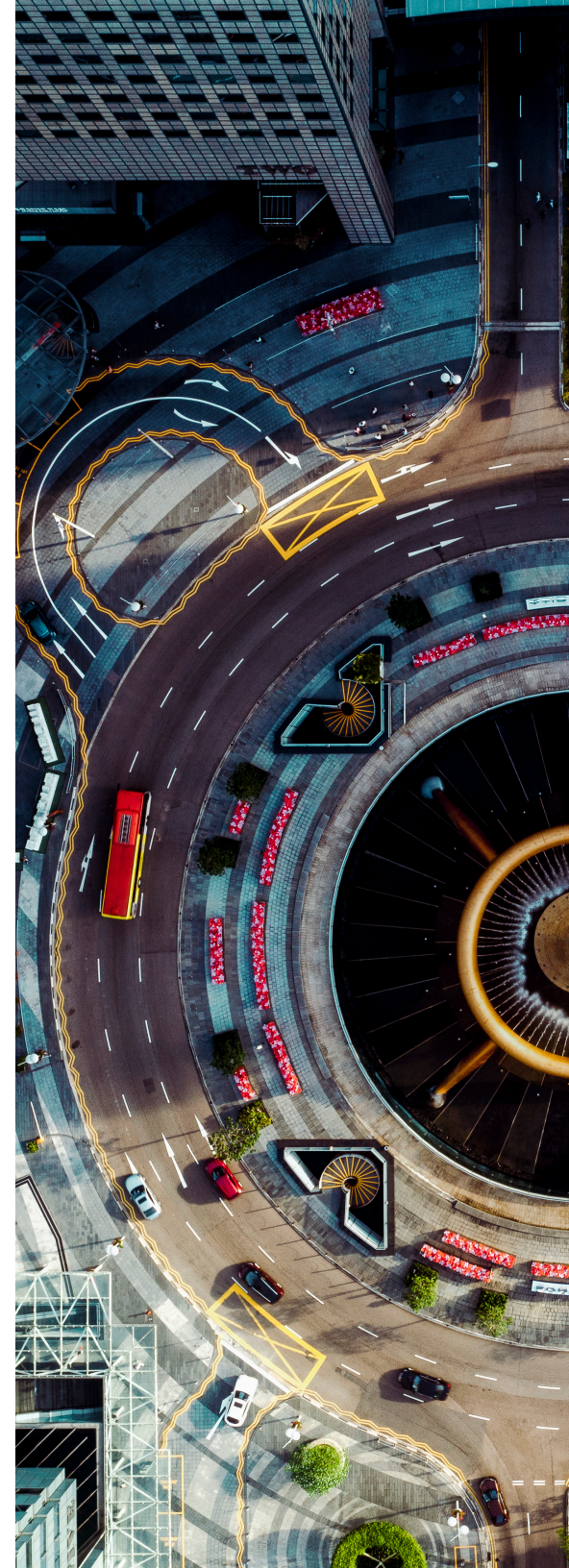
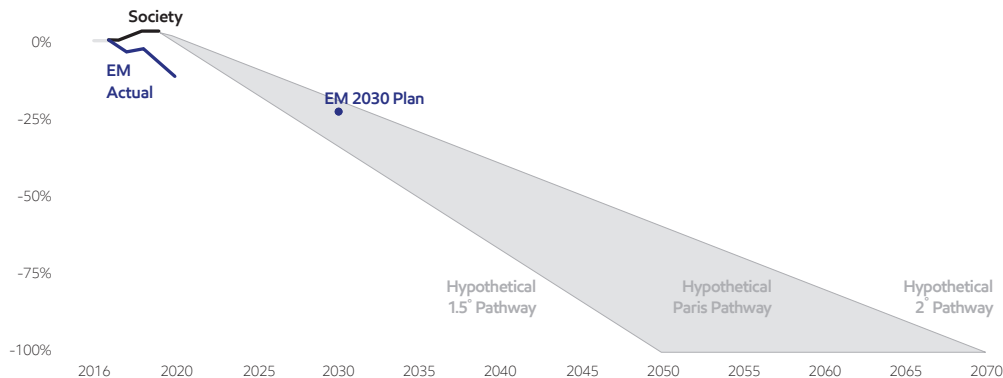
- Achieving net-zero Scope 1 and Scope 2 greenhouse gas emissions in its Permian Basin operations by 2030.
- Deploying hydrogen, carbon capture and storage, and lower-emission fuels in its operations.

- Further reducing methane emissions in alignment with the Global Methane Pledge by deploying best practices and advanced technologies, including satellite, aerial and ground-sensor networks.
- Further reducing flaring in upstream operations to meet the World Bank Zero Routine Flaring initiative.
- Integrating lower greenhouse gas energy sources into its facilities, for example through long-term renewable power purchase agreements and increasing power and steam co-generation.
- Improving energy efficiency in its businesses by adapting operational and maintenance processes, such as improving furnace efficiency.
- Deploying innovative lower-emission solutions to further reduce greenhouse gas emissions as supportive policies are enacted.

ExxonMobil also plans to use its technology expertise, particularly in carbon capture and storage, hydrogen, and biofuels, to support net-zero ambitions. Over the next six years, the Company plans to invest more than \$15 billion on lower-emission initiatives, including large-scale projects to lower greenhouse gas emissions, a significant share of which will be directed toward its Low Carbon Solutions business.

ExxonMobil emission reduction plans within pathway of Paris Agreement ^{(1), (2)}

GHG Scope 1 and 2 operated absolute emissions change vs. 2016 level



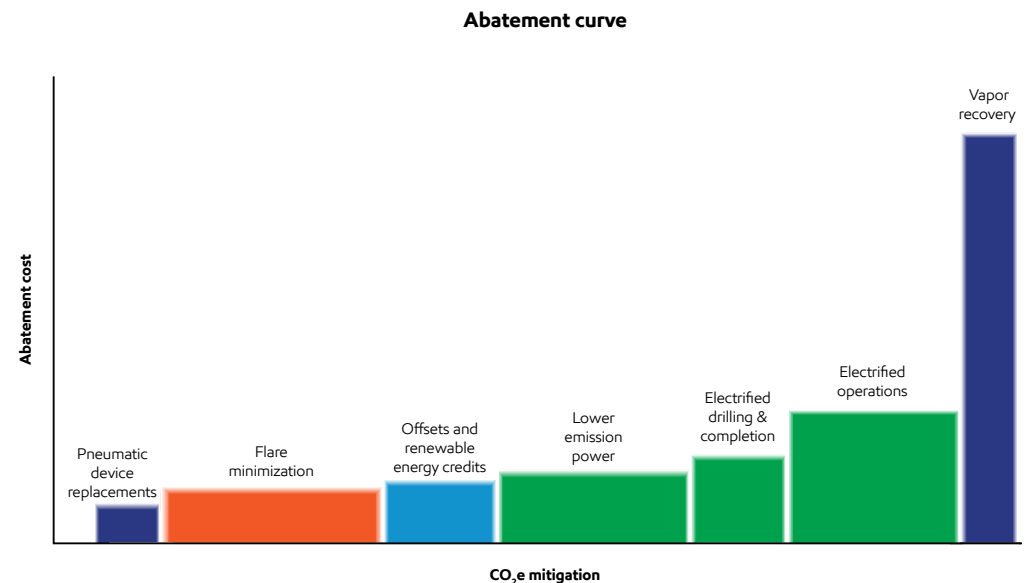
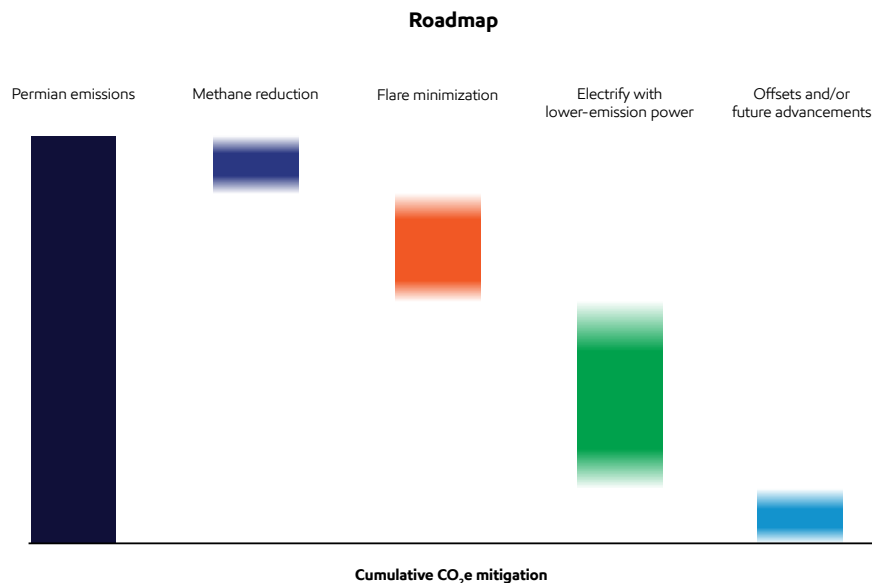
Policy support has driven rapid deployment of key technologies, such as wind, solar, and electric vehicles. Additional policy support would accelerate and broaden deployment of critical technologies like carbon capture and storage, hydrogen and lower-emission fuels. It would also provide ExxonMobil additional investment opportunities to reduce greenhouse gas emissions.

ExxonMobil has long supported an explicit price on carbon to establish market incentives and provide the needed clarity and stability for investments. In the absence of economy-wide carbon-pricing systems, well-designed, sector-based policy options to drive innovation and investment could also be an effective way to reduce emissions.

Approach to greenhouse gas emission reductions in business planning

Actions needed to advance the Company's 2030 greenhouse gas emission-reductions plans are incorporated into its medium-term business plans, which are updated annually. The reference case for planning beyond 2030 (including impairment assessments and future planned development activities) is based on the Energy Outlook, which contains the Company's demand and supply projection based on its assessment of current trends in technology, government policies, consumer preferences, geopolitics, and economic development. Reflective of the existing global policy environment, the Energy Outlook does not project the degree of required future policy and technology advancement and deployment for the world, or ExxonMobil, to meet net zero by 2050. As future policies and technology advancements emerge, they will be incorporated into the Outlook, and the Company's business plans will be updated accordingly.

Potential GHG abatement options for ExxonMobil Permian unconventional operations supporting 2030 net zero plan⁽³⁾





LIFE CYCLE ASSESSMENT AND BENEFITS OF EXXONMOBIL PRODUCTS

ExxonMobil is committed to helping society reduce overall greenhouse gas emissions by decreasing the Company's emissions and developing and deploying emission-reducing technologies and products. Increasing the supply of products with lower life-cycle greenhouse gas emissions enables the transition from higher-emission alternatives.

To evaluate ExxonMobil's impact on society's overall greenhouse gas emissions, including Scope 3 emissions, it is critical to consider society's essential needs, available alternatives and the emissions created or avoided throughout a product's life cycle in meeting those needs. This holistic approach provides a better assessment of overall emissions and improves customers, stakeholders and policy makers understanding of ExxonMobil's efforts to thoughtfully reduce global emissions while meeting society's essential needs.

ExxonMobil used this approach⁽⁴⁾ to analyze the change in overall emissions associated with the Company's business plans. On this basis, ExxonMobil's full life-cycle absolute greenhouse gas emissions for its oil, natural gas, fuels (including biofuels), chemicals, and lubricants portfolio could decrease by about 12% in 2030 relative to 2016 levels. Similarly, ExxonMobil's portfolio life-cycle emissions intensity (g CO₂e/MJ) could decrease by about 4% in 2030 relative to 2016. The decrease in absolute emissions and emissions intensity is a result of continued improvement in greenhouse gas performance of existing operations, optimization of the asset portfolio and product mix, with a growth in LNG, chemical products, lubricants, and lower-emissions fuels that help customers reduce their emissions.

For products that lack practical short-term alternatives, constraining ExxonMobil's production to reduce the Company's Scope 3 emissions simply transfers that production and associated emissions to another supplier. This would increase overall emissions if production shifts to a less-efficient, higher-emission operator. For more than two decades, ExxonMobil refineries have focused on energy efficiency and lower emissions. As a result, today the emissions intensity (Scope 1 and 2) of ExxonMobil refineries is more than 15% lower on Carbon Emissions Intensity (the equivalent of about 5 million metric tons per year CO₂e based on ExxonMobil refining throughput in 2020) than the global industry average⁽⁵⁾.

ExxonMobil has publicly reported the Company's Scope 1 and Scope 2 greenhouse gas emissions data for many years and more recently began providing Scope 3 estimates (See data table on Page 48).

Reporting Scope 1 emissions data (direct greenhouse gas emissions from Company operations) can provide useful insight into the efficiency and emission-reduction performance of the Company's operations, portfolio of products, and resource types.

Reporting Scope 2 emissions data (indirect greenhouse gas emissions from energy purchased by the Company) highlights the Company's choice of electricity purchased to power its operations.

Scope 3 emissions primarily refer to the indirect emissions resulting from society's need for and use of the Company's products.

To illustrate this concept, the Company modeled⁽⁶⁾ the greenhouse gas benefit of substituting unabated LNG for unabated coal for generating power in a market such as India. The analysis concluded that more than 100 million metric tons of greenhouse gas emissions per year could be avoided if all of ExxonMobil's projected 2030 LNG production displaced coal in power generation. Similar benefits can also be expected in other industry sectors utilizing coal.

In the U.S., fuel switching from coal to natural gas led to a 14% reduction in greenhouse gas emissions from 1995 to 2020⁽⁷⁾. More recently in Europe, shortfalls in lower-carbon sources of energy, including natural gas, resulted in increased coal use and higher emissions.

Another example of ExxonMobil's products reducing emissions versus alternatives is in the transportation sector. The Company's projected 2030⁽⁸⁾ renewable fuel production could avoid more than 25 million metric tons per year of greenhouse gas emissions by displacing a corresponding amount of conventional fuel refined from crude oil.

In the chemical sector, a study⁽⁹⁾ concluded that plastic packaging in the United States helped society avoid life-cycle greenhouse gas emissions versus turning to alternatives as a group. In terms of 2030 ExxonMobil volumes into U.S. plastic packaging, that calculation⁽¹⁰⁾ would equate to approximately 13 million metric tons per year of U.S. enabled avoided emissions. If applied globally, our plastics could enable approximately 40 million metric tons per year of avoided emissions⁽¹¹⁾.

In addition to packaging applications, the use of plastics is growing in a variety of other applications that improve modern life such as cell phones, electric vehicles, wind turbine blades, medical devices, food preservation, agriculture, and shipping and distribution. Lightweight plastic also reduces the weight of vehicles, which is especially important in electric vehicles to improve battery performance and range. In internal combustion engine vehicles, every 10% reduction in vehicle weight improves fuel economy by 6-8%, which reduces greenhouse gas emissions accordingly.⁽¹²⁾

POSITIONING FOR A LOWER-EMISSION FUTURE

OIL AND NATURAL GAS

ExxonMobil is well positioned to meet the expected demand for oil and natural gas through the next decade, delivering value while seeking to minimize environmental impact across its operations.

As highlighted in the Net-Zero Ambition section of this report, the company is developing proprietary roadmaps to evaluate and pursue emission-reduction opportunities at its operated assets ranging from small-scale operational changes to large-scale capital investments. To date, ExxonMobil has identified more than 100 potential modifications across all upstream asset types including energy efficiency measures, equipment upgrades and the elimination of venting and routine flaring. Examples of further high-impact reduction opportunities include use of power and steam co-generation, electrification, carbon capture and storage projects, and blue hydrogen.

UNCONVENTIONAL

ExxonMobil has set a net-zero Scope 1 and 2 greenhouse gas emission goal by 2030 for its Permian Basin operated assets.

The actions to achieve this objective include:

- Enhancing operations protocols, including implementation of a comprehensive methane-monitoring and leak-detection program.
- Minimizing flaring, including eliminating routine flaring by year-end 2022 in line with the World Bank Zero Routine Flaring Initiative, and

seeking additional outlets for non-routine flared gas.

- Electrification of operations.
- Sourcing electricity from renewables and other lower-carbon sources.
- Potentially using high-quality emissions offsets to address residual emissions.

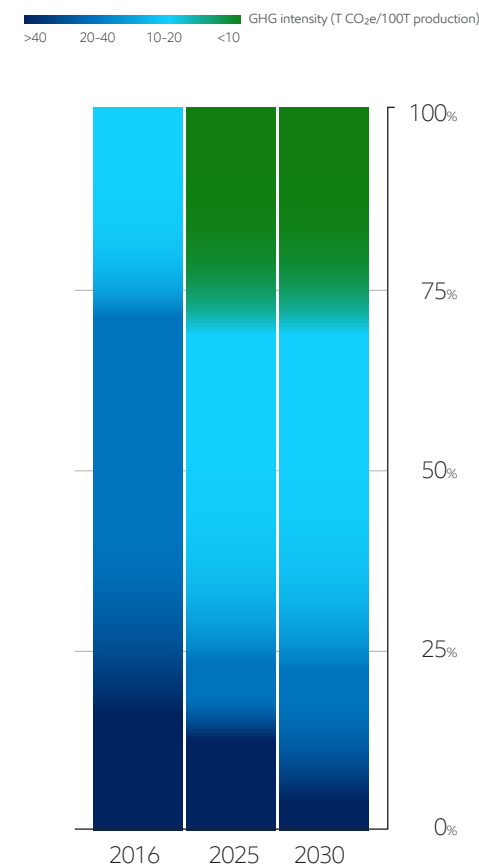
LNG

ExxonMobil is progressing development of approximately 12 million metric tons per year of low-cost, high-efficiency LNG liquefaction capacity to meet expected global demand growth. This includes diverse projects in the U.S., Papua New Guinea, Mozambique, and Russia that, when benchmarked against the industry, are targeted to have first-quartile greenhouse gas intensity.

DEEPWATER

ExxonMobil's deepwater oil and gas developments are being designed to perform in the first quartile for greenhouse gas intensity. Offshore Guyana, the Liza Unity floating production storage and offloading (FPSO) vessel was awarded the SUSTAIN-1 notation by the American Bureau of Shipping. It is the first FPSO in the world to achieve this recognition for sustainability of its design and operational procedures.

Upstream gross operated volumes by GHG intensity



FUELS, LUBRICANTS AND CHEMICALS

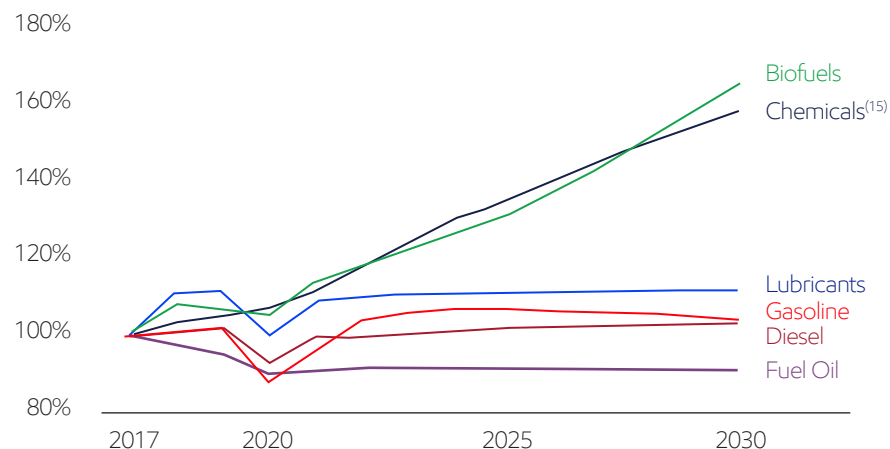
ExxonMobil is growing production of high-value products and aggressively pursuing reduction of greenhouse gas emissions in its Fuels, Lubricants and Chemical businesses by leveraging competitive advantages in technology, scale and integration.

Demand for chemicals, lower-emission fuels, and lubricants remains strong, supporting customer mobility, efficiency and greenhouse gas emission-reduction goals. Global chemical demand is expected to grow faster than the economy as a whole,⁽¹³⁾ driven by demand for products that support modern life as a growing, global population enters the middle class. Demand for lower-emission fuels is expected to grow rapidly, driven by the need for energy-dense, lower-carbon fuels for hard-to-decarbonize transportation such as aviation, marine and heavy-duty trucking. Lubricants demand is expected to be resilient and grow in the industrial, aviation and marine sectors. Demand for conventional fuels is expected to peak this decade and then decline at an uncertain pace.

More than 75% of the Company's manufacturing capacity is co-located in large, integrated sites that have the flexibility to optimize and shift product output to meet society's evolving needs. For example, as demand for conventional road transport fuels declines, assets can be repurposed to manufacture chemicals, lower-emissions fuels and lubricants, or converted to terminals. The Company continues to improve the portfolio and focus investments on large, integrated assets. Key investments in North America, China, and Singapore will help meet the growing demand for these lower life-cycle emission products.

Global market demand growth⁽¹⁴⁾

Indexed versus 2017, %



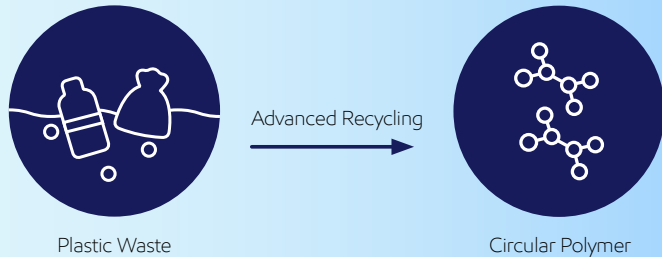
Key plan activities to grow high-value products



* Includes Gulf Coast Growth Venture, Baton Rouge Polypropylene, Baytown Chemicals Expansion, Beaumont Light Crude, and USGC Fuels Reconfiguration

The Company is progressing comprehensive lower-emission technology roadmaps to reduce greenhouse gas emissions, which would more than offset emissions from new facilities needed to meet growing demand. The Company's emission-reduction plans include: fuel switching to hydrogen and carbon capture and storage projects in Houston, Rotterdam, Fife, and Antwerp; renewable power purchase agreements; energy efficiency projects; and conversions of refineries to terminals.

ExxonMobil's customers want products with lower life-cycle greenhouse gas emissions, which requires lowering the carbon intensity of the feedstock and the manufacturing process. Bio-based feed for lower-emission fuels provides further opportunity for lower greenhouse gas emissions, as do plastic waste streams. ExxonMobil is rapidly growing capacity to use bio-feeds to manufacture lower-emission fuels and progressing one of North America's largest plastic waste advanced recycling facilities with initial planned capacity to annually recycle 30,000 metric tons of plastic waste. Capacity can be added as feedstock supplies increase through enhanced waste collection.



ExxonMobil is a leader in advanced recycling of plastic waste for certified circular polymers. Co-processing plastic waste via the Company's advanced recycling approach results in lower greenhouse gas emissions, according to ExxonMobil estimates prepared on an ISO 14067 feedstock basis, with a cradle-to-process unit outlet boundary. For every 1,000 metric tons of waste plastic processed, greenhouse gas emissions are expected to be at least 120 metric tons lower than if the same amount of conventional feedstock had been used.⁽¹⁶⁾

Products to help customers reduce their emissions

ExxonMobil applies its competitive advantages of scale and integration, along with proprietary technology to provide customers with a differentiated product offering, measurable greenhouse gas emission benefits, and improved energy efficiency. The Company provides innovative technical solutions for a wide range of applications, including packaging, transportation and industrial applications.



Sustainable solutions to improve modern life

- Plastic packaging has 54% lower life-cycle GHG emissions versus alternatives⁽¹⁷⁾
- Exceed™ XP enables up to 30% thinner plastic packaging versus conventional plastics⁽¹⁸⁾
- Certified circular polymers⁽¹⁹⁾ with equivalent performance of virgin plastics



Total vehicle product solutions to improve transportation efficiency

- Plastics enable lighter vehicles and 6–8% fuel efficiency improvement for every 10% reduction in vehicle weight⁽¹²⁾
- Butyl rubber improves air retention in tires, which can increase electric vehicle range by up to 7%⁽²⁰⁾
- Mobil 1 ESP X2 0W-20 engine oil helps provide up to 4% fuel economy improvement⁽²¹⁾
- Renewable diesel can reduce carbon emissions by up to 70% compared to conventional diesel⁽²²⁾
- Marine bio fuel, BMF.5™, can reduce carbon emissions by up to 30% compared to conventional marine fuel⁽²³⁾



Reliable solutions for industrial efficiency

- Mobil DTE 10 Excel Series provides up to 6% improvement in hydraulic pump efficiency⁽²⁴⁾
- Mobil SHC™ 600 Series provides up to 3.6% energy efficiency gain⁽²⁵⁾
- Mobil SHC™ Gear WT helps reduce oil consumption and maintenance costs through extended oil life and drain intervals⁽²⁶⁾



UP CLOSE: METHANE SPOTLIGHT

OPERATIONS

ExxonMobil has implemented a program across its U.S. unconventional production to reduce methane emissions from Company-operated facilities by:

- Enhancing leak detection and repair surveys.
- Ending use of high-bleed pneumatic devices.
- Monitoring low-pressure gas well liquid unloadings to reduce releases.
- Improving facility designs.
- Enhancing leak inspections and training programs for operations personnel.

The Company continues to deploy new research and technology developments, such as emerging aerial leak detection and expanded use of continuous methane detection technologies. In March 2021, the Company submitted the industry's first application to the U.S. EPA to use aerial leak-detection technology in lieu of handheld cameras to improve effectiveness and cost of monitoring and mitigation.

Since initiating its methane reduction program, ExxonMobil has conducted more than 23,000 leak surveys on more than 5.2 million components at more than 9,500 production sites. High-bleed pneumatic devices were eliminated across U.S. unconventional production as of year-end 2020. These actions reduced operated U.S. unconventional methane emissions by approximately 40% as of year-end 2020, compared to 2016, which equates to about 1.7 million metric tons of CO₂ equivalent.

The Company signed an agreement with non-profit independent validator MiQ to begin a methane certification process for natural gas produced at its Poker Lake facilities in the Permian Basin. Certified lower-emission natural gas validates reduction efforts and helps customers meet their environmental goals. Approximately 200 million cubic feet of natural gas per day from Poker Lake will be assessed and certified. ExxonMobil is considering expanding certification to other Permian Basin fields and unconventional assets, including Appalachia and Haynesville.

Actions to reduce emissions

~40%

METHANE REDUCTION ACROSS THE
COMPANY'S OPERATED U.S.
UNCONVENTIONAL PRODUCTION AS OF 2020

~100%

HIGH-BLEED PNEUMATIC DEVICES PHASED
OUT ACROSS THE COMPANY'S U.S.
UNCONVENTIONAL PRODUCTION AS OF 2020

ADVOCACY

ExxonMobil supports the U.S. and European Union's Global Methane Pledge and the proposed U.S. Methane Emissions Reduction Action Plan. These actions follow ExxonMobil's ongoing advocacy efforts that include submitting a letter to the U.S. Environmental Protection Agency rulemaking docket indicating support for reasonable, cost-effective regulation of methane from new and existing sources, and the Company's participation on a national U.S. EPA Methane Technology panel in August 2021.

In March 2020, the Company published a model framework for industry-wide methane regulations and urged stakeholders, policy makers and governments to develop comprehensive, enhanced rules to reduce methane emissions in all phases of production and across the natural gas value chain. In addition, ExxonMobil is a founding and active member in the Methane Guiding Principles⁽²⁷⁾ – an international multi-stakeholder initiative now comprising more than 20 companies and 15 supporting organizations that work together to address methane emissions. Under the Methane Guiding Principles, ExxonMobil is a primary sponsor of the International Energy Agency's Methane Tracker,⁽²⁸⁾ a web-based portal that provides information on global methane emissions, mitigation measures, and potential regulatory approaches.

The Company also participates in the EU methane policy work to support legislation that achieves methane emission reductions, including submitting recommendations on monitoring, reporting and verifying oil and gas methane emissions, leak detection and repair, upstream venting and flaring, and reducing methane emissions in the agricultural and waste sectors.

ExxonMobil supports strong measurement, reporting and verification standards as part of a broad suite of regulations to help reduce methane emissions. In addition to its participation in the Methane Guiding Principles, the Company is actively engaged in the Oil and Gas Climate Initiative (OGCI), the Collaboratory for Advancing Methane Science, and the Environmental Partnership. ExxonMobil also participates in the recently formed International Association of Oil & Gas Producers/IPIECA/OGCI Task Force for Recommended Practices for Methane Emission Detection & Quantification Technologies.



RESEARCH AND TECHNOLOGY

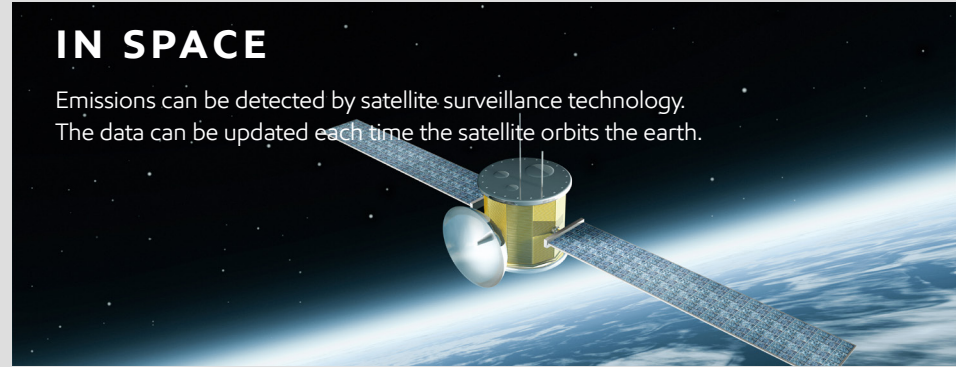
ExxonMobil participates in Project Astra, a collaboration of universities, environmental groups and industry partners developing an innovative sensor network to continuously monitor methane emissions across large areas of Texas for quick and efficient leak detection and repair. This high-frequency monitoring system will enable operators to more easily direct resources to specific locations and could provide a more affordable, efficient solution to reduce methane emissions. In 2021, the initiative completed its first phase of sensor evaluation and initiated a small-scale pilot in the Permian Basin.

The Company also works to advance the scientific understanding of satellite-based methane detection, and has partnered with Scepter Air to develop technology to greatly improve global methane detection and quantification. Through other collaborations with Stanford University and the Collaboratory for Advancing Methane Science, ExxonMobil is progressing field and desktop studies to better understand capabilities of current deployed satellite technology.

Through OGCI, the Company is working with GHGSat to finance monitoring of industry methane plumes in Iraq, one of the world's largest methane emitters. If successful, this initiative could be extended to other methane hotspots.

IN SPACE

Emissions can be detected by satellite surveillance technology. The data can be updated each time the satellite orbits the earth.



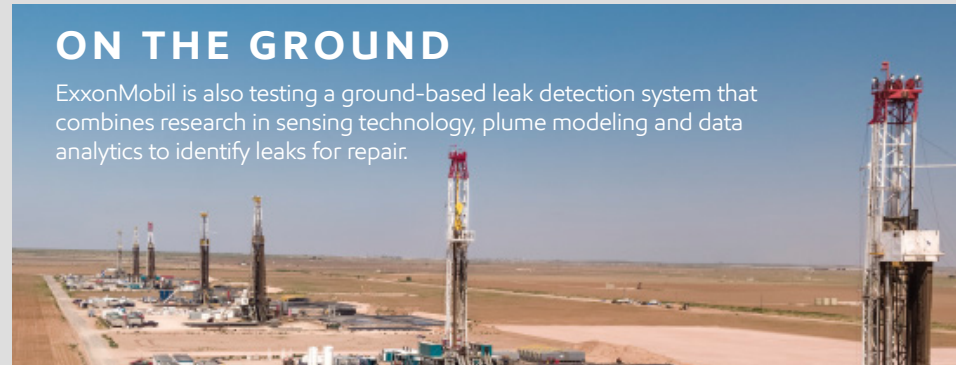
IN THE AIR

Using helicopters and airplanes, ExxonMobil is trialing four different airborne technologies fitted with methane sensors to detect and quantify emissions.



ON THE GROUND

ExxonMobil is also testing a ground-based leak detection system that combines research in sensing technology, plume modeling and data analytics to identify leaks for repair.





LAUNCHING THE LOW CARBON SOLUTIONS BUSINESS

ExxonMobil established its Low Carbon Solutions business in early 2021, leveraging its unique combination of capabilities such as geophysics expertise and complex project management, to establish a new business in carbon capture and storage, hydrogen and biofuels to accelerate emission reductions for customers and in its existing businesses.

CARBON CAPTURE AND STORAGE

Carbon capture and storage is the process of capturing CO₂ emissions from industrial activity or power plants at the source and injecting it into deep underground geologic formations for safe, secure and permanent storage.

Carbon capture and storage on its own, or in combination with hydrogen production, is among the few proven technologies that could enable reduced CO₂ emissions from high-emitting and hard-to-decarbonize sectors, such as power generation and heavy industries, including manufacturing, refining and petrochemicals. According to the Center for Climate and Energy Solutions, carbon capture and storage can capture more than 90% of emissions from power plants and industrial facilities.⁽²⁹⁾

The International Energy Agency's NZE report concluded that more than 7.6 billion metric tons per year of CO₂ will need to be captured and stored by 2050. By comparison, the world's current capture capacity is about 40 million metric tons of CO₂ per year⁽³⁰⁾. The agency has also said "reaching net zero [emissions] will be virtually impossible" without carbon capture and storage⁽³¹⁾.

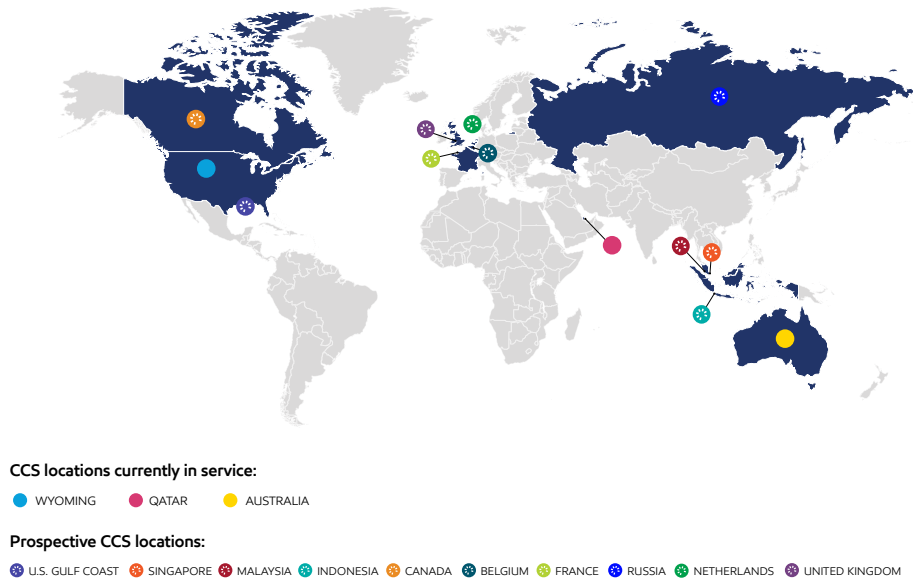
The U.N.'s Intergovernmental Panel on Climate Change estimated in its Fifth Assessment Report that the cost of achieving a 2°C outcome would more than double if carbon capture and storage was not among the decarbonization solutions.⁽³²⁾ Carbon capture and storage is also recognized as one of the only technologies that can enable negative CO₂ emissions when combined with bio-energy or direct air capture.

ExxonMobil has more than 30 years of experience capturing and permanently storing CO₂, and has cumulatively captured more anthropogenic CO₂ than any other company. It has an equity share of about one-fifth of the world's carbon capture and storage capacity⁽³³⁾ at about 9 million metric tons per year, which is the equivalent of approximately 2 million passenger vehicles per year⁽³⁴⁾.

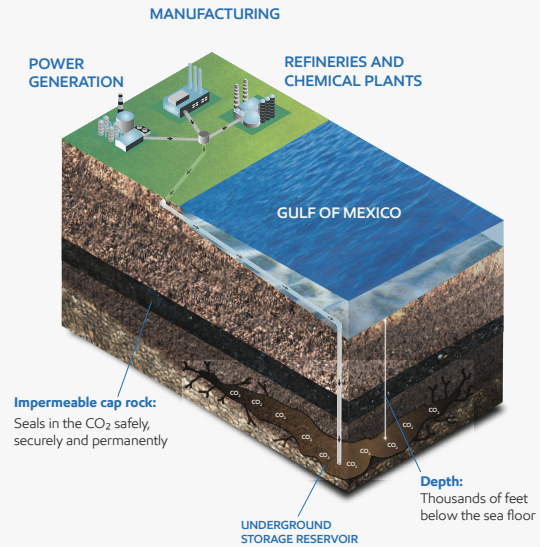
ExxonMobil has announced progress on 10 carbon capture and storage opportunities since establishing its Low Carbon Solutions business. The new initiatives are in Houston; LaBarge, Wyoming; Edmonton, Canada; St. Fergus, U.K.; Southampton, U.K.; Fife, U.K.; Normandy, France; Malaysia; Indonesia; and Russia. These are in addition to previously announced projects in Qatar; Antwerp, Belgium; Rotterdam, Netherlands; and Australia.

ExxonMobil is working with FuelCell Energy to substantially improve the efficiency, effectiveness and affordability of carbon capture through fundamental research into a novel technology that uses proprietary carbonate fuel cells to concentrate carbon dioxide from large-scale industrial and power plants.

The Company is exploring options to conduct a pilot test of next-generation fuel cell carbon capture solution at one of its operating sites.



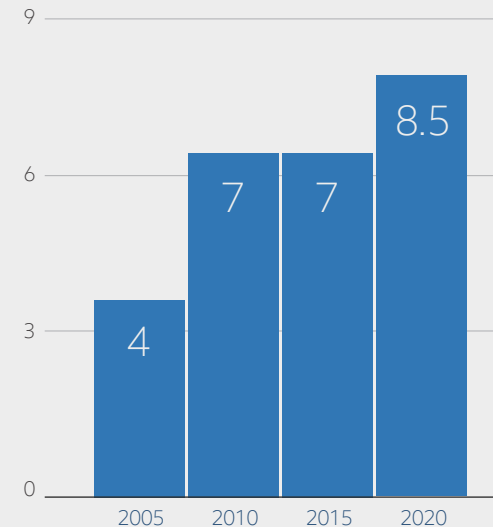
Houston CCS Innovation Zone



ExxonMobil is one of 11 companies that are discussing a CCS Innovation Zone along the Houston Ship Channel with the potential to capture CO₂ emissions from the petrochemical, manufacturing and power generation facilities located there. The CO₂ would be piped into natural geologic formations thousands of feet under the sea floor in the Gulf of Mexico for safe, secure and permanent storage.

ExxonMobil carbon capture capacity

(Equity, million metric tons CO₂e per year)



HYDROGEN

ExxonMobil is evaluating strategic investments in hydrogen to increase the use of this important lower-emissions energy technology. The Company has extensive experience with hydrogen, and produces about 1.3 million metric tons annually.

Hydrogen is a zero-carbon energy carrier that could serve as an affordable and reliable source of energy for heavy-duty trucking and energy-intensive industrial processes in the steel, refining and chemical sectors⁽³⁵⁾. Low-carbon hydrogen can be produced from low-carbon electricity via electrolysis of water, natural gas reforming coupled with carbon capture and storage, and other processes. Low-carbon hydrogen from natural gas with carbon capture and storage is called blue hydrogen, and is available for deployment at scale today.

The Company is participating in cross-industry groups to identify the technologies and policies required to deploy low-carbon hydrogen at scale. For example, existing natural gas transmission infrastructure has the potential to be used for hydrogen with moderate upgrade costs.⁽³⁶⁾ New natural gas transportation infrastructure could also be made hydrogen-ready. To rapidly develop a hydrogen economy, additional technology-neutral policy is required. Natural gas-derived hydrogen could provide an economic and readily available option in many settings.

ADVANCING HYDROGEN THROUGH PARTNERSHIPS

ExxonMobil has joined the U.S. HyBlend consortium, a collaborative research and development project designed to address the technical barriers of blending hydrogen into natural gas pipeline streams. It also signed a memorandum of

understanding with SGN and Macquarie's Green Investment Group to explore the use of hydrogen and carbon capture to reduce emissions in England's Southampton industrial cluster. In addition, the Company is studying large-scale production of hydrogen for the Rotterdam industrial complex and has provided funding to Hydrogen4EU, a cross-sectoral research project confirming that hydrogen is essential to help meet the EU Green Deal's 2050 net-zero targets.

LOWER-EMISSION FUELS

Lower-emission fuels, like renewable diesel, have the high energy density required to meet the needs of commercial transportation, while significantly reducing CO₂ emissions. ExxonMobil is focused on growing its lower-emission fuels business by leveraging current technology and infrastructure, in addition to continuing research in advanced biofuels that could provide improved longer-term solutions through upgrading lower-value bio-based feedstock.

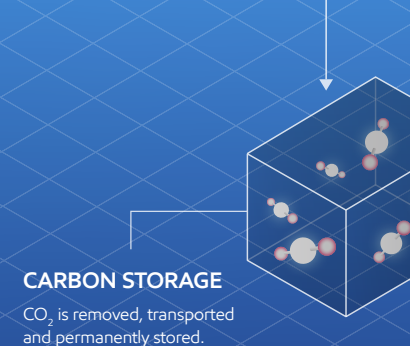
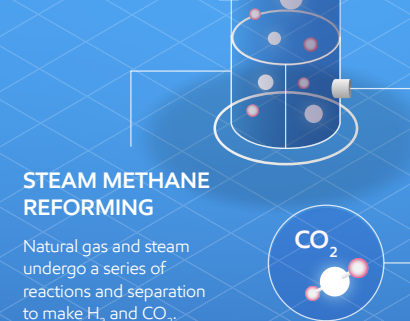
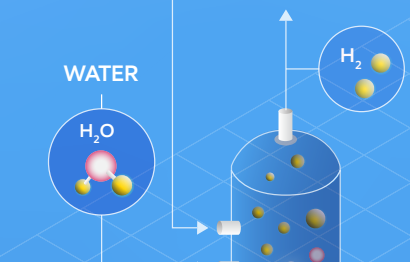
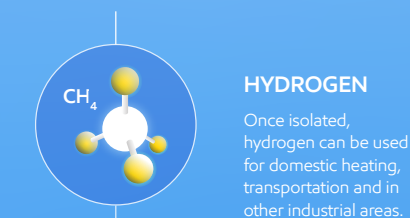
ExxonMobil plans to provide more than 40,000 barrels per day of lower-emissions fuels by 2025, and has a further goal of 200,000 barrels per day by 2030. Achieving this goal will help society reduce more than 25 million metric tons of CO₂ emissions from the transportation sector⁽⁸⁾.

Markets with lower-carbon fuel policies such as Canada, California and some countries in Europe support accretive investment in a wide range of technologies and bio-feed sources. These policies support the accelerated deployment of lower-emission fuels and incentivize renewable diesel hydrotreating, bio-feed co-processing in existing facilities, and carbon capture and storage.

Low-carbon hydrogen

NATURAL GAS

Natural gas is comprised largely of methane (CH₄) and can be turned into hydrogen through a reforming process.



ADVANCING LOWER-EMISSION FUELS THROUGH PARTNERSHIPS

ExxonMobil is partnering with Global Clean Energy⁽³⁷⁾, which is converting a refinery in Bakersfield, California, to annually produce more than 4 million barrels of drop-in renewable diesel – meaning it can be substituted for traditional fuels without additional infrastructure or costly engine modifications. The refinery will begin production in 2022, initially utilizing soybean oil as a feedstock then gradually switching over to camelina oil, which would improve renewable diesel carbon intensity by 50%.

In Canada, ExxonMobil’s affiliate, Imperial Oil, will produce more than 7 million barrels of drop-in renewable diesel annually from the Strathcona refinery in Edmonton, Alberta, starting in 2024⁽³⁸⁾. The refinery will use canola oil as feedstock and blue hydrogen in the hydrotreating process, reducing transportation-related emissions by about 3 million metric tons of CO₂ equivalent annually.

A joint venture in Norway will provide nearly 1 million barrels of renewable diesel annually by 2024 from woody biomass that meets Europe’s 9A, U.K. and U.S.

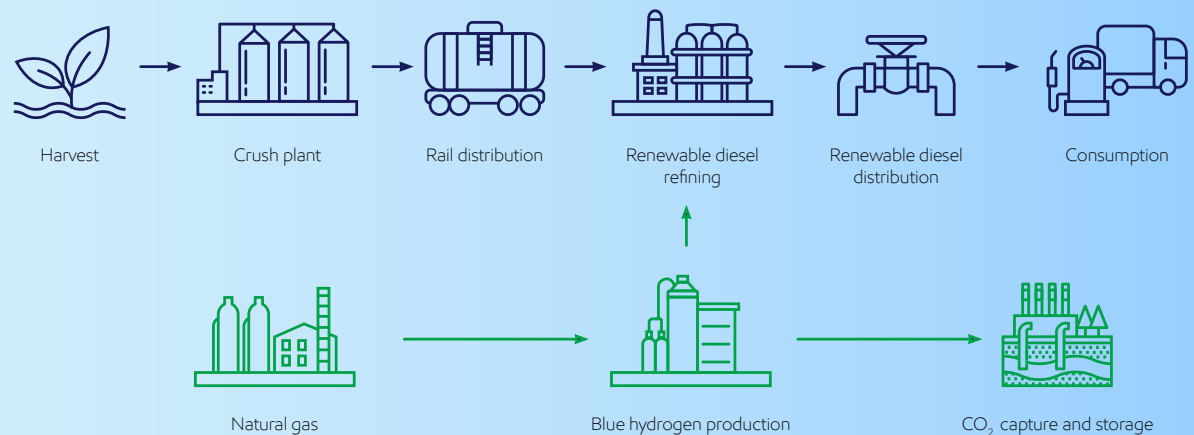
advanced cellulosic designations. The venture is also evaluating production of renewable jet fuel through low-cost modifications.

ExxonMobil completed successful co-processing trials in Europe and Canada, where policy supports bio-feed co-processing. The ability to co-process bio-feed through an existing fluid catalytic cracker or hydrotreater will enable large quantities of lower-emission fuels for customers. With enough bio-feed and effective low-carbon fuel policies, ExxonMobil has sufficient capacity to co-process 100,000 barrels per day of lower-emission fuels.

Longer term, ExxonMobil is advancing other forms of lower-emission fuels including advanced biofuels. These technologies include the Company’s research with Viridos, formerly known as Synthetic Genomics, to transform algae into liquid biofuels for the transportation sector. Together, we have improved strains of algae that use CO₂ and sunlight to produce energy-rich bio-oil, which can potentially be processed at existing refineries into renewable fuels. A key focus of ongoing research is further building on the breakthroughs already made in developing novel genetic tools to overcome inherent inefficiencies in photosynthesis and to improve bio-oil production and to plan for demonstration and deployment of the technology.

Strathcona renewable diesel unit

The renewable diesel production unit at Imperial Oil’s refinery in Alberta is expected to begin operations in 2024, with capacity of more than 7 million barrels per year. The unit will use crop-based feedstock and get power from blue hydrogen with carbon capture and storage. Estimates show it will reduce Canadian transportation emissions by about 3 million tons CO₂e per year.



EXXONMOBIL'S UNIQUE AND SUSTAINED APPROACH TO R&D

ExxonMobil recognizes the need for next-generation, lower-emissions solutions supported by sustained investment in research and development.

ExxonMobil employs 20,000 scientists and engineers, including more than 1,500 Ph.D.s. Their abilities drive the Company's research in areas such as developing new generations of catalytic and separation materials, novel low-energy processes, and improved means of CO₂ storage. The Company's scientists have written more than 1,000 peer-reviewed publications and received more than 10,000 patents over the past decade.

In addition, ExxonMobil collaborates around the world with more than 80 universities, five energy centers, and U.S. national laboratories. These collaborations have increased knowledge important to the energy transition, including fugitive methane emissions detection, modeling and optimization techniques to understand CO₂ storage, electrification of processes, biofuels, and energy systems models. ExxonMobil actively monitors a broad range of emerging lower-emission technology for future research opportunities and to improve understanding of likely transition pathways.

CORE R&D CAPABILITIES

BIOLOGY DATA SCIENCE CLIMATE SCIENCE
PRODUCT TECHNOLOGY GEOSCIENCE
EMERGING TECHNOLOGY MATERIAL SCIENCE
ENERGY MODELING PROCESS TECHNOLOGY
ENGINEERING CHEMISTRY PHYSICS MATHEMATICS

ENERGY CENTER COLLABORATIONS



NATIONAL LABS



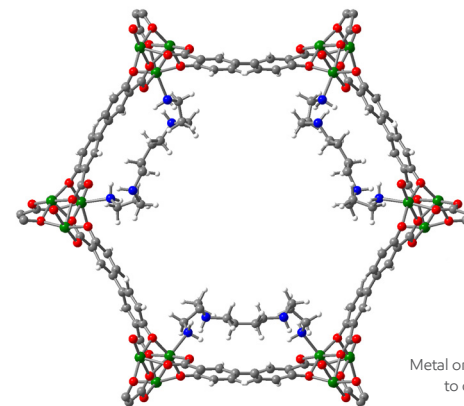
NEXT-GENERATION TECHNOLOGY

Existing and emerging technologies are often challenged by scale and cost limitations, making it necessary to discover new materials and process innovations that reduce greenhouse gas emissions on a life-cycle basis.

ExxonMobil scientists together with the University of California, Berkeley, published joint research in the peer-reviewed journal *Science* on the discovery of a new metal organic framework (MOF) material that captures and later releases CO₂ like an on/off switch for storage or utilization. It has the potential to capture more than 90% of CO₂ and could prove up to six times more effective than conventional approaches. The MOF is highly selective to CO₂ over nitrogen and oxygen and is also stable in steam, opening up many potential new process options⁽³⁹⁾.

The Company has also worked with researchers from the Georgia Institute of Technology and Imperial College London on membrane technologies. Research results published in *Science* demonstrate the potential for non-thermal fractionation of light crude oil through a combination of class- and size-based “sorting” of molecules⁽⁴⁰⁾. Reducing the amount of energy needed to refine fuels could dramatically reduce emissions from the refining process. Initial prototypes have shown these membranes to be twice as effective in separating gasoline and jet fuel molecules as the most selective commercial membranes in use today.

In another R&D collaboration, ExxonMobil is working with Global Thermostat to develop the potential of large-scale deployment of direct air capture. The companies also continue to develop novel processes and materials that increase the rate of CO₂ capture and reduce the amount of energy required in the process. While more research and development is needed, direct air capture is increasingly recognized to have a significant role to play in global decarbonization efforts.



Metal organic frameworks could offer higher selectivity to capture CO₂ versus conventional approaches⁽³⁹⁾



ADVOCATING FOR SOUND POLICIES

Recognizing that sound government policies are required and can act as an accelerator for lower-emission alternatives, ExxonMobil actively participates in climate-related policy discussions around the world.

The Company focuses on practical policy solutions that recognize the increasing global demand for affordable and reliable energy while enabling scalable development and deployment of lower- and zero-greenhouse gas emission technologies.

Durable and predictable market-driven policies can further incentivize developments, and scale investments in lower-emission technologies to help achieve the Paris Agreement goals at the lowest cost to society.

A good example is a coordinated and transparent economy-wide price on carbon such as a carbon tax. An established carbon price would enable all technologies to compete and cost-effectively lower carbon intensity while delivering meaningful emission reductions. Broad adoption of an economy-wide price on carbon could also help spur the development of global carbon markets as envisioned in Article 6 of the Paris Agreement.

In the absence of economy-wide carbon pricing, well-designed sector-based policy options could also be an effective way to reduce emissions. ExxonMobil supports the approaches outlined below, which help address emissions in manufacturing, transportation and power generation.

Understanding life-cycle emissions to better inform policy decisions

ExxonMobil has been working with the MIT Energy Initiative to develop a new life-cycle analysis tool that covers pathways of multiple technologies representing most sources of greenhouse gas emissions. This tool, called the Sustainable Energy System Analysis Modeling Environment (SESAME⁽⁴¹⁾) is based on well-referenced, peer-reviewed public sources and will evolve to perform full life-cycle analyses for more than 1,000 technology pathways, from primary energy sources to final products or services including those from the power, transportation, industrial and residential sectors. To date, a series of SESAME-related publications in peer-reviewed journals have been released exploring areas such as the U.S. electric power systems^(42,43,44).

MANUFACTURING

For the manufacturing sector, ExxonMobil's focus is on carbon capture and storage and hydrogen. The International Energy Agency [<https://www.iea.org/reports/ccus-in-clean-energy-transitions>] and the U.N. Intergovernmental Panel on Climate Change have identified both hydrogen and carbon capture and storage as vital to reducing emissions associated with manufacturing and heavy industry.

The carbon capture and storage opportunities that ExxonMobil is evaluating have the potential to move forward with current technologies. However, to drive investment and deploy the technology at the pace and scale needed to meet the Paris Agreement goals, governments must establish durable regulatory and legal frameworks as well as incentives, similar to those available for other more established low-emission technologies. Low-carbon policies should be clear, cost-effective, technology-neutral and aligned with free-market principles.

ExxonMobil supports a policy and regulatory framework for carbon capture and storage that would:

- Sustain long-term government support for research and development.
- Provide standards to ensure safe, secure and permanent CO₂ storage.
- Allow for fit-for-purpose CO₂ injection well design standards.
- Provide legal certainty for pore space ownership.
- Ensure a streamlined permitting process for carbon capture and storage facilities.
- Provide access to CO₂ storage capacity owned or controlled by governments.
- Allow for trading of high-quality offsets generated from carbon capture and storage and low-carbon projects.

ExxonMobil is actively engaging stakeholders and potential partners on these policy enablers that can unlock Low Carbon Solutions business opportunities and contribute to a lower-emission future.

TRANSPORTATION

A holistic Low Carbon Transport policy that combines a market-based, technology-neutral fuel standard with a life-cycle vehicle CO₂ emission standard could drive emission reductions across the entire vehicle fleet.

ExxonMobil advocates for a carbon intensity-based fuel standard approach that can also be extended to the harder-to-decarbonize aviation and marine sectors. The Company was a lead participant in developing the American Petroleum Institute's policy framework that includes an action plan to reduce life-cycle emissions in the U.S. transportation sector.

POWER GENERATION

A technology-neutral clean energy standard, or carbon intensity standard, could reduce CO₂ emissions in the electricity sector by setting targets based on carbon intensity and incentivizing necessary infrastructure and lower-emission options, including natural gas, renewables, carbon capture and storage and negative-emission technologies such as bioenergy with CCS, and direct air capture.

ExxonMobil participated in the U.S. Chamber of Commerce's development of policy principles to underpin a U.S. clean energy standard for the electricity sector. The Company continues to support engagement with the U.S. government on this issue.

As part of its participation in policy discussions, ExxonMobil engages through trade associations and industry collaboration efforts, including the Oil & Gas Climate Initiative. The Company uses various communications channels, including this report, press releases, exxonmobil.com and the Exxchange advocacy portal to clearly and transparently articulate ExxonMobil's climate-related policy positions. These positions inform and provide the basis for the Company's lobbying and advocacy efforts.

Houston CCS Hub

ExxonMobil and 10 other companies have expressed interest in deploying large-scale carbon capture and storage technology near Houston, one of the nation's most concentrated sources of industrial CO₂ emissions⁽⁴⁵⁾. The carbon capture and storage hub could remove 100 million metric tons of CO₂ emissions every year from power plants, refineries and petrochemical plants by 2040. The concept will require government policy that enhances tax credits to create greater incentives for broad technology deployment or a price on carbon to create a market incentive for capturing emissions.



ENERGY OUTLOOK⁽⁴⁶⁾

ExxonMobil's business planning is underpinned by a deep understanding of long-term energy fundamentals.

These fundamentals include energy supply and demand trends; the scale and variety of energy needs worldwide; capability, practicality and affordability of energy alternatives including low-carbon solutions; greenhouse gas emission-reduction technologies; and supportive government policies. The Company's Energy Outlook considers these fundamentals to form the basis for the Company's long-term business planning, investment decisions, and research programs.

The Outlook reflects the Company's view of global energy demand and supply through 2050. It is a projection based on current trends in technology, government policies, consumer preferences, geopolitics, and economic development.

WHAT'S THE DIFFERENCE BETWEEN A PROJECTION AND A SCENARIO?⁽⁴⁷⁾

The Outlook projects ExxonMobil's view of future energy supply and demand. It starts with current factors, such as policy and commercially available technology, and estimates how they might change over time. In contrast, many scenarios start with a hypothetical outcome and work backward to identify the factors that need to occur to achieve that outcome.

HOW ARE THE OUTLOOK AND SCENARIOS USED?

ExxonMobil uses the Outlook as the basis for developing its business plans. Since any projection carries uncertainty, the Company separately considers scenarios including the Intergovernmental Panel on Climate Change Lower 2°C and the International Energy Agency Net Zero Emissions by 2050 to help inform its thinking on the resiliency of its assets and the opportunities to evolve its businesses.

To effectively evaluate the pace of change, ExxonMobil uses many scenarios to identify signposts that provide leading indicators of future developments and allow for timely adjustments to the Outlook. Some of these signposts are highlighted in the following pages.



HOW THE ENERGY OUTLOOK IS DEVELOPED

MONITORING POLICY AND TECHNOLOGY TRENDS

The Company monitors changes in technology, such as solar panels getting cheaper and batteries improving, as well as policy developments like the EU's tailpipe emissions regulations and China's coming 14th five-year plan.

HISTORICAL FOUNDATION AND FUNDAMENTALS

ExxonMobil uses the International Energy Agency's World Energy Statistics and Balances data service and other credible third-party sources as the historical basis for the Outlook. For liquids supply, S&P Global Platts data is used. For natural gas, historical production and pipeline flows are based on Wood Mackenzie, IHS, JODI Gas, S&P Global Platts (Eclipse) and others; historical LNG production and trade flows are based on IHS Markit (Waterborne) data. In the 2021 Energy Outlook, data for 2019 and earlier are considered historical; the Outlook's modeled projections cover 2020 to 2050.

The Company compiles demographic information and models economic trends for about 100 regions around the world. Primary sources are the United Nations, World Bank, International Monetary Fund and IHS. Population estimates are compiled from the U.N. and the World Bank. Economic trends (e.g., GDP) are modeled based on respected third-party views and ExxonMobil's own analysis.

Use of sensitivity analysis

ExxonMobil uses sensitivity analyses to provide greater perspective on how variations to its Outlook assumptions could affect projected energy supply and demand. The analyses for these sensitivities involve assessing technology advancements and the potential impact on energy supply and demand, resulting in a range of potential low- to high-demand outcomes for certain energy sources. The projections in the sensitivity analyses do not represent the Company's viewpoint or the likelihood of these alternatives, but can provide context to its analysis.

MODELING

The Company projects demand for services across 15 sectors covering needs for transportation; residential energy; production of steel, cement and chemicals; plus many others. Then it matches that demand across multiple energy sources, taking into account current use and potential evolution. It also projects liquid and natural gas supply and trade flows.

ENERGY DEMAND CONTINUES TO GROW

Energy and human development are linked. The left chart indicates that between now and 2050, the world population is expected to grow to almost 9.7 billion from 7.7 billion people, and global gross domestic product (GDP) is expected to more than double. Billions of people in developing economies are expected to see their incomes grow to levels considered middle class.⁽⁴⁸⁾ That translates to more demand for homes, transportation, electricity, consumer goods and the energy to power them.

Energy demand is likely to rise over this same time period, given population growth and the linkage between energy use and living standards. The Outlook projects efficiency gains that reduce energy use per capita in developed countries, whereas developing nations increase energy per capita as they pursue improved living standards. This increased demand in developing countries, which represent about 85% of global population, leads to a 14% higher estimate of energy demand in 2050 versus 2019.

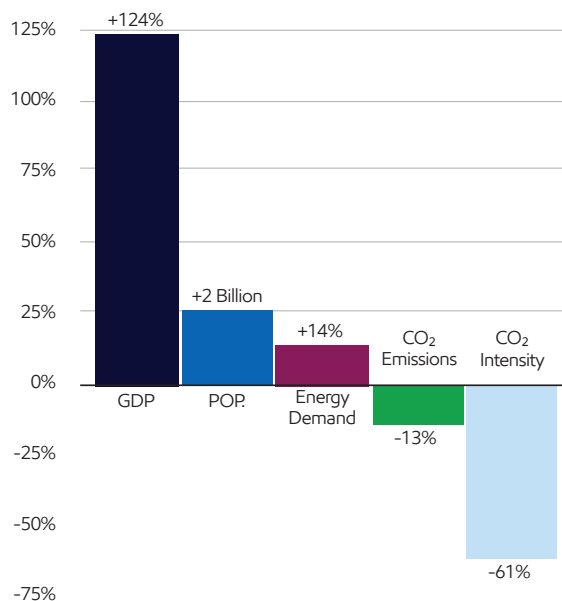
Energy-related greenhouse gas emissions are projected to peak by 2030 before declining about 15% to 2050, marking a significant improvement versus the emissions growth that occurred over the past decade. Efficiency gains and a shift in the energy mix, including increased use of lower-carbon sources, enable a more than 60% improvement in the carbon intensity of global GDP from 2019 to 2050.

The right chart shows how energy demand is expected to grow during the same period and the energy sources that are expected to meet that demand. The IEA's Stated Policies Scenario reflects

current policy settings based on a sector-by-sector assessment of the specific policies that are in place, as well as those that have been announced by governments around the world. It offers a relevant scenario to compare and contrast with ExxonMobil's Outlook. Although differences in assumptions lead to some variation between the scenarios, directionally similar observations can be made. Both project that wind and solar will make up about 10% of primary energy demand compared to less than 2% today. Both also indicate that oil and natural gas will account for more than 50% of total primary energy in 2050.

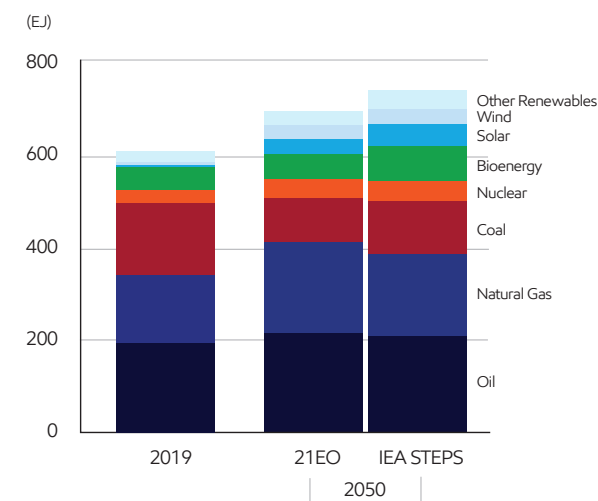
Key dimensions of the Energy Outlook

(Growth from 2019 to 2050)



Source: ExxonMobil 2021 Energy Outlook

Oil and natural gas remain important



Source: EM Analysis; IEA World Energy Outlook (WEO) 2021

GLOBAL EMISSIONS GAP

MORE ACTION IS NEEDED TO PUT THE WORLD ON A PARIS-ALIGNED PATHWAY

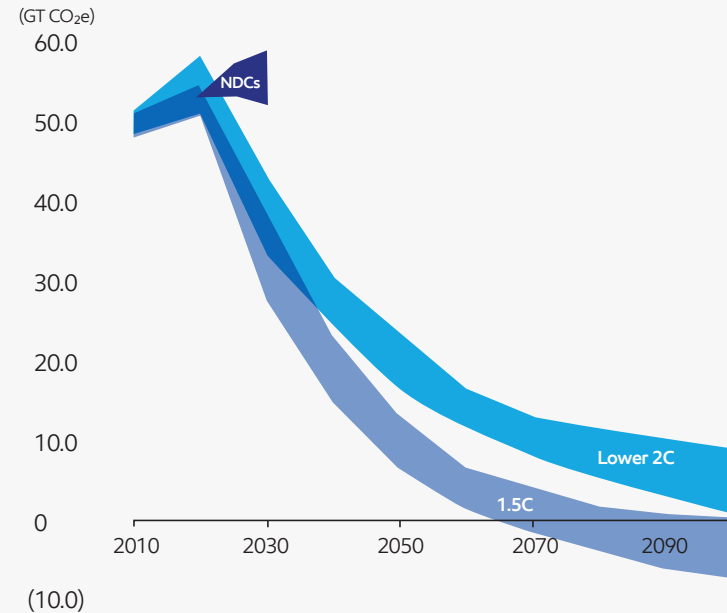
Updates to the Nationally Determined Contributions (NDCs) of the Paris Agreement pledges by 2030 were announced prior to the recent Conference of Parties meeting in Glasgow, Scotland (COP26). The United Nations Environment Programme emissions gap report states that these current NDCs are not yet on a Paris-aligned pathway, and G20 members as a group do not have policies in place to achieve their current NDCs. It further states that more government policy support is needed to deliver NDC commitments and for the world to accelerate progress toward a 2°C pathway.⁽⁴⁹⁾

Assuming the latest NDCs are implemented through policy by all signatories to the Paris Agreement, total greenhouse gas emissions are expected to peak before 2030. Levels that year are still expected to be 5% higher than in 2019.⁽⁵⁰⁾ To limit global warming to below 2°C, CO₂ emissions would need to decrease by about 25% from the 2010 level by 2030 and reach net zero around 2070.⁽⁵⁰⁾

The emissions gap remains large. Compared to previous unconditional NDCs, the new pledges for 2030 reduce projected 2030 emissions by only 7.5%, whereas a 30% reduction is needed for 2°C, and 55% is needed for 1.5°C.

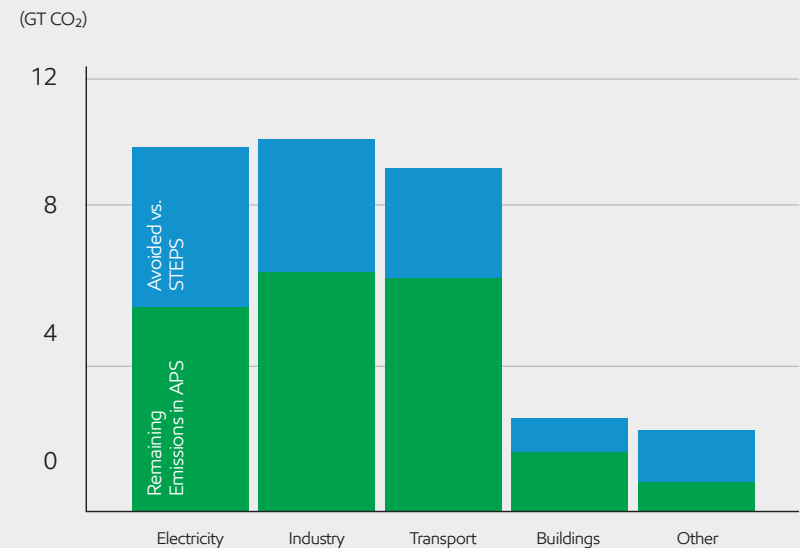
Comparing the IEA scenario that describes energy demand under stated policies (STEPS) with its scenario that describes energy demand under the announced pledges (APS) highlights that further emission reductions in all sectors will be required. In addition, innovation to provide new solutions for harder-to-abate sectors, such as heavy industry and commercial transportation, will be needed to further reduce global emissions to limit temperature rise to 2°C.

Global GHG emissions




Source: UNFCCC 2021 Synthesis report, IPCC scenario database: range shown is Interquartile within scenario group

Emissions by sector in IEA APS versus STEPS in 2050



Source: IEA WEO 2021



CONSIDERING PARIS-ALIGNED SCENARIOS

ExxonMobil considers a range of scenarios – including remote scenarios – to help inform perspectives of the future and enhance strategic thinking.

No single pathway can be reasonably predicted, given the wide range of uncertainties. Key unknowns include yet-to-be-developed government policies, market conditions, and advances in technology that may influence the cost, pace and potential availability of certain pathways. Scenarios that employ a full complement of technology options are likely to provide the most economically efficient pathways.

Following are Paris-aligned scenarios the Company has assessed and what they could mean for ExxonMobil's business.

IPCC LOWER 2°C SCENARIOS

In October 2018, the Intergovernmental Panel on Climate Change published a Special Report on *Global Warming of 1.5°C* (IPCC SR1.5)⁽⁵¹⁾ and utilized more than 400 emissions pathways with underlying socioeconomic development assumptions, energy system transformations and land use change until the end of the century. The IPCC report identified 74 scenarios as “Lower 2°C,” which are pathways with a 66% likelihood of limiting peak warming to below 2°C during the entire 21st century.

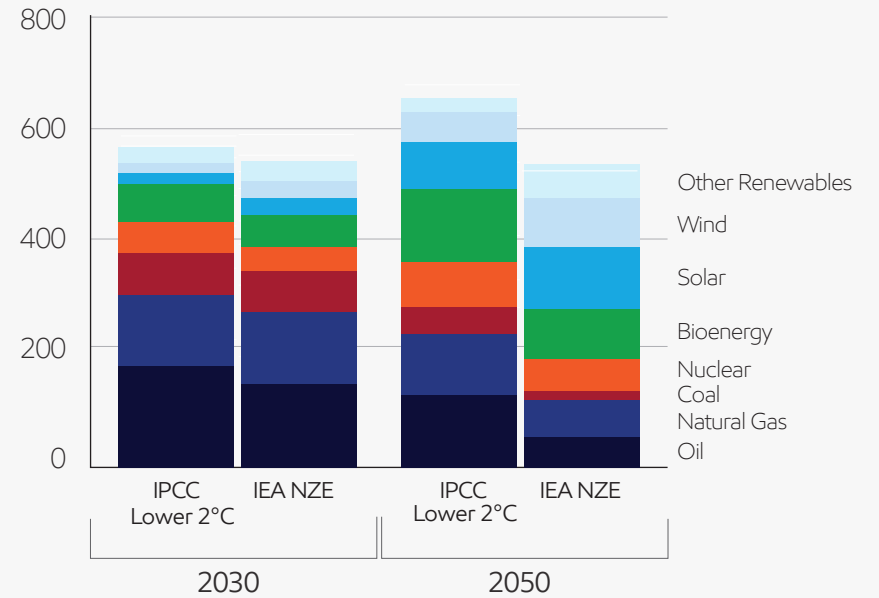
IEA NET ZERO EMISSIONS BY 2050 SCENARIO

In its 2021 World Energy Outlook, the IEA included its Net Zero Emissions by 2050 Scenario (IEA NZE), which lays out a pathway for the global energy sector to achieve net-zero CO₂ emissions by 2050. The IEA describes the IEA NZE as extremely challenging, requiring all stakeholders – governments, businesses, investors and citizens – to take action this year and every year after so that the goal does not slip out of reach.

The chart at upper right depicts the range of global energy demand in 2050 across the IPCC Lower 2°C and IEA NZE scenarios. As the chart illustrates, predicting absolute 2050 energy demand levels in total and by energy type carries a wide range of uncertainty. Technology and policy assumptions heavily influence particular scenarios.

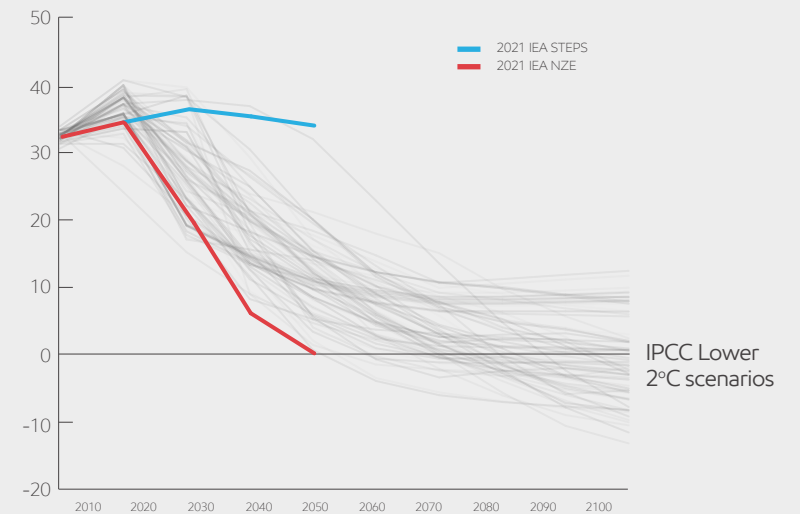
The chart at lower right illustrates potential global energy-related CO₂ emissions trajectories of these IPCC Lower 2°C scenarios, the IEA NZE, and the Stated Policies Scenario. The Stated Policies Scenario projects emissions at a comparable level generally in line with the IEA NDC submissions. While all Paris-aligned scenarios show reduced emissions over time, the pace of reduction varies widely. The IEA NZE emissions pathway is clearly much more aggressive than most of the IPCC Lower 2°C scenarios.

Global energy demand mix across Paris-aligned scenarios (EJ)



Source: IEA World Energy Outlook 2021, IPCC SR1.5

Global CO₂ emissions⁽⁵²⁾ (GT CO₂)



Source: IEA World Energy Outlook 2021, IPCC SR1.5

The IPCC Lower 2°C scenarios produce a variety of views on projected global energy demand in total and by specific types of energy. This report uses the average of the scenarios' growth rates per energy source to consider potential impacts on energy demand.⁽⁵³⁾ This is shown together with the growth rates of the IEA NZE scenario in the upper right hand chart.

These scenarios project total primary energy demand on a worldwide basis to only marginally increase, from zero to 0.5% per year on average from 2010 to 2050, assuming energy efficiency improvements almost entirely offset population and economic growth. Expected demand and technologies deployed in 2050 vary by model and energy type (see upper right chart):

- **Natural gas:** The IPCC Lower 2°C scenarios forecast demand in 2050 similar to 2010 levels. The IEA NZE places it at about 50% of 2010 levels.
- **Oil:** Demand is projected to decline by 1% per year in the Lower 2°C scenarios and 2.8% per year in the IEA NZE.
- **Non-bio renewables:** The IPCC Lower 2°C and IEA NZE scenarios foresee increases of 6-7% per year for wind and solar.
- **Nuclear:** The IPCC Lower 2°C scenarios project an annual growth rate for nuclear of above 2%; the IEA NZE projects an increase of 1.8% per year.
- **Coal:** Demand is expected to decline by 3.5% per year in the IPCC Lower 2°C and 5.5% in IEA NZE.
- **Bioenergy:** The IPCC Lower 2°C scenarios project growth of about 2.5% per year, versus 1.2% for the IEA NZE.

Wide variety of 2050 energy mix across Paris-aligned scenarios

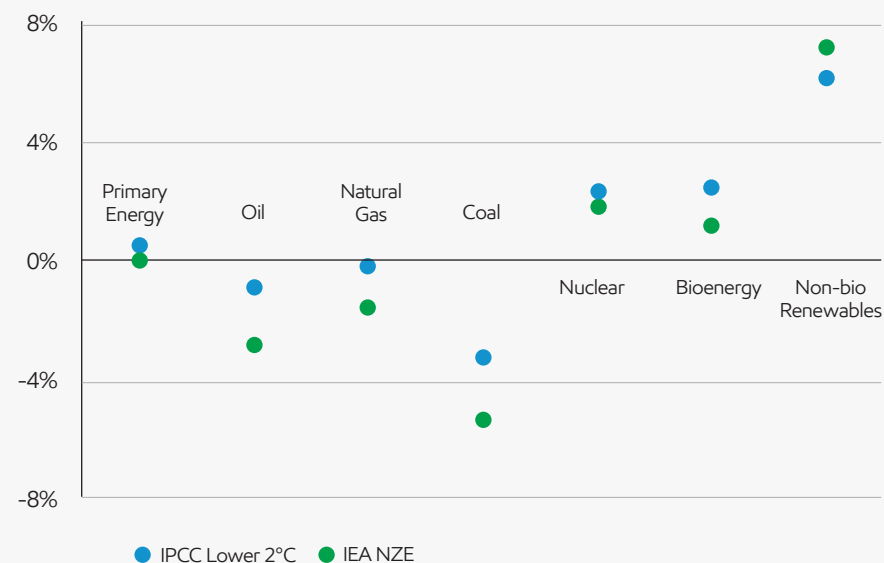
	IPCC Lower 2°C Average	IPCC Lower 2°C Range	IEA NZE
O&G	36%	16-57%	22%
Coal	7%	0-16%	3%
Nuclear	12%	2-22%	11%
Bioenergy	25%	9-52%	16%
Non-bio Renewables	20%	7-43%	48%

Source: IEA 2021 WEO, IPCC SR1.5, ExxonMobil Analysis

2010-2050 growth rates by energy type in two Paris-aligned scenarios

(CAGR)

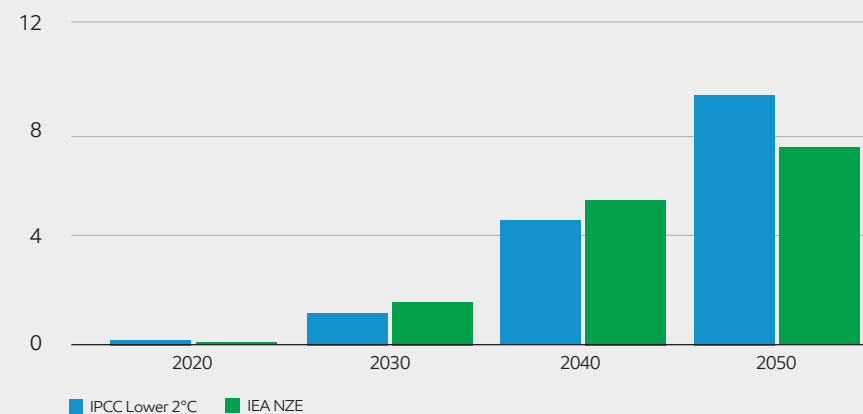
(% change per year)



Source: IEA 2021 WEO, IPCC SR1.5, EM analysis

CCS growth required in Paris-aligned scenarios

(GT CO₂)



Source: IEA 2021 WEO, IPCC SR1.5

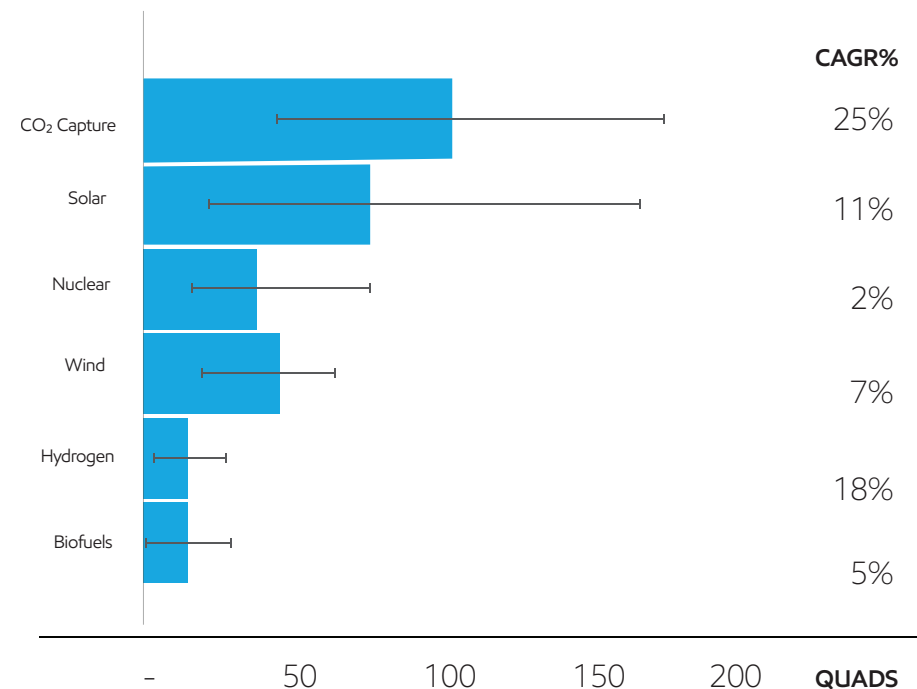
All energy sources remain important through 2050 across all Paris-aligned scenarios, as the mix of energy and technology shifts over time. Across these scenarios, a wide range of outcomes can be observed for various fuel sources. Oil and natural gas remain essential components of the energy mix. The rate of natural decline from producing fields would suggest that substantial new investments are required in both oil and natural gas capacity, even under the Lower 2°C and IEA NZE scenarios. In fact, without investment, only about 50% of world oil demand would be met in 2050 under the IEA NZE scenario. Natural gas is projected to have lower demand reductions due to its many advantages, including lower greenhouse gas emissions.

The various third-party scenarios illustrate each transition pathway can be very different with a wide range of uncertainty based on the pace of transition policy developments and scaling of technologies. It also is likely that the energy transition will be regionalized, based on access to infrastructure, technology, policy, and resources. For instance, the transition is expected to evolve differently based on relative proximity to quality wind/solar resources, hydrocarbon resources, and carbon storage sites, among others.

Limiting the supply of oil and natural gas prematurely, when these energy sources continue to be essential, could lead to shortages, regressive inflationary pressure, or an increase in societal greenhouse gas emissions as previously discussed.

Similarly, these scenarios would imply a range of lower-emissions growth opportunities as highlighted in the chart, which looks across the IPCC Lower 2°C scenarios and illustrates the average (blue bars) growth potential of various lower-carbon solutions. While all these lower-carbon solutions are needed, the black bars represent the wide range of growth potential across the IPCC Lower 2°C scenarios. To support further deployment of these technologies at scale, additional policy is needed to incentivize investments and influence consumer behavior. Striking the right balance in investments at a pace consistent with policy support is crucial.

Growth of lower-carbon solutions between 2020 and 2050 in IPCC Lower 2°C scenarios



Source: IPCC SR1.5, Lower 2°C

Error bars represent 10th percentile to 90th percentile scenario



POTENTIAL IMPACT ON PROVED RESERVES AND RESOURCES IN PARIS-ALIGNED SCENARIOS

The following assessment is intended to address the potential impacts to the Company's proved reserves and resources⁽⁵⁴⁾ through 2050, considering the discussed scenarios' ranges of oil and natural gas demand.

PROVED RESERVES

Proved reserves are assessed annually and reported in the Company's annual report on Form 10-K in accordance with rules of the U.S. Securities and Exchange Commission. Based on currently anticipated production schedules, a substantial majority of ExxonMobil's year-end 2021 proved reserves are expected to have been produced by 2050. For the remaining year-end 2021 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 assets generally have lower risk given the technical knowledge accumulated over many decades of production.

RESOURCES

ExxonMobil maintains a large and diverse portfolio of undeveloped resources that provide considerable flexibility to develop new supplies to meet future demand. The Company also continues to enhance the quality of this resource base through successful exploration, acquisitions, divestments, and ongoing development planning and appraisal activities.

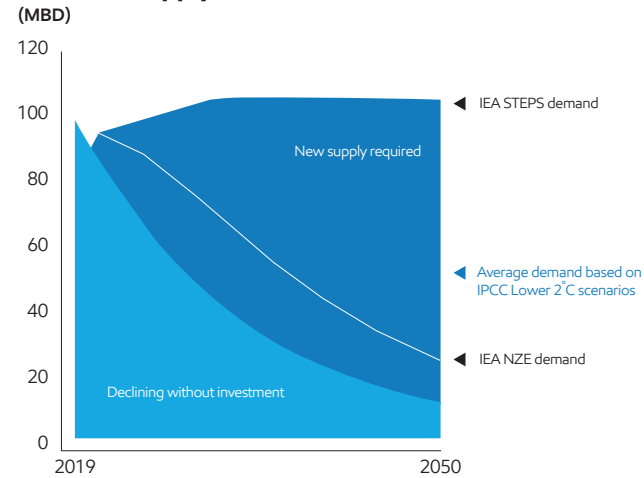
For ExxonMobil, the underlying economics of commercializing resources depend on a number of factors that are assessed annually. The Company advances the best resource opportunities and monetizes or exits those with lower potential. All investments are tested over a wide range of commodity price assumptions and market conditions. In extreme 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 regulate resources and industry 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. However, ExxonMobil is confident in its ability to apply high-impact technologies to position the Company's portfolio to compete successfully in a broad range of scenarios.

Significant investment still needed in Paris-aligned scenarios

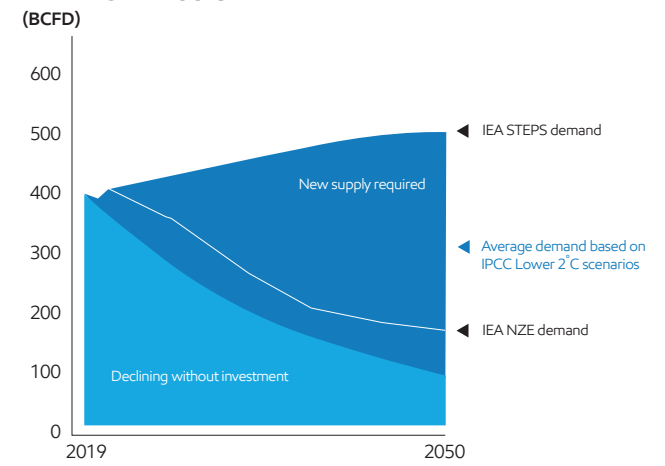
In the IPCC Lower 2°C scenarios, average global oil demand is projected to decline from 97.4 million barrels per day in 2019 to about 52 million in 2050. The IEA NZE scenario projects about 24 million barrels per day of demand in 2050. However, without future investment and due to natural field decline, world oil production would be expected to drop to about 11 million barrels per day. Even in the IEA NZE scenario, additional investment of approximately \$11 trillion through 2050 would be required in both oil and natural gas development to meet the world's energy demand.⁽⁵⁵⁾

Global oil supply estimates



Source: IEA 2021 WEO, IPCC SR1.5, Lower 2°C

Global gas supply estimates

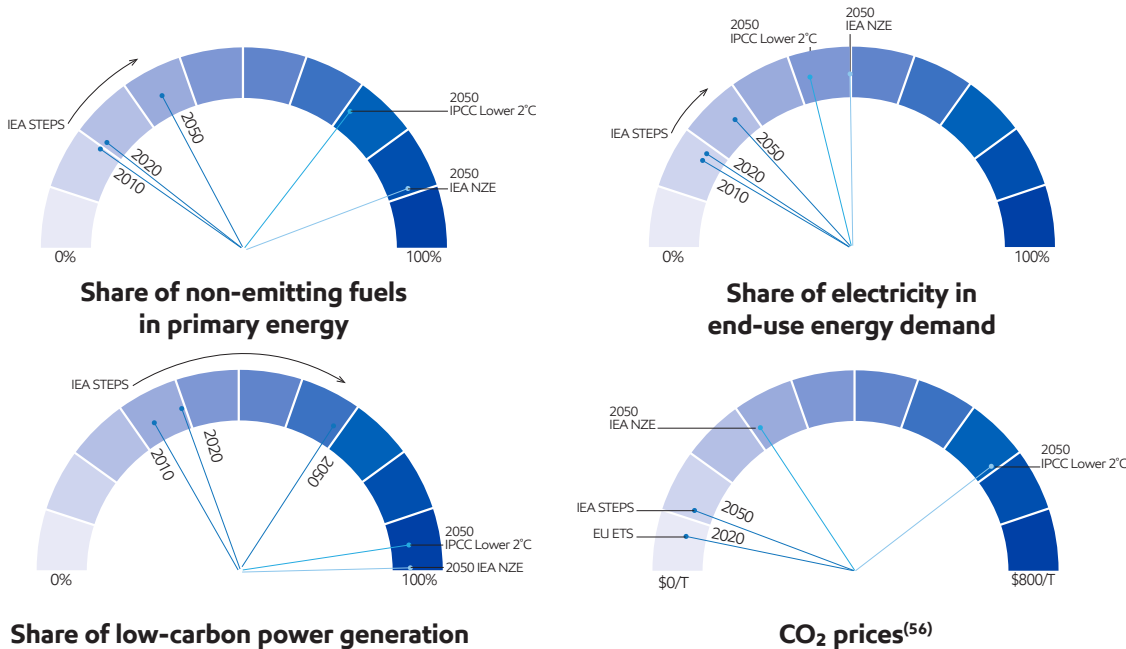


Source: IEA 2021 WEO, IPCC SR1.5, Lower 2°C

Using Company and third-party sources, ExxonMobil monitors a variety of signposts that may indicate a potential acceleration in shifts in the energy landscape. For example, a key consideration in advancing the energy transition is the cost of new technologies compared to existing or alternative energy sources. Changes in relative cost may further increase shifts in the global energy mix. They include:

- Increasing electrification of energy systems and technology developments that reduce costs and increase the reliability and capacity of energy storage.
- Development of scalable alternative energy technologies such as advanced biofuels, leading to displacement of gasoline and distillate in the fuels market.
- Advances in carbon capture and storage technology to lower cost and enable lower-emission hydrogen production.
- New, more ambitious NDCs, along with broad implementation of significant policy and regulatory initiatives, such as carbon pricing.

The charts below show the outcome of the IEA Stated Policies Scenario by 2050 and highlight the progress made from 2010 to 2020. In addition, the Paris-aligned scenario markers indicate where the world would need to be by 2050.



Sources: IEA WEO 2021, IPCC SR1.5, The World Bank, 2021, State and Trends of Carbon Pricing 2021 (May), World Bank, Washington, DC, EM analysis



SIGNPOSTS FOR THE EVOLVING ENERGY LANDSCAPE

The transition to 2050 in the Paris-aligned scenarios is of such a magnitude, that in the next 10 years, noticeable trends should emerge to indicate whether the world is moving in that direction.

- **Energy efficiency:** Per capita energy use improvement is a key trend across the Paris-aligned scenarios. In recent history, the world has seen an increase in energy use per capita, as living conditions in the developing world improve, more than offsetting efficiency trends in the developed world. This trend would need to reverse.
- **Solar and wind power:** The installed annual solar capacity would have to increase by 3.5-5 times the rate of the past five years. Wind turbines would have to be built at 2-4 times the recent rate.
- **Nuclear:** Capacity would have to be added at 3-5 times the recent rate.

- **Carbon capture and storage:** There are currently about 40 million metric tons per year of carbon capture and storage facilities in operation around the world⁽³³⁾. Over the next decade, 3-4 times the existing carbon capture and storage capacity would have to be added annually.
- **Biofuels:** Growth would need to continue for an entire decade and require commensurate growth in logistics. Whereas the IPCC Lower 2°C would require a growth similar to the average of the past five years, the IEA NZE would require 3.5 times that growth in the next decade.
- **Hydrogen:** Growth would have to exceed 9% per year in the IEA NZE scenario, more than doubling current use in one decade.

	Last 5-yr Avg ⁽⁵⁷⁾	Annual deployment over 2020-2030		
		21EO ⁽⁵⁸⁾	IPCC Lower 2°C ⁽⁵⁹⁾	IEA NZE 2050 ⁽⁶⁰⁾
Efficiency (Energy per capita)	+0.3%/yr	-0.2%/yr (2019-2030)	-1.5%/yr	-1.9%/yr (2019-2030)
Solar⁽⁶¹⁾ (GW)	80	95	255	420
Wind⁽⁶¹⁾ (6MW turbines equivalent)	55	60	120	240
CCS⁽⁶²⁾ (1.3 MTA Equivalent)	<1	5	90	125
Nuclear⁽⁶³⁾ (GW)	6	18	30	19
Biofuels (KBDOE Growth)	115	110	155	420
H2 (MTA Consumption) Excluding Feedstock, NH3		0.5	0.6	5.4

IEA NZE SCENARIO ANALYSIS⁽⁶⁴⁾: VALIDATING STRATEGY RESILIENCY

The International Energy Agency Net Zero Emissions by 2050⁽⁶⁵⁾ scenario (IEA NZE) outlines a pathway to achieve net-zero global emissions by 2050. It is one of multiple IEA scenarios, each of which is built to compare different versions of how the energy system might evolve.

The scenario assumes unprecedented and sustained energy efficiency gains, innovation and technology transfer, lower-emission investments, and globally coordinated greenhouse gas reduction policy. The IEA acknowledges that society is not on the IEA NZE pathway. ExxonMobil uses these extreme assumptions to further test the resiliency of its businesses and strategy.

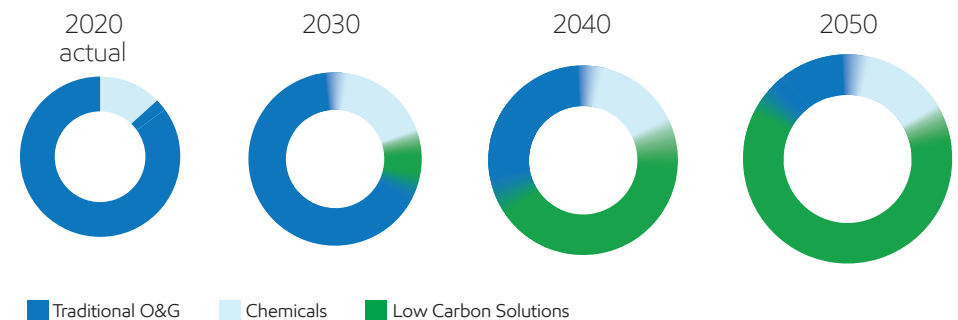
To test resiliency, ExxonMobil modeled a business and investment portfolio that could result under the assumptions provided by the IEA NZE. The analysis included existing operations and future opportunities across ExxonMobil’s businesses in oil, natural gas, fuels, lubricants, chemicals, lower-emission fuels, hydrogen and carbon capture and storage. The Company used the IEA NZE’s assumptions for demand and pricing for oil, natural gas and carbon. Where additional assumptions were necessary to estimate the performance of ExxonMobil’s portfolio and the current industry environment, the Company did so in a manner consistent with the IEA NZE narrative.⁽⁶⁴⁾ For example, the IEA NZE scenario did not provide assumed margins for refining and chemical businesses. Therefore, for refining, the Company used oil demand levels from the scenario and assumed margins would decline to the lowest level needed to incentivize the required production to meet IEA’s demand assumptions. For chemicals, margins were modeled consistent with history, at a level sufficient to support the investment necessary to meet chemicals demand growth per the IEA NZE assumptions. For its Low Carbon Solutions business, the Company used the IEA’s demand assumptions and assumed this business reached an overall market position similar to ExxonMobil’s current businesses.

The chart below illustrates potential changes to ExxonMobil’s business portfolio through 2050 resulting from this modeling. It demonstrates that under the IEA NZE assumptions, the Company could continue to grow cash flows over time through reduced investments in oil and gas and increased investments in accretive projects in chemicals, carbon capture and storage, low emissions fuels and hydrogen.

Consistent with the scenario’s long-term decline in oil and natural gas demand and pricing, the Company would cease oil and gas exploration in new basins and reduce spending on new developments. This would result in lower overall production as natural depletion outpaces investment in new volumes. It would also lead to initially higher net cash flow due to the lower investment levels. Upstream resources with shorter production cycles, such as unconventional developments, and a lower cost of supply, like deepwater production, would continue to attract capital and generate competitive returns.

Operating cash flow modeled under IEA NZE 2050 scenario

Trailing 5-year averages (nominal \$)



See supplemental information on [page 54](#) for a definition of operating cash flow.

In addition, under this scenario, production of traditional refined products would decline as sites are either closed, converted to terminals or reconfigured to shift production to chemicals, lubricants, basestocks and lower-emission fuels. Investments in carbon capture and storage, hydrogen, and biofuels, would increase significantly as carbon pricing provided in the IEA NZE scenario increases. The Company would continue to make accretive investments in its chemicals business as demand for these products grows in the IEA NZE scenario, with many of these products generating lower life-cycle emissions relative to available alternatives.

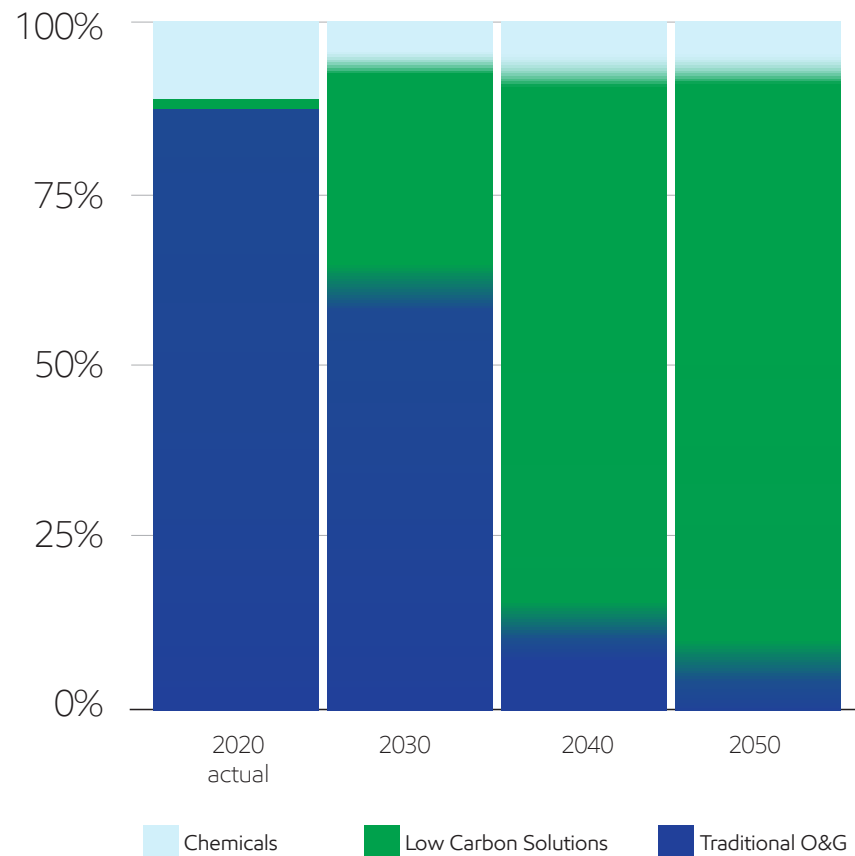
Existing oil and gas production and fuels manufacturing assets would be optimized and operated as long as economically justified, consistent with the IEA NZE demand assumptions, which project daily production of 24 million barrels of oil and 169 billion cubic feet of natural gas will still be needed to meet demand in 2050.

Overall, under IEA NZE, significant growth potential exists in chemicals, low emission fuels, carbon capture and storage, and hydrogen. ExxonMobil is positioned to effectively compete in these businesses by leveraging existing differentiated capabilities and repurposing assets. Throughout the modeled period, IEA NZE's assumed carbon price supports attractive investments in key growth areas that drive increases in cash flow. The Company's core capabilities, experience and advantages in scale, integration, technology, project execution and people would be critical success factors in this hypothetical transition path.

Assessing under the IEA NZE scenario helps the Company identify targeted investments that will generate competitive returns and deliver value to shareholders across a wide range of future scenarios.

Capital expenditures modeled under IEA NZE 2050 scenario

Trailing 5-year averages



Third-party quality assurance model review

An independent third party, Wood Mackenzie, performed a quality assurance audit of ExxonMobil's portfolio model, confirming the integrity of the calculations and overall model functionality and validating the IEA NZE assumption inputs were accurately reflected in the model, ensuring the output is a reasonable expression of the portfolio mix as defined by the model inputs.



GOVERNANCE

ExxonMobil has a robust governance framework designed to identify, manage and oversee risks and opportunities associated with its business and enable the Board and management to exercise oversight responsibilities.

ExxonMobil's Board of Directors oversees and provides guidance on the Company's strategy and planning, which include opportunities and risks related to climate change and the energy transition. Directors engage with experts from inside and outside the Company and apply their individual experience and perspective to guide the Company's capital-allocation priorities with a focus on growing shareholder value and playing a leading role in the transition to a lower-emission future. The independent lead director plays a key role in these engagements and, in consultation with the Chairman, develops Board meeting agendas.

The Management Committee, including the Chief Executive Officer, provides leadership in managing strategic risks and regularly reviews and assesses safeguards and mitigation plans.

ASSESSING CLIMATE RISK

The Board, with recommendations from the Public Issues and Contributions Committee (PICC), routinely reviews the Corporation's environmental approach and performance. This includes briefings with internal and external subject-matter experts on scientific and

technical research, public policy positions, greenhouse gas emission-reduction performance, and new technology developments. As part of the business planning process, the Board meets to discuss technology deployment within the business lines and research on new technology to further Scope 1 and Scope 2 emission reductions for ExxonMobil's operated assets. Throughout the year, the Board also considers multiple potential scenarios as it deliberates Company strategy and capital allocation, and reviews assumptions and sensitivities in testing projects and investments for resiliency across a range of potential outcomes. Informed by this transparency into Company processes, and after discussion and dialogue with ExxonMobil management, the Board exercised its oversight in finalizing the Company's plans through 2027 that included significantly increasing investments to more than \$15 billion over the next six years on lower-emission initiatives. In addition, independent directors engage directly with shareholders to gather insights and share perspectives on issues of importance to the Company, including discussions regarding the risks and opportunities related to climate change.

The Board regularly reviews the strategy and plans for each business, including the key role of technology in mitigating greenhouse gas emissions. The Board's guidance focuses on ensuring each business is well positioned to deliver shareholder value across a wide range of future scenarios.

The Board also uses its committees to oversee a broad spectrum of interrelated risks and opportunities to grow shareholder value, with each committee incorporating aspects of climate-related risks within their purview.

The Public Issues and Contributions Committee

The Public Issues and Contributions Committee oversees operational risks associated with safety, security, health, and environmental performance including actions taken to address climate-related risks; lobbying activities and expenditures; and community engagement.

The Finance and Audit Committees

The Finance Committee oversees risks associated with the Company's capital structure, and capital allocation, including actions to enhance resiliency. **The Audit Committee** oversees ExxonMobil's overall risk management approach and structure, which is applied to risks related to climate change, among other business risks.

The Board Affairs Committee

The Board Affairs Committee oversees matters of corporate governance, including Board transition and refreshment.

The Compensation Committee

The Compensation Committee reviews executive compensation, which is aligned with the long-term interests of shareholders and requires careful consideration of current and future risks, such as those related to climate change.



“Like other committees, the PICC is able to work on key issues in greater detail than possible by the full Board. The PICC plays a central role in the Board’s governance, especially on matters related to climate risk. My experience as an atmospheric scientist and chair of the PICC is complemented by the other member directors who bring expertise in running large complex organizations, strategy development, technology, and research. We share a commitment to see ExxonMobil establish a leadership position among industry in advancing a lower-emissions future and addressing the risks related to climate change.”

— DR. SUSAN AVERY
CHAIR OF THE PUBLIC ISSUES AND CONTRIBUTIONS COMMITTEE

INTEGRATING RISK MANAGEMENT INTO EXECUTIVE COMPENSATION, INCLUDING EMISSIONS REDUCTIONS

The executive compensation program is designed to incentivize long-term, sustainable decision-making. Key design features include performance shares with long vesting periods and compensation that is strongly tied to Company performance.

The program is based on four strategic objectives (see graphic) that are established to drive sustainable growth in shareholder value while positioning the Company for long-term success in a lower-emissions future. These objectives are interdependent with long-term business success determined by delivery in each of the strategic objectives.

Two of the four strategic objectives specifically integrate climate risk:

- **Operations Performance:** deliver industry-leading performance in safety, emissions reductions, environmental performance and reliability.
- **Energy Transition:** lead industry in hard-to-decarbonize emissions reductions.

Strategic objectives are integrated into the corporate plan, which is reviewed and finalized by the Board each year. This approach helps ensure accountability at all levels in the organization, as accomplishments versus the plan goals and objectives inform the level of compensation.

Details on the executive compensation program can be found in the Company's annual Proxy Statement.

Long-term strategic objectives

OPERATIONS PERFORMANCE

Deliver industry-leading performance

FINANCIAL PERFORMANCE

Deliver industry-leading earnings & cash-flow growth

ENERGY TRANSITION

Lead industry in hard-to-decarbonize emissions reductions

BUSINESS PORTFOLIO

Optimize existing business portfolio

Supported by financial & operating metrics

LTIR, spills, GHG emissions intensity, flaring and methane emissions, ROCE, CFOAS, TSR



BOARD COMPOSITION AND EVALUATION

The Board is comprised of independent directors and the CEO. All members of the Audit, Board Affairs, Compensation and Public Issues and Contributions committees are independent. Individual directors leverage their experience and knowledge in Board and committee deliberations. Board decisions reflect the collective wisdom of the group.

The Board Affairs Committee, chaired by the independent lead director, recommends committee assignments to the full Board. The recommendations, including committee chairs, consider the tenure, skills and experiences of each director and the collective group to ensure a diverse representation.

The Board and each of the Board committees conduct a robust and thorough evaluation of their performance and effectiveness, as well as potential changes to the committees' charters. The independent lead director leads the evaluation process, which occurs annually or more frequently, as needed.

BOARD REFRESHMENT AND DIRECTOR ONBOARDING

The Board refreshment process is led by the Board Affairs Committee, which incorporates the perspectives of external experts and shareholders. The process values a diverse slate of experienced and highly qualified Board members who bring unique perspectives to deliberations and discussions.

Qualifications sought for director nominees are documented in the Board's Guidelines for the Selection of Non-Employee Directors available on [exxonmobil.com](https://www.exxonmobil.com). Important director competencies, built from these qualifications, include experience in risk management, global business leadership, finance, energy, operations, science, environment, climate, business transition, technology, and research.

Newly elected directors participate in comprehensive onboarding sessions designed to cover a wide range of topics, which helps greatly accelerate the learning curve for new board members.

EXXONMOBIL'S APPROACH TO RISK MANAGEMENT



ExxonMobil's corporate risk framework provides a structured, comprehensive approach to identify, prioritize and manage risks across the Company. It is designed to drive consistency across risk type, and monitor key risks, including risks related to climate change. The framework includes five elements: (1) a way to organize and aggregate risks (illustrated at the right); (2) robust risk identification practices; (3) a prioritization method; (4) an inventory of systems and processes to manage risk; and (5) risk governance.

ExxonMobil's approach to risk governance is multilayered and includes clearly defined roles and responsibilities for managing each type of risk. It includes a definition of the responsibilities of risk owners, functional experts and independent verifiers. Each risk type is managed and supported by functional organizations that are responsible for specifying corporate requirements and processes. Each of these processes includes the critical elements of leadership, people, risk identification and management, and continuous improvement. Oversight responsibilities by the Management Committee and the Board and its committees are a key part of risk governance.

Managing long-term risks associated with climate change is an integral part of managing strategic risks. A core element of the Company's management of strategic risks is the work underpinning the Energy Outlook. As described in a previous section of this report, the

Outlook reflects a long-term, data-driven approach to promote a deeper understanding of global trends and projections related to population and economic growth, energy demand and supply options, as well as assessments of key uncertainties and potential impacts of alternative assumptions. Managing risk associated with climate change is an integral part of that work, helping to ground choices related to long-term strategies and individual investments.

ExxonMobil enterprise risk framework considers climate-related risks

Risk type	Examples of potential risks that could be impacted by climate change, energy transition or extreme weather
1 Strategic	Supply/demand, disruptive technology, geopolitical, government changes and capital allocation
2 Reputational	Industry reputation, corporate reputation
3 Financial	Price volatility, foreign exchange fluctuations, customers' credit risk, insurance
4 Operational	Geological risk, project risk, product quality and brand, talent, supplier, operations disruption
5 Safety, Security, Health & Environment	Process safety, well control events, environmental incidents
6 Compliance & Litigation	Litigation risks, regulatory compliance

PROTECTION OF ASSETS, THE COMMUNITY AND THE ENVIRONMENT



ExxonMobil has extensive experience operating in a wide range of challenging physical environments around the world.

Before pursuing a new development, the Company uses data from measurements and advanced computer modeling to assess the full range of potential environmental, socioeconomic and health risks associated with potential operations. It also consults with the public through community meetings and other outreach, and it works with regulators to share information and maintain alignment. This process gives the Company a comprehensive understanding of potential impacts, which it uses to implement measures to avoid environmental, socioeconomic and health risks, reduce them, or remedy the impacts.

When considering physical environmental risks, including risks for production, refining and petrochemical facilities, the Company evaluates the type and location of current and planned facilities. As an example, changes in patterns of waves, wind or ice floes can affect offshore facilities; while onshore facilities could be vulnerable to sea level rise, changes in storm surge, flooding, changes in wind and seismic activity, or geo-technical considerations. The Company conducts environmental assessments before building and operating facilities to ensure that protective measures and procedures are in place.

ExxonMobil's scientists and engineers are industry experts across a variety of disciplines. Through their active participation and leadership in industry groups, they advise and gather insights to inform and improve industry standards, which in turn are adopted to enhance ExxonMobil's standards and procedures and industry practices such as the American Society of Civil Engineers' *Climate-Resilient Infrastructure: Adaptive Design and Risk Management* manual of practice⁽⁶⁶⁾.

Industry standards such as American Society of Civil Engineers (ASCE 7)⁽⁶⁷⁾ *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, are used along with historical experience and additional factors to cover a range of uncertainties. After construction of a facility, the Company monitors and manages ongoing facility integrity, through periodic checks of key aspects of the structures.

For example, the Gulf Coast Growth Venture, a new petrochemical manufacturing facility near Corpus Christi, Texas, is compliant with both San Patricio County and national standards (ASCE 7). Storm water handling is a risk factor associated with the facility, so the design includes basins to retain excess storm water to supplement the capacity of the municipal water system. The design, construction and operations of petrochemical facilities are highly regulated by the Texas Commission on Environmental Quality. Company representatives have held hundreds of outreach meetings with local organizations, chambers, government agencies, civic groups and neighborhoods and have addressed comments and concerns raised during the permitting process. More information on the Texas Commission on Environmental Quality permitting process can be found on its website.⁽⁶⁸⁾

Once facilities are in operation, the Company maintains disaster preparedness, response and business continuity plans. Detailed, well-practiced and continuously improved emergency response plans are tailored to each facility to help ExxonMobil prepare for unplanned events, including extreme weather. Periodic emergency drills are conducted with appropriate government agencies and community coalitions to help heighten readiness and minimize the impacts of such events. Strategic emergency support groups are established around the world to develop and practice emergency response strategies and assist field responders. Regardless of the size or complexity of any potential incident, each ExxonMobil facility and business unit has access to readily available trained responders, including regional response teams, to provide rapid tactical support.





METRICS & TARGETS

ExxonMobil has established programs to drive improvements in energy efficiency and mitigate Scope 1 and Scope 2 greenhouse gas emissions at Company-operated facilities.

These programs are supported by key performance metrics to identify and prioritize opportunities to deliver results.

In 2020, the Company announced plans to reduce its greenhouse gas emissions by 2025, compared to 2016 levels which coincides with the Paris Agreement. This included a 15-20% reduction in greenhouse gas intensity of upstream operations; a 40-50% reduction in methane intensity; and a 35-45% reduction in flaring intensity across the corporation. ExxonMobil anticipates it had achieved these 2025 emission reduction plans in 2021 – four years ahead of schedule.

GREENHOUSE GAS EMISSIONS PERFORMANCE DATA

ExxonMobil assesses its performance to support continuous improvement throughout the organization. The reporting guidelines and indicators of IPIECA, the International Oil and Gas Producers Association, and the American Petroleum Institute *Oil and Gas Industry Guidance on Voluntary Sustainability Reporting* (2020) informed the selection of the data included in this performance table. Lloyd's Register Quality Assurance has provided their independent limited [level of assurance](#) that the 2020 ExxonMobil greenhouse gas emissions inventory meets ISO 14064 expectations.

MANAGING THE RISKS OF CLIMATE CHANGE⁽⁶⁹⁾

	2016	2017	2018	2019	2020
EQUITY BASIS					
⁽⁷⁰⁾ Greenhouse gas emissions, absolute (net equity, CO ₂ -equivalent emissions), millions of metric tons	124	121	123	118	111
⁽⁷¹⁾ Direct (excluding emissions from exported power and heat)	116	112	115	110	104
⁽⁷²⁾ Emissions associated with imported power	8	9	8	8	7
CO ₂ (excluding emissions from exported power and heat)	116	114	115	112	106
Methane (CO ₂ -equivalent)	7	7	8	6	5
Other gases (CO ₂ -equivalent)	1	<1	<1	<1	<1
Emissions from exported power and heat	3	3	3	3	3
⁽⁷⁰⁾ Greenhouse gas emissions, normalized (net equity, CO ₂ -equivalent emissions), metric tons per 100 metric tons of throughput or production					
Upstream	25.8	25.8	26.5	24.8	24.0
Downstream	19.3	18.5	18.7	19.1	19.7
Chemical	53.6	54.2	53.9	54.7	53.1
By-division Greenhouse gas emissions (net equity, CO ₂ -equivalent emissions), millions of metric tons					
Upstream	58	57	57	54	50
Downstream	45	42	42	41	39
Chemical	21	22	23	23	22
CO ₂ - captured for storage (net equity, CO ₂ -equivalent), millions of metric tons	6	6	7	7	7
OPERATED BASIS					
⁽⁷⁰⁾ Greenhouse gas emissions, absolute (gross operated, CO ₂ -equivalent emissions), millions of metric tons	113	109	110	106	99
⁽⁷¹⁾ Direct (excluding emissions from exported power and heat)	105	100	101	97	92
⁽⁷²⁾ Emissions associated with imported power	8	9	9	9	7
CO ₂ (excluding emissions from exported power and heat)	105	102	102	100	95
Methane (CO ₂ -equivalent)	8	7	8	6	4
Other gases (CO ₂ -equivalent)	<1	<1	<1	<1	<1
Emissions from exported power and heat	3	3	3	2	2
Methane normalized (metric tons CH ₄ per 100 metric tons of throughput/production)	0.07	0.07	0.07	0.05	0.04
⁽⁷⁰⁾ Greenhouse gas emissions, normalized (gross operated, CO ₂ -equivalent emissions), metric tons per 100 metric tons of throughput or production					
Upstream	28.1	28.1	28.8	25.7	24.0
Downstream	19.3	18.5	18.6	19.1	19.7
Chemical	53.1	53.8	53.0	53.6	51.2
By-division Greenhouse gas emissions (gross operated, CO ₂ -equivalent emissions), millions of metric tons					
Upstream	51	48	48	46	42
Downstream	44	42	42	41	39
Chemical	18	19	20	19	18
ENERGY - OPERATED BASIS					
Energy use (billion gigajoules)	1.5	1.4	1.5	1.5	1.5
Upstream (gigajoules per metric tons production)	2.4	2.5	2.5	2.5	2.5
Downstream (gigajoules per metric tons throughput)	2.9	2.9	3.0	3.1	3.3
Chemical (gigajoules per metric tons product)	10.6	10.5	10.0	10.5	11.7
FLARING - OPERATED BASIS					
Hydrocarbon flaring (worldwide activities), million standard cubic feet per day	530	410	410	430	320
Africa/Europe/Middle East	400	290	260	230	170
Americas	70	70	100	160	120
Asia Pacific	60	50	50	40	30
Hydrocarbon flaring (worldwide activities), m ³ per metric tons of throughput/production	12	10	10	11	8
Scope 1 - Greenhouse gas emissions from flaring	15	12	12	12	9

*2020 performance data includes ongoing greenhouse gas emissions mitigation measures as well as impacts associated with COVID-19.

SCOPE 3 EMISSIONS

ExxonMobil has publicly reported the Company’s Scope 1 and Scope 2 greenhouse gas emissions data for many years and more recently began providing Scope 3 estimates.

Reporting Scope 1 emissions data (direct greenhouse gas emissions from Company operations) can provide useful insight into the efficiency and emission-reduction performance of the Company’s operations, portfolio of products, and resource types.

Reporting Scope 2 emissions data (indirect greenhouse gas emissions from energy purchased by the Company) highlights the Company’s choice of type of electricity purchased to power its operations.

Scope 3 emissions primarily refer to the indirect emissions resulting from society’s need for and use of the Company’s products.

Estimated Scope 3 emissions from the use of ExxonMobil’s crude and natural gas production for the year ending Dec. 31, 2020 as provided under IPIECA’s Category 11 were 540 million metric tons.

Notes: The table below provides ExxonMobil’s Scope 3 estimates associated with the use of its natural gas and crude production in alignment with Category 11 of IPIECA’s methodology, which contemplates accounting for products at the point of extraction, processing or sales. ExxonMobil’s Scope 3 estimates represent three approaches for accounting and are not meant to be aggregated as this would lead to duplicative accounting. For example, for completeness, the Scope 3 estimates associated with the combustion of the crude processed, produced or sold from ExxonMobil’s refineries are provided; however, to avoid duplicative accounting, these Scope 3 estimates are not included in ExxonMobil’s Scope 3 Category 11 total since the associated Scope 3 emissions would have been reported by the producer of those crudes.

ExxonMobil 2020 Scope 3 estimates

(Million metric tons CO₂-equivalent)

IPIECA Category 11 Scope 3 potential estimates	Upstream production	Refining throughput	Petroleum product sales
Natural gas production	540	600	650
Crude production	170		
	370		

Notes: Applied CO₂ emission factors were obtained from EPA or derived from API calculations; where applicable emission factors for specific fuel products were applied. Non-fuels products are not combusted by the end-user and therefore are not included in these Scope 3 estimates. IPIECA’s Scope 3 methodology includes 15 categories of activities along each product’s value chain. Due to lack of third-party data, Scope 3 emissions for categories other than Category 11 could not be estimated.

ADVANCING CLIMATE SOLUTIONS IS ALIGNED WITH THE CORE ELEMENTS OF THE TCFD FRAMEWORK

ExxonMobil's Advancing Climate Solutions is aligned with the core elements of the framework developed by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD), designed to encourage the informed conversation society needs on these important issues.

TCFD CORE ELEMENTS AND RECOMMENDED DISCLOSURES	EXXONMOBIL DISCLOSURES
<p>STRATEGY</p> <p>Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.</p> <ul style="list-style-type: none"> a. Describe the climate-related risks and opportunities the organization has identified over the short, medium and long term. b. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy and financial planning. c. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. <p>GOVERNANCE</p> <p>Disclose the organization's governance around climate related risks and opportunities.</p> <ul style="list-style-type: none"> a. Describe the Board's oversight of climate-related risks and opportunities. b. Describe management's role in assessing and managing climate-related risks and opportunities. <p>RISK MANAGEMENT</p> <p>Disclose how the organization identifies, assesses, and manages climate-related risks.</p> <ul style="list-style-type: none"> a. Describe the organization's processes for identifying and assessing climate-related risks. b. Describe the organization's processes for managing climate-related risks. c. Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management. <p>METRICS & TARGETS</p> <p>Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.</p> <ul style="list-style-type: none"> a. Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process. b. Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 GHG emissions, and the related risks. c. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets. 	<p>Pages 3-36 Pages 3-36 Pages 3-20, 25-38</p> <p>Pages 39-42 Pages 39-42</p> <p>Pages 6-8, 43-45 Pages 6-8, 43-45 Pages 6-8, 43-45</p> <p>Pages 3-4, 6-10, 46-47 Pages 3-4, 6-10, 46-48 Pages 3-4, 6-8, 46</p>

DISCLOSURES AND GLOSSARY

ExxonMobil is committed to providing its shareholders with disclosures that impart meaningful insights about its business, including how it manages climate-related risks. This report, along with the rest of its comprehensive set of disclosures relating to climate-related matters, follow the framework established by IPIECA, including IPIECA's Climate Change Reporting Framework.⁽⁷³⁾ This year's report is also aligned with the core elements of the TCFD framework. IPIECA members represent a significant portion of the world's oil and natural gas production, including state oil companies, and the organization is the industry's principal channel of communication with the United Nations. A broad and global membership enables a reporting framework that is tailored to the petroleum industry and facilitates better comparisons of member companies on a more consistent and standardized basis.

Web links to other various climate-related disclosures are highlighted below:

- **SUSTAINABILITY REPORT:** ([exxonmobil.com/sustainabilityreport](https://www.exxonmobil.com/sustainabilityreport))
- **OUTLOOK FOR ENERGY:** ([exxonmobil.com/energyoutlook](https://www.exxonmobil.com/energyoutlook))
- **TECHNOLOGY:** ([exxonmobil.com/technology](https://www.exxonmobil.com/technology))
- **ENHANCED METHANE EMISSIONS REDUCTION PROGRAM:** ([exxonmobil.com/methane](https://www.exxonmobil.com/methane))
- **ADVANCING CLIMATE SOLUTIONS:** ([exxonmobil.com/advancingclimatesolutions](https://www.exxonmobil.com/advancingclimatesolutions))
- **SEC FORM 10-K:** ([exxonmobil.com/secfilings](https://www.exxonmobil.com/secfilings))
- **EXECUTIVE COMPENSATION MATERIALS CONTAINED IN CURRENT YEAR PROXY STATEMENT** ([exxonmobil.com/proxymaterials](https://www.exxonmobil.com/proxymaterials))

Existing policy frameworks (including the Paris NDCs), financial flows, and the availability of cost-effective technologies indicate that society is not currently on a 2°C pathway. Should society choose to more aggressively pursue a 2°C pathway, the Company will be positioned to contribute through its engagement on policy, development of needed technologies, improved operations and customer solutions.

Glossary

BCFD: billion cubic feet per day

CAGR: compound annual growth rate

CFOAS: cash flow from operations and asset sales

CO₂e: carbon dioxide equivalent

EJ: exajoules

GT: gigatons

GW: gigawatts

KBDOE: thousand barrels per day of oil equivalent

MBD: million barrels per day

MJ: megajoules

MTA: million tons per annum

ROCE: return on capital employed

T: tons

TSR: total shareholder return

Footnotes

- 1** The IPCC Global Warming of 1.5°C special report states that in model pathways with no or limited overshoot of 1.5°C, global net anthropogenic CO₂ emissions reach net zero around 2050, and for limiting global warming to below 2°C (with at least 66% probability of likelihood) CO₂ emissions are projected to reach net zero around 2070. The Hypothetical 1.5°C Pathway and Hypothetical 2°C Pathway are derived from the 2050 and 2070 net zero end points, respectively, using a linear relationship from societal greenhouse gas emissions in 2019 as the starting point.
- 2** ExxonMobil uses the Hypothetical 1.5°C and 2°C pathways to illustrate the Company's expected operated Scope 1 and 2 emissions performance relative to the Paris Agreement goal of "limiting global temperature increase to well below 2 degrees Celsius and the pursuit of limiting the increase to 1.5 degrees." (Article 2, Paris Agreement).

Global CO₂ emissions used to calculate society's relative emissions to 2016 are taken from the Global Carbon Budget 2020 (Friedlingstein et al (2020), <https://doi.org/10.5194/essd-12-3269-2020>) and include energy-related and cement processing CO₂ emissions.

ExxonMobil's plans regarding expected GHG emissions reductions by 2030 can be found at <https://corporate.exxonmobil.com/News/Newsroom/News-releases/2021/1201-ExxonMobil-announces-plans-to-2027-doubling-earnings-and-cash-flow-potential-reducing-emissions>.
- 3** These charts illustrate potential greenhouse gas abatement options as of the date of this publication. These options (such as abatement reduction magnitude, implementation timing, abatement cost, portfolio changes, policy developments, and technology advancements) may change as actual Scope 1 and 2 GHG reduction endeavors are implemented and annual company plans are updated.
- 4** ExxonMobil's proprietary portfolio life-cycle model estimates elements of Scope 1, 2, and 3 GHG emissions for ExxonMobil's Upstream, Downstream, and Chemicals businesses. The estimated figures are based on projected 2021 plan volumes for 2030.
- 5** Calculated by Solomon Associates' proprietary Carbon Emission Index in a 2020 industry survey.
- 6** The modeled figures are estimates and assume that 100% EM LNG volumes displace unabated coal for power generation. For GHG avoided emissions, the life-cycle GHG benefit basis from Mallapragada et al. 2018 (<https://pubs.acs.org/doi/10.1021/acs.est.8b04539>) was used.
- 7** Carbon Dioxide Emissions from Energy Consumption by Source (from EIA Monthly Energy Review Section 11) <https://www.eia.gov/totalenergy/data/browser/index.php?tbl=T11.01#/?f=A&start=1973&end=2020&charted=14>.
- 8** Calculation based on projected 2021 plan volumes for 2030 and specific estimated fuel CI by project from Argonne National Labs' GREET model analysis as compared against its conventional fuel alternate.
- 9** April 2018 report of Franklin Associates on Life Cycle Impacts of Plastic Packaging Compared to Substitutes (April 2018 Franklin Associates Report); alternatives include steel, aluminum, glass, paper-based packaging, fiber-based textiles, and wood (Table 4-14). Source: <https://www.americanchemistry.com/content/download/7885/file/Life-Cycle-Impacts-of-Plastic-Packaging-Compared-to-Substitutes-in-the-United-States-and-Canada.pdf>.
- 10** Calculation of 13 million metric tons based on: April 2018 Franklin Associates Report, 4.7 metric tons of enabled avoided emissions per metric ton of resin used in plastic packaging derived from April 2018 Franklin Associates Report (Table 2-2 and Table 4-14), ExxonMobil's sales volumes into U.S. packaging applications, and U.S. growth of plastic packaging to 2030 using third-party forecast for polyethylene (IHS Markit report, 2022 Edition: Fall 2021 update, U.S., 2019-2030) as a proxy.
- 11** Calculation of 40 million metric tons based on: April 2018 Franklin Associates Report, 4.7 metric tons of enabled avoided emissions per metric ton of resin used in plastic packaging derived from April 2018 Franklin Associates Report (Table 2-2 and Table 4-14), ExxonMobil's sales volumes into packaging applications globally, and global growth of plastic packaging to 2030 using third-party forecast for polyethylene (IHS Markit report, 2022 Edition: Fall 2021 update, global) as a proxy. Actual market conditions vary by region and over time.
- 12** Department of Energy statements at <https://www.energy.gov/eere/vehicles/lightweight-materials-cars-and-trucks>.
- 13** Global economy - ExxonMobil's 2021 Outlook for Energy (<https://corporate.exxonmobil.com/Energy-and-innovation/Outlook-for-Energy>); Chemicals growth - IHS Markit Report, Global Polyethylene, Polypropylene, and Paraxylene, 2022 edition: Fall 2021 update.
- 14** Total demand through 2030 - ExxonMobil's 2021 Outlook for Energy.
- 15** Chemical feedstock demand from ExxonMobil's 2021 Outlook for Energy excluding direct ethane from Upstream operations.
- 16** Based on an ExxonMobil study assuming plastic waste feedstock sourced within a 750-mile radius, which in the case of U.S. operations would ordinarily be diverted from landfill. Source: https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/guide-facts-and-figures-report-about#Materials_and_Products.
- 17** Per April 2018 report of Franklin Associates; U.S.; Max Decomp.; Figure 4-1; Impacts as defined in Chapter 4.7: Global Warming Potential (GWP) results, and indexed to the alternatives as a group (including steel; aluminum; glass; paper-based packaging; fiber-based textiles; and wood). Source: <https://www.americanchemistry.com/content/download/7885/file/Life-Cycle-Impacts-of-Plastic-Packaging-Compared-to-Substitutes-in-the-United-States-and-Canada.pdf>.
- 18** Based on performance of specific ExxonMobil Exceed™ XP grades versus conventional polyethylene in flexible packaging applications.
- 19** Certifications through the International Sustainability and Carbon Certification Plus (ISCC+) process.
- 20** Based on ExxonMobil analysis.
- 21** Based on ExxonMobil analysis when compared to conventional mineral oils.
- 22** ExxonMobil analysis using Argonne National Labs' GREET tools and published fuel carbon intensity from California LCFS regulations.
- 23** Based on ExxonMobil analysis versus conventional fuel oil.
- 24** Based on ExxonMobil analysis; performance profile at <https://www.mobil.com/en-us/industrial/pds/gl-xx-mobil-dte-10-excel-series>.

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- 25** Based on ExxonMobil analysis; performance profile at <https://www.mobil.com/en-us/industrial/pds/gl-xx-mobil-shc-600-series>.
- 26** Based on ExxonMobil analysis; performance profile at <https://www.mobil.com/en-us/industrial/pds/gl-xx-mobil-shc-gear-320-wt>.
- 27** <https://methaneguidingprinciples.org>
- 28** <https://www.iea.org/reports/methane-tracker-2020>
- 28** <https://www.iea.org/reports/methane-tracker-2020>
- 29** Center for Climate and Energy Solutions. <https://www.c2es.org/content/carbon-capture/>
- 30** IEA (2021), Net Zero by 2050: A Roadmap for the global energy sector, <https://www.iea.org/reports/net-zero-by-2050>
- 31** IEA (2020), Energy Technology Perspectives 2020: Special Report on Carbon Capture Utilisation and Storage. <https://www.iea.org/reports/ccus-in-clean-energy-transitions>
- 32** Edenhofer, O. et al (2014) Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf
- 33** Global CCS capacity: Global CCS Institute, Global Status of CCS 2021, p. 14. ExxonMobil CCS capacity: ExxonMobil estimates.
- 34** 9 million metric tons of CO₂ emissions is equivalent to approximately 2 million passenger vehicles driven for one year, according to the U.S. EPA greenhouse gas equivalencies calculator <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.
- 35** IEA, World Energy Outlook 2020, p. 122.
- 36** IEA, Future of Hydrogen, 2019, pp.70, 182-183. <https://www.iea.org/reports/the-future-of-hydrogen>
- 37** <https://corporate.exxonmobil.com/News/Newsroom/News-releases/2021/0422-ExxonMobil-expands-renewable-fuels-agreement-with-Global-Clean-Energy-Holdings>
- 38** <https://corporate.exxonmobil.com/News/Newsroom/News-releases/2021/0825-ExxonMobil-affiliate-to-produce-renewable-diesel-to-reduce-emissions-in-Canada>
- 39** E. Kim, R. Siegelman, H. Jiang, A. Forse, J-H. Lee, J. Martell, P. Milner, J. Falkowski, J. Neaton, J. Reimer, S. Weston, J. Long, Cooperative carbon capture and steam regeneration with tetraamine-appended metal-organic frameworks, Science 369 (6502) (2020) 392-396.
- 40** K. Thompson, R. Mathias, D. Kim, J. Kim, N. Rangnekar, J. Johnson, S. Hoy, I. Bechis, A. Tarzia, K. Jelfs, B. McCool, A. Livingston, R. Lively, M. Finn, N-Aryl-linked spirocyclic polymers for membrane separations of complex hydrocarbon mixtures, Science 369 (6501) (2020) 310-315.
- 41** E. Gencer, S. Torkamani, I. Miller, T. Wu, F. O'Sullivan, Sustainable energy system analysis modeling environment: analyzing life cycle emissions of the energy transition, Applied Energy 277 (2020) 115550.
- 42** E. Kasseris, N. Goteti, S. Kumari, B. Clinton, S. Engelkemier, S. Torkamani, T. Akau, E. Gencer, Highlighting and overcoming data barriers: creating open data for retrospective analysis of US electric power systems by consolidating publicly available sources, Environmental Research Communications 2 (2020) 115001.
- 43** I. Miller, E. Gencer, H. Vogelbaum, P. Brown, S. Torkamani, F. O'Sullivan, Parametric modeling of life cycle greenhouse gas emissions from photovoltaic power, Applied Energy 238 (2019) 760-774.
- 44** I. Miller, M. Arbabzadeh, E. Gencer, Hourly power grid variations, electric vehicle charging patterns, and operating emissions, Environmental Science & technology 2020, 54, 16071-16085.
- 45** <https://corporate.exxonmobil.com/News/Newsroom/News-releases/2021/0916-Carbon-capture-and-storage-gains-wide-industry-support-in-Houston>
- 46** For more information on ExxonMobil's 2021 Outlook for Energy, see <https://corporate.exxonmobil.com/Energy-and-innovation/Outlook-for-Energy>
- 47** The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities - TCFD Knowledge Hub. tcfhub.org/scenario-analysis/
- 48** Brookings Institution, There are many definitions of "middle class" - here's ours, Richard V. Reeves and Katherine Guyot, Sept. 4, 2018, accessed December 2020. <https://www.brookings.edu/blog/up-front/2018/09/04/there-are-many-definitions-of-middle-class-heres-ours/>
- 49** United Nations Environment Programme (2021). Emissions Gap Report 2021: The Heat Is On - A World of Climate Promises Not Yet Delivered. Nairobi.
- 50** https://unfccc.int/sites/default/files/resource/cma2021_08E.pdf
- 51** IPCC, 2018: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B.R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. In Press.
- 52** Land use and natural sinks are excluded.
- 53** The IPCC Lower 2°C scenarios produce a variety of views on the global energy demand in total and by specific types of energy, providing a range of possible growth rates for each type of energy across these 74 scenarios. Given the inherent uncertainty in energy demand modeling, we used an average of all 74 scenarios to approximate growth rates for various energy types as a means to estimate trends to 2040 indicative of hypothetical 2°C pathways.
- 54** For the purposes of this report, "proved reserves" means estimated year-end 2021 proved oil and gas reserves for consolidated subsidiaries and equity companies which will be reported in the Corporation's 2021 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

Footnotes

determined using the average of first-of-month oil and natural gas prices during the reporting year.

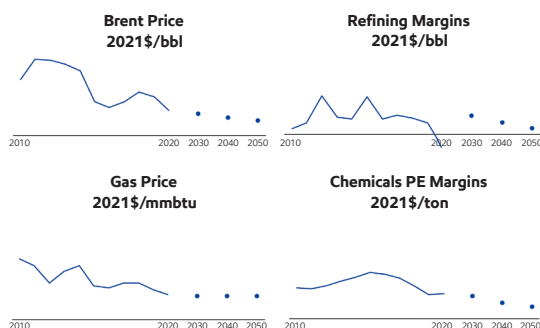
For the purposes of this disclosure, resources are total remaining estimated quantities of discovered oil and gas that are expected to be ultimately recoverable. The resource base includes proved reserves and quantities of oil and gas that are not yet classified as proved reserves.

- 55** IEA (2021). Net Zero by 2050: A roadmap for the global energy system. fig 3.4 p 103.
- 56** IEA STEPS 2050 represents EU; IEA NZE 2050 represents OECD plus non-OECD EU countries; IPCC Lower 2°C 2050 is the average global carbon price over 74 scenarios. 2050 values are in 2020 U.S. dollars.
- 57** Last 5-year average range of 2015 to 2019 from 2021 IHS Markit Global Energy Scenarios data set, Inflections scenario, July 2021 Version 1.0.
- 58** ExxonMobil 2021 Energy Outlook.
- 59** IPCC Lower 2°C scenarios at <=0 Gtonnes CO₂ emissions by 2050 (subset of scenarios from the IAMC 1.5°C Scenario Explorer, <https://data.ene.iiasa.ac.at/iamc-1.5c-explorer/#/login?redirect=%2Fworkspaces>).
- 60** IEA NZE scenario per IEA WEO 2021 Net Zero Emissions by 2050. (based on Annex A, tables for scenario projections).
- 61** Wind and Solar deployment calculated from TWh based on fixed capacity factor of 35% and 17%, respectively.
- 62** CCS history from Global Status of CCS Report (2021).
- 63** Last 5-year average range 2014 to 2018 based on absolute nuclear capacity, and

deployment based on projected demand growth and retirement profile from IHS Markit Global Energy Scenarios data set, Inflections scenario, July 2021 Version 1.0, Table 43.

- 64** Modeling assumptions include: (1) current prices for Brent and Henry Hub decline to conform with IEA NZE published prices by 2025 and the price path is linear between IEA NZE published prices by decade thereafter, (2) chemicals margins decline over time partially offset by inflation, (3) refining margins decline consistent with the change in oil demand under IEA NZE, (4) Low Carbon Solutions investments attract reasonable returns based on historical Company averages for similar business lines and products, (5) market position as a percentage of demand under IEA NZE for current business (Upstream, F&L, Chemicals) and new products (biofuels, hydrogen, and carbon capture and storage) is in line with the Company's current market positions in existing businesses, (6) investment to abate estimated GHG emissions from remaining Upstream, F&L, and Chemicals businesses by 2050, (7) annual inflation of 2.5%, (8) total capital expenditures held approximately constant near 2020 trailing 5-year average through 2050. The statements and figures contained in this section are hypothetical in nature, and do not constitute a forecast of future Company performance.

Price and margin assumptions used in IEA NZE Modeling



- 65** IEA WEO 2021, p. 94: "This World Energy Outlook (WEO) explores various scenarios, each of which is built on a different set of underlying assumptions about how the energy system might evolve. These scenarios are not predictions – the IEA does not have, and has never had, a single view about what the long-term future might hold. Instead, what the scenarios seek to do is to enable readers to compare different possible versions of the future and the levers and actions that produce them, with the aim of stimulating insights about the future of global energy."
- 66** American Society of Civil Engineers' Climate-Resilient Infrastructure: Adaptive Design and Risk Management <https://ascelibrary.org/doi/book/10.1061/9780784415191>
- 67** American Society of Civil Engineers (ASCE 7) Minimum Design Loads and Associated Criteria for Buildings and Other Structures <https://ascelibrary.org/doi/book/10.1061/9780784415788>
- 68** https://www.tceq.texas.gov/permitting/business_permitting.html
- 69** ExxonMobil reported emissions, reductions, and avoidance performance data are based on a combination of measured and estimated emissions data. Calculations are based on industry standards and best practices, including guidance from the American Petroleum Institute (API) and IPIECA. There is uncertainty associated with the emissions, reductions, and avoidance performance data due to variation in the processes and operations, the availability of sufficient data, quality of those data and methodology used for measurement and estimation. Performance data may include rounding of subcategories. Changes to the performance data may be reported as part of the company's annual publications as new or updated data and/or emission

methodologies become available. ExxonMobil works with industry, including API and IPIECA, to improve emission factors and methodologies, including measurements and estimates.

- 70** The net equity greenhouse gas emissions metric was introduced in 2011 as a replacement for the direct equity greenhouse gas metric. Information has been restated back to 2016 according to the new metric. The net equity greenhouse gas metric includes direct and imported greenhouse gas emissions and excludes emissions from exports. ExxonMobil reports greenhouse gas emissions on a net equity basis (reflecting its percent ownership in an asset) and starting in 2022 on a gross operated basis, for all business operations.
- 71** The addition of direct emissions and emissions associated with exported power and heat is equivalent to World Resources Institute (WRI) Scope 1.
- 72** These emissions are equivalent to WRI Scope 2.
- 73** IPIECA/API/IOGP Sustainability reporting guidance for the oil and gas industry (4th edition, 2020).

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CAUTIONARY STATEMENT WARNING

CAUTIONARY STATEMENT RELEVANT TO FORWARD LOOKING INFORMATION FOR THE PURPOSE OF THE "SAFE HARBOR" PROVISIONS OF THE PRIVATE SECURITIES LITIGATION REFORM ACT OF 1995

Statements of future ambitions, goals, events or conditions in this publication, including projections, plans to reduce emissions and emissions intensity, sensitivity analyses, expectations, estimates, the development of future technologies, and business plans, are forward-looking statements. Actual future results, including the achievement of ambitions to reach Scope 1 and Scope 2 net zero from operated assets by 2050, to reach Scope 1 and 2 net zero in Upstream Permian Basin operated assets by 2030, to eliminate routine flaring in-line with World Bank Zero Routine Flaring, to reduce methane emissions, to meet its emission-reduction plans, divestment and start-up plans, and associated project plans as well as technology efforts, and reserve or resource changes could vary depending on the ability to execute operational objectives on a timely and successful basis; changes in laws and regulations, including international treaties and laws and regulations regarding greenhouse gas emissions and carbon costs; government incentives; trade patterns and the development and enforcement of local, national and regional mandates; unforeseen technical or operational difficulties; the outcome of research efforts and future technology developments, including the ability to scale projects and technologies on a commercially competitive basis; changes in supply and demand and other market factors affecting future prices of oil, gas, and petrochemical products; changes in the relative energy mix across activities and geographies; the actions of competitors; changes in regional and global economic growth rates and consumer preferences; the pace of regional and global recovery from the COVID-19 pandemic and actions taken by governments and consumers resulting from the pandemic; changes in population growth, economic development or migration patterns; military build-ups or conflicts; and other factors discussed in this release and in Item 1A. "Risk Factors" in ExxonMobil's Annual Report on Form 10-K for 2020 and subsequent Quarterly Reports on Forms 10-Q, as well as under the heading "Factors Affecting Future Results" on the Investors page of ExxonMobil's website at www.exxonmobil.com. We do not undertake to provide any updates or changes to any data or forward-looking statements in this document.

This document is a shareholder requested publication and is purposefully focused on unknown future events. It is not intended to communicate any material investment information. The statements and analysis in this document represent a good faith effort by the Company to address these requests despite significant unknown variables and, at times, inconsistent market and government policy signals. Energy demand modeling aims to replicate system dynamics of the global energy system, requiring simplifications. The reference to any scenario, including any potential net-zero scenario, does not imply ExxonMobil views any particular scenario as likely to occur. In addition, energy demand scenarios require assumptions on a variety of parameters. As such, the outcome of any given scenario using an energy demand model comes with a high degree of uncertainty. For example, the IEA describes its NZE scenario as extremely challenging, requiring unprecedented innovation, unprecedented international cooperation and sustained support and participation from consumers. Third-party scenarios discussed in this report reflect the modeling assumptions and outputs of their respective authors, not ExxonMobil, and their use or inclusion herein is not an endorsement by ExxonMobil of their underlying assumptions, likelihood or probability. Investment decisions are made on the basis of ExxonMobil's separate planning process, but may be secondarily tested for robustness or resiliency against different assumptions, including against various scenarios. Any reference to ExxonMobil's support of a third-party organization within this document does not constitute or imply an endorsement by ExxonMobil of any or all of the positions or activities of such organization.

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References to "resources," "resource base," "recoverable resources" and similar terms refer to the total remaining estimated quantities of oil and natural gas that are expected to be ultimately recoverable. ExxonMobil refers to new discoveries and acquisitions of discovered resources as "resource additions." The resource base includes quantities of oil and natural gas classified as proved reserves, as well as quantities that are not yet classified as proved reserves, but that are expected to be ultimately recoverable. The term "resource base" is not intended to correspond to SEC definitions such as "probable" or "possible" reserves. For additional information, see the "Frequently Used Terms" on the Investors page of the Company's website at exxonmobil.com. References to "oil" and "gas" include crude, natural gas liquids, bitumen, synthetic oil, and natural gas. The term "project" as used in this publication can refer to a variety of different activities and does not necessarily have the same meaning as in any government payment transparency reports.

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SUPPLEMENTAL INFORMATION FOR NON-GAAP AND OTHER MEASURES

Page 37 of this publication mentions operating cash flow in comparing different sources of revenue over times in a future scenario. 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 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 this publication, including on emissions, is not financial data and is not GAAP data.