# Advancing Climate Solutions

Progress Report

2023

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CAUTIONARY STATEMENT AND SUPPLEMENTAL INFORMATION
This document and its associated supplement provide disclosure on future emission-reduction plans and third-party models of potential future pathways and implications to our businesses. See Cautionary Statement on Page 100 for a discussion of these forward-looking statements. See the Supplemental Information on Page 100 of the publication and Page 2 of the GHG Data Supplement for a discussion of important information either required by Regulation G for non-GAAP measures or that we consider useful to investors like operating cash flow.


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# Executive summary

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As the world continues to face the challenge of securing adequate energy supply while ensuring the energy transition proceeds at pace – divergent views have emerged. There are some who believe that society's efforts should be solely directed toward the energy transition without considering the very real consequences of not ensuring energy security. ExxonMobil and others see the situation for what it is: There are two challenges of great importance, both necessitating the full cooperation and effort of companies, governments, and NGOs worldwide in order to address these critical issues.

In this edition of our Advancing Climate Solutions Progress Report, we share the ways in which ExxonMobil remains determined to tackle head-on the challenge of strengthening energy supply security and reducing emissions to support a net-zero future while growing value for our shareholders and stakeholders. We discuss the ways we will continue delivering solutions that lower the greenhouse gas emissions intensity of our portfolio and help meet society's growing need for affordable and reliable energy and products.

## What's new?

- Increased the amount we intend to invest from 2022 through 2027 on lower-emission initiatives to approximately $17 billion, up by nearly 15%.
- Achieved highest refinery throughput since 2007[1] and prepared to bring 250,000 barrels per day of expanded refining capacity on line in early 2023 – all in an effort to meet society's needs by providing additional supply.
- Deployed new technology to expand measurement and mitigation of methane emissions, and reduced methane emissions intensity from operated assets by more than 40% as of year-end 2021 versus 2016 levels in line with greenhouse gas emission-reduction plans.
- Remained on track to eliminate routine flaring in our Permian Basin operated assets by the end of 2022 in support of the World Bank Zero Routine Flaring Initiative.
- Grew and strengthened our Low Carbon Solutions business by focusing on competitively advantaged opportunities in carbon capture and storage, hydrogen, and biofuels. This included tripling the organization's size and signing the largest commercial agreement of its kind to capture and store $CO_2$.
- Reduced our Scope 1 and 2 emissions intensity by 9%, as we continue progress toward our 2030 greenhouse gas emission-reduction plans. These intensity reductions led to our absolute emissions falling by about 13%. These results are on an operated basis as of year-end 2021 versus 2016 levels.

- Improved the expected carbon intensity of our portfolio on a life-cycle basis.
- Increased plastics production capacity by nearly 10% to meet growing global needs, support low-carbon technologies, and avoid emissions,[2] while helping address the issue of plastic waste by starting up one of the largest advanced recycling facilities in North America.
- Advocated for supportive policies that would expand opportunities in lower-emission solutions, including methane regulations and enhanced incentives for carbon capture and storage and hydrogen under the U.S. Inflation Reduction Act.

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## Strategic priorities

We are focused on five strategic priorities to create sustainable solutions that improve quality of life and meet society's evolving needs.

Our strategy calls for us to maximize the advantages of our scale, business integration, leading technology, functional excellence, and our people to build globally competitive businesses that lead industry in earnings and cash flow growth across a range of future scenarios. We strive to play a leading role in the energy transition, bringing to bear these same advantages while retaining investment flexibility across a portfolio of evolving opportunities to grow shareholder value.

## Create sustainable solutions that improve quality of life and meet society's evolving needs

**Strategic priorities**

| | |
|---|---|
| Leading performance | Industry leader in operating and financial performance |
| Essential partner | Value through win-win solutions for our customers, partners, and broader stakeholders |
| Advantaged portfolio | Portfolio of assets and products outperform competition and grow value in a lower-emission future |
| Innovative solutions | New products, technologies, and approaches to accelerate large-scale deployment of solutions essential to modern life and lower emissions |
| Meaningful development | Diverse engaged organization with unrivaled opportunities for personal and professional growth |

## 2050 net-zero ambition and 2030 emission-reduction plans

As part of this strategy, with advances in technology and the support of clear and consistent government policies, we aim to achieve net-zero operated Scope 1 and 2 greenhouse gas emissions by 2050. To this end, we have taken a comprehensive approach to create emission-reduction roadmaps for our major operated assets. The roadmaps build on our 2030 emission-reduction plans, which are within Paris Agreement pathways[3] and, notably, include reaching net-zero emissions in our unconventional Permian Basin operated assets by 2030.

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## Reducing emissions intensity

Our 2030 GHG emission-reduction plans

| 20-30% | 40-50% | 70-80% | 60-70% |
|---|---|---|---|
| Reduction in corporate-wide greenhouse gas intensity. | Reduction in upstream greenhouse gas intensity. | Reduction in corporate-wide methane intensity. | Reduction in corporate-wide flaring intensity. |

Versus 2016 levels. Applies to Scope 1 and 2 GHG emissions from operated assets.

**Our 2030 emission-reduction plans are intensity based. They focus on driving industry-leading performance while still meeting the needs of society.**

These plans include actions that are also expected to achieve:

- Absolute reduction in corporate-wide greenhouse gas emissions by approximately 20% (or approximately 23 million metric tons).
- Absolute reduction in upstream greenhouse gas emissions of approximately 30% (or approximately 15 million metric tons).
- Absolute flaring reduction of approximately 60%.
- Absolute reduction in methane emissions by 70%.
- World Bank Zero Routine Flaring by 2030.

These emission-reduction plans cover Scope 1 and 2 emissions from assets we operate, compared to 2016 levels. For non-operated assets, we work with our equity partners to advance greenhouse gas reductions to achieve comparable results.

## Lower-emission investments

Through 2027, we plan to invest approximately $17 billion on initiatives to lower greenhouse gas emissions, an increase of nearly 15% from the amount we announced last year. These investments are designed to make possible reduced emissions in our operations and are also directed toward reducing others' emissions through commercializing and scaling carbon capture and storage, hydrogen, and biofuels.

## Advocating for policy support

Policy support, along with technology advancements, can and will further accelerate development and deployment of lower-emission technologies necessary to arrive at a net-zero future. We have consistently advocated for sound government policies like enhanced incentives for carbon capture and storage and hydrogen. We also support market-based, technology-neutral policies that recognize the value of addressing full life-cycle emissions versus focusing solely on Scope 3 emissions, thereby incentivizing companies to take actions that reduce emissions, while still meeting the world's demand for essential energy and products.

To meet a net-zero goal, companies must fully understand net emissions and have a consistent means of comparing themselves against others in their industry.

## Outlook for Energy (Outlook)[4]

The 2022 Outlook for Energy is ExxonMobil's latest projection of energy supply and demand through 2050 using models based on current trends in economic development, technology, global policies, geopolitics, and consumer behavior.

All energy sources are projected to remain important through 2050, with oil and natural gas accounting for 55% of the world's energy mix in 2050.

Many products, from plastics to fabrics to construction materials, are petroleum-based, resulting in increased industrial demand for oil as both a raw material and energy source. Global demand growth for raw materials into chemical products (such as plastics used in medical supplies, lighter-weight vehicles, food packaging, and more) is expected to double from 2021 to 2050.[5]

## Key takeaways from 2050 projections

Energy and human development are tightly linked

Energy demand increases 15% to support rising human development in the developing world.

Innovative solutions and supportive policies are needed to reach a Lower 2°C pathway.

The industrial sector represents 50% of energy consumption to produce society's goods and infrastructure.

Biofuels, hydrogen-based fuels, and carbon capture and storage offer lower-emission solutions for hard-to-decarbonize sectors.

Energy demand for transportation rises 30% as the growing middle class increases travel and buys more goods.

Oil and natural gas continue to play an important role. Sustained investment is needed to meet demand.

Source: ExxonMobil 2022 Outlook for Energy

## ExxonMobil remains resilient through the energy transition

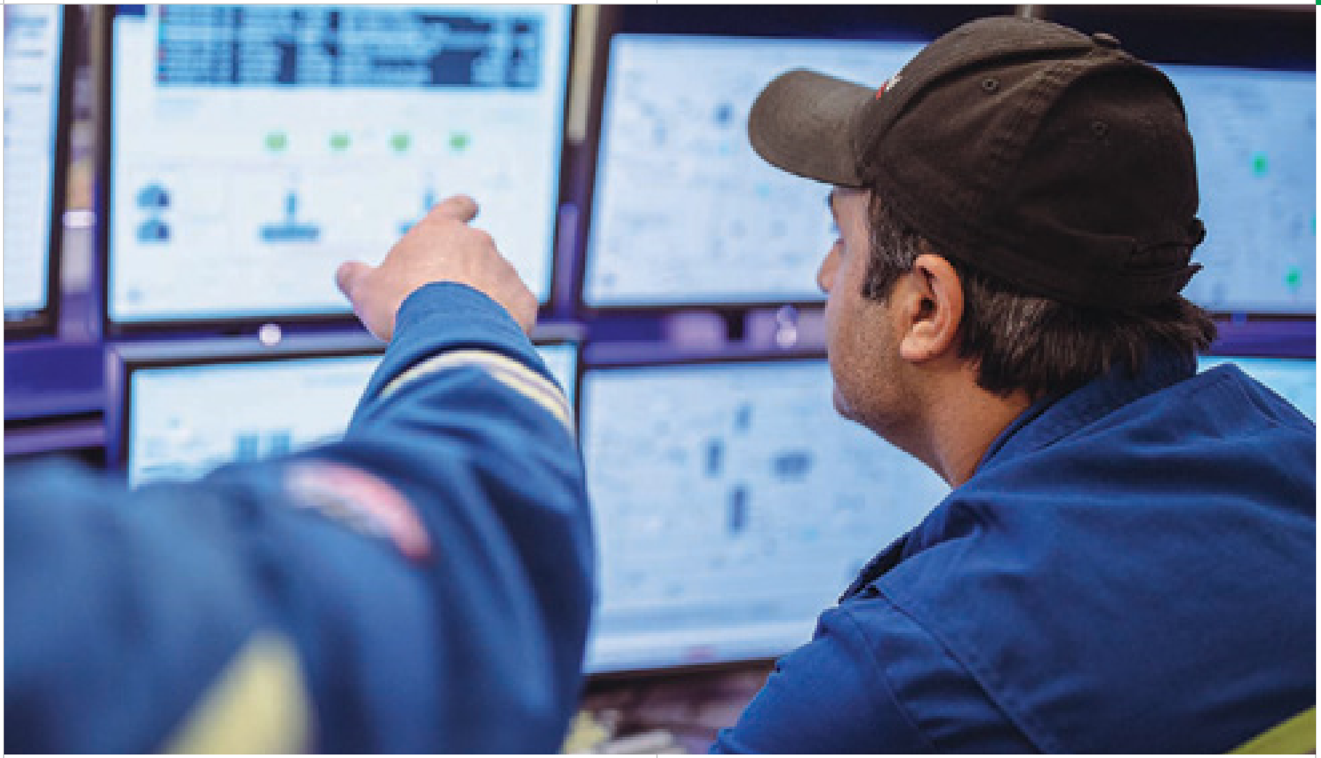
We have continued to test the resiliency of our business and investment portfolio against a range of future scenarios that are aligned with the goals of the Paris Agreement, including the International Energy Agency's (IEA) Net Zero Emissions by 2050 (NZE) scenario. These resiliency tests demonstrate that our business is positioned for growth even in an aggressive decarbonization pathway, driven by the growth potential for chemicals, lower-emission fuels, carbon capture and storage, and hydrogen opportunities, which are critical to achieve net zero.

For more than 140 years, we have been a leader in innovation, supplying the energy and products people need to live healthy, prosperous lives in the modern world. We are continuing this legacy of innovation by doing our part to provide energy security and evolving our operations in ongoing support of a net-zero future – all while creating long-term shareholder value.

# Our strategic priorities

We are focused on five strategic priorities to create sustainable solutions that improve quality of life and meet society's evolving needs.

- **Leading performance:** Industry leader in shareholder returns; earnings and cash flow growth; safety; reliability; greenhouse gas emissions intensity; and cost and capital efficiency.
- **Essential partner:** Create value through win-win solutions for our customers, partners, and other stakeholders, including communities in which we operate.
- **Advantaged portfolio:** Portfolio of assets and products that outperform competition and grow value in a lower-emission future; flexible portfolio of industry-leading, high-return investments that strengthen our competitive position in an evolving world.
- **Innovative solutions:** Develop new products, approaches and technologies to improve competitiveness and accelerate large-scale deployment of solutions essential to modern life and a lower-emission future.



- **Meaningful development:** A diverse and engaged organization that provides every individual unrivaled opportunities for personal and professional growth with impactful work meeting society's evolving needs.

We plan to play a leading role in the energy transition as we retain investment flexibility across a portfolio of evolving opportunities to maximize shareholder returns.

# Progress toward net zero by 2050

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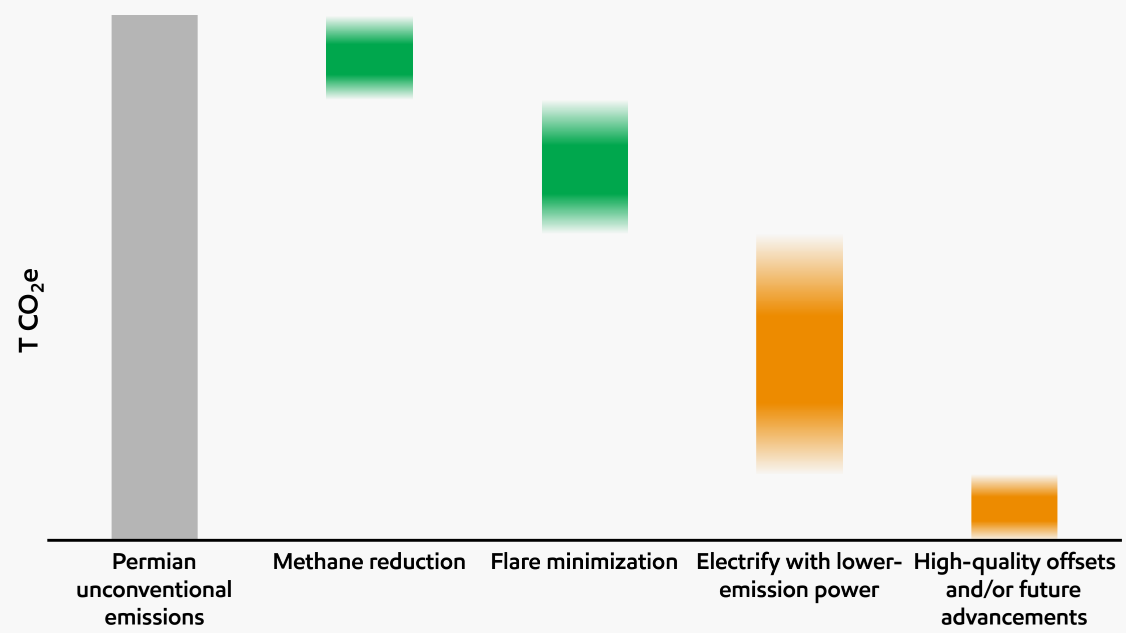
With advancements in technology and the support of clear and consistent government policies, we aim to achieve net-zero Scope 1 and 2 greenhouse gas emissions in our operated assets by 2050.

ExxonMobil's net-zero ambition is backed by a comprehensive approach centered on detailed emission-reduction roadmaps for our major operated assets. We completed these roadmaps in 2022, and will be updating them as needed to reflect technology, policy, and other developments, including the development and acquisition of major operated assets.

One example of our roadmap approach is our Permian Basin unconventional operations, where we announced industry-leading plans to reach net-zero Scope 1 and 2 emissions by 2030. We are working to electrify operations with lower-emission power, which may include wind, solar, and natural gas. We are also working to expand and accelerate our methane detection and mitigation technology, eliminate routine flaring, upgrade equipment, and employ high-quality emissions offsets, which may include nature-based solutions.

## Potential GHG abatement options for ExxonMobil Permian unconventional operated assets supporting 2030 net-zero plan[6]

Roadmap

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## 2030 greenhouse gas emission-reduction plans[7]

Our 2030 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 corporate-wide methane intensity and 60-70% in corporate-wide flaring intensity. These plans apply to Scope 1 and 2 greenhouse gas emissions from our operated assets versus 2016 levels.

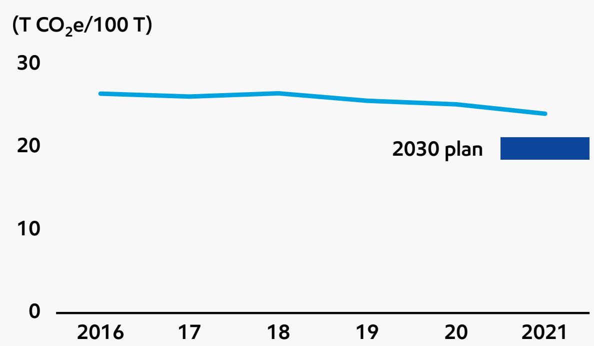
Our actions to reduce emissions through 2030 include:

- Achieving net-zero Scope 1 and 2 greenhouse gas emissions in our Permian Basin unconventional operated assets.
- Deploying carbon capture and storage, hydrogen, and lower-emission fuels in our operations.
- Further reducing methane emissions at operated assets in alignment with the Global Methane Pledge and Oil and Gas Climate Initiative developed Aiming for Zero Methane Emissions Initiative 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, which mitigates methane and greenhouse gas emissions.
- Integrating lower greenhouse gas energy sources into our facilities, for example through long-term renewable power purchase agreements and equipment electrification.
- Improving energy efficiency in our businesses by adapting operational and maintenance processes, such as improving furnace efficiency.
- Substituting blue hydrogen for natural gas to reduce emissions from our manufacturing operations.
- Deploying innovative lower-emission solutions to further reduce greenhouse gas emissions with future advancements in technology and supportive policies.

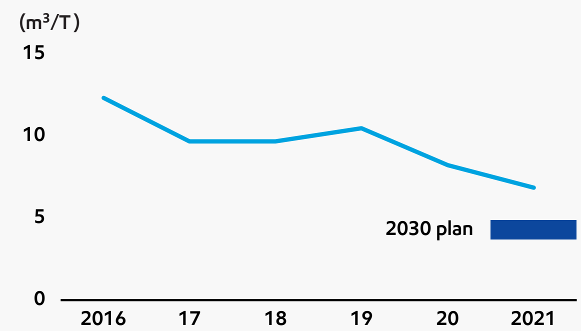
We are working to continuously improve our performance, methods to detect and address methane emissions, and our measurement of emissions, with the aim to lower our emissions in support of our greenhouse gas emissions plans.

## Progress toward 2030 greenhouse gas emission-reduction plans[7,8]

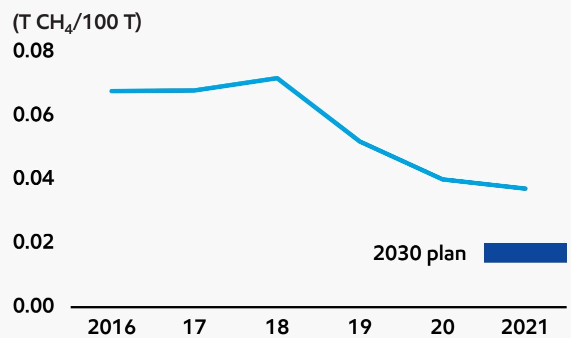
**Corporate-wide operated GHG emissions intensity**



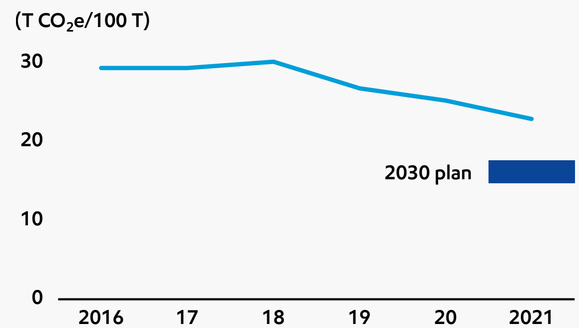

**Corporate-wide operated hydrocarbon flaring intensity**




**Corporate-wide operated methane emissions intensity**




**Upstream operated GHG emissions intensity**

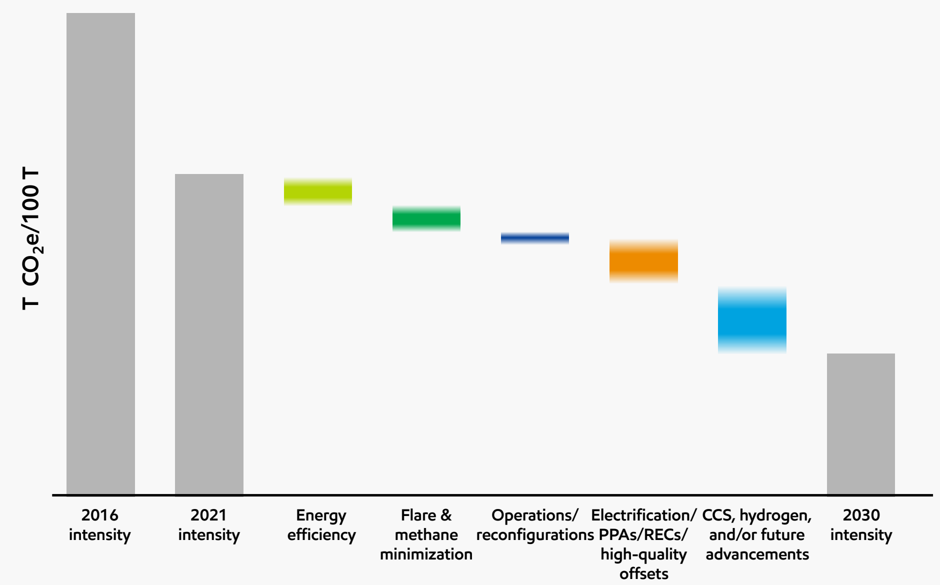


## Approach to greenhouse gas emissions reductions in business planning

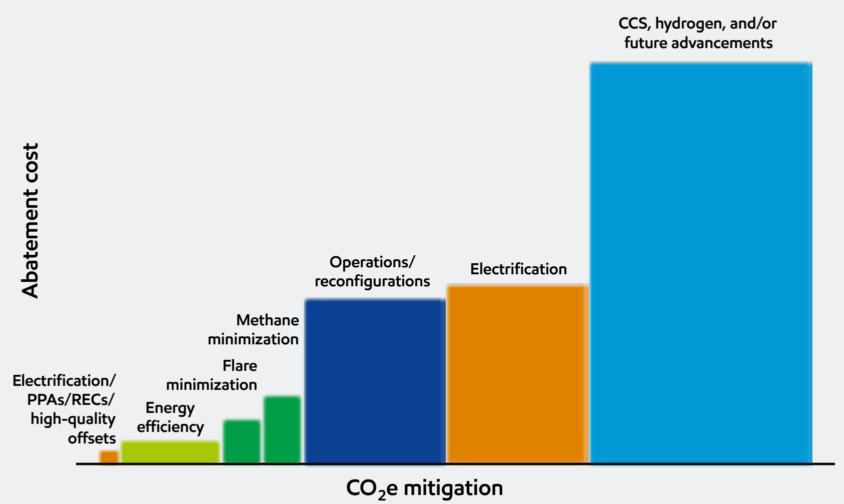
Actions needed to advance our 2030 greenhouse gas emission-reduction plans are incorporated into our medium-term business plans, which we update annually. The reference case for planning beyond 2030 including impairment assessments and future planned development activities is based on our Outlook for Energy. The Outlook is reflective of the existing global policy environment and does not attempt to project the degree of necessary future policy and technology advancement and deployment for the world, or ExxonMobil, to meet net zero by 2050. As policies are implemented and technology advancements emerge, they will be incorporated into the Outlook, and our business plans will be updated accordingly.

## Potential GHG abatement options for ExxonMobil operated assets supporting 2030 GHG emission-reduction plans[6]

### Roadmap




### Abatement curve



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# Positioning for a lower-emission future

We have evolved our operating model, enabling efficiencies that better leverage the scale of an increasingly integrated company. At the same time, we have centralized many of the skills and capabilities required by our businesses, allowing us to improve allocation of critical resources; enable continuous improvement, including detection and measurement of emissions; and drive value. This serves us well in a variety of future scenarios, irrespective of the pace of the energy transition.

## Core businesses

- **Upstream** is critical to strengthening energy security by expanding our low-cost-of-supply, high-return oil and natural gas operations.
- **Product Solutions** consolidates Downstream and Chemical to form the world's largest downstream and chemical company developing high-value innovative products needed by modern society.
- **Low Carbon Solutions** helps to lower society's greenhouse gas emissions by providing solutions in growing markets for carbon capture and storage, hydrogen, and biofuels. It also supports reducing emissions from our major operations and products.

## Evolving our model to strengthen competitiveness

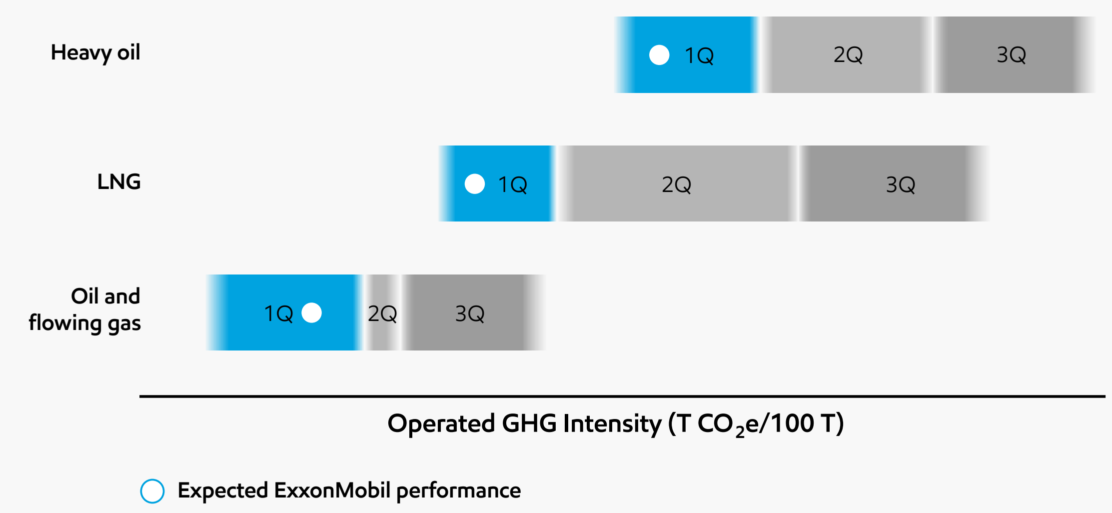
Realizing full set of corporate competitive advantages

**Delivering solutions**


- Fully capturing benefits of scale and integration
- Leveraging synergies across businesses
  - Consolidating capabilities and skills
  - Eliminating duplication and redundancy
- Central ownership for enterprise-wide capabilities, practices, and processes
  - Harmonizing practices and processes
  - Allocating critical resources to highest priorities

## 2030 Upstream GHG intensity[9]

By resource type and benchmarking quartile (Q)




## Upstream

We are well positioned to help meet the need for oil and natural gas through the next decade and beyond, delivering value by reducing structural costs, growing high-value production at low cost of supply, and improving emissions intensity.[9]

As part of our net-zero ambition, we have identified more than 100 potential modifications to reduce emissions across all upstream asset types including energy efficiency measures and equipment upgrades. Examples include carbon capture and storage at operations in the U.S., Australia, and Canada; electrification of compressors and heaters in our Permian operations; and replacement of pneumatic devices with electrical or mechanical devices to eliminate fugitive emissions in natural gas operations. These examples demonstrate our capacity to lead industry as a responsible operator and are expected to deliver first quartile Scope 1 and 2 emissions intensity performance by 2030 for each resource type when benchmarked against other operators based upon available data.[9]

## Unconventional operations

We have set a goal to be net zero in Scope 1 and 2 greenhouse gas emissions by 2030 for our Permian Basin unconventional operated assets. The enhancements in our unconventional operations include electrification, improving processes, minimizing flaring, and using electricity from renewables and other lower-emission sources.

Our efforts have already helped us achieve the top certification for methane emissions management at our Poker Lake, New Mexico, facilities from independent validator MiQ.

## Liquefied natural gas (LNG)

ExxonMobil is progressing development of approximately 12 million metric tons per year of low-cost, high-efficiency liquefaction capacity to meet expected global demand growth for LNG. This includes diverse projects in the U.S., Papua New Guinea, Mozambique, and Qatar with operations to be among industry's lowest in greenhouse gas intensity.[10]


## Deepwater

ExxonMobil's deepwater oil and gas developments are being designed to support our 2030 greenhouse gas emission-reduction plans.

For example, 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 its sustainable design and operating procedures.

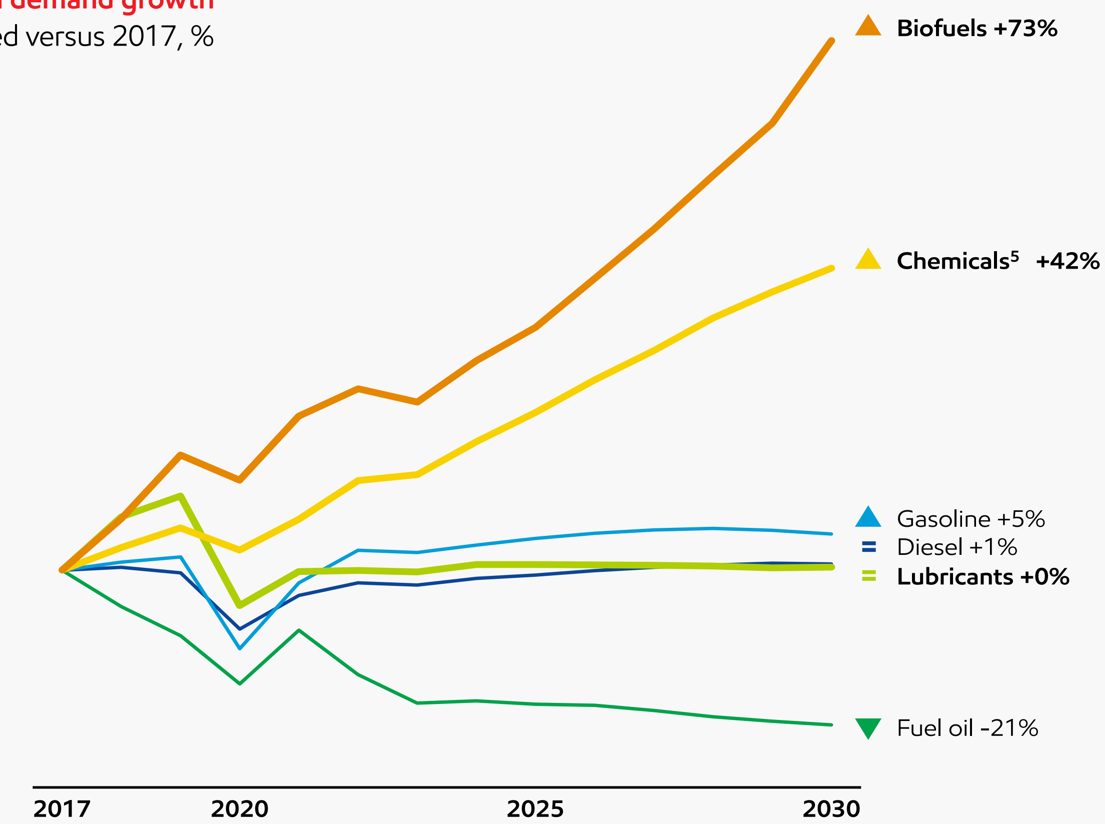
## Product Solutions

Our Product Solutions business plays a critical role in providing products that are needed for modern life. Our customers want high-value products with lower life-cycle greenhouse gas emissions, which requires product innovation and emissions intensity reductions in our manufacturing processes.

Our refining and chemicals businesses each operate within the first quartile for greenhouse gas intensity.[11] Through 2030, we expect to more than offset emissions from new operated facilities needed to meet growing demand. Our emission-reduction plans consider fuel switching to hydrogen; carbon capture and storage projects in Houston, Rotterdam, Scotland, and Antwerp; renewable power purchase agreements; energy efficiency projects; and conversions of select refineries to terminals.

### Global demand growth[12]

Indexed versus 2017, %




Source: ExxonMobil 2022 Outlook for Energy, ExxonMobil analysis

## Energy products

Demand for conventional fuels is expected to peak this decade and then begin to decline, while demand for energy-dense, lower-emission fuels is expected to grow rapidly, driven by hard-to-decarbonize transportation sectors such as aviation, marine, and heavy-duty trucking.

More than 75% of our manufacturing capacity is co-located in large, integrated sites that have the flexibility to shift product yield to best meet society's evolving needs. As demand for conventional road transport fuels declines, select assets can be repurposed to manufacture high-value products including chemicals, lubricants, and lower-emission fuels.

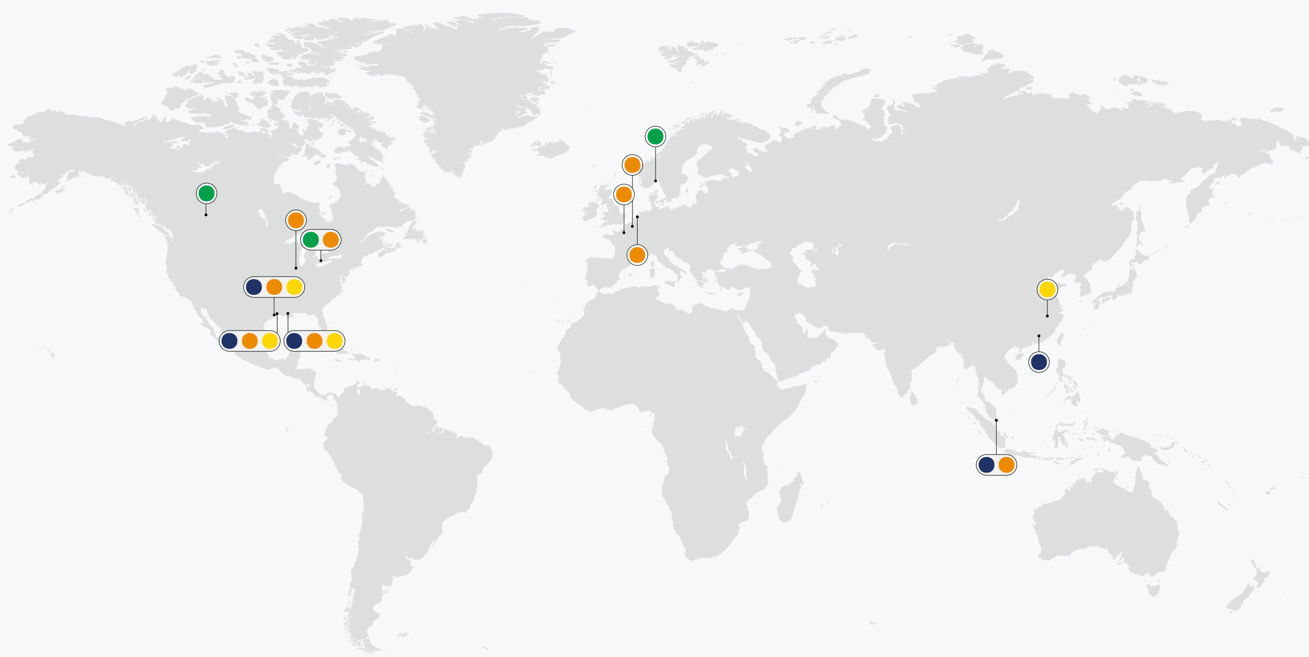
We continue to improve our portfolio, focusing investments on those major assets in locations with sound comprehensive carbon policy. Our investments in North America, China, and Singapore will help meet the growing demand for products with lower life-cycle emissions, and the flexibility of our sites will allow us to change as society's needs evolve.

## Chemical products

Global chemical demand is expected to grow faster than the global economy,[13] driven by demand for products like cell phones and medical supplies, as well as products necessary to preserve food and improve hygiene. Demand for performance chemicals, including our performance polyethylene and polypropylene, is expected to remain strong and resilient through the energy transition. These products support customers' efficiency and greenhouse gas emission-reduction needs. To further support our customers, we continue to grow the supply of performance chemicals through large, competitively advantaged investments such as:

- The Gulf Coast Growth Venture, which started up at the end of 2021, ahead of schedule and under budget. The operation includes a 1.8 million-metric-ton-per-year ethane steam cracker, two polyethylene units capable of producing up to 1.3 million metric tons per year, and a monoethylene glycol unit with a capacity of 1.1 million metric tons per year.

### Key plan activities to grow high-value products[14]



**Major expansions**
- Performance polypropylene – Baton Rouge, Louisiana
- Performance chemicals – Baytown, Texas
- Refinery expansion – Beaumont, Texas
- Performance chemicals – Guangdong, China
- Lubricants and chemicals – Singapore

**Advanced recycling**
- Baton Rouge, Louisiana
- Baytown, Texas
- Beaumont, Texas
- Joliet, Illinois
- Sarnia, Canada
- Antwerp, Belgium
- Gravenchon, France
- Rotterdam, Netherlands
- Singapore

**Biofuels**
- Renewable diesel – Strathcona, Canada and Slagen, Norway
- Bio co-processing – Sarnia, Canada

**Other**
- U.S. Gulf Coast refinery reconfigurations
- China lubricants expansion

- The Baton Rouge, Louisiana, performance polypropylene project, which started up in fourth quarter 2022, expanded our production capacity along the Gulf Coast by 450,000 metric tons per year.
- The Baytown, Texas, chemical expansion, which will produce about 400,000 metric tons of Vistamaxx™ polymers per year and about 350,000 metric tons of Elevexx™ linear alpha olefins per year.
- The chemical complex in Guangdong province, China, which includes performance polyethylene lines, differentiated performance polypropylene lines, and a flexible feed steam cracker with a capacity of about 1.6 million metric tons per year.

## Specialty products

Demand for lubricants is expected to remain strong and grow in the industrial, aviation, and marine sectors. Our Singapore Resid upgrade project will upgrade bottom-of-the-barrel products into higher-value lubricant basestocks and cleaner fuels. This investment will position us to better meet demand growth in Asia, while displacing higher-carbon intensity products in the marketplace.

## Helping customers reduce their emissions

Our competitive advantages of scale, integration, and proprietary technology provide customers with products that improve efficiency, avoid greenhouse gas emissions associated with alternative products, and serve a range of applications, including health and safety, packaging, transportation, and industrial.

## Innovative solutions to improve modern life

- Plastic packaging has 54% lower life-cycle greenhouse gas emissions versus alternatives.[15]
- Exceed™ XP enables up to 30% thinner plastic packaging versus conventional plastics for equivalent performance.[16]
- Certified circular polymers[17] offer equivalent performance of virgin plastics.

## Total vehicle product solutions improve transportation efficiency

- Plastics enable lighter vehicles and 6-8% fuel efficiency improvement for every 10% reduction in vehicle weight.[18]
- Butyl rubber improves air retention in tires, which can increase electric vehicle range by up to 7%.[19]
- Mobil 1 ESP X2 0W-20 engine oil helps provide up to 4% fuel economy improvement.[20]
- Renewable diesel can reduce carbon emissions by up to 70% compared to conventional diesel.[21]
- Marine biofuel can reduce carbon emissions by up to 30% compared to conventional marine fuel.[22]

## Reliable solutions for industrial efficiency

- Mobil DTE 10 Excel Series provides up to 6% improvement in hydraulic pump efficiency.[23]
- Mobil SHC™ 600 Series provides up to 3.6% energy efficiency gain.[24]
- Mobil SHC™ Gear WT helps reduce oil consumption and maintenance costs through extended oil life and drain intervals.[25]

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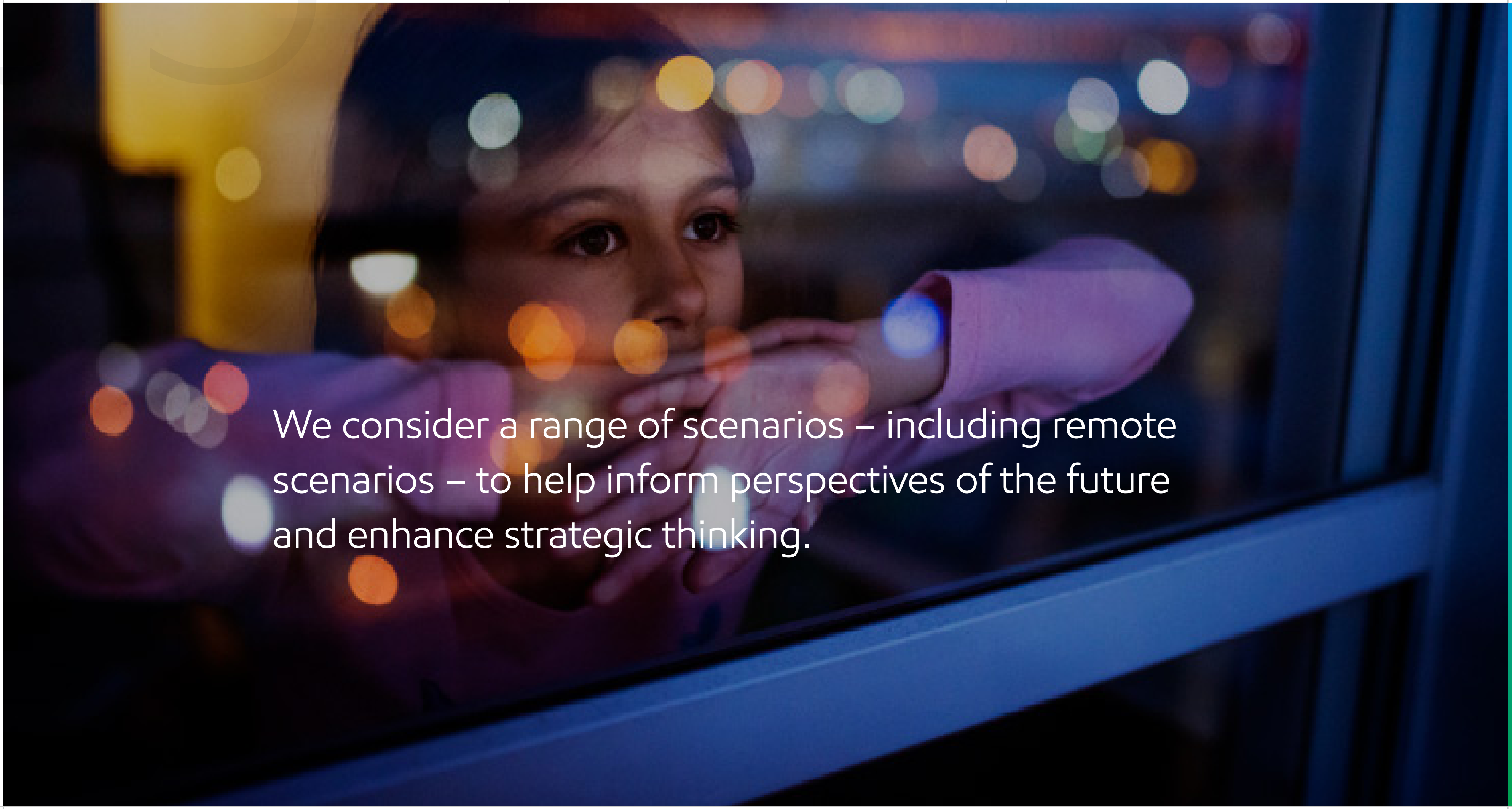
# Understanding the role of scenarios and ExxonMobil's Outlook for Energy



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No single transition 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.

We use projections and scenarios from reputable third parties such as the IEA and the Intergovernmental Panel on Climate Change (IPCC) to help inform our thinking, including the resiliency of our portfolio and opportunities.[26] While any one scenario may be remote in probability, all of these projections and scenarios are useful in informing our long-term strategic priorities (including potential investments, divestments, mergers, and acquisitions) as we evolve our businesses and integrate learnings to further improve resiliency.

Most projections indicate the world population will grow and that people will strive for better living standards, driving greater energy demand. At the same time, aspirations to limit the rise of average global temperatures while ensuring reliable and affordable energy products mean that the energy system could be quite dynamic, with a range of scenarios in the energy transition pathway that may unfold.

Our strategy, business model, and emission-reduction plans provide a framework for strengthening resiliency. As an integrated company with assets around the world, we believe taking a portfolio approach is the best way to make capital-allocation decisions, which drive future cash flows. This approach helps ensure flexibility and optionality to shift investments to adapt to an uncertain world and maximize value for our stakeholders. We evolve our portfolio to responsibly and efficiently meet needs for lower-emission intensity oil and natural gas, chemicals, and lubricants while advancing carbon capture and storage, hydrogen, and biofuels. In doing so, we position ExxonMobil to grow earnings, cash flow and shareholder value, even in aggressive emission-reduction scenarios like the IEA NZE.

## Our Outlook for Energy[4]

The Outlook for Energy is our latest view of energy demand and supply through 2050. It forms the basis for our business planning and is underpinned by a deep understanding of long-term fundamentals. In addition to assessing trends in economic development, technology advances, and consumer behavior, the Outlook seeks to identify potential impacts of climate-related government policies, which often target specific sectors.

To support a robust evaluation, our business planning process annually updates assumptions by major regions for crude oil and natural gas pricing. We look at refinery and chemical margins, production, and costs, including greenhouse gas emissions prices and policy. During the funding process, we actively test major investment opportunities on key aspects, such as financial performance and greenhouse gas intensity through an opportunity-specific, scenario-based evaluation process. This informs actions that are improving the portfolio mix, such as adding low cost-of-supply oil and gas production, as well as higher-value fuel and chemical products. This enhances resiliency and positions us to lead through the energy transition.

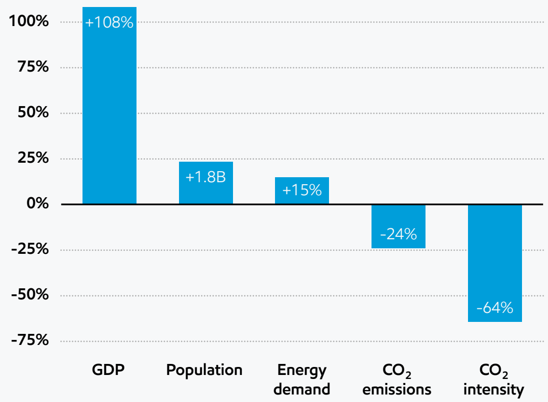
We also publish components of this Outlook on our website so that interested parties can see our key assumptions and conclusions and the data and analysis behind them.

## Outlook highlights

Energy and human development are tightly linked. Between now and 2050, the world population is expected to grow to almost 9.7 billion from 7.8 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, translating to more demand for electricity, as well as for homes, transportation, consumer goods, and the energy to power them. Importantly, many across the globe will, during this period, have access to reliable energy for the first time.

## Key dimensions of the Outlook for Energy

(Growth from 2021 to 2050)




Source: ExxonMobil 2022 Outlook for Energy

The Outlook projects efficiency gains that will reduce energy use per capita in developed countries. On the other hand, developing nations will increase energy use per capita as they pursue improved living standards. This growing demand in developing countries, which represent about 85% of the increased global population, leads to an estimated 15% increase in energy demand in 2050 versus 2021.

Energy-related greenhouse gas emissions are projected to peak by 2030 before declining about 24% by 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 an improvement of more than 60% in the carbon emissions intensity of global GDP from 2021 to 2050.

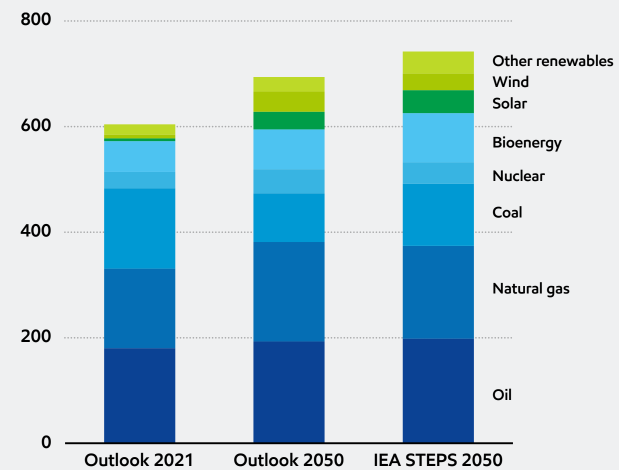
The chart to the right highlights the mix of energy sources the Outlook projects will be needed to meet demand. Our projections are directionally similar to the IEA's Stated Policies Scenario (STEPS), which is based on a sector-by-sector assessment of the current and announced government policies around the world. Both project that wind and solar will make up about 10% of primary energy demand in 2050, up from less than 2% today. Both also indicate that oil and natural gas will account for more than 50% of total primary energy in 2050.

### Use of sensitivity analysis

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

## Oil and natural gas remain important

(Exajoules)



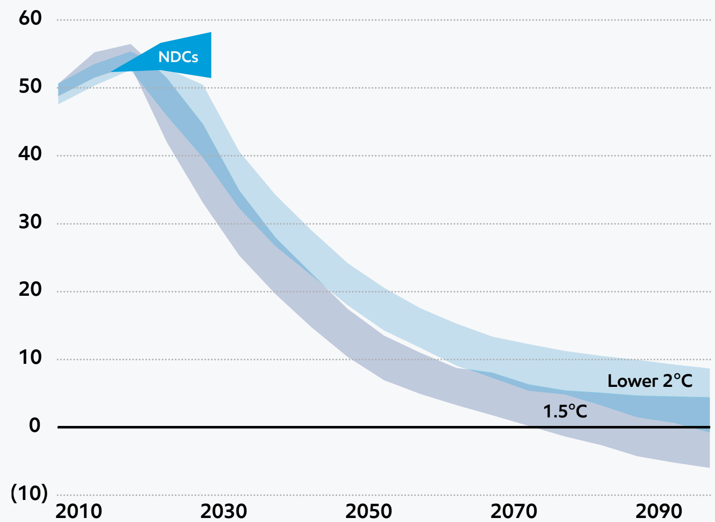

Source: ExxonMobil 2022 Outlook for Energy, IEA World Energy Outlook 2021

## More is needed to put the world on a 2°C pathway

The U.N. Environment Programme Emissions Gap Report states that current Nationally Determined Contributions (NDCs) to 2030, which were updated at COP26, are not yet within a Lower 2°C pathway. It further states that G20 members as a group do not have policies in place to achieve their current NDCs. According to the report, more government policy support is needed to potentially develop markets to achieve NDC goals and for the world to accelerate progress toward a 2°C pathway.[27]

### Global GHG emissions[28]

(GT $CO_2e$)




Source: UNFCCC 2021 Synthesis Report, IPCC Sixth Assessment Report, ExxonMobil analysis. Range shown is interquartile within scenario group.

In addition, a significant difference remains between projected emissions based on NDCs and emission pathways compatible with the long-term temperature goal set in the Paris Agreement. Compared to previous unconditional NDCs, the COP26 pledges by governments reduce projected 2030 greenhouse gas emissions by only 7.5%. This is in the face of the 30% emission reduction needed to limit global average temperature increase to below 2°C, and the 55% needed to limit temperature increases to 1.5°C.[27]

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 policy to support 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.

The Outlook estimates energy-related $CO_2$ emissions in 2050 to have dropped by 24% versus 2021 to 25 billion metric tons per year – approximately 20% lower than IEA STEPS and 35% higher than IEA APS.

## IPCC Lower 2°C Scenarios

In 2022, the IPCC published the Working Group III contribution to the Sixth Assessment Report on Mitigation of Climate Change (IPCC AR6)[29] and utilized more than 1,200 potential pathways with underlying socioeconomic development assumptions, energy system transformations, and land use change until the end of the century. The IPCC report identified 311 scenarios as "Lower 2°C," which are defined as pathways with a 67% likelihood of limiting peak warming to below 2°C throughout the 21st century.

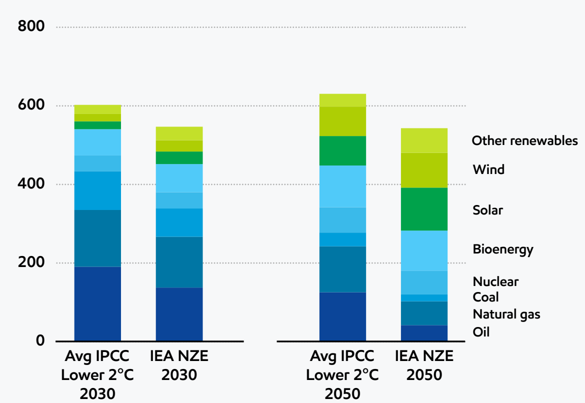
## IEA Net Zero Emissions by 2050 Scenario

In its 2021 World Energy Outlook, the IEA included its Net Zero Emissions by 2050 Scenario (IEA NZE),[30] a 1.5°C scenario, which lays out a pathway for the global energy sector to achieve net-zero $CO_2$ emissions by 2050. Unlike our Outlook, which is a projection, the NZE scenario works backward from a hypothetical outcome to identify the factors that would need to occur to achieve that outcome.[31] The IEA describes the IEA NZE as extremely challenging, requiring all stakeholders – governments, businesses, investors and citizens – to take immediate, unprecedented action so that the goal does not slip out of reach.

The chart below depicts the range of global energy demand in 2050 across the IPCC Lower 2°C and IEA NZE scenarios. As the chart shows, predicting absolute 2050 energy demand levels in total and by energy type carries a range of uncertainty. As noted, technology and policy assumptions heavily influence particular scenarios.

### Global energy demand mix across IPCC Lower 2°C and IEA NZE

(Exajoules)

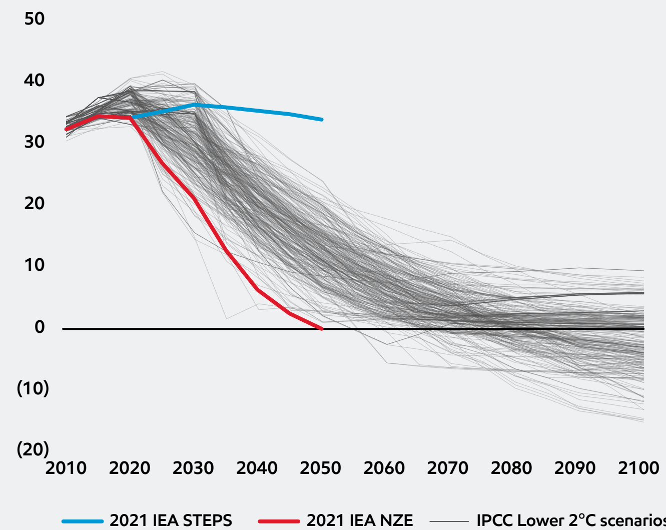



Source: IEA World Energy Outlook 2021, IPCC Sixth Assessment Report, ExxonMobil analysis

The Global $CO_2$ emissions chart illustrates potential global energy-related $CO_2$ emissions trajectories of these IPCC Lower 2°C scenarios, the IEA NZE, and the IEA Stated Policies Scenario (STEPS). While these scenarios show reduced emissions over time, the pace of reduction varies widely. STEPS projects emissions peak by 2030, at a comparable level generally in line with NDC submissions. The IEA NZE pathway is significantly more aggressive than most of the IPCC Lower 2°C scenarios.

### Global $CO_2$ emissions

(GT $CO_2$)

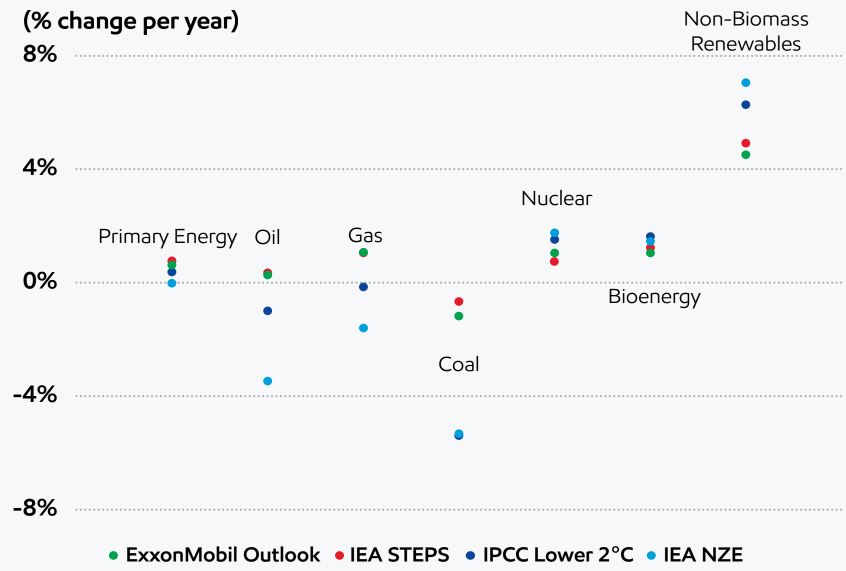



Source: IEA World Energy Outlook 2021, IPCC Sixth Assessment Report, ExxonMobil analysis. Land use and natural sinks are excluded.

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.[32] This is shown together with the growth rates of the IEA NZE scenario, IEA STEPS, and the Outlook for Energy in the chart.

## 2010-2050 growth rates by energy type

(CAGR)



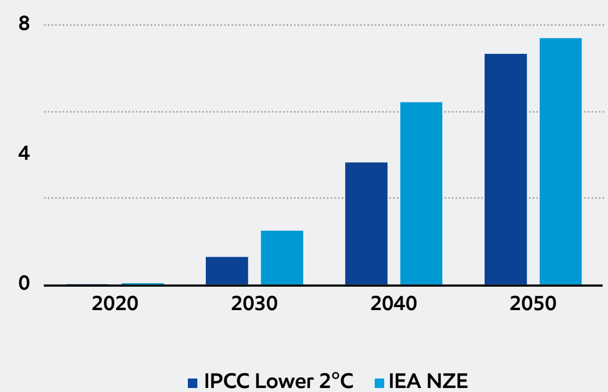

Source: IEA World Energy Outlook 2021, IPCC Sixth Assessment Report, ExxonMobil analysis, ExxonMobil 2022 Outlook for Energy

These scenarios project total primary energy demand on a worldwide basis to only marginally increase, from zero to 0.4% per year on average from 2010 to 2050, and assume that energy efficiency improvements would almost entirely offset population and economic growth. Expected demand and technologies deployed by 2050 vary by model and energy type.

All energy sources remain important through 2050 across these scenarios, as the mix of energy and technology shifts over time.

## CCS growth required in Lower 2°C and IEA NZE scenarios

($GT\ CO_2$)




Source: IEA World Energy Outlook 2021, IPCC Sixth Assessment Report

## Oil and natural gas remain essential components of the energy mix

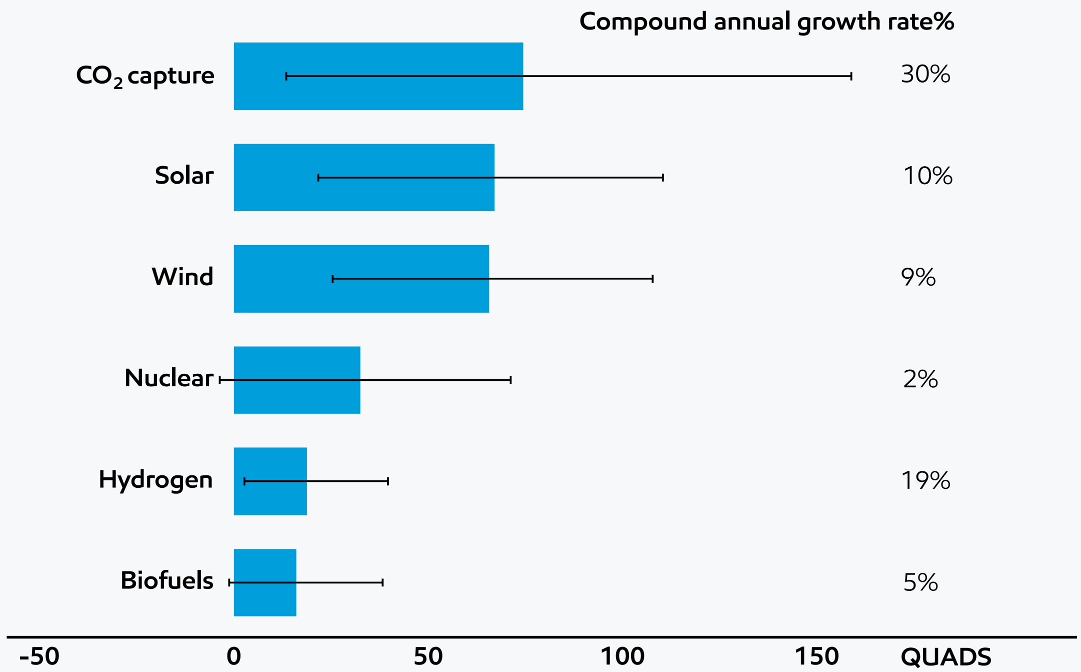
To meet the world's oil demand in 2050 under the IEA NZE scenario, substantial new investments are required for oil and natural gas production to offset natural decline from producing fields. Only about half of the world's oil demand will be met in 2050 under the IEA NZE scenario without additional drilling and investment. Natural gas is projected to have less demand reduction due to its many advantages, including lower greenhouse gas emissions. To ensure energy security and stable supply in the face of geopolitical instability, new discoveries will be needed even under IEA NZE.

Limiting the supply of oil and natural gas when these energy sources will clearly continue to be essential could lead to shortages, regressive inflationary pressure, or an increase in societal greenhouse gas emissions because some may resort to more carbon-intense alternatives. This is not speculation. We see aspects of this phenomenon occurring today because of years of underinvestment, exacerbated by regional political instability and conflict.

The third-party scenarios also illustrate that the energy transition will evolve differently in each region 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, hydrocarbons, and carbon storage sites, among others. Additionally, access to reliable and affordable sources of energy in developing nations may affect their view of the urgency associated with climate change. Energy security is a concern for both developed and developing nations.

These scenarios imply a range of lower-emission 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-emission solutions. While all of these 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 policies and technology advancements are needed to incentivize investments and influence consumer behavior. Striking the right balance in investments at a pace consistent with policy support and technology advancements is crucial.

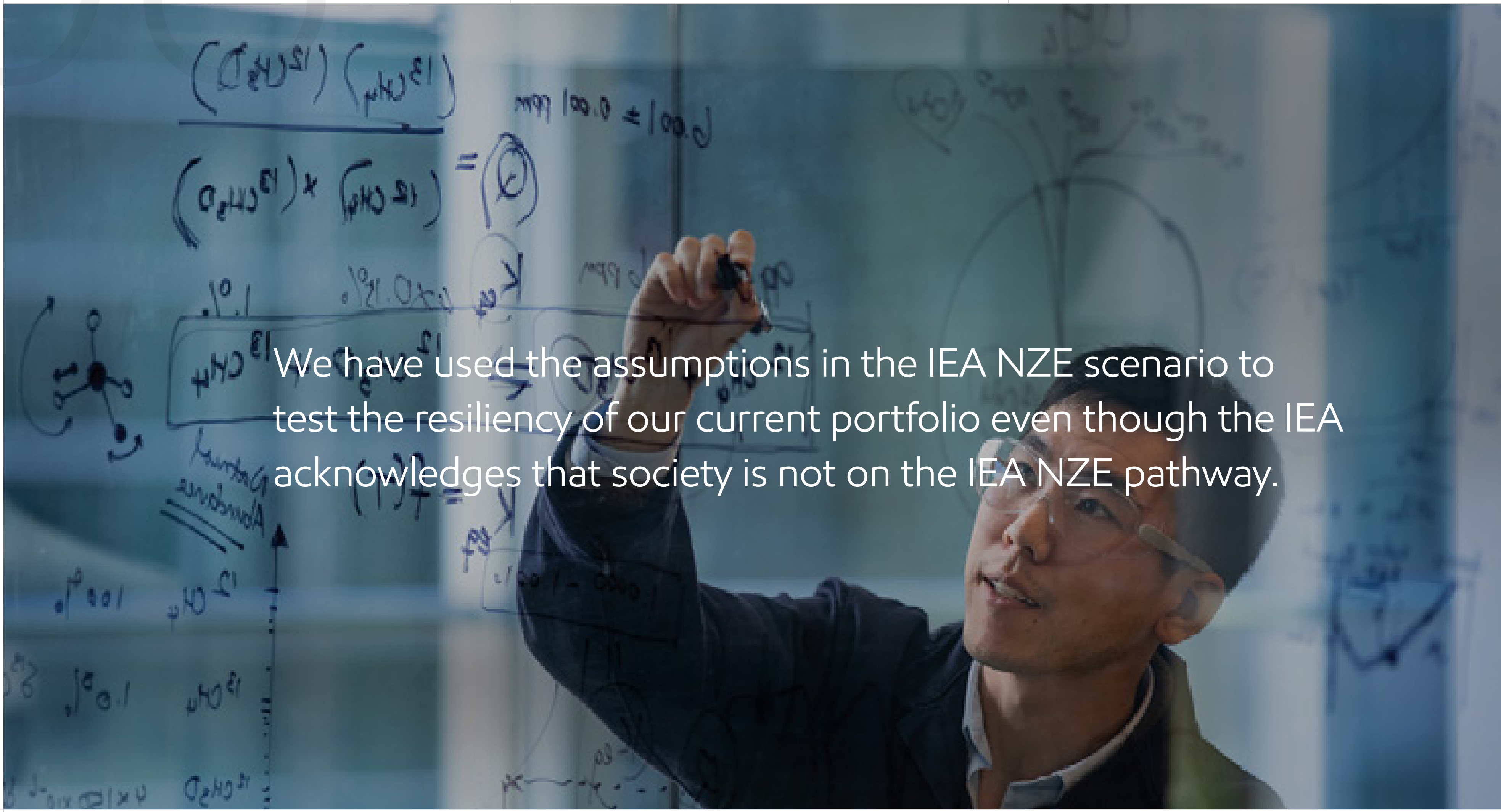
### Growth of lower-carbon solutions between 2020 and 2050 in Lower 2°C scenarios




Source: IPCC Sixth Assessment Report, ExxonMobil analysis

Error bars represent 10th percentile to 90th percentile scenario.

# Testing resiliency under the IEA NZE scenario[26, 33]



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## Our testing methodology uses IEA's assumptions

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

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

We developed additional assumptions consistent with the IEA NZE narrative as needed to estimate the performance of our portfolio. To use the IEA NZE price assumptions, we assumed that current prices decline to conform to IEA published prices by 2025 and that the path is linear between the price assumptions that IEA provided by decade thereafter.

The IEA NZE scenario did not provide assumed margins for refining and chemical businesses. Therefore, for refining, we assumed margins decline to the lowest level needed to incentivize production required to meet IEA NZE oil demand. For chemicals, we modeled margins consistent with history, at a level sufficient to support the investment necessary to meet chemicals demand growth per the IEA NZE; the margins decline over time, partially offset by inflation.

For our Low Carbon Solutions business, we used IEA NZE demand assumptions and assumed the business investments attract reasonable returns based on our historical averages for similar business lines and products. Our modeling assumes that the resulting market position for existing and new areas as a percentage of demand under IEA NZE is in line with our current market positions in existing businesses. We assumed investment to abate estimated greenhouse gas emissions from our businesses by 2050. Annual inflation was set to 2.5%. We also assumed total capital expenditures through 2050 starting with our 2020 trailing five-year average and moving forward on a real basis, which is sufficient investment to maintain market share. On this basis, the results further support the growth in cash flow from our Low Carbon Solutions business under the IEA NZE scenario.

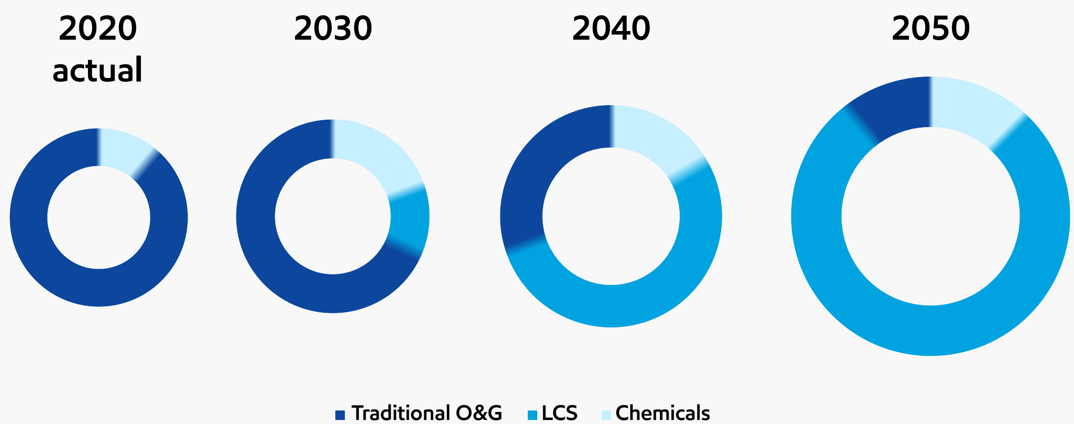
## Outcomes of our testing

The chart illustrates potential changes to our business portfolio through 2050 from the modeling. It demonstrates that, under the IEA NZE assumptions, we have flexibility to continue to grow cash flows over time through reduced investments in oil and natural gas and increased investments in accretive projects in chemicals, carbon capture and storage, lower-emission fuels, and hydrogen.

We disclose estimated operating cash flows over time, broken out by traditional oil and gas, chemicals, and Low Carbon Solutions to address enterprise resiliency questions. We believe this is a valuable, industry-leading disclosure, because it provides a clearer view of the resiliency and enterprise value of our portfolio, expertise, and opportunities than hypothetical non-cash accounting measures dependent on asset-specific assumptions not provided by the IEA NZE.

## Operating cash flow modeled under IEA NZE 2050 scenario

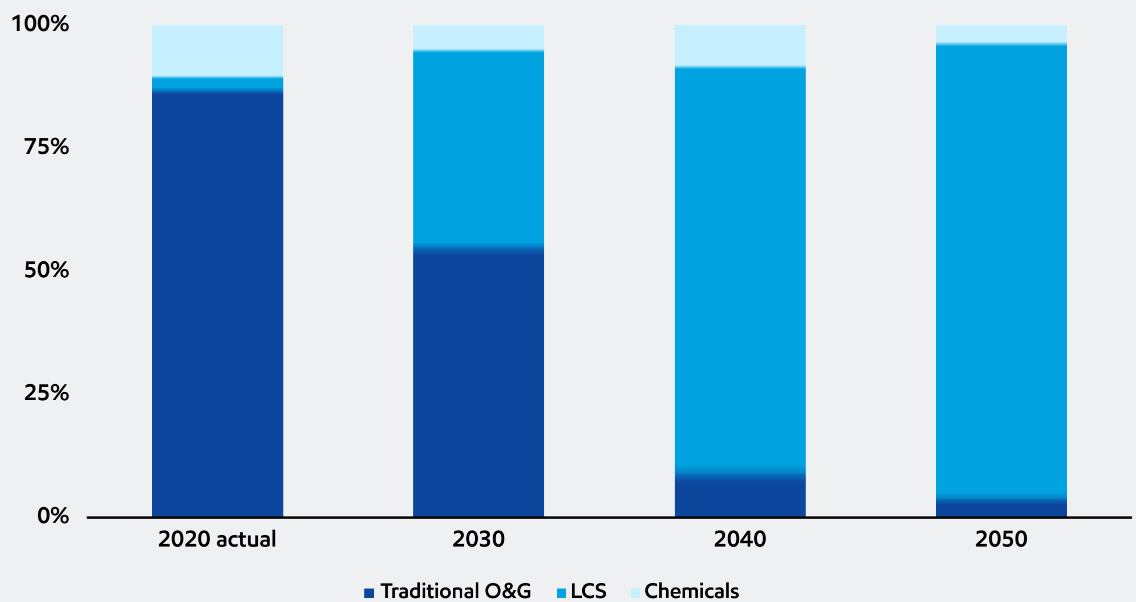
Trailing 5-year averages (nominal $)




See supplemental information on Page 100 for a definition of operating cash flow.
Source: ExxonMobil analysis, IEA NZE by 2050 (2021)

## Capital expenditures modeled under IEA NZE 2050 scenario

Trailing 5-year averages




Source: ExxonMobil analysis, IEA NZE by 2050 (2021)

06

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

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

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

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

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

We would also pursue investments like the Baytown blue hydrogen project, acquisition of geologic storage to sequester $CO_2$, and participation in new potential industrial clusters that would accelerate new and existing infrastructure opportunities and position us as a partner of choice. Longer-term through 2050, the carbon price and demand for decarbonization options would continue to grow rapidly in the scenario, leading to a significant shift in our capital spend to further scale carbon capture and storage and hydrogen.

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

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

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

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

As a global research and consultancy business with 50 years of experience, Wood Mackenzie partners with organizations to provide quality data, analytics, and insights used to power the natural resources industry.[34] To view the 2022 Wood Mackenzie independent audit statement, click here.

07

# Assessing potential impacts

The following is intended to address the potential impacts through 2050 to our proved reserves, resources, evaluation of asset impairments, and other measures, considering the discussed scenarios' ranges of oil and natural gas demand.[35]

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

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

To further support our portfolio approach, we believe using the IEA NZE in a hypothetical individual asset impairment analysis is inconsistent with the principles outlined under U.S. GAAP, which specifies that impairment analyses should be based on assumptions that are "reasonable in relation to" our planning basis. As described beginning on Page 23, our planning basis is our Outlook for Energy, which is a projection of supply and demand through 2050. The assumptions in the IEA NZE significantly vary from our Outlook, and the IEA has acknowledged that its NZE is an extremely aggressive scenario, and that society is not currently on this pathway. Providing detailed asset-specific public disclosure regarding remaining useful lives, retirement costs, and potential proved reserves changes in an IEA NZE scenario could imply a higher degree of certainty or accuracy than exists. In addition, as the energy transition progresses, disclosing this type of detailed asset-level information could provide a competitively sensitive roadmap of how we might make adjustments in our portfolio. For these reasons, we do not provide hypothetical, individual asset accounting analysis using the IEA NZE. We believe looking at the evolution of our portfolio operating cash flows, which reflect how investment decisions change under the IEA NZE, provides a better demonstration of our resiliency and enterprise value with less potential to confuse our stakeholders.

## Proved reserves

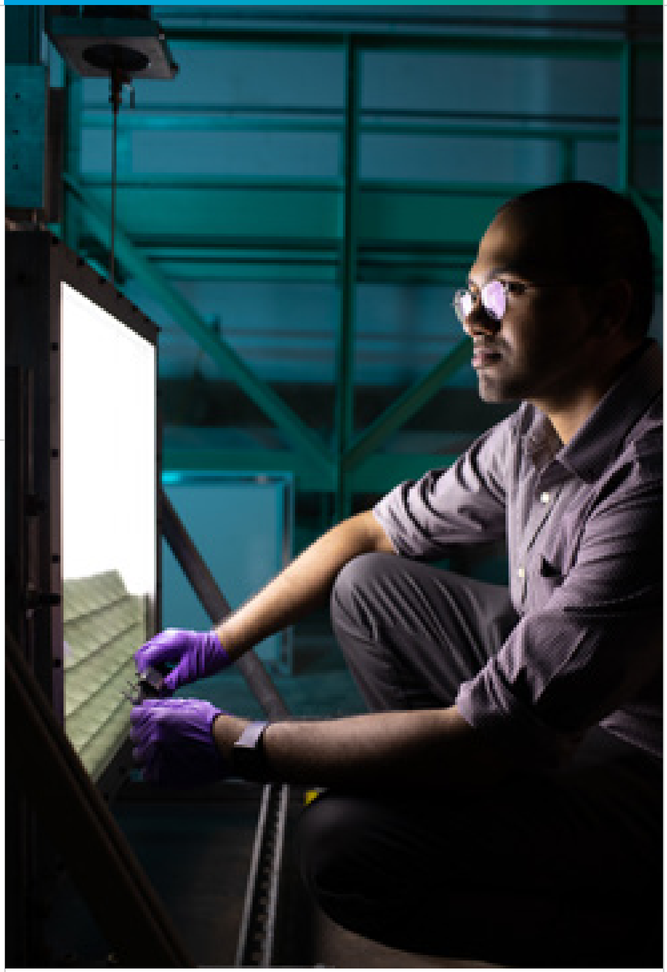
Proved reserves are assessed each year and reported in our annual report on Form 10-K in accordance with rules of the U.S. Securities and Exchange Commission. Based on 2021 production schedules, a substantial majority of our year-end 2021 proved reserves are expected to have been produced by 2050. For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

## Resources

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

The underlying economics of commercializing resources depend on a number of factors that are assessed annually. Decisions can range from developing the resource (which eventually moves to proved reserves), monetizing the resource by selling it to others, or exiting the resource. All investments are tested over a wide range of commodity price assumptions and market conditions. In scenarios like the IEA NZE, higher-cost assets could become disadvantaged without active portfolio management.

In light of the multiple and dynamic factors that influence governments' diverse approaches to regulating resources and industry's decisions to

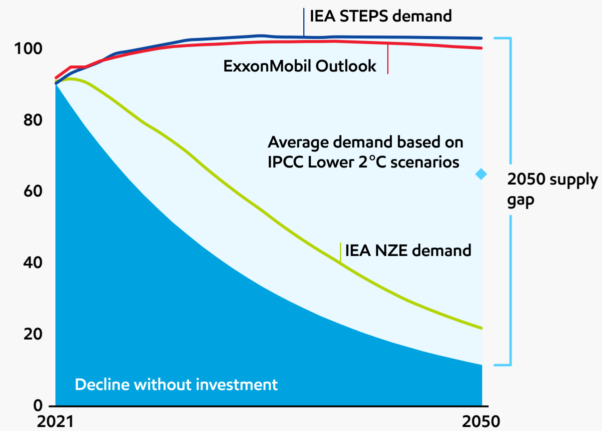


commercialize undeveloped resources, it is not possible to identify which specific assets will ultimately be developed. For example, regional policies that constrain supply in one area could enhance returns in others. Alternatively, geopolitical conflict affecting resources in one region could advantage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

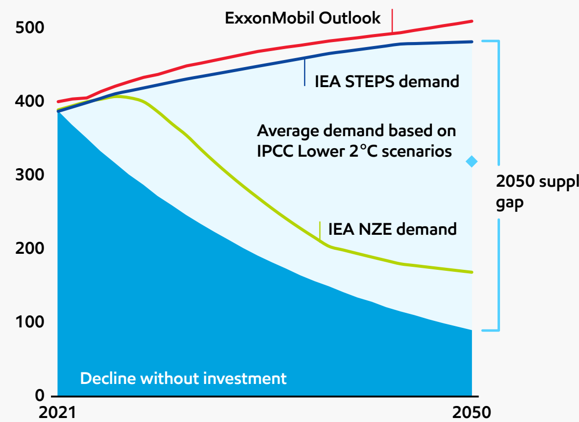
## Significant investment still needed under Lower 2°C and IEA NZE scenarios

In the IPCC Lower 2°C scenarios, average global oil demand is projected to decline from approximately 90 million barrels per day in 2021 to about 65 million in 2050. The IEA NZE scenario projects about 24 million barrels per day of demand in 2050. Without future investment, world oil production would be expected to drop to about 11 million barrels per day due to natural field decline. In the IEA NZE scenario, additional investment of approximately $11 trillion through 2050 will be required in oil and natural gas to meet the world's energy demand.[36] New discoveries will be needed even under IEA NZE to support energy security and reliable supply in the face of geopolitical uncertainty.

## Global oil supply estimates
(million oil-equivalent barrels per day)




## Global gas supply estimates
(billion cubic feet per day)

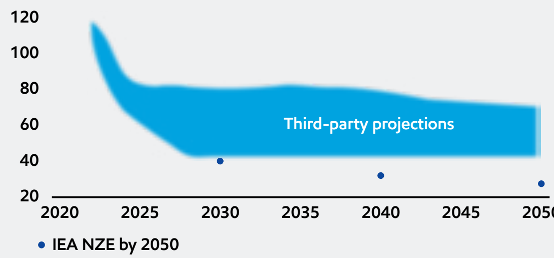



**The 2050 supply gap**
Significant investment would be needed to meet even the rapidly declining demand for oil and gas envisioned in the IEA's Net Zero Emissions by 2050 scenario. In 2050, IEA STEPS projects a price of $88 per barrel and a U.S. natural gas price of $4.27 per million British thermal units (Prices in 2020 U.S. dollars).

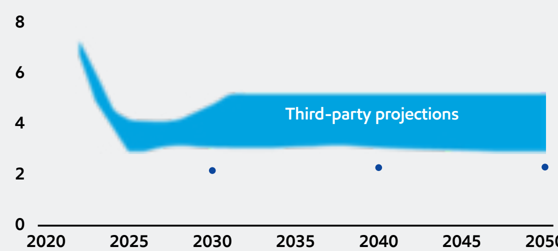
Source: IEA World Energy Outlook 2021, ExxonMobil analysis, ExxonMobil 2022 Outlook for Energy, IPCC Sixth Assessment Report

## Third-party price projections versus IEA NZE 2050 scenario[37]

### Brent oil
(2022$/barrel)




### Henry Hub natural gas
(2022$/million British thermal units)




Source: ExxonMobil analysis, IEA NZE by 2050 (2021), Third party projections: FACTS Global Energy Group, IHS Markit, Wood Mackenzie, Rystad Energy, S&P Global Commodity Insights

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

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# Signposts for the evolving energy transition

Using our own experts and third-party sources, we monitor a variety of signposts that may indicate a potential shift in the energy transition. For example, the regional pace of the transition could be influenced by the cost of new technologies compared to existing or alternative energy sources.

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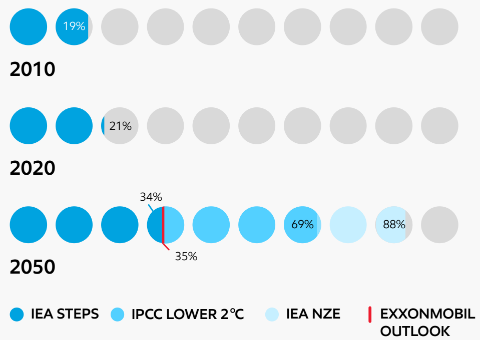
Changes in relative cost may accelerate shifts in the global energy mix. Our signposts include:

- 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 policies and regulatory initiatives, such as carbon pricing.

These charts show the outcome of the IEA Stated Policies Scenario by 2050 and highlight the progress made from 2010 to 2020. The Outlook for Energy, IPCC Lower 2°C average, and IEA NZE scenario markers are provided for comparison.

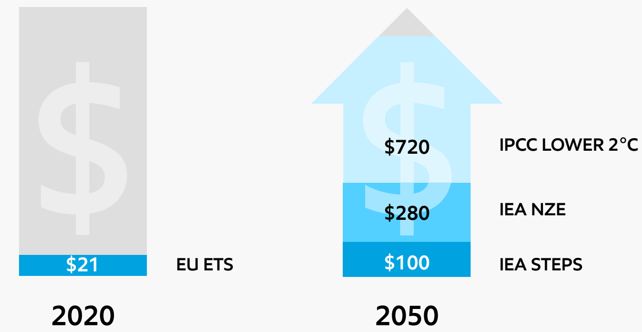
## Share of non-emitting primary energy

% non-emissions primary energy demand




## $CO_2$ prices[38]

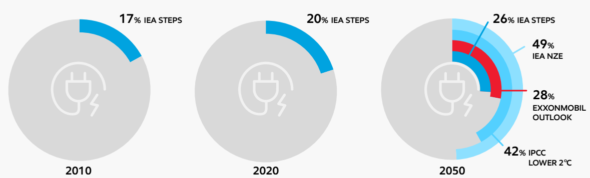
$/metric ton $CO_2$ in 2022$ Real




See Page 41 for ExxonMobil's GHG emissions pricing

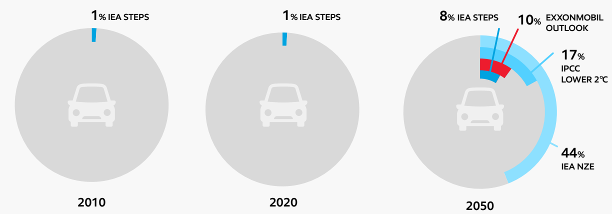
## Share of electricity in final energy demand

% electricity



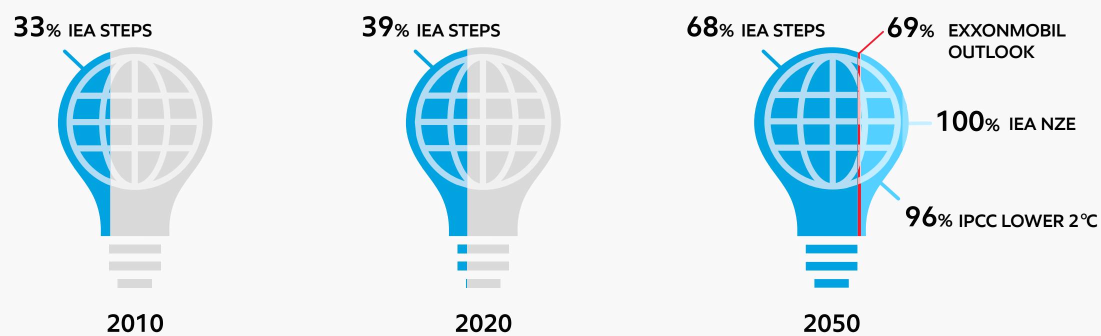

## Share of electricity in transportation

% electricity




## Share of low-carbon power generation

% low-carbon power



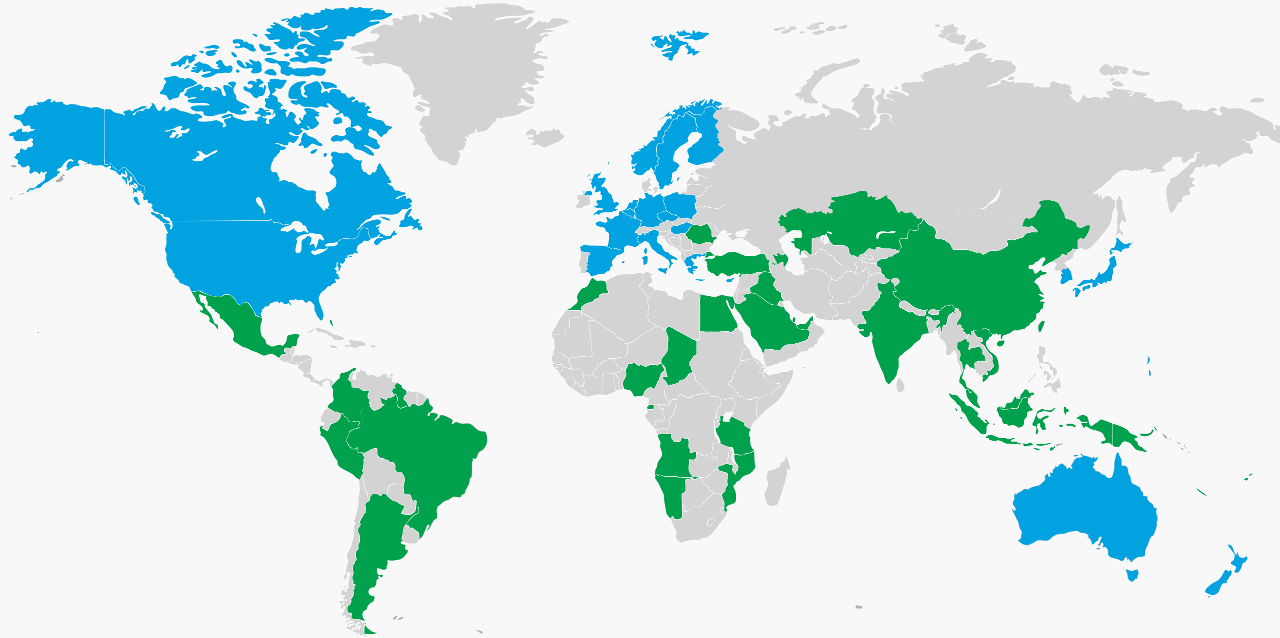

Source: ExxonMobil 2022 Outlook for Energy, IEA World Energy Outlook 2021, IPCC Sixth Assessment Report, The World Bank, 2021, State and Trends of Carbon Pricing 2021 (May), World Bank, Washington, DC, ExxonMobil analysis.

Our Outlook for Energy seeks to identify potential impacts of climate-related policies by using various assumptions and tools, including application of a proxy cost of carbon, to estimate potential impacts on global energy demand.

Separately, we use proprietary greenhouse gas pricing where we operate and invest. Where policy provides greenhouse gas pricing, we align with and apply such greenhouse gas pricing to evaluate investment opportunities and estimate operating cost, where appropriate, for specific greenhouse gas emissions sources. Where greenhouse gas pricing policy currently does not exist, we assume a price informed by the Outlook for Energy proxy cost of carbon. International accords and underlying regional and national regulations covering greenhouse gas emissions continue to evolve with uncertain timing, outcome, and potential business impact.

## Greenhouse gas emissions pricing where ExxonMobil operates or invests

The greenhouse gas pricing we use for planning falls within or exceeds ranges provided by the third parties referenced below.



$/metric ton $CO_2$ in 2022$ real

| | World Bank[39] Carbon prices | ExxonMobil GHG emissions prices | IEA WEO STEPS[40] $CO_2$ prices | |
|---|---|---|---|---|
| | | 2022-2050 | 2030 | 2050 |
| Advanced economies | 4-99 | 4-150 | <73 | <102 |
| Emerging economies | 1-13 | 1-100 | <34 | <62 |

Ranges provided for jurisdictions where ExxonMobil operates or invests.

ExxonMobil's GHG emissions pricing for 2022-2030 is based on currently stated existing or anticipated policies; pricing for 2030-2050 reflects presumed regional policies for both advanced and emerging economies.

ExxonMobil's GHG emissions pricing is in 2022 USD and has not been adjusted for future inflation.

For 2022 and 2023, we have not applied GHG emission prices to our operations or investments in countries where there is no existing GHG emission price. We do apply anticipated prices within the range identified in the table in those countries beginning in 2024.

ExxonMobil's GHG emissions prices include $CO_2$ and other GHGs (e.g., methane), where appropriate.

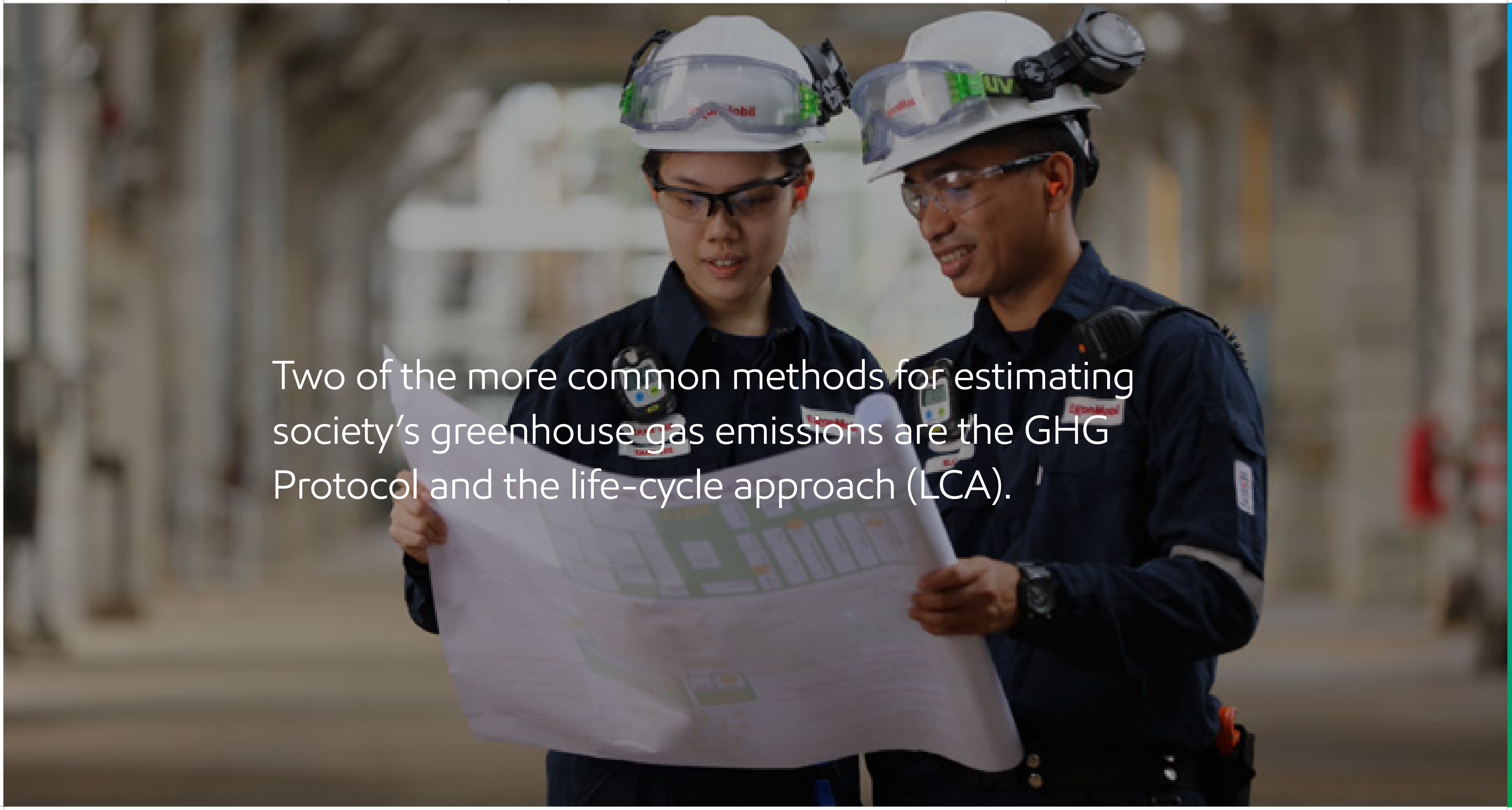
The transition to 2050 in the Lower 2°C and 1.5°C scenarios is of such a magnitude that, in the next 10 years, noticeable trends should emerge to indicate whether the world is moving in that direction.

| | Last 5-yr Avg[41] | Annual deployment over 2020-2030 | | | |
|---|---|---|---|---|---|
| | | Outlook | IEA STEPS[40] | IPCC Lower 2°C[42] | IEA NZE[43] |
| Efficiency (Energy per capita) | 0.3% | -0.4% (2019-2030) | -0.1% (2019-2030) | -0.7% | -2.0% (2019-2030) |
| Solar[44] (GW) | 80 | 110 | 180 | 300 | 420 |
| Wind[44] (GW) | 55 | 75 | 90 | 120 | 240 |
| CCS[45] (1.3 MTA equivalent) | <1 | 25 | 4 | 65 | 125 |
| Nuclear[46] (GW) | 6 | 19 | 12 | 20 | 19 |
| Biofuels in transportation (KBDOE growth) | 115 | 110 | 155 | 105 | 385 |
| Hydrogen (MTOE) Excluding feedstock, $NH_3$ | | 2.6 | 0.5 | 2.4 | 15 |

Source: ExxonMobil 2022 Outlook for Energy, IEA World Energy Outlook 2021, IPCC Sixth Assessment Report

- **Energy efficiency:** Improvement in energy use per capita is a key trend across these scenarios. In recent history, the world has seen an increase in energy use per capita as living conditions in the developing world have improved, more than offsetting efficiency trends in the developed world. This trend would need to reverse.
- **Solar and wind power:** Solar capacity installed each year would have to increase by 4-5 times the rate of the past five years. Wind turbines would have to be built at 2-4 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.[47] Over the next decade, 1.5-3 times the existing carbon capture and storage capacity would have to be added every year.
- **Nuclear:** Capacity would have to be added at around three times the recent rate.
- **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 slightly less than 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.

# Reducing portfolio life-cycle emissions and emissions intensity[48]



Two of the more common methods for estimating society's greenhouse gas emissions are the GHG Protocol and the life-cycle approach (LCA).

Each method has value, and to better understand the degree to which a company is helping reduce global emissions, we see LCA as a more useful alternative to the GHG Protocol. Below is a brief overview of each approach and the reasons we view LCA as preferable.

## GHG Protocol

The GHG Protocol divides emissions into three categories or "scopes." Scope 1 emissions are the direct result of an organization's operations, and Scope 2 emissions come from the power generated by others that is used to run the operations. For instance, Scope 1 would cover the direct emissions from a factory in which a product is made, and Scope 2 would cover the emissions from the electricity provider that powered that factory. These are fairly straightforward to calculate and offer reasonably good insights into that company's carbon emissions. We have reported our Scope 1 and 2 emissions for more than a decade. Scope 3, however, is more difficult to determine because it attempts to understand the full range of indirect emissions

from sources not owned or controlled by the manufacturer. For instance, the manufacturer is required under Scope 3 to estimate the carbon emitted by the people or businesses using its product. In addition, Scope 3 often results in double counting of emissions because the same emissions are treated as Scope 3 for the factory making the product and Scope 1 for the company using that same product. The assumptions both parties would have to make about each other's activities make Scope 3 overly complicated and likely inaccurate.

The GHG Protocol is a valuable tool to track progress on society's collective efforts to reduce total emissions. It's insufficient for fully assessing an individual company's progress in helping reduce emissions while producing essential goods. This is because the only reasonable way to fully assess a company's progress is to understand the amount of carbon it emits relative to the products it produces and the alternatives to those products.[49] This is known as life-cycle carbon "intensity," and that insight is required to engage in a reasonable comparison between companies or product alternatives, regardless of a company's relative size or what products it produces.

The GHG Protocol is an activity-based analysis and provides limited insight for a company like ours into how it might substantially lower its emissions, short of shrinking, discontinuing operations, or outright divesting operations. A company that reduces production will see its GHG Protocol-calculated emissions decrease, but activity does not stop because society's needs have not changed. As a result, if another company fills the production void, it may do so in ways that are less efficient and actually increase carbon emissions in the energy sector. If activity completely stops, society's needs may go unfulfilled, leading to shortages with resulting spikes in price. The GHG Protocol calculation was not designed to consider these important nuances and, as a result, will reward an individual company's behavior by showing a reduction in a company's greenhouse gas levels even when society's emissions remain constant or, perhaps, rise.

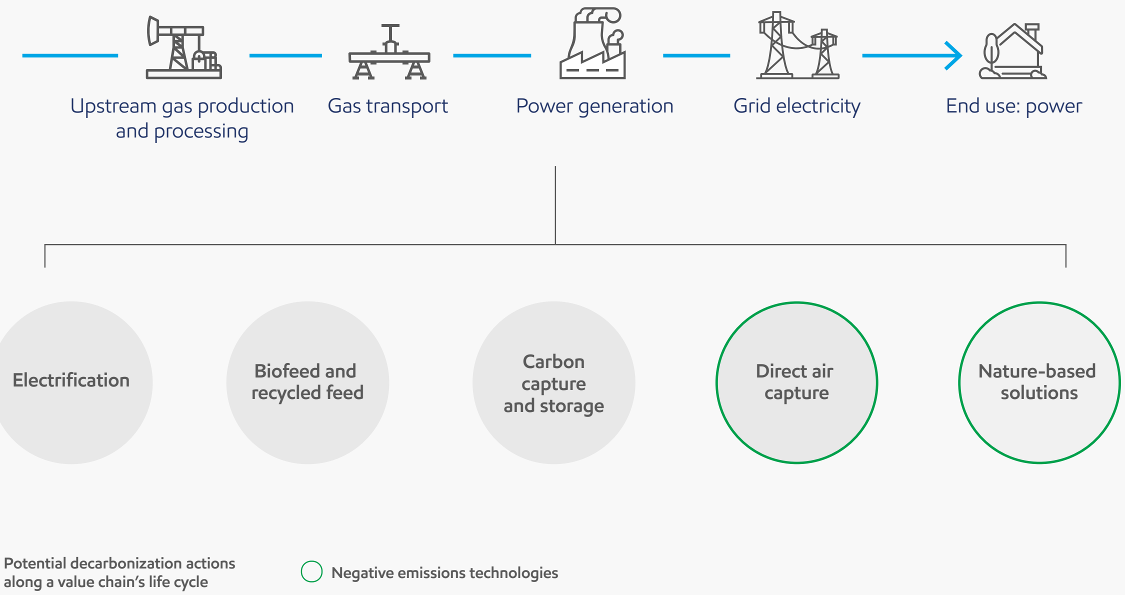
## Life-cycle approach

LCA, on the other hand, offers advantages not present in GHG Protocol calculations. First, that same manufacturer may be engaged in an effort to remove carbon through the application of so-called "negative emissions."

Direct air capture is an example of these negative emissions, because it removes carbon directly from the atmosphere and stores the carbon deep underground where it can have no adverse effect on the climate.[50] These technologies, among others, offer an increasingly important method for companies to reduce emissions and are essential, in the view of experts, if we are to arrive as a society at net zero in the future. For this reason it is notable that LCA allows for consideration of negative emissions when calculating a company's carbon footprint. This is the case because it is designed to reflect a "net" emissions number. The GHG Protocol calculation, on the other hand, does not take negative emissions into account and only provides "gross" emissions estimates. If a company were to rely only on a GHG Protocol analysis, this fact might adversely affect its willingness to invest in environmentally critical technologies like direct air capture.

## Life-cycle approach

Highlights multiple opportunities to reduce emissions intensity along a full value chain




Second, one of the critical questions in considering the best way to meet society's needs for energy is the relative carbon burden associated with different energy products. For instance, both natural gas and coal are used to generate electricity and power heavy industry, but natural gas combustion produces far fewer carbon emissions than coal. However, under the GHG Protocol, the provider of natural gas would see their emissions calculations increase if they were producing more natural gas to replace coal as a source of energy. In other words, the natural gas provider, though materially benefiting the climate relative to coal, would be penalized for meeting society's energy needs in a way that is better than the alternative. By contrast, LCA allows for a comparison of the relative emissions efficiency of different forms of energy by providing a view of life-cycle "intensity" of carbon emissions associated with meeting a societal need. As mentioned above, understanding life-cycle "intensity" normalizes for company size and the products it makes. It also allows for a more accurate, net emissions estimate. In our real-world example, natural gas emits up to 60% lower greenhouse gases and produces significantly fewer air pollutants than coal for power generation. LCA provides the basis for this comparison. The GHG Protocol does not.

Finally, LCA offers a view of the emissions intensity of all aspects of a company's value chain. This allows for like-for-like comparisons within and across industries to understand who is doing a better job of reducing greenhouse gas emissions while meeting society's needs for various products. In this way, one can ignore the size of a particular company and look only at how carbon-efficient it is. For instance, the GHG Protocol would tell you only that ExxonMobil is a very large producer of energy and products, with a corresponding emissions footprint. It would not, however, give you any insight into how carbon-efficient it is when compared to other, smaller companies in the same businesses.

For these reasons, we do not set Scope 3 targets. We see the GHG Protocol as a useful tool for understanding progress in reducing total emissions, but it is not suited to understanding and comparing a company's efforts to reduce emissions associated with the services and products it provides in meeting society's needs. To meet a net-zero goal, it is essential that companies fully understand their net emissions and have a means of comparing themselves against others in their industry. Most importantly, the approach needs to equip and incentivize companies to make investments that will reduce their emissions – not simply encourage companies to back away from meeting society's needs and pass portions of their carbon footprint to someone else.

Utilizing an LCA approach and applying it to ExxonMobil's business plans through 2030, we expect a 6% reduction in full life-cycle emissions intensity, the result of which is expected to be an estimated 18% reduction in full life-cycle absolute emissions. These are in comparison to 2016 levels.[51]

## LCA recognizes the benefits of CCS, hydrogen, and biofuels

For example, under a life-cycle approach, biofuels, which are an alternative to transportation fuels made from crude oil, have a significantly lower overall carbon intensity. This is because when the biomass that is used to make the biofuel is grown, it removes carbon from the atmosphere, which makes the net carbon footprint of the biofuel lower than conventional fuels. Scope 3 under the GHG Protocol methodology does not account for or reflect these negative emission aspects of a company's biofuel feedstock production. It treats the ultimate biofuel no differently than fossil fuels, providing companies with no credit for, or incentive to, produce these lower greenhouse gas emission products.

## Potential GHG benefits of ExxonMobil products

**120** MTA of GHG emissions avoided if all of ExxonMobil's projected **2030 LNG supply** to the market substitutes unabated coal in power generation[52]

**25** MTA of GHG emissions avoided if all of ExxonMobil's projected **2030 renewable fuel production** displaces conventional fuel refined from crude oil[53]

**13** MTA of life-cycle GHG emissions avoided if all of ExxonMobil's projected **2030 volumes into U.S. plastic packaging** displaces alternatives[54]

**4** MTA of GHG emissions avoided if all of ExxonMobil Baytown's expected **2030 blue hydrogen production** displaces natural gas use in industrial applications[55]

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# Our risk management approach

Managing long-term risks associated with climate change is a key part of managing strategic risks.

## ExxonMobil's enterprise risk framework considers climate-related risks

Our Outlook for Energy is a core element of our enterprise risk framework, which provides a structured, comprehensive approach to identify, prioritize and manage risks across the company. Our framework is designed to drive consistency across risk type and monitor key risks.

The framework includes five elements:

1. A way to organize and aggregate risks
2. Robust risk identification practices
3. A prioritization method
4. An inventory of systems and processes to manage risk
5. Risk governance

For more details on the risks we consider and manage, refer to Item 1A. Risk Factors in the 10-K.

| | 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 |

Our 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. Our Management Committee consists of our Chief Executive Officer, our Chief Financial Officer, and our two Senior Vice Presidents, who are responsible for the Upstream and Product Solutions businesses, as well as ExxonMobil Technology and Engineering, and Global Projects. The President of our Low Carbon Solutions business reports directly to the Chief Executive Officer.

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## Protection of assets, the community, and the environment

We have extensive experience operating in a wide range of challenging physical environments around the world.

Effective risk management requires the ongoing assessment and mitigation of potential physical impacts to our people, our assets, the community, and the environments in which we operate. Before pursuing a new development, we use data and advanced computer modeling to assess the full range of potential environmental, socioeconomic and health risks associated with potential construction and operations. We also consult with communities through public meetings and other outreach, and we work with regulators to share information and seek necessary approvals. This process gives us a comprehensive understanding of possible impacts, which we use to implement measures to avoid, reduce, or remedy environmental, socioeconomic, and health risks or impacts.

When considering physical environmental risks, we evaluate the type and location of facilities and investments. As an example, changes in patterns of waves, wind, or ice floes can affect offshore facilities. Onshore facilities could be vulnerable to sea level rise, changes in storm surge, flooding, changes in wind and seismic activity, or geo-technical considerations. We conduct environmental assessments before building and operating facilities to ensure that protective measures and procedures are in place.

The Hebron platform is located off the coast of eastern Canada in 92 meters of water. The platform is a reinforced concrete gravity-based structure designed to withstand sea ice, icebergs, and meteorological and oceanographic conditions. Hebron was engineered and wave-tank tested for storms so extreme they may occur only once every 10,000 years. On Nov. 14, 2018, the Grand Banks saw its largest storm in 30 years, estimated as a 100-year return period event. Following temporary shutdown of all Grand Banks platforms, Hebron was up and running within a week without any major issues.

Our 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 our standards and procedures. We follow industry practices such as the American Society of Civil Engineers' Climate Resilient Infrastructure: Adaptive Design and Risk Management manual of practice.[56]

Industry standards, including American Society of Civil Engineers (ASCE 7)[57] Minimum Design Loads and Associated Criteria for Buildings and Other Structures, are also used along with professional experience to cover a range of uncertainties. After construction of a facility, we monitor and manage ongoing facility integrity through periodic checks of key aspects of the structures.

The Gulf Coast Growth Venture, a petrochemical manufacturing facility near Corpus Christi, Texas, is compliant with both San Patricio County and national standards (ASCE 7). Stormwater handling is a risk factor associated with the facility, so the design includes basins to retain excess stormwater 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 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.[58]

Once facilities are in operation, we maintain disaster preparedness, response, and business continuity plans. Detailed, well-practiced, and continuously improved emergency response plans are tailored to each facility to help us 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 an event. 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.

Our PNG LNG facilities and pipelines were designed to withstand extreme earthquakes in one of the world's most active seismic zones. In 2018, our facilities sustained a magnitude 7.5 earthquake with no injuries and no loss of containment. An ExxonMobil site response team was immediately formed to stabilize the operations, evaluate the damage, and make repairs as needed. As a result of the robust design, extensive preparatory work and response, the facility returned to operations in less than six weeks. We incorporated the learnings from the successful response into our Facilities Integrity Management System and applied them across our global facilities.

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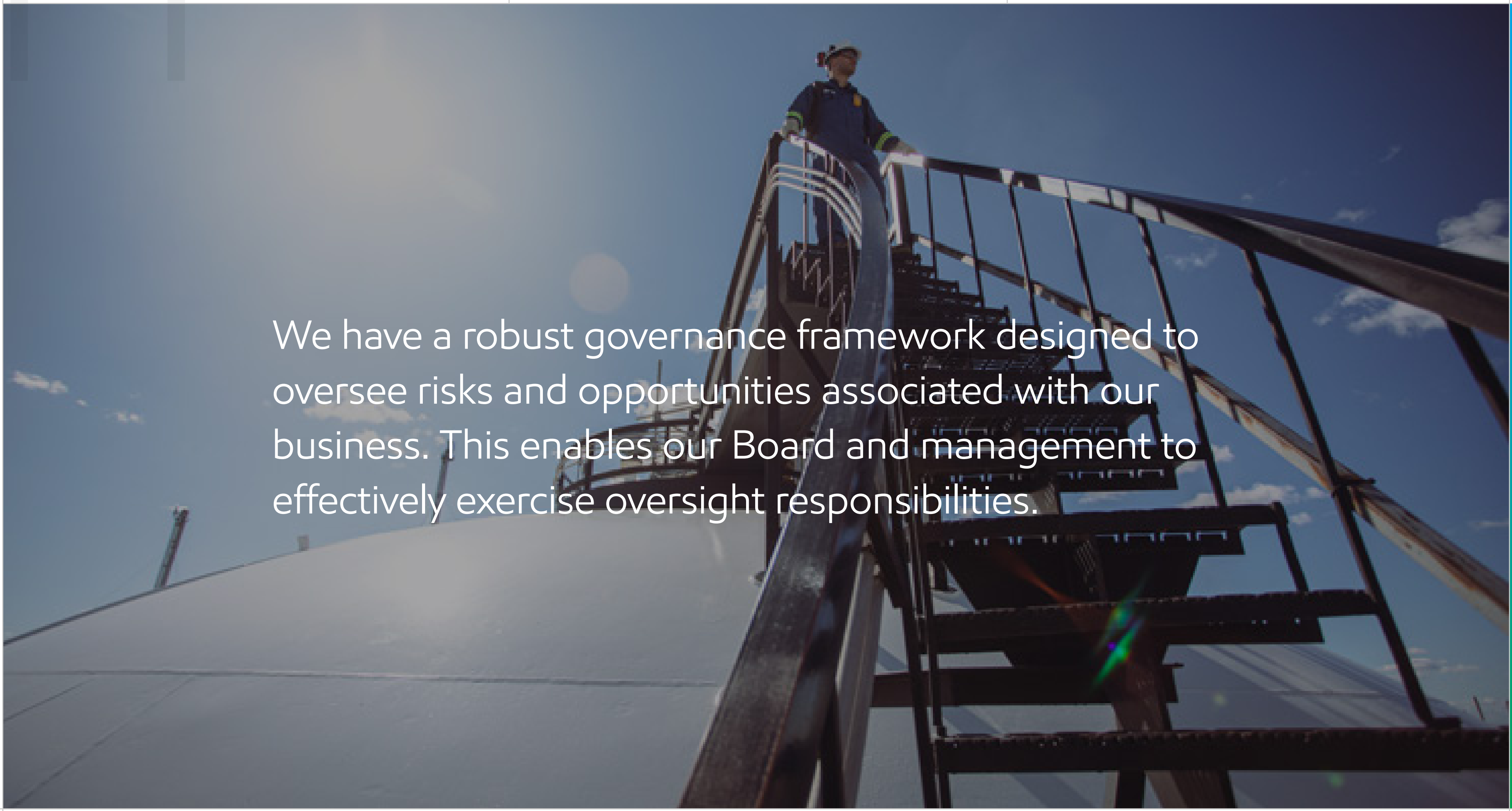
# Governance and executive compensation



We have a robust governance framework designed to oversee risks and opportunities associated with our business. This enables our Board and management to effectively exercise oversight responsibilities.

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Our Board of Directors oversees and provides guidance on the company's strategy and planning, which includes 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 energy transition. The independent lead director plays a key role in these shareholder engagements and, in consultation with the Chairman, develops Board meeting agendas.

## Assessing climate risk

The Board, collectively and through its Environment, Safety and Public Policy (ESPP) Committee, regularly engages with senior management on climate matters and our environmental approach and performance. This includes briefings with internal and external subject-matter experts, which can cover elements of 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 reviews and discusses technology deployment within the business lines and research on new technology to further Scope 1 and 2 emission reductions for ExxonMobil's operated assets. The Board approves company strategy and annual capital allocation, and reviews assumptions and sensitivities in testing major projects and investments for resiliency across a range of potential outcomes.

After discussion and dialogue with ExxonMobil management, the Board exercised its oversight in endorsing the company's plans through 2027. This included increasing investments in lower-emission initiatives to approximately $17 billion during that period.

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 and the energy transition.

The Board 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 charters.

- **The Environment, Safety and Public Policy 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 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 enterprise risk management approach and structure, which is applied to risks related to climate change, among other business risks.
- **The Nominating and Governance Committee** oversees matters of corporate governance, including Board transition and refreshment.
- **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.

"

As chair of our ESPP Committee, I'm proud to work on key issues related to climate risk at ExxonMobil. With my experience as an atmospheric scientist and a leader at a global research organization, I am committed to helping to advise the Board on public issues of significance. The diverse backgrounds and knowledge of the ESPP Committee members enable us to take an in-depth look at issues surrounding safety, security, health and the environment to support the full Board.

The members of the ESPP Committee bring valuable, complementary expertise in the fields of science, research, risk management and public policy. They also bring experience in running large, complex organizations, including managing the risks involved in global businesses. The members of the ESPP Committee are united in our commitment to position ExxonMobil as an industry leader in pursuing sustainable solutions that improve quality of life and meet society's evolving needs."

**Dr. Susan Avery**
Chair of the Environment,
Safety and Public Policy Committee

Former President and Director – Woods Hole Oceanographic Institution; Former Interim Dean of the Graduate School, Vice Chancellor for Research, Interim Provost, Executive Vice Chancellor for Academic Affairs – University of Colorado Boulder

## Integrating energy transition risk management into executive compensation

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 the company's performance.

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

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.

Two of the four strategic objectives specifically integrate climate risk:

- Operations performance: deliver industry-leading performance in safety, emissions-intensity reductions, environmental performance and reliability.
- Energy transition: lead industry in reducing emissions in hard-to-decarbonize sectors.

Financial and operating metrics tie to the company's strategic objectives and are assessed over near- and long-term time horizons.

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 and cash-flow growth

**ENERGY TRANSITION**
Lead industry in hard-to-decarbonize emissions reductions

**BUSINESS PORTFOLIO**
Optimize existing business portfolio

**Supported by financial and operating metrics**

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

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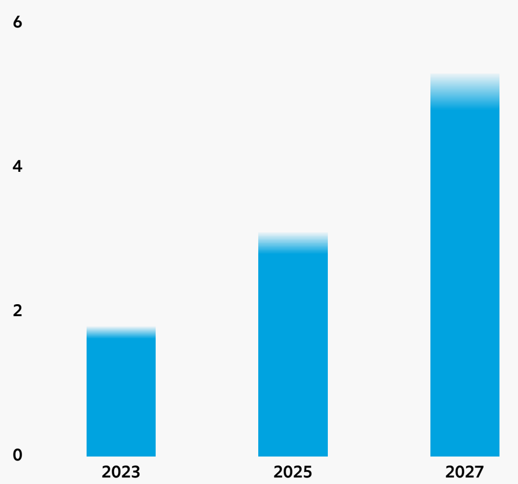
# Investing approximately $17 billion to reduce emissions

We are putting more money and resources behind our efforts to reduce greenhouse gas emissions from our operated assets and to be a leader in the energy transition.

We plan to invest approximately $17 billion on lower-emission initiatives from 2022 through 2027. This is an increase of nearly 15% as compared to the amount we previously announced. Of our total investment, approximately 60% is focused on reducing our own emissions and approximately 40% is directed toward building our lower-emissions business with third-party customers.

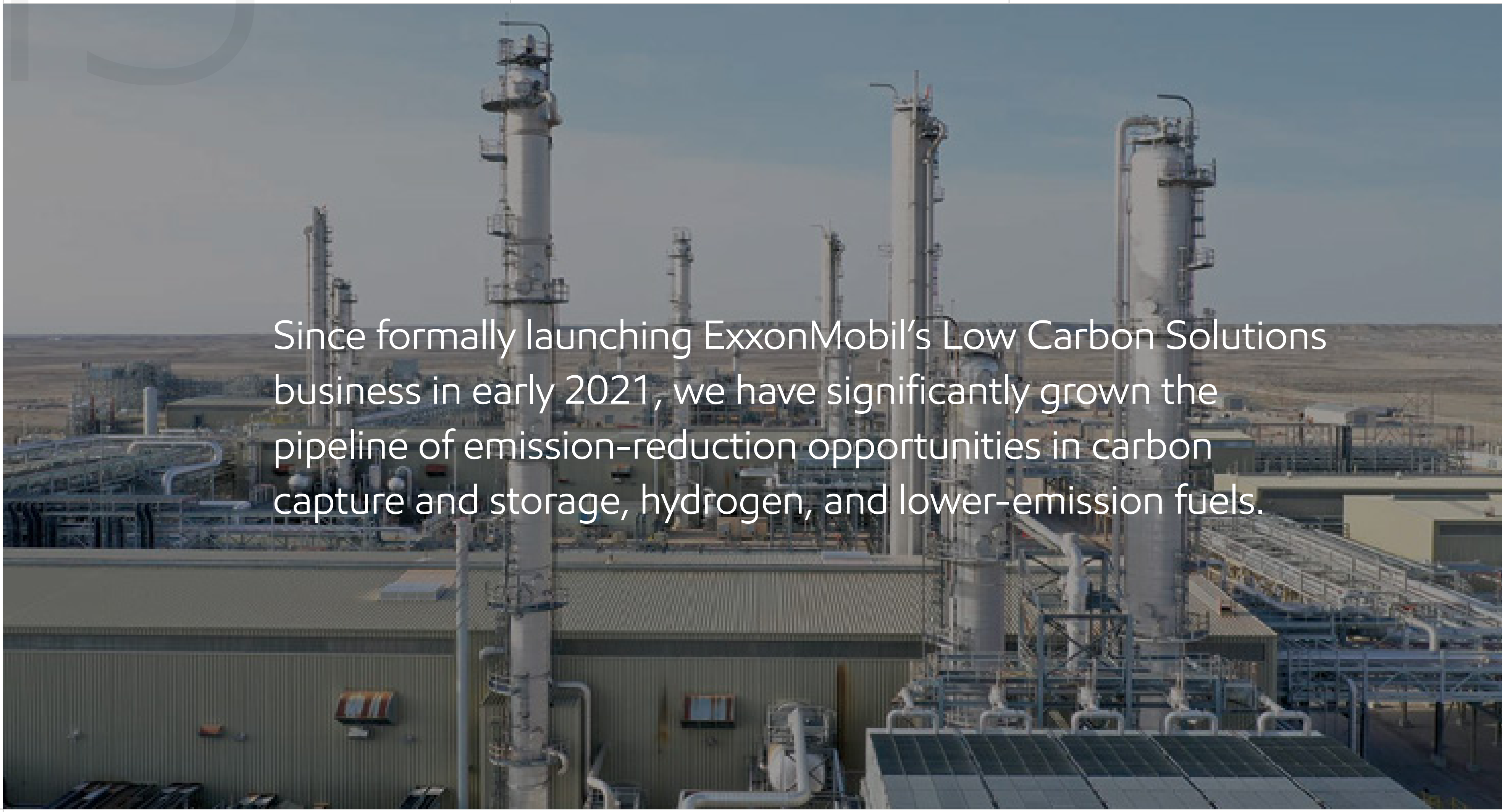
## Growing lower-emission investments

Billion USD




# 13

# Low Carbon Solutions



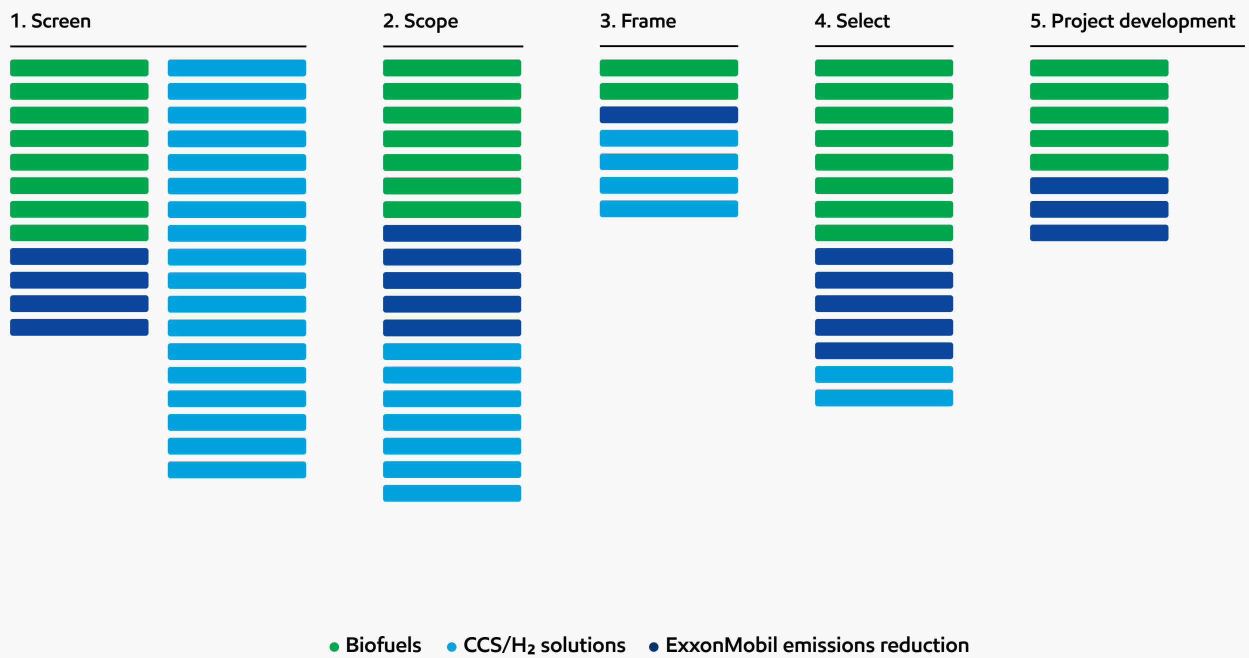
Since formally launching ExxonMobil's Low Carbon Solutions business in early 2021, we have significantly grown the pipeline of emission-reduction opportunities in carbon capture and storage, hydrogen, and lower-emission fuels.

Low Carbon Solutions is quickly establishing itself as a partner of choice by leveraging our unique combination of existing assets, technical capabilities, project management skills, and broad relationships with industry and governments.

The chart illustrates our broad set of competitively advantaged opportunities around the world. Individual opportunities may advance based on a number of factors, including availability of supportive policy, technology for cost-effective abatement, and alignment with our partners and other stakeholders.

## Progressing deep global opportunity pipeline[59]

Rapidly advancing where supportive policy exists today




## Carbon capture and storage

Carbon capture and storage is the process of capturing $CO_2$ emissions from industrial activity or power plants at the source and injecting it into deep underground geologic formations for safe, secure, and permanent storage. The injected $CO_2$ is held in place by thick, impermeable seal rocks thousands of feet underground, which are similar to the rocks that have kept oil, natural gas, and naturally occurring $CO_2$ underground for millions of years.

Carbon capture and storage on its own, or in combination with hydrogen production, is among the few proven technologies that could enable significant $CO_2$ emission reductions from high-emitting and hard-to-decarbonize sectors, such as power generation and heavy industries, including manufacturing, refining, steel, cement, and petrochemicals. According to the Center for Climate and Energy Solutions, carbon capture and storage can capture more than 90% of $CO_2$ emissions from power plants and industrial facilities.[60]

The IEA NZE report concludes that more than 7.6 billion metric tons per year of $CO_2$ will need to be captured and stored by 2050 in order to reach a net-zero future. By comparison, the world's current capture capacity is about 40 million metric tons of $CO_2$ per year.[61] The agency has also said "reaching net zero will be virtually impossible" without carbon capture and storage.[62]

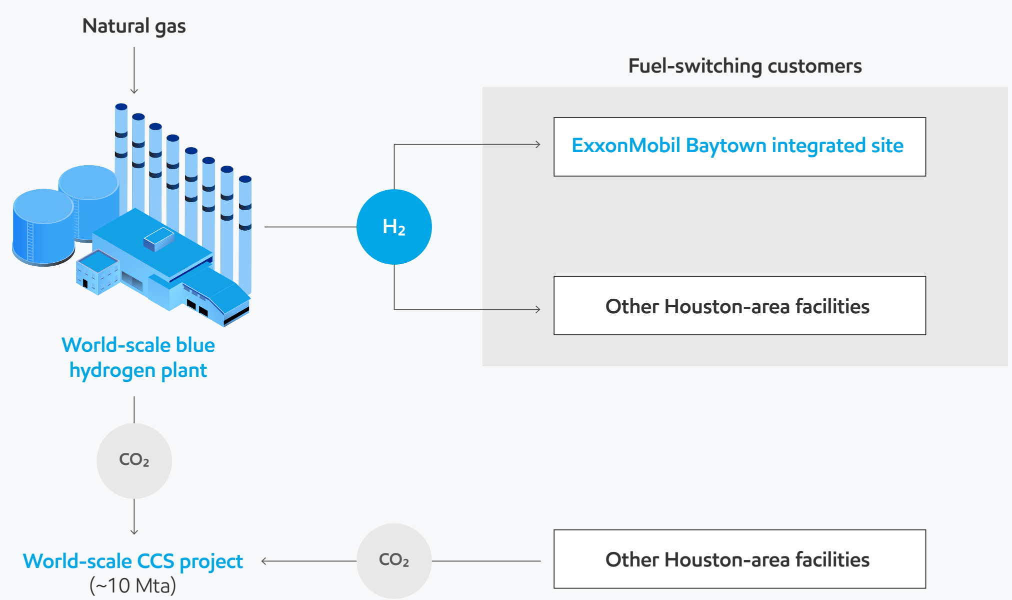
The IPCC estimates that the cost of achieving a 2°C outcome would more than double if carbon capture and storage were not among the decarbonization solutions.[63] Carbon capture and storage is also recognized as critical to enabling removal of $CO_2$ from the atmosphere when combined with bio-energy or direct air capture.

We have advanced a large number of carbon capture and storage opportunities and lead the industry in successful deployment of this technology. We continue to evaluate and progress potential future projects around the world. We identify opportunities with concentrated streams of $CO_2$ near sites with safe and secure storage space, and where we can use existing infrastructure to gain scale to offer economical solutions to customers.

An example of this is the carbon capture and storage component of our announced blue hydrogen facility at Baytown. This project has the potential to transport and store up to 10 million metric tons of $CO_2$ per year, more than doubling ExxonMobil's current carbon capture capacity. At this facility, we can leverage existing scale and infrastructure needed to more cost-effectively reduce our own emissions and provide additional carbon capture and storage to our customers. It would be our initial contribution to a broad, cross-industry effort to establish a Houston carbon capture and storage hub with an initial goal of about 50 million metric tons of $CO_2$ per year by 2030 and 100 million metric tons by 2040.

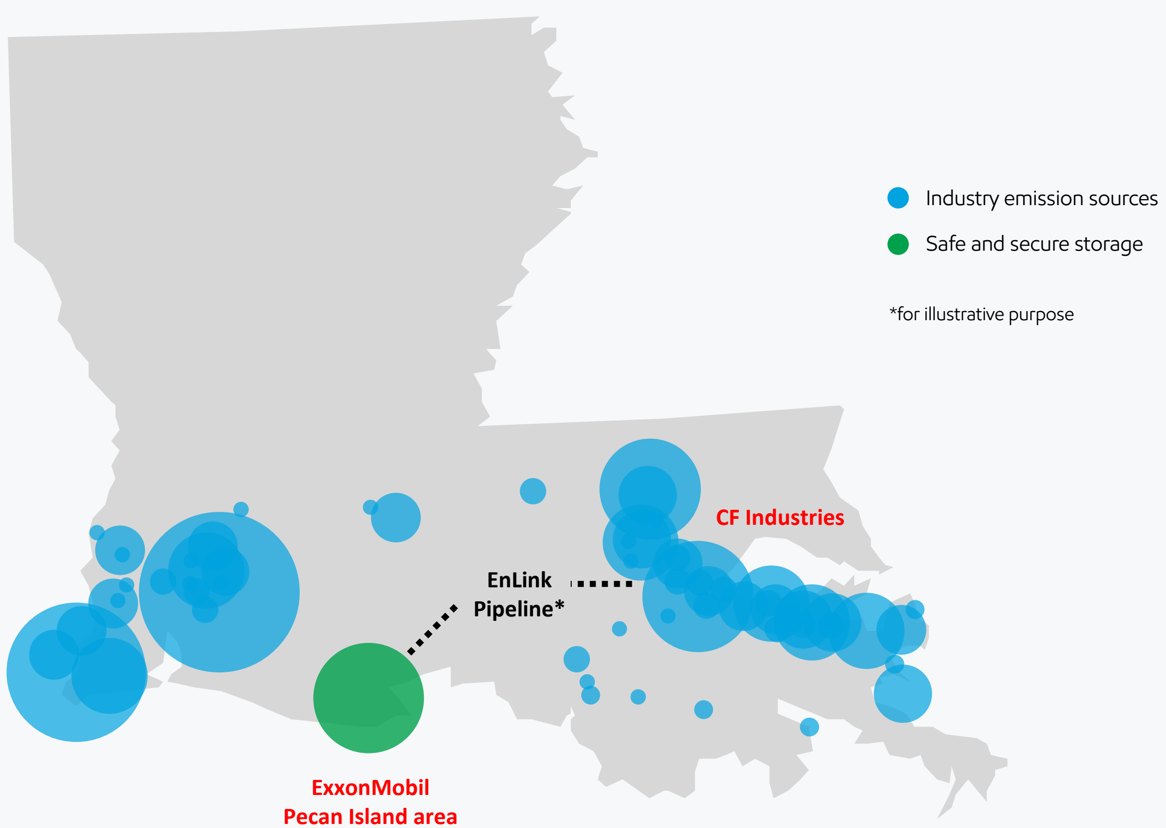
ExxonMobil has more than 30 years of experience capturing and storing $CO_2$, and has cumulatively captured more anthropogenic $CO_2$ than any other company. It has an equity share of about one-fifth of the world's carbon capture capacity[64] at about 9 million metric tons per year, which is the equivalent of approximately 2 million gasoline-powered passenger vehicles per year.[65]

## Baytown blue hydrogen




CCS capacity for Houston-area industrial emissions

## A landmark carbon capture and storage project in Louisiana




Source: ExxonMobil analysis of EPA Facility Level Information on Greenhouse Gases Tool, 2019 data as of Feb. 15, 2022.

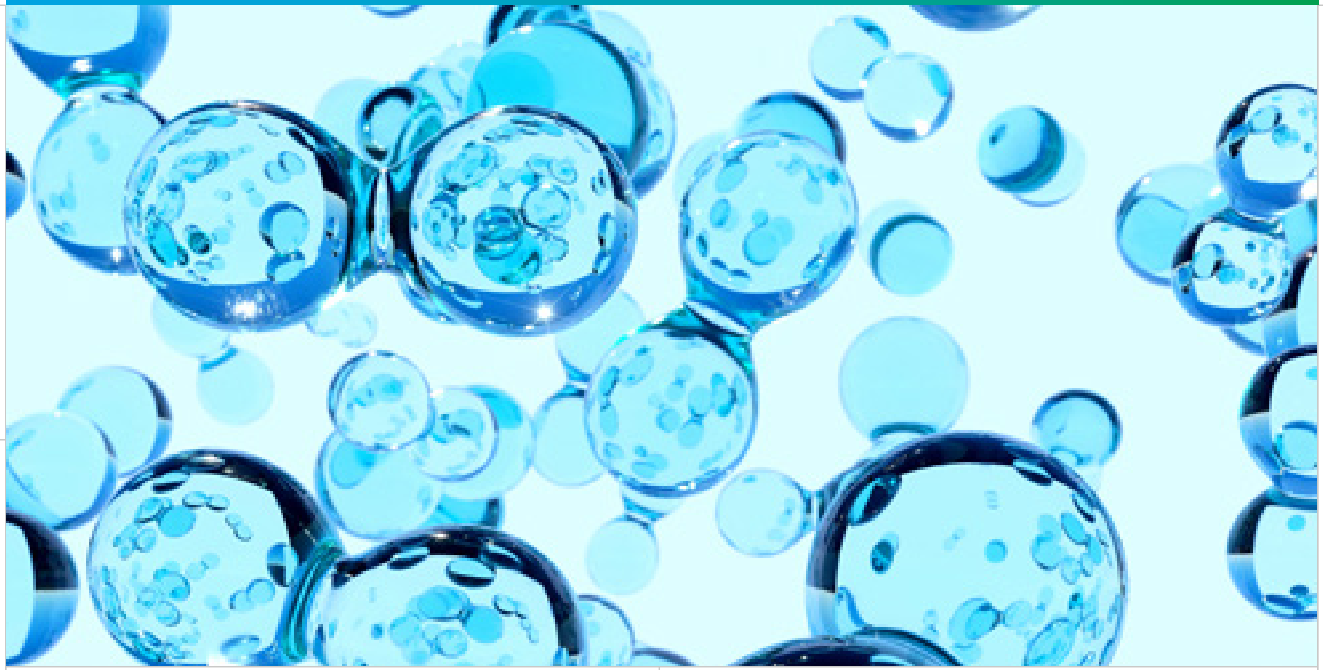
An important aspect of any carbon capture and storage project is having an adequate amount of geologic storage to safely and securely store $CO_2$. Over the past year, we have identified and gained access to nearly 150,000 acres of onshore land in the U.S. for use as secure geologic storage. Building on our long record of successful collaborations with host governments around the world, we are also negotiating to gain access to nationally owned acreage that holds potential for $CO_2$ storage.

Another vital element of establishing a successful business is building a customer base, and our recently announced collaboration with CF Industries and EnLink Midstream highlights some of our progress. This landmark project is expected to capture up to 2 million metric tons of $CO_2$ emissions annually from CF Industries' existing operations in Louisiana and safely and securely transport and permanently store them. At the time of signing, this is the largest-of-its-kind commercial agreement and is equivalent to replacing approximately 700,000 gasoline-powered cars with electric vehicles.[66]

## Hydrogen

We are evaluating strategic investments in hydrogen to expand the use of this important lower-emission energy technology. Hydrogen is a zero-carbon energy carrier that could serve as an affordable and reliable source of energy for hard-to-decarbonize industrial processes in the steel, refining, and chemical sectors, as well as heavy-duty trucking.[67] Low-carbon hydrogen can be produced from low-carbon electricity via electrolysis of water ("green hydrogen"), natural gas reforming coupled with carbon capture and storage ("blue hydrogen"), and other processes.

We have extensive experience with hydrogen, and produce about 1.3 million metric tons annually. We have announced a blue hydrogen production plant at Baytown, Texas, that would produce nearly 1 million metric tons per year of hydrogen – increasing our capacity by more than 65%. This quantity of new low-carbon hydrogen capacity highlights one of the benefits that blue hydrogen can bring to society today, which is its immense scale.



We 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 $CO_2$ emissions in England's Southampton industrial cluster. In addition, we are evaluating large-scale production of blue hydrogen for the Rotterdam industrial complex and have 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 goals.

### Advancing hydrogen through collaboration

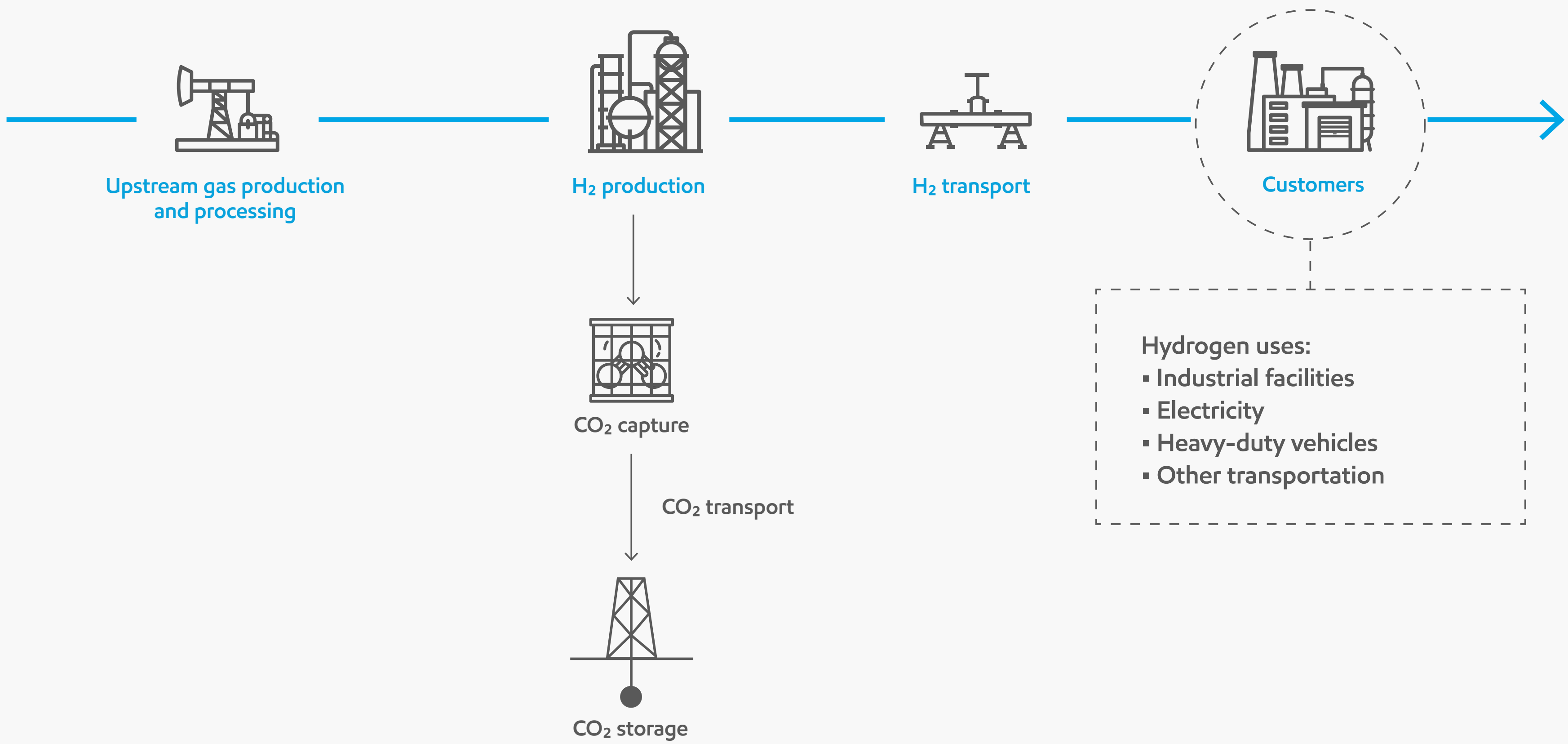
We are participating in cross-industry initiatives to identify the technology advancements and government policies required to deploy low-carbon hydrogen at scale. For example, existing natural gas transmission infrastructure has the potential to be used for hydrogen transport. Our membership in the U.S. HyBlend consortium will help address the technical barriers of blending hydrogen into natural gas pipeline systems.

We are a sponsor of the Open Hydrogen Initiative, which was formed to measure hydrogen production carbon intensity, advance transparency, and support development of a globally traded hydrogen market. It is led by GTI Energy, S&P Global Commodity Insights, and the U.S. Department of Energy's National Energy Technology Laboratory.

## R&D Spotlight: Our hydrogen value chain

We innovate new materials and process enhancements to reduce greenhouse gas emissions on a life-cycle basis, accelerating change as existing and emerging technologies grow to meet scale and cost challenges. In our Low Carbon Solutions business, we are developing innovative technology and process opportunities for blue hydrogen to drive down the cost of abatement.

## Science and technology in the blue hydrogen pathway



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## Hydrogen transport

We are working with the U.S. Department of Energy to help the industry understand the challenges and opportunities of transporting hydrogen through existing natural gas pipeline infrastructure.[68] At the same time, we are working with industry organizations to develop standards for safe hydrogen transport, enabling scalable, long-distance delivery of hydrogen to end users.

## $CO_2$ capture

We continue to research technologies, compounds, and materials to more efficiently capture carbon. These innovations include a new metal organic framework[69] that is highly selective to $CO_2$, as well as advanced amines that provide enhanced efficiency and stability.[70]

## $CO_2$ transport

We are working closely with suppliers and logistics partners to develop new materials and designs for offshore transport, and we partner with a wide range of experts on materials integrity for pipeline transport and storing $CO_2$.

## $CO_2$ storage

We are working with leading universities and other research organizations to improve modeling of geologic storage, including seal characterization for containment assessment, as well as optimal long-term monitoring of stored $CO_2$.[71] Our research and experimental efforts are advancing knowledge in areas such as monitoring requirements and effective storage capacity.

## Direct air capture

With Global Thermostat, we are developing novel processes and robust materials to efficiently increase the rate and quality of $CO_2$ capture. While more research and development is needed, direct air capture is increasingly recognized to have a significant role to play in global decarbonization efforts.

## Nature-based solutions

We are piloting a grassland restoration initiative in the Permian Basin, targeting improved carbon sequestration in soil and research on microbial communities in the soil.

## Life-cycle approach

We are working with the MIT Energy Initiative[72] to develop a new life-cycle approach tool that covers pathways of multiple technologies representing most sources of greenhouse gas emissions, including pathways of producing blue hydrogen.

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## Lower-emission fuels

Lower-emission fuels have the high energy density required to meet the needs of commercial transportation. For example, renewable diesel can reduce carbon emissions by up to 70% compared to conventional diesel.[21] We are focused on growing lower-emission fuels 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.

We are working to supply approximately 40,000 barrels per day of lower-emission fuel by 2025 and have 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 $CO_2$-equivalent emissions per year from the transportation sector.[53]

We monitor policy and technology developments around the world that are creating markets for lower-emission fuels and will help support accretive investments in a wide range of technologies. We support market-based, technology-neutral policies that recognize life-cycle emissions and incentivize the production of lower-carbon-intensity fuels, including fuels used in shipping and aviation.

## Advancing lower-emission fuels through collaboration

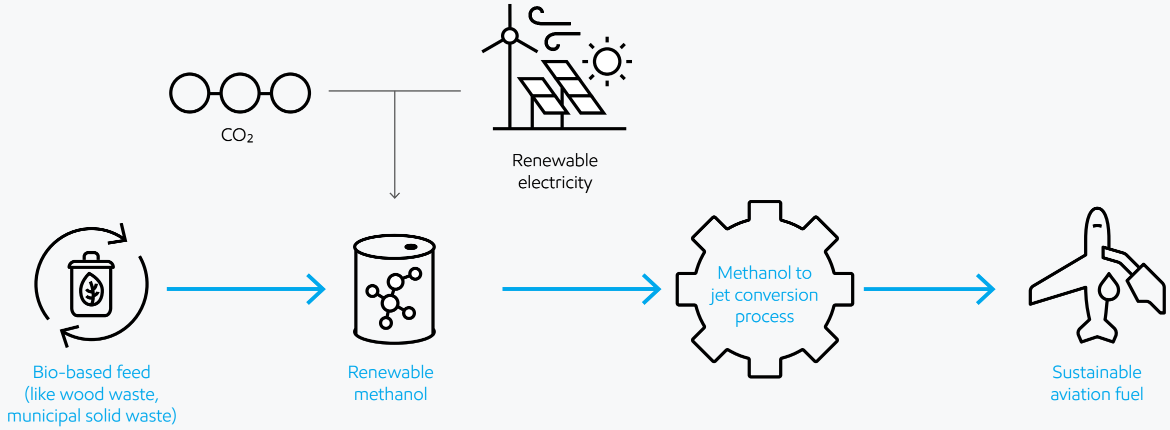
In Canada, ExxonMobil's affiliate, Imperial Oil, announced a long-term contract with a supplier of low-carbon hydrogen at the Strathcona refinery. The project is designed to use low-carbon hydrogen, canola oil feedstock, and our proprietary catalyst to produce approximately 20,000 barrels per day of renewable diesel, thereby reducing transportation-related emissions by about 3 million metric tons of $CO_2$-equivalent annually.[73]

Our joint venture in Norway is expected to provide approximately 2,000 barrels per day of renewable products upon completion. The site will use leftover wood material from the forest industry (also called woody biomass) that meets Europe's 9A, U.K. development fuel, and U.S. advanced cellulosic designations. The venture is also evaluating production of renewable jet fuel through low-cost modifications to our equipment.

We are conducting co-processing trials in our facilities using proprietary technology to produce lower-emission fuels. The ability to co-process bio-feed through an existing fluid catalytic cracker or hydrotreater could allow for faster delivery of lower-emission fuels to customers compared to construction of new facilities requiring large capital investments. We are evaluating how to deploy our capacity to co-process 100,000 barrels per day of lower-emission fuels to markets where supportive policy exists.

We are evaluating opportunities to lower life-cycle emissions through conversion of bio-based feedstocks for diesel production. With the processes ExxonMobil has developed and our proprietary dewaxing catalyst, we can convert waste fats or vegetable oils into renewable fuels with less byproduct formation and hydrogen consumption than other methods. With an additional step, we could use this same process to make sustainable aviation fuel.

## Sustainable aviation fuel




We recently announced a new technology that can produce jet fuel using renewable methanol as the feedstock. This methanol has a lower carbon intensity and can be made through either gasification of bio-feeds, such as wood waste, or captured $CO_2$ and $H_2$ made by electrolysis of water using renewable electricity. The lower-emission methanol can be converted into sustainable aviation fuel using our innovative technology. We expect this process will provide a higher yield of jet fuel than other techniques for the same feedstock, with the potential to be used to make other fuels or chemicals.

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## Nature-based solutions

Nature-based solutions include leveraging natural systems as $CO_2$ sinks while protecting, sustainably managing, and restoring ecosystems to help address certain societal environmental challenges, including preservation of biodiversity and atmospheric $CO_2$ levels.

We are piloting native grassland restoration in the Permian as a method by which to increase carbon sequestration in soil in degraded lands. This effort will test multiple land restoration methodologies, targeting improved carbon sequestration in soil and an understanding of how the practices alter microbial communities in the soil.

By exploring enhancements in these natural sink capabilities, including monitoring, reporting and verification methodologies, high-quality offsets can be demonstrated from these carbon removal activities.

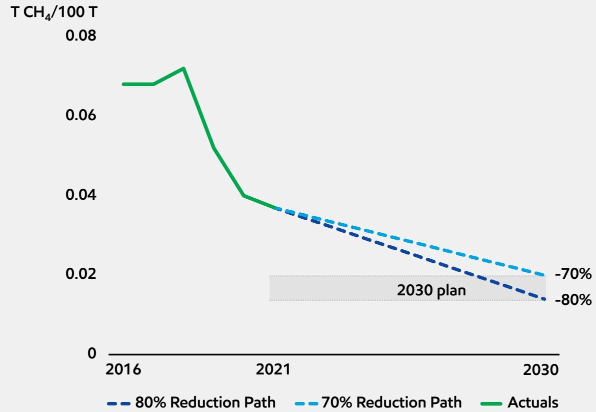
# 14 Driving methane emissions reductions

When it comes to reducing methane emissions, we are making significant progress as we continue to improve our methods of detection and measurement. Through 2021, we reduced methane emissions intensity from all operated assets by more than 40% and absolute methane emissions by nearly half since 2016.

We achieved our results by:

- Reducing total flaring by more than 75% from our Permian Basin operated assets compared to 2019, resulting in one of the lowest flaring intensities in the basin.[74]
- Enhancing operations protocols and developing plans for implementation of a comprehensive methane-monitoring and leak-detection program.
- Design improvements, including electrifying operations and enhancing the reliability of storage tank facilities, and elimination of high-bleed, natural gas-driven pneumatic devices across our U.S. unconventional operated assets.

## Reducing corporate-wide methane emissions intensity[8]



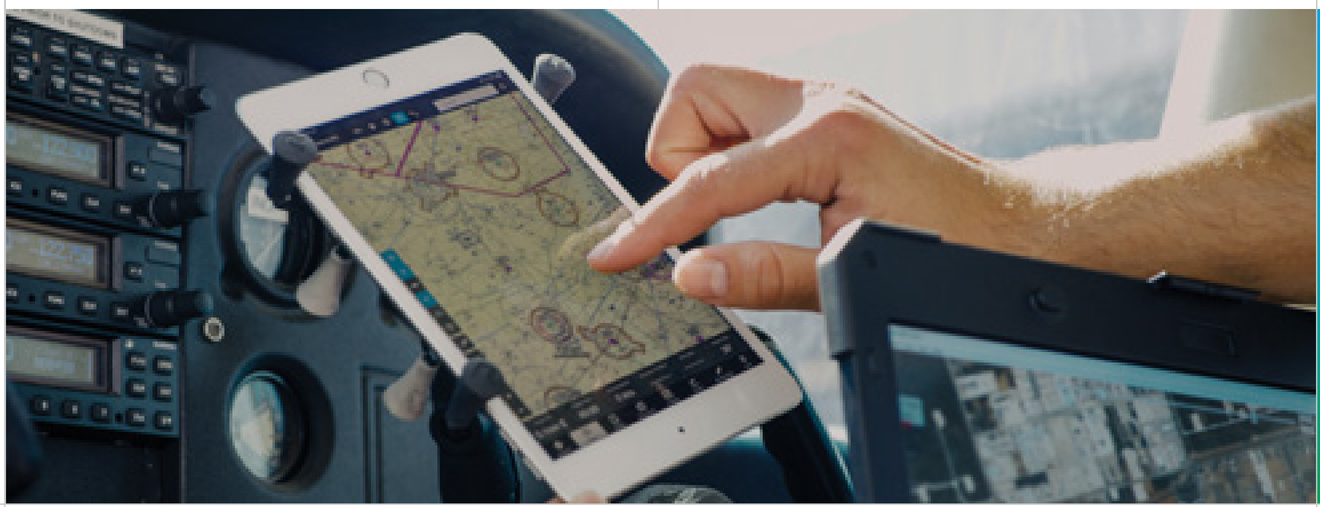

We are working to eliminate all of our natural-gas-driven pneumatic devices by 2025 in our key U.S. unconventional operated assets and to accelerate the phaseout of these devices across all of our global operated assets where technically feasible.

## Aiming for zero methane emissions

We are a founding signatory to the Aiming for Zero Methane Emissions Initiative announced in March 2022.[75] As part of this initiative, we are working to reach near-zero methane emissions from our operated oil and gas assets by 2030.

This initiative builds upon our 2030 greenhouse gas emission-reduction plans, which include a 70-80% reduction in corporate-wide methane intensity compared to 2016 levels.[7] These plans include actions that are expected to cut corporate-wide absolute methane emissions by an estimated 70% compared to 2016 levels, and achieve net-zero greenhouse gas emissions (Scope 1 and 2) from our unconventional operated assets in the Permian Basin. Our plans are consistent with the Global Methane Pledge and the U.S. Methane Emissions Reduction Action Plan.

These efforts are also expected to eliminate routine flaring in our Permian Basin operated assets by year-end 2022 and across our global upstream assets by 2030 in line with World Bank Zero Routine Flaring Initiative.



## Methane emissions measurement and reporting

We support strong measurement, reporting, and verification standards as part of a broad suite of regulations to help reduce methane emissions.

We have publicly reported methane emissions on an annual basis since 2014. This data is based on internationally recognized methodologies and compiled every year by determining emissions by source at each operated asset across the company.

Our reporting framework has enabled the development of consistent and comparable data, which along with our growing field observations has guided our mitigation efforts. We are focused on emissions mitigation and the transition to observation-based emission quantification of potential non-routine sources.

## Methane detection technology

**In space**
Global imaging

Emissions can be detected by satellite surveillance technology. Data is collected as the satellite rapidly orbits the earth.

**In the air**
Regional deployments

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

**On the ground**
Facility installations and equipment surveillance

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.

This is why we continue to develop and deploy enhanced technologies to ensure rapid detection, mitigation, and quantification of these non-routine sources at our operated assets. Since 2019, we have been using airplane-based surveys as enhanced leak detection in the Permian Basin, with expectations to deploy additional ground-based continuous monitors on storage tank facilities by 2025.

We have also partnered with Scepter to develop satellite-based technology to improve global methane detection and quantification. Currently, ExxonMobil and Scepter are collaborating to design and optimize satellite placement and coverage, initially focused on capturing methane emissions data from our operations in the Permian Basin. Scepter anticipates deploying satellites and increasing coverage to more than 24 satellites over three years, forming a large constellation network capable of monitoring oil and natural gas operations around the world.

We also collaborate with others on leading-edge research and on piloting new technologies in our operations to help industry reduce its methane emissions.

For example, Project Astra is a collaboration of universities, environmental groups and industry partners that is developing an innovative sensor network to continuously monitor methane emissions across large areas of Texas for quick and efficient leak detection and repair. We are participating in this high-frequency monitoring system that 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 following that successful campaign, the project launched a small-scale pilot in 2022 in the Permian Basin.

To further advance the scientific understanding of satellite-based methane detection, we are collaborating with Stanford University and with the Collaboratory for Advancing Methane Science to progress field and desktop studies to better understand capabilities of current deployed satellite technology. Through the Oil and Gas Climate Initiative, we are 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.

We have long participated in industry and academic consortiums to advance the scientific understanding of the calculations and models. We recently joined the Gas Technology Institute-led Project Veritas to develop and implement a standardized, science-based, technology-neutral, measurement-informed approach to reporting methane emissions.

## Certified natural gas

As part of another key effort in our methane emissions management program, we continue to expand the volume of natural gas production that is independently certified by the non-profit organization MiQ.

In April 2022, we announced that approximately 200 million cubic feet per day of natural gas produced from our Permian Basin facilities at Poker Lake, New Mexico, was independently certified and received the top grade for methane emissions management. We are the first company to achieve certification for natural gas production associated with oil. The certification from MiQ helps us meet customer demand for energy produced with lower methane emissions. It also helps us identify areas for improvement.

Currently, we are working to expand certification in other unconventional operated assets, including Appalachia and Haynesville.

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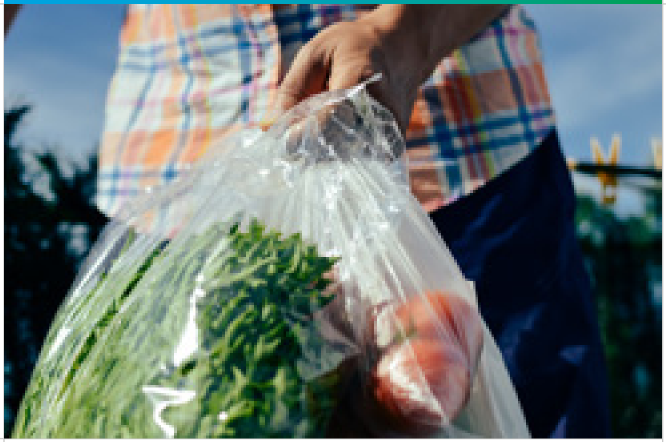
# Enabling emissions reductions with high-performance plastics and advanced recycling



That is why we are focused on providing the products the world needs while working to develop and deploy solutions to reduce plastic waste. To this end, we have started up our first, large-scale advanced recycling facility and are progressing activities throughout the world with the expectation to have about 1 billion pounds of annual advanced recycling capacity by year-end 2026.

Plastics are increasingly one of society's materials of choice because of their superior performance, affordability, and life-cycle benefits compared to alternatives. Step into any hospital, kitchen, daycare center, science lab, airplane, or automobile, and you will find abundant examples of critical plastic products. The plastics found in cell phones, computers, vehicles, packaging, surgical devices, personal protective equipment, facemasks, and many other applications provide countless benefits as well.

Plastics are instrumental to achieving many of the U.N. Sustainable Development Goals. In the IEA NZE by 2050 scenario, the demand for chemicals is expected to grow more than 30% versus 2020,[76] and plastics make up approximately half of that total volume. They protect against disease, preserve food, and increase access to clean drinking water. Greenhouses covered with plastic film help grow fresh fruit and vegetables, while plastic pipes and reusable pouches help deliver water in developing countries.

Plastics also further the goal of addressing climate change by helping to reduce emissions. On a life-cycle basis, plastic packaging has 54% lower greenhouse gas emissions compared to alternative materials as a group, including aluminum, glass and paper.[15] In addition, a recent report from McKinsey & Company comparing plastics versus next-best alternatives showed that in 13 of the 14 applications studied, plastics had greenhouse gas savings ranging between 10-90%.[77] And a 2016 TruCost study found that replacing plastic in consumer products and packaging with alternatives that perform the same function would have nearly four times the negative impact on the environment on a full life-cycle basis.[78]

Plastics are also used in many lower-emission technologies, such as solar panels, energy-saving building insulation, and lightweight, fuel-efficient vehicles. Plastics enable 6-8% fuel efficiency improvement for every 10% reduction in vehicle weight.[18]

As an industry leader in delivering high-performing, cost-competitive plastics solutions for our customers, we are using our advantages in scale, integration, and technology to help reduce emissions and plastic waste in the environment.

## Enabling emissions reductions

We are helping our customers reduce their life-cycle emissions by making thinner, lighter plastics that enable them to do more with fewer emissions and to avoid reliance on alternative materials with higher life-cycle greenhouse gas emissions.

Our Exceed™ and Enable™ performance polyethylene make downgauging possible, i.e., the use of less plastic to perform the same function. For example, our customers can produce lighter weight packaging that reduces shipping weight, thereby lowering emissions.

Our polyethylene technology also makes it possible to use more recycled plastic in packaging, and to make plastic packaging easier to recycle.

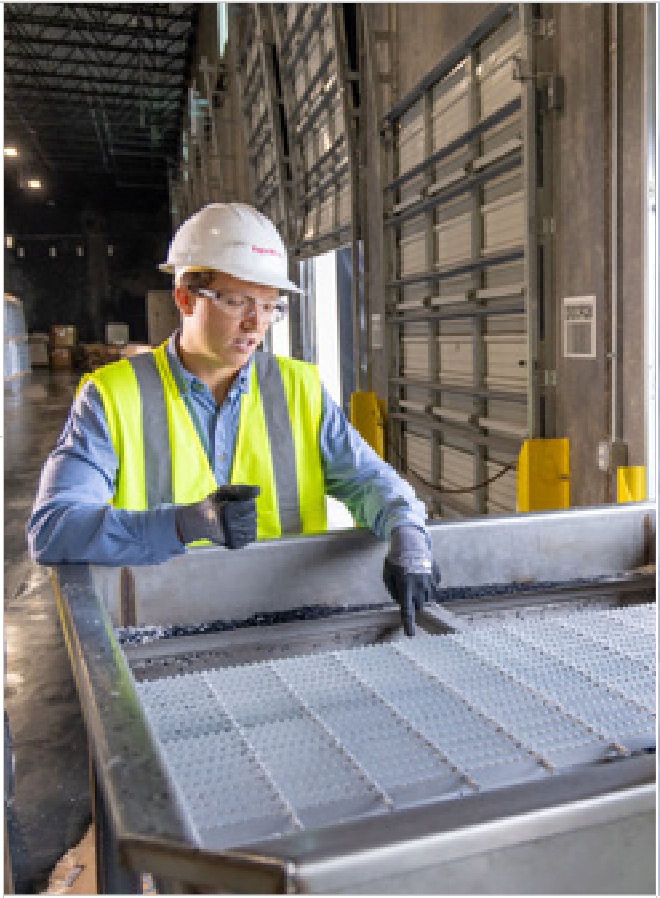
Using plastics for packaging in the U.S. helps society avoid life-cycle greenhouse gas emissions versus alternatives. In terms of ExxonMobil 2030 volumes into U.S. plastics packaging, this would equate to approximately 13 million metric tons per year of U.S.-enabled avoided emissions.[54] If applied globally, our plastics could enable approximately 40 million metric tons per year of avoided emissions.[79]

## Leveraging technology to reduce waste and emissions

We are helping reduce plastic waste by expanding our advanced recycling capacity. This technology complements traditional mechanical recycling by using chemical processes to break down to the molecular level hard-to-recycle plastics, turning them into raw materials that can be used to make new, virgin-quality plastics and other valuable products.

## Here's how it works


Since the start of pilot operations at Baytown last year, we have recycled nearly 15 million pounds of plastic waste with our Exxtend™ technology for advanced recycling. In December, our Baytown team started up one of North America's largest advanced plastic waste recycling facilities, with the capacity to recycle approximately 80 million pounds of plastic waste per year. We are planning to leverage the technology used in Baytown at our sites in Belgium, the Netherlands, Canada, and other U.S. locations. We are also collaborating with third parties on advanced recycling projects in France, Malaysia, Indonesia, and Singapore. By year-end 2026, we expect to build about 1 billion pounds of annual advanced recycling capacity.



This is significant capacity that can be expanded further with supportive government policies and technology advancements in the collection and sorting of plastic waste. To help address this challenge, we formed the joint venture Cyclyx International together with Agilyx Corp., which is developing innovative solutions for aggregating and pre-processing large volumes of plastic waste that can be recycled into valuable products. This includes a collaboration with Cyclyx and Tencate Turf Recycling Solutions to recycle artificial turf that might otherwise end up in a landfill. We are investing in Cyclyx's first-of-its-kind plastic waste processing facility in Houston, which will provide feed for plastic recyclers, including ExxonMobil. Cyclyx and ExxonMobil are also both founding members of the Houston Recycling Collaboration, which brings together industry and government to increase access to plastic recycling.

Our advanced recycling technology enhances the circularity of plastics with reduced greenhouse gas emissions on a feedstock basis. According to a 2022 carbon footprint assessment by Sphera, every ton of waste plastic processed using our advanced recycling technology results in at least 19% lower greenhouse gas emissions compared to processing the same amount of crude-based feedstocks.[80]

The IEA, in its Net Zero Emissions by 2050 scenario, assumes 55% of the world's plastic waste will be recycled by 2050. We are uniquely positioned with our scale, integration, and technology to significantly expand advanced recycling capacity and help broaden the range of plastics that society recycles. This is pivotal for improving overall plastic recycling rates and for meeting growing customer demand for recycled products. We have completed sales of circular plastics to customers around the world for use in food-safe plastic packaging, including collaborations with Sealed Air and Ahold Delhaize USA, Berry Global, and Amcor.

Plastics are an integral part of our Product Solutions business. By working with others in industry, governments, communities, and consumers, we are helping address plastic waste by expanding our advanced recycling capacity while delivering products that bring important benefits to everyday life.

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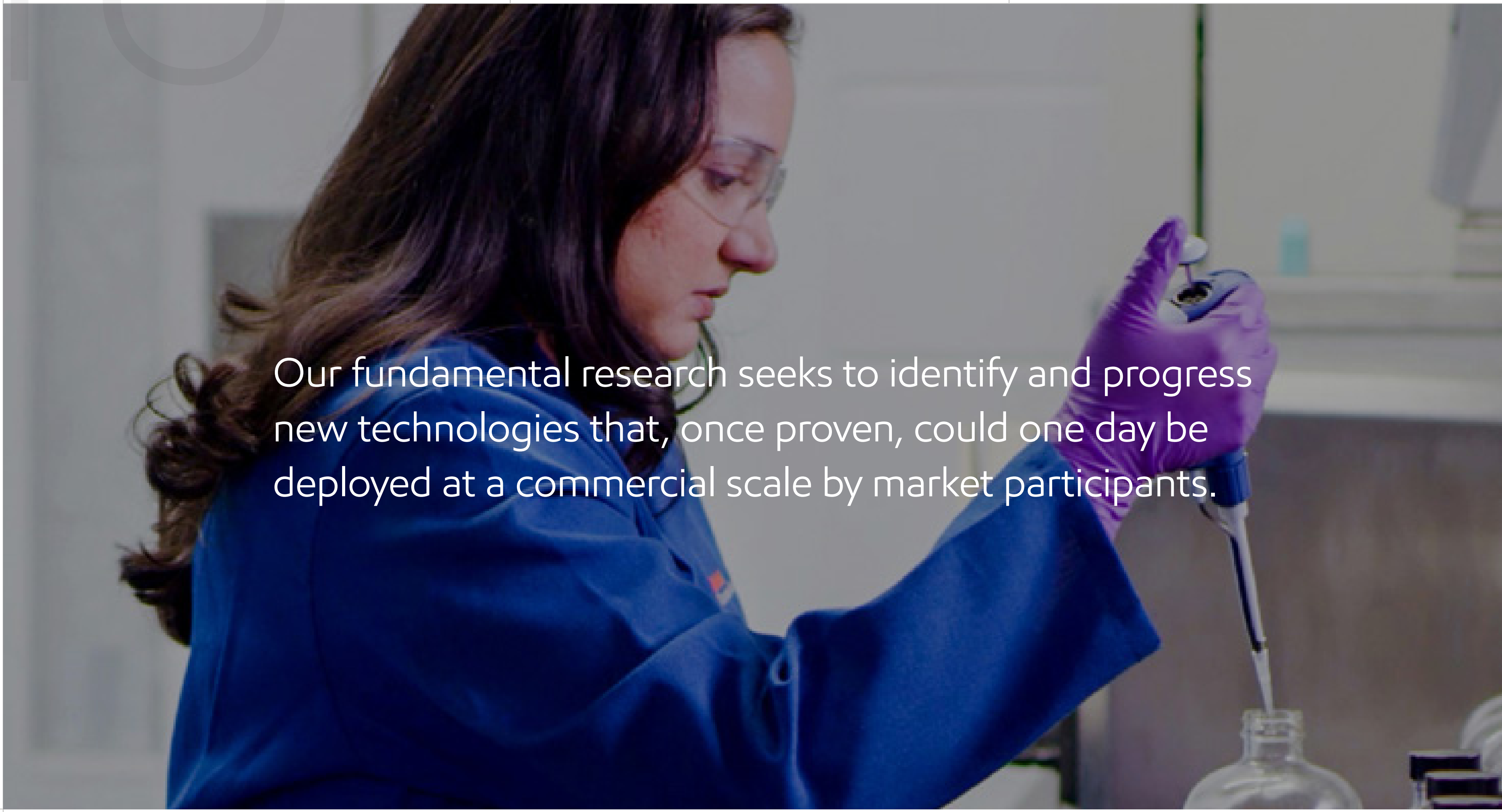
# Our unique and sustained approach to R&D



Our fundamental research seeks to identify and progress new technologies that, once proven, could one day be deployed at a commercial scale by market participants.

The R&D process can take years or even decades and does not result in success for every endeavor. Individual projects advance based on a number of factors, including availability of supportive policy, technology for cost-effective abatement, and alignment with our partners and other stakeholders.

As we work to advance carbon capture and storage, hydrogen and lower-emission fuels opportunities, we are also investing in research and development aimed at next-generation, lower-emission solutions.

We employ thousands of scientists and engineers, including more than 1,500 Ph.D.s. Their work drives our research in areas such as new catalytic and separation materials, novel low-energy processes, and improved means of $CO_2$ storage.

Our scientists have written more than 1,000 peer-reviewed publications and received more than 10,000 patents over the past decade.

In addition, we collaborate with more than 80 universities around the world, four energy centers, and several 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 $CO_2$ storage, electrification of processes, lower-emission fuels, and energy systems models.

We also monitor emerging lower-emission technologies for future research opportunities and to improve understanding of likely energy transition pathways. Our research and development approach focuses on areas that align with our businesses, recognizing that not every endeavor will prove to be scalable or commercially viable.

## Core R&D capabilities

- Biology
- Data science
- Production technology
- Geoscience
- Emerging technology
- Material science
- Energy modeling
- Process technology
- Engineering
- Chemistry
- Physics
- Mathematics

## Energy center collaborations

Stanford | Strategic Energy Alliance, Precourt Institute for Energy

Singapore Energy Centre

The University of Texas at Austin Energy Institute

MITei MIT Energy Initiative

## National labs

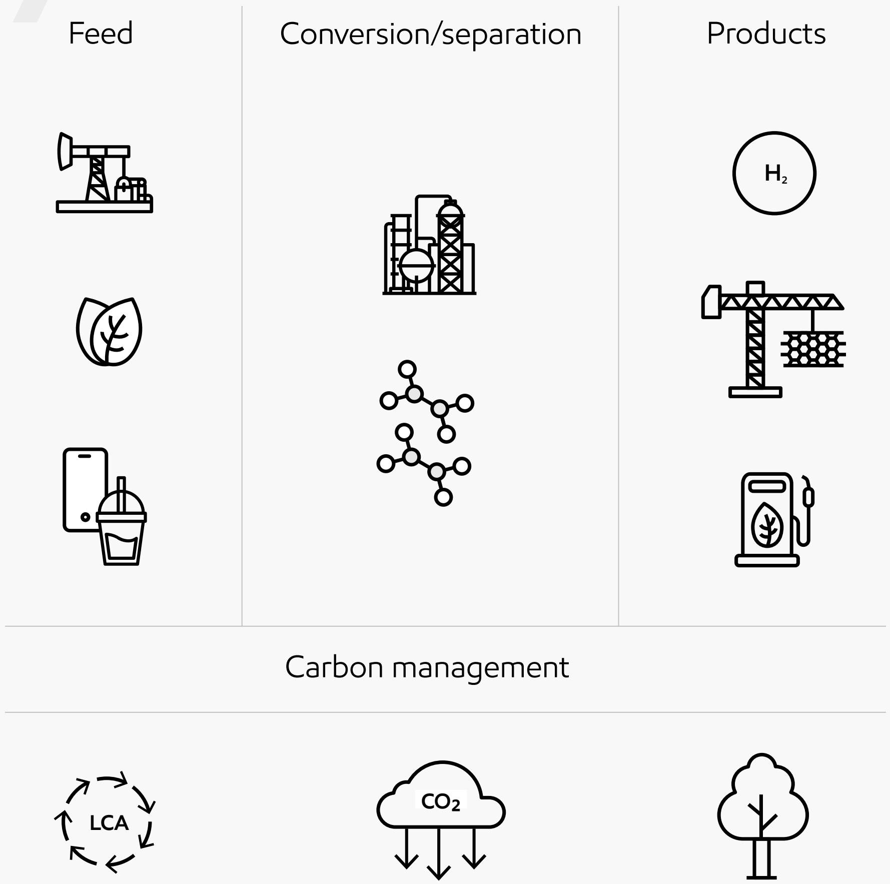
NETL

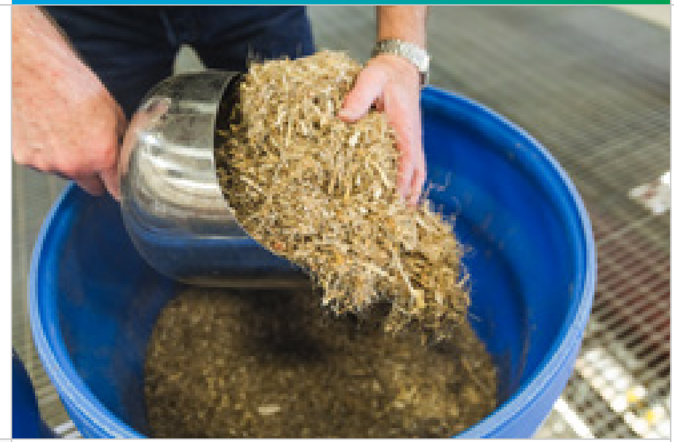
NREL National Renewable Energy Laboratory

INL Idaho National Laboratory

# R&D Spotlight: Innovating across our value chain

## R&D Spotlight: Innovating across our value chain



## Feed

**Biomass** – We are working to expand the range of options for biofuels feedstocks, ranging from vegetable oils to wood wastes, cover crops, and more, with potential application for our biofuels facilities, such as our Strathcona renewable diesel plant.

**Plastic waste** – We focus on plastics that are difficult to recycle mechanically, allowing us to use a wider range of mixed and soiled plastic waste to make high-value raw materials safely, reliably, and economically at scale.

**Methane detection** – We are deploying innovative technology on the ground, in the sky and even in space to identify fugitive emissions in our natural gas value chain, which supports the production of blue hydrogen.

## Conversion/separation

**New catalytic materials** – Our proprietary catalysts have applications in lower-emission fuels, including renewable fuels. For example, our dewaxing catalyst provides higher yield with less hydrogen consumption by improving the diesel flow even at low temperatures.

**Low energy membranes** – Reducing the energy needed to sort molecules (i.e., isolate hydrocarbons for use in the refining or chemical process) can dramatically reduce emissions in our manufacturing. Our scientists are building off years of research with university partners to identify ways to improve the scalability of this technology.[81, 82]

**GHG abatement and energy efficiency** – As part of our 2030 roadmaps, we are working across our sites to apply modeling that can drive efficiencies, explore opportunities for electrification and heat recovery, and pursue the full range of large and small optimizations that may lower emissions.

**Advanced recycling** – Our proprietary advanced recycling process can leverage our existing integrated facilities to transform plastic waste into the raw materials used in making valuable products, including virgin-quality plastic.

## Products

**Hydrogen** – We are working with the U.S. Department of Energy and industry organizations to evaluate safe and cost-effective hydrogen transport, which could enable us to grow the supply of hydrogen for a wide range of end users.[83]

**Structural materials** – We collaborate with a range of external stakeholders to advance more sustainable materials for use in infrastructure. One example is our support for Stanford University to develop composite durability models for architects and engineers to incorporate into their designs.[84]

**Lower-emission fuels** – Our continuing research in advanced biofuels could provide improved longer-term solutions by upgrading lower-value, bio-based feedstock into renewable methanol for use in aviation fuels and more.

## Carbon management

**Carbon capture and storage** – We are collaborating with FuelCell Energy on fundamental research into a novel technology that uses proprietary carbonate fuel cells to concentrate $CO_2$ from large-scale industrial and power plants while generating power, thus lowering the effective capture cost. We are exploring options to conduct a pilot test of this next-generation fuel cell carbon capture solution at our Rotterdam facility. Work like this will play an important role in achieving significant global emissions reductions.

**Direct air capture** – We are working with Global Thermostat to develop the potential of large-scale deployment of direct air capture while continuing to develop novel processes and materials to capture more $CO_2$ with less energy.

**Nature-based solutions** – Prairies, grasslands, and other nature-based carbon storage opportunities provide potential opportunities to remove carbon from atmosphere, and we are studying land management practices, restoration methodologies and more to improve carbon sequestration.

**Life-cycle approach** – The Sustainable Energy System Analysis Modeling (SESAME) tool we have been developing with the MIT Energy Initiative can perform full life-cycle assessments for more than 1,000 technology pathways, from primary energy sources to final products or services.[72]

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# Advocating for essential policy support

We recognize the important role that supportive government policies play in the development and deployment of lower-emission technologies, including those that are part of our Low Carbon Solutions business.

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## Understanding life-cycle emissions to better inform policy decisions

We have been working with the MIT Energy Initiative to develop a new life-cycle approach 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),[72] 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.[85, 86, 87]

Clear and consistent policies, along with advancements in technology, can act as an accelerator for lower-emission alternatives, which is why we actively participate in climate-related policy engagements around the world, including our work with the IPCC.

Our focus is on practical policy solutions that take into account increasing global demand for affordable and reliable energy while enabling scalable development and deployment of lower and zero-greenhouse gas emission technologies.

For example, a coordinated and transparent economy-wide price on carbon such as a carbon tax would enable all technologies to compete and cost-effectively lower carbon emissions intensity by focusing on reducing emissions per unit of energy 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, along with technology advancements, could also be an effective way to reduce emissions. We support the approaches outlined below, which help address greenhouse gas emissions in hard-to-decarbonize sectors of the economy, including manufacturing, transportation, and power generation.

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## Manufacturing

To reduce industrial emissions in the manufacturing sector, our focus is on carbon capture and storage and hydrogen. To drive investment and deploy these technologies at the pace and scale needed for a net-zero future, governments must establish durable regulatory and legal frameworks as well as incentives similar to those available for more established lower-emission technologies such as solar and wind. The U.S. Congress recently passed the Inflation Reduction Act (IRA), which provides some of the government support described in this document. The IRA leverages a life-cycle assessment approach as the method for assessing the greenhouse gas emissions of low-carbon hydrogen and transportation fuels, and defines the value of corresponding credit by the emissions intensity achieved on a life-cycle basis.

We support 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 and secure $CO_2$ storage.
- Allow for fit-for-purpose $CO_2$ injection well design standards.
- Provide legal certainty for geologic storage ownership.
- Ensure a streamlined permitting process for carbon capture and storage facilities.
- Provide access to $CO_2$ storage capacity owned or controlled by governments.
- Allow for high-quality offsets generated from carbon capture and storage, low-carbon, and carbon-removal projects.

We are participating in several studies, including the National Petroleum Council's report on low-carbon hydrogen, to assess emissions during hydrogen production and transportation as well as the benefits of hydrogen on a full life-cycle intensity basis versus alternatives.

## Transportation

A holistic low-carbon transport policy that combines a market-based, technology-neutral fuel standard with a life-cycle vehicle $CO_2$ emission standard could drive emission reductions across the entire vehicle fleet.

We advocate for a carbon intensity-based fuel standard approach that can also be extended to the aviation and marine sectors. We are a lead participant in developing the American Petroleum Institute's policy framework that includes actions to reduce life-cycle emissions in the U.S. transportation sector.

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## Power generation

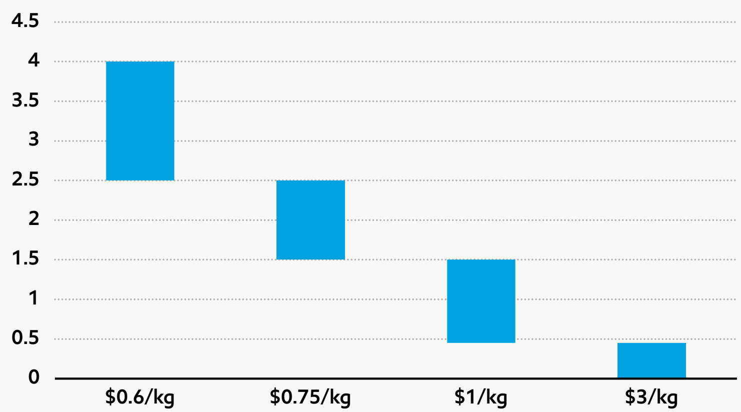
A technology-neutral clean-energy standard or carbon-intensity standard could reduce $CO_2$ emissions in the electricity sector by setting targets based on carbon intensity and incentivizing necessary infrastructure and lower-emission options. These include natural gas, renewables, and bioenergy, as well as negative-emission technologies like carbon capture and storage and direct air capture.

We 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. We continue to support engagement with the U.S. government on this issue.

As part of our participation in policy discussions, we engage through trade associations and industry collaborations, including the Oil and Gas Climate Initiative. We use various communication channels including this report, press releases, exxonmobil.com, and the Exxchange advocacy portal to clearly and transparently articulate our climate-related policy positions. These positions inform and provide the basis for our lobbying and advocacy efforts.

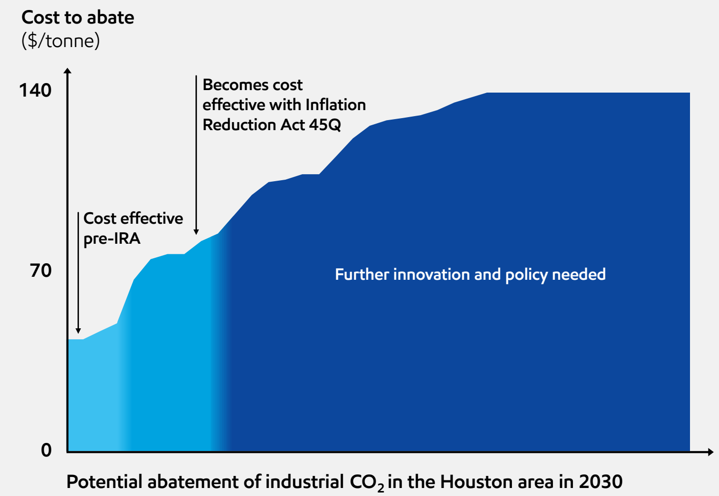
### U.S. Inflation Reduction Act 45V credit by GHG intensity

Well-to-gate GHG intensity, kg $CO_2e$/kg $H_2$



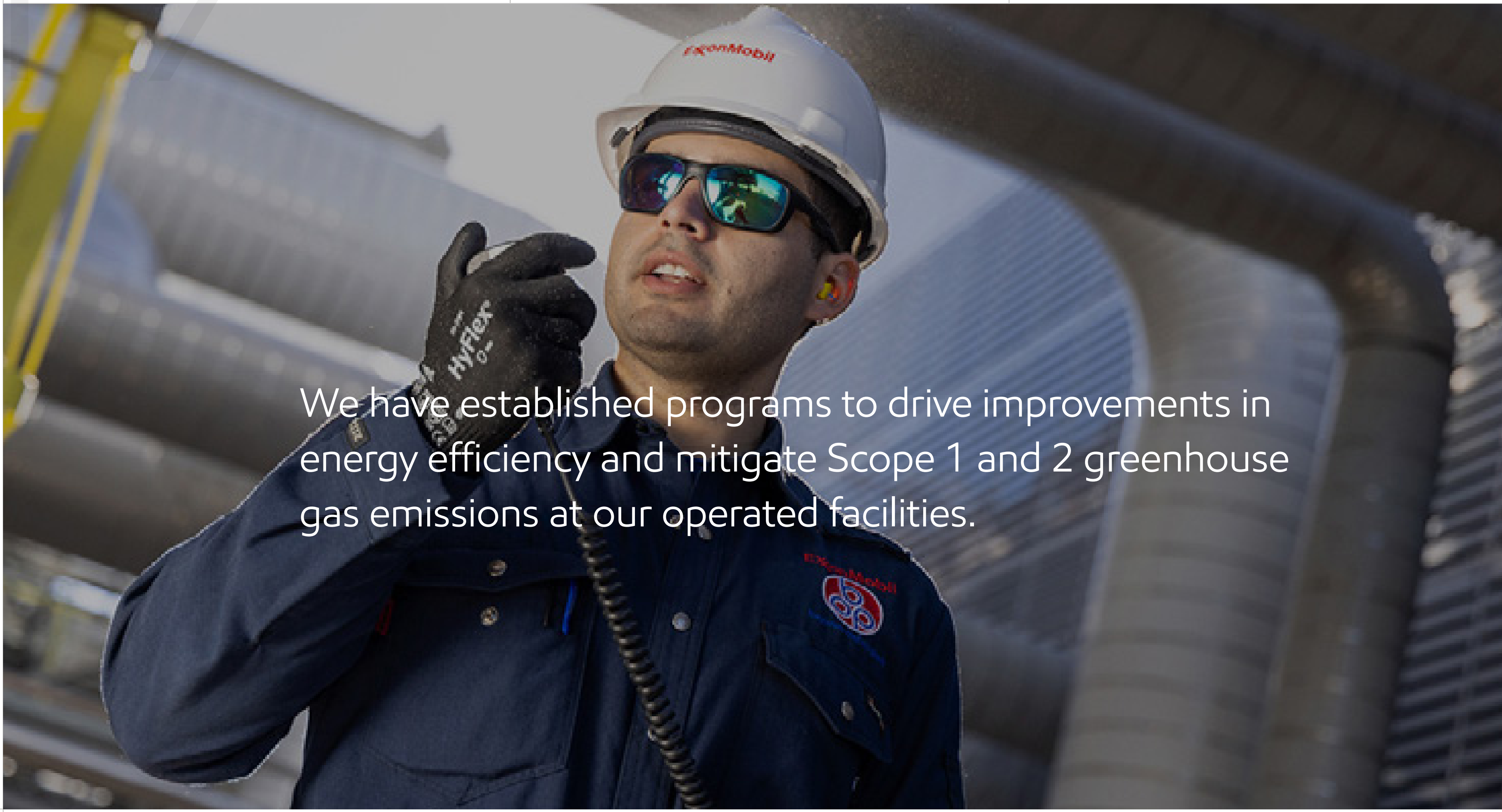

Source: H.R.5376 - Inflation Reduction Act of 2022, Sec. 45V. Credit for production of clean hydrogen

### U.S. Inflation Reduction Act incentives for technologies[88, 89]



19

# Metrics & targets



We have established programs to drive improvements in energy efficiency and mitigate Scope 1 and 2 greenhouse gas emissions at our operated facilities.

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

In 2020, we announced plans to reduce our 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 company. We achieved these 2025 emission-reduction plans in 2021 – four years ahead of schedule.

That same year, we announced new medium-term Scope 1 and 2 greenhouse gas emission-reduction plans for 2030 for operated assets, compared to 2016 levels.[7] Our 2030 plans are detailed starting on Page 6 of this report.

# Greenhouse gas emissions performance data[8]

We assess our performance to support continuous improvement throughout the organization. The reporting guidelines and indicators of Ipieca, the American Petroleum Institute (API), and the International Association of Oil and Gas Producers Sustainability Reporting Guidance for the Oil and Gas Industry (2020) informed the selection of the data included in this performance table. These guidelines are based on the GHG Protocol. The performance data in the July 2022 Advancing Climate Solutions Progress Report was based upon IPCC AR4. The following data table is based upon IPCC AR6.[90] Lloyd's Register Quality Assurance has provided their independent limited level of assurance that the 2021 ExxonMobil greenhouse gas emissions inventory meets ISO 14064-3 expectations.

# Managing the risks of climate change

Click here for the GHG Data Supplement

| Operated basis | Units | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|
| **Net GHG (excludes exported power and heat)**[91] | (million metric tons $CO_2e$) | 114 | 110 | 112 | 107 | 100 | 100 |
| **Scope 1 GHG emissions**[92] | (million metric tons $CO_2e$) | 109 | 104 | 106 | 100 | 95 | 96 |
| $CO_2$ | (million metric tons $CO_2$) | 99 | 95 | 97 | 94 | 90 | 91 |
| $CH_4$ | (million metric tons $CO_2e$) | 9 | 9 | 9 | 7 | 5 | 5 |
| Other gases | (million metric tons $CO_2e$) | <1 | <1 | <1 | <1 | <1 | <1 |
| **Emissions from exported power and heat** | (million metric tons $CO_2e$) | 3 | 3 | 3 | 2 | 2 | 2 |
| **Scope 2 GHG emissions (location-based)**[93] | (million metric tons $CO_2e$) | 8 | 9 | 9 | 9 | 7 | 7 |
| **Scope 2 GHG emissions (market-based)**[94] | (million metric tons $CO_2e$) | 8 | 9 | 9 | 9 | 7 | 7 |
| Energy attribute certificates (RECs, GOOs) | (million metric tons $CO_2e$) | 0 | 0 | 0 | <1 | <1 | 1 |
| **Methane ($CH_4$)** | (million metric tons $CH_4$) | 0.30 | 0.29 | 0.31 | 0.22 | 0.16 | 0.16 |
| **Methane ($CH_4$) intensity***  | (metric tons $CH_4$ per 100 metric tons of throughput or production) | 0.07 | 0.07 | 0.07 | 0.05 | 0.04 | 0.04 |
| **GHG emission intensity (Scope 1 + Scope 2)*** | (metric tons $CO_2e$ per 100 metric tons of throughput or production) | 26.5 | 26.1 | 26.5 | 25.6 | 25.0 | 24.0 |
| Upstream* | (metric tons $CO_2e$ per 100 metric tons production) | 29.3 | 29.3 | 30.1 | 26.7 | 24.8 | 22.9 |
| Downstream | (metric tons $CO_2e$ per 100 metric tons of throughput) | 20.0 | 19.3 | 19.4 | 19.8 | 20.2 | 20.1 |
| Chemical | (metric tons $CO_2e$ per 100 metric tons production) | 52.6 | 52.8 | 52.0 | 53.1 | 51.2 | 49.0 |
| **By-division GHG emissions (Scope 1 + Scope 2)** | (million metric tons $CO_2e$) | 117 | 113 | 115 | 109 | 102 | 102 |
| Upstream | (million metric tons $CO_2e$) | 53 | 50 | 51 | 47 | 44 | 41 |
| Downstream | (million metric tons $CO_2e$) | 46 | 43 | 44 | 42 | 40 | 41 |
| Chemical | (million metric tons $CO_2e$) | 19 | 19 | 20 | 19 | 19 | 19 |
| **ENERGY - OPERATED BASIS** | | | | | | | |
| Energy use | (billion gigajoules) | 1.5 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 |
| Upstream energy intensity | (gigajoules per metric tons production) | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.4 |
| Downstream energy intensity | (gigajoules per metric tons throughput) | 2.9 | 2.9 | 3.0 | 3.1 | 3.3 | 3.4 |
| Chemical energy intensity | (gigajoules per metric tons product) | 10.3 | 10.1 | 9.7 | 10.2 | 11.3 | 10.0 |
| **FLARING - OPERATED BASIS** | | | | | | | |
| Hydrocarbon flaring (worldwide activities) | (million standard cubic feet per day) | 530 | 410 | 410 | 430 | 320 | 280 |
| Africa/Europe/Middle East | (million standard cubic feet per day) | 400 | 290 | 250 | 230 | 170 | 170 |
| Americas | (million standard cubic feet per day) | 70 | 70 | 100 | 160 | 120 | 80 |
| Asia Pacific | (million standard cubic feet per day) | 60 | 50 | 50 | 40 | 30 | 30 |
| Hydrocarbon flaring (worldwide activities) intensity* | ($m^3$ per metric tons of throughput/production) | 12 | 10 | 10 | 10 | 8 | 7 |
| Scope 1 - Greenhouse gas emissions from flaring | (million metric tons $CO_2e$) | 15 | 12 | 12 | 12 | 9 | 8 |
| **$CO_2$ - captured for storage** | (million metric tons of $CO_2$) | 6 | 7 | 7 | 6 | 6 | 6 |

| Equity basis | Units | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|
| **Net GHG (excludes exported power and heat)**[91] | (million metric tons $CO_2e$) | 125 | 123 | 125 | 120 | 112 | 113 |
| **Scope 1 GHG emissions**[92] | (million metric tons $CO_2e$) | 120 | 118 | 120 | 114 | 108 | 110 |
| $CO_2$ | (million metric tons $CO_2$) | 111 | 109 | 111 | 107 | 102 | 104 |
| $CH_4$ | (million metric tons $CO_2e$) | 9 | 9 | 9 | 7 | 6 | 5 |
| Other gases | (million metric tons $CO_2e$) | <1 | <1 | <1 | <1 | <1 | <1 |
| **Emissions from exported power and heat** | (million metric tons $CO_2e$) | 3 | 3 | 3 | 3 | 3 | 3 |
| **Scope 2 GHG emissions (location-based)**[93] | (million metric tons $CO_2e$) | 8 | 9 | 8 | 8 | 8 | 7 |
| **Scope 2 GHG emissions (market-based)**[94] | (million metric tons $CO_2e$) | 8 | 9 | 8 | 8 | 7 | 7 |
| Energy attribute certificates (RECs, GOOs) | (million metric tons $CO_2e$) | 0 | 0 | 0 | <1 | <1 | 1 |
| **Methane ($CH_4$)** | (million metric tons $CH_4$) | 0.29 | 0.29 | 0.30 | 0.24 | 0.19 | 0.18 |
| **Methane ($CH_4$) intensity** | (metric tons $CH_4$ per 100 metric tons of throughput or production) | 0.06 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 |
| **GHG emission intensity (Scope 1 + Scope 2)** | (metric tons $CO_2e$ per 100 metric tons of throughput or production) | 26.0 | 25.7 | 26.2 | 25.8 | 25.7 | 25.2 |
| Upstream | (metric tons $CO_2e$ per 100 metric tons production) | 26.6 | 26.6 | 27.4 | 25.7 | 24.8 | 24.0 |
| Downstream | (metric tons $CO_2e$ per 100 metric tons of throughput) | 20.2 | 19.4 | 19.6 | 19.8 | 20.3 | 20.6 |
| Chemical | (metric tons $CO_2e$ per 100 metric tons production) | 54.7 | 54.9 | 54.6 | 55.8 | 54.7 | 51.9 |
| **By-division GHG emissions (Scope 1+Scope 2)** | (million metric tons $CO_2e$) | 128 | 126 | 128 | 123 | 115 | 117 |
| Upstream | (million metric tons $CO_2e$) | 59 | 59 | 59 | 56 | 52 | 51 |
| Downstream | (million metric tons $CO_2e$) | 47 | 44 | 44 | 43 | 40 | 42 |
| Chemical | (million metric tons $CO_2e$) | 22 | 23 | 24 | 24 | 23 | 23 |
| **$CO_2$ - captured for storage** | (million metric tons $CO_2$) | 6 | 6 | 7 | 7 | 7 | 7 |

*ExxonMobil announced greenhouse gas emission-reduction plans[7] compared to 2016 levels

# Scope 3 emissions

The table below provides Scope 3 estimates associated with the use of our 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. Scope 3 estimates represent three approaches for accounting and are not meant to be aggregated, as this would lead to duplicative accounting.

Estimated Scope 3 emissions from the use of ExxonMobil's crude and natural gas production for the year ending Dec. 31, 2021, as provided under Ipieca's Category 11 were 530 million metric tons.

For example, for completeness, the Scope 3 estimates associated with the combustion of the crude processed, produced, or sold from our refineries are provided; however, to avoid duplicative accounting, these Scope 3 estimates are not included in our Scope 3 Category 11 total, since the associated Scope 3 emissions would have been reported by the producer of those crudes.

Applied $CO_2$ 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. Scope 3 guidelines are based on the GHG Protocol.

## ExxonMobil 2021 Scope 3 estimates

(Million metric tons $CO_2$-equivalent)

Click here for the GHG Data Supplement

| Ipieca Category 11 Scope 3 potential estimates | | Upstream production | Refining throughput | Petroleum product sales |
|---|---|---|---|---|
| Natural gas production | 170 | 530 | 620 | 690 |
| Crude production | 360 | | | |

## 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 |
|---|---|
| **Strategy** | |
| 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. | |
| a. Describe the climate-related risks and opportunities the organization has identified over the short, medium and long term. | Pages 3-28, 34-47, 57-86 |
| b. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy and financial planning. | Pages 3-28, 34-47, 57-86 |
| c. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. | Pages 3-37, 43-47, 57-77 |
| **Governance** | |
| Disclose the organization's governance around climate related risks and opportunities. | |
| a. Describe the Board's oversight of climate-related risks and opportunities. | Pages 53-56 |
| b. Describe management's role in assessing and managing climate-related risks and opportunities. | Pages 53-56 |
| **Risk management** | |
| Disclose how the organization identifies, assesses, and manages climate-related risks. | |
| a. Describe the organization's processes for identifying and assessing climate-related risks. | Pages 10-13, 48-52 |
| b. Describe the organization's processes for managing climate-related risks. | Pages 10-13, 48-52 |
| c. Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management. | Pages 10-13, 48-52 |
| **Metrics & targets** | |
| Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material. | |
| a. Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process. | Pages 3-7, 10-13, 43-47, 87-90 |
| b. Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 GHG emissions, and the related risks. | Pages 3-7, 10-13, 43-47, 87-92 |
| c. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets. | Pages 3-7, 10-13, 87-88 |

## Climate Action 100+ Net Zero Company Benchmark

Climate Action 100+ Net Zero Company Benchmark has 10 disclosure indicators that aim to assess companies' actions related to climate change and that will be incorporated by Institutional Shareholder Services (ISS) into ISS's recommendations regarding the board of directors and annual meeting proposals. Some of these indicators recognize the work ExxonMobil is doing, such as our alignment with the core elements of the TCFD framework. We believe that the most recent analysis of ExxonMobil by Climate Action 100+ does not recognize the work we have done in meeting those indicators, such as indicator 3 (Medium-term Reduction Targets), indicator 5 (Decarbonization Strategy), and indicator 6 (Capital Allocation Alignment). Separately, we believe that other metrics used by Climate Action 100+, such as a requirement to set Scope 3 reduction targets, are too narrow of an approach to evaluate a company's efforts and contributions to helping reduce global greenhouse gas emissions to support the goals of the Paris Agreement and may result in artificially constraining supply, which can lead to shortages, regressive inflationary pressure, or an increase in societal greenhouse gases. For additional information that should be considered in using the Climate Action 100+ Net Zero Company Benchmark indicators click here.

## 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.[95] 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)
- **Outlook for Energy:** (exxonmobil.com/outlookforenergy)
- **Technology:** (exxonmobil.com/technology)
- **Enhanced methane emissions reduction program:** (exxonmobil.com/methane)
- **Advancing climate solutions:** (exxonmobil.com/advancingclimatesolutions)
- **SEC Form 10-K:** (exxonmobil.com/secfilings)
- **Executive Compensation materials contained in current year proxy statement** (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, we 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

**$CO_2e$:** carbon dioxide equivalent

**EJ:** exajoules

**GOOs:** guarantees of origin

**GT:** gigatons

**GW:** gigawatts

**KBDOE:** thousand barrels per day of oil equivalent

**Lower 1.5°C:** equivalent to combining C1 and C2 in IPCC AR6

**Lower 2°C:** equivalent to C3 in IPCC AR6

**MBD:** million barrels per day

**MJ:** megajoules

**MTA:** million tons per annum

**PPAs:** power purchase agreements

**RECs:** renewable energy certificates

**ROCE:** return on capital employed

**T:** tons

**TSR:** total shareholder return

## Footnotes

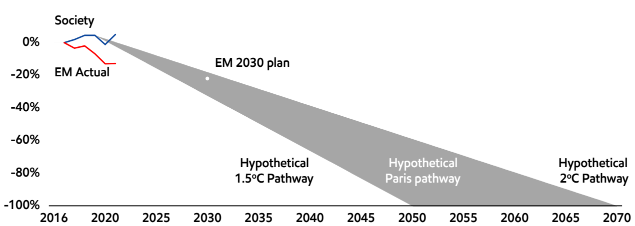
**01** Highest global refining throughput at our operated facilities through third quarter 2022 since 2007 on a full-year same-site basis.

**02** Increased plastic production capacity based on polyethylene and polypropylene production capacity growth since fourth quarter 2021, before the start-up of the Corpus Christi chemical complex. The April 2018 report of Franklin Associates on Life Cycle Impacts of Plastic Packaging Compared to Substitutes study concluded that plastic packaging in the United States helped society avoid life-cycle greenhouse gas emissions versus turning to alternatives as a group; 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.

**03** 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 $CO_2$ emissions reach net zero around 2050, and for limiting global warming to below 2°C (with at least 67% probability of likelihood) $CO_2$ 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.

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).

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




Society $CO_2$
emissions sourced from IEA Global Energy Review: $CO_2$ Emissions in 2021 and include $CO_2$ emissions from energy combustion and industrial processes.

Our 2030 emission-reduction plans are intensity based. These plans include actions that are also expected to achieve absolute reduction in corporate-wide greenhouse gas emissions by approximately 20%, compared to 2016 levels.

ExxonMobil's 2030 GHG emission reduction plans, https://corporate.exxonmobil.com/News/ Newsroom/News-releases/2021/1201_ ExxonMobil-announces-plans-to-2027-doubling-earnings-and-cash-flow-potential- reducing-emissions.

**04** ExxonMobil's 2022 Outlook for Energy, https://corporate.exxonmobil.com/Energy-and-innovation/Outlook-for-Energy.

**05** ExxonMobil analysis based on ExxonMobil's 2022 Outlook for Energy chemical feedstock projected demand excluding direct ethane from Upstream operations.

**06** These charts illustrate potential greenhouse gas abatement options for Scope 1 and 2 greenhouse gas emissions. These options are not all-inclusive and are subject to change as a result of a number of factors, including abatement reduction magnitude, implementation timing, abatement cost, portfolio changes, policy developments, technology advancements, and as annual company plans are updated. Includes energy attribute certificates, such as RECs and GOOs.

**07** ExxonMobil's 2030 GHG emission reduction plans, https://corporate.exxonmobil.com/News/ Newsroom/News-releases/2021/1201_ ExxonMobil-announces-plans-to-2027- doubling-earnings-and-cash-flow-potential-reducing-emissions.

**08** ExxonMobil's reported emissions, reductions, and avoidance performance data are based on a combination of measured and estimated emissions data using reasonable efforts and collection methods. 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. 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. We are working to continuously improve our performance and methods to detect, measure and address greenhouse gas emissions. ExxonMobil works with industry, including API and Ipieca, to improve emission factors and methodologies, including measurements and estimates.

**09** Projected emission intensity includes Scope 1 and 2 emissions of ExxonMobil operated assets as compared to available benchmark. Reduction estimates provided herein have a high degree of uncertainty, and are subject to change based on potential future conditions. 2030 first quartile projection based on comparison of available peer performance data, third-party sources and ExxonMobil analysis.

**10** First quartile operated performance based on ranking of the PNG LNG liquefaction facility in Phillip Townsend and Associates Inc. industry benchmarking analysis for operating year 2020.

**11** Based on Scope 1 and 2 emissions of ExxonMobil operated assets. Refining performance results based on ExxonMobil analysis of 2020 Solomon Associates' proprietary Carbon Emissions Index; Chemicals performance results based on ExxonMobil analysis of key competitors' publicly available information, annual data (2016-2021).

**12** Total demand through 2030 – ExxonMobil's 2022 Outlook for Energy.

**13** Global economy - ExxonMobil's 2022 Outlook for Energy; Chemicals growth - IHS Markit Report, Global (Polyethylene, Polypropylene, and Paraxylene), 2022 edition: Fall 2022 update.

**14** May not reflect investment decisions made by the company. Individual opportunities may advance based on a number of factors, including availability of supportive policy, technology for cost-effective abatement, and alignment with our partners and other stakeholders. The company may refer to these opportunities as projects in external disclosures at various stages throughout their progression.

**15** April 2018 report of Franklin Associates on Life Cycle Impacts of Plastic Packaging Compared to Substitutes (April 2018 Franklin Associates Report); U.S. packaging market; 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.

**16** Based on performance of specific ExxonMobil Exceed™ XP grades versus conventional polyethylene in flexible packaging applications.

**17** Certifications through the International Sustainability and Carbon Certification Plus (ISCC PLUS) process.

**18** Department of Energy statements at https://www.energy.gov/eere/vehicles/lightweight-materials-cars-and-trucks.

**19** Based on ExxonMobil analysis.

**20** Based on ExxonMobil analysis when compared to conventional mineral oils.

**21** Based on ExxonMobil analysis using Argonne National Labs' GREET tools and published fuel carbon intensity from California LCFS regulations.

**22** Based on ExxonMobil analysis versus conventional fuel oil.

**23** Based on ExxonMobil analysis; performance profile at https://www.mobil.com/en-us/ industrial/pds/gl-xx-mobil-dte-10-excel-series.

**24** Based on ExxonMobil analysis; performance profile at https://www.mobil.com/en-us/industrial/pds/gl-xx-mobil-shc-600-series.

**25** Based on ExxonMobil analysis; performance profile at https://www.mobil.com/en-us/industrial/pds/gl-xx-mobil-shc-gear-320-wt.

**26** The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities - TCFD Knowledge https://www.tcfdhub.org/scenario-analysis/.

**27** United Nations Environment Programme Emissions Gap Report 2021, The Heat Is On: A World of Climate Promises Not Yet Delivered, https://www.unep.org/resources/emissions-gap-report-2021.

**28** The IPCC AR6 scenarios shown include a range of near-term policy assumptions through 2030, in some cases reflecting NDCs and in other cases reflecting immediate, globally coordinated action The IPCC AR6 scenarios shown include a range of near-term policy assumptions through 2030, in some cases reflecting NDCs and in other cases reflecting immediate, globally coordinated action, https://report.ipcc.ch/ar6/wg3/IPCC_AR6_WGIII_Full_Report.pdf.

**29** IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.

**30** IEA (2021), World Energy Outlook 2021, IEA, Paris; International Energy Agency (2021), Net Zero by 2050, IEA, Paris.

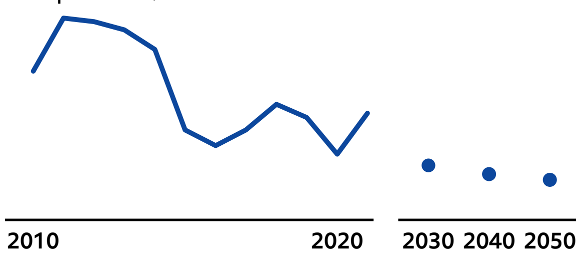
**31** IEA WEO 2021, p. 94: "This World Energy Outlook (WEO) explores various scenarios, each of which is built on a different set of underlying assumptions about how the energy system might evolve. These scenarios are not predictions – the IEA does not have, and has never had, a single view about what 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."

**32** 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 311 scenarios. Given the inherent uncertainty in energy demand modeling, we used an average of all 311 scenarios to approximate growth rates for various energy types to estimate trends to 2050 indicative of hypothetical 2°C pathways.

**33** The statements and figures contained in this section are hypothetical in nature, do not constitute a forecast of future company performance and are based on assumptions from International Energy Agency (2021), Net Zero by 2050, IEA, Paris.

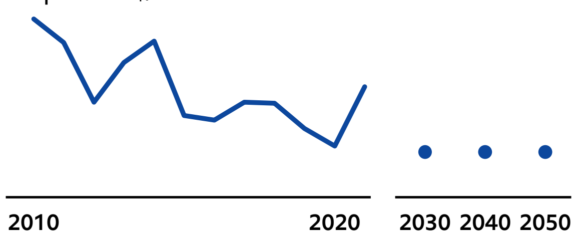
Forward price and margin assumptions used in IEA NZE modeling; historical values provided for context.

**Brent price 2021$/barrel**



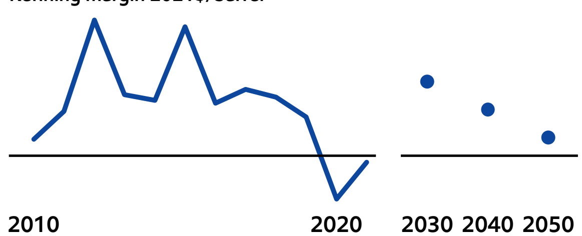

Source: historical – Platts Dated Brent; forward – IEA NZE by 2050 (2021)

**Gas price 2021$/million British thermal units**



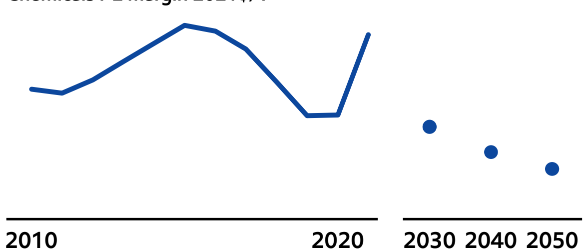

Source: historical – Settled NYMEX Henry Hub; forward – IEA NZE by 2050 (2021)

**Refining margin 2021$/barrel**




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

**Chemicals PE margin 2021$/T**




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

**34** Wood Mackenzie, https://www.woodmac.com/about-us/our-story/.

**35** 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 was 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 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.

**36** International Energy Agency (2021), Net Zero by 2050, IEA, Paris. Figure 3.4 p 103. Estimate is based on the New and Existing Fields, Refining and Transport data from 2020-2050.

**37** Third-party oil price projection range includes:

1. FACTS Global Energy Group – Forecast of Crude Oil Prices and Differentials. (August 2022); Strategic Outlook for Energy 2021.
2. IHS Markit, all rights reserved - Global Fundamentals Crude Oil Markets Price Long-Term Outlook – 3rd Quarter 2022 (August).
3. Wood Mackenzie – Macro Oil Short-term Outlook (August 2022); Global Crude Prices Strategic Outlook (March 2022).
4. Rystad Energy – UCube (August 2022).
5. S&P Global Commodity Insights – Energy Price Portal (November 2022).

Third-party gas price projection range includes:

1. IHS Markit, all rights reserved – North American Natural Gas Short Term Outlook (August 2022); North American Natural Gas Long-Term Outlook (February 2022).
2. Rystad Energy – UCube (August 2022).
3. Wood Mackenzie – LNG short-term outlook (August 2022); Global Gas Spot Prices (Long Term) (April 2022).
4. S&P Global Commodity Insights – Energy Price Portal (November 2022).

**38** IEA STEPS 2050 represents EU; IEA NZE 2050 represents advanced economies; IPCC Lower 2°C 2050 is the average global carbon price for C3 category. EU-ETS from 2020 World Bank State and Trends of Carbon Pricing. Values are in 2022 U.S. dollars.

39 World Bank: State and Trends of Carbon Pricing 2022, https://openknowledge.worldbank.org/handle/10986/37455. Reference World Bank ranges are consistent with existing carbon pricing for those jurisdictions as of April 1, 2022.

40 IEA World Energy Outlook 2021.

41 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.

42 IPCC AR6 Lower 2°C (C3 Category).

43 IEA NZE scenario per IEA WEO 2021 Net Zero Emissions by 2050. International Energy Agency (2021), Net Zero by 2050, IEA, Paris.

44 Wind and Solar deployment calculated from TWh based on fixed capacity factor of 35% and 17%, respectively, where capacity is not stated.

45 CCS history from Global Status of CCS Report (2021).

46 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.

47 Global CCS capacity: Global CCS Institute, Global Status of CCS 2021, p. 14.

48 This section includes a discussion of two common GHG emission estimation methodologies based on ExxonMobil's assessment and interpretation of such methodologies as potentially applied to an integrated oil and gas and petrochemical company. The methods discussed within this section are based on ExxonMobil's perspectives, certain assumptions, and may evolve as learnings are applied and additional information becomes available. The term "carbon" used in this section refers to GHG emissions converted to units of carbon dioxide equivalents. References to "GHG Protocol" mean the 2004 GHG Protocol Corporate Accounting and Reporting Standard and 2011 Corporate Value Chain (Scope 3) Accounting and Reporting Standard as of Oct. 24, 2022.

ExxonMobil's life-cycle approach methodology for estimating GHG emissions (carbon dioxide equivalents) of portfolios, energy pathways, and products versus alternatives is informed by the scientific principles of life-cycle assessment. We utilize this approach in various ways including: estimating a company's portfolio carbon intensity (g $CO_2e$ per MJ), comparison of alternative products and energy pathways, and estimating avoided GHG emissions relative to alternatives. Any references to double counting of GHG emissions in this section refer to the potential overlapping of emissions among companies, within a company, or in product pathways.

ExxonMobil's lifecycle approach methodology provides the flexibility to include all relevant value chain emissions; some exclusions may apply, for example, due to uncertainty, double counting, lack of data, or immateriality.

49 While the GHG Protocol standards acknowledge the relevance of emissions intensity and other metrics, its emphasis is on absolute emissions inventories; intensity metrics are optional. Other metrics and methodologies exist and can provide additional context on the progress a company is making to reduce emissions. The GHG Protocol standards do not, for example, require or allow for netting of GHG removals or negative emissions technologies.

50 IPCC Sixth Assessment Report Summary for Policymakers, p. 37, https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf.

51 This life-cycle approach was used to develop our proprietary portfolio life-cycle intensity model, which estimates elements of Scope 1, 2, and 3 GHG emissions for our Upstream, Product Solutions, and Low Carbon Solutions businesses. The estimated figures are based on our projected 2022 corporate plan volumes for 2030.

52 The modeled figures are estimates based on ExxonMobil's potential 2030 supply into the global LNG market, which includes working interest volumes and long-term purchase commitments, and assumes unabated LNG displaces unabated coal used for power generation in a market such as India. For GHG avoided emissions, the life-cycle GHG benefit basis is based on our analysis utilizing Mallapragada et al. 2018 (https://pubs.acs.org/doi/10.1021/acs.est.8b04539). This estimate represents a range of potential outcomes that are based on certain assumptions.

53 Calculation is an ExxonMobil analysis based on projected 2022 corporate plan volumes for 2030 and specific estimated fuel CI by project from various third-party sources (such as Argonne National Labs' GREET model) as compared against its conventional fuel alternate. Calculation is an estimate that represents a range of potential outcomes that are based on certain assumptions.

54 Calculation of 13 million metric tons is estimated 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 2022 update, U.S., 2019- 2030) as a proxy. Reference: April 2018 report of Franklin Associates on Life Cycle Impacts of Plastic Packaging Compared to Substitutes; 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.

55 The modeled figures are estimates based on our potential 2030 Baytown complex blue hydrogen production volumes, assuming all the blue hydrogen displaces natural gas on an equivalent amount of energy basis, for example in industrial fuel switching. For GHG avoided emissions, the life-cycle GHG comparison basis is based on our analysis utilizing Bauer et al., 2022, "On the climate impacts of blue hydrogen production." Sustainable Energy & Fuels 6.1 (2022): 66-75, estimated from Fig. 1. Our hydrogen project at our Baytown manufacturing facility remains subject to final investment decision. This estimate represents a range of potential outcomes that are based on certain assumptions.

56 American Society of Civil Engineers Climate- Resilient Infrastructure: Adaptive Design and Risk Management, https://doi.org/10.1061/9780784415191.

57 American Society of Civil Engineers (ASCE 7) Minimum Design Loads and Associated Criteria for Buildings and Other Structures, https://doi.org/10.1061/9780784415788.

58 Texas Commission on Environmental Quality permits and registration, https://www.tceq.texas.gov/permitting/business_permitting.html.

59 Position reflects maturity of potential opportunities as of Oct. 2022. May not reflect all potential opportunities or investment decisions made by the company. Individual opportunities may advance based on a number of factors, including availability of supportive policy, technology for cost-effective abatement, and alignment with our partners and other stakeholders. Project viability and returns may vary. For example, legal framework for carbon capture and storage still being developed. References to ExxonMobil emission reductions mean Scope 1 and 2 GHG emissions at operated assets. The company may refer to these opportunities as projects in external disclosures at various stages throughout their progression.

60 Center for Climate and Energy Solutions, https://www.c2es.org/content/carbon-capture/.

61 International Energy Agency (2021), Net Zero by 2050, IEA, Paris, https://www.iea.org/reports/net-zero-by-2050.

62 IEA (2020), Energy Technology Perspectives 2020: Special Report on Carbon Capture Utilisation and Storage. https://www.iea.org/reports/ccus-in-clean-energy-transitions.

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64 Global CCS capacity: Global CCS Institute, Global Status of CCS 2021, p. 14. ExxonMobil CCS capacity: ExxonMobil estimates.

65 9 million metric tons of $CO_2$ emissions is equivalent to approximately 2 million gasoline-powered passenger vehicles driven for one year, according to the U.S. EPA greenhouse gas equivalencies calculator. Passenger vehicles are defined as two-axle four-tire vehicles, including passenger cars, vans, pickup trucks, and sport/utility vehicles. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

66 ExxonMobil analysis using 2022 Outlook for Energy based on assumptions for U.S. in 2022 and equivalent to taking more than 400,000 gasoline-powered passenger vehicles off the road per year. According to the U.S. EPA greenhouse gas equivalencies calculator, 2 million metric tons of $CO_2$ emissions is equivalent to more than 400,000 gasoline-powered passenger vehicles driven for one year (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator).

67 IEA World Energy Outlook 2020, https://www.iea.org/reports/world-energy-outlook-2020, p. 122.

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74 2019 data based on ExxonMobil's existing assets, including acquisitions; flaring intensity performance based on 2021 competitor data via third-party source and ExxonMobil analysis.

75 Oil and Gas Climate Initiative Aiming for Zero, https://aimingforzero.ogci.com/

76 IEA Net Zero by 2050: A Roadmap for the Global Energy Sector (2021), https://www.iea.org/reports/net-zero-by-2050.

77 Climate Impact of Plastics, https://www.mckinsey.com/industries/chemicals/our-insights/climate-impact-of-plastics.

78 https://www.americanchemistry.com/better-policy-regulation/transportation-infrastructure/corporate-average-fuel-economy-cafe-emissions-compliance/resources/plastics-and-sustainability-a-valuation-of-environmental-benefits-costs-and-opportunities-for-continuous-improvement.

79 Calculation of 40 million metric tons is estimated 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 2022 update, global) as a proxy. Actual market conditions vary by region and over time. Reference: April 2018 report of Franklin Associates on Life Cycle Impacts of Plastic Packaging Compared to Substitutes; 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.

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90 IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2391 pp. doi:10.1017/9781009157896.

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93 Includes indirect emissions from imported electricity, heat, steam, and cooling.

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**CAUTIONARY STATEMENT WARNING**

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Statements of future ambitions, goals, events or conditions in the publication and its associated supplement, 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. Similarly, emission-reduction roadmaps to drive toward net zero are dependent on future market factors, such as continued technological progress and policy support, and represent forward-looking statements. Actual future results, including the achievement of ambitions to reach Scope 1 and 2 net zero from operated assets by 2050, to reach Scope 1 and 2 net zero in Upstream Permian Basin unconventional operated assets by 2030, to eliminate routine flaring in-line with World Bank Zero Routine Flaring, to reach near zero methane emissions from operated assets, to meet greenhouse gas emission reduction plans or goals, divestment and start-up plans, and associated project plans; technology efforts such as timing and outcome of projects to capture and store CO2, produce biofuels, integrate hydrogen projects, and use plastic waste as feedstock for advanced recycling; future cash flows; and reserve or resource changes could vary depending on the ability to execute operational objectives on a timely and successful basis; policy and consumer support for emission-reduction products and technology; changes in laws and regulations including international treaties and laws and regulations regarding greenhouse gas emissions, plastics, 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 such as advanced recycling on a commercially competitive basis; changes in supply and demand and other market factors affecting future prices of oil, gas, and petrochemical products; availability of feedstocks for biofuels or advanced recycling; 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; actions taken by governments and consumers resulting from a 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 2021 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**. This supplement includes 2022 greenhouse gas emissions performance data and Scope 3 Category 11 estimates for full-year 2022 as of March 1, 2023. The greenhouse gas intensity and greenhouse gas emission estimates include Scope 2 market-based emissions. We do not undertake to provide any further updates or changes to any data or forward-looking statements in this document. Neither future distribution of this material nor the continued availability of this material in archive form on our website should be deemed to constitute an update or re-affirmation of these figures or statements as of any future date. Any future update will be provided only through a public disclosure indicating that fact.

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ExxonMobil reported emissions, including reductions and avoidance performance data, are based on a combination of measured and estimated data. Calculations are based on industry standards and best practices, including guidance from the American Petroleum Institute (API) and Ipieca. Emissions reported are estimates only, and performance data depends on variations in processes and operations, the availability of sufficient data, the quality of those data and methodology used for measurement and estimation. Emissions data is subject to change as methods, data quality, and technology improvements occur, and changes to performance data may be updated. Emissions, reductions and avoidance estimates for non-ExxonMobil operated facilities are included in the equity data and similarly may be updated as changes in the performance data are reported. ExxonMobil's plans to reduce emissions are good-faith efforts based on current relevant data and methodology, which could be changed or refined. ExxonMobil works to continuously improve its approach to identifying, measuring, and addressing emissions. ExxonMobil actively engages with industry, including API and Ipieca, to improve emission factors and methodologies, including measurements and estimates.

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. 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 **www.exxonmobil.com**. References to "oil" and "gas" include crude, natural gas liquids, bitumen, synthetic oil, and natural gas. The term "project" as used in the publication and its associated supplement can refer to a variety of different activities and does not necessarily have the same meaning as in any government payment transparency reports. Exxon Mobil Corporation has numerous affiliates, many with names that include ExxonMobil, Exxon, Mobil, Esso, and XTO. For convenience and simplicity, those terms and terms such as "Corporation," "company," "our," "we," and "its" are sometimes used as abbreviated references to one or more specific affiliates or affiliate groups. Abbreviated references describing global or regional operational organizations, and global or regional business lines are also sometimes used for convenience and simplicity. Nothing contained herein is intended to override the corporate separateness of affiliated companies. Exxon Mobil Corporation's goals do not guarantee any action or future performance by its affiliates or Exxon Mobil Corporation's responsibility for those affiliates' actions and future performance, each affiliate of which manages its own affairs.

**SUPPLEMENTAL INFORMATION FOR NON-GAAP AND OTHER MEASURES**

Page 31 of this publication mentions modeled operating cash flow in comparing different businesses over time in a future scenario. Historic operating cash flow is defined as net income, plus depreciation, depletion and amortization for consolidated and equity companies, plus noncash adjustments related to asset retirement obligations plus proceeds from asset sales. The Company's long-term portfolio modeling estimates operating cash flow as revenue or margins less cash expenses, taxes and abandonment expenditures plus proceeds from asset sales before portfolio capital expenditures. The Company believes this measure can be helpful in assessing the resiliency of the business to generate cash from different potential future markets. The performance data presented in the publication and its associated supplement, including on emissions, is not financial data and is not GAAP data.