ExxonMobil

2025 Global Outlook

Executive summary

Increasing global energy supply *and* reducing emissions is not only possible – **It's essential.**

Nothing happens without energy. Society will need to produce enough of it to support a bigger population, larger economies, and higher living standards for everyone.

By 2050, the world also has ambitious goals to reduce emissions. But the world is not on track to meet global emissions targets, climate policies have largely failed, and critical technologies are underdeveloped.

There are opportunities to change course.

With the right policy and technology advancements, the world can meet rising energy demand ***and*** reduce emissions by 2050.

2025 Global Outlook
Our view to 2050

Key takeaways:

All energy types are needed for a more prosperous, lower-emission future.
- Renewables grow the fastest
- Coal declines the most
- Oil & natural gas still make up more than half of the global energy mix

Rising living standards increase energy use 25% in developing countries.
- Half the world's population currently lacks the energy needed to address basic human needs.

Industry and transport underpin the global economy and will require growing supplies of energy.[1]

Global CO_2 emissions fall 25%; affordability will drive the pace of any transition.

Sustained oil and natural gas investment is more important than ever.

Fueling the **future**

In 2050, developing countries will use 25% more energy as living standards improve.

Global Outlook projections: The world will be bigger in 2050.

More people.
The world's population will grow by more than 1.5 billion people, mostly in developing countries.

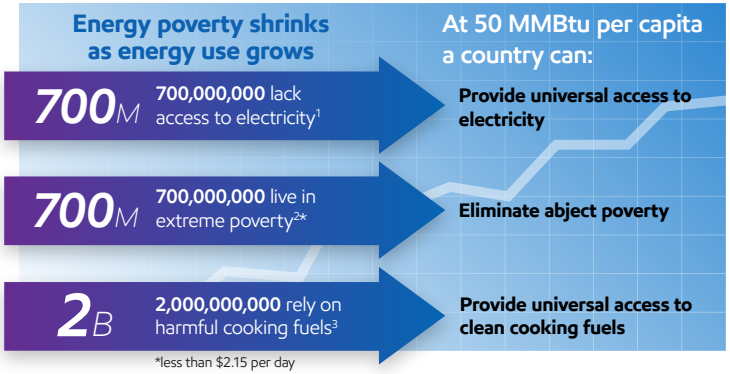
Larger global economies.
Global gross domestic product (GDP) will double. Developing nations will expand their economies twice as fast as developed nations.

Higher living standards.
Personal income will rise nearly 80% by 2050, driven by rising economic growth and affordable, available energy.

Currently 4 billion people – half the world's population – lack access to the energy needed for housing, infrastructure, jobs, and other basic human needs.

Our analysis estimates that the most basic living standards require a person to use at least 50 million British thermal units (MMBtu) per year. To put that in perspective, people in developed countries around the world use more than three times that amount – about 160 MMBtu per person.

Energy use correlates with longer lifespans and higher levels of education. Energy enables people to cook with cleaner fuels, heat and cool their homes, access better healthcare, and buy modern products and many other necessities.



Even today, **billions of people** lack access to energy for basic needs

Health: Increased risks from indoor air pollution and lack of access to quality healthcare.

Education: Limited study time and resources hinder children's educational progress due to a lack of lighting, transportation, and equipment.

Economic: Fewer economic opportunities due to high costs of inefficient energy sources and limited access to trade and commerce.

Social: Isolation and reduced access to information and communications like smartphones, computers, and the internet.

The consequences of energy poverty are profound.

~50%

~50% of the population in sub-Saharan Africa lacks access to electricity.[1]

3.2M

3,200,000 people die every year from illnesses caused by indoor pollution, largely associated with dirty cooking fuels such as wood, dung, and charcoal. Women and children are disproportionately affected.[2]

What's worse is ... these consequences are entirely preventable.

Powering the economy

Manufacturing essential products requires oil and natural gas

As the global population grows through 2050, demand for the industries and products that make modern living possible will grow too.

Heavy industry and manufacturing

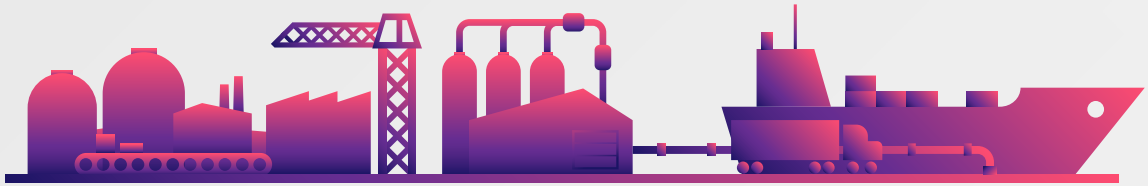
Energy-intensive products like steel, aluminum, and cement that are essential for construction and shipping.

Petrochemical products

Essential components in medical supplies, food packaging, cars and trucks, and more.

Commercial transportation

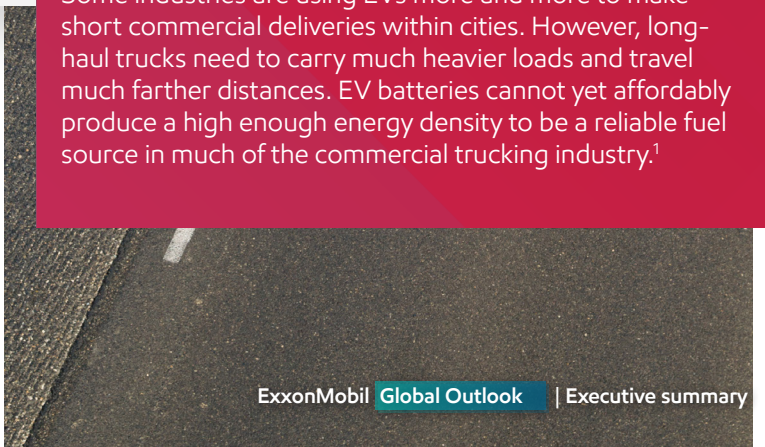
How the world moves the essential goods that power the economy.



Renewables and electricity alone cannot provide the high energy density or the extremely high heat required by these critical sectors.

Why not lower emissions in commercial transportation with electric trucks?

Some industries are using EVs more and more to make short commercial deliveries within cities. However, long-haul trucks need to carry much heavier loads and travel much farther distances. EV batteries cannot yet affordably produce a high enough energy density to be a reliable fuel source in much of the commercial trucking industry.[1]

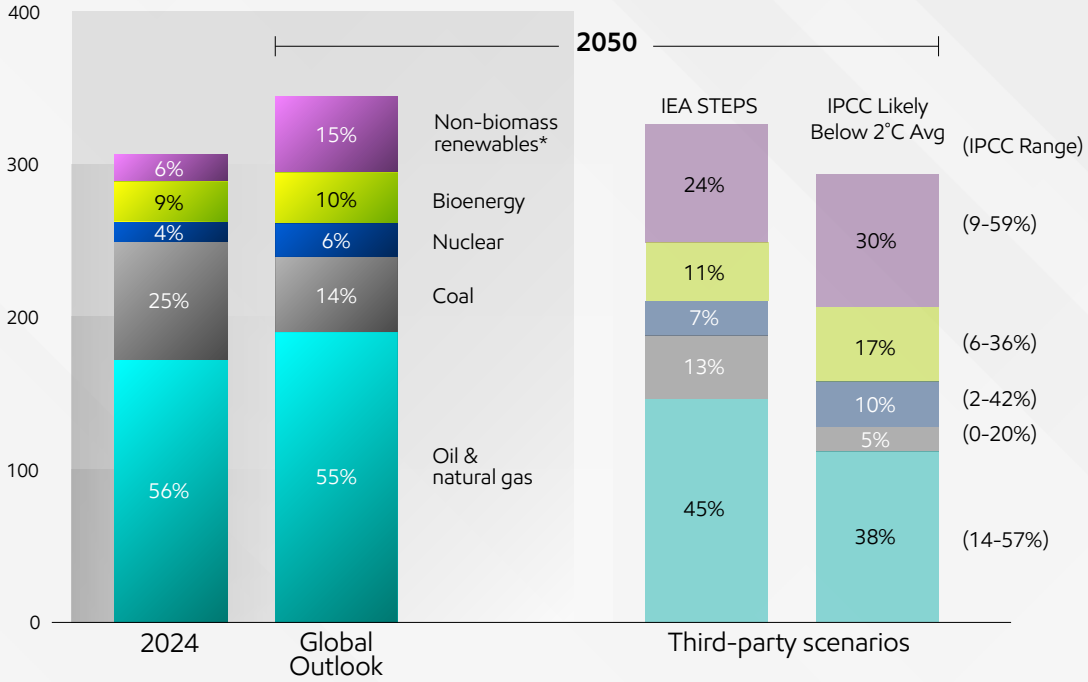


What sources of energy are needed to fuel economic **growth?**

Today: Traditional fuels like coal, oil, and natural gas
2050: Natural gas will continue to grow and displace coal. Renewables and lower-emission technologies like hydrogen, carbon capture and storage, and biofuels will become more important. Oil and natural gas will remain key to powering the 2050 economy.

All solutions will be necessary long-term.

Global energy mix
million oil-equivalent barrels per day



*Non-biomass renewables includes hydro, wind, solar and geothermal
Source: 2024 IEA World Energy Outlook; IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: "Likely below 2°C" scenarios

Affordability will drive the pace of any energy transition

In today's world, lower-emission technologies are expensive. That's part of the reason why today's efforts to reduce emissions have fallen behind.

Bio-diesel for long-haul trucking is **1.5x more expensive** than traditional diesel.[1]

Sustainable aviation fuel is **3x more expensive** than traditional jet fuel.[2]

Lessons from Europe

Heavy industry and commercial transportation are the backbone of the European economy, according to the European Commission.[3] Europe's high-regulation, high-cost approach to lowering emissions has hurt its economy.

Under Europe's decarbonization approach:

- Industrial production, a critical sector in Europe's economy, is declining.[4]
- Energy prices in heavy industry and commercial transportation are rising.[5]

As a result, public support for lower-emissions technology needed to reach EU climate goals is wavering.[6]

Higher energy costs affect the whole economy. Historically, when consumers spend more on energy, their confidence in the economy falls.

When consumers lose confidence in the economy, they lose confidence in the social and political institutions around them. If a political administration implements policies that make energy too expensive, it will lose the support of the electorate. If the electorate stops supporting policies that advance an energy transition, that will hurt the overall progress of lower-emissions technology.

However, the opposite is also true. When lower-emission options are cost competitive, they are more readily adopted. This is where supportive policy can help in the early stages.

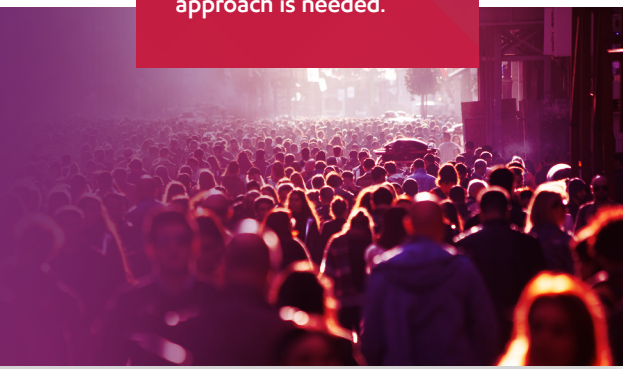
* U.S. Bureau of Economic Analysis (6-month rolling average)
** University of Michigan Consumer Sentiment Survey (1966Q1=100)

What's needed to make lower-emissions technology **affordable?**

It's been 20 years since the Kyoto protocol came into force and 10 years since the Paris climate agreement. Yet, global energy-related CO_2 emissions continued to rise at ~1% per year in 2024 — unchanged vs the 20-year average. Clearly, a different policy approach is needed.

Public policy support

Policy should be designed in such a way to avoid energy price spikes that will shake consumer confidence. That means policy frameworks that support all solutions and focus on reducing carbon intensity of energy and products, rather than wholesale replacement or constraining supply. Policies that unnecessarily raise cost by increasing tax burdens or otherwise reduce financial support can pinch supply below the point needed to meet demand. This can drive up costs for everyone and create unnecessary energy shortages.



Technology advancements

Only 3 out of more than 50 technologies needed to reach net-zero are "on track," according to the International Energy Agency.[1] The reasons why include technology challenges, policy and regulatory barriers, market readiness, and insufficient investments. The right policy framework can incentivize technology advancements that will help drive costs down long term.

Market-driven solutions

Where no market exists and initial costs are high, incentives make sense to get things started. But government incentives should only be used as a bridge to market-driven incentives. Markets must develop to naturally select the most cost-effective technologies for companies and for consumers. One fundamental requirement for any market to work is a transparent and consistent accounting system, where participants can evaluate both the cost and carbon intensity of products and energy.

Direct Air Capture pilot unit in Baytown, Texas.

Advancing an **energy transition**

By 2050, CO_2 emissions are expected to fall ~25%, driven by efficiency improvements and a bigger shift toward lower-emission solutions.

Carbon emissions are expected to fall by 2050, but more progress is needed

In 2050, oil and natural gas will still make up more than half of the world's energy supply. But the world will also use more lower-emission technologies than it does today. This shift will help drive down emissions by 2050, even as energy demand grows.

	2024 levels:	Global Outlook 2050 projected levels:	Level needed to meet global emission goals in 2050 (according to IPCC)**:
Global CO_2 emissions*	36 billion metric tons	27 billion metric tons	11 billion metric tons
Solar generation	2,000 TWh	11,000 TWh >5x today	22,000 TWh >10x today
Carbon capture and storage	24 MMT CO_2	3,100 MMT CO_2 130x today	7,000 MMT CO_2 ~290x today
Low-carbon hydrogen production	1 MTA	80 MTA ~80x today	170 MTA ~170x today

*Energy-related CO_2 emissions

**IPCC: AR6 Scenarios Database hosted by IIASA release 1.0 average IPCC C3: "Likely below 2°C" scenarios

Efficiency improvements and renewables are necessary but not a complete solution.

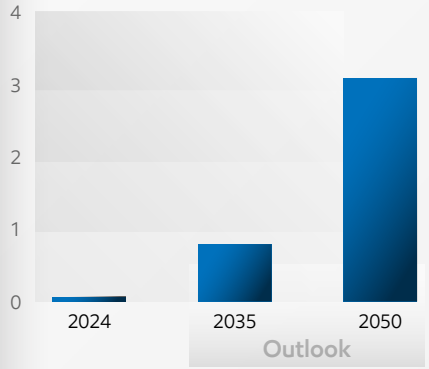
It will take **all solutions** to help drive faster progress on **reducing emissions.**

Technologies like low-carbon hydrogen, carbon capture and storage, and biofuels are nowhere near reaching their full potential to reduce emissions on a global scale.

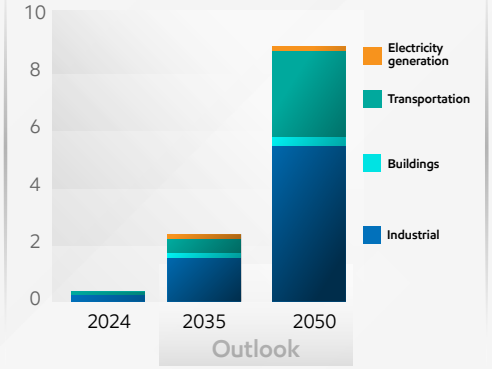
With the right climate policies and technology advancements, these solutions can help move society closer to achieving its climate goals.

Global Outlook projections

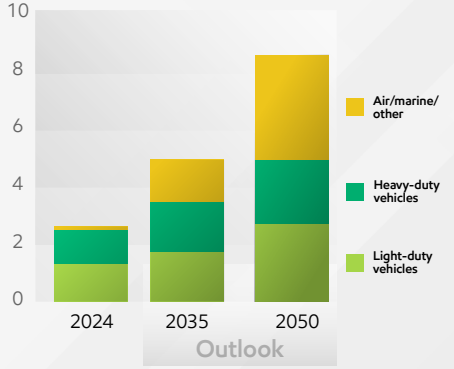
Carbon capture and storage
CO_2 Billion metric tons per year



Low-carbon hydrogen-based fuel use
Quadrillion Btu



Biofuels use
Million barrels per day of oil equivalent



A proven and safe technology that captures CO_2 emissions at the source and permanently stores them deep underground. One of the few proven technologies to help reduce emissions in critical, hard-to-decarbonize industrial sectors.

Hydrogen generates water vapor when combusted. Expected to become a key for replacing traditional furnace fuel. Has potential to lower emissions when used in commercial transportation in the long-term.

A lower-emission alternative to fossil fuels when combusted. Expected to become especially important in aviation, where electric batteries are too heavy to be feasible.

Changes in the world's energy mix **are coming**

A broad array of energy types will be vital to a prosperous, lower-emissions future in 2050

Renewables will grow the most.

Solar and wind will grow from 3% today to more than 11% of the world's energy mix by 2050.

Oil production remains essential.

Demand for oil to make gasoline for cars will shrink by ~25% by 2050, but most of the world's oil is used for other things like manufacturing, plastics and other chemicals, and heavy-duty transport — all of which drive economic growth.

Coal use will decline the most.

By 2050, the world's use of coal will fall to levels not seen since before 2005. Many developing countries rely heavily on coal today, but over time it will be replaced by other alternatives as technology improves.

Demand for natural gas will grow significantly.

Growing electricity demand and industrial activity in developing countries drives a 20% increase in natural gas, which emits much less CO_2 than coal.

Electricity demand will expand, a lot.

Electricity demand will grow 70% by 2050, driven by population growth and improved living standards in developing countries. It will take all types of energy to meet this demand.

Commercial transportation and industrial activity will make up 50% of emissions in 2050 (up from 40% today).

To decarbonize these sectors, the world will have to deploy lower-emissions technologies such as biofuels, CCS, and hydrogen.

Global Outlook projections

Oil and natural gas are essential. There's no other viable way to meet the world's energy needs.

Our Global Outlook projects that oil and natural gas will make up more than half of the world's energy supply in 2050. We project that oil demand will stabilize after 2030, remaining above 100 million barrels per day through 2050. However, demand for natural gas will rise by more than 20% — driven by higher electricity demand in developing countries.

All major credible scenarios include oil and natural gas as a dominant energy source in 2050. Even in the average IPCC Likely Below 2° Scenario, where renewables will grow to 30%, oil and natural gas will still retain the biggest share of the global energy mix.

Sustained oil and natural gas investment is **more important** than ever

Oil supply declines with no new investment (Sensitivity Analysis)

Our Global Outlook estimates oil production naturally declines at a rate of about 15% per year. This decline rate reflects the world's shift toward "unconventional" sources of oil supply, which are produced mainly from shale and dense rock formations that have a faster rate of decline versus other sources of supply.

With no new investment, global oil production would drop from roughly 100 million barrels per day currently to 85 million in the first year alone. By 2030, it would fall below 30 million barrels daily – 70 million short of projected demand.

As our Outlook shows, sustained investment in oil and natural gas development is needed to meet the world's needs. This is true even as companies like ExxonMobil invest billions to lower greenhouse gas emissions in their products, their operations, and for their industrial customers.

We encourage you to take a much deeper dive into our Outlook's view of global supply and demand dynamics on our website.

How we develop the Global Outlook

Our Global Outlook is our latest view of demand and supply for energy and products through 2050. It forms the basis for the company's business planning and is scientifically grounded in our deep understanding of long-term market 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. It is not an endorsement of a particular outcome.

We consider a range of scenarios – including those we view as remote – to help inform strategic thinking. No single energy-transition pathway can be reasonably predicted, given the wide range of uncertainties. Key unknowns include yet-to-be developed government policies and advances in technology that may influence the cost, pace, and potential availability of certain pathways. What also remains uncertain is how quickly and to what extent businesses and consumers will be willing to pay for deeper carbon reductions in the products and services they use, thereby creating a market that incentivizes an accelerated path to net zero.

Unlike the company's Outlook, which is a projection, many scenarios, such as International Energy Agency's Net Zero Emissions (IEA NZE) by 2050, work backward from a hypothetical desired outcome with assumptions that are forced to achieve that outcome irrespective of cost. It is important to note that the IEA acknowledges that society is not on a net-zero pathway.[1]

Legal information

The "Global Outlook" portion of the website is an interactive version of the Company's 2025 Global Outlook. Some of the hyperlinks embedded in this section link to other parts of the Outlook, and some take the reader to other articles and information on the Company's website.

Cautionary statement

The Global Outlook includes Exxon Mobil Corporation's internal estimates of both historical levels and projections of challenging topics such as global energy demand, supply, and trends through 2050 based upon internal data and analyses as well as publicly available information from many external sources including the International Energy Agency. Separate from ExxonMobil's analysis, we discuss a number of third-party scenarios such as the Intergovernmental Panel on Climate Change Likely Below 2°C and the International Energy Agency scenarios. Third-party scenarios discussed in this report reflect the modeling assumptions and outputs of their respective authors, not ExxonMobil, and their use and inclusion herein is not an endorsement by ExxonMobil of their results, likelihood or probability. Work on the Outlook and report was conducted during 2024 and 2025. The report contains forward-looking statements, including projections, targets, expectations, estimates and assumptions of future behaviors. Actual future conditions and results (including but not limited to energy demand, energy supply, the growth of energy demand and supply, the impact of new technologies, the relative mix of energy across sources, economic sectors and geographic regions, imports and exports of energy, emissions and plans to reduce emissions) could differ materially due to changes in a number of factors, including: economic conditions, the ability to scale new technologies on a cost-effective basis, unexpected technological developments, the development of new supply sources, changes in law or government policy, political events, demographic changes and migration patterns, trade patterns, the development and enforcement of global, regional or national mandates, changes in consumer preferences, war, civil unrest, and other political or security disturbances, including disruption of land or sea transportation routes; decoupling of economies, realignment of global trade and supply chain networks, and disruptions in military alliances and other factors discussed herein and under the heading "Factors Affecting Future Results" in the Investors section of our website at www.exxonmobil.com.

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Footnotes

Page 2 - [1] The World Bank: World Development Indicators https://wdi.worldbank.org/table/4.2 (accessed July 2025)

Page 3 - [1] IEA (2025), Tracking SDG7: The Energy Progress Report, 2025, IEA, Paris https://www.iea.org/reports/tracking-sdg7-the-energy-progress-report-2025, Licence: CC BY NC 3.0 IGO
[2] World Bank Group (2024) Poverty, Prosperity, and Planet Report: Pathways Out of the Polycrisis https://www.worldbank.org/en/publication/poverty-prosperity-and-planet
[3] World Health Organization Air Quality, energy, and health https://www.who.int/teams/environment-climate-change-and-health/air-quality-energy-and-health/sectoral-interventions/household-air-pollution/health-risks#:~:text=Household%20air%20pollution%20is%20caused,half%20of%20all%20pneumonia%20deaths (accessed July 2025)

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[2] World Health Organization Air Quality, energy, and health: https://www.who.int/teams/environment-climate-change-and-health/air-quality-energy-and-health/sectoral-interventions/household-air-pollution/health-risks#:~:text=Household%20air%20pollution%20is%20caused,half%20of%20all%20pneumonia%20deaths (accessed July 2025)

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[4] Draghi, Mario (2024): The Draghi report on EU competitiveness https://commission.europa.eu/topics/eu-competitiveness/draghi-report_en
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[6] The Economist (2025): The Humbling of Green Europe https://www.economist.com/briefing/2025/07/31/the-humbling-of-green-europe

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Page13 - [1] IEA (2024), World Energy Outlook 2024, IEA, Paris https://www.iea.org/reports/world-energy-outlook-2024, Licence: CC BY 4.0 (report); CC BY NC SA 4.0 (Annex A)