



Net Zero 2050?

Not What the Experts Predict

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NET ZERO? NOT WHAT THE EXPERTS PREDICT

US ENERGY INFORMATION ADMINISTRATION INTERNATIONAL ENERGY OUTLOOK 2021

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EXECUTIVE SUMMARY

On October 6, 2021, the United States Energy Information Administration (EIA) published its International Energy Outlook 2021. The outlook report presented the organization's projections of global energy supply, demand and greenhouse gas (GHG) emissions from now until 2050.

The EIA reference case projects that:

- global energy use will grow quickly from 2022 on. From a level of just under 60 quadrillion Btu in 2021, the reference case projects a rise to almost 900 quadrillion Btu by 2050. This is driven by a rise in the global population from about 7 billion in 2021 to over 8 billion in 2050, and a doubling of GDP in the non-OECD areas over that period.
- oil and natural gas liquids demand will continue to grow at a constant pace until at least 2050. By then, world oil demand will reach about 125 million barrels per day, well above the previous peak of 101 million barrels per day reached in 2019.
- global natural gas production will increase steadily to 2050, rising by about 30% between 2020 and 2050 (i.e., from just under 120 trillion cubic feet per year in 2020 to just over 180 trillion cubic feet per year by 2050).
- government mandates for increased use of renewable energy generation and relatively low natural gas prices will cause global demand for coal to decline from about 2022 to 2030. Thereafter, however, coal use for power generation is projected to increase, returning to the 2020 level by 2050.
- world electricity generation will increase from about 25 trillion kilowatt hours in 2020 to about 42 trillion kilowatt hours in 2050.
- energy-related GHG emissions will grow from about 35 billion tonnes per year in 2019 to about 43 billion tonnes per year in 2050. Emissions in the non-OECD countries in 2050 will be 35% above 2020 levels (up by 7.9 billion tonnes), compared with a 5% growth (575 million tonnes) in OECD countries.

In other words, the outlook report finds that even after western governments spend over one trillion dollars per year over 30 years and severely impair their own economic wellbeing pursuing the goal of reduced global GHG emissions, those emissions will likely increase by over 8 billion tonnes per year. The net zero target won't just be missed. The extremely costly efforts to achieve it will be utterly inconsequential to the world's climate outcomes. You are unlikely to see this reported in the media.

NET ZERO? NOT WHAT THE EXPERTS PREDICT

US ENERGY INFORMATION ADMINISTRATION INTERNATIONAL ENERGY OUTLOOK 2021

As COP26 approaches in Glasgow with dozens of climate 'leaders' like Mark Carney pushing for NetZero2050 promises and targets, there is clearly a disconnect between the world of green finance and Carbon Neutrality ideology and the world of reality.



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On October 6, 2021, the United States Energy Information Administration (EIA) published its International Energy Outlook 2021. The outlook report presented the organization's projections of global energy supply, demand and greenhouse gas (GHG) emissions from now until 2050. As one of the most authoritative sources of information on present and future market trends, the EIA offers a highly credible view of likely developments based on current economic and technology trends, taking into account what is now known about government policies.

The EIA outlook report can be found here:

<https://www.eia.gov/outlooks/ieo/>

The EIA has been publishing such reports for over 40 years. For most of that period, its future projections were based primarily on the data available about energy supply and demand and technology. Government policies have become increasingly important as a consideration, largely because of the increasing tendency of governments, especially in the countries that are members of the Organization for Economic Cooperation and Development (OECD) to intervene in energy markets to influence energy-related GHG emissions. The newest report implicitly accepts the thesis that government policies, more than the underlying market choices, will be the primary influence on the sources of energy used for electric power generation, for fueling light duty vehicles, and for the geographic distribution of industrial activity in future. In spite of accepting this thesis, however, the EIA analysis does not agree that government policies and/or market developments will inevitably result in significantly lower global GHG emissions, let alone “net zero” emissions by 2050 in any country.

This article will present a summary of the findings of the EIA, focusing primarily on those that are most relevant to the public policy debate about what role climate considerations should play in the energy policy of Canada and other OECD countries.



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FREQUENTLY ASKED QUESTIONS (FAQS)

What countries are the top producers and consumers of oil?

The 10 largest oil¹ producers and share of total world oil production² in 2020³

Country	Million barrels per day	Share of world total
United States	18.60	20%
Saudi Arabia	10.82	11%
Russia	10.50	11%
Canada	5.26	6%
China	4.93	5%
Iraq	4.16	4%
Brazil	3.79	4%
United Arab Emirate	3.79	4%
Iran	3.01	3%
Kuwait	2.75	3%
Total top 10	67.60	72%
World total	94.20	

¹ Oil includes crude oil, all other petroleum liquids, and biofuels.
² Production includes domestic production of crude oil, all other petroleum liquids, biofuels, and refinery processing gain.
³ Source: International Energy Statistics, [Total oil \(petroleum and other liquids\) production](#), July 26, 2021

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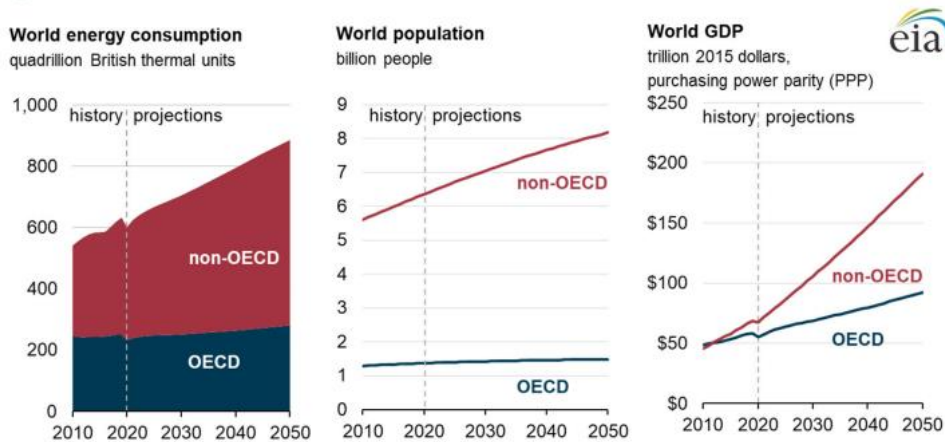
Primary energy consumption refers to the use of all forms of energy as measured in terms of quadrillion British thermal units (Btu). Historically, trends in global primary energy consumption have been driven largely by the underlying trends in economic activity and population growth. While increasing energy efficiency has altered the underlying relationships somewhat in recent decades, they have been more influenced by the flattening of economic growth and population growth in the OECD countries contrasted with the relatively rapid economic and population growth in the non-OECD countries and especially in Asia. The COVID-19 pandemic depressed economic activity in 2020, especially in the OECD countries.

The EIA reference case projects global energy use to grow quickly from 2022 on. From a level of just under 60 quadrillion Btu in 2021, the reference case projects a rise to almost 900 quadrillion Btu by 2050. This is driven by a rise in the global population from about 7 billion in 2021 to over 8 billion in 2050, and a doubling of GDP in the non-OECD areas over that period.

By 2050, global energy use in the Reference case increases nearly 50% compared with 2020—mostly a result of non-OECD economic growth and population, particularly in Asia

Non-OECD GDP is double OECD GDP by 2050, primarily as a result of fast-growing populations; however, large differences in standards of living remain

Figure 10.



Source: U.S. Energy Information Administration, *International Energy Outlook 2021 (IEO2021)* Reference case

Source: EIA report page 12

The demand for petroleum and natural gas liquids is much influenced by transportation sector needs (i.e., as fuel for surface, aviation and marine uses).

There are persistent claims in the western media that the demand for oil products to fuel road vehicles will decline sharply in future as a result of the combined effects of more stringent vehicle fuel efficiency standards and government restrictions on the purchase of internal combustion engine (ICE) vehicles. The EIA projects that, due to government controls, sales of all-electric vehicles will increase and make up almost a third of the global light duty vehicle stock by 2050.

Nonetheless, due to significant increases in the number of road vehicles in the non-OECD countries, rapidly increasing aviation demand and increasing use of oil fuels in heavy industry in the non-OECD countries, **EIA projects the growth in liquids demand to continue at a constant pace until at least 2050. By then, world oil demand will reach about 125 million barrels per day, well above the previous peak of 101 million barrels per day reached in 2019.** The EIA sees supply of crude oil from OPEC and non-OPEC sources being more than adequate to meet these demands, with OPEC production growing at almost three times non-OPEC production between 2020 and 2050.

Natural gas liquids (NGLs) are a coproduct of natural gas production. They include ethane, liquified petroleum gases (propane, butane and isobutane), and natural gasoline. In its reference case, **EIA projects natural gas liquids production to grow about 50% by 2050, a faster rate than crude oil production.** This will be driven by high demand for NGLs in industry. These products serve as industrial feedstocks used in the production of plastics and other petrochemicals.

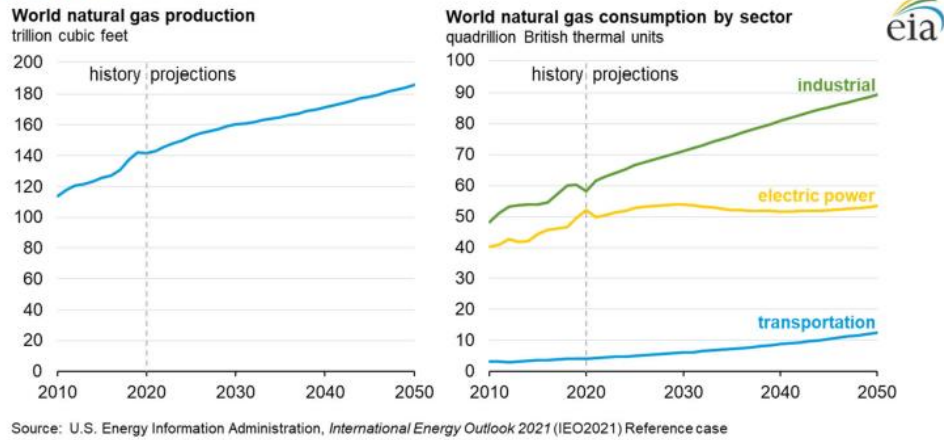
NATURAL GAS

In the EIA reference case, global natural gas production increases steadily to 2050, rising by about 30% between 2020 and 2050 (i.e., from just under 120 trillion cubic feet per year in 2020 to just over 180 trillion cubic feet per year by 2050).

Natural gas demand in this view is driven mainly by increased usage in industry, not as recently in electricity generation. This is due to natural gas prices rising while renewable energy generation costs

decline. In fact, the EIA sees the worldwide demand for natural gas used for power generation plateauing in 2030 and staying roughly flat thereafter.

Figure 38.



Source: EIA report page 37

COAL

Rising natural gas prices and the continuing need for electricity generation sources that are dispatchable (i.e., that can change production levels quickly in response to varying demand) will also affect the trends in coal consumption. EIA projects government mandates for increased use of renewable energy generation and relatively low natural gas prices to cause global demand for coal to decline from about 2022 to 2030. Thereafter, however, coal use for power generation is projected to increase, returning to the 2020 level by 2050. There are no resource constraints that will inhibit increased coal consumption, and coal resources are widely available in countries like China and India where electricity demand is increasing the fastest.



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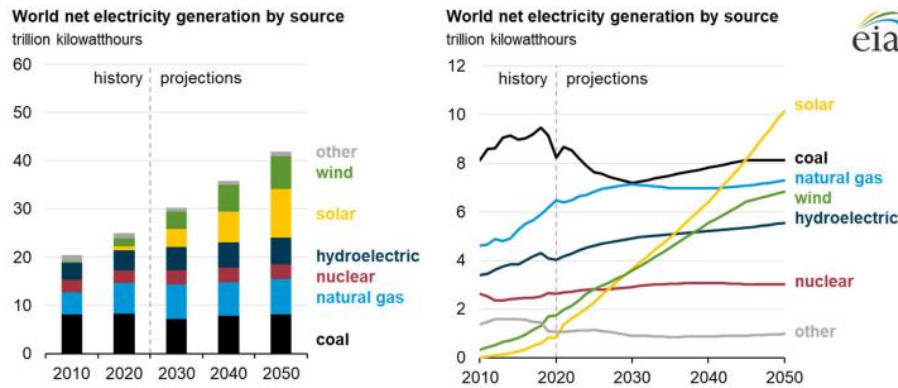
Coal Consumption by Country

Product	Rank	Country	Consumption (Thousand Short Tons)
Crude Oil	1	China	4,361,427.00
Natural Gas Liquids	2	United States	924,442.00
Motor Gasoline	3	India	886,052.00
Jet Fuel	4	Germany	270,404.00
Kerosene	5	Russian Federation	229,820.00
Distillate Fuel Oil	6	Japan	222,304.00
Residual Fuel Oil	7	South Africa	190,085.00
Liquefied Petroleum Gases	8	Poland	160,817.00
Petroleum Gases	9	Korea, Republic Of	142,464.00
Other	10	Australia	132,565.00

World coal-fired generation declines through 2030 in the Reference case, but it remains a significant part of the worldwide generation mix

With expected rising natural gas prices after 2030, growth in natural gas-fired generation slows and generation from existing coal-fired plants becomes more economic

Figure 27.



Source: EIA report page 26

ELECTRICITY

EIA projects world electricity generation to increase from about 25 trillion kilowatt hours in 2020 to about 42 trillion kilowatt hours in 2050. Government policies drive up solar energy generation so that it becomes the largest source of generation by 2050. Wind generation rises to fourth place behind solar, coal and natural gas. In fact, when one adds in the generation from hydroelectricity and nuclear power, fossil fuels (i.e., coal and natural gas) fall from about 55% of generation in 2020 to about 30% of generation by 2050.

The EIA hedges this projection somewhat with the following comment:

“This projected growth in renewables is uncertain and may largely depend on changes to regulatory policies and market rules, large and cost-effective supply chains to support renewable installations, and a sufficient amount of conventional generation technologies or storage to back intermittent renewable capacity.”

The EIA projects electricity generation to follow quite different trendlines in the OECD and non-OECD regions. In the OECD, end-use efficiency improvements driven by much higher electricity rates constrain consumption growth to about one per cent per year to 2050 (reaching about 5 trillion kilowatt hours). In the non-OECD countries, after a quick return to pre-pandemic electricity consumption levels, electricity generation is projected to rise at about twice the rate in the OECD countries, reaching 13 trillion kilowatt hours by 2050.

GHG EMISSIONS

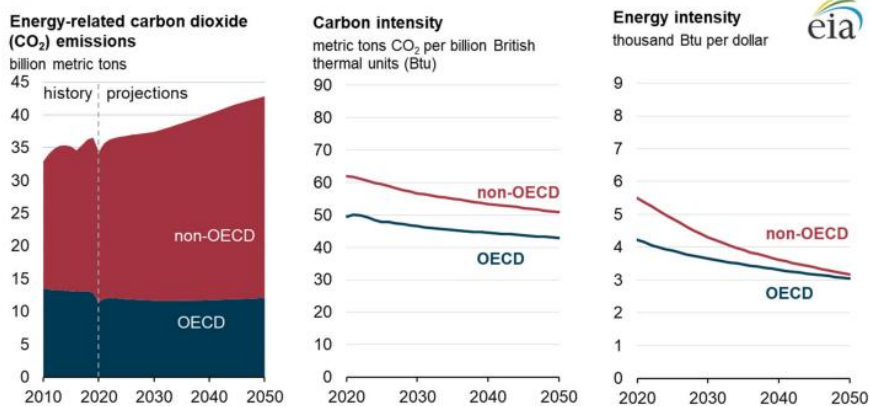
According to the EIA, policies, technology and economic factors will decrease the “carbon intensity” of the world economy throughout its projection period, but they will not offset the effects of economic and population growth. Therefore, they do not halt GHG emissions growth.

In fact, the EIA projects energy-related GHG emissions to grow from about 35 billion tonnes per year in 2019 to about 43 billion tonnes per year in 2050. Emissions in the non-OECD countries in 2050 will be 35% above 2020 levels (up by 7.9 billion tonnes), compared with a 5% growth (575 million tonnes) in OECD countries.

In the Reference case, global emissions rise throughout the projection period, although slowed by regional policies, renewable growth, and increasing energy efficiency

Policies, fuel choice, technology, and economic factors decrease carbon intensity and energy intensity, but they do not halt emissions growth

Figure 17.



Source: U.S. Energy Information Administration, *International Energy Outlook 2021 (IEO2021) Reference case*

Source: EIA report page 17

Coming from such an authoritative source as the EIA, these projections should cause policy makers to reflect on the feasibility and advisability of “net zero” emission goals. The EIA clearly went the distance in terms of accepting the premise that government interventions will sharply affect energy demand growth and emissions in the OECD countries. It arguably adopted optimistic assumptions about the extent to which the people living in OECD countries will accept increased energy costs, reduced purchasing choices and policies that reduce jobs and growth. Yet, having made these concessions to the projected effectiveness of OECD emission-reduction measures, the EIA finds that the global trends completely offset the likely effects of western policy measures.

To present the conclusions of the EIA projections starkly, the outlook report finds that even after western governments spend over one trillion dollars per year over 30 years and severely impair their own economic wellbeing in pursuing the goal of reduced global GHG emissions, those emissions will likely increase by over 8 billion tonnes per year! The net zero target won't just be missed. The extremely costly efforts to achieve it will be utterly inconsequential to the world's climate outcomes.

Climate campaigners, viewing this projection, no doubt will emphasize that it is based upon the policies that have been implemented or committed to date, and does not include the much more onerous restrictions that they favour. What such a perspective misses is that GHG emissions growth is being driven by population and economic trends in by far the largest part of the world's population, and by the inexorable demands of the people who live in the developing countries for a higher standard of living that can only be assured by increased fossil fuel use. All the campaigners' lobbying of western governments will not make the slightest difference to the aspirations of the world's developing countries for a better life.



ABOUT THE AUTHOR

ROBERT LYMAN is an economist with 27 years' experience as an analyst, policy advisor and manager in the Canadian federal government, primarily in the areas of energy, transportation, and environmental policy. He was also a diplomat for 10 years. Subsequently he has worked as a private consultant conducting policy research and analysis on energy and transportation issues as a principal for Entrans Policy Research Group. He is a frequent contributor of articles and reports for Friends of Science, a Calgary-based independent organization concerned about climate change-related issues. He resides in Ottawa, Canada. [Full bio.](#)

ABOUT FRIENDS OF SCIENCE SOCIETY

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens that is celebrating its 19th year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO₂).

Friends of Science Society

P.O. Box 23167, Mission P.O.

Calgary, Alberta

Canada T2S 3B1

Toll-free Telephone: 1-888-789-9597

Web: friendsofscience.org

E-mail: [contact\(at\)friendsofscience\(dot\)org](mailto:contact@friendsofscience.org)

Web: climatechange101.ca

