

Can the World Reach Net Zero Emissions by 2050?



The International Energy Association outlines the framework for getting the entire world to net zero emissions over the next three decades.

A sustainability buzzword that's used to describe the balance between the amount of greenhouse gas (GHG) produced and the amount removed from the atmosphere, “net zero” has long been a goal for governments, organizations and individuals looking to vastly reduce the size of their carbon footprints (or, the total GHGs generated by their actions).

With enough effort and attention, the entire world may reach net zero emissions by 2050, but it will take a lot of work, commitment and participation. According to a new [International Energy Association \(IEA\) report](#), the number of countries announcing pledges to achieve net zero emissions over the coming decades continues to grow. However, it adds that the pledges by governments to date—even if fully achieved—fall “well short” of what is required to bring global energy-related carbon dioxide emissions to net zero by 2050.

Carving Out Productive Pathways

“Net Zero by 2050: A Roadmap for the Global Energy Sector” is the first comprehensive study of how to transition to a net zero energy system by 2050 while ensuring stable and affordable energy supplies, providing universal energy access and enabling robust economic growth.

In it, the IEA outlines a cost-effective and economically productive pathway, resulting in a clean, dynamic and resilient energy economy dominated by renewables like solar and

wind instead of fossil fuels. “The path to net zero emissions is narrow,” IEA explains. “Staying on it requires the massive deployment of all available clean energy technologies—such as renewables, EVs and energy efficient building retrofits—between now and 2030.”

To reach net zero emissions by 2050, the organization says annual clean energy investment worldwide will need to more than triple by 2030 to around \$4 trillion. “This will create millions of new jobs, significantly lift global economic growth,” IEA adds, “and achieve universal access to electricity and clean cooking worldwide by the end of the decade.”

New Technology Needed

According to IEA, most of the reductions in carbon dioxide (CO₂) emissions through 2030 will be generated by technologies already available on the market today. But in 2050, it says almost half the reductions come from technologies that are currently at the demonstration or prototype phase. “Major innovation efforts must take place this decade in order to bring these new technologies to market in time,” it says.

The world also has to shift away from fossil fuels like coal, oil and gas, IEA recommends, and halt sales of new internal combustion engine passenger cars by 2035. And, it has to phase out all unabated coal and oil power plants by 2040. At that point, electricity will play a key role across all sectors—from transportation and buildings to industry.

“Electricity generation will need to reach net zero emissions globally in 2040,” IEA states, “and be well on its way to supplying almost half of total energy consumption.”

Tapping Advanced Energy Sources

By 2045, IEA expects that new energy technologies will be widespread, with cars running on electricity or fuel cells; planes relying on advanced biofuels and synthetic fuels; and industrial plants using carbon capture or hydrogen.

“The global energy sector in 2050 is based largely on renewables, with solar the single largest source of supply,” IEA explains. “Achieving this cleaner, healthier future will rely on a singular, unwavering focus from all governments, working closely with businesses, investors and citizens.”

For example, it says many energy efficient solutions for buildings, vehicles, home appliances and industry are available today and can be scaled up quickly, creating jobs in the process. “Our pathway rapidly puts [these solutions] to use on a massive scale,” IEA points out, “in order to push the average rate of energy efficiency improvements in the 2020s to about three times the average of the last two decades.”

Humankind’s Biggest Challenge

Getting to net zero by 2050 will also require greater international cooperation among countries, notably to ensure that developing economies have the financing and technologies they need to reach net zero in time. In the end, IEA says achieving that goal will surely require a complete transformation of the global energy system.

“Our Roadmap shows the priority actions that are needed today to ensure the opportunity of net zero emissions by 2050—narrow but still achievable—is not lost,” IEA Executive Director Fatih Birol said in a [press release](#). “The scale and speed of the efforts demanded by this critical and formidable goal—our best chance of tackling climate change and limiting global warming to 1.5°C—make this perhaps the greatest challenge humankind has ever faced.”