

Tracking Clean Energy progress 2023

Assessing critical energy technologies for global clean energy transitions

Overview

About this report

The IEA's Tracking Clean Energy Progress (TCEP) assesses recent developments for over 50 components of the energy system that are critical for clean energy transitions. The components assessed include sectors, subsectors, technologies, infrastructure and cross-cutting strategies.

Where do we need to go?

The IEA's [Net Zero Emissions by 2050 Scenario](#) (NZE) is a pathway for the global energy sector to achieve net zero CO₂ emissions by 2050, while also achieving universal energy access by 2030 and major improvements in air quality.

How do we get there?

Progress is assessed at the global level against the Net Zero by 2050 Scenario trajectory for 2030, and recommendations are provided on how they can get "on track" with this pathway. The assessed components include technologies, infrastructure, sectors, subsectors and cross-cutting strategies.

How are we doing?

Of the over 50 components tracked, in the 2023 edition 3 are evaluated as fully "On track" with the Net Zero by 2050 Scenario trajectory – solar PV, electric vehicles and lighting. [Solar PV](#) was upgraded in this edition, as the annual growth in generation in 2022 of 26% is now aligned with the average compound annual growth rate needed from now to 2030 in the Net Zero Scenario.

Progress on clean energy technology deployment has been very rapid in 2022, even if many components are not yet fully on track at the global level. The momentum towards the clean energy economy is clearly accelerating. Some highlights in 2022 include the following:

- **Electric vehicle** sales grew by 55%, reaching a record high of more than 10 million. And for the first time ever, announced manufacturing capacity for electric vehicle batteries is sufficient to fulfil expected demand requirements in 2030 in the NZE Scenario.
- **Nuclear** capacity additions grew by 40%, with 8 GW newly installed. While higher deployment is needed in the Net Zero Scenario, the growth in 2022 represents a clear step forward after capacity additions had remained stable from 2019 to 2021.
- **Heat pumps** saw another record year, with 11% growth in sales. This is close to the 15% average compound annual growth needed to fully align with the Net Zero Scenario.

- **Electrolyser** installed capacity grew by more than 20%, while electrolyser manufacturing capacity grew by more than 25%. The bigger story though is likely yet to come - based on the current pipeline of projects under development and their expected operation dates, electrolyser capacity could reach almost 3 GW by the end of 2023, a more than four-fold increase in total capacity compared to 2022.
- **Energy efficiency** of the economy overall grew by more than twice the level the previous year. This is a positive step forward following several years of relatively weak improvements.

Progress is occurring faster in those parts of the energy system for which clean technologies are already available and costs are falling quickly, such as for electricity generation and passenger cars. But a full transition to net-zero emissions will require decarbonising all areas of energy production and use. Rapid innovation is needed to bring to market clean technologies in particular for those parts of the energy system where emissions are harder to address, such as heavy industry and long-distance transport. Positive steps forward on innovation have been made in the past few years, but an acceleration is needed in order to soon move to deployment of novel low emission technologies for these areas.

The transition is also occurring at different speeds across regions and sectors. For example, nearly 95% of electric car sales in 2022 occurred in China, the United States and Europe. Meanwhile, nearly 75% of operating and planned carbon capture capacity is in North America and Europe. As such, the global evaluation that a technology is “on track” does not mean that it is on track in all countries, and, conversely, a technology that is “not on track” globally could be progressing more quickly in some specific countries. Stronger international cooperation and robust policy development is needed to spread progress to all regions, particularly emerging market and developing economies.

This report is part of the IEA’s support of the first global stocktake of the Paris Agreement, which will be finalized in the run up to COP28, the next UN Climate Change Conference, at the end of 2023. Find other reports in this series on the IEA’s [Global Energy Transitions Stocktake](#) page.

Methodology

The IEA's Tracking Clean Energy Progress (TCEP) assesses recent developments for over 50 components of the energy system that are critical for clean energy transitions. The components assessed include sectors, subsectors, technologies, infrastructure and cross-cutting strategies.

Progress is assessed against the [Net Zero by 2050 Scenario](#) trajectory for 2030. In the current edition, projections and estimates are based on research and modelling results derived from data and policy inputs gathered up to June 2023. More updated data will be available in the report *Net Zero Emissions by 2050: A Roadmap for the Global Energy*

Sector – 2023 Update and the *World Energy Outlook 2023*, to be released in autumn 2023.

Each component is assigned one of the following "traffic light" ratings:

- ***On track (green)***: if recent trends continue, in 2030 this area will comfortably be in line with the Net Zero by 2050 Scenario
- ***More efforts needed (yellow)***: recent trends are positive and generally in the right direction to being in line by 2030 with the Net Zero by 2050 Scenario trajectory. However, progress needs to be faster, as a continuation of recent trends without any acceleration would still fall short of the Net Zero by 2050 Scenario trajectory.
- ***Not on track (red)***: recent trends are either in the wrong direction or substantially insufficient to get in line by 2030 with the Net Zero by 2050 Scenario trajectory. This does not exclude that there may be positive developments on certain aspects or in certain regions; however, a step-change in effort is needed at the global level. The assessment includes consideration of multiple indicators, such as trends and developments related to CO₂ emissions, energy consumption, activity, technology deployment, innovation, supporting infrastructure, policy, investment, international collaboration and private sector strategies. The assessment does not rely on a single particular quantitative indicator, but rather is an overall evaluation of the key factors that would contribute to Net Zero by 2050 Scenario alignment by 2030. The assessment is made at the global level, which means that the evaluation could differ for specific countries or regions.
- **Learn more about the Net Zero Emissions by 2050 Scenario**