Tracking Energy Efficiency Progress

The IEA Energy Efficiency Progress Tracker allows users to view the current rate of progress on energy efficiency at global and regional levels, containing the very latest energy demand and efficiency estimates.

COP28 saw a historic agreement reached with paragraph 28a of the First Global Stocktake, calling for "doubling the global average annual rate of energy efficiency improvements by 2030". The Tracker provides a view on how the world is progressing towards meeting this pledge and can inform countries developing efficiency strategies in a manner appropriate to their own national and regional circumstances.

The most comprehensive measure of energy efficiency is the energy intensity of the world economy, which encompasses the ratio of energy input to economic activity. Primary energy intensity is the main indicator used by the United Nations (UN) Sustainable Development Goals to track energy efficiency. It comprises the amount of total energy supply (TES) used to produce a given amount of Gross Domestic Product (GDP) measured in constant purchasing power parity (PPP) terms. Energy intensity progress – illustrated as positive values in this Tracker – is the annual reduction in energy intensity of the economy.

Energy efficiency is a measure of energy performance for a specific end use or process, such as heating, cooling, transport or manufacturing a product. Energy efficiency improves when less energy is required to meet the same needs or achieve similar output. This concept closely relates to energy intensity, a broader metric that reflects overall energy consumption relative to economic activity.

The Tracker brings together data from the IEA's Energy Data Centre (EDC), the fuel market reports of the IEA's Energy Markets and Security Directorate (EMS), and the World Energy Outlook (WEO). The Tracker uses IEA World Energy Balances (WEB) for its baseline historical data, to support consistency with the Tracking Sustainable Energy Goals (SDG7) Energy Progress Report. Current year estimates are preliminary.

Three WEO scenarios, none of which are forecasts, are illustrated to provide a framework for exploring different energy futures. These scenarios are not designed to predict the most likely pathway —but rather to examine a range of potential futures.

The Stated Policies Scenario (STEPS) provides a sense of the prevailing direction of travel for the energy sector based on a detailed reading of the latest policy settings in countries around the world. It accounts for energy, climate, and related industrial policies that are in place or that have been announced. The aims of these policies are not automatically assumed to be met; they are incorporated in the scenario only to the extent that they are underpinned by adequate provisions for their implementation.

The Announced Pledges Scenario (APS) starts from the same detailed reading of government policies assuming that all national energy and climate targets, including longer-term net zero emissions targets and pledges in Nationally Determined Contributions, are met in full and on time.

The Net Zero Emissions by 2050 Scenario (NZE) portrays a pathway for the global energy sector to achieve net zero CO2 emissions by 2050, which is consistent with limiting long-term global warming to 1.5°C with limited overshoot (with a 50% probability). The NZE Scenario also meets the key energy-related UN Sustainable Development Goals, in particular achieving universal access to modern energy services by 2030 and securing major improvements in air quality.

The rate of electrification progress is also included as a feature of the Tracker as electric end uses are much more efficient than those based on fossil fuels. Electrification also has many other benefits, enabling a deeper potential penetration of renewable energy, which also eliminates the thermal heat losses associated with fossil fuel use in power generation.

While primary energy intensity is the main metric for tracking efficiency progress, energy intensity can also be measured based on TFC, which represents the energy consumed in all end-use sectors – including transport, industry, and buildings. This excludes the losses from energy conversion, distribution, and transmission, which are included in TES.

Exchange rates measured in USD PPP terms are most commonly used for international comparisons. This is the approach used in this Tracker, although market exchange rates or natural currency units are also used. The reference year used for USD GDP PPP in this Tracker is 2015. Different reference years are also used, subject to regular updates. Such alternative approaches can introduce differences in intensity levels and rates of progress. At the most granular, as efficiency touches every energy-consuming activity that exists, it also can be measured in terms of the energy used for each unit of physical activity across a multitude of activities. Such data can be explored in the IEA's Energy End Uses and Efficiency Data Explorer.

Industry module

The IEA Energy Efficiency Progress Tracker industry module provides an overview of industrial energy intensity progress, energy demand and electrification trends at the global, regional and country levels. It aims to support understanding of national baselines in the context of the latest data of regional and global trends.

The Energy Efficiency Tracker industrial module is designed to help support countries align Nationally Determined Contributions (NDCs) with the COP28 Doubling Energy Efficiency Progress goal. While the Tracker does not attempt to provide a comprehensive view of all relevant data it provides a strong starting point for developing national strategies. Further data and policy support is available by contacting energy.efficiency@iea.org.

Regional groupings of individual countries in the module are consistent with the classifications outlined in the IEA Global Energy and Climate (GEC) Model documentation last updated in October 2024. The Tracker covers most countries, except where the availability and reliability of data require further development.

Two key indicators of industrial efficiency progress are assessed in detail, for all countries and regions – industrial energy intensity progress and industrial electrification progress. Industrial energy intensity progress is calculated by dividing total industrial energy

consumption by total industrial value added. Changes in energy intensity are represented in all figures as annual improvement, and therefore, energy intensity progress (a fall in intensity) is represented in positive values. Electrification progress is indicated by the year-on-year percentage change in the share of electricity in total industrial energy consumption, with positive values representing an increase in the share of electricity and negative values a decrease in the share.

The Tracker uses IEA World Energy Balances (WEB) for its baseline historical data, to support consistency with the Tracking Sustainable Energy Goals (SDG7) Energy Progress Report. The most recent years and scenarios are derived by scaling up WEB values with the rates of change from the latest IEA World Energy Outlook (WEO) estimates. Industry value-added (IVA) data is compiled by adding National Accounts IVA data from the UNIDO Data Browser with construction value added data from the UNdata portal both in USD PPP, 2015 terms.

Industrial energy demand is characterised by both heavy and light industries. Energy-intensive (heavy) industries comprise the production of metals; chemicals and petrochemicals; non-metallic minerals; and the paper, pulp, and printing sectors. Less energy-intensive (light) industries include food and beverages, textiles, wood products, machinery, transport equipment (including cars) and other non-manufacturing industries including mining and construction. Energy consumption and losses from coke ovens and blast furnaces used in steel manufacturing are included in total industrial energy consumption. Non-energy uses such as material feedstocks for petrochemicals (e.g. for plastics manufacturing) are excluded.