IRENA
International Renewable Energy Agency

Renewable energy highlights

from *Renewable energy statistics 2025*

10 July 2025

HEADLINE FIGURES

Electricity generation

8 928 TWh

Renewables in 2023

29.9%	5.6%
Renewables	YoY growth
13.2%	**15.7%**
Variable renewables	YoY growth

Hydro	**4 270** TWh
Wind	**2 304** TWh
Solar	**1 624** TWh
Bioenergy	**632** TWh
Geothermal	**98** TWh
Marine	**1** TWh

Electricity capacity

4 443 GW

Renewables in 2024

46.2%	15.1%
Renewables	YoY growth
31.2%	**23.3%**
Variable renewables	YoY growth

Solar	**1 866** GW
Hydro	**1 277** GW
Wind	**1 133** GW
Bioenergy	**151** GW
Geothermal	**15** GW
Marine	**1** GW

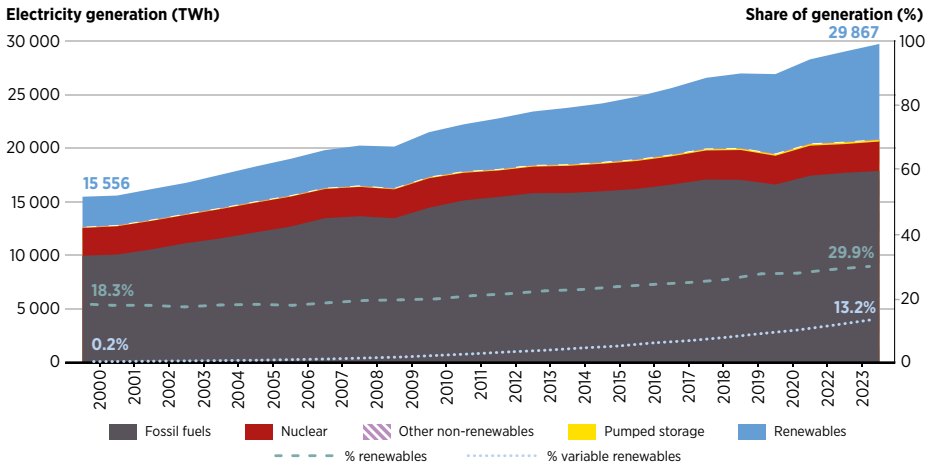
11.17 TW target by 2030

1.07 TW since 2022 — 6.73 TW to meet target

Progress | Remaining

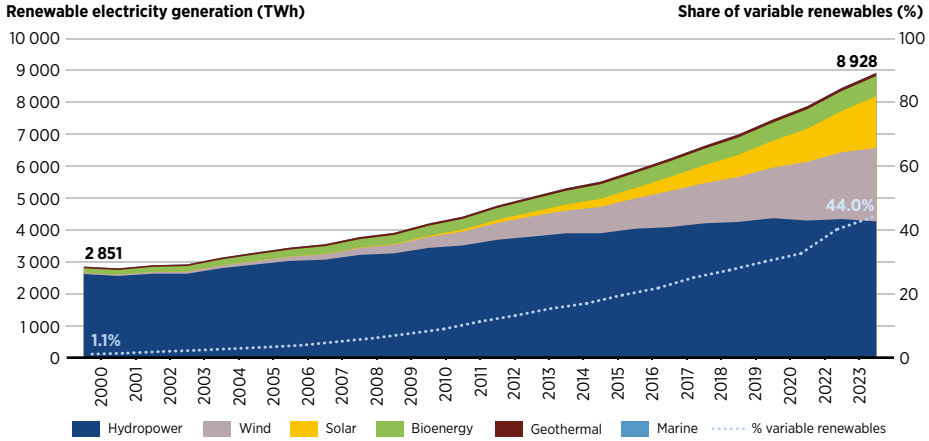
ELECTRICITY GENERATION BY ENERGY SOURCE

Renewable energy sources accounted for 29.9% of electricity generation globally in 2023, totalling 8 928 terawatt hours (TWh). The remaining 70.1% (20 939 TWh) corresponded to fossil fuels, nuclear energy, pumped storage and other non-renewables, bringing global electricity generation from all sources to 29 867 TWh in 2023.



Note: TWh = terawatt hour.

Total electricity generation increased by an average of 2.5% each year between 2012 and 2023. During the same period, renewable electricity expanded at a compound annual growth rate (CAGR) of 5.9%, significantly outpacing non-renewable sources, which recorded a CAGR of just 1.3%. In 2023, renewable electricity generation grew by 5.6% over 2022, while non-renewables grew by 1.2% over the same period. Since 2010, the largest growth in renewable electricity has been for solar and wind energy (variable renewables) which, combined, represented 13.2% of the global electricity mix in 2023, having risen by 15.7% compared to 2022.



Note: TWh = terawatt hour.

RENEWABLE ELECTRICITY GENERATION BY ENERGY SOURCE

Over the past 25 years, the profile of renewable energy sources has significantly diversified. While renewable hydropower (which excludes pumped storage) continues to provide the bulk of renewable electricity generation, variable renewables have steadily increased their share in the mix, growing from 1.1% of renewable generation in 2000 to 44.0% in 2023.

In 2023, renewable hydropower remained the largest source of renewable electricity, generating 4 270 TWh, but reported a decrease of 72 TWh (-1.6%) from 2022 levels. Although not considered a renewable energy source, electricity from hydropower pumped storage increased by 5.5 TWh (3.9%) in 2023.

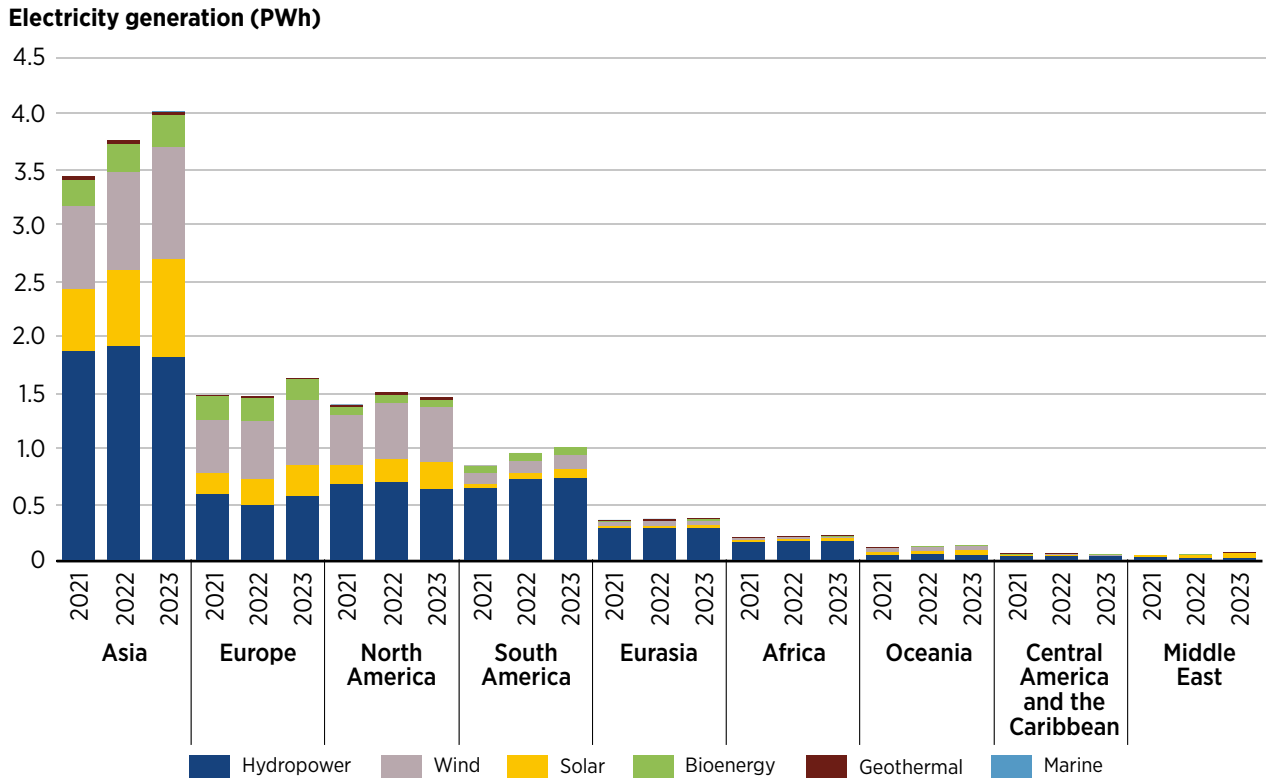
Wind energy follows, producing 2 304 TWh and marking a 9.8% increase compared to the 13.9% growth rate reported in 2022. Solar energy, the fastest-growing renewable energy source in recent years, generated 1 624 TWh – a year-on-year increase of 25.2%, and the largest annual growth since 2018. Bioenergy produced 632 TWh, growing by 1.4%, while geothermal energy contributed 98 TWh and marine energy almost 1 TWh.

RENEWABLE ELECTRICITY GENERATION BY REGION

In absolute terms, Asia led the world in renewable electricity generation in 2023, producing 4 008 TWh, representing a 6.9% increase driven by all technologies except hydropower – which shows a decrease both in share and generation – while growth was particularly strong across solar and wind.

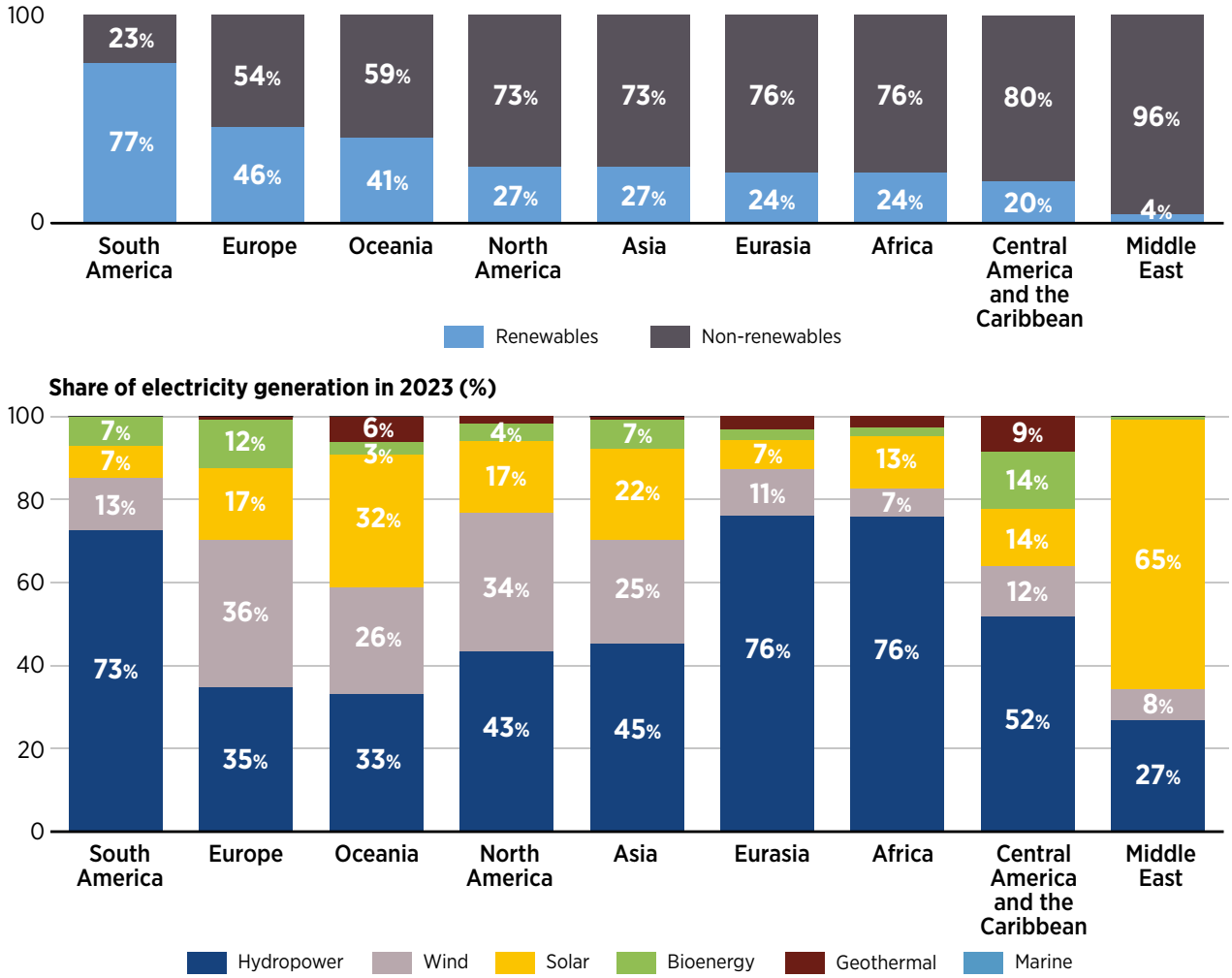
Europe produced 1 626 TWh, up by 11.4% and driven by increases in hydropower, solar and wind, which offset declines in bioenergy, geothermal and marine energy. North America generated 1 452 TWh – a 2.9% decrease from 2022 – and South America generated 1 009 TWh, showing a 6.0% increase from 2022 due to an increase across all technologies.

Eurasia produced 369 TWh, growing by 1.8% year-on-year, with solar and wind making up for continuous declines in hydropower generation. Africa generated 216 TWh, showing an increase of 4.5% across all sources. Oceania generated 134 TWh – a robust 18.8% increase. The Middle East followed with 62 TWh, representing a substantial growth of 35%. Lastly, Central America and the Caribbean generated 52 TWh – a decrease of 8.0%.



Note: PWh= petawatt hour.

In terms of the electricity mix by region, South America leads the way with 76.8% of its electricity coming from renewable sources (predominantly hydropower, which accounts for almost three-quarters of this). Europe follows with 46.2% of electricity being generated from renewables, but is characterised by a more varied mix: 35.6% wind energy; 34.7% hydropower; 17.3% solar; 11.7% bioenergy; and 0.8% geothermal. Oceania has the third highest renewable energy share at 40.7%, with hydropower contributing 33.0%; solar, 32.0%; wind, 25.8%; geothermal, 6.2%; and bioenergy, 3.0%.



In North America, renewables contribute 26.6% of the electricity mix, the same share as in Asia; Africa and Eurasia both generate 24.1% of their electricity from renewables, while Central America and the Caribbean had 20.0% renewable electricity. Lastly, the Middle East lags significantly behind, with just 4.3% of its electricity generated from renewables.

Both the G7[1] and G20[2] country groupings continued to generate more electricity from non-renewables than from renewables in 2023, proportionally less renewable electricity than the global 29.9%. G20 countries produced 28.9% of their electricity from renewable sources, with the share staying constant with that of 2022, while the G7 generated 29.5% of its electricity from renewables. Both groups have similar breakdowns in renewable sources. Out of all renewable electricity generated in 2023 in the G20 countries, 43.9% was from hydropower, 28.5% from wind energy, 19.6% from solar energy, and 7.1% from bioenergy and a small proportion of geothermal energy. For G7 countries, the breakdown was: 35.5% hydropower; 34.1% wind energy; 19.9% solar energy; 9.2% bioenergy; and 1.3% geothermal energy.

[1] *Excludes aggregate data for the European Union.*

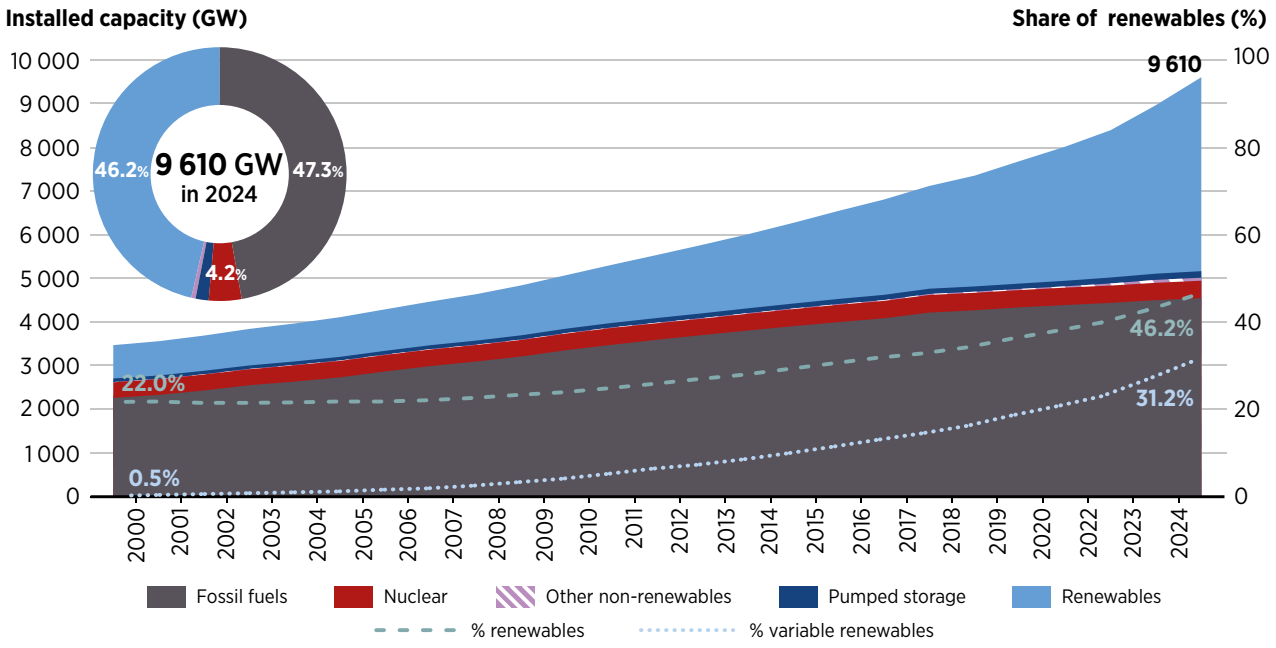
[2] *Includes data for Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, the Republic of Korea, Mexico, the Russian Federation, Saudi Arabia, South Africa, Türkiye, the United Kingdom and the United States; excludes aggregate data for the European Union and African Union.*

REVISIONS TO RENEWABLE GENERATION CAPACITY

IRENA's latest statistics include some minor revisions to the 2024 and historical renewable generation capacities reported in March 2025. Total renewable generation capacity in 2024 has been revised downwards by 5.3 gigawatts (GW) to 4 443 GW. This decrease occurred due to downward revisions for hydropower and wind power plants, partly off-set by upward revisions for solar and bioenergy power plants.

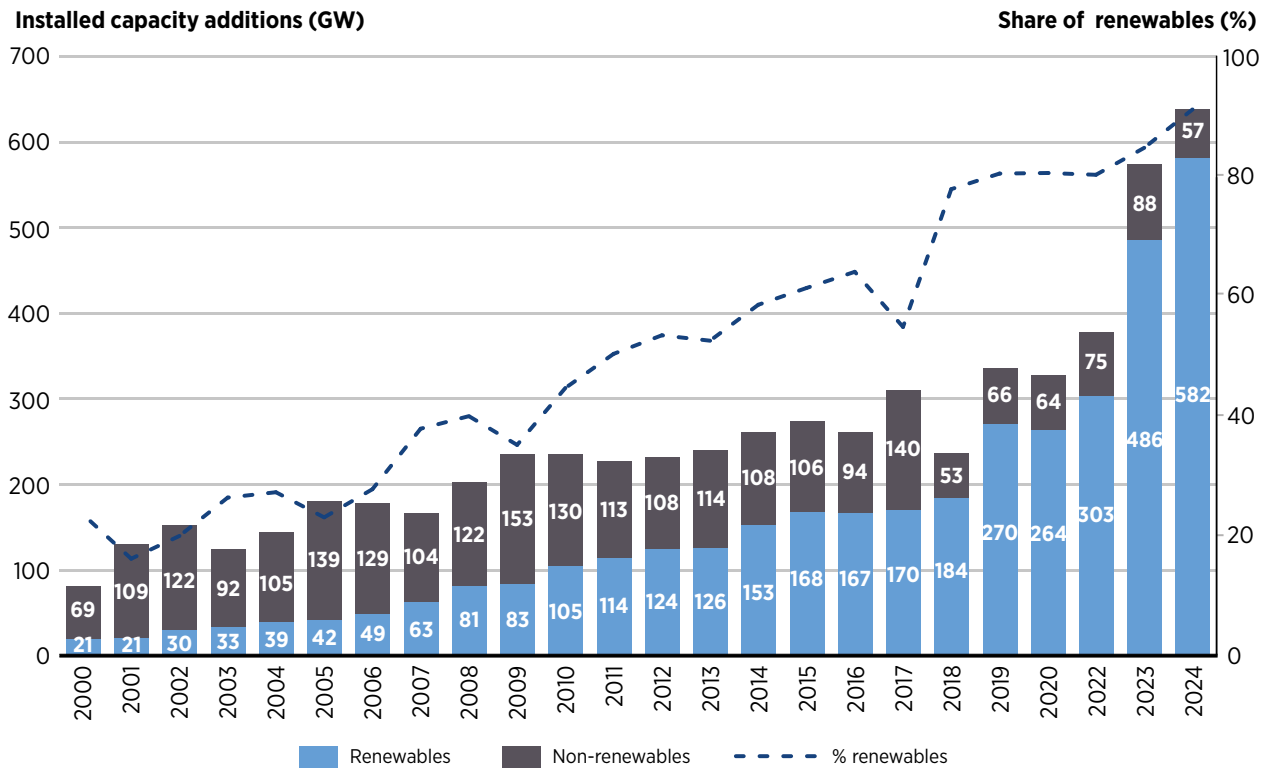
The revised figures show that at the end of 2024, renewable capacity accounted for 4.4 TW, or 46.2% of the 9.6 TW of global total capacity including non-renewables. It indicates an unprecedented 15.1% increase from 2023, significantly higher than the 10.4% compound annual growth rate over the preceding five years (from 2018 to 2023). Within renewables, variable renewable capacity grew by 23.3% over 2023 to reach 31.2% of total renewable capacity.

The remaining installed capacity amounts to 5.2 TW (53.8%) of non-renewable power, comprising 4.5 TW (47.3%) of fossil fuels; 400 GW (4.2%) of nuclear energy; 150 GW (1.6%) of pumped storage; and 68 GW (0.7%) of other non-renewables. The recent trend confirms renewables as the fastest growing capacity source; and illustrates a slowdown in non-renewables and even some significant decommissioning of fossil fuel plants in several countries.



Notes: GW = gigawatt.

In 2024, solar energy was the largest source of renewable capacity at 42.0% or 1 866 GW, followed by 28.7% for hydropower (1 277 GW), 25.5% for wind energy (1 133 GW), 3.4% for bioenergy (151 GW), and 0.3% for geothermal (15 GW) with a small amount of marine energy. The share of variable renewables (wind and solar) increased to 67.5% of renewable capacity, indicating a shift towards these more intermittent energy sources. Solar and wind energy continued to dominate renewable capacity expansion, jointly accounting for 97.5% of all net renewable additions in 2024, with solar increasing by 453 GW and wind by 114 GW. Renewable capacity additions have seen a notable increase over the past 24 years, with 2024 seeing an unprecedented peak of 582 GW of new renewable capacity added. Moreover, the share of renewables in annual capacity additions as a whole has steadily increased, reaching 91.1% in 2024. Non-renewable capacity additions have remained relatively constant or decreased over the years, staying below 90 GW annually since 2019.

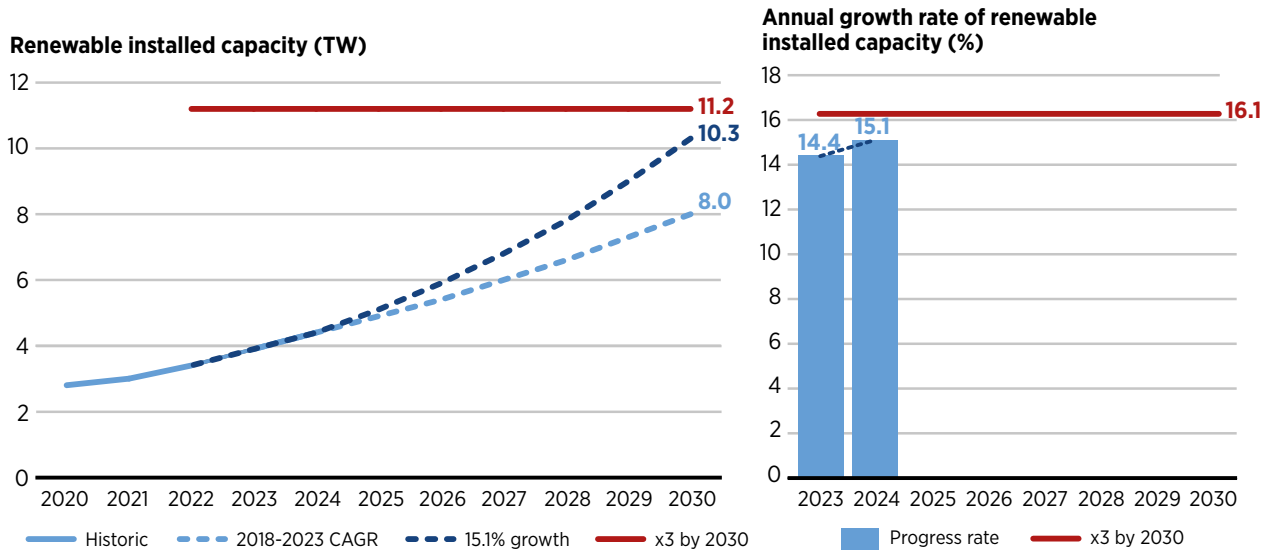


Note: GW = gigawatt.

Even though 2024 marks the largest increase in renewable energy capacity to date, significant disparities exist amongst countries and regions. Asia accounted for the majority of new capacity in 2024 (71.0%), increasing its renewable capacity by 413.2 GW, whilst Europe and North America increased their capacities by 71.9 GW and 45.5 GW, respectively. Other regions saw much smaller increases, with Central America and the Caribbean increasing by 0.4 GW, the Middle East by 4.0 GW and Africa by 4.7 GW.

REACHING THE GLOBAL TRIPLING TARGET OF 11.174 TW BY 2030

In 2024, 582 GW of renewable capacity was added, representing a 15.1% annual growth rate – an increase of 0.7 percentage points over the 14.4% growth reported in 2023. This marks the highest annual increase since 2000. Despite this progress, the growth still falls short of the pace required to achieve the target to triple global installed renewable power capacity to more than 11 TW by 2030. Maintaining the growth rate seen in 2024 would yield only 10.3 TW of renewables by 2030, falling 0.9 TW (7.7%) short of the target.



Notes: CAGR = compound annual growth rate; TW = terawatt.

In the five-year period from 2018 to 2023, global renewable energy capacity expanded at a compound annual growth rate (CAGR) of 10.4%. If this historical trend were to continue, it would result in 8.0 TW of installed renewable capacity by 2030 — falling 3.1 TW (or 28%) short of the target. Achieving the target by 2030 would have required maintaining a minimum annual growth rate of 16.1% from 2022 onwards. However, since 2023 and 2024 both fell short of this rate, renewable capacity must now expand even faster (by 16.6% each year during the remaining six years of the decade).

HEAT GENERATION

Commercial heat is used for various purposes, and in energy statistics we account for this heat in terms of joules of sold heat. Among electricity capacity, electricity generation and heat generation, the latter typically lags in terms of renewable energy penetration. In 2023, only 6.2% of global heat generation came from renewable sources, totalling 919 petajoules (PJ). The remaining 93.8% (13 965 PJ) was generated from fossil fuels, with traces of nuclear and other non-renewable sources.

The share of renewable heat generation has increased from 2.5% in the year 2000, albeit at a significantly slower growth rate than electricity. Bioenergy holds the largest share, contributing 90.6% of renewable heat in 2023, with similar historical rates. Other significant sources include geothermal and solar thermal energy. Europe leads the way in renewable heat generation, accounting for 89.6% of the global total and with a renewable share of 30.2% of the 2 727 petajoules (PJ) of heat generated in the region. Asia generated 6 495 PJ of heat in 2023, but just 0.4% came from renewable sources. Eurasia generated 5 169 PJ of heat in 2023 with 0.5% coming from renewable sources. Finally, North America produced 442 PJ of heat in 2023, with 9.6% from renewable sources.

OTHER RENEWABLE ENERGY INFORMATION

IRENA produces renewable energy balances for a select number of countries. These are available for the latest two years of information (2022 and 2023) in the full report and for a wider number of years via the online tools. Finally, data for the SDG indicators 7.a.1 (international public financial flows toward renewables) and 7.b.1 (renewable installed capacity per capita) are also included.

For any inquiries or questions, please contact us at statistics@irena.org.