

Renewable energy highlights

3 July 2023

HEADLINE FIGURES

7 858 TWh

Amount of electricity generated from renewables in 2021

5.4%

Increase in renewable generation compared to 2020

6.0%

compound annual growth rate (CAGR) in electricity generation from renewables since 2017

23%

Increase in solar power generation compared to 2020

16%

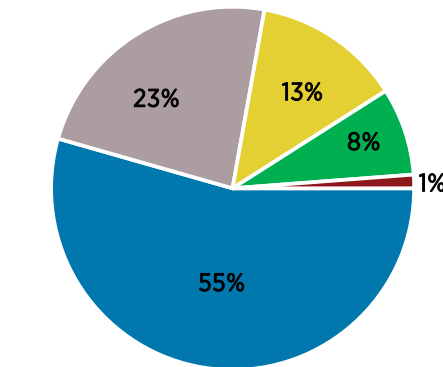
Increase in wind power generation compared to 2020

USD 18 bn

Amount of public investment in renewables in 2021

IRENA's renewable energy statistics can be downloaded from www.irena.org/statistics

Renewable electricity generation by energy source

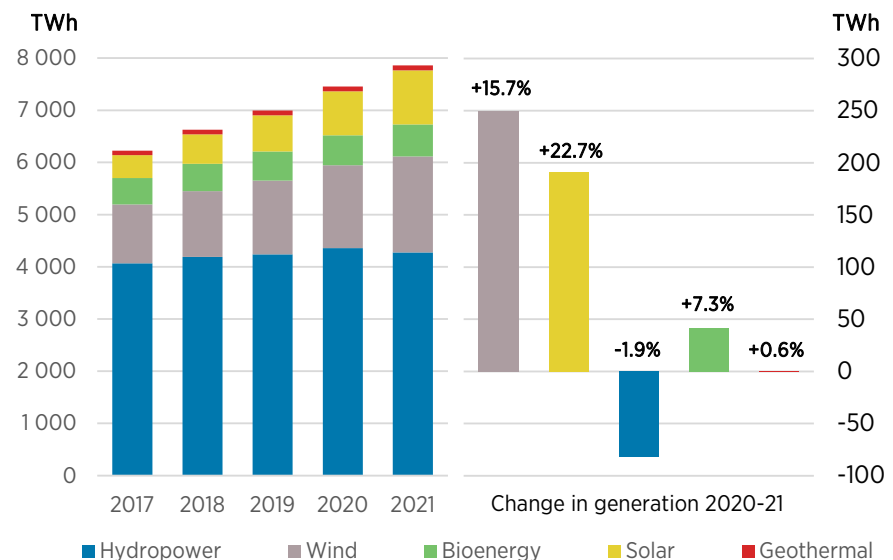


■ Hydro ■ Wind ■ Solar ■ Bioenergy ■ Geothermal

In 2021, the total amount of electricity generated from renewables was 7 858 TWh. Renewable hydro accounted for about 55% of this (4 275 TWh), followed by wind energy (1 838 TWh), solar energy (1 034 TWh), bioenergy (615 TWh), geothermal energy (95 TWh) and marine energy (1 TWh).

Bioenergy generation was divided as follows: 429 TWh (70%) from solid biofuels; 92 TWh (15%) from biogas; 86 TWh (14%) from renewable municipal waste; and 7 TWh (1%) from liquid biofuels.

Growth in renewable electricity generation



Renewable electricity generation in 2021 was 402 TWh higher than in 2020, an increase of 5.4%. About 80% of the growth in generation occurred in Asia, with Asian wind energy generation accounting for almost half of the global increase.

Solar and wind generation in 2021 increased by 23% and 16% respectively and these two energy sources continue to dominate growth in renewable generation, accounting for 80% of growth since 2017. Renewable hydropower generation fell by 82 TWh in 2021 (compared to an increase of 120 TWh in 2019-20).

Renewable electricity generation by region

As in other recent years, Asia accounted for most growth in renewable electricity generation, with an increase of 323 TWh in 2021. Asia's share of global renewable generation also increased slightly to 44%. Europe and North America's shares of global renewable electricity generation remained the same as in 2020, at 19% and 18% respectively. The share of global generation in South America also remained the same at 11%.

In 2021, renewable hydro generation decreased in most regions, but increased by 10 TWh in Europe and 7 TWh in Africa. Solar generation increased in all regions, but with the largest increase by far in Asia (+108 TWh). Wind generation also increased in all regions except Europe, where it fell by 20 TWh. Asia accounted for most of the global increase in wind generation, producing 193 TWh more than in 2020. Asia also continued to lead in the expansion of generation from bioenergy, increasing generation by 35 TWh in 2021.

Generation in 2021 (TWh)	Hydro	Wind	Bioenergy	Solar	Geothermal	Marine	Total
Africa	154	12	3	20	5		194
Asia	1 856	748	236	550	30	<1	3 418
Central America + Caribbean	32	6	8	6	5		56
Eurasia	285	35	7	16	11	<1	353
Europe	586	469	214	187	12	1	1 468
Middle East	19	3	<1	18			40
North America	671	439	71	178	23	<1	1 382
Oceania	41	27	4	28	9		110
South America	632	100	72	32	<1	<1	836
World total	4 275	1 838	615	1 034	95	1	7 858

Revisions to renewable generating capacity

IRENA's latest statistics include some minor revisions to the 2022 renewable generating capacity reported in March 2023. Total renewable generating capacity in 2022 has been revised upwards by 10 GW to 3 382 GW. Almost all of this increase occurred in global solar power capacity, which was revised from 1 053 GW to 1 062 GW. The latest 2022 capacity figures for the other technologies are all within 1 GW of what was reported in March.

Renewable share of total electricity generation

The renewable share of electricity generation in 2021 was 27.8%. The generation share increased by only 0.2 percentage points compared to the 2020 figure of 27.6%. This increase in the generation share was the smallest recorded in the last decade and contrasts strongly with the large increase in the generation share recorded in 2020. This modest improvement largely reflects recent changes in non-renewable electricity generation, which declined by 3% in 2020, but increased by 5% in 2021.

Public investment in renewables

Public investment in renewable energy increased slightly in 2021, with a total investment of USD 18 billion (at 2020 prices and exchange rates), compared to a figure of USD 17 billion in 2020. While this increase is a reversal of recent trends, the figure is still below the average annual investment of USD 20 billion recorded over the last decade. The increase in investment was also strongly focused on wind and solar energy, with investments in other technologies continuing to decline.

IRENA, along with the OECD-DAC, is responsible for reporting progress on SDG Indicator 7.a.1 on international financial flows to developing countries in support of clean and renewable energy. In 2021, the total flow was USD 10 billion, compared to a figure of USD 12 billion in 2020 (at 2020 prices and exchange rates). This is the fourth successive year that official development assistance focused on renewable energy has declined since it peaked at just over USD 25 billion in 2017.