

## Abkhazia renewable energy growth

Editor's Note, Dec. 14, 2023: This article was updated to use a new global target after the release of the 2023 State of Climate Action report. The updated data analysis doesn't change the eight countries that have scaled solar and wind energy the fastest, however, it does show that only three of the eight countries (Uruguay, Denmark and Lithuania) have had growth rates that exceed what is needed globally from 2022 to 2030.

Renewable energy has grown exponentially over the past two decades thanks to government policy and falling prices, far faster than many experts expected. Today, building new solar and onshore wind power on average costs around 40% less than coal or gas power. These cost declines have helped renewables reach a tipping point, meaning that the transition away from fossil fuels appears difficult to reverse.

But even if the shift to renewables is becoming inevitable, the crucial question is whether the world can ensure it occurs fast enough to limit global warming and meet goals set in the international Paris Agreement on climate change. As of 2022, solar made up 4.5% of global electricity generation and wind made up 7.5%, for a total of 12%. According to the State of Climate Action 2023 report, solar and wind together need to make up 57% to 78% of the global electricity mix by 2030 for the world to be on track for a net-zero emissions future. The range depends on how much other zero-carbon electricity sources, like nuclear power or hydropower, are deployed.

Increasing solar and wind generation from 12% to more than 57% by 2030 requires a rapid pace of change, but three countries have proven it's possible. Uruguay, Denmark, and Lithuania have all grown solar and wind over a span of five years at average annual rates higher than what's needed.

Other countries like Namibia, Netherlands, Palestine, Jordan and Chile have also grown solar and wind at remarkably high rates. Most of these countries appear well poised to extend their high levels of growth beyond five years, considering that their fastest years of growth have been the most recent.

Renewable energy has grown exponentially over the past two decades, with wind and solar comprising 12% of global electricity generation in 2022. Yet that share needs to reach at least 57% by 2030 to stay on track with net zero.

These three countries have already grown solar and wind at steeper rates than what's needed.

Several other countries have also experienced remarkable rates of growth.

The top eight countries are quite diverse, proving that a rapid transition is possible in many different contexts. Some have high income levels like Denmark (GDP per capita of \$67,000 in 2022); some are in the middle like Uruguay (\$21,000) and Lithuania (\$25,000); and others are much lower income like Namibia (\$5,000) and

Jordan (\$4,000). Their population density ranges from 798 people per square kilometer in Palestine to only 3 people per square kilometer in Namibia. In some of these countries, electricity use per capita has been growing rapidly, as in Uruguay, while in others it has been declining, like in Denmark.

Our ranking focuses on the growth in a country's share of solar and wind rather than total levels, which is why some other countries that have been influential in the development of renewable technologies are not on the list. China and the United States build the most renewable energy capacity each year, but because they are so populous, solar and wind still makes up less than one-sixth of electricity generation in both countries. Other countries have both a large population and have achieved a high share of solar and wind in their national electricity mix, like Spain (33%), Germany (32%) and the United Kingdom (29%) but for those three countries, the growth took place over a longer period at rates less than 3 percentage points per year.

Let's dive deeper into Denmark, Uruguay and Namibia to learn about the ingredients of a successful transition to solar and wind in different national circumstances.

Denmark has been at the forefront of wind energy innovation for more than a century. In 1891, a Danish scientist constructed one of the world's first wind turbines. That legacy is carried on today, as the government spends more on renewable energy research and development as a share of GDP than any other country. Denmark is also home to Vestas, the world's biggest wind turbine manufacturer.

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Web: <https://kary.com.pl/contact-us/>

Email: [energystorage2000@gmail.com](mailto:energystorage2000@gmail.com)

WhatsApp: 8613816583346

