

Brazil rises as G20 renewables powerhouse

Brazil is at the forefront of the clean energy transition within the G20, showcasing how rapid renewable energy growth can reduce emissions and sustainably meet increasing electricity demand. By following Brazil's example, G20 countries can lead the global transition to a sustainable energy future.

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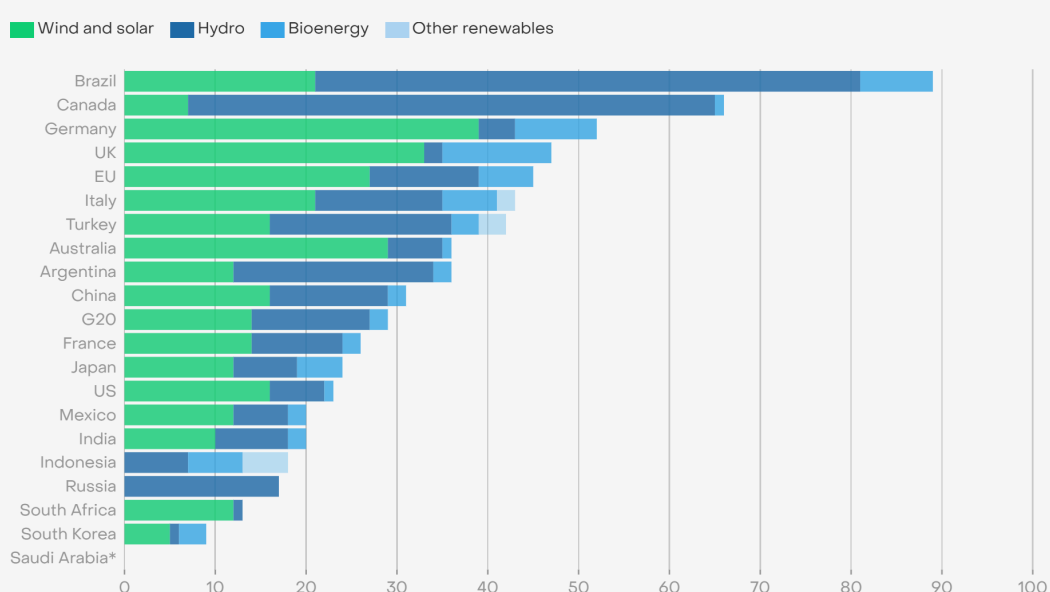
Brazil leads the G20 in renewable electricity, which provided 89% of its power in 2023. Rapid growth of wind and solar generation has ensured that Brazil met its rapidly growing demand for electricity over the past decade with renewables, resulting in significantly reduced power sector emissions. The rest of the G20 can follow Brazil's successful model and lead the global transition to a sustainable energy future.

Brazil leads the G20 in renewable electricity

Brazil is a leader in renewable electricity within the G20. 89% of Brazil's electricity came from renewables in 2023, by far the highest among G20 economies and three times higher than the global average of 30%. Meanwhile, nearly half of the G20, as well as the G20 average, were below the global average.

Brazil has the highest share of renewable electricity in the G20

Renewable share of electricity generation, 2023 rankings (%)



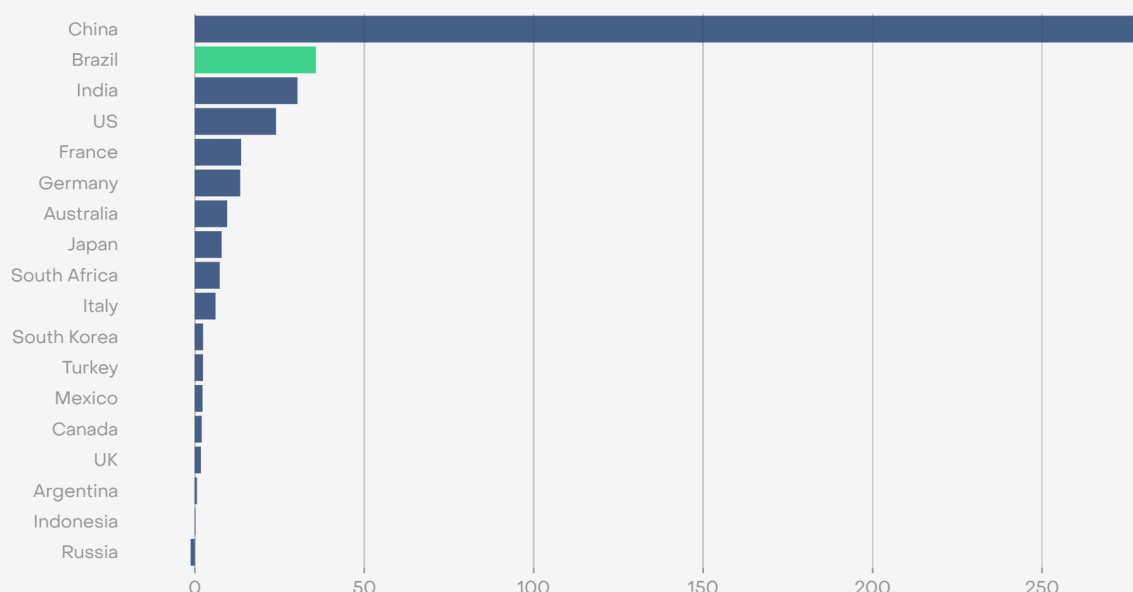
Source: Yearly electricity data, Ember
 *Saudi Arabia displays data for 2022, the latest available data.

Brazil's success in reaching such a high share of renewables is primarily due to its robust hydroelectric base and the rapid expansion of solar and wind power in recent years. The share of hydro has fluctuated from year to year over the past decade amid varying weather conditions, standing at 60% of Brazil's electricity in 2023 compared to 63% on average since 2013. Meanwhile, the share of wind and solar has been growing rapidly in recent years, reaching 21% in 2023, a substantial four percentage point increase from 17% in 2022, and up from just 5.8% in 2016.

Brazil recorded the world's second largest annual increase in wind and solar generation in 2023 (+36 TWh), behind only China.

Brazil's wind and solar generation grew more than most G20 countries in 2023

Wind and solar generation annual increase in 2023, TWh



Source: Yearly electricity data, Ember
Saudi Arabia is not displayed due to unavailable data for 2023

The growth in Brazil's solar generation has been particularly impressive. It increased by 72% from 30 TWh in 2022 to 52 TWh in 2023, providing 7.3% of Brazil's electricity last year. The latest monthly data shows continued strong growth this year: solar generation from January to May 2024 was 68% higher than in the same months in 2023.

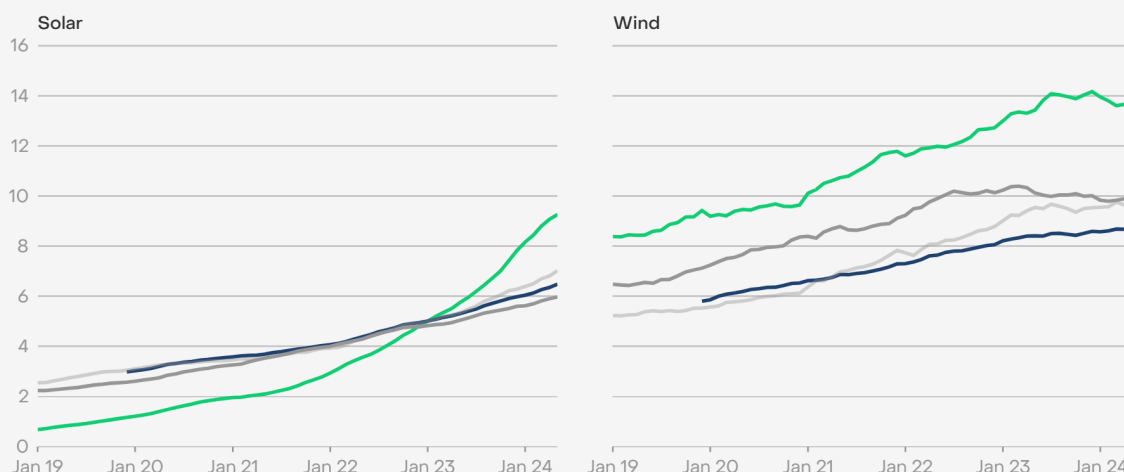
As a result of this rapid generation growth, Brazil's solar share has surged beyond that of other G20 countries. During the 12 months from March 2023 to April 2024, solar generated 9.1% of Brazil's electricity, noticeably higher than the G20 average (6.4%).

Brazil is also a long-standing leader in wind power in the G20. During the 12 months from March 2023 to April 2024, wind generated 14% of Brazil's electricity – above the 8.7% average for the G20.

Brazil is a solar and wind leader in the G20

12-month rolling share of electricity generation, %

■ Brazil ■ G20 ■ US ■ China



Source: Monthly electricity data Ember

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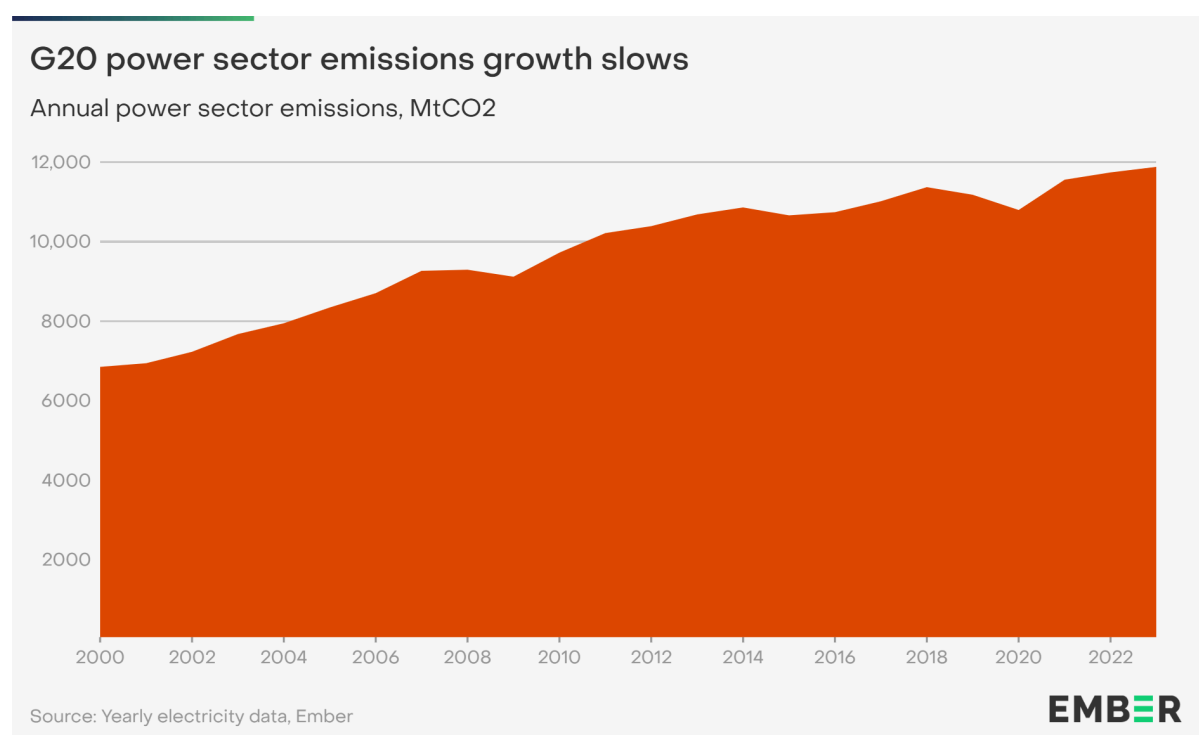
Brazil and the majority of G20 economies are past the peak of fossil power

Brazil's power sector emissions peaked in 2014 at 114 million tonnes of CO₂ (MtCO₂). In 2023, nine years past the peak, its power sector emissions were 38% below 2014 levels, at 70 MtCO₂. This represents an average decline of 6.7% per year.

The majority of G20 economies – Brazil plus 11 other members – are at least five years past the peak of power sector emissions. Collectively, they represent 41% of the G20 power generation in 2023.

With rapid falls in emissions across many G20 countries, and slowing emissions growth for the G20 as a whole, the world is approaching [a new era of falling power sector emissions](#).

However, G20 emissions are still rising. In 2023, G20 power sector emissions reached a new record high of 11,881 MtCO₂, up 1.2% from 11,742 MtCO₂ in 2022.

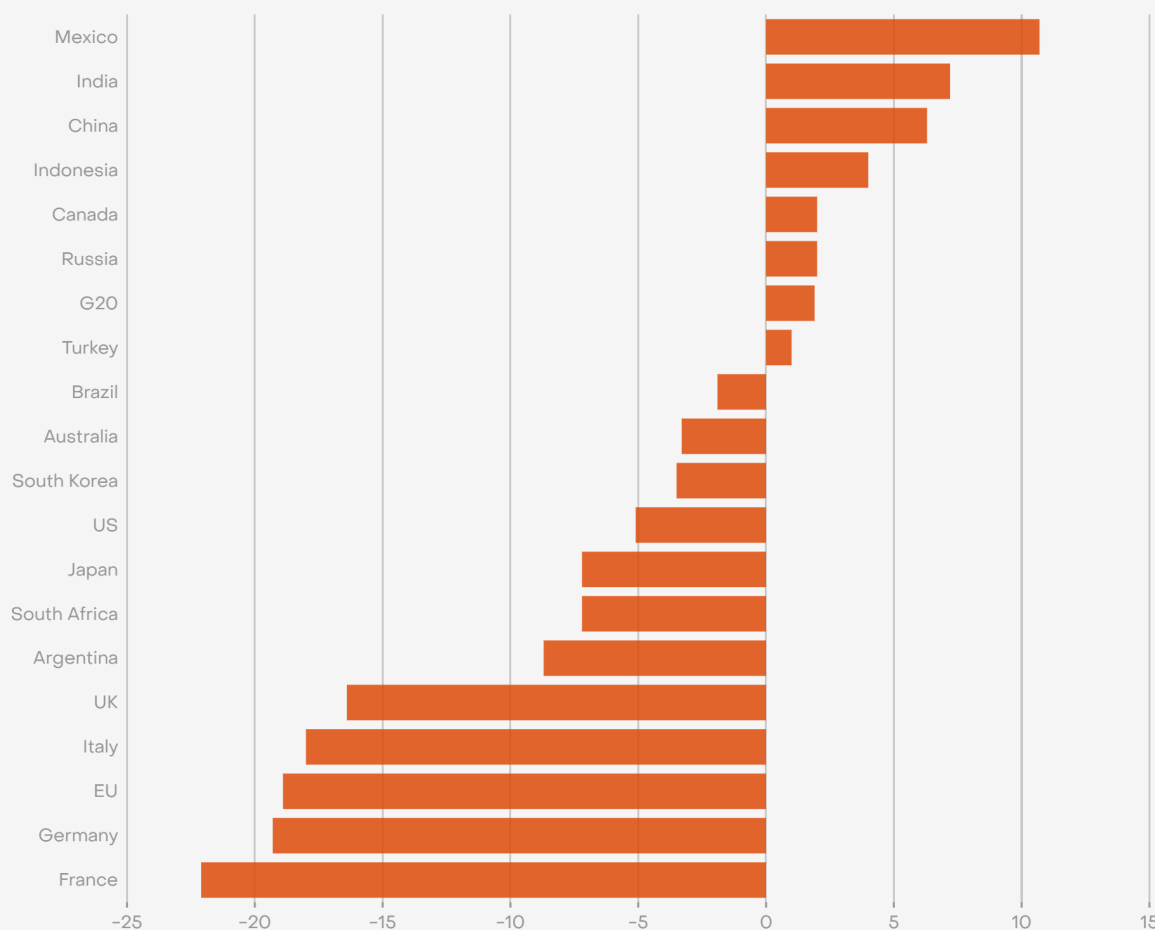


Mature economies in the G20 are already seeing progress in decarbonising their power sectors. EU members of the G20 saw the sharpest emissions falls in 2023, with France (-22%) and Germany (-19%) leading the way, thanks to strong growth in wind and solar generation and falling electricity demand. Canada was an exception, although the small increase in emissions seen in 2023 was due to temporary conditions. The sharp drop in hydropower in Canada created a shortfall that was partly met by higher fossil generation, leading to an increase in emissions (+2%).

Meanwhile, emerging economies – where electricity demand is growing fast – are still seeing growing emissions. For these countries, wind and solar offer a unique opportunity to meet their growing demand, as they can be deployed faster than any other renewable electricity source and are also [cheaper than fossil fuels in most countries](#). China is close to peaking its emissions – thanks to fast wind and solar growth – which would be a game changer as it accounted for almost half of G20 emissions in 2023 and 39% of global emissions.

Power sector decarbonisation is underway in the majority of G20 economies

Year-on-year change in power sector emissions (2023 vs. 2022), %



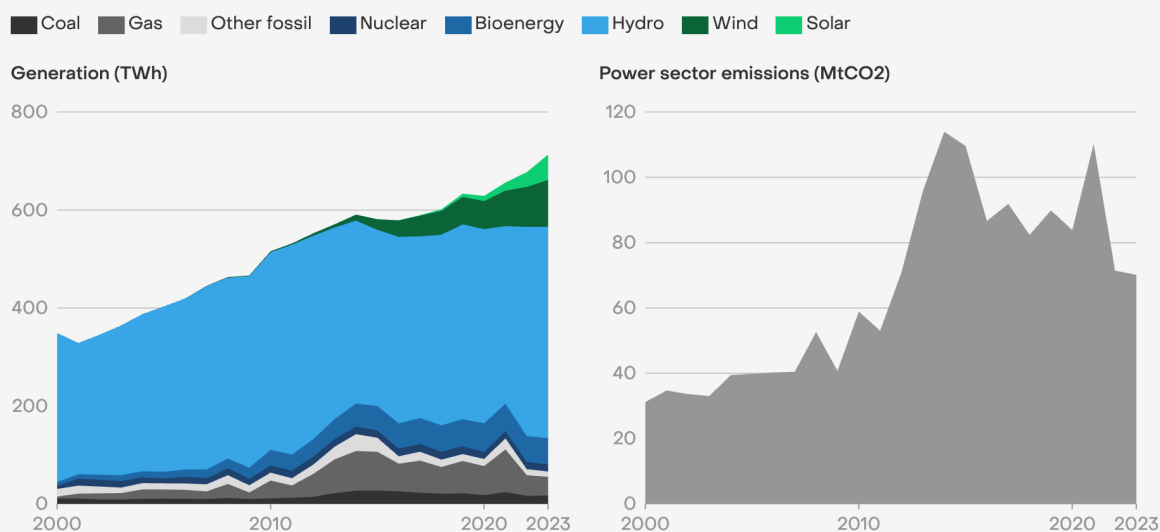
Source: Yearly electricity data, Ember
Saudi Arabia is not displayed due to unavailable data for 2023

Brazil sets a compelling example for other emerging economies. Despite rapidly growing electricity demand, Brazil has managed to meet this increase with renewable sources – primarily wind and solar – over the past decade.

Hydro, which has been the backbone of Brazil's power sector, stopped growing in the early 2010s, leading to a short-lived foray into gas power to meet electricity demand growth. This led to a surge in power sector emissions. The recent wind and solar boom has been reversing this, cementing Brazil's position as a global renewables powerhouse.

Over the nine years since Brazil's 2014 emissions peak, wind and solar generation has increased by 135 TWh, 10% more than the country's total electricity demand (+123 TWh), thus contributing to falling fossil generation (-76 TWh). Brazil enabled this by being an early wind and solar adopter, with auctions for projects starting in the mid-2000s and by introducing [other supportive policies](#) such as net metering.

In Brazil, wind and solar power have met rising demand for the past 10 years, halting growth in power sector emissions



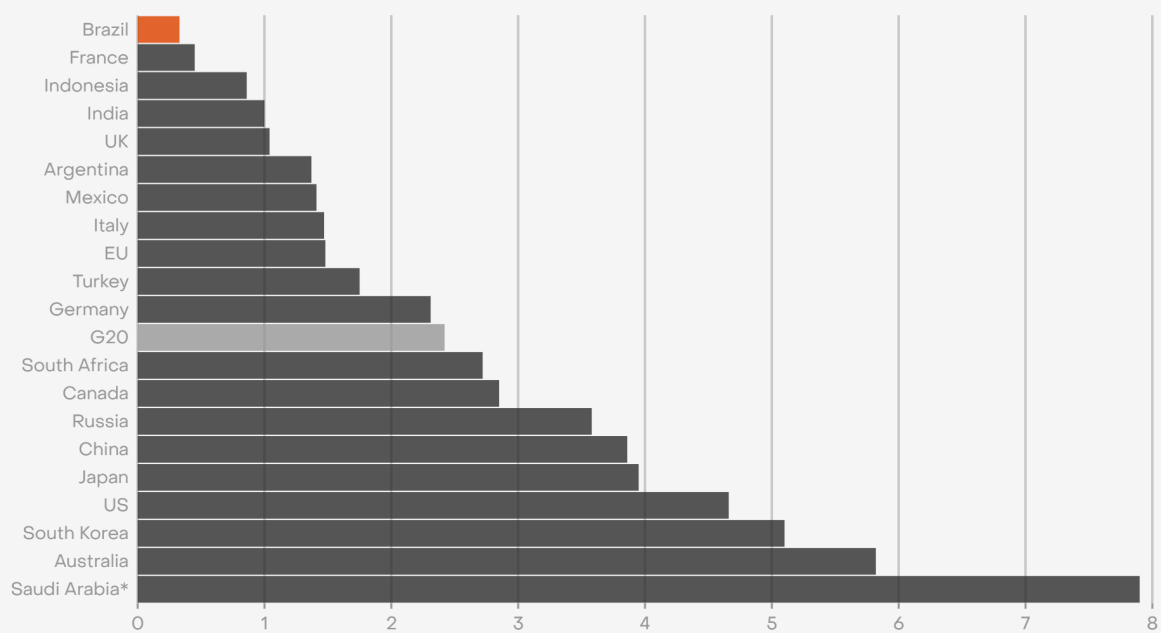
Source: Annual electricity data, Ember

Brazil has the lowest emissions per capita in the G20, a title it has held for at least two decades, except for being briefly knocked off the top spot by France in 2014. Brazil's renewables growth has helped to rapidly reduce its power sector emissions, from their peak of 0.56 tCO2 per capita in 2014 to 0.33 tCO2 per capita in 2023. Unlike Brazil, France's

emissions per capita have remained relatively flat, decreasing only slightly from 0.46 tCO₂ per capita in 2014 to 0.45 tCO₂ in 2023.

Brazil has the lowest power sector emissions per capita in the G20

Emissions 2023 rankings, tCO₂ per capita



Source: Yearly electricity data, Ember
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G20 countries can lead the way

At the UN's COP28 climate change conference in December, world leaders agreed to triple global renewable energy capacity by 2030. This historic agreement is the most significant step towards halving global emissions this decade and keeping the 1.5C goal within reach.

Additionally, tripling renewables will provide more stable and affordable energy compared to fossil fuels.

[The latest evidence](#) shows rapid renewables growth globally, providing greater confidence to global leaders that more ambitious targets are increasingly attainable. Upgrading the targets in their Nationally Determined Contributions (NDCs) and implementing more effective policies are needed to match the new global reality.

G20 countries are best positioned to lead the way. They accounted for 84% of global power sector emissions in 2023 and their combined emissions continue to grow. However, the majority of G20 countries are now in a new era of declining power sector emissions, showing what is possible. Brazil's success story of rapidly reducing its power sector emissions, while also meeting fast-growing electricity demand, underscores what works— early political commitment to renewables growth, strong policy frameworks and effective use of national natural resources. By following Brazil's example, G20 countries can lead the global transition to a sustainable energy future.

Supporting Materials

Methodology

Electricity data

The data in this report is based on Ember's yearly and monthly electricity data. You can download yearly data [here](#) and monthly data [here](#).

Acknowledgements

Cover photo

Rooftop solar overlooking Copacabana beach.

Credit: [Ricardo Funari / BrazilPhotos](#)

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