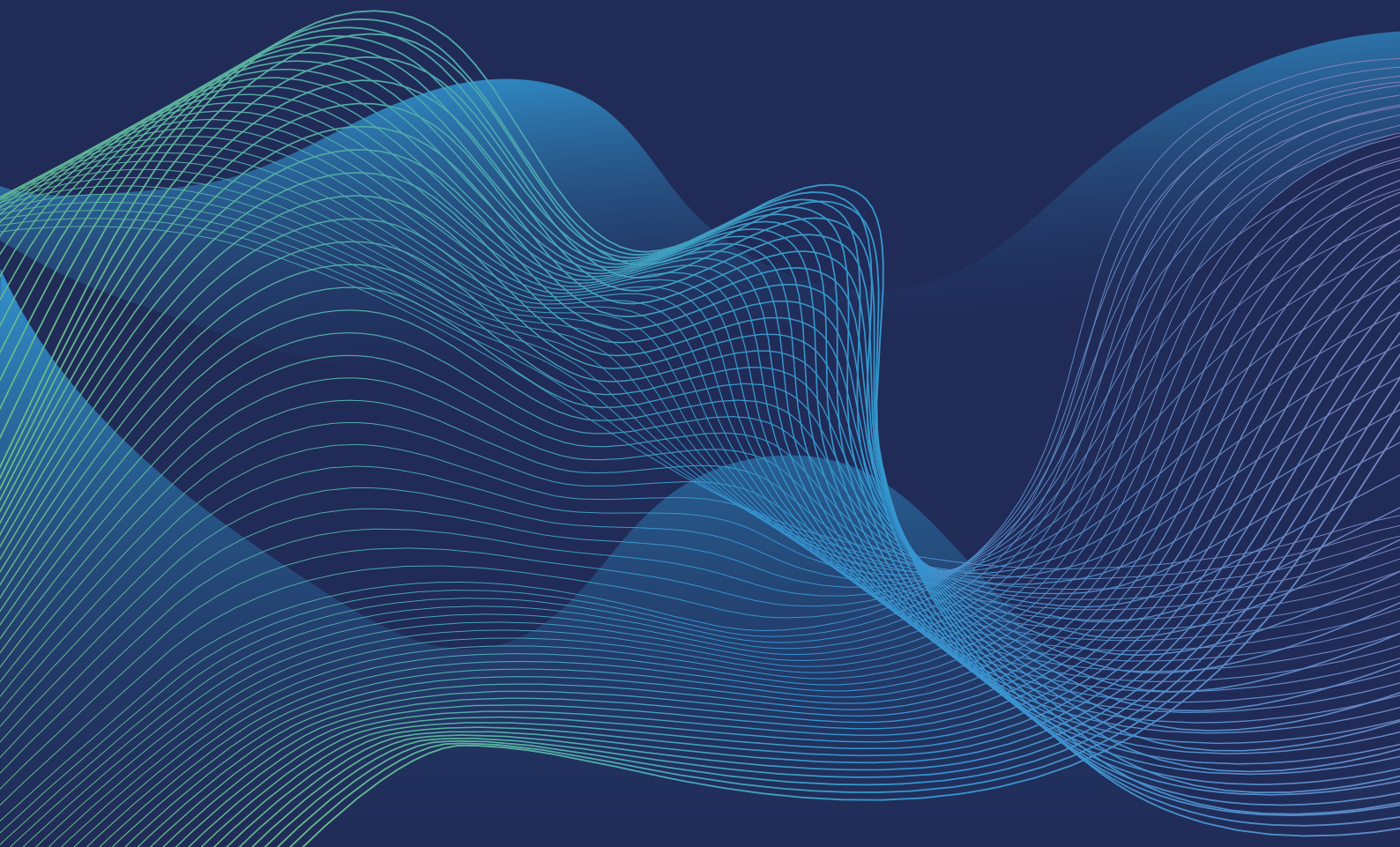
Global Electricity Review 2021
G20 Profile

EMBER
COAL TO CLEAN ENERGY POLICY

UNITED STATES

US responsible for half of rise in global gas generation since 2015

March 2021



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About Ember's Global Electricity Review

This annual report analyses electricity data from every country in the world to give the first accurate view of the global electricity transition in 2020. It aggregates generation data by fuel by country from 2000. 68 countries comprising 90% of world electricity generation have full-year data to 2020 and have formed the basis of an estimate for changes in worldwide generation. All remaining countries have full data as far as 2019. G20 countries, which comprise 84% of world electricity generation, each have a separate in-depth country analysis. All the data can be viewed and downloaded freely from Ember's website.

www.ember-climate.org/global-electricity-review-2021

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Clean generation only partly made up for coal's staggering fall since 2015

"Coal was already in terminal decline in the United States, and this trend only accelerated in 2020. But the switch to fossil gas seen over the last decade has limited potential reductions in emissions, especially considering the harmful impacts of methane leakage from gas infrastructure. President Biden's clean power plan puts gas generation in the spotlight. A pickup in both wind and solar deployment and grid investment in the short-term will be crucial to set the country on a course to clean power by 2035."

Euan Graham

Electricity Tracking Analyst, Ember

Key findings

1

Coal generation has fallen by 43% since 2015

The 579 TWh fall in coal has been facilitated by a 283 TWh increase in gas generation and a 239 TWh increase in wind and solar generation. The final driver was a small reduction in electricity demand. The fall in US coal is slightly less than that seen in the EU-27, which fell by 48% in the same period.

2

The US was responsible for half of the rise in global gas generation

Since 2015, global gas generation increased by 576 TWh, of which 283 TWh (49%) was from the United States. In 2020, gas generation fell globally for the second time this century, but still it increased in the US by 2%. As a result, despite the 43% fall in US coal generation, fossil generation has only fallen by 11% since 2015. In 2020, 60% of United States electricity was generated using fossil fuels, just below the global average of 61%.

3

Wind and solar grew impressively in 2020

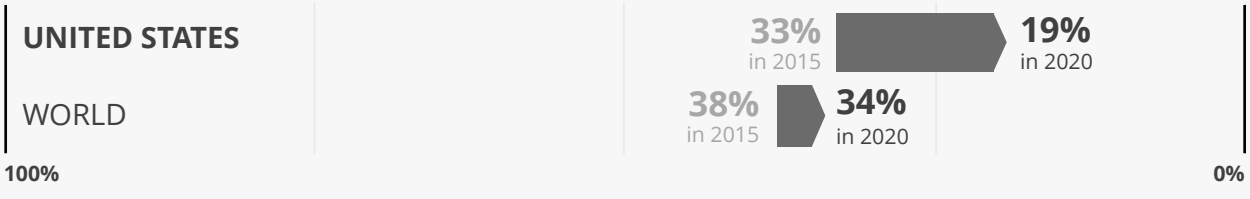
In the US, wind and solar rose by 42 TWh (+14%) and 26 TWh (+24%) respectively, breaking national records for year-on-year increases in either technology. This meant that wind and solar generation has doubled in just five years to produce 12% of US electricity in 2020. This is above the global average of 9.4%, but still considerably less than the EU-27, where 20% of electricity comes from wind and solar power.

Progress to 100% clean electricity

Percentage of all renewables & nuclear in total generation

Progress on phasing out coal

Percentage of coal in total generation

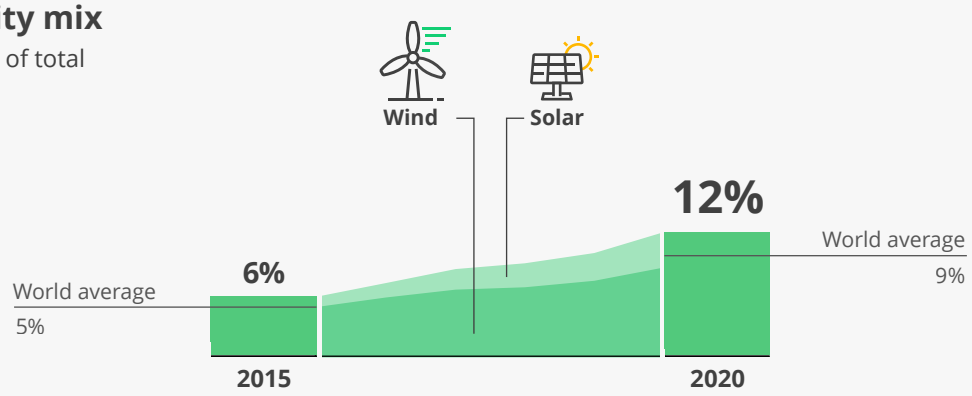


United States electricity transition in the spotlight: 2015-2020

Wind and solar have grown to become a key part of US electricity mix

Wind & solar in electricity mix

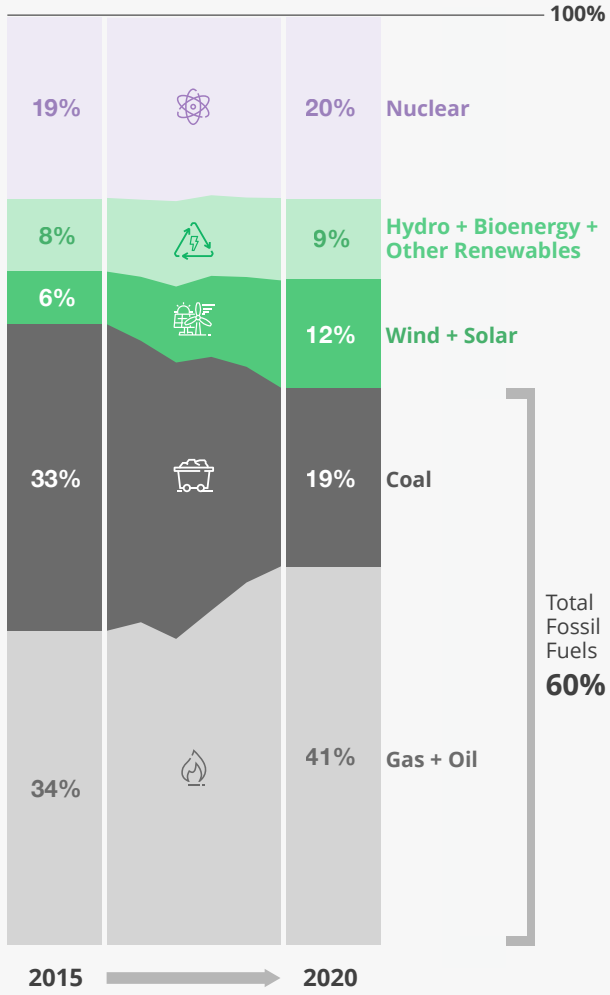
Percentage of total generation



Rising gas means fossil fuels still generated 60% of US electricity

Electricity mix

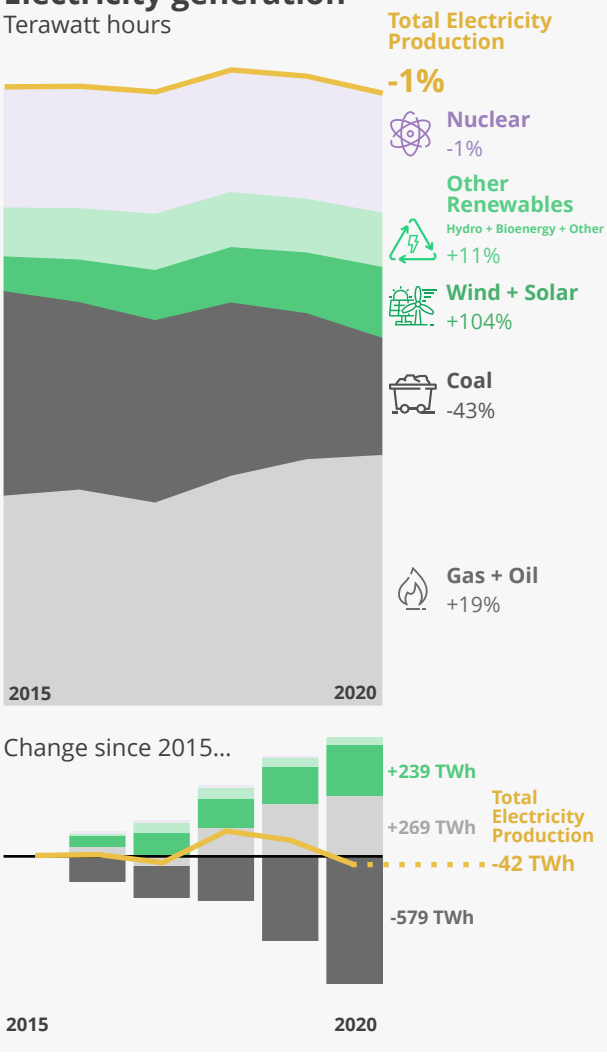
Percentage of total generation



Coal fell 43% since 2015 in absolute terms

Electricity generation

Terawatt hours



In the United States, the share of electricity from renewables has increased from 14% to 20% since 2015, as more wind and solar capacity has been added to the grid. Meanwhile, coal's share of electricity has tumbled, generating just 19% of electricity in 2020 compared to 33% in 2015. But not enough wind and solar has been introduced to ensure a switch from coal into clean, allowing gas generation to rise by 283 TWh. Gas now generates 40% of American electricity. This means that despite the rapid phaseout of coal, fossil fuels still generated 60% of the country's electricity in 2020.

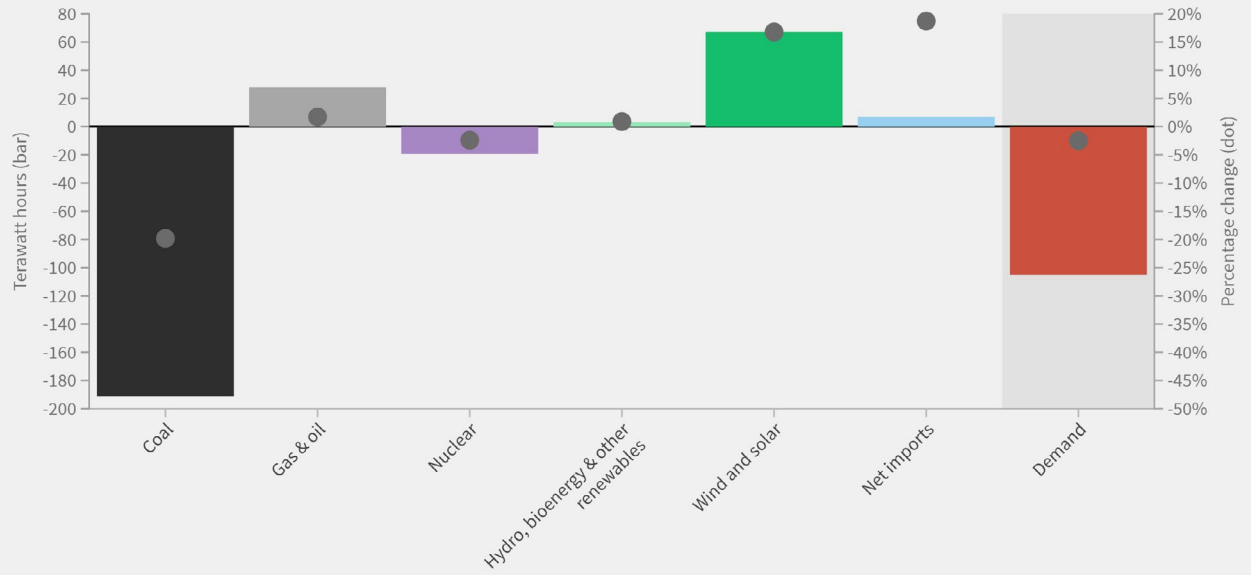
Renewables growth since 2015 has been driven by wind and solar. In the five years since 2015, wind and solar generation has increased by 239 TWh, while hydro generation has increased by 42 TWh and bioenergy generation has fallen by 8 TWh. Wind and solar's share of electricity production has increased by six percentage points from 6% to 12%, comfortably above the world average of 9.4%. Encouragingly, growth in wind and solar market share accelerated in 2020, showing promising signs that renewables growth is gaining speed.

Despite the 43% reduction in coal generation, the switch to gas generation has meant that generation from fossil fuels has only fallen by 11% since 2015. Broadly speaking, around 49% of the fall in coal was met by a rise in gas generation, compared to 41% by increased wind and solar generation. Nuclear generation has remained fairly stable, while electricity demand has been slowly falling. Per capita electricity demand still remains high, and was almost four times the world average last year.

What happened in 2020?

United States - Electricity changes in 2020 by source

Year-on-year change



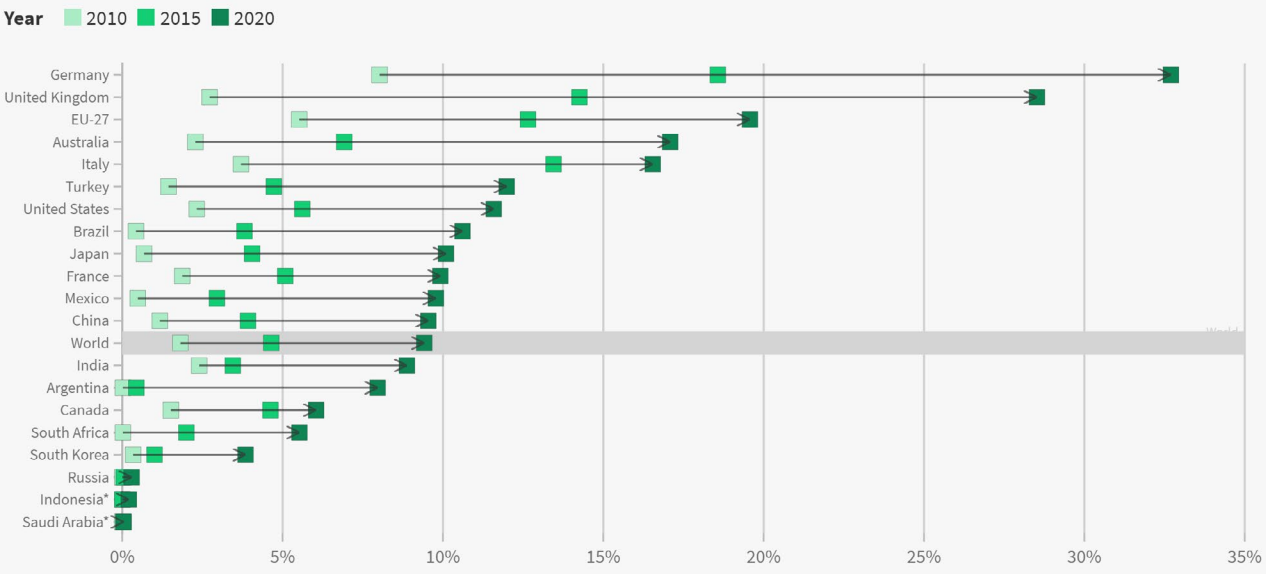
Coal generation fell by a staggering 20% (-191 TWh) in 2020, the largest percentage fall on record. A major reason for this was a 2.5% fall in electricity demand (-105 TWh), the largest since the 4.4% fall in 2009 following the financial crisis. However the United States also decommissioned 11 GW of coal plants in 2020, showing that this fall is more than a one-off. It was also an excellent year for wind and solar, rising by 42 TWh and 26 TWh respectively, which is the largest year-on-year increase seen for either technology. This was enabled by record capacity additions for both wind and solar, adding a combined total of 32 GW new generation capacity to the grid.

These dynamics meant that for the first time, renewables generated more electricity than coal power stations, which is a welcome landmark. But despite the fall in demand, gas generation still rose by 1.8% (+29 TWh), helped by the lowest delivered gas prices since 1995. Nuclear generation decreased by 2.4% (-19 TWh) amid falling demand and significant unplanned outages over the summer months.

United States transition in comparison with G20 countries

Wind and solar generation continue to rise in the United States

Wind and solar as % share of electricity production for G20 countries

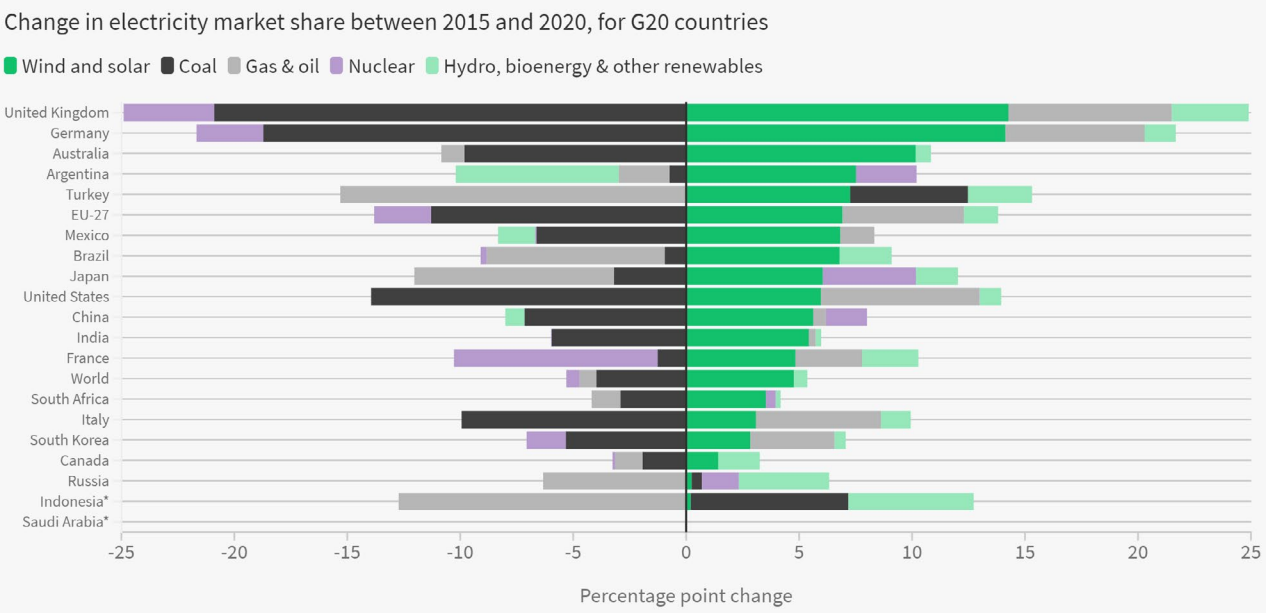


*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists
Ember's Global Electricity Review, March 2021.

Wind and solar generated 12% of electricity in the United States in 2020, comfortably above the world average of 9.4%. Growth in wind and solar generation has accelerated since 2015, when wind and solar generated 5.6% of electricity.

However, this growth is still small when compared to a country such as Germany, where wind and solar's market share has grown from 19% in 2015 to 33% in 2020.

United States has one of the largest reductions in coal—and highest increase in gas

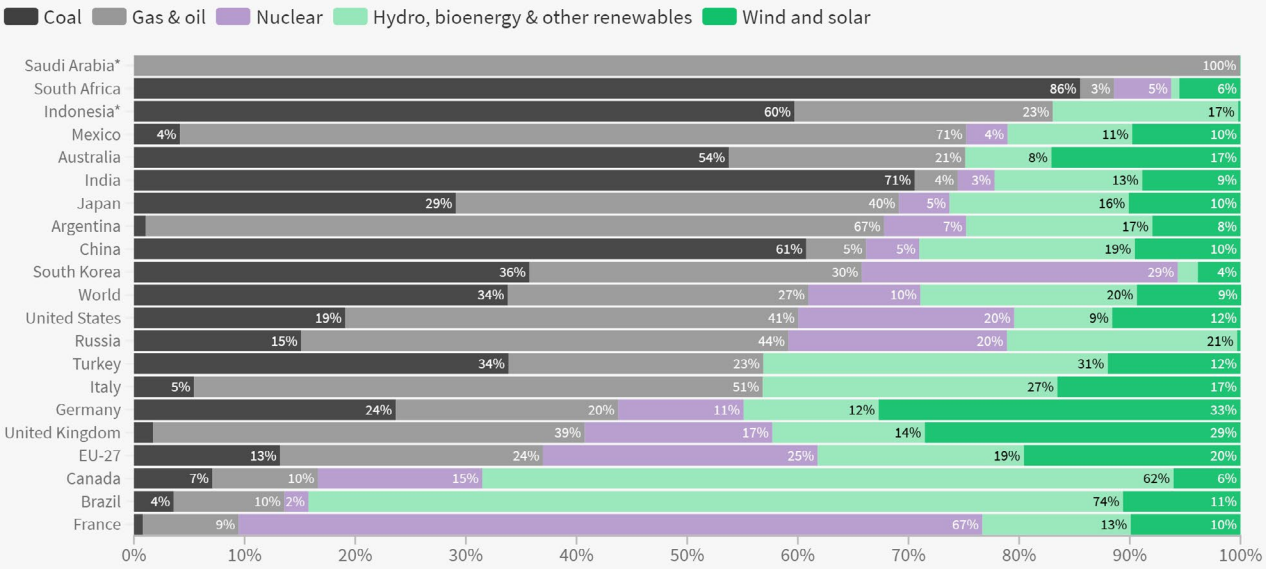


*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
Ember's Global Electricity Review, March 2021.

The six percentage point change in wind and solar generation has played a significant role in driving coal out of the electricity mix. But gas generation has increased its market share by seven percentage points, which represents the largest increase in the G20. Together these have resulted in a reduction of coal's share of 14 percentage points, the third largest of the G20 members.

United States electricity mix is still fossil-heavy

Electricity production mix in 2020, for G20 countries

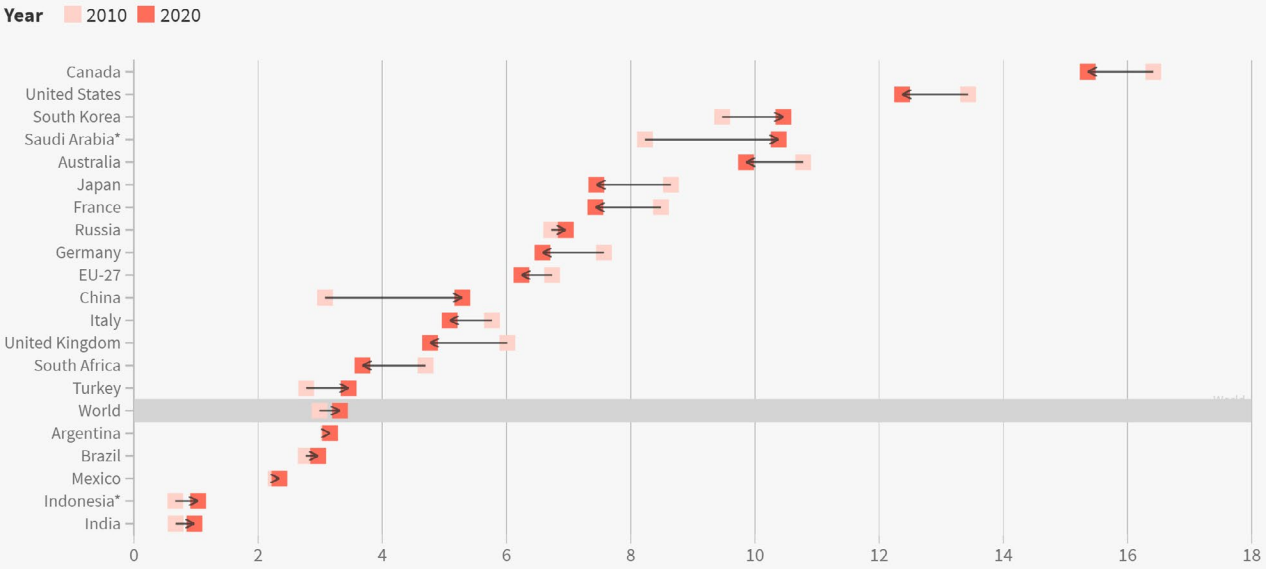


*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
Ember's Global Electricity Review, March 2021.

Since half of the reductions in coal power have been replaced by gas generation, the United States electricity mix is still dominated by fossil fuels. The United States produces more electricity from fossil fuels than Russia, and is only just below the world average of 61%.

United States demand per capita is second highest in the G20

Electricity demand per capita (Megawatt hours), for G20 countries

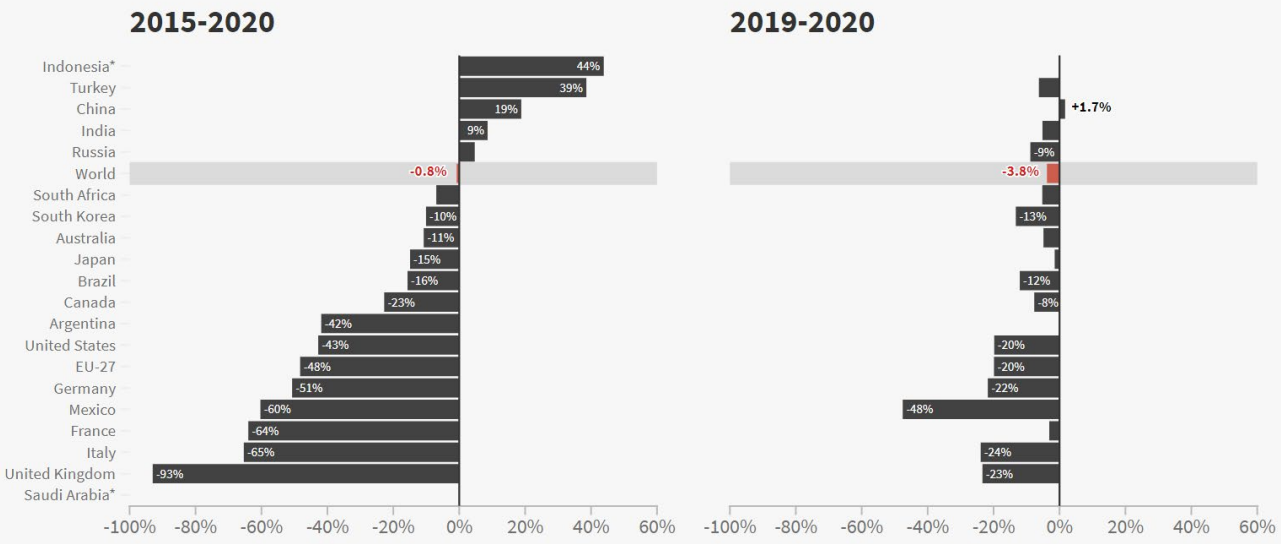


For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists. • Population sourced from United Nations.
Ember's Global Electricity Review, March 2021.

The United States has the second highest electricity demand per capita in the G20, behind Canada. Electricity demand per capita has been slowly falling over the last decade, but is still almost four times higher than the world average.

United States and EU-27 in race to phase out coal

Change in coal generation, for G20 countries



*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
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Coal generation has fallen by 43% since 2015, helped by the 20% fall seen last year. This is close to the 48% reduction seen in the EU-27, although the EU-27 has replaced more coal generation with solar and wind power than the US.

Concluding remarks

President Biden's intention to commit the United States to switch its electricity system to 100% clean power by 2035 represents a truly transformative step. But the way coal has been phased out in recent years would make achieving this more challenging in multiple ways—most obviously, the switch to gas has muted reductions in overall fossil fuel generation. In addition, the volatile nature of gas prices means that some of the gains made in phasing out coal over the last decade might not be permanent: the EIA forecasts that coal generation will increase in 2021 and 2022 as gas prices increase from the record lows seen in 2020. This prediction should act as a reminder that the current pace of change is not fast enough. A pickup in wind and solar deployment in the short-term will be absolutely crucial to prevent any backsliding and set the country on a course to a clean electricity system.

More information about the Global Electricity Review 2021

Global Electricity Review 2021	www.ember-climate.org/global-electricity-review-2021		
Main Report	Global Trends	English	Español 中文
G20 Profiles	Argentina	English	Español
	Australia	English	
	Brazil	English	Português
	Canada	English	
	China	English	中文
	European Union	English	
	France	English	Français
	Germany	English	Deutsch
	India	English	
	Indonesia	English	Bahasa Indonesia
	Italy	English	Italiano
	Japan	English	にほんご
	Mexico	English	Español
	Russia	English	русский
	Saudi Arabia	English	عربي
	South Africa	English	
	South Korea	English	한국어
	Turkey	English	Türk
	United Kingdom	English	
	United States	English	

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