



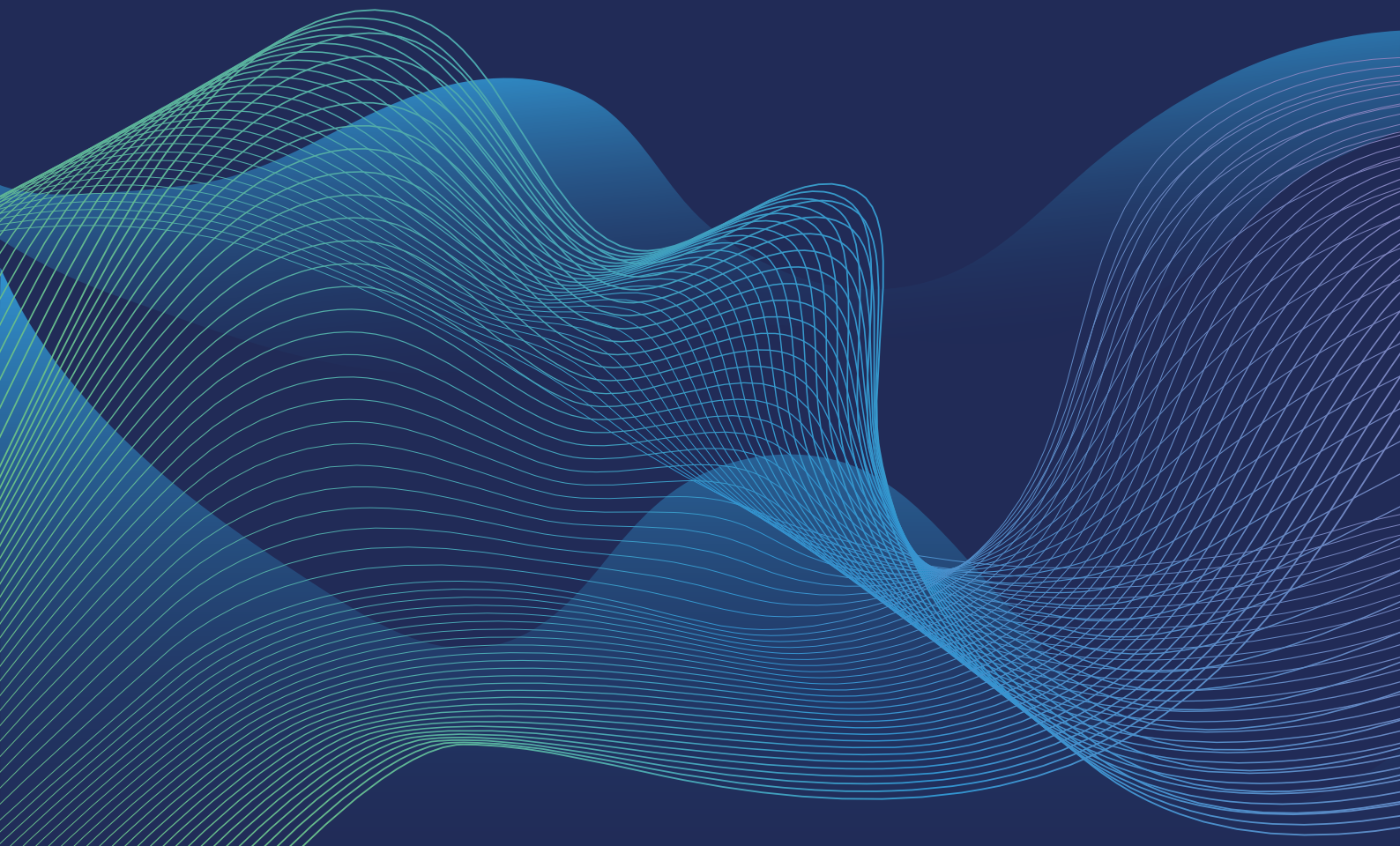
**Global Electricity
Review 2021**
G20 Profile

EMBER
COAL TO CLEAN ENERGY POLICY

TURKEY

Turkish coal generation fell for
a second consecutive year

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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EMBER COAL TO CLEAN
ENERGY POLICY

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TURKEY

Turkish coal generation fell for a second consecutive year

Two years of stagnating electricity demand growth, and increased wind and solar generation, put coal in reverse

"Coal generation has marginally fallen for two years in a row, but Turkey's coal risk is not over. Although the escalation in wind and solar generation is promising, the increase was only enough to meet a modest increase in electricity demand. Turkey has a considerable challenge ahead to ensure coal generation falls over the next decade, especially as electricity demand picks up."

Sarah Brown

Senior Electricity Analyst - Europe, Ember

Key findings

1

Coal fell for the second year in a row

However, this 7 TWh decrease only happened because electricity demand growth temporarily stalled over the last two years. Demand rose by only 0.6% in 2020. An increase in fossil gas generation in 2020 also caused coal generation to fall further back.

2

Wind and solar accounted for 12% of Turkey's generation in 2020

This is just above the world average of 9.4% and a higher proportion than even in the US. The world's wind and solar share of production has doubled in the last five years; by comparison, Turkey's has impressively tripled, from around 4% to 12%.

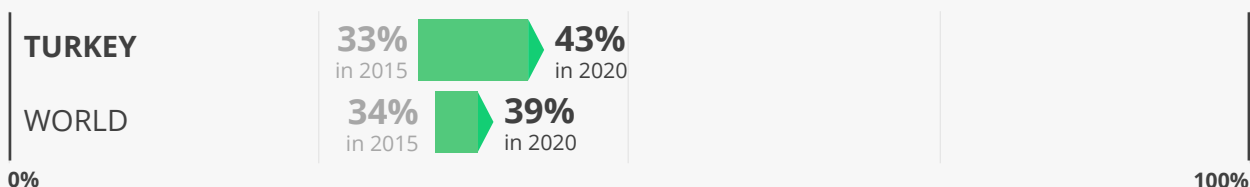
3

Turkey is one of only three G20 countries where coal's share of the electricity mix has increased since 2015

Fossil gas is being replaced by this even dirtier fuel. Across the world coal has fallen from 38% in 2015 to meet 34% of electricity demand in 2020: whereas Turkey's coal share increased from 29% to 34%. Turkey's coal generation increased by 39% from 2015 to 2020, the second largest increase of any G20 country.

Progress to 100% clean electricity

Percentage of all renewables & nuclear in total generation



Progress on phasing out coal

Percentage of coal in total generation

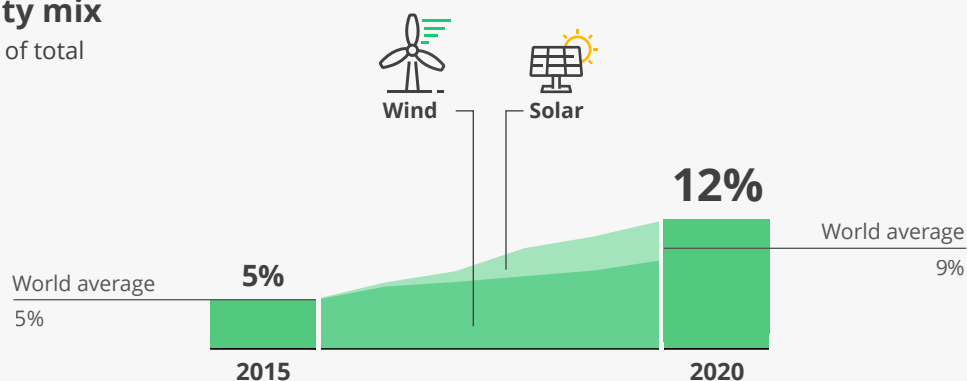


Turkey's electricity transition in the spotlight: 2015-2020

Wind and solar share almost tripled since 2015

Wind & solar in electricity mix

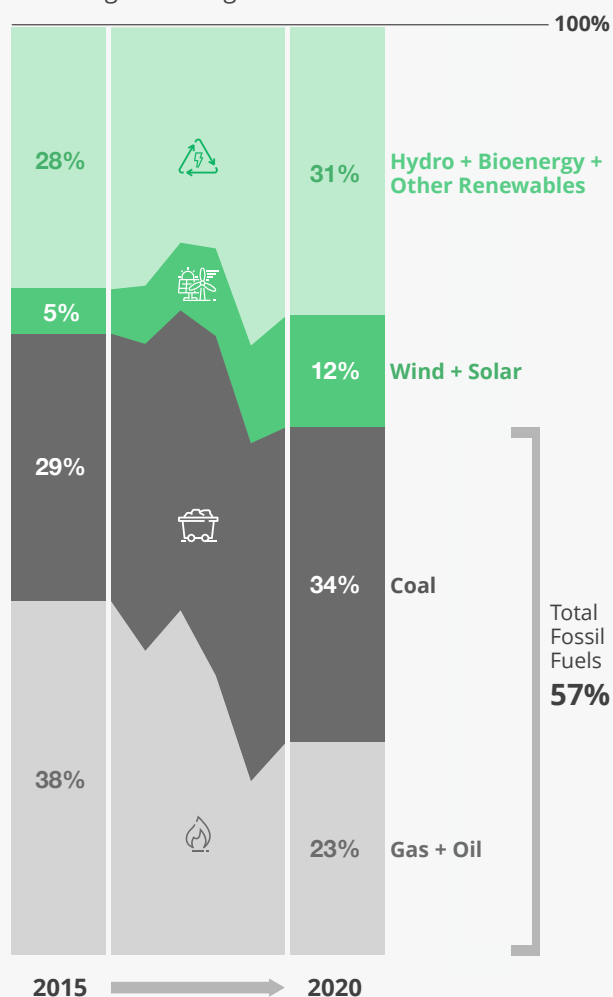
Percentage of total generation



Renewables and coal take market share from gas

Electricity mix

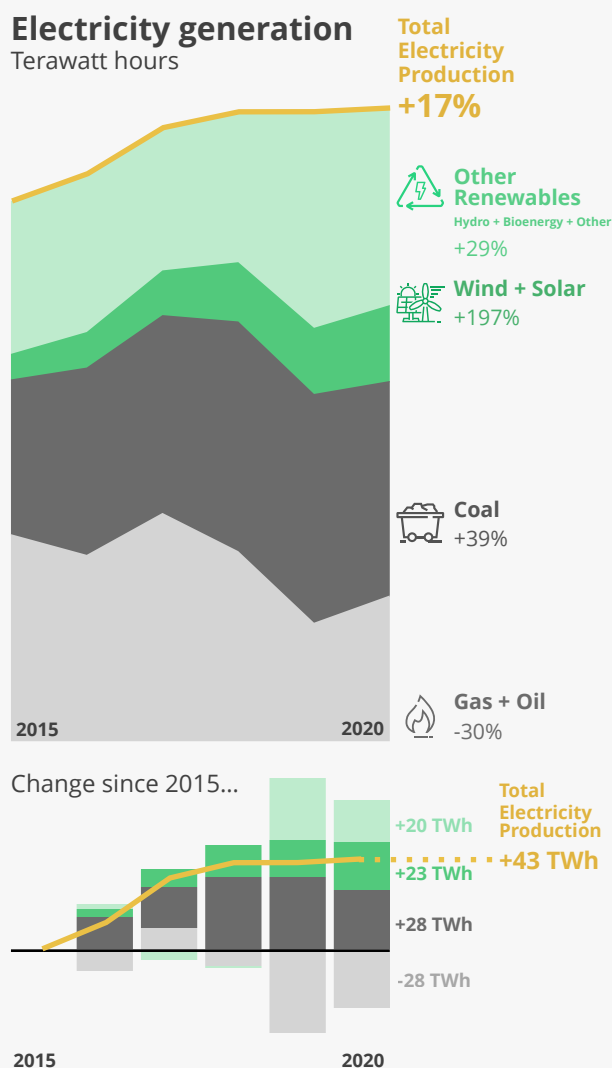
Percentage of total generation



Coal has increased by +39% since 2015

Electricity generation

Terawatt hours



Renewable generation has overtaken coal four times since 2015 in Turkey (2015, 2016, 2019 and 2020) but the last two years saw the highest margin at nine percentage points. In this period, renewables have never produced more electricity than all fossil fuels combined, but the gap between them substantially decreased in 2019 and 2020. Renewables only accounted for a third of electricity generation in 2015 compared to almost half (43%) in 2020.

As a trend, renewable electricity—especially hydro—has displaced fossil gas rather than coal, with fossil gas production falling 15 percentage points since 2015. 2020 actually saw fossil gas recover as hydro generation returned to more normal levels after a strong year in 2019. However, if wind and solar continue their steady growth, the dominance of fossil gas over renewables should not return to 2015 levels.

Wind and solar have increased their share of total generation from 4% to 12% (+23 TWh) over the last five years. Hydro remains the predominant renewable electricity source in Turkey but its share of production was the same in 2020 as it was in 2015 (26%). Wind, in particular, is showing strong growth with 1.2 GW additional capacity installed in 2020, double the amount installed in 2019, to take the total to 9 GW. However, the amount of additional solar capacity that was installed in 2020 was down 28% compared to 2019. Wind and solar combined only increased their market share by one percentage point year-on-year. Turkey needs to maintain the growth in wind generation and escalate investment in solar power.

Coal generation only fell by 6% in 2020 and has grown by 39% (+28 TWh) overall since 2015. Turkey is also one of only three countries in the entire G20 where coal's share of production has increased over this period—the others being Indonesia and Russia. Coal accounted for 29% of the electricity mix in 2015 versus 34% in 2020. Turkey's installed capacity has also risen by almost a third since 2015 (+4 GW).

The share of electricity generation from fossil gas has been falling over the last five years from 37% to 23%. However, fossil fuels still made up 57% of total production in 2020 with coal alone accounting for 34%. This looks set to continue if Turkey goes ahead with even a proportion of its planned new coal-fired plants.

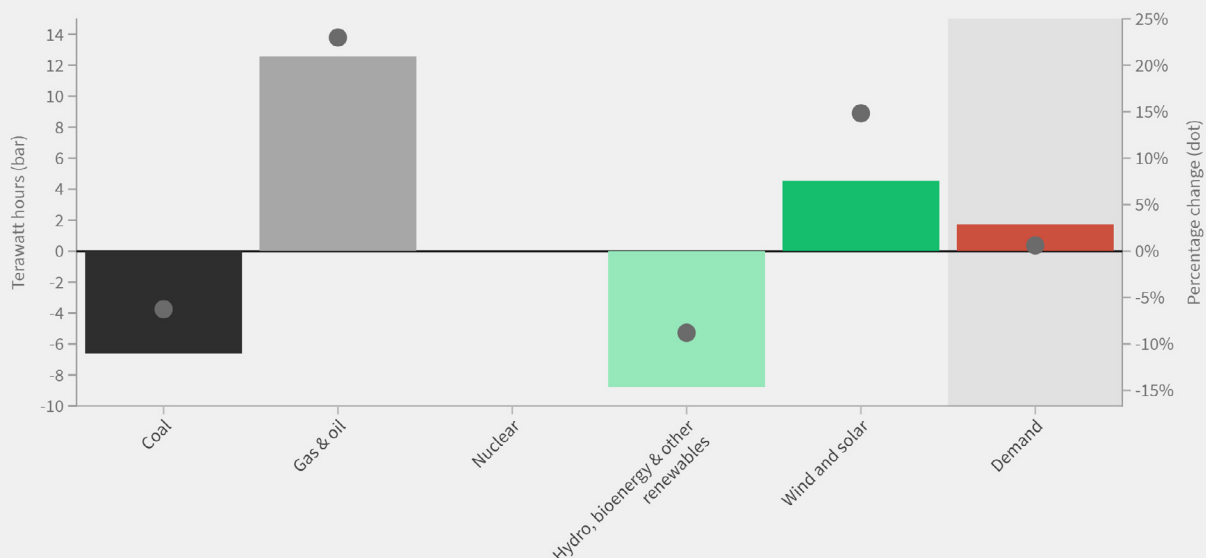
Turkey began construction on its first ever nuclear power plant in 2017. Akkuyu (4.8 GW) is due to be fully operational by 2026 with one of the four units operational by 2023. The government intends to bring another two nuclear plants online by 2030. However, there are international concerns regarding safety due to earthquake risks.

Electricity demand has steadily grown by 15% since 2015. Per capita, it is 1.5 times the global average.

What happened in 2020?

Turkey - Electricity changes in 2020 by source

Year-on-year change



Wind and solar electricity generation increased by 15% (5 TWh) in 2020 and installed capacity rose by 2 GW to just under 16 GW. Hydro production fell 12% (11 TWh) year-on-year due to lower rainfall and the fact that 2019 saw a record year for renewables, mostly because hydro electricity generation was up ten percentage points. Production at the three largest hydroelectric plants—Ataturk, Karakaya and Keban—was twice as high in 2019 compared to 2018 due to rainfall and snowfall being well above the seasonal average. The drought that followed in the second half of 2020 allowed fossil gas generation to recover, increasing by 25% (13 TWh) year-on-year. This represents the highest annual fossil gas gain in the G20.

Bioenergy production increased by 28% but this equates to less than 1 TWh due to extremely low installed capacity of below 1 GW.

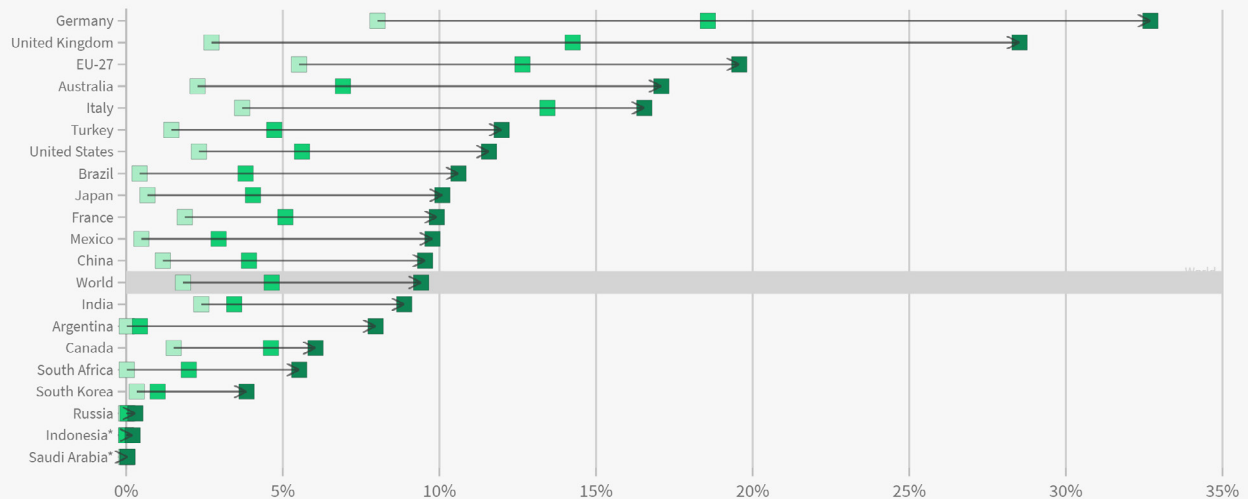
Total electricity production from coal dropped 6% in 2020. Five lignite plants had to cease operations in early 2020 because they did not make the necessary upgrades to comply with environmental regulations. Consequently, lignite production fell 18%. 1.6 GW of additional capacity was under construction in 2020, but 12.4 GW of proposed capacity was cancelled.

Turkey's transition in comparison with G20 countries

Turkey is fifth in the G20 for wind and solar share of production at 12%

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

Year 2010 2015 2020



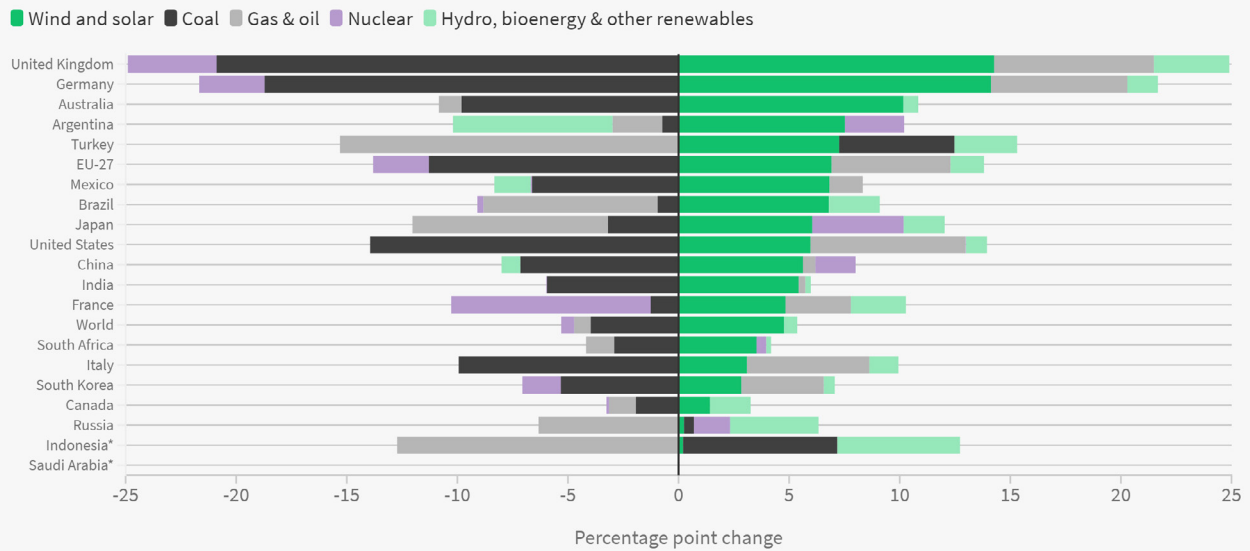
*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists
Ember's Global Electricity Review, March 2021.

With wind and solar making up 12% of Turkey's electricity, this places it above the global average of 10% and ahead of countries such as the US and France.

And, significantly, it is fourth in the G20 in terms of wind and solar deployment growth over the last five years, with an increase of seven percentage points (+23 TWh). This is more than double that of Italy.

Renewables replace fossil gas—not coal—in Turkey

Change in electricity market share between 2015 and 2020, for G20 countries

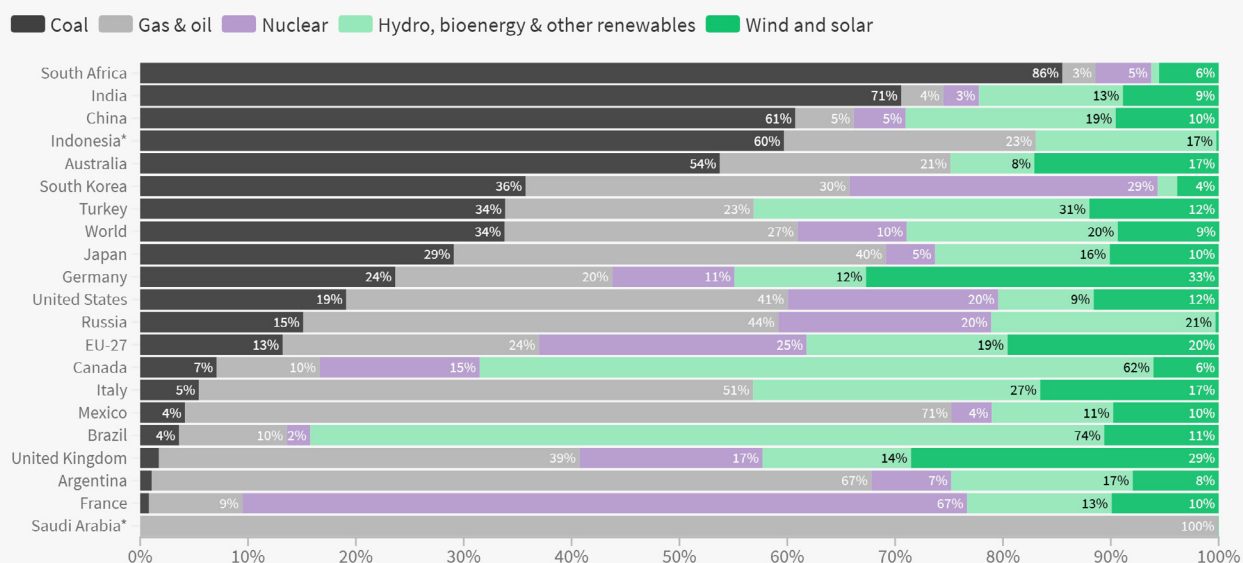


*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
Ember's Global Electricity Review, March 2021.

In line with the global trend, wind and solar have been replacing fossil fuels in Turkey. But it is fossil gas that is being pushed out rather than coal. Turkey is one of only three countries in the G20 that have seen an increase in percentage of coal in the electricity mix since 2015. Only Indonesia recorded higher growth.

Turkey is seventh in the G20 for share of electricity from coal

Electricity production mix in 2020, for G20 countries



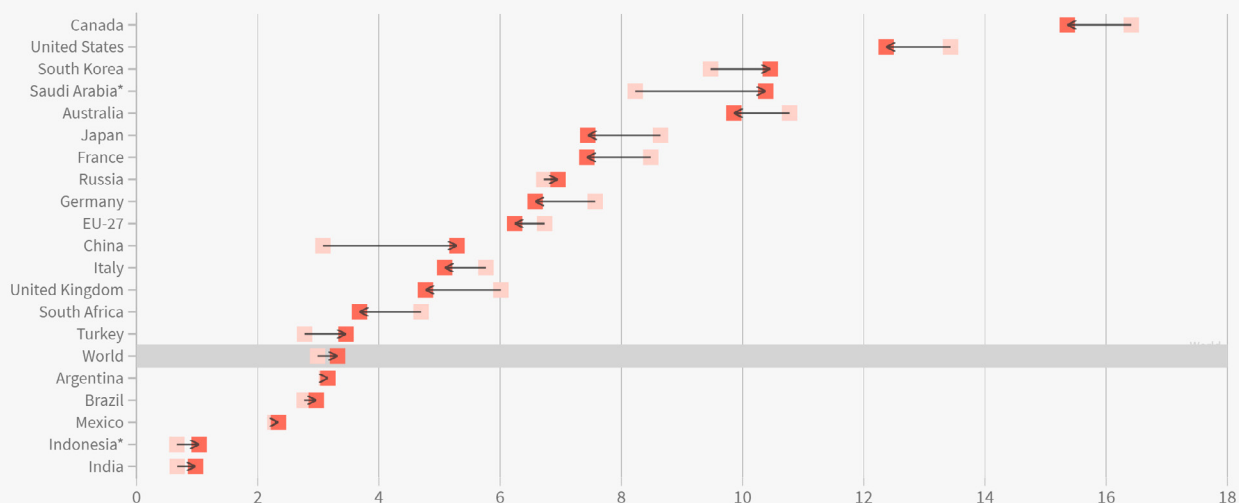
*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
Ember's Global Electricity Review, March 2021.

Coal accounts for 34% of Turkey's electricity mix. This is equal to the global average and is more than any other European country. Turkey also has high levels of fossil gas generation so its share of fossil fuels is a substantial 57%.

Turkey's electricity demand per capita rises above the world average

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

Year 2010 2020

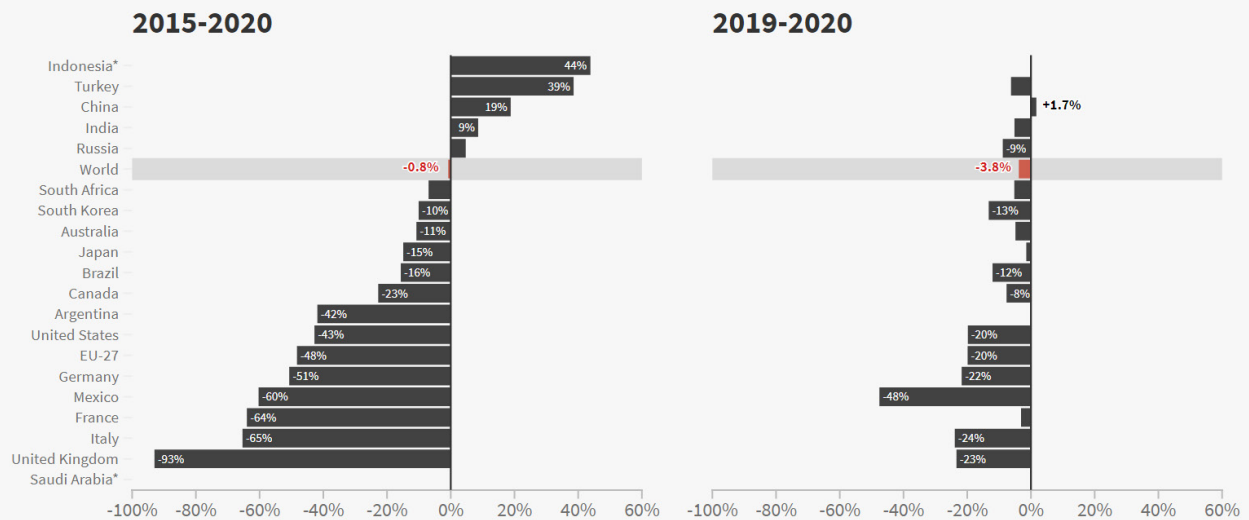


For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists. • Population sourced from United Nations. Ember's Global Electricity Review, March 2021.

Turkey's electricity demand has stagnated over the past two years but it saw an increase of 15% from 2015 to 2020. Per capita demand has grown by 25% in the last decade. In comparison, the UK's dropped by a similar proportion. However, Turkey has come from a low base as it had the fourth lowest per capita electricity demand in the G20 in 2010, the same level as Brazil.

Turkey has the second largest increase in coal generation in the G20

Change in coal generation, for G20 countries



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

Turkey's coal generation increased by 39% (+28 TWh) from 2015 to 2020. Only one country, Indonesia, saw larger growth at 44% (+51 TWh).

Concluding remarks

Turkey is the only G20 country that has not ratified the Paris Agreement. It does not have any announced target dates for phasing out coal and its 'Intended National Determined Contribution' (INDC) allows [greenhouse gas emissions to almost double](#) from current levels.

Turkey has the largest pre-construction pipeline in Europe for new coal-fired plants and ranks third globally behind China and India. This equates to [18 GW and 23 plants](#). That would double Turkey's current installed coal capacity. It is highly unlikely that the majority of these plants will be commissioned, as Turkey has seen 80 projects cancelled in the last decade, but it indicates an intention to rely on coal in the electricity mix for the foreseeable future unless the deployment rate of wind and solar rapidly increases.

Turkey has the climate and the available land to achieve the renewables growth required to replace fossil fuels. And the Ministry of Energy and Natural Resources has revealed plans to reach [20 GW of wind and solar by 2023](#). This would decrease Turkey's dependence on fossil gas imported from Russia. However, there needs to be the political will and the removal of government subsidies associated with coal plants and mines to enable the necessary investment in wind and solar.

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
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	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	يبرع
	South Africa	English	
	South Korea	English	한국어
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	United States	English	

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