Global Electricity Review 2021
G20 Profile

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AUSTRALIA

Australia remains heavily reliant on fossil generation despite the recent wind and solar boom

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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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Australia remains heavily reliant on fossil generation despite the recent wind and solar boom

Australia's electricity ranks fifth most fossil-intensive in the G20

"Australia must accelerate its transition away from fossil fuels for electricity, in order to give us a better chance of limiting global warming to 1.5 degrees. Redressing the current climate policy uncertainty is a critical prerequisite for achieving this."

Muyi Yang

Senior Electricity Policy Analyst - Asia, Ember

Key findings

1 The recent wind and solar boom makes Australia one of the world leaders in wind and solar generation

After a slow start in the first half of last decade, Australia has seen a wind and solar boom in more recent years. They now supply 17% of the electricity in Australia, rising from 7% in 2015. This is the third highest among G20 countries, following Germany and the United Kingdom, where wind and solar lead the way with much higher rates of 33% and 29% respectively.

2 Despite the recent surge in wind and solar generation, Australia has continued to rely on coal for electricity generation

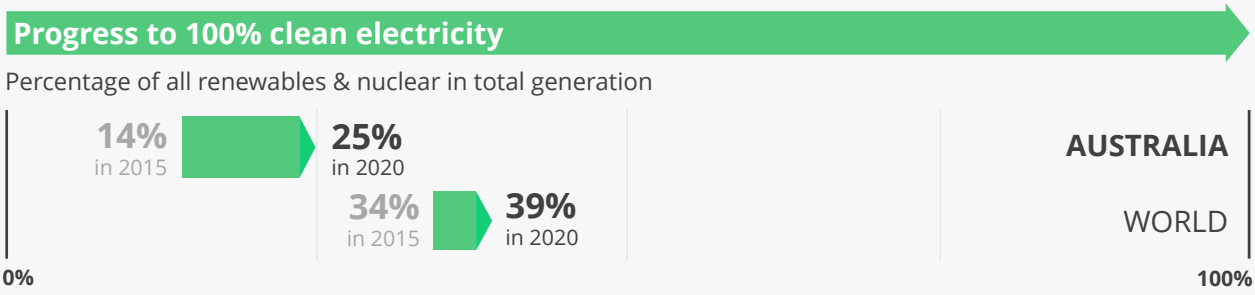
Wind and solar increased their market share by ten percentage points from 2015 to 2020. In the same period, coal generation lost 10% of its share, suggesting it had been replaced by wind and solar. Despite this, coal has remained dominant in Australia's generation-mix, accounting for over half of the electricity generated in 2020.

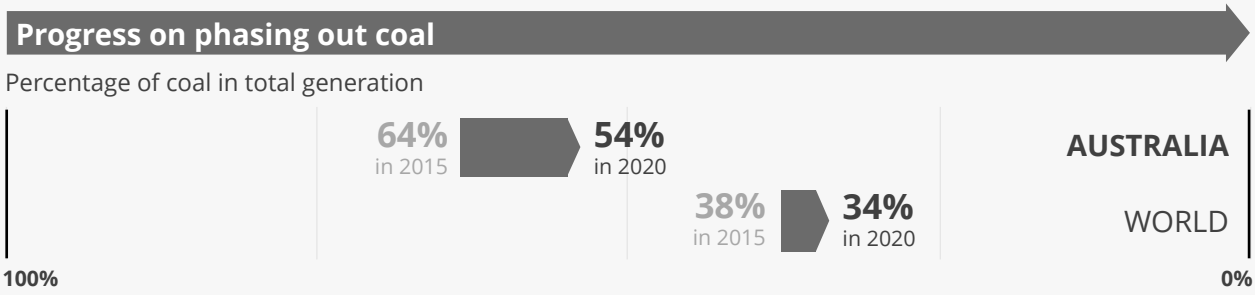
3 Besides coal, gas also plays an important role in Australia's generation-mix

It accounted for about 20% of the electricity generation in Australia over the period 2015-2020.

4 Australia's electricity generation ranks among the most fossil-intensive in the G20

Australia ranks 5th in the G20 for reliance on fossil electricity with fossil-free electricity accounting for less than 25% of the electricity generation.



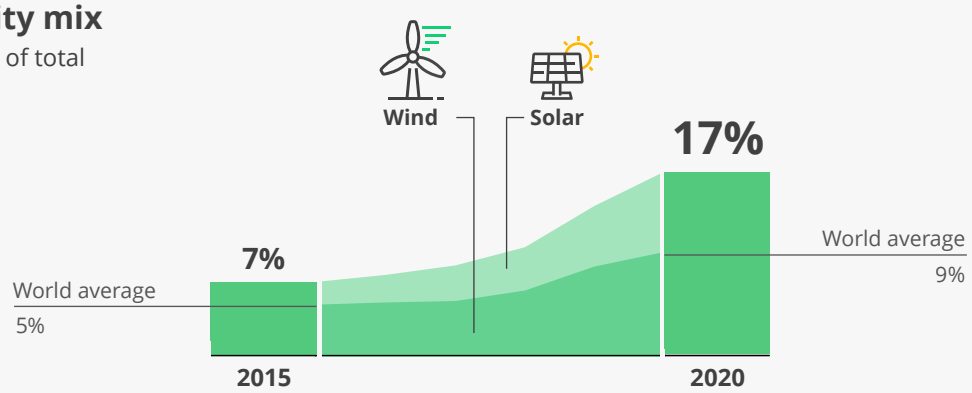


Australia's electricity transition in the spotlight: 2015-2020

Wind and solar have grown to become a key part of Australia's electricity mix

Wind & solar in electricity mix

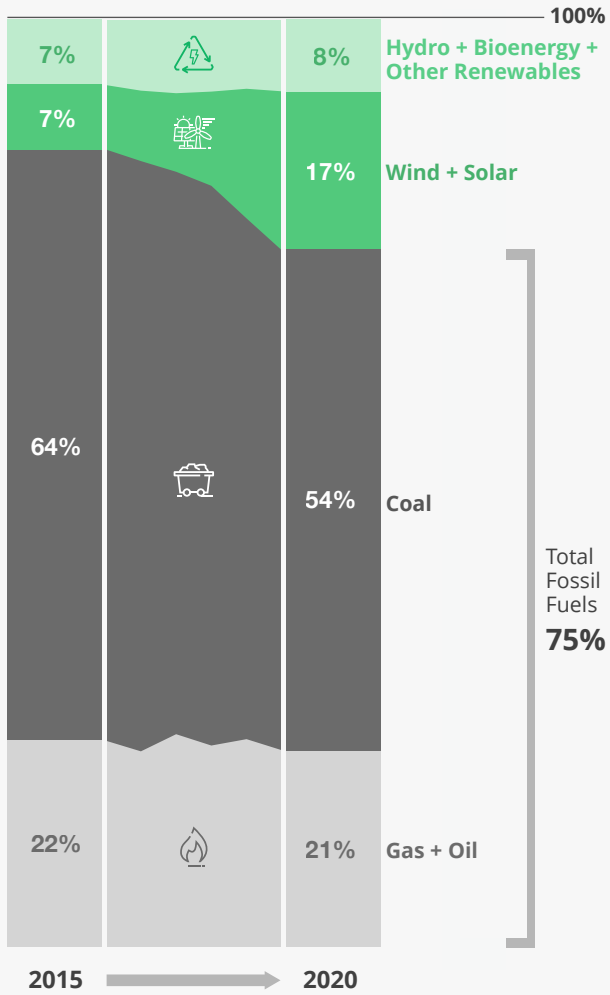
Percentage of total generation



Wind and solar take market share from coal

Electricity mix

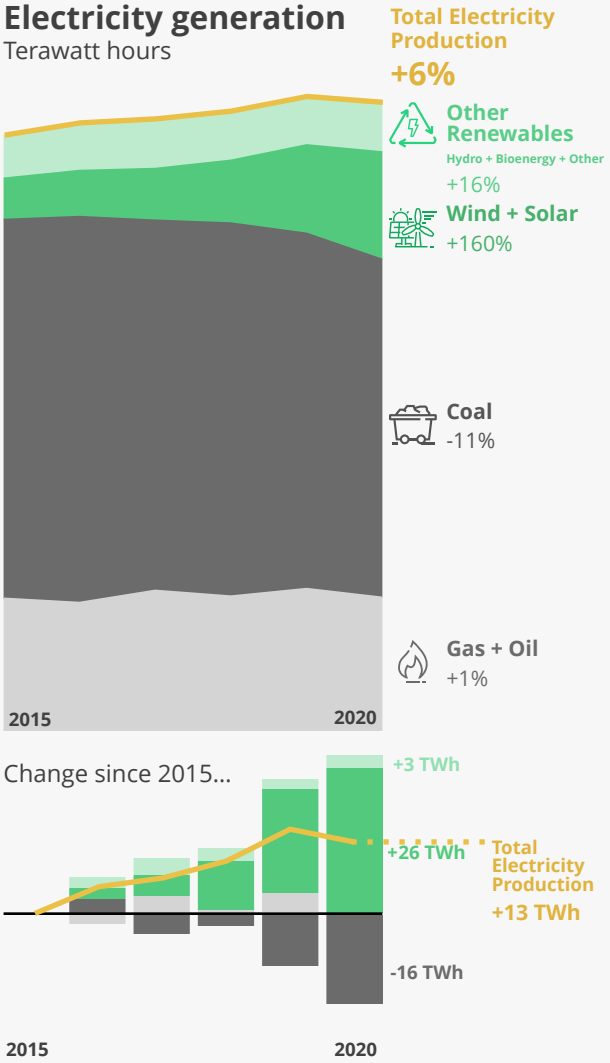
Percentage of total generation



Coal has fallen only 11% in absolute terms

Electricity generation

Terawatt hours

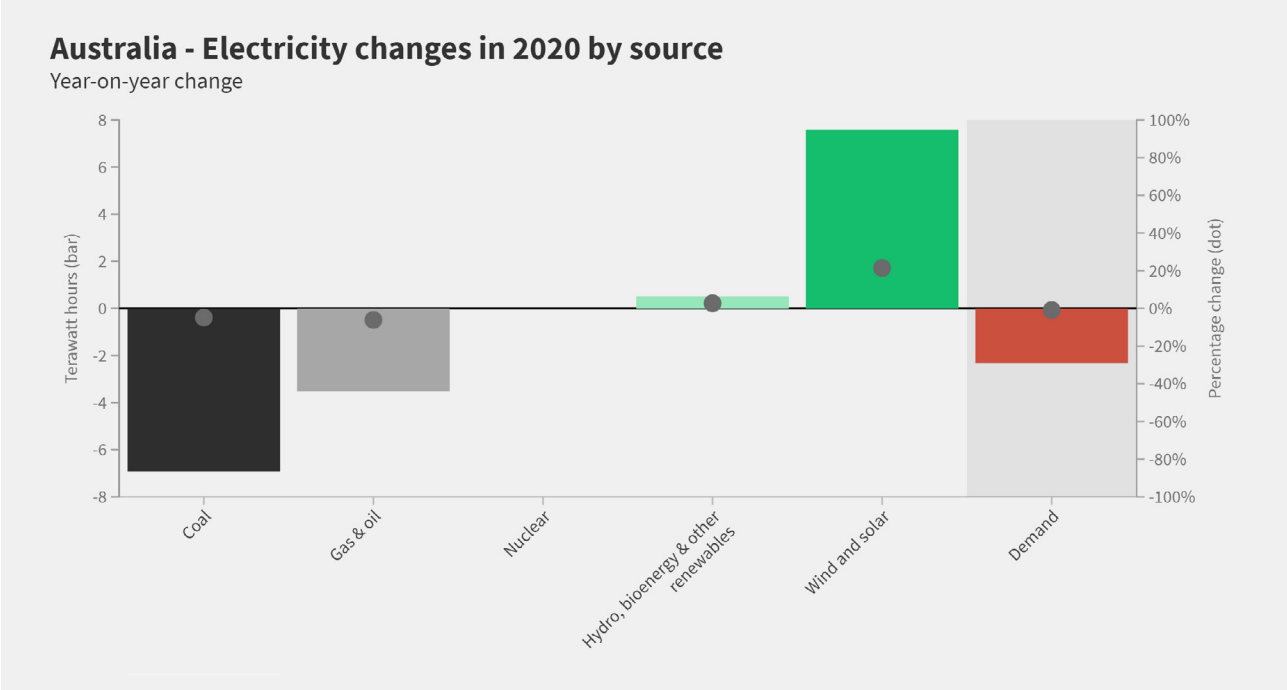


Australia has seen a wind and solar boom in recent years. Australia's renewable generation has grown by 30 TWh (+91%); from 33 TWh in 2015 to 63 TWh in 2020. Over 90% of this growth was from wind and solar. This growth has brought the share of renewable generation to 25% in 2020, up from 14% in 2015. The same time period also witnessed a 10% reduction in the share of coal generation, suggesting that Australia has been transitioning away from coal for electricity in this period.

Even with the recent wind and solar boom, Australia has continued to rely on coal for electricity generation. The rapid expansion of wind and solar generation has led to reduced coal generation (-11%) over the period 2015-2020, from 151 TWh in 2015, to 135 TWh in 2020. Despite this, coal has continued to be the single largest source of electricity in Australia, responsible for over half of the electricity generated in 2020. Coal generation needs to be completely phased out in Australia by around 2030, in order to put the world on track for 1.5 degrees, according to Climate Analytics. This is much ahead of the announced coal retirement schedule, which will still leave over 15 GW of coal capacity in the generation-mix by 2030, representing more than 70% of the current capacity.

Besides coal, other fossil fuels, primarily gas, also play an important role in Australia's generation-mix. The share of gas and oil generation has remained at around 20% in Australia's generation-mix over the period 2015-2020, with gas alone accounting for 90% of this. Whilst much of the existing attention has been given to phasing out coal, gas (and oil) generation also needs to decline rapidly to put the world on track for 1.5 degrees.

What happened in 2020?

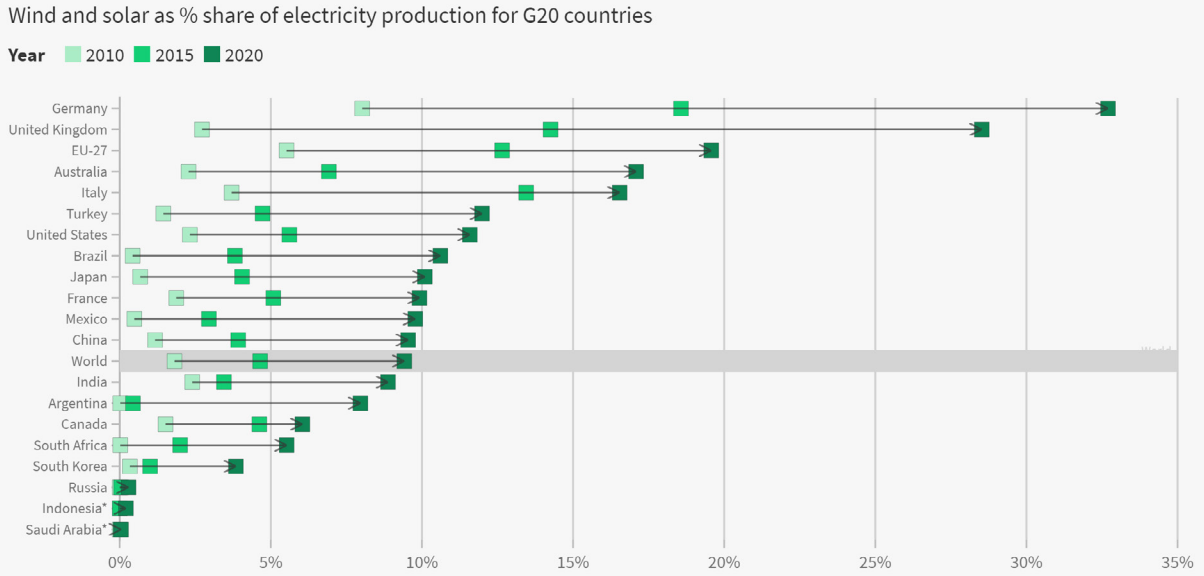


Last year saw electricity demand reducing slightly by 1% (2 TWh) in Australia. Last year also saw a 22% (8 TWh) surge in wind and solar generation. These developments coincided with a 5% (7 TWh) reduction in coal generation - the largest annual fall since 2015. According to the Australian Energy Market Operator, this is mainly due to the worsening economics of coal generation, caused by lower electricity demand and more competition from low-cost renewable capacity. The increasing unavailability of some aging coal power plants may have also contributed to the large fall in coal generation observed last year.

Gas generation also fell by 6% (4 TWh) last year. This reverses the trend observed in Australia since 2015; gas generation increased at an average of 2% per year from 48 TWh in 2015 to 52 TWh in 2019. The main factors responsible for this include lower electricity demand, more competition from low-cost renewable capacity, and less demand for fast-responsive gas capacity to cover unplanned outages of some aging coal power plants in New South Wales and Victoria, according to the Australian Energy Market Operator.

Australia's transition in comparison with G20 countries

Australia's wind and solar generation is almost twice the world average



*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists
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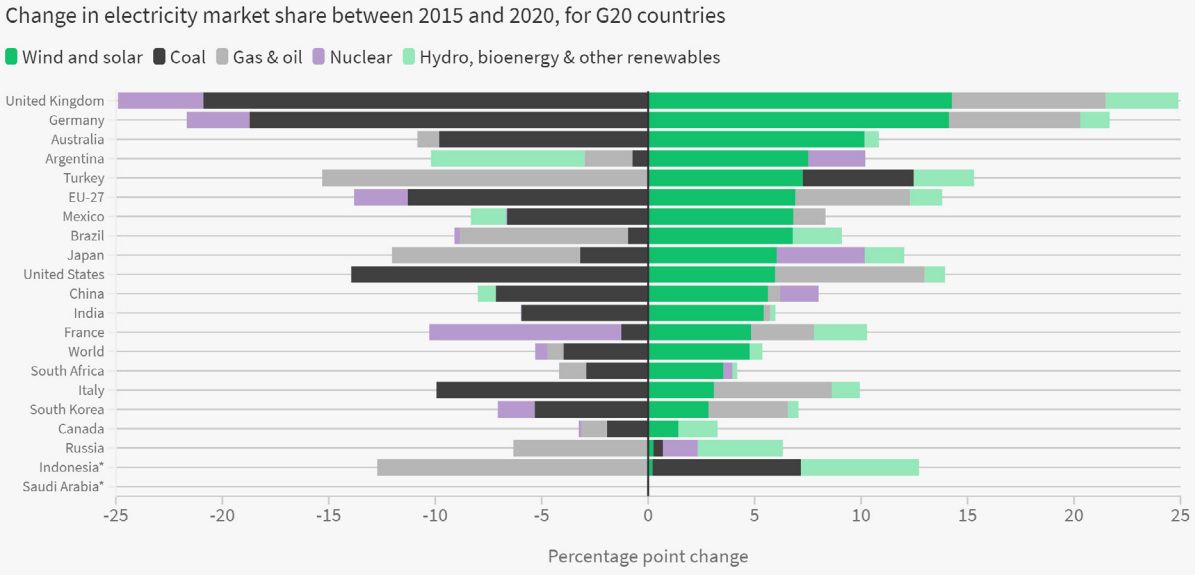
Wind and solar accounted for 17% of total electricity generated in Australia in 2020, up from 2% in 2010. This is almost twice the world average (9.4%). Nonetheless, there seems to be a growing concern about the loss of momentum for wind and solar uptake in Australia, as the national Renewable Energy Target (RET) has already been achieved in 2019, leaving little incentive for further capacity expansion. Although state and territory governments have stepped up and announced their own targets for renewable uptake, there still remains significant uncertainty about whether these targets can incentivise wind and solar uptake to the extent considered essential for putting the world on track for 1.5 degrees.

Wind and solar gain more market share in Australia than most other G20 countries



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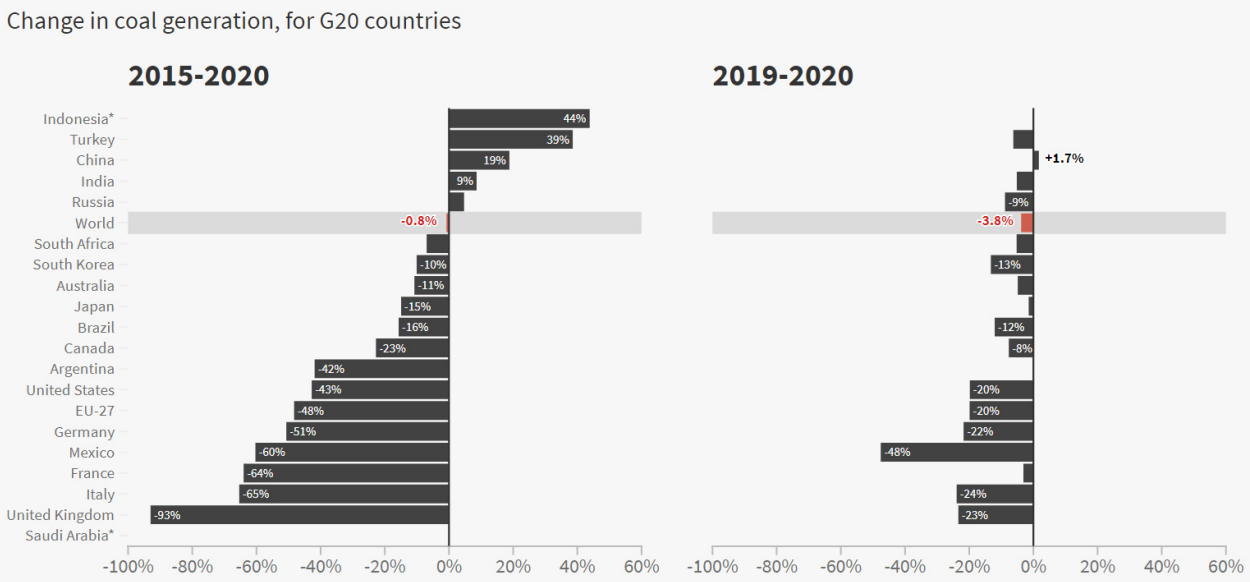
Since 2015, wind and solar have gained a 10% market share from coal in Australia. This is the third highest among G20 countries, only after Germany and the United Kingdom, where wind and solar have gained 14% market share from coal.

Australia continues to rely on coal for electricity despite the recent wind and solar boom



*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
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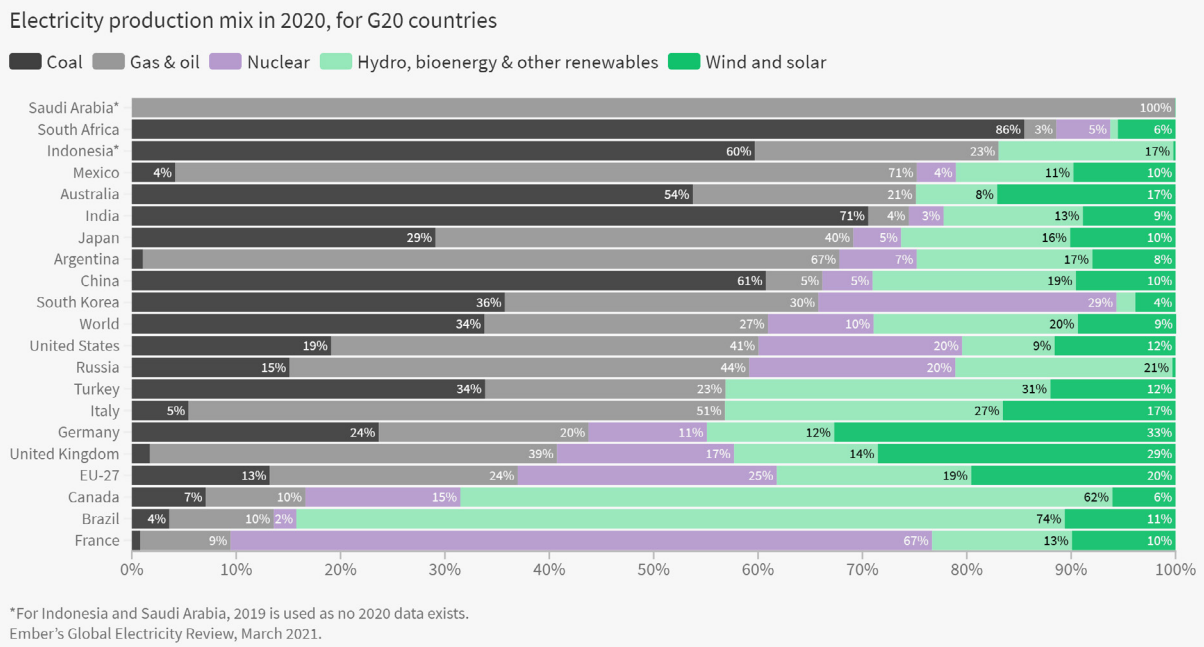
Australia's coal generation fell by 11% over the period 2015-2020; this compares to 51% for Germany, and 93% for the United Kingdom. Furthermore, over 40% of the coal fall occurred in 2019, mainly due to a less-than-expected demand for electricity, rather than concerted policy efforts. There is currently no plan or targets for coal phase-out in Australia, and coal is expected to remain the single largest source of electricity by 2030, responsible for over 30% of the electricity generation, as estimated by the Australian Department of Industry, Science, Energy and Resources.

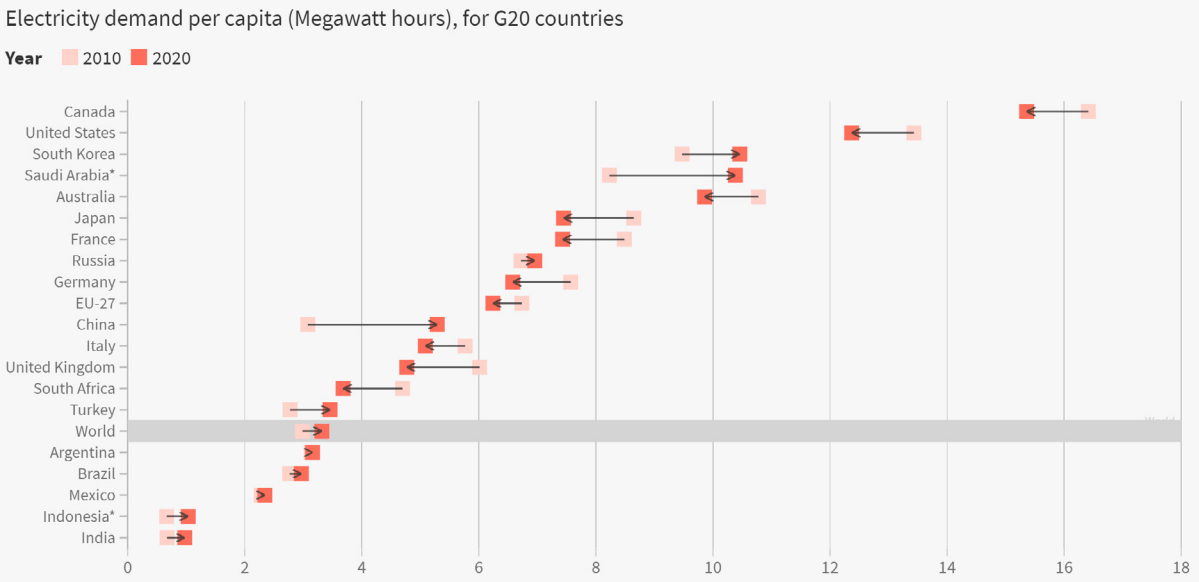
Australia's electricity supply remains one of the most fossil-intensive among G20 countries



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

Electricity generation in Australia has continued to rely on fossil fuels, primarily coal. In 2020, over three-quarters of the electricity generation was from fossil fuels: 54% from coal and 21% from gas and oil. Other G20 countries with a similarly large share of fossil fuel generation are: South Africa (89%), Indonesia (83%), Mexico (76%), and India (75%).

Australia's electricity demand per capita is two times higher than the world average despite recent downward trends



Although Australia's electricity demand per capita (9.9 MWh, in 2020) has declined since 2010, it is still three times the world average (3.3 MWh, in 2020) and well ahead of many other G20 countries, such as China (5.3 MWh), Germany (6.6 MWh), and the United Kingdom (4.8 MWh).

Concluding remarks

Despite its downward trend, coal has remained dominant in Australia's generation-mix, responsible for over half of the electricity generation in 2020. Besides coal, gas also plays an important role in the generation-mix, contributing around 20% to total generation. Together, fossil fuels accounted for 75% of total electricity generated in Australia in 2020.

To put the world on track for 1.5 degrees, Australia needs to phase out coal generation by around 2030, and also to peak gas generation in the 2020s and then phase it out before 2050, according to Climate Analytics. For this to happen, an earlier-than-announced retirement of existing coal capacity is required, as the announced retirement schedule will still leave over 15 GW of coal capacity in the generation-mix by 2030, representing more than 70% of the current capacity.

Achieving the 1.5 degree target also requires, as suggested by the Grattan Institute, a plan for transitioning away from fossil gas for electricity, while the federal government is currently considering the role of fossil gas in Australia's future electricity landscape.

The expansion of wind and solar generation also needs to accelerate in the coming years, to fill the vacuum left by the phase-out of coal and other fossil fuels. A large and growing body of research, undertaken by academics, think tanks, and industry associations, has demonstrated that a renewable electricity future is technically feasible and economically viable for Australia. Nonetheless, the uptake of renewables is still impeded by various techno-economic issues (e.g., grid integration and system security).

Redressing these issues requires sound and effective policies. The question is whether the Australian government can resolve the current climate policy inertia at the federal level and commit itself to leading the global transition towards a low-carbon electricity future, by tapping into the country's huge endowment of renewable resources.

More information about the Global Electricity Review 2021

Global Electricity Review 2021	www.ember-climate.org/global-electricity-review-2021		
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