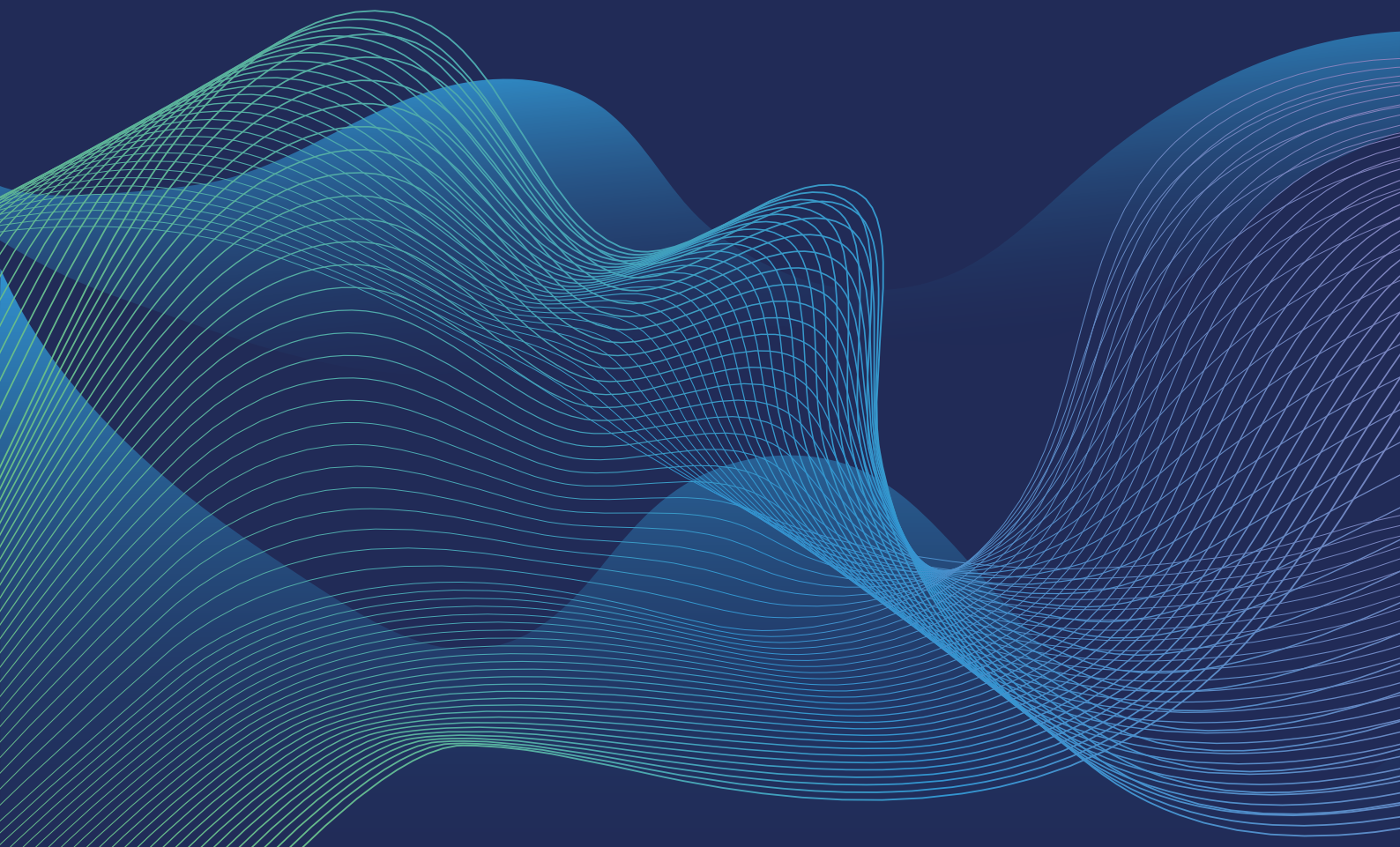
Global Electricity Review 2021
G20 Profile

EMBER
COAL TO CLEAN ENERGY POLICY

SOUTH KOREA

More of South Korea's electricity was generated from fossil fuels in 2020 than in 2015

March 2021



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Published date

March 2021

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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Document design & layout by Designers For Climate

EMBER COAL TO CLEAN ENERGY POLICY

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More of South Korea's electricity was generated from fossil fuels in 2020 than in 2015

South Korea's electricity transition is lagging behind the rest of the world

"Despite its 2050 carbon neutrality announcement, S. Korea is falling woefully behind the G20 on energy transition away from fossil fuels. The Korean government should announce a coal phase-out year and cancel new coal and combined gas power plant projects. To duly do its part under the Paris Agreement, Korea must phase out coal power by 2029 and unabated combined gas power by 2050. Bold and diligent transition to renewable energy is imperative."

"한국은 최근 2050 탄소중립 선언을 했지만, 에너지전환 속도는 주요 20개국(G20)에 비해 매우 느리다. 파리협정 온도 상승 목표를 준수하기 위해 한국은 석탄화력발전소를 2029년까지, 탄소저감장치를 갖추지 못한 가스복합발전소를 2050년까지 퇴출해야 한다. 정부는 하루빨리 석탄화력발전소 퇴출 연도를 발표하고 석탄화력발전소와 가스복합발전소의 신규 건설을 중단해야 한다. 재생에너지로의 빠르고 대담한 전환이 절실한 때다."

Gahee Han

Policy Analyst, Solutions for Our Climate

"South Korea needs to rapidly change its electricity mix to meet its 2050 net-zero target. The country's clean electricity transition remains in preliminary stages as wind and solar made up only 3.8% of the country's electricity in 2020, one of the lowest in the G20. Unless it ramps up its wind and solar generations significantly, South Korea will continue to face a gas risk that will make it challenging to decarbonize its power sector quick enough to meet the net-zero target."

Aditya Lolla

Senior Electricity Policy Analyst, Ember

Key findings

1

More of South Korea's electricity was generated from fossil fuels in 2020 than in 2015

Fossil generation rose slightly by 1% from 350 TWh in 2015 to 353 TWh in 2020, supplying 66% of South Korea's electricity in 2020. A rise in solar generation in the last five years was only enough to meet the small increase in electricity demand. Share of coal generation fell from 41% to 36% which resulted in gas generation rising from 22% to 27%. Overall, generation from all the other non-fossil sources combined was unchanged.

2

Slow wind and solar growth means South Korea's clean electricity transition fell behind most G20 countries

Wind and solar generated 3.8% of the country's electricity in 2020, up from 1% in 2015, driven by an increase in solar generation. This is well below the global average, which was a tenth of electricity (9.4%) in 2020. Share of wind and solar power in other Asian G20 countries was closer to the global average: Japan (10%), China (9.5%) and India (8.9%).

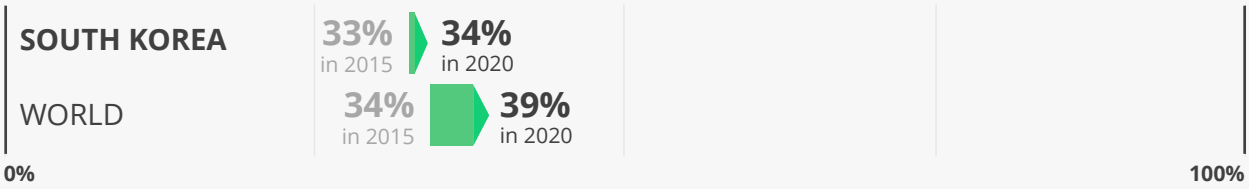
3

Coal power fell by 13% year-on-year in 2020 due to a fall in electricity demand and winter restrictions on coal plants to curb air pollution

This 2020 fall in coal generation was covered by nuclear generation increasing by 10%, and oil and gas generation rising by 4%. Between 2015 and 2020, however, coal generation fell by only 10%, putting South Korea far behind other G20 countries such as the UK (-93%), the EU-27 (-48%) and even Japan (-15%), who reduced their coal generation much faster.

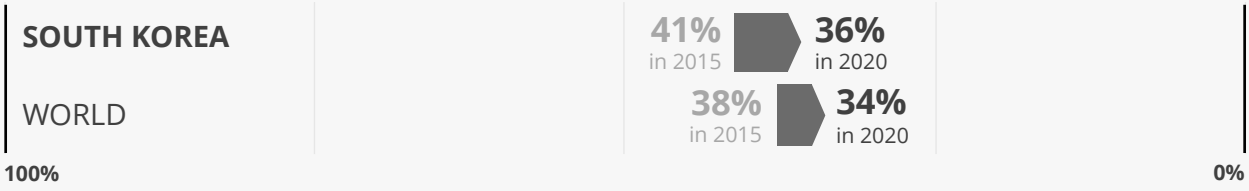
Progress to 100% clean electricity

Percentage of all renewables & nuclear in total generation



Progress on phasing out coal

Percentage of coal in total generation

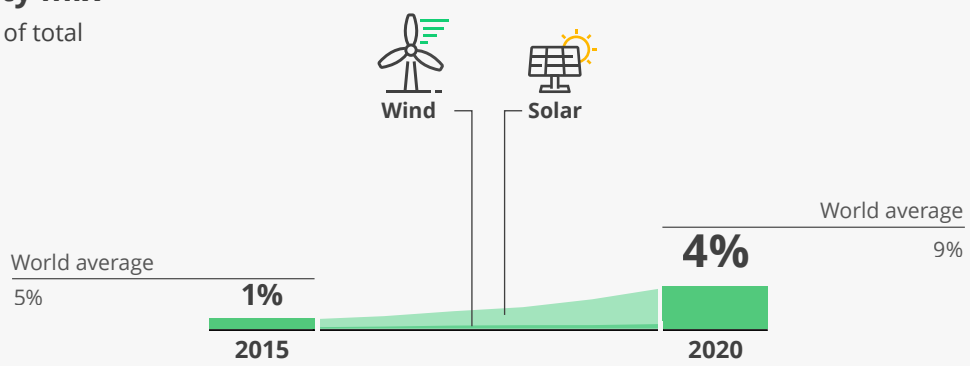


South Korea's electricity transition in the spotlight: 2015-2020

Wind and solar step up, but behind on global average

Wind & solar in electricity mix

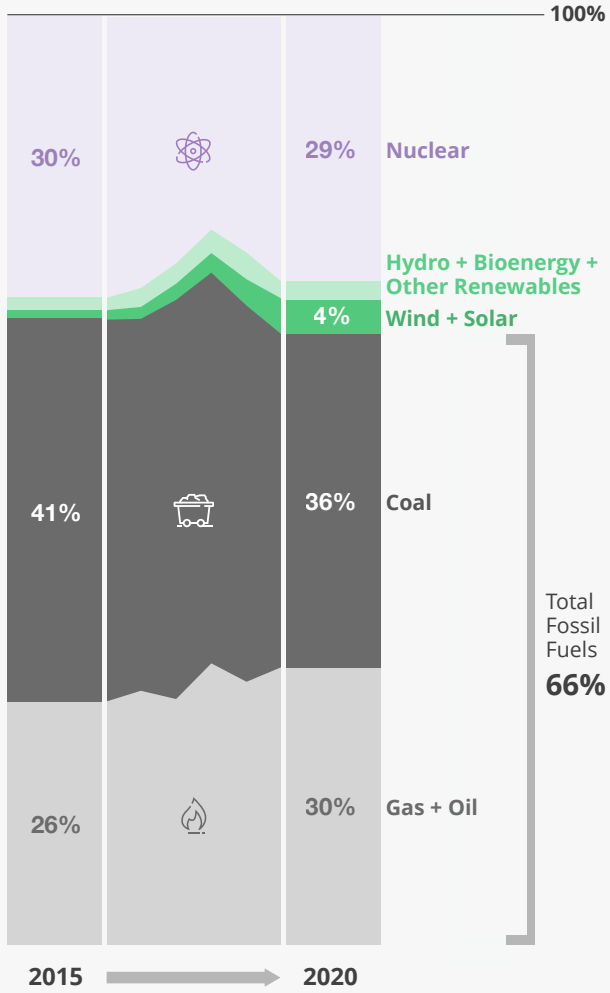
Percentage of total generation



Coal market share falls, in part from wind and solar, but also a rise in gas

Electricity mix

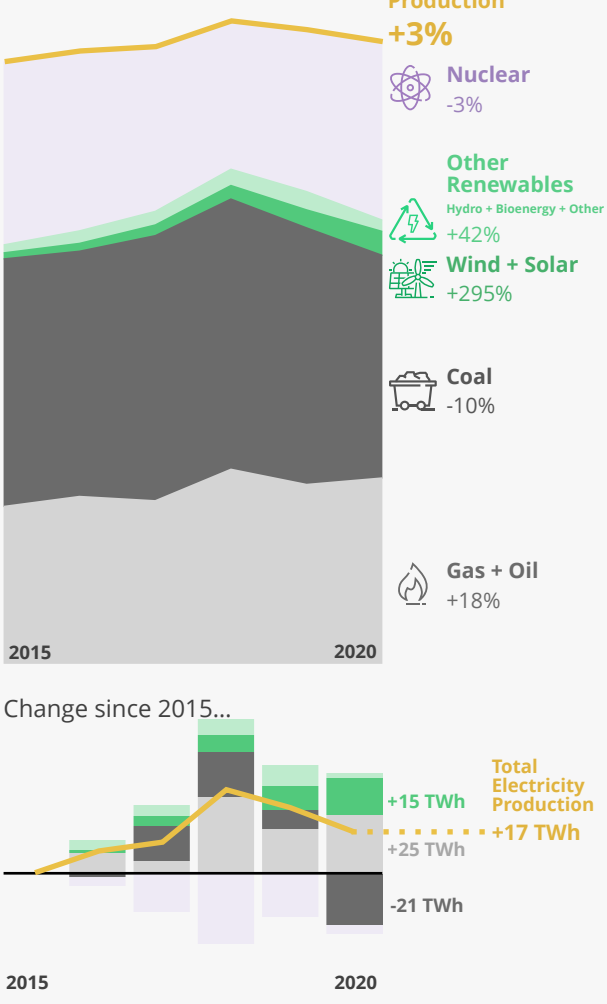
Percentage of total generation



Fossil generation higher than five years ago

Electricity generation

Terawatt hours

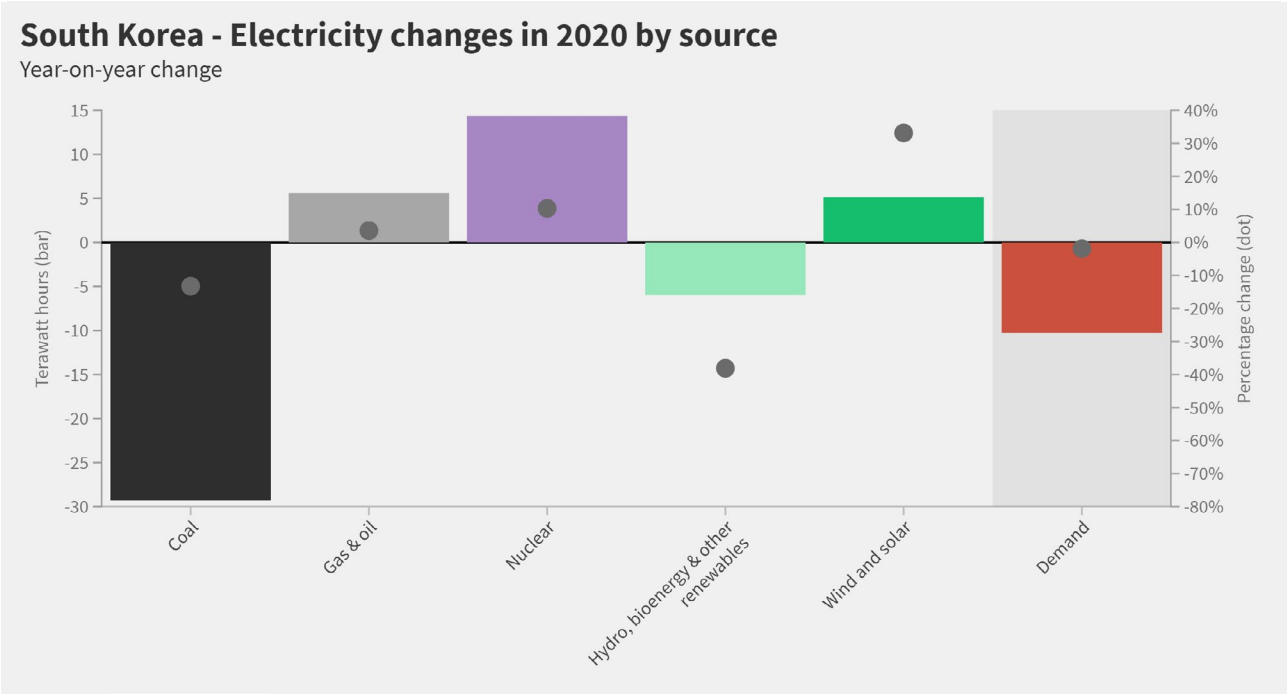


More electricity was generated from fossil fuels in 2020 than in 2015. The increased solar generation in 2020, compared to 2015 (+14 TWh) was only enough to meet the rise in electricity demand, which increased by 3% from 519 TWh in 2015 to 536 TWh in 2020. Generation from all the other non-fossil sources combined was unchanged. That meant fossil generation increased slightly by 1% from 350 TWh in 2015 to 353 TWh in 2020. With this, fossil fuels supplied 66% of South Korea's electricity in 2020. While South Korea committed to move its power sector away from coal, its transition to clean electricity remains in preliminary stages.

South Korea has the second lowest share of renewable generation of all the G20 countries. Only 6% (30 TWh) of South Korea's electricity came from renewables in 2020, up from 2% (12 TWh) in 2015. Only Saudi Arabia fared worse among the G20, with 100% of electricity powered by gas and oil generation in 2020. South Korea started adding new solar capacity in recent years, because of which the share of solar generation increased from 1% (4 TWh) in 2015 to 3% (18 TWh) 2020. This meant that more than three-fourths of the country's renewable power growth between 2015 and 2020 came from solar. The wind sector remains underdeveloped, generating just 1% (3 TWh) of the country's electricity in 2020. This may likely change in the next decade with the country already starting to invest in offshore wind and committing to build 12 GW off-shore wind capacity by 2030.

Gas has risen more than coal has fallen in the last five years. Coal generated 36% (192 TWh) of the country's electricity in 2020, declining from 41% (213 TWh) in 2015. This decline in coal's share of generation only started from 2019, possibly due to the government placing restrictions on use of coal plants in winter months in an effort to curb air pollution. However, muted growth in wind and solar meant South Korea's gas generation increased from 22% (113 TWh) in 2015 to 27% (142 TWh) in 2020 to replace coal power. Moreover, the dynamics around the country's nuclear generation seem to be evolving paradoxically in the last few years with the country pursuing a nuclear phaseout but also seeing a year-on-year rise in nuclear generation since 2019. This meant nuclear generated 29% (153 TWh) of South Korea's electricity in 2020, marginally down from 30% (157 TWh) in 2015. As a result, total generation from non-renewable sources, in absolute terms, changed very little between 2015 and 2020 in South Korea.

What happened in 2020?

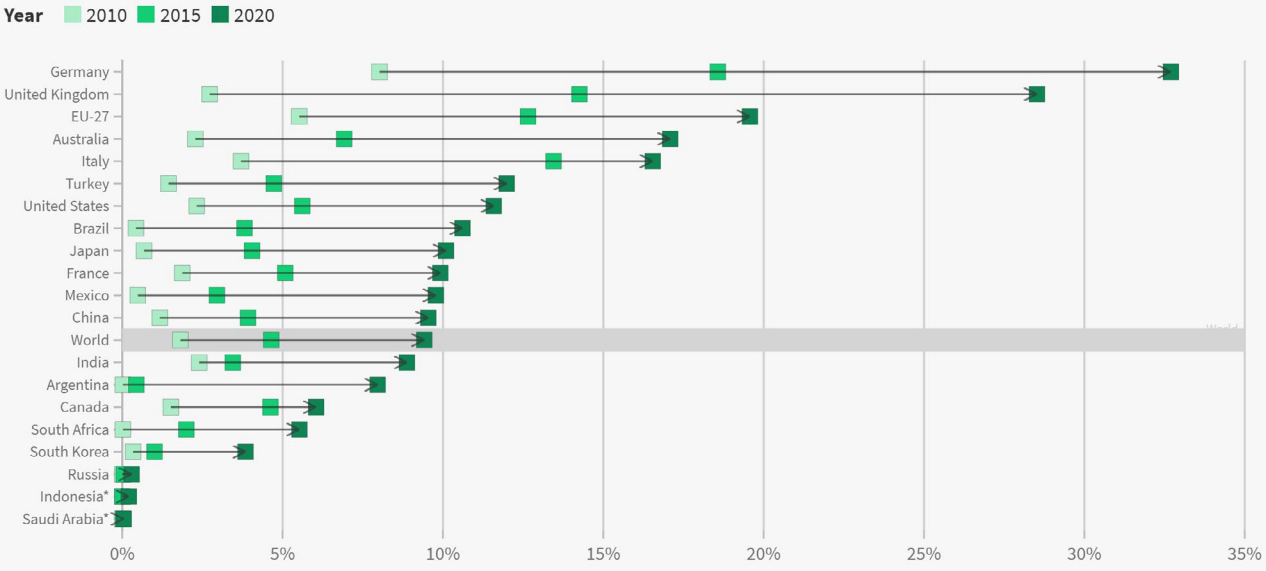


Coal generation fell in 2020 as South Korea's electricity demand declined and nuclear generation increased. The country's coal generation fell by 13% (-29TWh) in the last year, its biggest ever year-on-year fall since at least 2000. This is mainly due to a weaker power demand caused by Covid-19 measures and the government's winter month restrictions on use of coal plants to curb air pollution. Electricity demand fell by 2% (-10 TWh) year-on-year, marking a decline for a second consecutive year. South Korea relied on nuclear power to replace about half the fall in coal power in 2020, which saw an increase of 10% (+14 TWh). Meanwhile, the country's combined gas and oil generation rose by 4% (+6 TWh), making up for about one-fifth of the 2020 coal generation fall. However, combined wind and solar generation grew only by 5 TWh last year as new capacity came online. This helped reduce South Korea's bioenergy generation by 8 TWh, but led to the country's total renewable generation falling marginally (-1 TWh) in 2020.

South Korea's transition in comparison with G20 countries

South Korea has one of the lowest combined wind and solar power share in the G20

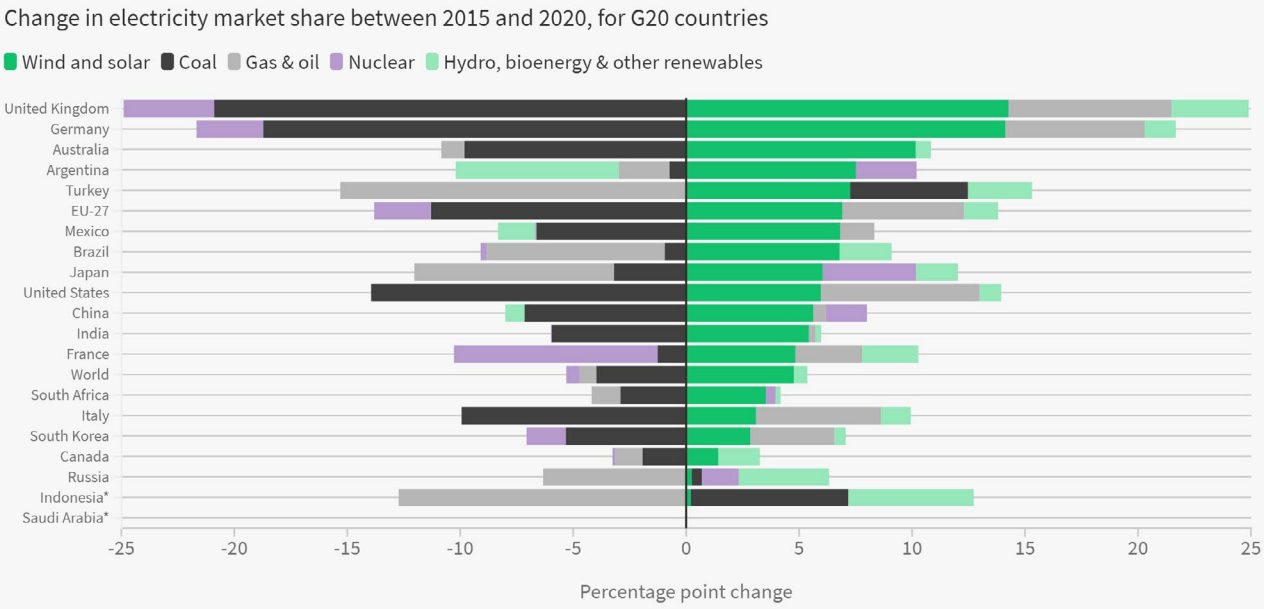
Wind and solar as % share of electricity production for G20 countries



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

South Korea generated 3.8% of its electricity from wind and solar in 2020 (21 TWh), the fourth lowest among the G20 countries. While this increased from 1% (5 TWh) in 2015, growth has been slow compared to most other G20 countries who are quickly transitioning their power systems to wind and solar. Brazil, for example, increased its combined wind and solar from 3.8% (22 TWh) to 10.6% (64 TWh) in the same time period. Slow growth in South Korea's wind and solar generation means that their share in the country's mix is now less than half the world average (9.4%), even lagging behind other Asian G20 countries like Japan (10%), China (9.5%) and India (8.9%).

Is South Korea going coal-to-clean, or coal-to-gas?



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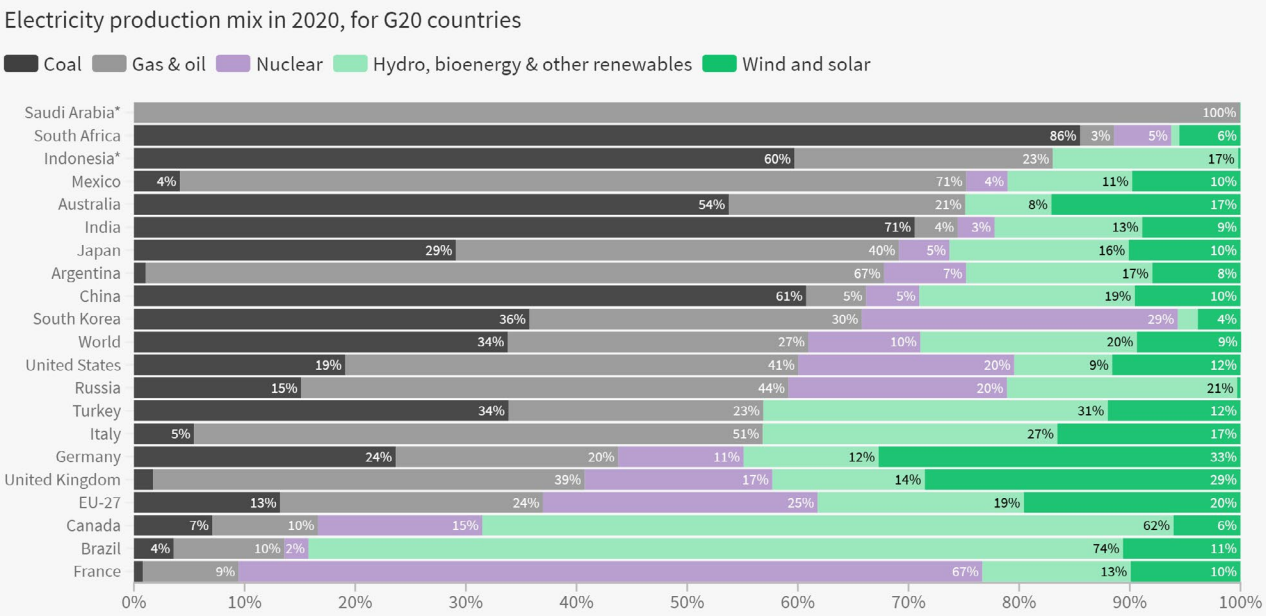
Ember's Global Electricity Review, March 2021.

Relatively small growth in wind and solar power between 2015 and 2020 stifled the potential reduction of fossil fuel's electricity market share in South Korea. Wind and solar captured only 3% of the market share during this period; fifteen other G20 countries did better on this metric. While coal did lose 5% of its market share between 2015 and 2020, it is notably less compared to other G20 countries like the UK, Germany and the US where coal's electricity market share reduced by more than 10%. Moreover, coal's fall in market share in South Korea was offset by oil and gas (driven mainly by gas) taking 4% of the market share.

South Korea has one of most coal-intensive electricity sectors among the G20 countries



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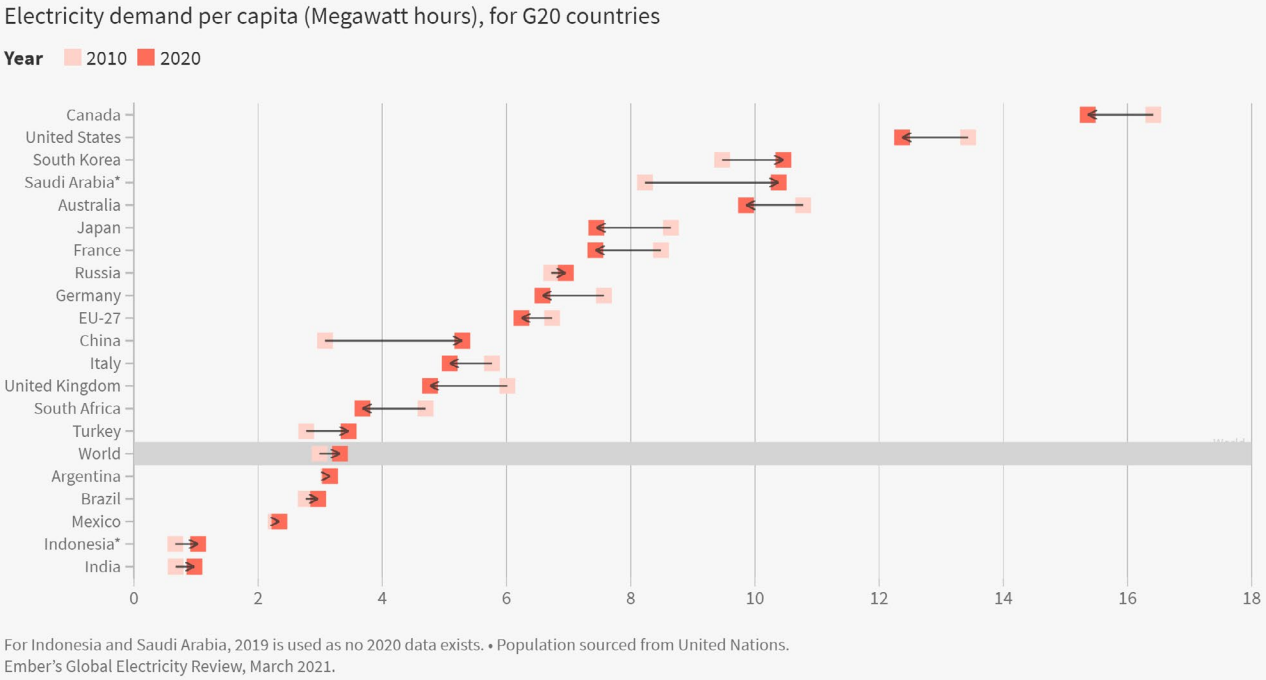
South Korea had the sixth-most coal-intensive electricity sectors among the G20 countries in 2020, generating 36% of the country's electricity from coal. This is higher than the global average of 34% and puts South Korea behind most G20 countries, including Japan (29%) and the US (19%). As South Korea's gas generation increased since 2015, its total fossil fuel share of generation (66%) is also higher than the global average (61%) and much higher than in G20 countries like France (10%), Brazil (14%) and Canada (17%), who relied on fossil fuels to generate less than 20% of their electricity.

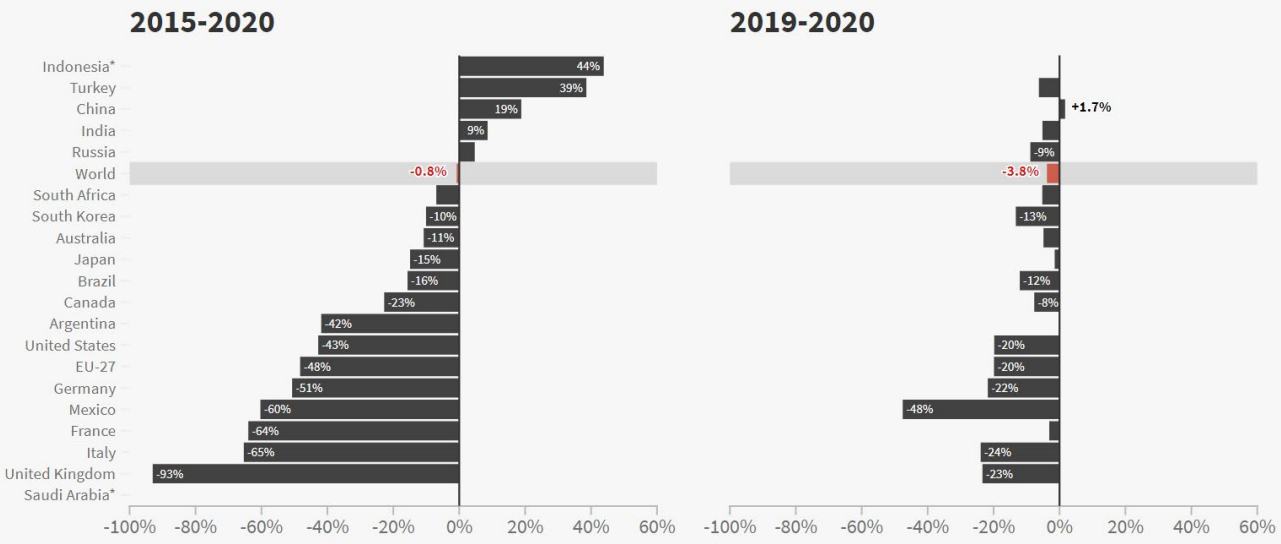
South Korea’s per-capita electricity demand has risen even above Australia’s



Korea’s per-capita electricity demand increased by 11%, from 9.5 MWh in 2010 to 10.5 MWh in 2020. With this, it overtook Australia (9.9 MWh in 2020) to become the country with the highest electricity demand, on a per-capita basis, of any G20 country in the Asia-Pacific region. This is more than three times the global average of 3.3 MWh seen in 2020 and is only behind Canada (15.4 MWh) and the USA (12.4 MWh) in the G20.

South Korea's coal generation is reducing much slower than many G20 countries

Change in coal generation, for G20 countries



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Although South Korea's coal generation in 2020 was 10% less than in 2015, many other G20 countries phased out coal much faster, including the UK (-93%), the EU-27 (-48%) and the US (-43%). The country's inability to quickly reduce its reliance on coal meant that South Korea even lagged behind Japan which reduced its coal generation by 15% between 2015 and 2020.

Concluding remarks

South Korea's pledge to achieve net-zero by 2050 is a welcome development. However, there is a long way to go for the country to achieve a transition to clean power. It had one of the lowest growths in wind and solar between 2015 and 2020 among the G20 countries, which its total fossil generation did not reduce in the last five years. Coal remains a significant challenge for South Korea as it still produces 36% of its electricity. Despite announcing plans to phase out coal, the government hasn't yet set a date to end coal power. Further, data from Global Energy Monitor shows that 34.5 GW of grid-connected coal plants are currently operational with a further 7.3 GW under construction. With reports suggesting that South Korea must phase out all its coal power plants by 2029 to meet its Paris Agreement obligations, the country would do well to adapt its national power plan to be consistent with its own net-zero ambitions. The target to achieve carbon neutrality by 2050 also faces a massive gas risk if South Korea continues to use gas as a transition fuel. Instead, by placing a moratorium on new coal plants and replacing coal generation with new wind and solar power, South Korea can position itself well to achieve its net-zero target.

More information about the Global Electricity Review 2021

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