



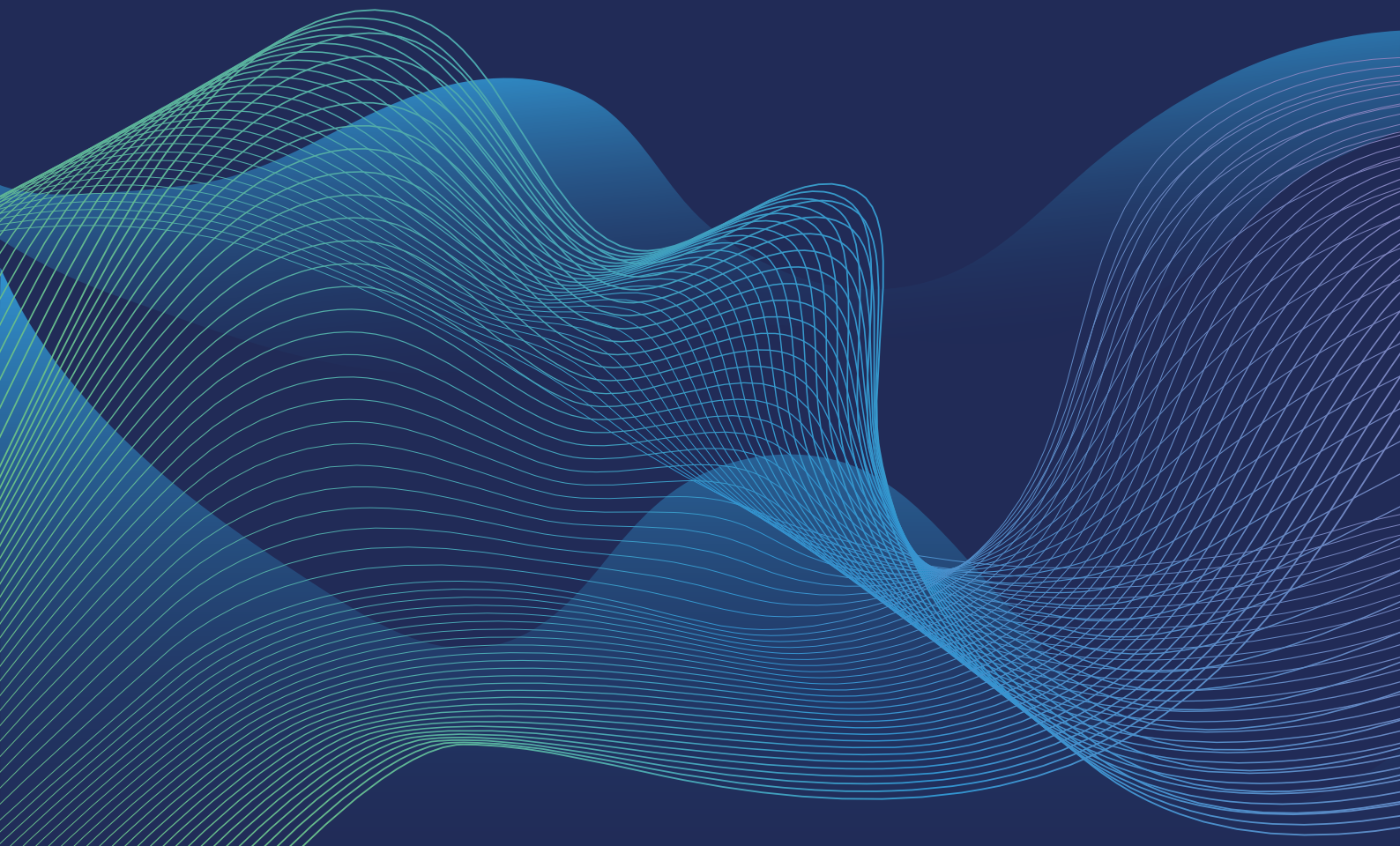
**Global Electricity
Review 2021**
G20 Profile

EMBER
COAL TO CLEAN ENERGY POLICY

INDIA

India's wind and solar generation
tripled since 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

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INDIA

India's wind and solar generation tripled since 2015

But will it keep pace with rising electricity demand to prevent a coal resurgence?

"India achieved an impressive wind and solar power growth rate in the last five years. The challenge now is to ensure the country doesn't slip on its ambitious renewable capacity targets. India needs to ramp up its wind and solar generation considerably to meet the projected growth in electricity demand whilst also reducing its reliance on coal for electricity production. Resolving barriers to wind and solar growth along with developing a coal phase out strategy is now crucial not just for India's but also the global electricity transition."

Aditya Lolla

Senior Electricity Policy Analyst - Asia, Ember

"The clean electricity transition is particularly challenging for developing economies, like India, where developmental goals need to be aligned with sustainability. India's electricity demand is naturally expected to rise as it progresses in realizing its developmental aspirations; however, the clean electricity transition needs to continue apace for a sustainable development"

Dr. Garima Vats

Associate Fellow, The Energy and Resources Institute (TERI)

Key findings

1

India's wind and solar generation tripled in five years

It rose from 39 TWh in 2015 to 119 TWh in 2020, two-thirds of which came from solar. But their annual growth rate slowed every year from +40% in 2016 to just +9% in 2020. Nonetheless, an impressive 8.9% of India's electricity in 2020 came from wind and solar. This is just below the global average of 9.4% and similar to the levels seen in China (9.5%), Japan (10.1%), Brazil (10.6%), the US (11.6%), and Turkey (12.0%). Europe is leading the way, with Germany at 32.7% and the UK at 28.5%.

2

The pandemic reduced electricity demand in 2020, and alongside a rise in solar this led to a fall in coal generation

Electricity demand fell 2% in 2020, and solar rose 27%, which helped push coal generation down by 5%. This marks the second year of coal falling, following low electricity demand growth in 2019. Coal fell a record 4% globally in 2020, as the same factors — lower electricity demand and higher wind and solar generation — impacted other countries throughout the world.

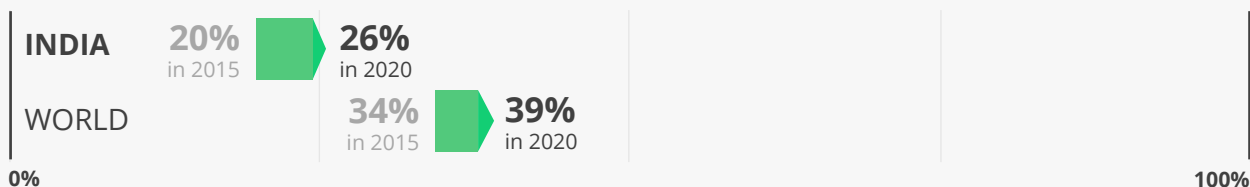
3

Clean electricity growth is not yet enough to offset the overall rise in electricity demand

Over the last 5 years, India's electricity demand rose by 18%. Electricity production also increased by 18%. Solar and wind met 26% and 14% of this rise respectively. In total clean electricity supplied 57% of the increased production, which resulted in 43% being met from rising fossil (mostly coal) generation.

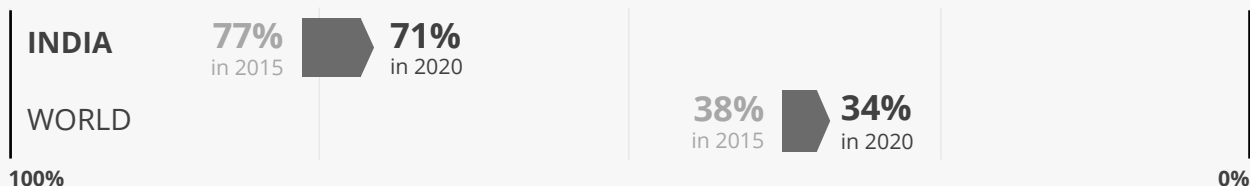
Progress to 100% clean electricity

Percentage of all renewables & nuclear in total generation



Progress on phasing out coal

Percentage of coal in total generation

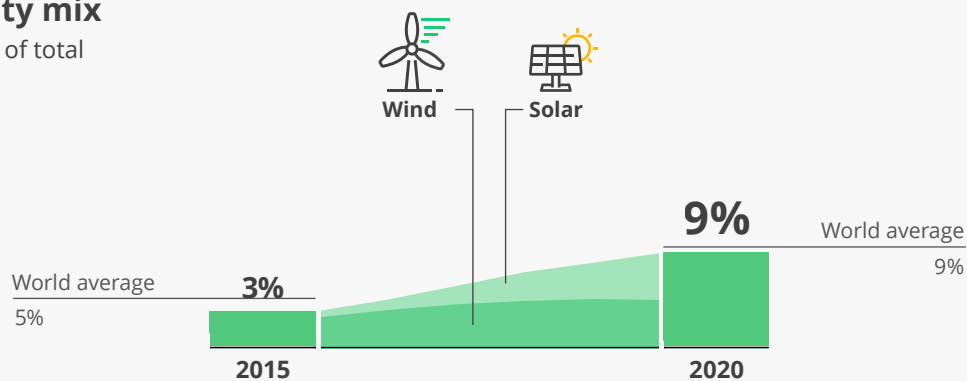


India's electricity transition in the spotlight: 2015-2020

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

Wind & solar in electricity mix

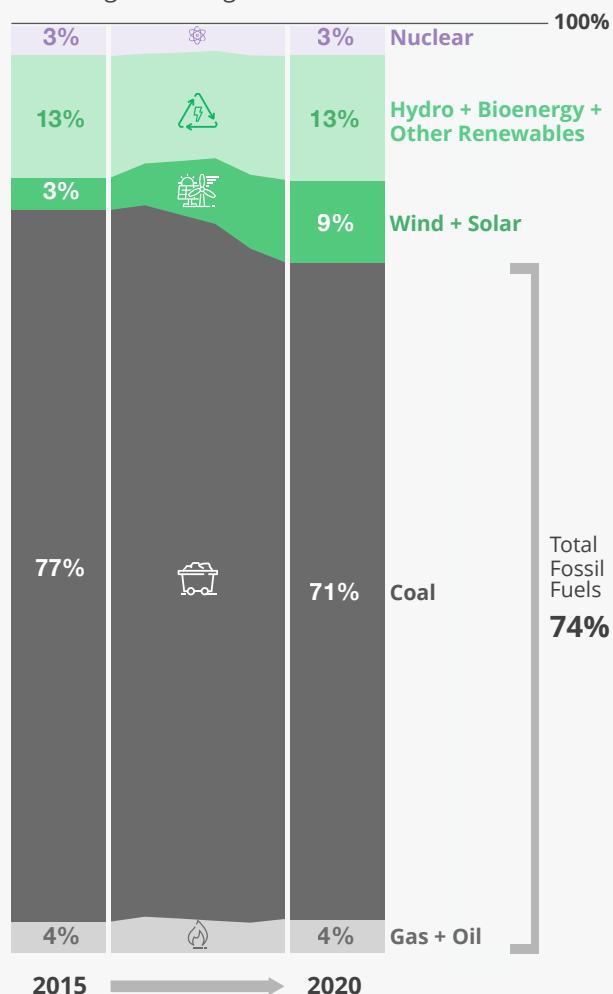
Percentage of total generation



Wind and solar took market share from coal

Electricity mix

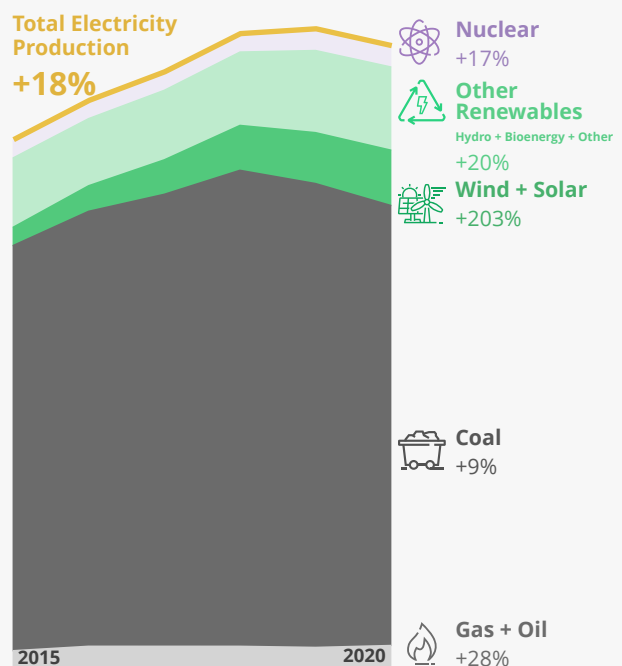
Percentage of total generation



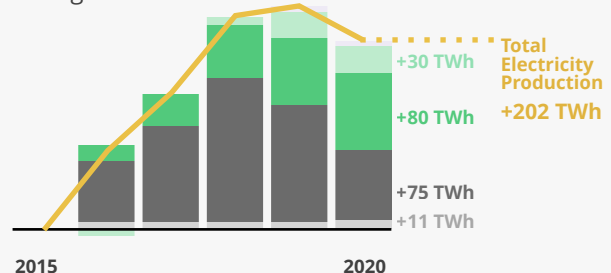
Rising electricity demand means absolute coal generation is still rising

Electricity generation

Terawatt hours



Change since 2015...



Strong electricity demand growth meant India increased both its renewable and fossil generation. India's electricity demand increased by 18% (+205 TWh) over the last five years. Electricity production also increased by 18% (+202 TWh) and 43% of this rise came as fossil generation grew from 913 TWh in 2015 to 999 TWh in 2020. During the same period, the share of renewable generation in the electricity mix rose from 16% (189 TWh) to 22% (298 TWh) and captured 6% of the electricity market share from coal.

Wind and solar drove the growth in renewable generation between 2015 and 2020. Solar and wind met 26% (52 TWh) and 14% (28 TWh) of the electricity production rise in the last five years respectively. India's combined wind and solar generation tripled from 39 TWh to 119 TWh as 29.5 GW of new solar and 13.5GW of new wind capacities came online. However, the annual growth rate slowed every year from 40% in 2016 to just 9% in 2020 due to various on-ground barriers related to land acquisition, grid integration, lack of investments into battery storage, poor financial health of distribution companies (DISCOMs), and lack of consistent state-level policies. Nevertheless, India's combined wind and solar share of power (8.9%) is now closer to the global average (9.4%) in 2020. Although hydro power's share in the power mix remained unchanged at 12%, it increased by 32 TWh in absolute terms as the government introduced new measures to promote hydropower.

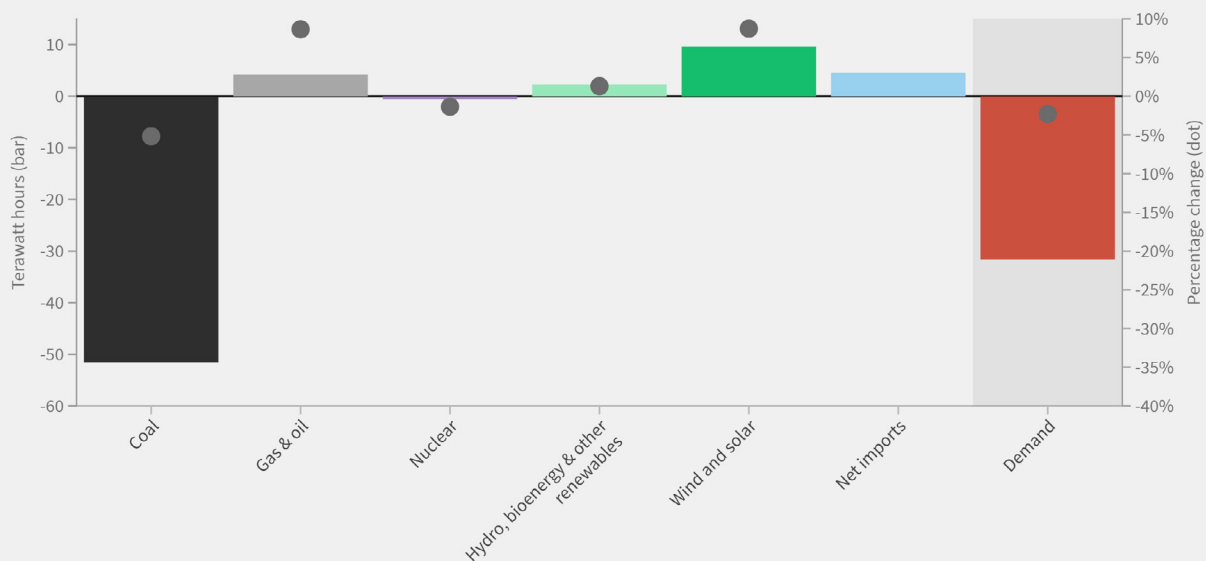
India increased its coal generation by 9% between 2015 and 2020.

Although share of renewable generation in India's power mix increased in the last five years, in absolute terms their growth was slower than the country's electricity demand growth. This led to a rise in its coal generation by 9% (+75 TWh) although its electricity market share fell from 77% in 2015 to 71% in 2020. India also brought 45.2 GW of new coal capacity online in these 5 years, which is more than Germany's total current installed coal capacity (43 GW). However, profitability of coal power plants continued to fall as India saw an average plant load factor of 53% in 2020, down from 62% in FY 2015-16. Meanwhile, the country's gas and nuclear generations also increased by 12 TWh and 6 TWh respectively, although their shares in the power mix remained unchanged. Despite its strong electricity demand growth, India's per capita demand remained the lowest in the G20 at 1 MWh in 2020.

What happened in 2020?

India - Electricity changes in 2020 by source

Year-on-year change



India's coal generation collapsed in 2020 as the country's electricity demand fell and solar continued to grow. Coal generation fell by 5% (-52 TWh) in India in 2020, its largest fall since at least 1990. This was in large part due to a 2% (-32 TWh) fall in electricity demand (the first annual fall since at least 2000) caused by confinement measures to tackle the Covid-19 pandemic. Further, India also increased its solar generation by 26% (+13 TWh) as it added 3.2 GW of new solar capacity in 2020, although the pace of new solar capacity addition was considerably less compared to 2019.

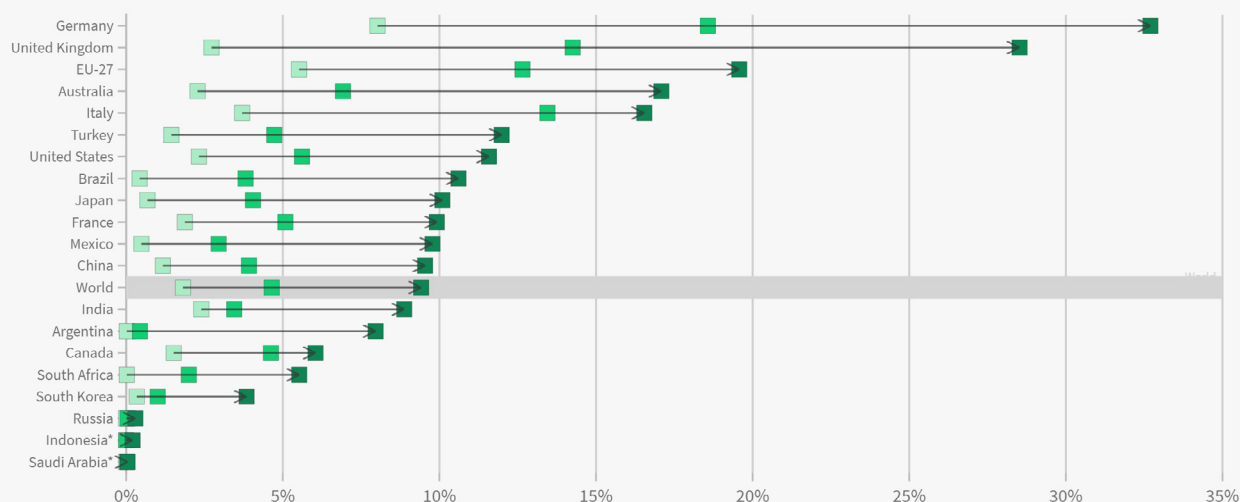
It also helped that the government granted a "must-run" status to renewable power stations even during the lockdown. Wind generation, however, saw a 5% decline (-3 TWh) because of an unseasonable sharp fall in wind speeds and only 1.2 GW of new capacity coming online. Combined gas and oil generation also increased by 9% (+4 TWh) last year as power producers in some states on India's west coast took advantage of reduced LNG prices. All the other sources of generation saw marginal changes compared to 2019.

India's transition in comparison with G20 countries

India wind and solar share of power rose to 8.9% in 2020

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

Year 2010 2015 2020

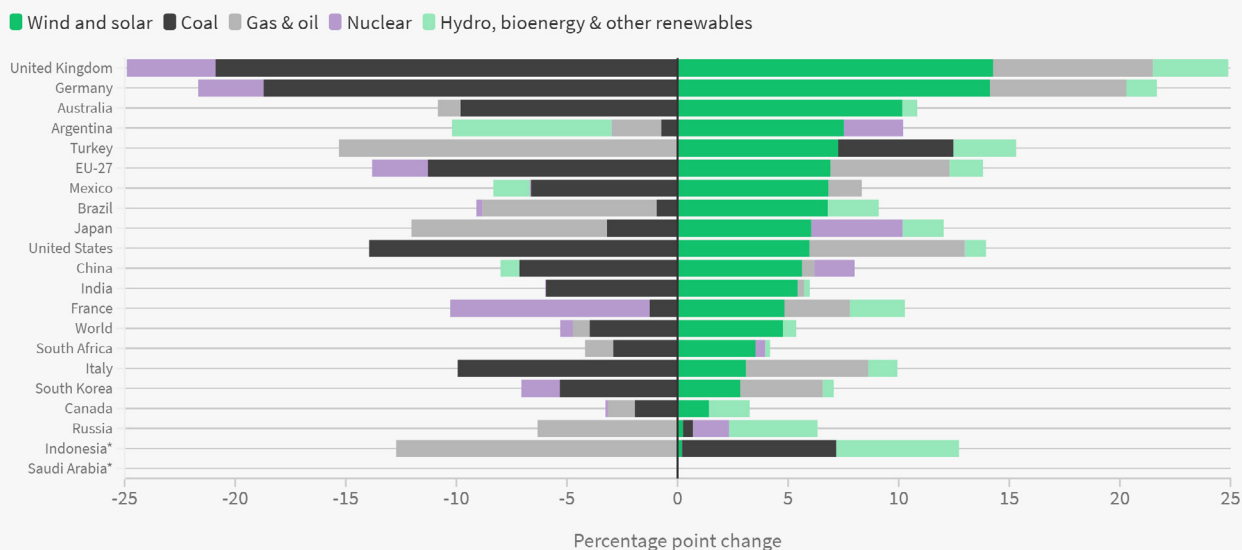


*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists
Ember's Global Electricity Review, March 2021.

India increased its combined wind and solar share of generation from 3.5% in 2015 to 8.9% in 2020. This is closer to the global average (9.4%) in 2020, but behind other G20 countries like Turkey (12%), the US (11.6%), Brazil (10.6%), Japan (10.1%) and China (9.5%). However, in absolute terms India had the fifth-most wind and solar generation in the G20, generating 119 TWh of electricity in 2020. This meant India had a higher wind and solar growth rate (+203%) over the last five years compared to countries like Germany (+56%) and the UK (+81%), but still less than China's (+224%).

Wind and solar generation are replacing coal generation in India

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

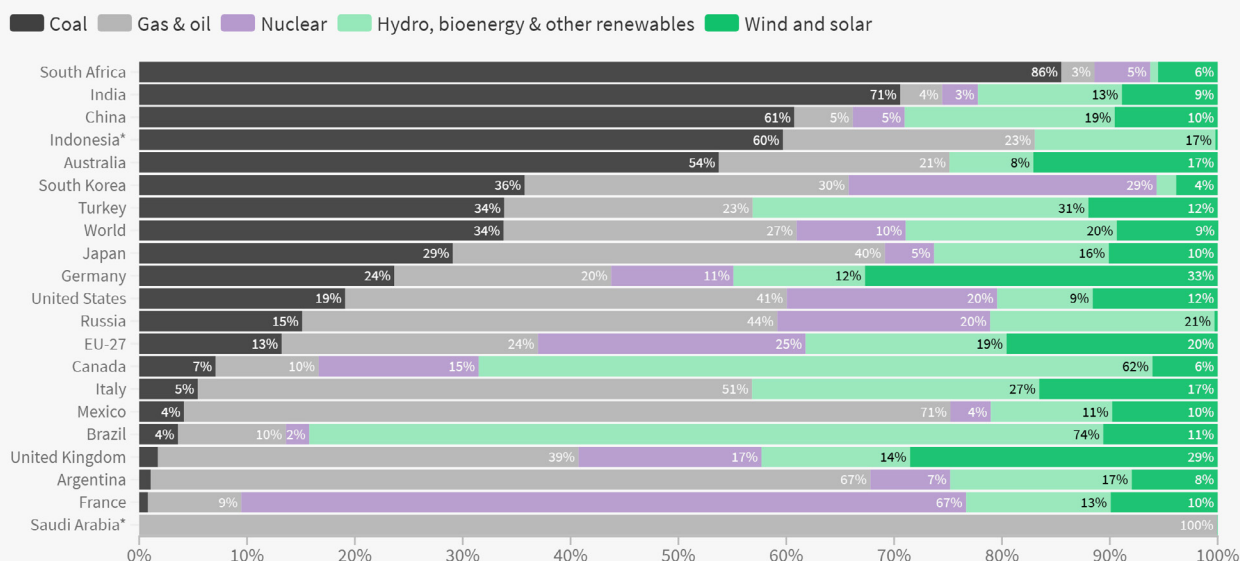


*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
Ember's Global Electricity Review, March 2021.

In the last five years, wind and solar generation captured 5% of India's electricity market share. This could have been higher as prevailing barriers stifled their growth in the recent years. While coal lost 6% of its market share in India during the same period, it is less compared to other G20 countries like the UK, Germany and Australia where the transition from coal to wind and solar in the same time span was much quicker with more than 10% market share gains for wind and solar.

India's power sector is the second-most coal-intensive in the G20

Electricity production mix in 2020, for G20 countries



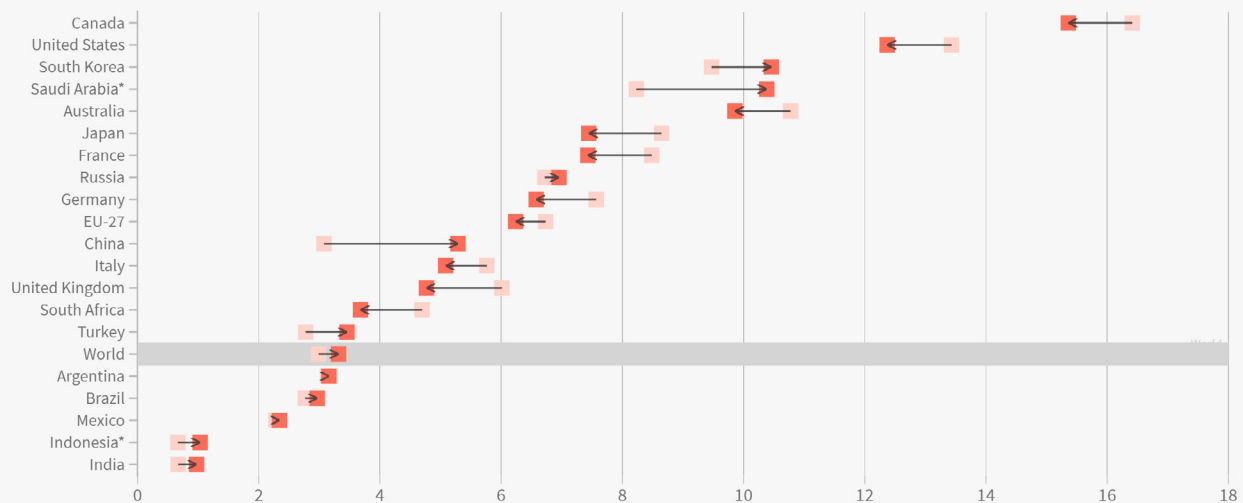
*For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists.
Ember's Global Electricity Review, March 2021.

With coal still generating 71% of the country's electricity, India had the second-most coal-intensive electricity sector among the G20 countries in 2020. By contrast, the world's share of coal-fired electricity (34%) was less than half of the figure for India. India's power sector was considerably more reliant on coal in 2020 when compared to other G20 countries like China (61%), Turkey (34%) and Japan (29%).

India's has the lowest per capita electricity demand in the G20

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

Year 2010 2020

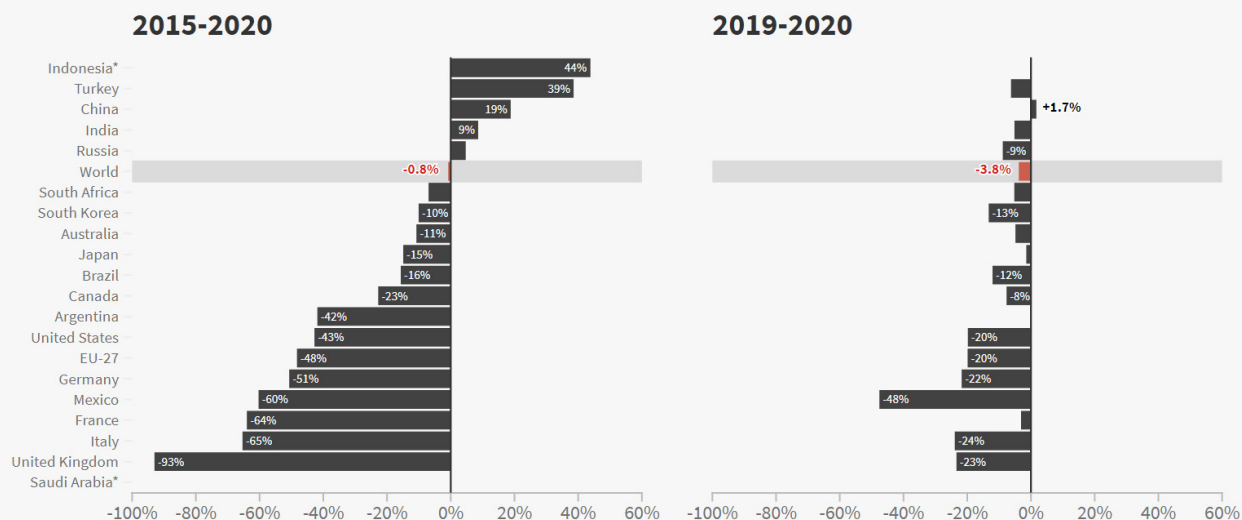


For Indonesia and Saudi Arabia, 2019 is used as no 2020 data exists. • Population sourced from United Nations. Ember's Global Electricity Review, March 2021.

India's per capita electricity demand increased from 0.7 MWh in 2010 to 1 MWh in 2020, representing a 43% increase. Despite this, India's per capita electricity demand remained the lowest in the G20 and was well below the global average of 3.3 MWh in 2020. With India's population continuing to increase and the country targeting strong economic growth, this is likely to increase in the coming years. And as demand grows, ramping up solar and wind power will be more crucial than ever for India to transition to a clean electricity system.

India one of only five G20 countries where coal generation has increased since 2015

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.

India's coal generation increased by 9% between 2015 and 2020 as the growth in renewables was slower than the rise in the country's electricity demand. Only four other G20 countries increased their coal generation in the same time period, while the world on an average saw a 1% decline. Many other G20 countries saw significant drops, most notably the UK (-93%), Italy (-65%) and Mexico (-65%).

Concluding remarks

India's electricity demand is [expected to see a strong growth](#) in the coming decades as it pursues its developmental aspirations. The country's clean electricity transition is particularly challenging as it needs to align its developmental goals with sustainability. Steady build up of wind and solar generation in recent years has started this transition, but India continues to rely quite heavily on coal generation which accounted for 71% of its electricity in 2020. [With the financial viability of new coal plants falling](#) and old, inefficient coal power plants [exacerbating Indian DISCOMs financial crisis](#), India can benefit from committing to a coal power phase

out. While natural gas offers flexibility, its variable prices and geopolitical risks could make it a vulnerability in India's power sector. Therefore, developing wind and solar is going to be imperative for India to [ensure coal generation doesn't bounce back](#) after two years of fall. Its current targets of 175 GW renewable capacity by 2022 and 450 GW by 2030 are massive, but barriers exist and continue to hinder their growth. Resolving these barriers along with phasing out coal power plants will be extremely important not just for India's but also for the world's electricity transition.

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	
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	United States	English	

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