



G20 Per Capita Coal Power Emissions 2023

Australia and South Korea retain their positions as G20's top polluters.

Published date: 5 September 2023

Lead authors: Rini Sucahyo, Ardhi Arsala Rahmani

Contributors: Dave Jones, Aditya Lolla, Uni Lee, Nicolas Fulghum, Matt Ewen, Chelsea Bruce-Lockhart, Hannah Broadbent

Contents

[Executive Summary](#)

[Introduction: Why G20 matters](#)

[Ranked: G20 per capita emissions](#)

[Trends and implications](#)

[Global trends in coal power emissions per capita, 2015-2022](#)

[Twelve G20 economies seeing declines in emissions per capita](#)

[Emissions per capita increasing in six G20 countries](#)

[G20 transition progress is lagging behind](#)

[Conclusion](#)

[Supporting Materials](#)

[Methodology](#)

[Emissions per capita calculations](#)

[Acknowledgements](#)

[Header image](#)

About

This analysis looks into the coal emissions of the G20 on a per capita basis, using data from Ember's [Global Electricity Review 2023](#), generation data from [Electricity Data Explorer](#) and annual population data from the United Nations.

Executive Summary

Australia, South Korea are G20's top coal polluters per capita

More countries are seeing decreasing per capita coal emissions as they shift towards clean power, but coal pollution remains an issue.

New analysis by energy think tank Ember finds that per capita coal power pollution in more than half of the G20 economies are declining. However, despite continued decline, the top two coal polluters – Australia and South Korea – are still far ahead; a position they have held since [2020](#).

This showcases the pace of clean transition, which is one of the key drivers to phase down coal, is not fast enough. Coal reliance continues in the group's major economies, increasing in countries such as China which falls in third place for per capita coal emissions.

01 Top two coal polluters, each emit more than triple the world average

Australia and South Korea are on average the G20's top two coal polluters, each emitting three times more coal emissions per capita than the average person in the world. Although they have also had their coal emissions per capita declining, they are still far ahead as top two.

02 12 out of 20 G20 economies saw declining per capita coal emissions since 2015

Over half of the world's largest economies have seen coal emissions per capita declining as a result of policies that ramp up renewables. But emissions in some emerging economies were still increasing in 2022.

03 Pace of clean transition isn't fast enough

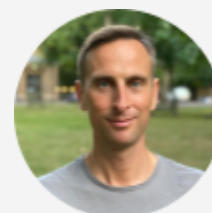
The speed of clean transition is not fast enough to help drive fossil phasedown and keep 1.5C within limit. Top polluters such as Australia and South Korea decreased their per capita coal emissions by 26% and 10% respectively since 2015. But, as their starting point was far ahead, they still lead in coal pollution by more than three times the world average.

The G20 accounts for 80% of global emissions. Within the group, however, an individual's coal emissions in 2022 were notably higher, with per capita figures reaching 1.6 tonnes of carbon dioxide, compared to the global average of 1.1 tonnes of carbon dioxide. With the nearing deadline to limit rise in global temperatures to 1.5C, G20 countries must be united in their efforts to triple renewables and plan for rapid and deep cuts in coal power generation.

“China and India are often blamed as the world's big coal power polluters. But when you take population into account, South Korea and Australia were the worst polluters still in 2022. As mature economies, they should be scaling up renewable electricity ambitiously and confidently enough to enable coal to be phased out by 2030.”

Dave Jones

Global Insights Lead, Ember



“India, as the host of the G20 summit, has the opportunity to assume climate leadership in the G20 and hold the bloc accountable. India's plans to ramp up renewable energy seem to align well with the COP28 president's call for tripling renewables by 2030. India's early backing to this call can not only influence the G20 into action but also ensure that the developed countries bring their per capita emissions down.”

Aditya Lolla

Asia Programme Lead, Ember



Introduction: Why G20 matters

G20 holds the key in keeping 1.5C within reach

The G20 could make or break global efforts to accelerate clean power.

The [G20](#) has become a focal point for global efforts to advance clean power transition and reduce carbon emissions. Accounting for 85% of the global GDP and contributing to 80% of the world's power sector emissions, the G20 plays a crucial role to lead this transition.

Around 36% of global electricity was generated from coal in 2022, producing 8,367 million tonnes of carbon emissions. Calculated on a per capita basis, this means that the average person worldwide emitted around 1.1 tonnes of carbon dioxide from coal power in 2022.

In addition to comparing countries on their share of coal power and total power sector emissions, it is a helpful metric to consider emissions on a per capita basis to compensate for large differences in population size and electricity demand.

Ember data shows that G20 countries (excluding the EU as a region) emit 1.6 tonnes of coal power emissions per capita, exceeding the world average of 1.1 tonnes of carbon dioxide.

Yet the G20 countries remain divided in their deliberations on the call to [triple renewables](#) and have [failed to come to a consensus](#).

Amid controversies, [75 nations](#) are showing commitment by either phasing out coal or not building new coal plants without carbon capture. However, challenges remain, as seven G20 nations—Brazil, China, India, Japan, South Korea, South Africa, and the United States—haven't yet unveiled their coal phase-down strategies.

Highlighted by an increasingly extreme climate, the urgency to ensure a global temperature rise well below 1.5C is clearer than ever. As the world's major economies and top carbon emitters, decisions the G20 states make on clean transition will have lasting implications. And wider acceleration of renewables within the G20 will help drive this.

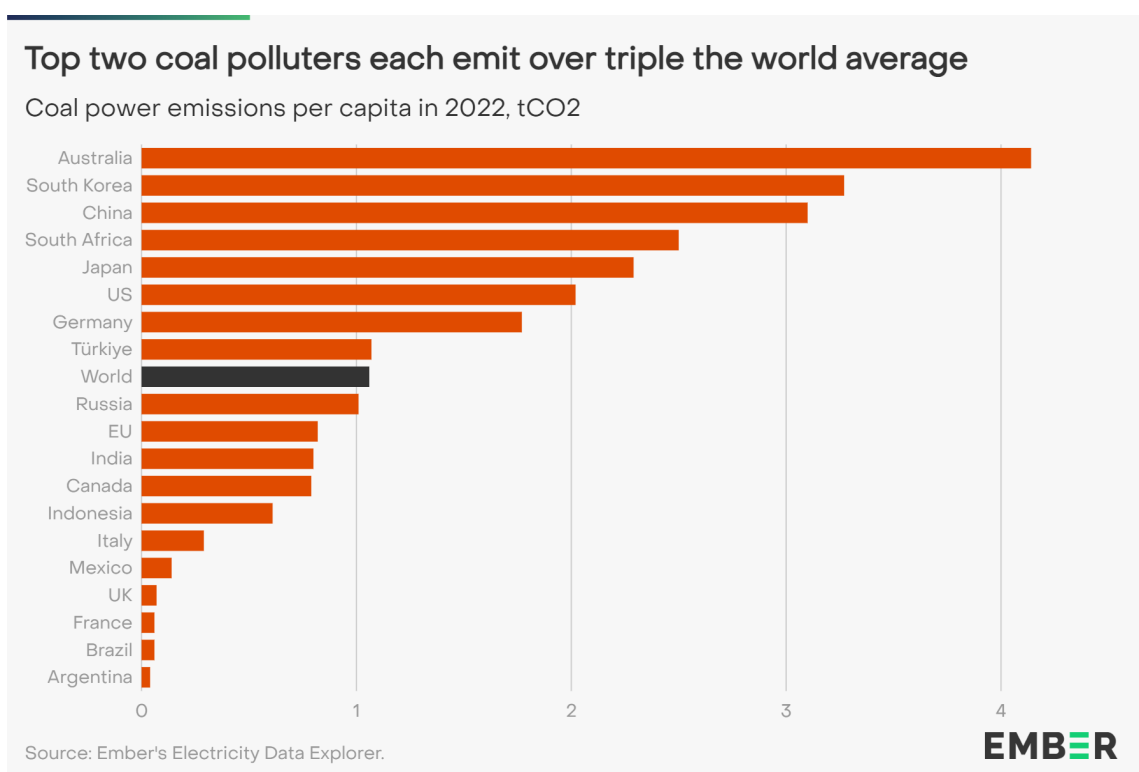
Ranked: G20 per capita emissions

Emissions per capita in Australia and South Korea still far ahead

Each of the top two polluters emit more than triple the 2022 global average, highlighting the urgency for faster clean transition.

In 2022, per capita emissions from coal power in all G20 countries combined was 1.6 tonnes of carbon dioxide. This is 54% more than the global average in the rest of the world which stood at 1.1 tonnes of carbon dioxide.

Australia and South Korea particularly stood out as the top two coal polluters per-capita among the G20, an [unchanged status](#) since 2020. They each emit over three times the global average and more than twice the G20 average, surpassing even China, the US, and Japan.



Australia remained the highest in terms of per capita coal power emissions of all G20 countries despite recent uptick in wind and solar power. Australia has twice the electricity use per capita of China, and still 47% of its electricity in 2022 was from coal power. However, solar and wind power have been growing: their share of electricity rose from 7% in 2015 to almost 26% in 2022, which was the main reason for the fall in share of coal from 64% to 48%. At the same time, electricity use per capita was broadly unchanged. This means per capita coal power emissions fell by 26% from 2015 to 2022.

In 2022, coal power emissions per capita fell by about 5%, compared to 2021, as coal generation fell by 8 TWh. This was caused by a rise in solar, wind and gas generation, even as electricity demand rose by more than 2%.

In South Korea, the share of wind and solar was only 1% of electricity in 2015, and it has grown fivefold since then to more than 5% in 2022. Yet South Korea's solar and wind share is still well below the global average of 12%, and their electricity is still 34% powered by coal. This has led them to emit more than three metric tonnes of carbon dioxide per individual, which also amounts to approximately three times the global average. This is despite their per capita coal emissions having dropped by 10% in seven years between 2015 to 2022.

Trends and implications

The slow progress of transition

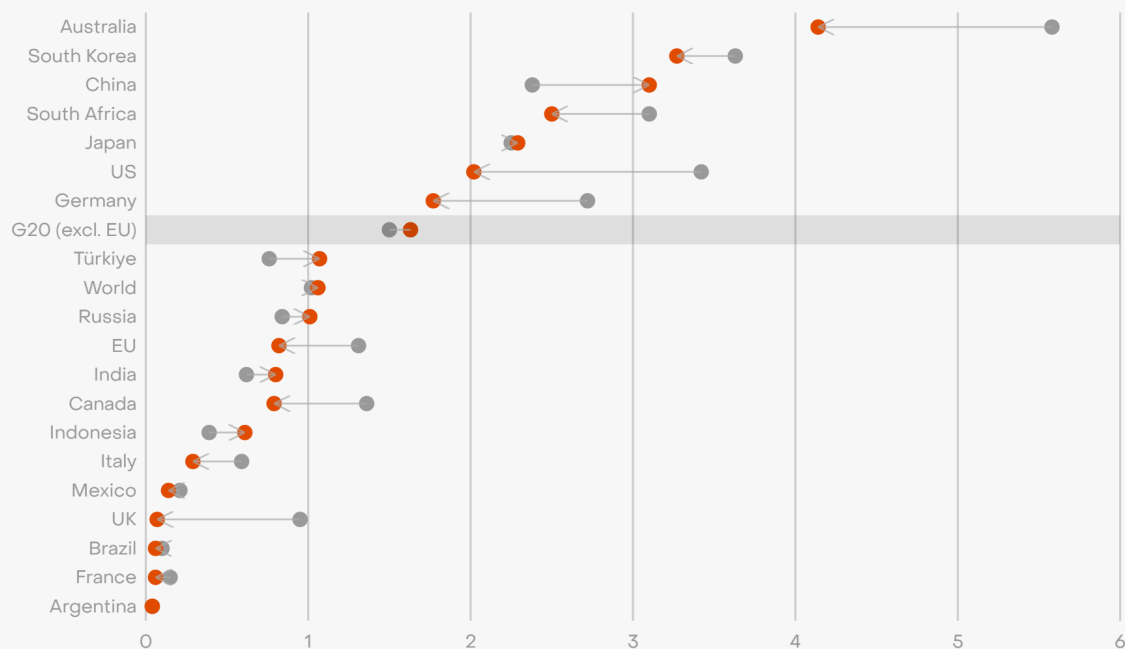
The combined G20 per capita emissions barely changed since 2015.

[Growing wind and solar](#) are helping to reduce coal power emissions per capita in many countries, but it's not enough yet to keep pace with rising electricity demand in most emerging countries. The G20 per capita emissions have shown minimal change since 2015.

Over half of the G20 nations see a decline in per capita emissions in 2022, but top polluters still far ahead

Coal power emissions per capita (tCO₂)

● 2015 ● 2022



Source: Ember's Electricity Data Explorer

EMBER

Trends in coal power emissions per capita in G20 countries, 2015-2022

Global coal power emissions per capita have increased slightly from 1 tonnes of carbon dioxide in 2015 to 1.1 tonnes of carbon dioxide in 2022. However, at a national level in the G20, there has been a decline in the majority of countries, with some emerging economies continuing to see increases in coal power emissions per capita.

Twelve G20 economies seeing declines in emissions per capita

Per capita coal power emissions have decreased in major G20 economies in the last seven years, including in Australia, South Korea, South Africa, the US, Germany, Canada, the UK, Brazil, Mexico, France, Italy and Argentina.

The UK saw the most significant decline in coal power emissions per capita in the last seven years, dropping by 93%, followed by France (-63%), Italy (-50%), and Brazil (-42%). In both [France](#) and [Brazil](#), the declines resulted from fossil generation being replaced by cleaner sources.

In Australia, coal power emissions per capita have dropped by 26% since 2015, driven by the massive growth in solar and wind. South Korea's emissions have also decreased, though not as fast. With increasing clean power generation, South Korea has seen a 10% drop in coal power emissions per capita between 2015 and 2022.

However, despite these noteworthy declines in Australia and South Korea, their coal power emissions per capita remain much higher than the world average.

Among the G20, per capita coal power emissions in Australia remains the highest as it continues to rely on coal, which made up 48% of the country's electricity generation (130.9 TWh) in 2022. Australia is also [falling short](#) of its 2030 goal to achieve 82% share of renewables in power generation by 2030.

In addition, the vast resource of coal has made Australia an enabler for other countries in becoming polluters as they rank [second in the world](#) as largest coal exporter after Indonesia.

Emissions per capita increasing in six G20 countries

Two G20 countries – Indonesia and Türkiye – saw notable rises in coal power emissions per capita over the last seven years, although still below the world average.

Indonesia witnessed the highest percentage rise among the G20, with per capita coal power emissions surging by 56% from 2015 to 2022 (+0.2 tCO₂). Türkiye also experienced a significant increase of 41% in emissions per capita (+0.3 tCO₂).

In China, per capita coal power emissions rose by 30% (+0.7 tCO₂ from 2015 to 2022), which were only below Australia and South Korea. But unlike Australia and South Korea, this was due to rapidly [growing demand](#) outpacing the [growth in clean generation](#). Since 2015, its per capita coal emissions have increased by about 4% annually on average, despite 670 GW of renewables being added in the same period.

India experienced a 29% increase in seven years (+0.2 tCO₂). Both countries are experiencing rapid electricity demand growth, which is outpacing even the [massive renewables expansion](#) in recent years. As a result, their coal-fired generation has also increased in this period.

Russia's per capita emissions also grew by 20% since 2015 (+0.17 tCO₂). Japan, while showing a relatively modest increase, saw its per capita coal power emissions inch up by 2% from 2015 (+0.04 tCO₂).

The rises in emissions per capita stem from the ongoing use of coal to meet the [pick up in demand](#) as pandemic restrictions ease, as well as the extreme weather events in summer and winter which drove coal generation up.

G20 needs to build renewables much faster

Although per capita emissions have declined in most G20 countries since 2015, this is not enough to reduce global coal power emissions per capita, nor the overall G20 coal power emissions per capita. In fact, the G20 per capita coal emissions slightly increased by about 9% from 1.5 tonnes of carbon dioxide in 2015 to 1.6 tonnes of carbon dioxide in 2022.

Coal power is still rising, where it needs to be rapidly falling. Concerted efforts are required to accelerate the transition to renewables and effectively phase down coal power. Adopting renewables on a broader scale will play a pivotal role in expediting the clean power transition, which is essential to significantly reduce per capita coal power emissions.

Conclusion

G20's crucial role in tripling renewables by 2030

Opportunity for G20 to take centre stage on an ambitious global renewables goal, leading to an accelerated transition to clean power.

The G20 nations are at a critical juncture to show leadership and drive global actions to end fossil fuels and usher in an era of clean power. As the world's largest economies, the G20 has the opportunity to prepare the scene at the G20 Summit for determined actions:

01 Triple renewables by 2030

Set and commit to higher renewable targets. [Tripling](#) global renewable capacity by 2030 is priority number one to keep 1.5C within reach.

02 Plan for a coal power phase-down

G20 countries must live up to their COP26 pledge to phase down coal power by aligning system-wide plans, clear and enabling policies, financial mechanisms and global partnerships.

Investing in renewables, rather than persisting with coal dependency, brings multiple benefits. Renewables provide homegrown clean power, curb emissions, bolster energy security and spur economic growth through innovation and job creation.

Supporting Materials

Methodology

Emissions per capita calculations

Viewing emissions that are averaged over population size in each country helps to assess the degree of coal pollution individuals are responsible for. For this report, we calculate coal power emissions using the [IPCC AR5](#) midpoint lifecycle emissions factor of $820\text{gCO}_2\text{eqkWh}^{-1}$, multiplying it by electricity generation. In real terms this figure is [known to be an underestimate](#), but allows comparability between countries and does not significantly impact the rankings in this report.

Per capita values were calculated using annual population data from the United Nations. Total coal emissions generated in a country or region were divided by the population data for a given year. The analysis excludes G20 countries without coal generation (i.e. Saudi Arabia).

Data set

The data set includes the calculated per capita coal emissions of all G20 countries included in this analysis, as well as the world average numbers. You can access the [data set here](#). For the raw data of coal generation, please refer to our [Electricity Data Explorer](#), or [download the data](#).

Acknowledgements

Contributors

[Dave Jones](#) and [Aditya Lolla](#) played a critical role in developing the analytical elements of this report. [Uni Lee](#), [Nicolas Fulghum](#) and [Matt Ewen](#) all played key roles in data validation and methodological accuracy. The contributions of [Hannah Broadbent](#) in editing and structure enhancement, along with [Chelsea Bruce-Lockhart](#)'s expertise in data visualisations, have been invaluable in shaping the final outcome of this work.

Header image

Queensland's largest single coal-fired power station in Gladstone, Queensland, Australia

Credit: [Lincoln Fowler](#) / Alamy Stock Photo

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