

Climate Action Tracker

Pulling the plug on fossils in power

September 2023



Summary

Decarbonising the power sector is a key step on the road to net zero as it will cut both power sector emissions and help push fossil fuels out of the buildings, transport and industrial sectors as these sectors electrify.

To help track global and country level progress, the Climate Action Tracker has established benchmarks for the shares of fossil gas, coal and renewable energy in the power sector that are compatible with limiting warming to 1.5°C. We have set out these benchmarks in a separate report, [Clean electricity within a generation](#), and in this briefing we use them to look at how close countries are to achieving them.

The end goal is straightforward: we need to decarbonise the power sector by 2040 – within a generation.

Developed countries need to phase out coal by 2030, and unabated gas by 2035. The developing country power sector transition is not far behind, phasing out both coal and fossil gas by 2040, many with financial support. This represents a transition to global clean power within a generation.

Key to achieving clean power is the acceleration of renewables deployment. All countries achieve above 80% of electricity from renewables by 2035 in these 1.5°C aligned benchmarks, and 90-100% renewable electricity supply by 2050.

There is no role for carbon capture and storage (CCS) in coal generation, and a marginal role for fossil gas equipped with CCS, at best. The future of fossil fuels in a 1.5°C compatible power sector transition, whether abated or unabated, is the same – one of swift decline.

In this briefing, we present 1.5°C benchmarks for 16 countries - Australia, Brazil, Chile, China, EU27, Germany, India, Indonesia, Japan, Mexico, Morocco, Türkiye, South Africa, United Arab Emirates, the UK, and the US – and assess whether they are on track to meet them.

No country we assessed is fully on track for this power shift, but there are some positive signs:

















- ▶ The **UK** is on track to phase out coal by 2024 - which is on a 1.5°C compatible timeline, with the **EU, Germany, Chile** and **South Africa** heading in the right direction. **Brazil** could get on the right track if it repeals Bolsonaro-era legislation.
- ▶ The **US** and the **UK's** 2035 power sector decarbonisation targets are in line with the needed unabated fossil gas phase-out by that time, but both need to do more to achieve them.
- ▶ **India** and **China** have 1.5°C compatible levels of fossil gas power now, but both need to develop their longer-term phase-out strategies.
- ▶ **Germany** and **Chile** are ahead of the pack in terms of renewables deployment. While the sector is booming elsewhere (China, India), it is still not fast enough for the speed of fossil phase-out needed.

There is still plenty to worry about:

- ▶ No country we analysed has an explicit fossil gas phase-out plan and the fossil gas pipeline is now larger than the pipeline for coal.
- ▶ While the global coal pipeline outside of **China** is shrinking, China's coal plant permitting spree is a cause for concern. If it continues, the only way to avoid a major increase in emissions would be to drastically cut coal power plant utilisation.
- ▶ Most countries are not doing enough to accelerate the renewable energy transition, with **Japan** and **Mexico** at the back of the pack.
- ▶ The **UAE** has called for an emissions phase-out rather than a fossil fuel one. Our analysis shows that CCS will play a minimal role in fossil gas power (and none at all in coal). As incoming COP President, the UAE can make a significant impact on climate ambition by securing global agreement to phase out fossil gas by 2040 globally and lead by example by doing so at home by 2035.

1.5°C

Country progress towards 1.5°C compatible benchmarks for coal, fossil gas and renewables

		COAL	FOSSIL GAS	RENEWABLES
	United Kingdom	✓ 1.5°C COMPATIBLE	⟷ MIXED PICTURE	⟷ MIXED PICTURE
	Chile	⟷ RIGHT DIRECTION	⟷ WRONG DIRECTION	⟷ AHEAD OF THE PACK
	Germany	⟷ RIGHT DIRECTION	⟷ WRONG DIRECTION	⟷ AHEAD OF THE PACK
	South Africa	⟷ RIGHT DIRECTION	⟷ MIXED PICTURE	⟷ MIXED PICTURE
	China	⟷ WRONG DIRECTION	⟷ RIGHT DIRECTION	⟷ MIXED PICTURE
	EU27	⟷ RIGHT DIRECTION	⟷ WRONG DIRECTION	⟷ MIXED PICTURE
	India	⟷ WRONG DIRECTION	⟷ RIGHT DIRECTION	⟷ MIXED PICTURE
	Australia	⟷ MIXED PICTURE	⟷ WRONG DIRECTION	⟷ MIXED PICTURE
	UAE	⟷ MIXED PICTURE	⟷ WRONG DIRECTION	⟷ MIXED PICTURE
	United States	⟷ WRONG DIRECTION	⟷ MIXED PICTURE	⟷ MIXED PICTURE
	Brazil	⟷ WRONG DIRECTION	⟷ WRONG DIRECTION	⟷ MIXED PICTURE
	Indonesia	⟷ WRONG DIRECTION	⟷ WRONG DIRECTION	⟷ MIXED PICTURE
	Morocco	⟷ WRONG DIRECTION	⟷ WRONG DIRECTION	⟷ MIXED PICTURE
	Türkiye	⟷ WRONG DIRECTION	⟷ WRONG DIRECTION	⟷ MIXED PICTURE
	Japan	⟷ WRONG DIRECTION	⟷ WRONG DIRECTION	⟷ LAGGING BEHIND
	Mexico	⟷ WRONG DIRECTION	⟷ WRONG DIRECTION	⟷ LAGGING BEHIND

Climate finance will be key to meeting the 2040 global phase-out. The handful of Just Energy Transition Partnerships (JETPs) developed to date are a step in the right direction, but insufficient. Countries like Morocco, who are heavily reliant on coal power today, but have huge renewable energy potential, will need international support to ensure a swift transition.

On the eve of the Climate Ambition Summit, it is clear that all governments need to do more. We will be watching.



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Why do we need to pull the plug?

Decarbonising the power sector is a key step on the road to net zero. Cutting emissions from the power sector is essential, as burning fossil fuels for electricity generation produced around a third of all fossil CO₂ emissions in 2022.¹

Rapid power sector decarbonisation will also be key to ensure an orderly transition, as buildings, transport and industry need clean electricity to help push fossil fuels out of the energy mix. Get power sector decarbonisation right, and it can be the foundation that unlocks rapid emissions cuts in other sectors. Fail to clean up electricity generation, and the power sector will be the laggard holding back system-wide decarbonisation that brings clean energy to all.

The good news is that solutions are at hand to bring in the era of clean electricity. The past decade has seen the cost of renewables plummet and their deployment explode.² Over 400 GW of renewables will be installed in 2023,³ a growth of over 30% compared to 2022. As a result, 2023 may well be the year that power sector emissions peak and enter into long-term decline.⁴ However, peaking is not enough – we need to approximately halve global emissions by 2030 to limit warming to 1.5°C.⁵ More action is needed to accelerate the road to clean power.

A brief history of power sector decarbonisation

Achieving a clean power sector will require a phase-out of fossil gas and coal from the power sector, and momentum is building around this goal. Much of the focus has been on coal.

In 2015, the UK was the first major economy to commit to phasing out coal by 2025.⁶ In the following years, more countries began to commit to a coal phase-out, and the Powering Past Coal Alliance (PPCA) was launched at COP23 in 2017.⁷ It started with 26 nations committing to phasing out existing unabated coal-fired power stations and has grown to 48 countries.⁸ At COP26 in Glasgow, all governments agreed to ‘phase down’ unabated coal-fired power,⁹ and some committed to phasing out unabated coal by 2030 in the OECD and by 2040 globally.

Much of the existing activity on a coal phase-out has been concentrated in developed countries. Many developing countries have large coal-fired power fleets, and face a range of economic, social, and regulatory challenges in accelerating their coal phase-outs. The launch of Just Energy Transition Partnerships (JETPs) to accelerate the energy transition in developing countries may represent a change here, with JETPs adopted or under development in several coal-dependent countries.¹⁰

The growing focus on the need to phase out coal is beginning to deliver results. The pipeline for new coal-fired power stations has shrunk by over two-thirds since the Paris Agreement¹¹ and commitments to end coal-fired power generation are being made across the world.

Phasing out coal is not enough – we also need to phase out fossil gas. However, governments across the world are planning to retain or substantially expand their gas-fired power fleets,¹² although some have committed to achieve clean power by the mid-2030s, which would implicitly require a phase-out of fossil gas, unless it is equipped with CCS. This is despite clear evidence that fossil gas generation is expensive, volatile and dirty, and needs to be phased out rapidly to limit warming to 1.5°C.¹³

Power sector decarbonisation is critical for closing the emissions gap

A rapid transition to clean power is the most critical step for closing the emissions gap to 2030. In 1.5°C compatible pathways assessed by the IPCC, phasing out fossil-based electricity generation is responsible for around 40% of emission reductions over the 2020s, while expanding clean electricity to other sectors is responsible for around another 10%.¹⁴ That means about half the emissions reductions required by 2030 are contingent on power sector decarbonisation.

The goal: clean electricity by 2040 globally

The CAT finds that to align with 1.5°C the world should aim to achieve clean electricity by 2040 – within a generation’s time – and to support each other to jointly meet these goals.

Developed countries need to phase out coal by 2030, and unabated gas by 2035. The developing country power sector transition is not far behind, phasing out both coal and fossil gas by 2040. This represents a transition to global clean power within a generation.

Key to achieving clean power is acceleration of renewables deployment. All countries achieve above 80% of electricity from renewables by 2035 in these 1.5°C aligned benchmarks, and 90-100% renewable electricity supply by 2050.

There is no role for carbon capture and storage (CCS) in coal generation, and a marginal role for fossil gas equipped with CCS, at best. The future of fossil fuels in a 1.5°C compatible power sector transition, whether abated or unabated, is the same – one of swift decline (see box).

In this briefing, we present 1.5°C benchmarks for 16 countries - Australia, Brazil, Chile, China, EU27, Germany, India, Indonesia, Japan, Mexico, Morocco, Türkiye, South Africa, United Arab Emirates, the UK, and the US – and assess whether they are on track to meet them.

The countries were selected based on their share of global power generation, scale of power sector emissions, geopolitical importance, and diversity (both geographic and economic).

Our benchmarks focus on what is needed to limit warming to 1.5°C. Many developing countries will need significant financial support to achieve their fossil fuel phase outs and renewable energy deployment.

This briefing was prepared as a companion to our [Clean electricity within a generation](#) report and should be read in parallel with it. The methodology used to develop these benchmarks is described in detail in that report.

Abated vs. unabated fossil fuels: the false promise of CCS

Current debates on the future of fossil fuels in a zero carbon energy system often focus on the difference between ‘abated’ and ‘unabated’ fossil fuels.

Here a key issue is the lack of clarity around what constitutes ‘abated’ fossil fuels. The IPCC defines abated fossil fuels as those which are produced and used with interventions which substantially reduce the amount of GHGs emitted throughout the lifecycle.¹⁵ This is defined as capturing over 90% of emissions from a power plant, and 50-80% of fugitive emissions from energy supply.

Abated fossil fuel use in the power sector would therefore require strong action to eliminate fugitive emissions from fossil fuel production, and fitting fossil fuel plants with carbon capture and storage technology, or CCS.

However, while proponents of CCS have suggested that it could enable coal and gas-fired power plants to continue to operate in a zero carbon future, there are major doubts over the viability or desirability of large-scale fossil CCS in the power sector.

The track record of CCS in the power sector has been very poor.¹⁶ As of the end of 2022, only one demonstration-level plant was currently operational globally (Boundary Dam, in Canada), with only two scheduled to come online in 2023.¹⁷ There have been multiple failed demonstration plants in recent years,¹⁸ and the Boundary Dam plant has a lifetime underperformance of ~50%.¹⁹

CCS in the power sector is low emissions, but not zero-carbon. Even with the IPCC’s stringent definition of abated fossil fuels (which existing CCS projects generally fail to meet, with capture rates far below 90% and no or limited action to address fugitive emissions), there would still be residual emissions from imperfect capture rates and upstream emissions. This would therefore require carbon dioxide removal to be paired with fossil CCS to maintain zero-emissions.

Finally, CCS in the power sector is no longer essential. As CCS suffered its “lost decade”, the cost of renewables plummeted,²⁰ significantly eroding the value of CCS in the power sector.²¹

As such, the latest modelling assessed by the CAT finds no role for coal-fired CCS in 1.5°C compatible transitions, and a marginal role for fossil gas equipped with CCS at best. The future of fossil fuels in a 1.5°C compatible power sector transition, whether abated or unabated, is the same – one of swift decline



Phasing out fossil gas electricity

1.5°C

What do we need for 1.5°C compatibility?

The world needs to phase out fossil gas power rapidly to be 1.5°C compatible. By 2030, fossil gas power should be less than a third of today's levels and effectively phased out by 2040. For developed countries that means phasing out unabated gas by 2035 and for developing countries by 2040.

Fossil gas is often trumpeted as a 'bridging fuel' and necessary for grid stabilisation when the sun is not shining, nor wind blowing. But these are false narratives pushed by industry. Reliance on gas power exposes countries to volatile fossil fuel markets and creates the risk of stranded assets. Zero carbon alternatives to balance grids are rapidly developing, from the falling cost of battery storage to flexible geothermal, demand-side responses and renewable hydrogen. The role for carbon capture and storage (CCS) (i.e. abated fossil gas) in the power sector is minor at best.



Fossil gas expansion must end now and must be effectively phased out globally by 2040

1.5°C compatible benchmarks for fossil gas in global electricity generation

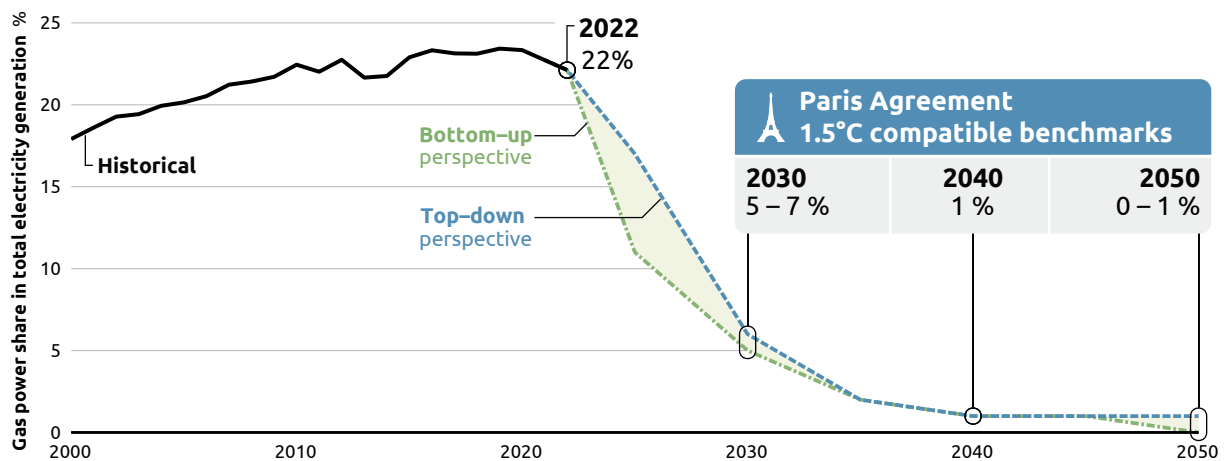


Figure 1: 1.5°C compatible share of fossil gas in global electricity generation



Where are we now?

Global gas-fired power generation grew strongly from 2000 until 2020, reaching close to a quarter of all electricity generation. This growth is global, with all regions increasing their reliance on fossil gas. While the fossil gas share has fallen in recent years, the change is driven by geopolitical developments and high prices, not a concerted effort to start the phase-down. As prices have started to normalise, consumption has increased.

The world is not on track to phase out fossil gas in the power system. While the picture is mixed at the country level, very few are heading in a direction compatible with 1.5°C.

The global pipeline for future fossil gas plants is now greater than that of coal-fired power, with around 790 GW of fossil gas-fired plants either under construction or proposed as of February 2023.²² Unlike coal, where development plans are limited to a small subset of countries, the dash for gas is global, with almost all countries planning on building new fossil gas plants.

Developed countries need to take the lead and phase out fossil gas by 2035 (with a marginal role for fossil gas with CCS), but no country we analysed has yet to commit phasing out unabated gas by 2035 and to such a phase out explicitly. The **US** and the **UK** have committed to decarbonising their electricity systems by then, but need to be more explicit about their fossil gas plans. **Germany** committed to this target under the G7 but chose to not include it in its renewable energy law. None of these countries is on track to achieve these goals, and some intend to add additional capacity which would be inconsistent.

In the developing world (where coal often dominates the electricity mix), the share of gas in electricity generation is generally lower, as these countries are more reliant on coal power.

India and **China** have 1.5°C compatible levels of fossil gas power now, but neither has plans to phase out this power source over the longer term.

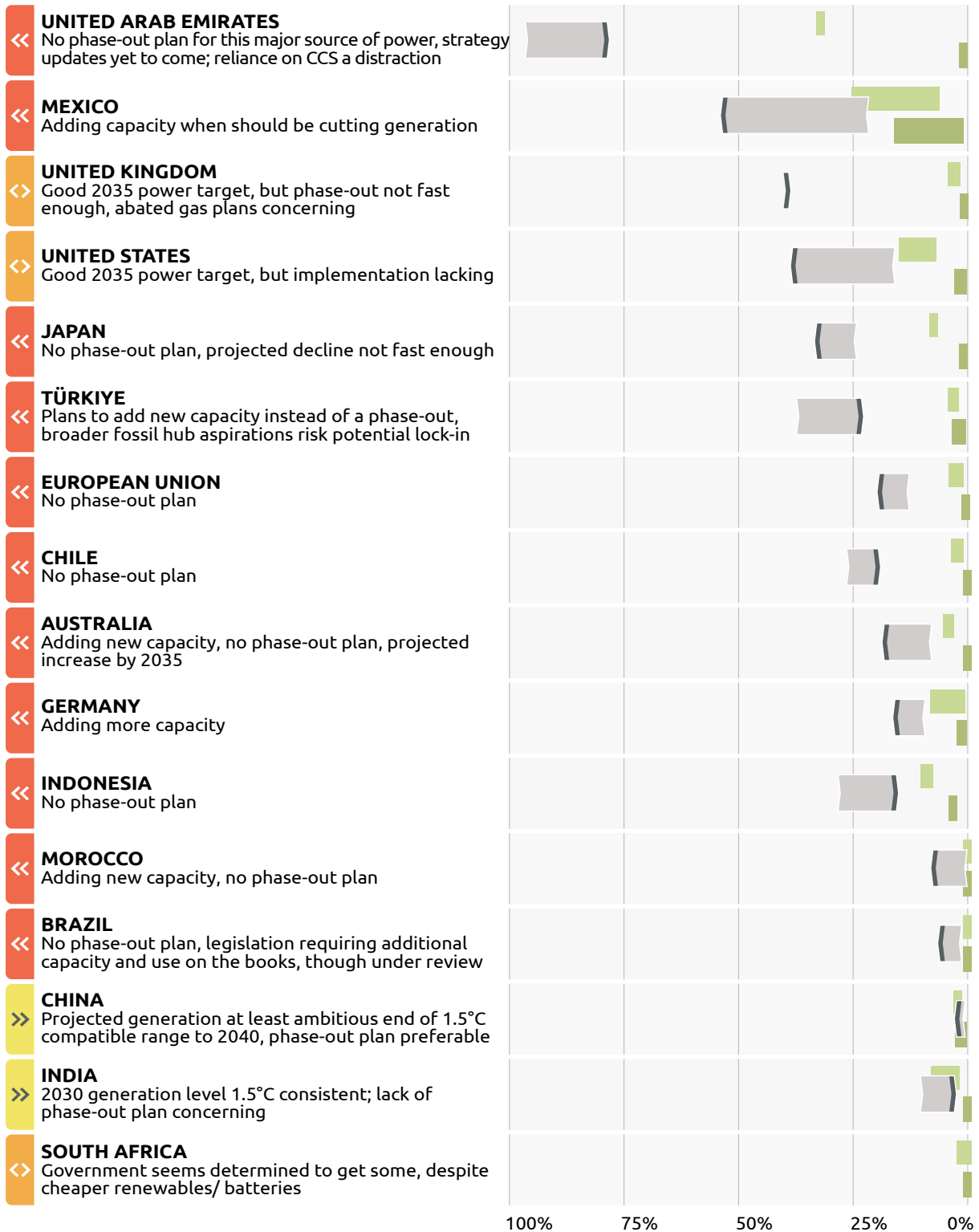
It is critical that developing countries avoid the gas trap (i.e. building up fossil gas capacity that may become stranded) and focus instead on a transition to zero-carbon electricity. **South Africa** is a prime example of this as the government seems determined to build fossil gas capacity. As the cost of renewables and battery storage continue to fall, South Africa would be better off skipping fossil gas altogether. **Brazil** and **Morocco** have low fossil gas shares and could phase out this power source quickly, but Morocco is planning to build additional capacity while Brazil's procurement plans are under review.

Perhaps, unsurprisingly, those countries who rely most heavily on fossil gas power (Mexico, UAE) are the farthest off track. **Mexico** has no plans to phase out fossil gas and is planning additional capacity. The **UAE** has called for an *emissions* phase out rather than a *fossil fuels* phase out, and stressed the importance of CCS for its energy transition, though our analysis suggests CCS will play a minimal role, if at all. As in-coming COP President, the UAE can make a significant impact on climate ambition by securing global agreement to phase out fossil gas by 2040 globally and lead by example by doing that at home by 2035.



Progress towards phasing out fossil gas in electricity generation

Country level 1.5°C compatible benchmarks compared to historical progress



Fossil gas power share in total electricity generation %

Historical data: Value in 2000 (grey bar), Value in 2022 (grey arrow)

1.5°C compatible benchmarks: For 2030 (light green bar), For 2035 (dark green bar)

Country progress towards 1.5°C compatible benchmarks



Getting the coal phase-out done

1.5°C

What do we need for 1.5°C compatibility?

It has been known for some time now that we need to consign coal-fired electricity to the history books in a 1.5°C compatible world. For developed countries, that means phasing out all coal power by 2030 and by 2040 for the rest of the world. To achieve this benchmark, coal power needs to fall rapidly from over a third of power generation today to the low single digits by 2030. **There is no room to expand coal power generation anywhere.**

While the coal phase-out must be led by developed countries, developing countries still need to rapidly reduce their share of generation. In most developing countries we assessed, coal provides less than 10% of electricity generation by 2030. Countries with coal-dominated power systems, such as **South Africa** and **India**, have slightly higher shares, but are still down to low single digits by 2035. Other countries, such as **Mexico** and **Brazil**, that have low shares of coal generation to begin with, phase out coal entirely by 2030.

Accelerating the coal phase-out in developing countries will require strong levels of international support. The growing number of Just Energy Transition Partnerships (JETPs) is encouraging, but the scale of ambition needs to be increased substantially to ensure that a global coal phase-out by 2040 is achieved in an equitable manner.

It is important to note that these benchmarks are for total coal (both abated and unabated). **However, we reiterate that there is no role for CCS-equipped coal generation in the global power sector.** All coal (both abated and unabated) must exit the system by 2040.



Coal must be phased out by 2040 globally

1.5°C compatible benchmarks for coal in global electricity generation

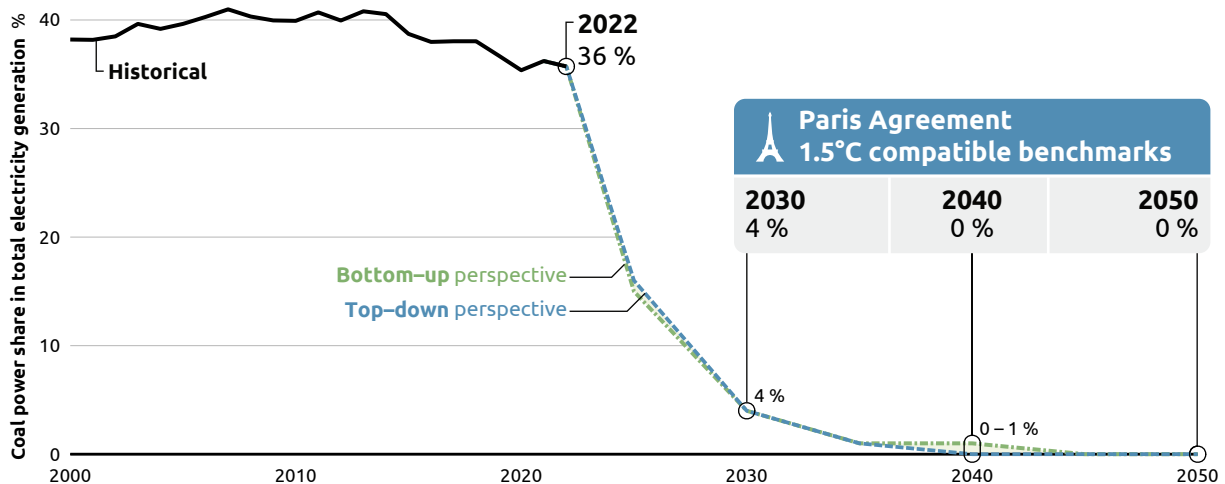


Figure 2: 1.5°C compatible share of coal in global electricity generation



Where are we now?

In 2022, coal power provided over a third of the world's electricity and was responsible for about two-thirds of power sector emissions. While all governments committed to 'phase down' unabated coal-fired power at COP26 in 2021,²³ they did not agree to a timeline. The UN Secretary General has called on governments to phase out coal in OECD countries by 2030 and by 2040 in the rest of the world as part of his Acceleration Agenda for September's Climate Ambition Summit.²⁴

The global coal phase-out is underway, but few countries get full marks

The **UK** is the only country we analysed that is definitively on-track to phase out coal power on a 1.5°C compatible timeline. The **EU** and **Germany** are heading towards a 1.5°C compatible coal phase-out, propelled by the EU Emissions Trading System. **Chile** has a 1.5°C compatible phase-out target, but it is only aspirational and not all of its plants have developed exit plans. Some **Australian** states have phase-out plans, but without a national plan and timeline, it is a mixed picture. The **US** does not have a coal phase-out plan, and its 2035 carbon-free power system goal is too late for coal, which should exit the system by 2030.

The new coal plant pipeline is concerning, but shrinking

The coal phase-out must be coupled with a commitment not to build any new coal power plants. The pipeline has shrunk by over two-thirds since the Paris Agreement,²⁵ but there is still a significant amount, with much of the construction occurring in just three countries: China, India and Indonesia. **India** plans to continue to build new coal plants throughout this decade, but market forces may thwart some of these efforts. **Indonesia's** current phase out date is too late, but it is developing a Just Energy Transition Partnership (JETP) with international donors. **China** has no coal commitments beyond reducing its consumption to 2025, but needs to address this source if it is serious about its carbon neutrality target. Instead, China has embarked on a spree of building coal plants, with construction starting on more than one coal plant per week in the first half of 2023, and similar levels of permitting and announcing new plants.²⁶ This coal plant chaos needs to stop, and China get in line with a 1.5°C compatible phase-out.

All of these countries have significant coal mining industries and see coal as a way to balance the grid and achieve energy security. However, they also suffer from overcapacity in their current grids, which is already reducing the utilisation of existing coal power plants. Building more coal-fired power plants will simply exacerbate this issue, preventing these countries from benefiting fully from the renewables revolution.

Quick wins are possible

Most of **Brazil's** coal power was on track to exit its power system before 2030, but former President Bolsonaro's legislative efforts delayed this exit. Reversing these unnecessary lifelines to the coal industry and committing to phasing out the small amount of coal power Brazil generates should be a no-brainer for President Lula.

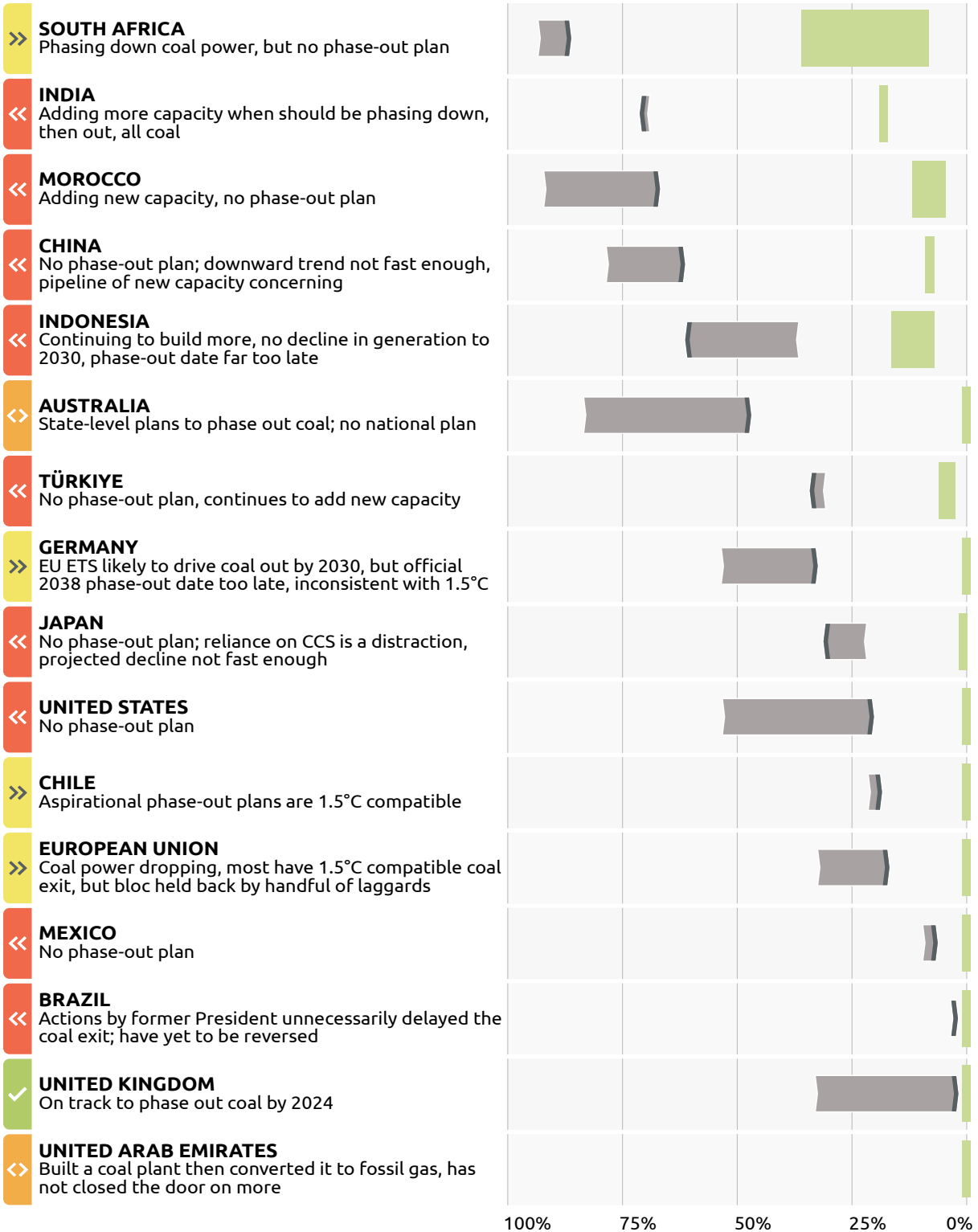
Climate finance will be key to meeting the 2040 global phase-out

The handful of Just Energy Transition Partnerships (JETPs) developed to date are a step in the right direction, but insufficient. Countries like Morocco, who are heavily reliant on coal power today, but have huge renewable energy potential, will need international support to ensure a swift transition.



Progress towards phasing out coal in electricity generation

Country level 1.5°C compatible benchmarks for 2030 compared to historical progress



Coal power share in total electricity generation %

Historical data: Value in 2000 to Value in 2022

1.5°C compatible benchmarks: For 2030

Country progress towards 1.5°C compatible benchmarks



Accelerating the transition to renewable electricity



What do we need for 1.5°C compatibility?

To limit warming to 1.5°C, the pace of renewables deployment needs to accelerate markedly. By 2030, more than 80% of the world's electricity needs to come from renewables.

There is significant variation at the country level, again, due to their current power mixes. Some countries with coal-dominated electricity mixes (such as Morocco) display very rapid transitions towards 100% renewables, while other countries with gas-dominated mixes (such as the UAE) move more slowly in IPCC assessed pathways. Achieving these rapid phase-outs in a fair manner will require significantly upscaled international support to countries like Morocco. For developed countries, like Japan and the USA, the slower renewable energy uptake is not due to a slower fossil phase-out, but due to the existing contribution of nuclear in the grid (which the CAT does not see as a solution).

But in general, developed countries should generate over 80% of their power from renewables by 2030. For developing countries, they should generate at least 50% to 75% of their power from renewables by this time, and more in some cases.

Achieving a highly renewable power sector across all countries is possible but will require unprecedented effort to accelerate renewables deployment. Beyond the scale of new installations, policies and measures are needed to ensure grid access, strengthen grid infrastructure, develop energy storage options and expand demand-side flexibility.



Figure 3: 1.5°C compatible share of renewables in global electricity generation



Where are we now?

In 2022, renewable electricity represented 30% of total generation. The growth over the past two decades has been modest, with solar and wind power driving most of it. Installation rates continue to grow, with 2023 on track to be 30% higher than last year, with 440 GW being added. Yet, more than three times this level - 1500 GW of wind and solar – needs to be added annually by 2030 to ensure sufficient generation share. At current rates, the world is on track to achieve around 50% renewable electricity by 2030, falling well short of the over 80% share needed for 1.5°C compatible.

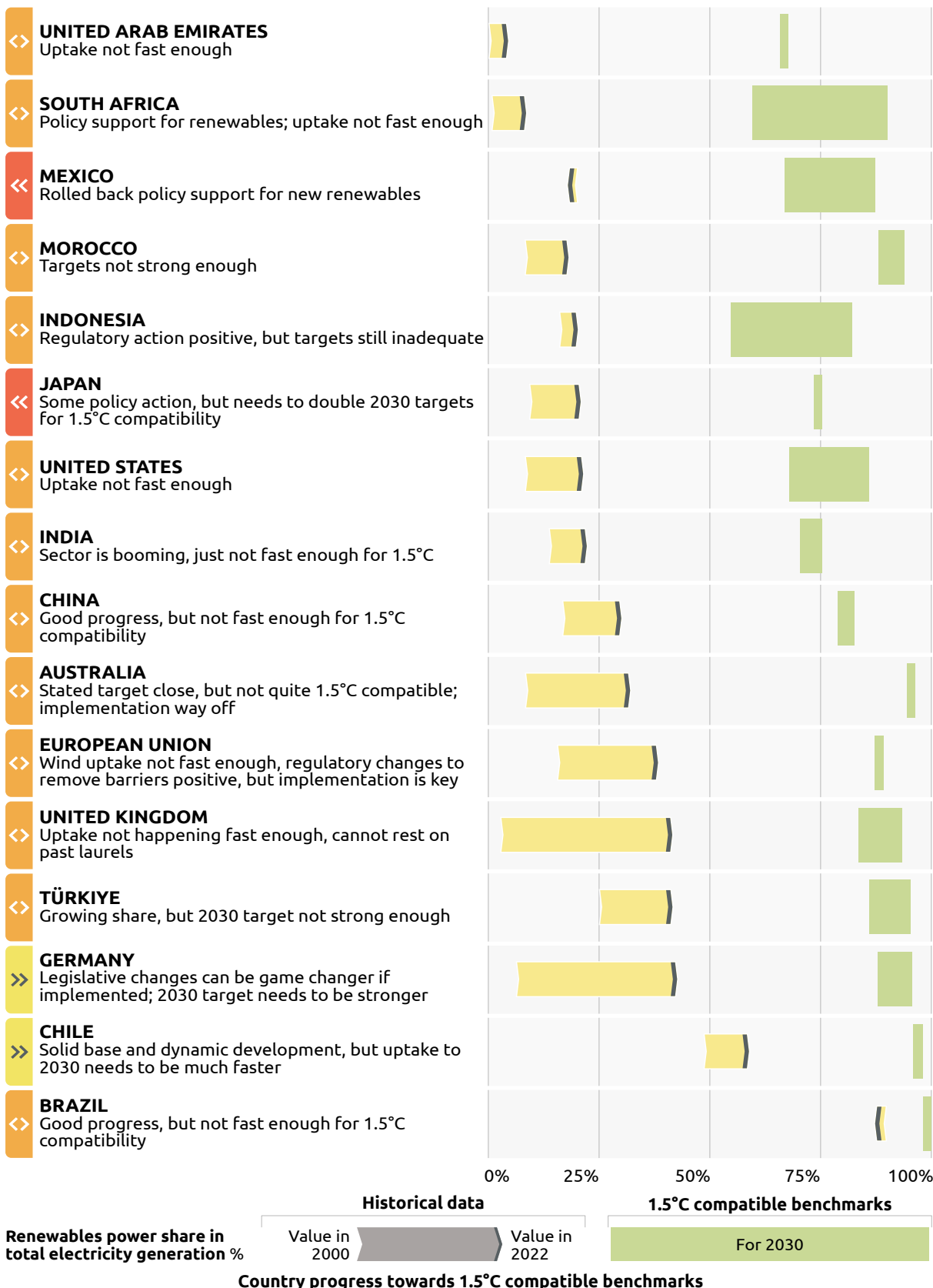
For most of the countries we analysed, the picture was mixed. Some have good targets, but poor implementation, while others are adding capacity, just not fast enough. Recent legislative changes in **Germany**, if fully implemented, will be a game changer for its renewable energy deployment. **Chile** has been improving its renewables targets over time and while it does not yet have a 1.5°C compatible target, its deployment rates look promising. These are the only two countries that we consider to be ahead of the pack. **Japan** and **Mexico** are on the other end of the spectrum: Japan has weak targets and Mexico has been rolling back support for new renewable technologies.

Overall, while renewable energy deployment is beginning to accelerate, there is still an important ambition gap in 2030 that needs to be closed and it is clear that all countries need to pick up the pace.



Progress towards 100% renewables in electricity generation

Country level 1.5°C compatible benchmarks for 2030 compared to historical progress





Country status



AUSTRALIA



Fossil gas
WRONG DIRECTION



Adding new capacity, no phase-out plan, projected increase by 2035



Coal
MIXED PICTURE



State-level plans to phase out coal; no national plan



Renewables
MIXED PICTURE



Stated target close, but not quite 1.5°C compatible, implementation way off

Australia’s electricity generation mix is dominated by coal, but has the potential for a rapid exit if it continues to advance on adding new renewable energy capacity, transmission lines and storage. But its goal to decarbonise its power sector does not have a target year and it is adding new fossil gas capacity. Overall, we find that Australia is at a crossroads.

Fossil gas provides about a fifth of Australia’s power. It has not set a deadline nor committed to phasing out fossil gas. Several Australian states are building or planning new gas capacity.²⁷ The federal government, for its part, has promised to prepare a ‘Future Gas Strategy’ to support achieving its renewable electricity target, which will, presumably, include fossil gas.²⁸

Fossil gas needs to be phased out by 2035 for 1.5°C compatibility. Building new capacity creates the risk of stranded assets or further entrenching fossil gas power beyond sustainable levels.

Australia has no national plan to phase out coal from its generation mix, despite its ageing, and increasingly unreliable,²⁹ coal power fleet. States are stepping up as leaders in the coal phase-out, in the absence of a national-level plan.³⁰ The sector is in significant flux: some plants are bringing forward closure dates,³¹ but other closures are being delayed over grid security fears.³² Coal provides just under half of the country’s power today and needs to go to zero by 2030 to be 1.5°C compatible.

The Australian Government’s stated renewable energy generation target of 82% by 2030 is not enshrined in legislation, unlike the previous target that ran out in 2020.³³ To be 1.5°C compatible, it needs to be generating at least 95% of its power from renewables in 2030.

Australia, which generates about a third of its electricity from renewables today, is not on track to meet its 82% renewable target. Under existing policies, the government projects achieving only 68% renewable energy generation by 2030 and 75% in 2035.³⁴ The investments needed in its transmission system to support rapid uptake are not happening fast enough and delays in grid connections are becoming increasingly problematic.³⁵ Despite the growth in rooftop solar adoption, the country’s progress in offshore wind energy development remains limited, even though there is a substantial potential for this form of renewable energy. Only one project has received the necessary licenses and environmental clearance.³⁶



BRAZIL



Brazil's electricity system is dominated by hydro power, with fossil gas and coal making up only about a tenth of generation. It has one of the cleanest power grids today, but it is also vulnerable to climate change.³⁷ 2021 was the driest year in almost a century, leading to low hydro power generation and a spike in fossil fuel use.³⁸ Brazil is heading in the wrong direction when it comes to coal and fossil gas, thanks in part to measures from the previous administration that have not (yet) been reversed.

Brazil is expanding its fossil gas capacity at a time when it needs to be phasing it out. It has added 4GW of new capacity since 2019 and under a 2021 law is required to contract 8GW of new fossil gas power that would run at a minimum capacity of 70% and require new gas pipeline infrastructure to serve these plants.³⁹ This mandated expansion results in a significant increase in power sector emissions by 2030, compared to a drop in emissions under market forces.⁴⁰ The government has encountered difficulty in contracting this new capacity: a 2022 auction yielded only about a third of its desired capacity.⁴¹ Lula's government is reviewing this legislation,⁴² though a complete fossil gas phase-out plan and not just repealing counterproductive legislation is needed.

Coal-fired power generation is responsible for 2-3% of Brazil's power on average, though 2022 saw the lowest level in a decade, as good hydro power conditions displaced the need for coal generation.⁴³ Coal power is highly reliant on government subsidies, which are set to expire in 2027.⁴⁴

Government modelling shows that most coal capacity could exit the system in 2027 and 2028 as power contracts and subsidies expire.⁴⁵ Such an exit is consistent with a 1.5°C pathway as Brazil needs to phase out coal by 2030. However, actions by former President Bolsonaro have delayed this retirement: in 2022, his administration passed a law to extend the life of a coal power complex until 2040 and require new coal capacity to be added to the system from 2028.⁴⁶ The constitutionality of the law is being challenged in court and the case is pending.⁴⁷

Until these unnecessary lifelines to the coal industry are reversed, we consider Brazil to be off-track on phasing out coal.

Brazil has been expanding its renewable electricity capacity beyond its solid hydro power base. Wind capacity has increased more than 10-fold over the last decade, adding over 2GW, on average, each year.⁴⁸ Solar growth began in 2017 and has increased 7-fold since that time. While Brazil will continue to expand its renewable electricity capacity, its current plans do not put it on track for essentially clean power by 2030.⁴⁹



CHILE



Fossil gas
WRONG DIRECTION



No phase-out plan



Coal
RIGHT DIRECTION



Aspirational phase-out plans are 1.5°C compatible



Renewables
AHEAD OF THE PACK



Solid base and dynamic development, but uptake to 2030 needs to be faster

Chile was an early adopter of a coal phase-out, but has no plans to phase out fossil gas. Renewables are gaining ground, even though not fast enough to essentially decarbonise the grid by 2030. Overall, we consider Chile to be heading in the right direction.

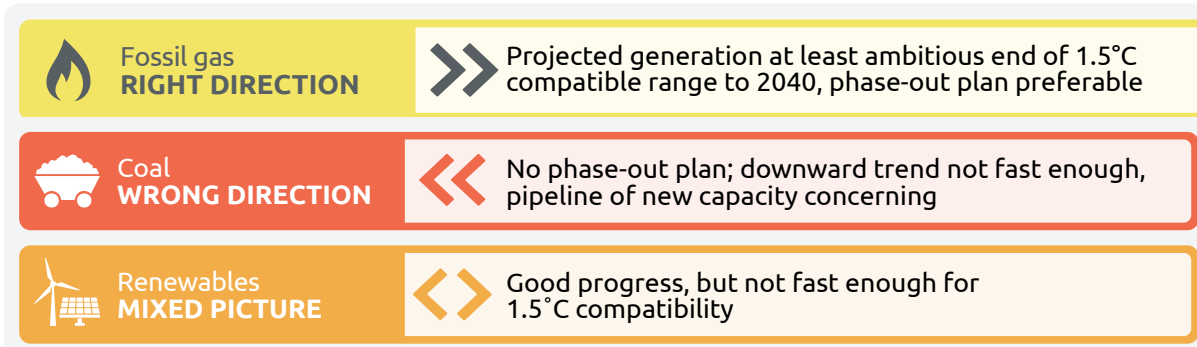
Fossil gas is responsible for about a fifth of Chile's power generation. For 1.5°C, it needs to largely phase down this power source by 2030, with a complete phase-out by 2035. The country is currently heading in the wrong direction by retrofitting some of its coal plants to fossil gas, despite it foreseeing a diminished role for fossil gas in the future.⁵⁰

Chile has committed to phasing out coal power. Originally set for 2040, Chile has an aspirational goal of 2030, which is 1.5°C compatible.⁵¹ Today, Chile still generates over a fifth of its power from coal. Of 28 units that were operational in 2019 when the coal phase-out was decided, 20 have a date to shut down or shift to gas before 2030, faster than originally planned. For the eight remaining units, the exact schedule is not yet set, but they will be retired or retrofitted for use with gas before 2040.⁵²

Since 2022, Chile has generated just over half of its power from renewables.⁵³ Chile has strengthened its renewable energy targets over time, to the current target of 80% renewable generation by 2030,⁵⁴ but this target is not yet 1.5°C compatible. For 1.5°C, almost all of Chile's power should come from renewables by 2030. However, wind and solar deployment are taking off strongly in Chile.⁵⁵ With further action to support their roll-out, Chile could achieve much greater than 80% renewables by 2030 and align with 1.5°C.



CHINA



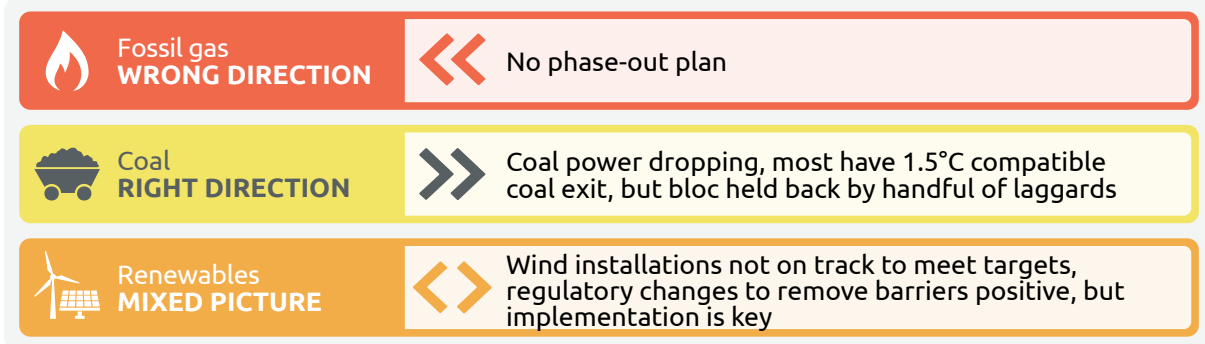
Despite record growth in renewable electricity and fossil gas power projections that are likely to be 1.5°C compatible to at least 2030, we consider China to be off track overall due to the additions of new coal-fired power plants and the lack of a coal phase-out plan.

China has a comparatively low dependency on fossil gas for power generation, with projections under current policies to remain around a 3% share beyond 2040. While this likely falls at the least ambitious end of a 1.5°C compatible range up to 2040, it needs to be phased out before 2050. It would be much better to gradually phase out gas by 2040. Fossil gas developments outside of the power sector, where China has sought to lock-in long term supply and expand its gas infrastructure, are also concerning as these may inhibit the decline needed in fossil electricity.

Coal power has long dominated China's electricity sector. Its share of total generation is projected to decline, but not at a rate fast enough for 1.5°C compatibility. China anticipates generating just under half of its power from coal in 2030, down to about a third in 2040,⁵⁶ whereas a 1.5°C compatible pathway would see coal power in the single digits by 2030 and completely phased out by 2040.

Although China has targeted a reduction in coal consumption after 2025, there is no concrete target of a complete phase-out, despite a carbon neutrality target in 2060. China continues to rapidly approve and construct new coal power plants in 2023 and currently has about 240 GW permitted or under construction: the figure could rise to almost 400 GW in the pipeline if permitting of new coal power capacity is not controlled.⁵⁷

China continues to make remarkable progress in renewable energy uptake: adding over 100 GW of combined wind and solar capacity annually since 2020. 2023 is projected to be another record year. While the share of renewable electricity is expected to grow to 44% in 2030, 52% in 2035, and 58% in 2040,⁵⁸ this growth is not expected to be fast enough to meet growing demand and displace fossil fuel generation. For 1.5°C compatibility, renewables would need to account for roughly 80% in 2030 and 89 to 97% in 2040.



The EU’s use of fossil gas and coal power is down notably in 2023. While it is heading in the right direction on phasing out coal power by 2030, despite some laggards, it urgently needs a plan to exit fossil gas power. It has started to address barriers to renewable uptake, but implementation will be key, especially for wind power.

Fossil gas provides around a fifth of the EU’s electricity and needs to fall to the low single digits by 2030, with a complete phase out by 2035 to be 1.5°C compatible. The EU does not have a plan to phase out fossil gas power. Fossil gas power generation is down 13% for the first half of 2023, however this is due to high prices and reduced demand,⁵⁹ not concerted policy effort. The EU needs to clearly spell out its vision for phasing out fossil gas by 2035. Its broader efforts to secure LNG supply and build out gas infrastructure do not inspire confidence.⁶⁰

The EU’s coal power share has been trending downward for some time. The energy crisis has not resulted in a deviation from this general trend.⁶¹ In May 2023, coal power generation dropped to 10%, a record low.⁶² Overall, usage in the first half of 2023 was down by close to a quarter. To be 1.5°C compatible, the EU needs to phase out coal by 2030 at the latest.

Most EU member states have coal power phase-out dates consistent with this timeline, though a handful do not.⁶³

- ▶ **Germany’s** official phase out date is 2038, but the EU ETS is likely to ensure a coal exit by 2030.
- ▶ **Croatia, Slovenia, and Czechia** will all phase out coal by 2033 at the latest, though there is potential for any earlier coal exit.⁶⁴

The real laggards, however, are Poland and Bulgaria.

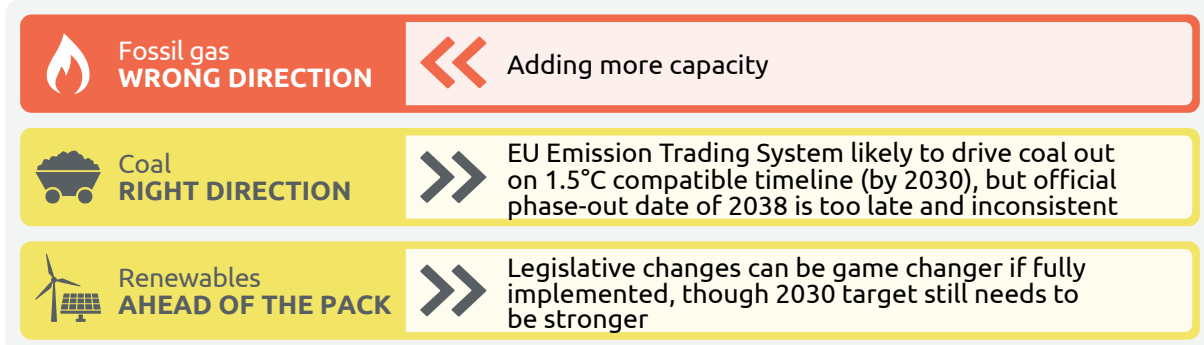
- ▶ **Poland** does not have a coal power phase-out date, but has set 2049 as the end date for its hard coal mining.⁶⁵ More than 70% of Poland’s electricity is from coal.⁶⁶ While the country is in the process of updating its national energy policy, initial figures suggest that 35% of its power would still come from coal in 2030 and 8% in 2040.⁶⁷ Others have shown a phase out can occur much faster.⁶⁸
- ▶ **Bulgaria** had agreed to a 2030 phase-out date last year,⁶⁹ but walked back that commitment in January 2023.⁷⁰ The country has been losing out on € millions in EU funding for failing to develop just transition plans for its coal sector, which will become uneconomic when subsidies are withdrawn in 2025.⁷¹

Overall, we consider the EU to be heading in the right direction, despite its laggards.

Close to 40% of the EU’s power came from renewables in 2022, but this needs to more than double by 2030 to be 1.5°C compatible. Industry assessments find that the EU is not installing wind capacity fast enough to meet its 2030 climate and energy targets.⁷² The EU has a substantial wind pipeline, but permitting remains a challenge. Recent regulatory changes should help this progress, but implementation of these measures by member states is critical.⁷³ Solar is doing better and on-track to exceed its 2030 capacity target, highlighting that the EU can increase its ambition in this area.⁷⁴



GERMANY



German power has come from an historic reliance on coal power, and accelerating renewable energy expansion is a government priority. Government action on fossil gas is another story: Germany is adding new gas capacity rather than reducing reliance. Overall, Germany needs to accelerate renewables further to achieve its goal of 80% renewables in the electricity sector by 2030.


Germany does not have a fossil gas phase-out plan. It chose not to include the target of nearly 100% zero emission power by 2035 in its renewable energy law,⁷⁵ although it had agreed to it as part of the G7 communiqué⁷⁶ and uses it on its websites⁷⁷. Under current policies Germany will continue to build gas combined heat and power stations until 2028. Electricity production from gas will increase until 2027 and will still be 10% higher in 2030 than in 2023.⁷⁸

To be 1.5°C compatible the share of fossil gas in the electricity generation mix should be halved by 2030 at a minimum, but the lower the better. Achieving its renewable generation and aspirational 2030 coal phase-out targets would leave too high a share of fossil gas in 2030. Its efforts to secure its fossil gas supply in the wake of Russia's illegal invasion of Ukraine, risk locking in unsustainable use of fossil gas in the power (and other) sectors and threatens the necessary transition in partner countries. Germany needs to eliminate its fossil gas dependency and not just diversify its supply.

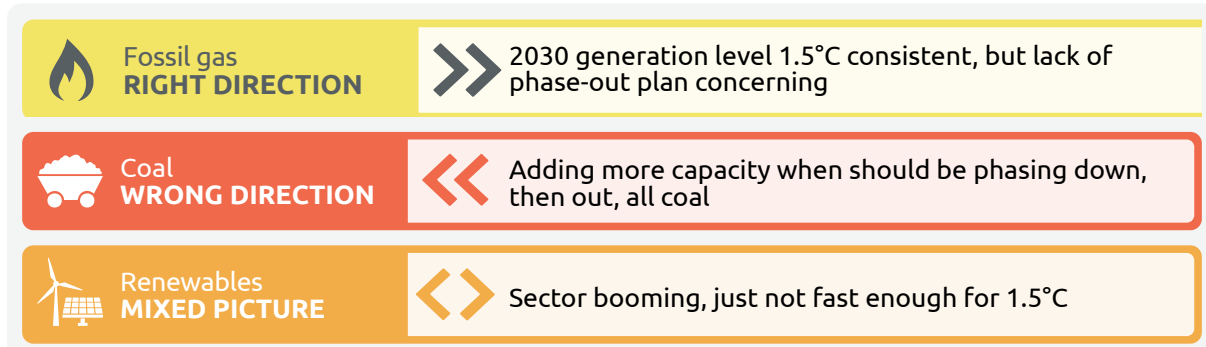
Coal power accounted for about a third of electricity generation in 2022, but is down to a quarter for the first eight months of this year.⁷⁹ Research, including from the country's own Federal Environment Agency, suggests that the EU Emissions Trading System will mostly drive coal out of the market by 2030.⁸⁰ While this date is the current government coalition's "ideal" phase out timeline, the official coal exit law still refers to 2038. Two thirds of Germany's coal power uses the most emissions-intensive form: lignite, and the sector is responsible for roughly a third of Europe's coal power CO₂ emissions.⁸¹ A full phase-out of coal in Germany by 2030 would be required for a 1.5°C-compatible trajectory.

Renewables provided just over 40% of Germany's electricity in 2022, but is up to 60% for the first eight months of this year.⁸² Revisions to the Renewable Energy Law (EEG) and the offshore wind energy law (WindSeeG) mean that renewable energy installations are now considered in the public interest so they can be prioritised over other issues.⁸³

The revisions also enhance support for rooftop solar PV, increase the focus on participatory models for citizens, support storage and redirect biogas towards flexible power generation. If fully implemented, these revisions will be a game changer for the industry. The government aims to generate 80% of its electricity from renewables by 2030, while strong, this level is not yet compatible with a 1.5°C trajectory, which needs to be in the range of 88-96% by 2030.



INDIA



India is not on track to pull the power plug on fossils. We are cautiously optimistic about its fossil gas, but coal remains a significant challenge. India needs to stop building new coal power capacity and develop a sustainable and inclusive plan for the early retirement of its existing capacity, a plan that includes international support needs. This includes the rapid build-out of renewable electricity and storage options, to ensure seasonal peaks in the demand can be met safely and confirming a fossil gas exit by 2040.

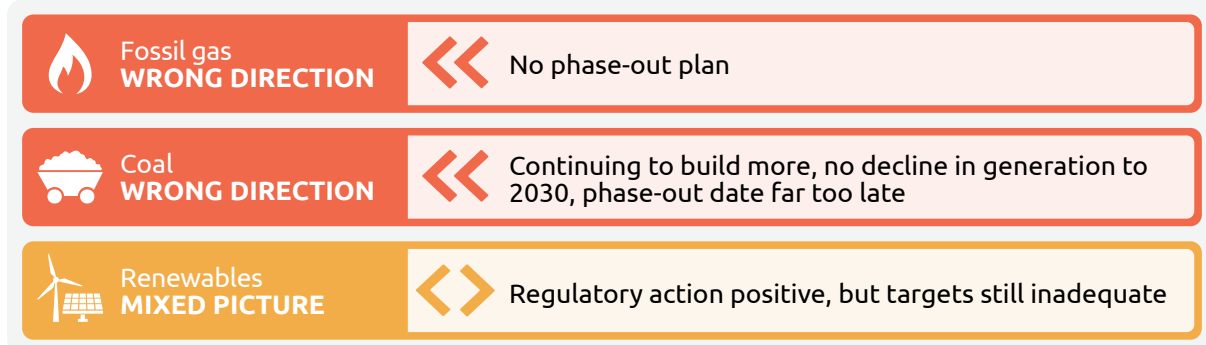
India has 25GW of gas power capacity, which generated a small fraction of its power in 2022. It has no plans to build any new gas-powered facilities and anticipates having roughly the same capacity in 2030.⁸⁴ The government estimates that it will generate 1.7% of its electricity from gas in FY2026 and 1.3% in FY2031. These generation levels are consistent with a 1.5°C compatible world in 2030, it needs a clear and explicit plan to phase out its remaining capacity post-2030 to remain 1.5°C compatible.

India is heading in the opposite direction entirely when it comes to phasing out coal power. It generates over 70% of its power from coal today and expects to still be producing 50% of its power from coal in 2030,⁸⁵ well above our 1.5°C benchmark of 17-19% and a complete phase out between 2035-2040. It is continuing to add to its massive coal fleet over the next decade with 27 GW of new coal power under construction or in advanced planning and an additional 24GW in the pipeline.⁸⁶

This continued construction only further adds to India's stranded asset risk.⁸⁷ India's coal fleet is relatively young, with much of it built in the last decade.⁸⁸ Without an early retirement plan, this existing capacity could potentially remain operational for another 40 to 50 years.

India is a world leader in new renewable energy (excl. hydro) for both total capacity and generation.⁸⁹ By mid-2023, India had installed more than 130 GW of new RE capacity, 30% of its total capacity.⁹⁰ It plans to add around 300 GW of solar and 80 GW of wind by the end of the decade.⁹¹ As positive as the recent growth and future plans are, they are not fast enough for 1.5°C compatibility. To be 1.5°C compatible, 70-75% of India's electricity generation should come from renewables in 2030. It will be less than 50% under the government's current plans.

INDONESIA



Indonesia is heavily reliant on coal power. It is moving forward with several energy transition mechanisms aimed at accelerating the phase out of coal power, but its phase-out plan for 2050 is far too late for 1.5°C. There is no plan to phase out fossil gas. Recent regulatory action should help accelerate the uptake of renewables, but targets remain inadequate for 1.5°C.

Fossil gas provides around 15% of Indonesia's electricity. Its share of power generation is projected to fall slightly by the end of the decade, but will increase in absolute terms. To be 1.5°C compatible, fossil gas needs to be on a clear downward trend by 2030 and essentially phased out by 2040.

The majority of Indonesia's electricity is from coal. Under current plans, Indonesia's coal fleet will continue to expand and coal will still provide over 60% of the country's electricity in 2030.⁹² Indonesia's large captive coal pipeline threatens to exacerbate this dependence on coal and drive emissions even higher.⁹³ To be 1.5°C compatible, Indonesia needs to rapidly cut coal generation this decade and phase out coal entirely by 2040. The government has set a 2050 phase out date for unabated coal power generation, but this is far too late.⁹⁴ However Indonesia will need significant financial support to accelerate its coal phase out.

Indonesia is currently developing the Energy Transition Mechanisms (ETMs) to mobilize capital for early retirement of coal-fired power plants.⁹⁵ It is also working on a Just Energy Transition Partnership (JETP), under which power sector emissions would peak in 2030 and reach net zero power sector emissions by 2050. The partnership aims to mobilise USD 20 billion over the next five years, but only a tiny fraction is in the form of grants.⁹⁶

Indonesia generated about a fifth of its electricity from renewables in 2022. The sector is now on an upwards trend, with rooftop solar growing dynamically. Under its current energy plan, Indonesia aims to reach 23% renewable electricity by 2025 and 31% by 2050. The JETP significantly increases this target to 34% by 2030. To be 1.5°C compatible, it needs to generate at least 55% and up to 80% by 2030. However, to reach these levels Indonesia will need significant financial support.

Indonesia's potential for renewables, particularly solar, is much higher than reflected in its plans and targets.⁹⁷ Current investment in renewables has fallen short with its renewable capacity goals, signalling the absence of attractive tariffs; the need to improve its financing ecosystem to disfavor coal; and the need for firm regulation to incentivise renewables developments in the country.⁹⁸



JAPAN



Fossil gas
WRONG DIRECTION



No phase-out plan, projected decline not fast enough



Coal
WRONG DIRECTION



No phase-out plan; reliance on CCS is a distraction, projected decline not fast enough



Renewables
LAGGING BEHIND



Some policy action, but needs to double 2030 targets for 1.5°C compatibility


Japan does not have a fossil gas phase-out plan. Today, two thirds of its electricity come from fossil gas and coal, and while it projects that this share will fall by 2030, it is nowhere near fast enough for 1.5°C compatibility. Japan is off track on all metrics.

About a third of Japan's electricity comes from fossil gas. Its latest energy plan projects that fossil gas generation will fall to 20% by 2030,⁹⁹ which is not fast enough to be 1.5°C compatible. Instead, Japan needs to effectively phase out fossil gas by 2035 and achieve a clean electricity system.

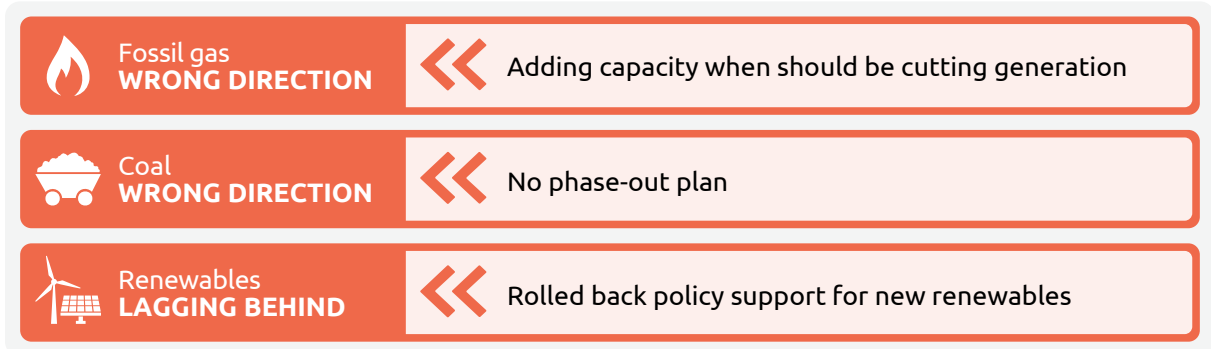
Coal provides another third of Japan's power. The country has started to shift away from coal and anticipates generating only about a fifth of its power from coal in 2030, but this decline is nowhere near fast enough. To be 1.5°C compatible, Japan needs to phase out coal completely by 2030.

Equally concerning is the fact that the government does not intend to phase out coal power, but rather rely on carbon capture and storage (CCS).¹⁰⁰ The 2030 coal phase-out for Japan is for both unabated and abated coal. There is no role for coal power in Japan's electricity mix post-2030 at all.

Renewables provide about a fifth of Japan's electricity and have been growing steadily in the past few years. Japan has a renewable electricity target of 36-38% by 2030,¹⁰¹ but to be 1.5°C compatible, it will need to generate about twice that target level. It adopted further policies measures last year to support renewable energy uptake; however, these will be insufficient to achieve 1.5°C compatible levels.¹⁰²



MEXICO



Mexico has no plans to phase out either fossil gas or coal. It has been rolling back support for new renewable energy and is far off track from decarbonising its electricity supply.

Fossil gas is the dominant source of electricity generation in Mexico, responsible for more than half of its power. Mexico has no plans to phase out fossil gas nor commit to a decarbonised power sector. It plans to add 6 GW more fossil gas capacity by 2026 up from ~45 GW today,¹⁰³ and anticipates continued generation from fossil gas throughout the 2030s.¹⁰⁴ Mexico needs to cut its fossil gas generation by more than half by 2030, with a total phase-out no later than 2040 to be 1.5°C compatible.

Coal provides less than 10% of Mexico's electricity. The country does not have plans to add more coal capacity in the coming years but also does not have a clear plan to phase-out existing infrastructure.¹⁰⁵ For 1.5°C compatibility, Mexico would need to phase out coal in its electricity sector, at the latest, by 2030.

Mexico needs to generate at least two thirds of its power from renewables in 2030 to be 1.5°C compatible, up from about a fifth today. In the last few years, Mexico has rolled back policies that supported and incentivised the development of new renewable energy capacity from the private sector and instead has prioritised modernisation of existing national hydropower plants.



MOROCCO



Fossil gas
WRONG DIRECTION



Adding new capacity, no phase-out plan



Coal
WRONG DIRECTION



Adding new capacity, no phase-out plan



Renewables
MIXED PICTURE



Targets not strong enough

Morocco has no plans to phase out fossil fuels in its power sector and is heading in the wrong direction by adding fossil capacity. Morocco has huge renewable energy potential and will need international support to help it phase out fossil power.

Morocco's power generation is dominated by coal, which provides about two thirds of its power. The government has not committed to phasing out coal and is moving in the opposite direction, adding new coal capacity and extending the life of existing facilities into the 2040s.¹⁰⁶ To be 1.5°C compatible, Morocco would need to cut coal power generation to around a tenth in 2030, and completely phase out coal power by 2040, with support of the international community.

Fossil gas provides roughly a tenth of Morocco's electricity. To be 1.5°C compatible, Morocco needs to phase out most of its fossil gas generation by 2030 and entirely by 2035. The government plans are heading in the wrong direction. It intends to build 450MW of additional fossil gas generation by 2030.¹⁰⁷ It is also building up its LNG infrastructure to diversify and secure its supply.¹⁰⁸

About a fifth of Morocco's electricity comes from renewables today, but that level needs to jump to around 90% in 2030 to be 1.5°C compatible. The government is supportive of renewable energy development and has set capacity targets for 2030 and 2050, although it was not able to meet its 2020 capacity target. Its capacity targets are unlikely to achieve the levels of generation required for 1.5°C compatibility. For Morocco to achieve the rapid acceleration it needs, it will require significant international support.



SOUTH AFRICA



Fossil gas
MIXED PICTURE



Government seems determined to get some, despite cheaper renewables/ batteries



Coal
RIGHT DIRECTION



Phasing down coal power, but no phase-out plan



Renewables
MIXED PICTURE



Policy support for renewables, though uptake not fast enough

South Africa has the potential to accelerate its energy transition, but its current plans are inconsistent with this goal as it anticipates still having coal power beyond 2050, seems determined to develop fossil gas power and is not installing renewables fast enough.

South Africa's plan to procure fossil gas power is likely to disrupt its transition to a renewables-based economy.¹⁰⁹ It intends to launch a procurement round for 3GW of fossil gas this year,¹¹⁰ though the potential pipeline could be upwards of 14GW.¹¹¹ In 2021, 1.2GW of floating LNG-to-power vessels were selected as part of an emergency capacity procurement programme,¹¹² but none of these power ships have secured the necessary environmental permits to proceed.¹¹³ The government is also looking to revise its contract length from 20 years down to five or less.¹¹⁴

Though a small amount of fossil gas would be 1.5°C compatible in 2030, it must be entirely phased out by 2035. Seeing as there is no actual need for fossil gas, even for peaking or balancing power, as renewable energy and battery storage are already an economic alternative,¹¹⁵ South Africa would be well advised to skip this dirty chapter entirely.

The majority of South Africa's electricity is from coal. It has committed to phasing down coal power as part of its Just Energy Transition Investment Plan (JETP), but has not yet set a date for a full phase-out.¹¹⁶ Some plants have already been shut down, with more scheduled to go offline – it expects 22 GW to be decommissioned by 2035. However, the frequent - and increasingly longer - blackouts that are plaguing the country may delay part of this phasedown.¹¹⁷ It also anticipates still having coal power beyond 2050 and is bringing on new capacity in the coming years.¹¹⁸ While South Africa is heading in the right direction, it needs to cut its coal power reliance significantly by 2030 and phase it out by 2040.

South Africa generates less than 10% of its power from renewables today, but needs to grow that share to 60-90% by 2030 to be 1.5°C compatible. The government has held several successful procurement rounds – with bidding oversubscribed – but there have been considerable delays in connecting these projects to the grid.¹¹⁹ The government does recognise that strengthening and expanding the transmission grid is critical to enabling a rapid scaling up of renewable energy.¹²⁰ It has also taken measures to simplify licensing, which should accelerate solar PV uptake.¹²¹ South Africa is in the process of updating its electricity sector plan for 2030 and beyond.¹²² Public consultations are expected later this year. Its Presidential Climate Commission expects the updated plan to include 50-60GW of variable renewable energy and 3-5GW of peaking support.¹²³ These installation levels are unlikely to be sufficient to achieve the levels of generation needed for 1.5°C compatibility. South Africa had about 10GW of installed renewable capacity in 2021.¹²⁴



TÜRKIYE



Fossil gas
WRONG DIRECTION



Plans to add new capacity instead of a phase-out, broader fossil hub aspirations risk potential lock-in



Coal
WRONG DIRECTION



No phase-out plan, continues to add new capacity



Renewables
MIXED PICTURE



Growing share, but 2030 target not strong enough

Türkiye's electricity is dominated by fossil fuels. Rather than investing further in domestic lignite coal and fossil gas production to reduce its dependency on imported fossil fuels, Türkiye should focus on further increasing and diversifying its renewable energy generation to avoid technology lock-in and improve energy security.

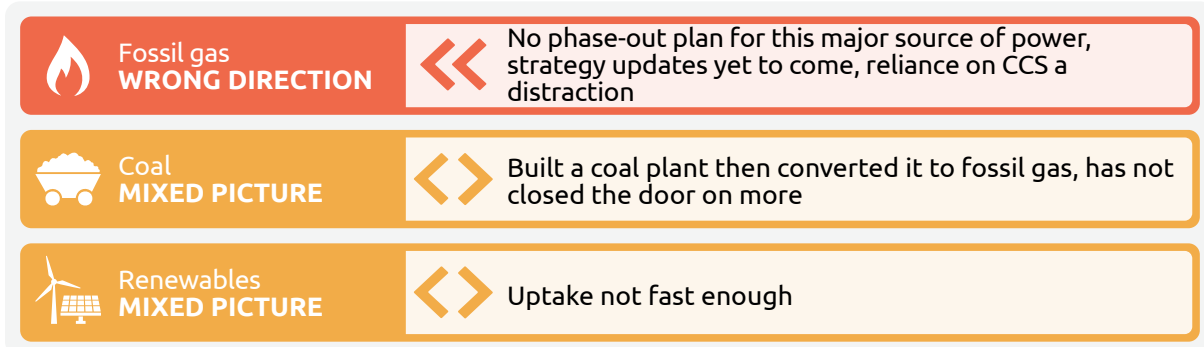
Coal power provides about a third of Türkiye's electricity. It has not committed to phasing out coal power, and continues to bring new capacity online.¹²⁵ The viability of its remaining coal pipeline becomes more questionable by the day due to mounting financial risks and vulnerabilities, and decreasing investment interest in coal power.¹²⁶ The pipeline has been cut in half compared to last year.¹²⁷ To be 1.5°C compatible, the Turkish government needs to urgently adopt a coal phase-out, cutting generation to the single digits by 2030 and phasing it out entirely during the 2030s. Civil society has called for, and shown, that a 2030 phase-out date is feasible.¹²⁸

Fossil gas provides close to a quarter of the country's electricity. Türkiye's National Energy Plan for 2020-2035 does not outline its fossil gas plans,¹²⁹ but new fossil gas plants are in the pipeline.¹³⁰ The country is currently a fossil gas importer, but it has plans to establish itself as a gas trading hub¹³¹ and intends to ramp up its offshore gas production,¹³² which could further delay any transition away from fossil power. By 2030, Türkiye needs to significantly cut its fossil gas generation and urgently needs to develop a plan to exit both coal and fossil gas.

Türkiye has been increasing its renewable energy generation for more than a decade and now generates over 40% of its power from a mix of sources, led by hydro and wind.¹³³ However, Türkiye's target of reaching a 47.3% share of renewable electricity generation by 2030 is still far off-track from a 1.5°C compatible benchmark.¹³⁴ It needs to more than double its share of renewable electricity generation by that time for 1.5°C compatibility.



UNITED ARAB EMIRATES



The vast majority of the UAE's electricity comes from fossil gas. To be 1.5°C compatible, it would need to cut this generation down to a third by 2030 and almost completely phase it out by 2035. We expect an update on its electricity sector plans if it submits its long-term strategy to the UNFCCC later this year, but nothing we have seen to date suggests that it is on the right track.

The UAE has called for an emissions phase-out rather than a fossil fuels phase-out, and stressed the importance of carbon capture and storage for its energy transition.¹³⁵ Fossil plants equipped with CCS are not cost-competitive with renewable energy technologies and come with additional ecological and societal risks (see box on CCS). There is also no technology commercially available at scale that comes close to a 100% emissions capture rate. In any event, our 1.5°C benchmark of 1% fossil gas in 2035 for the UAE is for all gas, both those equipped with CCS and those that are not.

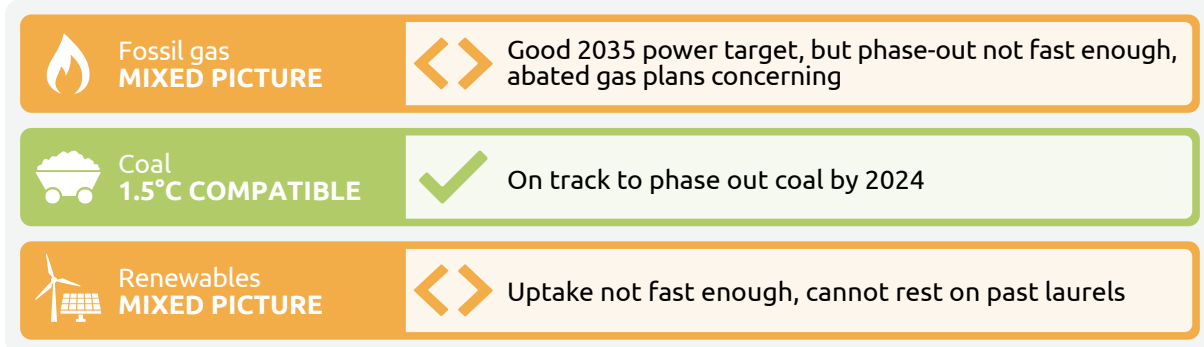
As in-coming COP President, the UAE can make a significant impact on climate ambition by securing global agreement to phase out fossil gas by 2040 globally and lead by example by doing that at home by 2035.

The UAE is currently not generating any coal power. It did construct its first coal power plant (and the first for the Middle East) in 2020, with further units planned for this year, but announced in 2022 that the plant would switch to fossil gas. The UAE has not definitively ruled out developing further coal facilities. Similar to gas, we expect an update on its plans when its long-term strategy is released. To be 1.5°C compatible, the UAE should commit to keeping coal out of its electricity mix.

The UAE's share of renewable electricity is currently in the single digits, but the government is adding capacity, especially solar energy, rapidly. With its current and planned renewable energy developments, the UAE is expected to reach 9 GW of renewable power by 2030, or about 15% of electricity generation.¹³⁶ To a 1.5°C compatible, UAE needs to generate two thirds of its power from renewables in 2030 and almost all of it by 2035.



UNITED KINGDOM



The UK has committed to decarbonising its electricity sector by 2035. It is on track to phase out coal by 2024, but off track when it comes to fossil gas. Renewables will be key to achieving the decarbonisation target, but the UK's historical success of supporting renewables deployment is at risk.

Today, close to 40% of the UK's power comes from fossil gas. Meeting its 2035 clean power target will essentially require phasing out this gas, but the government has not released a comprehensive strategy on how to achieve this objective.¹³⁷ Its own advisory body considers it to be 'slightly off track' with halving its fossil gas by 2025 (a key milestone towards decarbonisation).¹³⁸

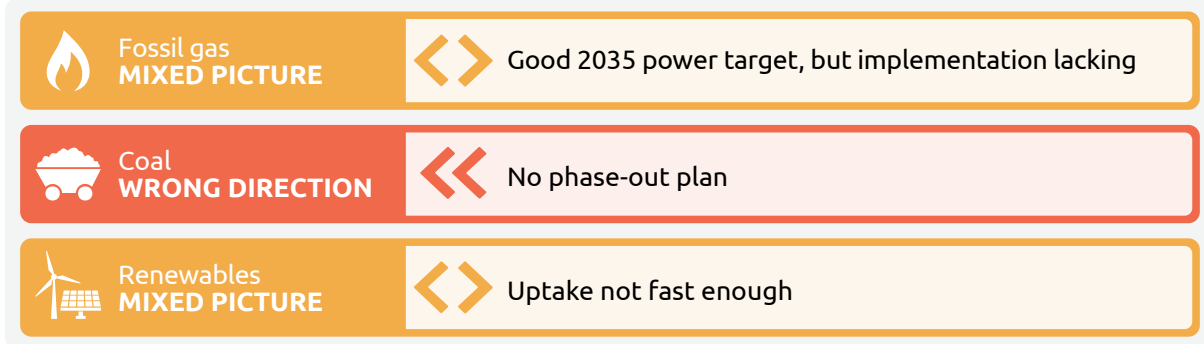
It is also in the process of building new abated fossil gas (i.e. fossil gas with CCS), with a 860 MW plant in advanced negotiations and several other projects in development.¹³⁹ While a small amount of abated gas is consistent with 1.5°C, the scale the UK is considering is likely not. Instead of banking on abated fossil gas, the UK should be prioritising alternative sources of flexibility such as green hydrogen, demand-side response and improved transmission and distribution networks.

The UK has been a world leader when it comes to ensuring a global coal exit. The country will phase out coal power by 2024. Less than 2% of the UK's power came from coal in 2022.¹⁴⁰

Renewables supplied over 40% of the UK's electricity in 2022. This level needs to more than double by 2030 to be 1.5°C compatible. The government has set various GW targets for offshore wind and solar PV. The government's advisory body considers that deployment is 'slightly off track' for its offshore wind target and 'significantly off track' for solar.¹⁴¹ Planning system barriers are slowing the deployment of solar and onshore wind,¹⁴² while offshore wind deployment is also faltering after the latest auction received no bids from developers.¹⁴³ The UK's historic performance in supporting renewables is to be commended, but the UK cannot rely on its past successes, and needs to act to address these issues immediately.



UNITED STATES OF AMERICA



Coal-fired power generation has generally declined year-on-year over the last decade. As coal power has exited the system, fossil gas power has grown and is now the largest source of electricity. Renewables are also on the rise, overtaking coal and nuclear in 2022, to become the second largest source.¹⁴⁴ The US has the right target for its power sector, but it is not phasing out fossil gas and coal and phasing in renewable energy fast enough.

The Biden administration's target of a carbon-free power system by 2035 is 1.5°C compatible, but the US is not on track to achieve this based on current policies. The proposed emissions standards for existing natural gas facilities only apply to large plants (>300 MW) operating as baseload.¹⁴⁵ While setting emissions limits for power plants is a step in the right direction, most fossil gas plants will not be covered. By 2030, the US needs to be well on its way to a carbon-free grid, with fossil gas generation more than cut in half from today's levels.

The resurgence of coal power in 2021, due to high fossil gas prices is not expected to affect the long-term downward trajectory of this power source. Nearly 30% of the coal-fired generating capacity has been retired since 2010, and no new coal-fired capacity has been installed since 2013, nor is any planned.¹⁴⁶ Notwithstanding the decline, government projections still show coal capacity of 73 GW in 2050.¹⁴⁷ Generation is expected to decrease to a share of 8% by 2030.¹⁴⁸ This decline is not fast enough, as a complete phase out of coal-fired power generation by 2030 is required for a 1.5°C compatible transition.

Market forces and recent legislation (IRA) are expected to continue to drive the growth of renewables in the electricity sector in the future, displacing coal and gas-fired power plants. The CAT projects that the share of renewables in electricity generation will increase to 47% in 2030 and 62% in 2050. However, these penetration levels are not enough to meet President Biden's goal of a carbon-free power sector by 2035, nor the levels required for a 1.5°C trajectory of 68-86% by 2030.



Annex: 1.5°C benchmarks



Share of total coal-fired power generation

Table 1: 1.5°C compatible benchmarks for total coal-fired power generation

**In Morocco historical data is only available until 2021. Countries are ordered by developed vs. developing, and then by size of emissions in 2021.*

Country	2022	2030	2035	2040	2050
Global	36%	4%	1%	0%	0%
USA	20%	0%	0%	0%	0%
EU27	17%	0%	0%	0%	0%
Japan	31%	0%	0%	0%	0%
Germany	33%	0%	0%	0%	0%
Australia	47%	0%	0%	0%	0%
UK	2%	0%	0%	0%	0%
UAE	0%	0%	0%	0%	0%
China	62%	7–9%	1–3%	0%	0%
India	72%	17–19%	1–6%	0%	0%
Brazil	2%	0%	0%	0%	0%
Indonesia	62%	7–16%	1%	0%	0%
Mexico	7%	0%	0%	0%	0%
Türkiye	34%	3–6%	0–3%	0%	0%
South Africa	86%	8–36%	2–4%	0%	0%
Chile	19%	0–1%	0%	0%	0%
Morocco	67%*	5–12%	1–7%	0%	0%



Share of total fossil gas in the power sector

Table 2: 1.5°C compatible benchmarks for total fossil gas in the power sector

*In Morocco historical data is only available until 2021. Countries are ordered by developed vs. developing, and then by size of emissions in 2021.

Country	2022	2030	2035	2040	2050
Global	22%	5–7%	2%	1%	0–1%
USA	39%	7–15%	0–3%	0%	0%
EU27	20%	1–4%	0%	0%	0%
Japan	34%	7%	1%	0%	0%
Germany	17%	1–8%	0–3%	0%	0%
Australia	19%	3–5%	0%	0%	0%
UK	39%	2–4%	1–2%	1–2%	0%
UAE ¹	79%	32%	1%	0%	0%
China	3%	2–3%	0–3%	0–3%	0%
India	3%	2–8%	0–1%	0%	0%
Brazil	7%	0%	0%	0%	0%
Indonesia	15%	8–10%	2–4%	0–1%	0%
Mexico	54%	6–25%	1–16%	0–2%	0%
Türkiye	23%	2–4%	0–3%	0–3%	0%
South Africa	0%	0–2%	0%	0%	0%
Chile	19%	1–4%	0%	0%	0%
Morocco	8%*	0–1%	0%	0%	0%

1 In the UAE, the share of gas fell rapidly from 2020–2022 as 4 GW of nuclear capacity came online. However, there is only 1.4 GW of further nuclear capacity under construction in the UAE. To maintain this level of fossil gas displacement over the coming years will require substantially greater effort to accelerate renewables deployment.



Share of renewables in electricity generation

Table 3: 1.5°C compatible benchmarks for the share of renewables in electricity generation

Historical data comes from IEA up to 2021 extended out to 2022 using Ember data.

Countries are ordered by developed vs. developing, and then by size of emissions in 2021.

*In Morocco historical data is only available until 2021.

Country	2022	2030	2035	2040	2050
Global	30%	81–89%	91–95%	93–98%	95–100%
USA	22%	68–86%	85–95%	93–97%	99–100%
EU27	39%	87–89%	94–96%	96–99%	99–100%
Japan	21%	74%	81%	81%	86–100%
Germany	43%	88–96%	97–98%	99%	100%
Australia	32%	95–96%	100%	100%	100%
UK	42%	84–93%	89–96%	91–98%	96–100%
UAE	5%	67%	98%	99%	100%
China	30%	79–83%	87–96%	89–97%	90–100%
India	22%	70–75%	90–93%	94–96%	94–100%
Brazil	88%	99%	99–100%	99–100%	100%
Indonesia	20%	55–82%	95%	98–99%	99–100%
Mexico	18%	67–87%	82–97%	92–98%	99–100%
Türkiye	42%	86–95%	89–99%	92–100%	95–100%
South Africa	9%	60–90%	95–97%	99–100%	100%
Chile	59%	96–98%	100%	100%	100%
Morocco	18%*	88–94%	93–99%	98–100%	100%



Endnotes

- 1 <https://www.iea.org/reports/co2-emissions-in-2022>
- 2 <https://www.irena.org/Publications/2023/Aug/Renewable-Power-Generation-Costs-in-2022>
- 3 <https://www.iea.org/news/renewable-power-on-course-to-shatter-more-records-as-countries-around-the-world-speed-up-deployment>
- 4 <https://ember-climate.org/insights/research/global-electricity-review-2023/>
- 5 <https://climateanalytics.org/publications/2023/2030-targets-aligned-to-15c-evidence-from-the-latest-global-pathways/>
- 6 <https://www.gov.uk/government/news/government-announces-plans-to-close-coal-power-stations-by-2025>
- 7 <https://poweringpastcoal.org/our-story/#/the-alliance-launches>
- 8 <https://poweringpastcoal.org/members/>
- 9 <https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact-key-outcomes-from-cop26>
- 10 <https://www.thepresidency.gov.za/content/south-africa%27s-just-energy-transition-investment-plan-jet-ip-2023-2027>; <https://www.gov.uk/government/publications/vietnams-just-energy-transition-partnership-political-declaration/political-declaration-on-establishing-the-just-energy-transition-partnership-with-viet-nam>; <https://web.pln.co.id/pln-ietp/jetp-home>; <https://www.iisd.org/articles/insight-just-energy-transition-partnerships>
- 11 <https://globalenergymonitor.org/report/boom-and-bust-coal-2023/>
- 12 <https://globalenergymonitor.org/report/boom-and-bust-gas-2022/>
- 13 <https://climateanalytics.org/publications/2022/fossil-gas-a-bridge-to-nowhere/>
- 14 CAT's own analysis, using the pathways selected in <https://climateanalytics.org/publications/2023/2030-targets-aligned-to-15c-evidence-from-the-latest-global-pathways/>
- 15 https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf (footnote 54)
- 16 <https://www.sciencedirect.com/science/article/pii/S2590332221005418>
- 17 <https://www.globalccsinstitute.com/resources/global-status-of-ccs-2022/>
- 18 <https://www.sciencedirect.com/science/article/abs/pii/S030142152100416X>
- 19 <https://ieefa.org/resources/carbon-capture-crux-lessons-learned>
- 20 <https://www.irena.org/Publications/2023/Aug/Renewable-Power-Generation-Costs-in-2022>
- 21 <https://www.sciencedirect.com/science/article/pii/S2590332221006102>
- 22 <https://globalenergymonitor.org/projects/global-oil-gas-plant-tracker/download-data/>
- 23 https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf
- 24 https://www.un.org/sites/un2.un.org/files/un_sgs_acceleration_agenda.pdf
- 25 <https://globalenergymonitor.org/report/boom-and-bust-coal-2023/>
- 26 <https://globalenergymonitor.org/press-release/chinas-coal-power-spree-could-see-over-300-coal-plants-added-before-emissions-peak>
- 27 <https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information> (July 2023 update); https://www.wa.gov.au/system/files/2023-05/swisda_report.pdf; <https://research.csiro.au/hyresource/tallawarra-b-dual-fuel-capable-gas-hydrogen-power-plant/>
- 28 https://budget.gov.au/content/overview/download/budget_overview-20230511.pdf
- 29 https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2023/2023-electricity-statement-of-opportunities.pdf?la=en

- 30 <https://www.wa.gov.au/government/announcements/state-owned-coal-power-stations-be-retired-2030-move-towards-renewable-energy>; https://media.epw.qld.gov.au/files/Queensland_Energy_and_Jobs_Plan.pdf; <https://www.energy.vic.gov.au/renewable-energy/our-renewable-energy-future>; <https://www.abc.net.au/news/2023-07-20/nsw-energy-liddell-closure-report/102624382>
- 31 New South Wales' largest coal plant, the Eraring station may close seven years earlier than planned in 2025. It is not the only station to bring forward its closure date: <https://www.theguardian.com/australia-news/2022/feb/17/australias-largest-coal-fired-power-station-eraring-to-close-in-2025-seven-years-early>
- 32 For example, Western Australia has pushed back the closure of one its plants by 6 months until April 2025 due to concerns over blackouts: <https://www.abc.net.au/news/2023-08-17/wa-electricity-gas-energy-shortage-muja-coal-extension/102740940>. Officials are considering whether to keep Eraring open beyond 2025 to address reliability as well: <https://www.smh.com.au/environment/sustainability/nsw-mulls-extending-life-of-its-biggest-coal-plant-to-avoid-shortfalls-20230426-p5d3h4.html>
- 33 <https://www.dccew.gov.au/sites/default/files/documents/annual-climate-change-statement-2022.pdf>
- 34 <https://www.dccew.gov.au/sites/default/files/documents/australias-emissions-projections-2022.pdf>
- 35 <https://assets.cleanenergycouncil.org.au/documents/Clean-Energy-Australia-Report-2023.pdf>; <https://reneweconomy.com.au/solar-farm-output-cut-by-half-as-renewables-cop-brunt-of-grid-congestion/>
- 36 <https://www.minister.industry.gov.au/ministers/husic/media-releases/unlocking-power-offshore-wind-gippsland>
- 37 https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-245/Relatorio_PDE2031_Cap03_EUS.pdf
- 38 https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-245/Relatorio_PDE2031_Introduction_Electric%20Power%20Generation%20and%20Transmission%20Chapters_EUS.pdf
- 39 <https://dashboard.epe.gov.br/apps/anuario-livro-eng/>; <https://www.bnamericas.com/pt/feature/brasil-pode-contratar-os-8-gw-de-energia-termeletrica-previstos-na-lei-de-privatizacao-da-eletronas>
- 40 https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-245/Relatorio_PDE2031_Cap03_EUS.pdf
- 41 <https://g1.globo.com/economia/noticia/2022/09/30/com-pouca-oferta-governo-contrata-so-tres-termeletricas-em-leilao-imposto-por-lei-da-eletronas.ghtml>
- 42 <https://epbr.com.br/minas-e-energia-estuda-como-revogar-contratacao-obrigatoria-de-termicas-a-gas-natural/>
- 43 <https://dashboard.epe.gov.br/apps/anuario-livro-eng/>
- 44 https://coalizaoenergialimpa.org/wp-content/uploads/2022/12/INESC-Rel_NDC-v6.pdf
- 45 https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-245/Relatorio_PDE2031_Cap03_EUS.pdf
- 46 https://www.planalto.gov.br/ccivil_03/_ato2019-2022/2022/lei/l14299.htm
- 47 <https://portal.stf.jus.br/processos/detalhe.asp?incidente=6361174>
- 48 <https://dashboard.epe.gov.br/apps/anuario-livro-eng/>
- 49 https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-245/Relatorio_PDE2031_Cap03_EUS.pdf
- 50 <https://www.bnamericas.com/en/news/engie-to-retrofit-mejillones-coal-plant-in-chile-to-work-with-natural-gas>; https://energia.gob.cl/sites/default/files/1_Energia_renovable_y_sin_emisiones.pdf
- 51 <http://www.energia.gob.cl/noticias/nacional/gobierno-anuncia-la-salida-ocho-centrales-carbon-en-5-anos-y-la-meta-de-retiro-total-al-2040-0>; <https://energia.gob.cl/noticias/nacional/ministro-claudio-huepe-presento-la-agenda-de-energia-2022-2026-hoja-de-ruta-para-la-transicion-energetica-de-chile>
- 52 https://energia.gob.cl/sites/default/files/documentos/20230801_jornada_mesa_descarbonizacion_vfinal.pdf
- 53 <https://generadoras.cl/prensa/sector-de-generacion-electrica-reduce-en-un-25-sus-emisiones-de-co2-y-alcanza-niveles-record-de-generacion-renovable-en-2022>
- 54 https://energia.gob.cl/sites/default/files/1_Energia_renovable_y_sin_emisiones.pdf
- 55 <https://www.wri.org/insights/countries-scaling-renewable-energy-fastest>

- 56 Climate Action Tracker assessment June 2023, based on WEO 2022. For more detail see <https://climateactiontracker.org/countries/china/assumptions/>
- 57 <https://energyandcleanair.org/publication/chinas-new-coal-power-spree-continues-as-more-provinces-jump-on-the-bandwagon/>
- 58 Climate Action Tracker assessment June 2023, based on WEO 2022. For more detail see <https://climateactiontracker.org/countries/china/assumptions/>
- 59 <https://ember-climate.org/insights/research/eu-fossil-generation-hits-record-low-as-demand-falls/>
- 60 <https://climateactiontracker.org/publications/massive-gas-expansion-risks-overtaking-positive-climate-policies/>
- 61 <https://ember-climate.org/insights/research/european-electricity-review-2023/>
- 62 <https://ember-climate.org/insights/research/eu-fossil-generation-hits-record-low-as-demand-falls/>
- 63 <https://beyondfossilfuels.org/europes-coal-exit/>
- 64 <https://www.glasistre.hr/istra/2023/04/15/luka-tomac-predsjednik-zelene-akcije-plomin-na-uqljen-treba-ugasiti-najkasnije-do-2025-857441>; <https://www.euractiv.de/section/europa-kompakt/news/slowenien-letztes-kohlekraftwerk-nur-noch-bei-notfaellen-in-betrieb/>; <https://www.ceps.cz/en/ceps-publications>; <https://www.reuters.com/business/energy/czech-republic-may-require-electricity-imports-2030-grid-operator-2023-03-01/>
- 65 <https://www.iea.org/policies/12650-hard-coal-mining-phase-out-2049>
- 66 https://economy-finance.ec.europa.eu/system/files/2023-05/PL_SWD_2023_621_1_en.pdf
- 67 <https://energia.rp.pl/oze/art38264741-ministerstwo-pokazuje-liczby-zielonej-strategii>
- 68 <https://instrat.pl/en/coal-phase-out/>
- 69 <https://dv.parliament.bg/DVWeb/showMaterialDV.jsp;j%20sessionid=954D30FE901EC5011CC0626B1ECFC249?idMat=175352>
- 70 <https://www.parliament.bg/bg/desision/ID/164626>
- 71 <https://www.politico.eu/article/bulgaria-europe-miner-coal-dark-future-with-millions-of-eu-funds-jeopardy/>; <https://www.euractiv.com/section/politics/news/bulgaria-risks-e10-billion-over-coal-addiction/>
- 72 <https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2022-statistics-and-the-outlook-for-2023-2027/>
- 73 <https://windeurope.org/newsroom/press-releases/new-permitting-rules-and-tools-available-for-governments-to-speed-up-renewables-expansion/>
- 74 <https://www.solarpowereurope.org/insights/market-outlooks/eu-market-outlook-for-solar-power-2022-2026-2>
- 75 https://www.gesetze-im-internet.de/eeg_2014/BJNR106610014.html
- 76 <https://www.g7germany.de/resource/blob/974430/2062292/9c213e6b4b36ed1bd687e82480040399/2022-07-14-leaders-communiqué-data.pdf?download=1>
- 77 <https://www.bmwk.de/Redaktion/DE/Dossier/10-handlungsfelder-der-abteilung-strom.html>
- 78 https://www.umweltbundesamt.de/sites/default/files/medien/11740/publikationen/2023_08_21_climate_change_39_2023_projektionsbericht_2023_0.pdf
- 79 https://energy-charts.info/charts/renewable_share/chart.htm?l=de&c=DE
- 80 [umweltbundesamt.de/sites/default/files/medien/11740/publikationen/2023_08_21_climate_change_39_2023_projektionsbericht_2023_0.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/11740/publikationen/2023_08_21_climate_change_39_2023_projektionsbericht_2023_0.pdf)
- 81 <https://www.iea.org/data-and-statistics/data-product/co2-emissions-from-fuel-combustion>
- 82 https://energy-charts.info/charts/renewable_share/chart.htm?l=de&c=DE
- 83 <https://www.gesetze-im-internet.de/windseeg/WindSeeG.pdf>; https://www.gesetze-im-internet.de/eeg_2014/EEG_2023.pdf
- 84 https://cea.nic.in/wp-content/uploads/irp/2023/05/NEP_2022_32_FINAL_GAZETTE-1.pdf
- 85 https://cea.nic.in/wp-content/uploads/irp/2023/05/NEP_2022_32_FINAL_GAZETTE-1.pdf
- 86 https://cea.nic.in/wp-content/uploads/irp/2023/05/NEP_2022_32_FINAL_GAZETTE-1.pdf

- 87 <https://iopscience.iop.org/article/10.1088/1748-9326/ab8033>
- 88 <https://docs.google.com/spreadsheets/d/1hbnTKLn1NJxVFsbYfvpzkbYKwvbxY-EbLvc-b5N0kiM/edit#gid=557672932>
- 89 <https://www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Country-Rankings>
- 90 <https://cea.nic.in/dashboard/?lang=en>
- 91 https://cea.nic.in/wp-content/uploads/irp/2023/05/NEP_2022_32_FINAL_GAZETTE-1.pdf
- 92 <web.pln.co.id/statics/uploads/2021/10/ruptl-2021-2030.pdf>
- 93 <https://globalenergymonitor.org/report/boom-and-bust-coal-2023/>
- 94 <https://drive.esdm.go.id/wl/?id=o8WDM5f2AXpP9AwT2y4CFnvB3t2JdOAF>
- 95 <https://ieefa.org/resources/navigating-many-faces-indonesias-energy-transition-schemes>
- 96 <https://www.whitehouse.gov/wp-content/uploads/2022/11/Joint-Statement.pdf>; <https://www.bloomberg.com/news/articles/2023-09-03/money-and-politics-put-world-s-biggest-climate-deal-worth-21-5-billion-at-risk?embedded-checkout=true>
- 97 <https://iesr.or.id/en/pustaka/deep-decarbonization-of-indonesias-energy-system-a-pathway-to-zero-emissions-by-2050>
- 98 <https://iesr.or.id/en/pustaka/indonesia-sustainable-finance-outlook-isfo-2023>
- 99 https://www.meti.go.jp/english/press/2021/1022_002.html
- 100 https://www.meti.go.jp/english/press/2022/0301_004.html
- 101 Ibid
- 102 https://www.meti.go.jp/english/press/2022/0325_004.html
- 103 <https://base.energia.gob.mx/PRODESEN2023/Anexo1.pdf>
- 104 <https://base.energia.gob.mx/PRODESEN2023/Capitulo4.pdf>
- 105 <https://www.gob.mx/sener/articulos/programa-de-desarrollo-del-sistema-electrico-nacional-2023-2037>
- 106 <https://www.mees.com/2022/6/17/news-in-brief/morocco-to-expand-coal-storage-in-2022/d9c364c0-ee3d-11ec-9155-0de5487d4363>; <https://www.industryprojectstechnology.com/taqa-morocco-extends-the-contract-of-the-jorf-lasfar-power-plant-for-an-additional-17-years/>
- 107 [https://unfccc.int/sites/default/files/NDC/2022-06/Moroccan updated NDC 2021 Fr.pdf](https://unfccc.int/sites/default/files/NDC/2022-06/Moroccan%20updated%20NDC%202021%20Fr.pdf)
- 108 <https://www.atalar.com/en/articulo/economy-and-business/morocco-will-enter-liquefied-natural-gas-market-next-april/20220317111553155570.html>
- 109 <https://www.gov.za/speeches/president-cyril-ramaphosa-address-nation-energy-crisis-25-jul-2022-0000>; <https://mg.co.za/environment/2023-08-28-new-gas-find-in-mpumalanga/>; <https://www.gov.za/speeches/dmre%20welcomes-discovery-maiden-gas-reserves-and-increase-contingent-resource-23-aug-2023#:~:text=The%20Department%20of%20Mineral%20Resources,%20in%20Amersfoort%2C%20Mpumalanga%20province>
- 110 <https://www.gov.za/speeches/minister-gwede-mantashe-mineral-resources-and-energy-dept-budget-vote-202324-16-may-2023>
- 111 <https://www.iisd.org/publications/report/south-africa-no-need-for-gas>
- 112 <https://www.ipp-rm.co.za/>
- 113 <https://www.engineeringnews.co.za/article/karpowership-very-confident-south-african-projects-will-proceed-but-open-to-shorter-contract-term-2023-08-15>; <https://www.news24.com/fin24/economy/govt-in-talks-over-shorter-contracts-for-karpowership-20230531>
- 114 <https://www.engineeringnews.co.za/article/karpowership-very-confident-south-african-projects-will-proceed-but-open-to-shorter-contract-term-2023-08-15>; <https://www.news24.com/fin24/economy/govt-in-talks-over-shorter-contracts-for-karpowership-20230531>; https://www.news24.com/fin24/climate_future/energy/a-20-year-karpowership-deal-doesnt-make-sense-for-the-western-cape-says-winde-20230824
- 115 <https://www.iisd.org/publications/report/south-africa-no-need-for-gas>
- 116 <https://www.thepresidency.gov.za/content/south-africa%27s-just-energy-transition-investment-plan-jet-ip-2023-2027>

- 117 <https://www.climatechangenews.com/2023/05/22/rich-nations-understanding-of-south-african-delay-to-coal-plant-closures/>; <https://www.reuters.com/world/africa/south-africa-can-keep-coal-fired-plants-running-longer-climate-committee-says-2023-05-15/>
- 118 <https://dailyinvestor.com/energy/30957/no-power-from-kusile-after-r233-billion-and-15-years-of-construction/>
- 119 See e.g. <https://www.engineeringnews.co.za/article/grid-still-seen-as-key-risk-for-upcoming-renewables-round-despite-reduction-in-govt-guarantee-2023-07-18>
- 120 <https://www.thepresidency.gov.za/content/south-africa%27s-just-energy-transition-investment-plan-jet-ip-2023-2027>
- 121 <https://www.gov.za/speeches/president-cyril-ramaphosa-amendment-schedule-two-electricity-regulation-act-10-jun-2021-0>; <https://www.engineeringnews.co.za/article/draft-regulations-removing-licensing-cap-for-distributed-generators-released-for-comment-2022-09-02/>
- 122 <https://www.engineeringnews.co.za/article/mantashe-aiming-to-secure-cabinet-approval-for-irp-2023-in-sept-2023-08-29>
- 123 <https://www.climatecommission.org.za/publications/recommendations-from-the-pcc-on-south-africas-electricity-system>
- 124 <https://public.tableau.com/views/IRENARETimeSeries/Charts?:embed=y&showVizHome=no&publish=yes&toolbar=no>
- 125 <https://globalenergymonitor.org/wp-content/uploads/2023/03/Boom-Bust-Coal-2023.pdf>
- 126 <https://www.ft.com/content/1aa8c98b-ff80-461b-bad6-b3232377f904>; <https://e3g.wpenginepowered.com/wp-content/uploads/E3G-No-New-Coal-Briefing-Paper-COP27-IEA.pdf>
- 127 https://docs.google.com/spreadsheets/d/1W-qobEQuqgTR_PP0iczJCrdAR-vYkJ0DzztSsCJXuKw/edit#gid=822738567; https://docs.google.com/spreadsheets/d/1_6AkrRZOn3ZXhSV9O6tZnX-m7aJsfG9HiQ_iEqBkbW8/edit#gid=1228809590
- 128 <https://caneurope.org/content/uploads/2021/11/komurden-cikis-2030-min.pdf>
- 129 https://enerji.gov.tr/Media/Dizin/EIGM/tr/Raporlar/TUEP/Türkiye_National_Energy_Plan.pdf
- 130 <https://www.bbc.com/turkce/articles/cmmzpr0j5po>
- 131 <https://www.energymonitor.ai/policy/russias-war-in-ukraine-inspires-turkish-gas-dreams/?cf-view>
- 132 <https://www.reuters.com/world/middle-east/turkeys-ruling-party-presents-gas-reform-step-towards-trading-hub-2023-03-08/>
- 133 <https://enerji.gov.tr/infobank-energy-electricity>
- 134 https://enerji.gov.tr/Media/Dizin/EIGM/tr/Raporlar/TUEP/Türkiye_National_Energy_Plan.pdf
- 135 <https://www.theguardian.com/environment/2023/may/16/cop28-host-uae-climate-united-arab-emirates>
- 136 Climate Action Tracker [assessment](#) July 2023, based on the UAE's NDC and 2050 Energy Strategy
- 137 <https://www.gov.uk/government/publications/net-zero-strategy>; <https://www.theccc.org.uk/publication/delivering-a-reliable-decarbonised-power-system/>
- 138 <https://www.theccc.org.uk/publication/2023-progress-report-to-parliament/>
- 139 <https://www.theccc.org.uk/publication/2023-progress-report-to-parliament/>; <https://www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-track-1-project-negotiation-list-march-2023>; <https://www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc>; <https://www.netzeroteesside.co.uk/project/>
- 140 <https://www.gov.uk/government/statistics/electricity-section-5-energy-trends>
- 141 <https://www.theccc.org.uk/publication/2023-progress-report-to-parliament/>
- 142 *ibid*
- 143 <https://www.theguardian.com/environment/2023/sep/10/uks-net-zero-ambitions-at-risk-after-disastrous-offshore-wind-auction>
- 144 <https://www.eia.gov/todayinenergy/detail.php?id=52178>
- 145 https://www.epa.gov/system/files/documents/2023-05/utilities_ria_proposal_2023-05.pdf

- 146 <https://www.eia.gov/todayinenergy/detail.php?id=49336>; <https://www.eia.gov/outlooks/aeo/>
- 147 <https://www.eia.gov/todayinenergy/detail.php?id=56460>
- 148 <https://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2023®ion=0-0&cases=ref2023&start=2021&end=2050&f=A&linechart=ref2023-d020623a.38-8-AEO2023~ref2023-d020623a.44-8-AEO2023&map=&ctype=linechart&sourcekey=0>



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The Climate Action Tracker (CAT) is an independent scientific project that has been tracking climate action since 2009. We track progress towards the globally agreed aim of holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C.

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NewClimate Institute is a non-profit institute established in 2014. NewClimate Institute supports research and implementation of action against climate change around the globe, covering the topics international climate negotiations, tracking climate action, climate and development, climate finance and carbon market mechanisms. NewClimate Institute aims at connecting up-to-date research with the real world decision making processes.

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Climate Analytics is a non-profit institute leading research on climate science and policy in relation to the 1.5°C limit in the Paris Agreement. It has offices in Germany, the United States, Togo, Australia, Nepal and Trinidad and Tobago.

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