

No change to warming as fossil fuel endgame brings focus onto false solutions

Climate Action Tracker

Warming Projections Global Update

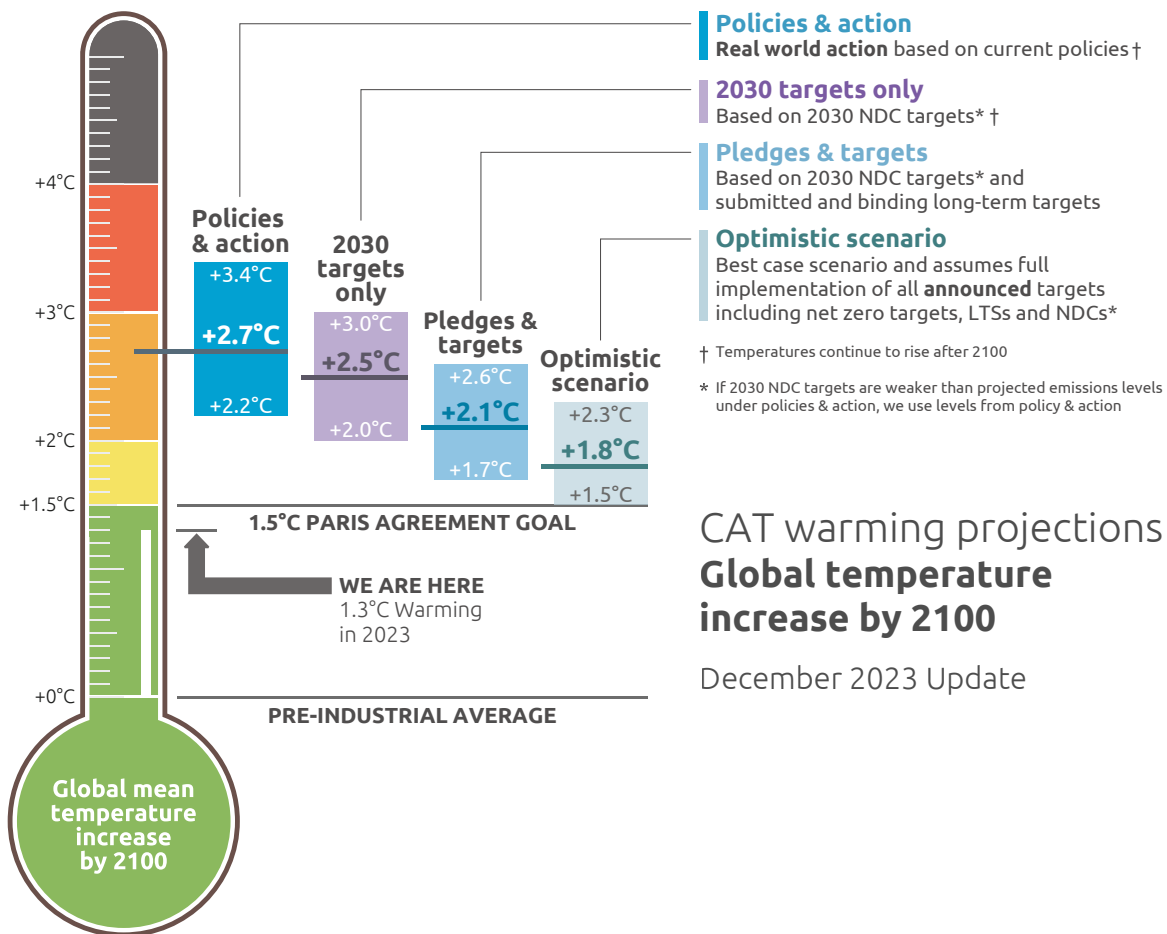
December 2023



Summary

Despite government promises, warming projections have not improved since Glasgow two years ago, amid worsening climate impacts. In a year where every continent experienced record-breaking heat, wildfires, tropical cyclones or some other extreme events, there has been no discernable shift in action.

Governments' 2030 targets will lead to 2.5°C of warming by the end of the century, 0.1°C higher than last year. This change is due to weak existing targets rather than any major shifts in new NDC updates: we take the level of emissions anticipated under current policies for those countries that we expect to overachieve their weak 2030 targets.



CAT warming projections Global temperature increase by 2100

December 2023 Update

Warming levels under binding net zero targets (our “Pledges and targets” scenario) is back to what we estimated in 2021, with an end of century warming of 2.1°C. Of the 40 countries we track, **Kazakhstan was the only government to enshrine its net zero target into law this year and have its net zero target added to this scenario.** Governments agreed to stronger targets for **international shipping**, it wasn’t enough to move the needle.

The CAT **“Optimistic scenario,”** which includes also all announced targets in addition to the binding ones, results in warming of 1.8°C, still well above 1.5°C. Until the world achieves universal coverage of net zero targets or significant improvements in governments’ existing long-term targets (covering more sectors or less relying on removals) or 2030 targets (and thus lower cumulative emissions), we are unlikely to see any movement in this pathway.

Under the CAT “Policies and action” scenario, given the absence of any major policy improvement in this critical decade, end of century warming remains at 2.7°C, an estimate, again, unchanged since 2021.

Indonesia’s emissions from coal use have spiked. Our estimates for **Saudi Arabia**, the **UAE** and the **UK** are also higher than last year. Saudi Arabia is doing little to decarbonise its economy, while its national oil company, Aramco, is planning to increase oil output in the coming years. The UAE has submitted a stronger target, but has yet to back that up with policy action. The current UK government is wrecking the country’s long-held claims to climate leadership, making a series of U-turns on key climate policies that resulted in a noticeable uptick in our numbers.

Looking ahead, 2035 offers glimmers of improved policy actions to come, but cannot be an excuse for a lack of action this critical decade. The CAT has extended our policy pathways to 2035 for several countries in this year’s update, allowing us to better estimate how emissions are likely to evolve over the remainder of the century. We see noticeable drops in our policy emissions projections for **China, the US, and the EU. China’s emissions are up slightly in 2030 compared to last year**, but renewables take over in our more optimistic scenario post-2030: not fast enough for its carbon neutrality by 2060 target, but nevertheless an improvement. For the US and EU, it is the implementation of their respective policy plans (IRA and Fit for 55).

“Abated” is not a phase-out. COP28 must agree to phase out fossil fuels: everything else is a distraction. In 2015, as part of the Paris Agreement’s commitment to balance emission sources and sinks in the second half of the century, governments essentially agreed to ‘phase out’ fossil fuels. Burning fossil fuels is THE main cause of climate change. Anything less than a clear and explicit commitment to phase out fossil fuels in a COP28 decision is a step backwards. Not phase ‘down’, not limiting it to ‘unabated’ nor shifting the focus to fossil fuel ‘emissions’: just a fossil fuel phase-out.

The fossil fuel industry and some governments are still trying to support every unrealistic techno fix to see if one of these false solutions sticks.

- ▶ Adding carbon capture and storage (CCS) to fossil fuel operations or coal or fossil gas-fired power stations does not work, neither technologically, and certainly not commercially, and not at scale. Wind and solar with storage are much better options.
- ▶ Co-firing ammonia with coal in thermal power plants is highly inefficient and uneconomic.
- ▶ E-fuels are in a similar boat, being five to six times less efficient than battery electric cars. It’s the same story for hydrogen boilers compared to heat pumps.
- ▶ Using carbon credits to offset domestic emissions and meet NDC targets will only lead to a delay in reducing countries’ own emissions and add to the ambition gap. There are also serious concerns about the quality of the reductions and removals sold.
- ▶ Countries should not rely on carbon removal for their net zero targets. While the world will need some carbon dioxide removal to keep warming below 1.5°C, we need to keep its use as low as possible, given the tremendous uncertainties around reliability, costs, and permanence. It cannot be an excuse to avoid deep cuts in emissions across all sectors of the global economy and a phasing out of fossil fuels.

The fossil fuel industry must face facts: its very existence is not climate friendly. Exploration, production and use has to stop.


The Global Stocktake needs to deliver increased momentum on real action this decade and inform governments in their preparation of 1.5°C aligned 2035 targets. Real action means:


- ▶ Peaking emissions as soon as possible and before 2025,
- ▶ Tripling renewables and doubling energy efficiency by 2030, and
- ▶ Cutting fossil fuel production and use [40% by 2030](#).


Setting new 2035 targets without changing 2030 targets will not keep 1.5°C alive. The 2035 targets need to be part of a broader pathway to net zero and must show how countries will surpass their current 2030 targets and ramp up emission cuts this decade. These new NDCs are due by February 2025. In this update, we set out a list of “must haves” for what should be in the 2035 NDCs.


The UAE Presidency’s ability to lead this COP to a meaningful agreement on phasing out fossil fuels has been called into question in recent days, given its continued investment in large-scale fossil fuel developments and support for CCS. Time to prove everyone wrong.


Country snapshots


 **ARGENTINA** is slowly making progress on developing climate policies, but lacks ambition in the key sectors of energy, agriculture, and livestock. The government has shifted its focus from developing renewables to expanding fossil fuels and nuclear power. Argentina is increasing oil and gas production and has begun offshore exploration. The recent inflation crisis, combined with the election of a far-right president, raise concerns over the country’s ability and willingness to implement ambitious mitigation measures.










 **AUSTRALIA** continues to fail to deliver real climate ambition, despite being a year and a half into the mandate of a government that promised to do things differently. It relies on dubious land sector emission reductions to obscure its lack of action elsewhere. It is also continuing to support the expansion of the coal and gas industry. It is not on track to meet its renewable energy target and has no coal or fossil gas power phase-out plans.


 **Bhutan** is already carbon neutral due to its large land sink, but cannot rely on its forests instead of concrete actions to limit emissions. After a temporary drop during the pandemic, its emissions are projected to grow over the course of the decade, unless stringent policies are put in place. Bhutan has identified policies that would reduce emissions, especially in its transport and industry sectors, and now needs to focus on policy implementation, with the support of the international community.


 **BRAZIL’S** President Lula has cut deforestation rates significantly since taking office at the beginning of this year. But joining OPEC+ is not a good look: Brazil needs to be phasing out production of fossil fuels, not expanding them, if it wants to show real climate leadership as a future COP host.


 **CANADA:** It’s still Sunday afternoon in Canada (see last year’s snapshot). Emissions are leisurely meandering downwards, but there has been no major policy advancement since last year. Regulations are still in draft form, though the Environment Minister has indicated an oil and gas sector emissions cap is possible by the end of the COP.


 **CHILE** continues its progress on climate actions. At COP27, the government unveiled its green hydrogen action plan 2023-2030 and signed MoUs on hydrogen developments with the EU, Japan, and Germany. Chile’s coal phase-out is advancing, with two additional coal power plants shut down this year. Renewable energy deployment is also progressing with a renewables participation bill recently approved and a new energy storage law in the works.


-  **CHINA'S** emissions are projected to peak by 2025, five years ahead of its 2030 target. However, current policies are not ambitious enough to drive down emissions in the critical period before 2030. Energy and electricity demand forecasts keep growing steadily. Despite record and rapid renewables deployment, the government continues to champion the role of fossil fuels in transitioning its energy sector, seen as key to providing stability and security. China's energy dependence on fossil fuel consumption remains the most important single factor driving global emissions.
-  **COLOMBIA'S** has joined the Power Past Coal Alliance, became a friend of the Beyond Oil and Gas Alliance, and endorsed the call for a Fossil Fuel Non-Proliferation Treaty. Yet, at home, it remains off track to meeting its 2030 target, which is not yet 1.5°C aligned. Its planned policies go some way to closing that gap, but more is needed.
-  **COSTA RICA'S** ambitious climate policy set up is already showing results in areas such as electric vehicles uptake and enhancement of carbon sinks. Emissions are close to the upper end of the government's projections, meaning that policy implementation has been successful but remains insufficient to meet the 1.5°C-compatible trajectory presented in the country's National Decarbonisation Plan. Costa Rica needs to improve the implementation of mitigation policies in key emission sectors such as transport, agriculture, and waste.
-  The **EU** finalised its policy package for its 2030 target, now it is up to member states to implement these. The EU missed the opportunity to strengthen its NDC target, with its October 2023 submission making no change to the target level. Preparations are underway to set the EU's 2040 target, with its advisory body recommending a 90-95% reduction (incl. LULUCF) below 1990 levels. The range is in line with 1.5°C compatible domestic emission cuts, but seeing as the EU is failing to contribute its fair share to global climate action, it should go for the top end of that range.
-  **EGYPT'S** focus on expanding fossil gas production and exports has largely overshadowed recent investments in renewable energy. The government's second NDC update, submitted in June 2023, is almost identical to its predecessor, except for a slightly revised emissions reduction target in the power sector. Egypt's 2030 target remains weak and would still see emissions continuing to rise, surpassing even the levels expected with the current policies in place.
-  **ETHIOPIA** is already doing its fair share to meet 1.5°C. Under its long-term strategy, Ethiopia has outlined three pathways to further reduce its emissions and reach net-zero by 2050 under the '*Late Action*' and '*NDC Aligned*' pathway and an accelerated ambition to reach this by 2035 through the '*Maximum Ambition*' pathway. However, these pathways necessitate substantial financial investment and international support. Notably, Ethiopia's primary emissions stem from agriculture and LULUCF, making mitigation in these sectors pivotal to attaining these ambitious climate goals.
-  **THE GAMBIA** continues to develop its oil and gas sector at a time when countries should be moving away from fossil fuels. It wants to cut its dependency on imports, but renewables offer a better route. The country is doing its fair share to stop the climate crisis, but is falling short of achieving its conditional NDC target, for which it needs international support.
-  **GERMANY'S** recent climate policies are driving emissions projections downwards. The energy sector has shown significant improvement, but transport, buildings and industry still lack sufficient short-term policies. The three-party coalition government remains significantly divided on comprehensive action across all sectors, putting the country's climate targets in danger. The government still supports new fossil fuel infrastructure in and outside of Germany. Planned LNG capacity is larger than needed, while financing gas abroad is still under discussion, undermining the country's climate commitments.
-  **INDIA'S** reliance on coal power continues to be a drag on ambition, despite its ever-expanding renewable energy sector. The latest power sector plan, adopted in May, sends mixed signals: it indicates that no additional coal capacity is planned beyond what is under development in the near term (2026-27), but includes substantial new coal capacity after, which was reconfirmed by the Minister of Power recently. The government is also pushing for increased domestic coal production. Rising temperatures and an extended summer season are taxing India's power grid: all the more reason for accelerating the shift to renewables.


- 


INDONESIA'S renewable energy expansion is overshadowed by a huge increase in coal use that skyrocketed emissions in 2022. The spike is driven by the booming domestic metal industry and infrastructure for the new capital. "New" insights on the huge captive coal pipeline forced a revision of the JETP targets which are not Paris Agreement-aligned. The JETP marks a milestone in global climate cooperation, but also underscores the persisting failure of wealthy nations to provide adequate finance. With high share of funds being loans, the JETP risks burdening Indonesia with debt.
- 


IRAN remains one of the few countries that has not yet ratified the Paris Agreement. Its economic turmoil, driven by international sanctions, the COVID-19 pandemic and high inflation, have hindered its capacity to address climate change. Investments in mitigation measures, renewable energy in particular, have significantly slowed down, as the government has been prioritising economic recovery.
- 


JAPAN'S new decarbonisation strategy, the Green Transformation Basic Policy, fails to put renewable energy at its core. Instead, it promotes the deployment of false solutions in the power sector, putting a strong emphasis on the "need" to develop CCS technologies, and ammonia and hydrogen co-firing in coal-fired power plants. The government continues to support increased investment in upstream gas and LNG.
- 

KAZAKHSTAN failed to increase the ambition of its 2030 targets: its June 2023 updated NDC is identical to its predecessor. Emissions are projected to continue rising until 2035 (at least) under current policies. Kazakhstan's net-zero by 2060 target was enshrined in law in February 2023, but recent policy developments, including plans for new coal power and increased fossil fuel production, are driving emissions in the wrong direction.
- 










KENYA'S climate action is in line with its fair share. Kenya's policies and unconditional target are rated 1.5°C compatible, but there is still room for Kenya to strive for further emissions reductions in all sectors. Renewables represent 85% of electricity, but coal plans remain in play.
- 


MEXICO'S climate policies and targets continue their backwards slide. Mexico continues prioritising fossil fuels, dismantling climate-related policies and institutions, and its 2022 NDC update is less ambitious and transparent than its previous one. In 2023, Mexico achieved its clean energy target due to a change in accounting methodology, which includes electricity production from fossil gas. Emission projections under current policies are expected to continue rising towards 2030.
- 


MOROCCO is ramping up efforts to increase renewable energy capacity, with many projects on track to start before 2025. However, the country remains heavily dependent on coal and has recently unveiled plans to expand fossil gas infrastructure. Morocco is on track to meet its unconditional NDC target but will need significant international support to meet its conditional target.
- 


NEPAL is already doing its fair share to address the climate crisis, but needs significant international support to peak and start cutting its emissions in order to meet 1.5°C. Nepal has decarbonised its power sector, running on 100% renewables since 2015 mostly on hydropower and is planning to expand generation in order to export electricity to neighbouring countries. It aims to phase out petrol-diesel vehicles by 2031 and is rolling out several EV policies. Under its long-term strategy, Nepal intends to achieve carbon neutrality by 2045.
- 


NEW ZEALAND'S emissions are finally beginning to drop for the first time, as a result of policy measures. However, the recent change of government is likely to see backsliding, if it delivers on promises to cut EV subsidies, build new roads, cancel light rail and other public transport policies, and revoke the ban on new oil and gas exploration. New Zealand's continued reliance on land sector offsets domestically and to buy international carbon credits to meet its target also remain of concern.


-  **NIGERIA** continues to send mixed messages on its energy priorities: acknowledging the need to reduce reliance on the oil and gas sector, and expand solar power, but also seeking to expand oil and gas production. Emissions plateau this decade if its energy transition plan is fully implemented, but more is needed to meet its conditional NDC target and for 1.5°C. Both require international support. New oil and gas methane guidelines are good, but implementation is key. A carbon tax is also in the works.
-  **NORWAY'S** current policies and actions have improved slightly but are still off track to meeting its 2030 target. The Norwegian government has no plans to phase out of the fossil fuel industry, rather the government anticipates oil production to increase and fossil gas output to continue at near record high levels. These actions on the part of the Norwegian government stand in stark contrast to the fact that oil and gas production should already be declining in 1.5°C compatible pathways.
-  **PERU** recent political instability has slowed down climate policy development overall. The land sector is still the biggest source of emissions in the country, with the rate of deforestation remaining sky high. The share of renewables continues to increase, despite further investment in fossil fuels.
-  **Philippines** led Southeast Asia in stopping new coal-fired power, but has yet to adopt a phase-out plan. Its draft energy plan still has coal in 2050 and sees a ramp-up of gas-fired generation despite the depletion of its domestic gas field. The plan would also introduce nuclear (a false solution in our view). A major oil spill earlier this year caused extensive damage, further highlighting the risks posed by the country's fossil gas expansion plans. It is far off track from meeting its 1.5°C compatible conditional NDC target and will need support.
-  **RUSSIA'S** efforts to tackle climate change remain very low. Its few relevant policies are unambitious or have an unclear expected effect on emissions. Russia's existing policies indicate no real commitment to curb emissions. It will meet its weak 2030 target with current policies and is far off track from what is needed for 1.5°C.
-  **SAUDI ARABIA** has done little to decarbonise its economy in the last ten years, with emissions projected to significantly rise by 2030. Despite its economic diversification plan, Saudi Arabia remains heavily dependent on oil revenue and plans to increase oil output in coming years. The government has actively sought to undermine global efforts to phase out fossil fuels, instead promoting CCS technologies as a smokescreen to continue expanding oil and gas production.
-  **SINGAPORE** is expanding solar capacity and "low-carbon" electricity imports. However, as energy demand increases, and 96% of electricity is fueled by fossil gas, Singapore is simultaneously increasing LNG imports and gas-fired power capacity in the near term. While it is making efforts to convert energy infrastructure from LNG to hydrogen in the future, Singapore needs to accelerate the transition to renewables, especially to green hydrogen. It wants to become a regional hub for hydrogen, which must be green. Singapore has an opportunity to lead regional efforts for collaborative decarbonisation and green electricity trading, but should accelerate plans leading to fossil gas phase-out for its own energy mix.
-  **SOUTH AFRICA'S** energy system remains at a crossroads. It is moving forward with the Just Energy Transition Investment Plan, but the energy crisis threatens to delay the planned decommissioning of some coal. Market indicators point to rapid renewables uptake with the import of solar panels hitting record highs this year, but the government has yet to release its electricity plan. South Africa continues to pursue controversial fossil gas capacity despite concerns and court challenges. Any new gas would need to exit by 2035; better to skip this dirty chapter entirely.
-  **SOUTH KOREA** is pursuing nuclear power at the expense of renewables in its power sector. This change has little impact on 2030 emissions, but the reprioritisation of renewables hampers the transition in the longer term. Coal power use is falling, but being replaced with fossil gas. South Korea needs to exit coal by 2030 and fossil gas shortly thereafter. It can meet its NDC with its planned policies, but is far off track in implementing these.


- 


SWITZERLAND'S emissions continue to drop, with voters approving the Climate Protection Act in June 2023, thereby enshrining the 2050 net-zero target into law. However, after the rejection of the CO₂ Act by referendum in 2021, the government was forced to extend its weak, expired CO₂ Act to 2024. Recent drafts of a successor act appear to have decreased ambition further. Switzerland's heavy reliance on international carbon credits where it tries to "offset" emissions through bilateral agreements and the lack of transparency around the domestic emissions reduction effort in its NDC risk setting a bad precedent for other countries.
- 


THAILAND is intensifying its climate reduction efforts with the upcoming release of its National Energy Plan (NEP) and Climate Change Act draft in 2023. The NEP will strengthen renewable share targets, but would not be ambitious enough for 1.5°C-compatibility. The draft National Electricity Plan (PDP) reveals a sustained emphasis on fossil fuels; for which its 2030 target for fossil fuel electricity generation capacity remains at nearly half the overall capacity, with continued reliance on hydropower imports, highlighting challenges in transitioning to renewable energy.
- 

TÜRKIYE finally updated its NDC this year. The targets are stronger on paper, but will not actually cut emissions in the real world. It continues to bring new coal capacity online, rather than committing to a phase-out. Its plans to ramp up offshore fossil gas production and become a trading hub are not consistent with 1.5°C. Its latest plans to ramp up solar and wind are a step in the right direction, but need to go further, faster.
- 

The **UNITED ARAB EMIRATES**, President of COP28, submitted a strengthened NDC target in July 2023, although it will not be able to achieve it under current policies. Despite dropping its coal target, the UAE's emissions are projected to continue rising through 2030. The government committed to investing USD 55bn in renewables, but is also still planning to increase fossil fuel production and consumption, with a USD 150 bn investment plan into oil and gas expansion.
- 

The **UK** took a wrecking ball to any claims it had on climate leadership this year with a series of policy U-turns. Policy action is still inadequate to meet the UK's climate targets. Recent rollbacks on phasing out gasoline cars and gas boilers as well as cancelling some residential energy efficiency measures have sown needless uncertainty in the energy transition. Doubling down on North Sea oil and gas extraction adds insult to injury. Plans to decarbonise power and electrify industry are still M.I.A. One in five cars sold in 2022 was fully electric.
- 

UKRAINE: The CAT has suspended our rating and assessment of Ukraine in light of Russia's illegal invasion. Ukraine reiterated its commitment to exiting coal power by 2035 earlier this year.
- 

US climate action has shown promising signs in the first year of the Inflation Reduction Act (IRA); mobilising huge investments in renewables, driving an increase in clean projects, creating jobs, accelerating state and local action, and boosting private sector confidence to pursue a transition to decarbonisation. However, the US should also adopt bold policy packages at the sectoral level, keep its promise to increase international climate finance contributions, and move away from its increasing reliance on fossil fuels to achieve the pace and scale of emission reductions needed to meet its NDC target. The year-over-year increase in the country's oil and gas production and exports remains a cause for concern.
- 

VIET NAM latest electricity plan sends mixed signals: coal expansion plans have been curtailed and renewables are projected to expand, albeit at a slow pace until 2030. Nevertheless, the country is shifting to fossil gas, with plans to expand its installed gas-fired capacity by 2030 to four times its current size, and importing massive amounts of LNG. It needs to expedite its coal phase out timeline and strengthen its targets and policies. More support than its existing JETP is needed.



Summary	i
Country snapshots	iii
1 Targets and policy action stalled to 2030 - warming estimates continue to exceed Paris limit by wide margin	1
2 Warming outlook has improved since Paris but stalled in recent years.....	3
3 Do not fall for “false solutions”	5
3.1 “Phase out of fossil fuels” instead of “phase down” or “unabated”	8
3.2 Production phase-out plans instead of “abated” fossil fuel operations with CCS.....	10
3.3 Wind and solar with storage instead of gas/coal-fired power stations with CCS.....	11
3.4 Wind and solar or other storage options instead of co-firing ammonia in coal-fired power plants	11
3.5 Battery electric cars instead of e-fuels or biofuels.....	12
3.6 Heat pumps instead of hydrogen-ready gas boilers.....	14
3.7 Domestic emissions reductions in NDCs instead of offsetting through Article 6.....	15
3.8 Achieving long-term targets by reducing <i>own</i> emissions instead of relying on carbon dioxide removal	16
4 NDC targets – 2030 and beyond	18
Annex	23
A1 Scenario definition	23
A2 Comparison to other warming estimates.....	25
A3 Country ratings summary	27

Targets and policy action stalled to 2030 - warming estimates continue to exceed Paris limit by wide margin

Targets continue to disappoint: Outlook to 2030 bleak

Governments continue to fail on delivering 2030 targets in line with the level of action needed to limit warming to 1.5°C. Our temperature estimates have not improved since COP26 in Glasgow, 2021, where governments promised to 'revisit and strengthen' their 2030 targets. Our estimate of the warming impact of 2030 targets alone has increased.

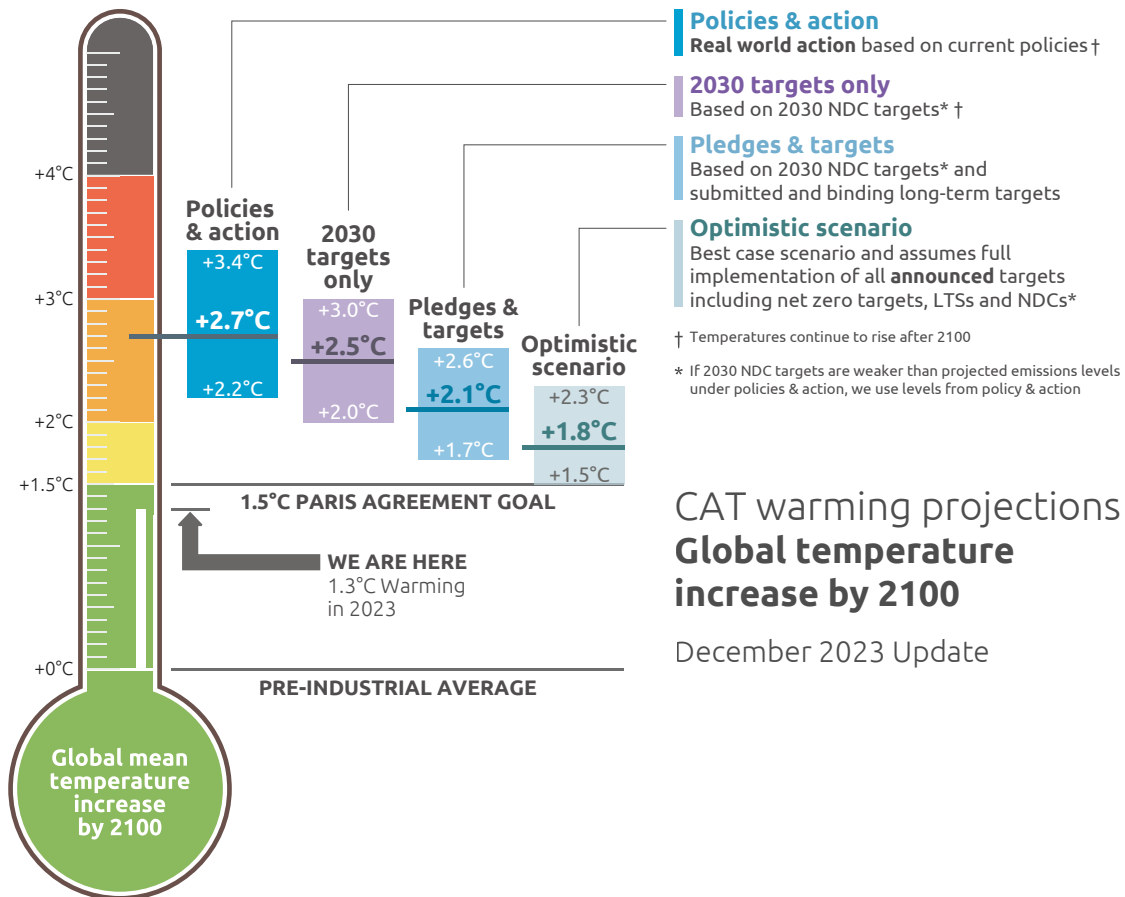


Figure 1 CAT thermometer with warming projections for 2100.

2023 was another anaemic year for new NDC target submissions, with only a handful of countries making the effort and even fewer strengthening targets (see section 4 below). Our estimate for where end of century warming will be based on these targets alone is 2.5°C – 0.1°C higher than last year. We do not include weak 2030 targets in this estimate (i.e. a target that a country can easily meet now based on its current policy action), but rather we take the level of emissions anticipated under those policies.

It is increases in those estimates that are driving the change:

- ▶ **Indonesia's** expanding coal power fleet, notably its off-grid coal plants, caused its emissions to skyrocket by 21% last year, is one of the main drivers.
- ▶ Our estimate for **Iran** is also much higher as the economy recovers from slow growth.
- ▶ Our estimates for **China** and **Saudi Arabia** are also up, to the point that we now consider those countries' NDC target levels and not the emissions under policies and actions, which used to be lower.
- ▶ **Mexico** is heading in the opposite direction of where it should be. Its 2022 NDC update is weaker than its original NDC,¹ so we now consider its current level of policy action.

1 Our 2022 estimate used the 2016 NDC as the 2020 NDC had been invalidated by the courts and the 2022 NDC update came after our cut-off date.

- ▶ It also does not help that some developed countries plan to rely on the land sector to achieve their targets (we do not consider land sector emissions in our analysis – as to get to 1.5°C we need to cut fossil-based emissions): **Australia** had notable increases this year.

The picture does not improve if one broadens the scope to consider binding² net zero targets (the ‘Pledges and targets’ scenario). Our estimate here has bounced around 2.1°C for the last three years. Last year we celebrated as we rounded it down to 2.0°C after a handful of countries legally adopted or strengthened their net zero targets. This year we are back to rounding up to 2.1°C due to the higher 2030 emissions estimates.

Kazakhstan was the only country, of the 39 we track (40 incl. the EU), to enshrine its net zero target into law this year and have its net zero target added to this pathway. (We also included a handful of countries who submitted long-term strategies after our cut-off date in 2022.³) Governments adopted stronger targets for international shipping in July 2023.⁴ But these positive impacts were not enough to counterbalance higher 2030 estimates.

There were no major developments in new net zero target announcements in 2023, and our optimistic scenario (that includes these announcements along with the binding long-term targets) remains at 1.8°C. This is not surprising, given that about 90% of global emissions are already covered by such targets.

- ▶ Our estimated warming level for this, our most ‘Optimistic’ scenario, improved from 2.1°C to 2.0°C in [May 2021](#) with the announcement of several major 2030 target improvements. At the time, it covered about 70% of global emissions.
- ▶ We saw another improvement in our [November 2021 analysis](#) as global coverage increased to about 90% and the temperature fell to 1.8°C, and has remained there ever since.

Until we achieve universal coverage of net zero targets or significant improvements in governments’ 2030 targets (with their knock-on effect of lower cumulative emissions over the rest of the century), we are unlikely to see any movement in this pathway.

It also important to stress that this temperature estimate has a 50/50 chance of limiting warming to 1.8°C by 2100. In probabilistic terms, it is “likely” to be below 2.0°C. And, of course, it is still well above 1.5°C.

No policy improvement in this critical decade, but glimmers of hope for 2035

Policies and actions currently being implemented by governments will limit end of century warming to 2.7°C, an estimate unchanged since 2021.

2023 has been the hottest year on record ([WMO 2023](#)), so this failure by governments to implement substantive change is unacceptable and has devastating real world consequences.

As bad as it is to have had no change in aggregate policy action over the last few years, there are some glimmers of hope under the surface. We have extended our policy pathways to 2035 for several countries in this year’s update.⁵ This new data allows us to better estimate how emissions are likely to evolve over the remainder of the century.

We see noticeable drops in our emissions projections, especially at the low end of our policy pathway, for China, the US, and the EU. China’s emissions are up slightly in 2030 compared to last year,⁶ but in our more optimistic policy scenario renewables uptake is fast enough to meet growing energy demand, while displacing coal and replacing the need for fossil gas in end-use sectors.

China’s GHG emissions begin the first stages of structural decline as the country shifts from controlling energy to controlling carbon, which we can see in our estimates out to 2035, although more action is needed to reach its carbon neutrality by 2060 target. For the US and EU, it is the implementation of their respective policy plans (IRA and Fit for 55).

2 We consider targets to be binding if they have been adopted in domestic legislation or submitted, with sufficient clarity, in long-term strategies to the UNFCCC. We exclude older submissions if we deem that the country has abandoned its target. See Annex I for details.

3 These are Argentina, Ethiopia, and The Gambia. See Annex I for details. We also updated our estimates for Canada and Singapore based on their LTS submissions. Our quantification of Singapore’s net zero target improved, but Canada’s was much weaker due to much greater reliance on its land sector than we had previously estimated.

4 Stronger targets were adopted for 2030 and 2050, with interim targets set of the first time in 2040, while these targets influence all scenarios, the greatest impact is on the long-term estimates.

5 19 out of 40 so this is only a provisional picture.

6 Note this differs from the comparison we make on our country assessment page: there the comparison is being made with our June 2023 assessment, not our last temperature update.

All that said, these glimmers of hope are still not enough to counterbalance increases elsewhere. As noted above, Indonesia’s emissions from coal use have spiked. Our estimates for Saudi Arabia, the UAE and the UK are also higher than last year. Saudi Arabia is doing little to decarbonise its economy, while its national oil company, Aramco, is planning to increase oil output in the coming years. The UAE has submitted a stronger target, but has yet to back that up with policy action. The current UK government is wrecking the country’s long-held claims to climate leadership, making a series of U-turns on key climate policies that resulted in a noticeable uptick in our numbers.

Higher 2030 emissions are also reflected in a growing implementation gap (Figure 2). The gap has shifted slightly from 23-27 GtCO₂e last year to 24-27 GtCO₂e.

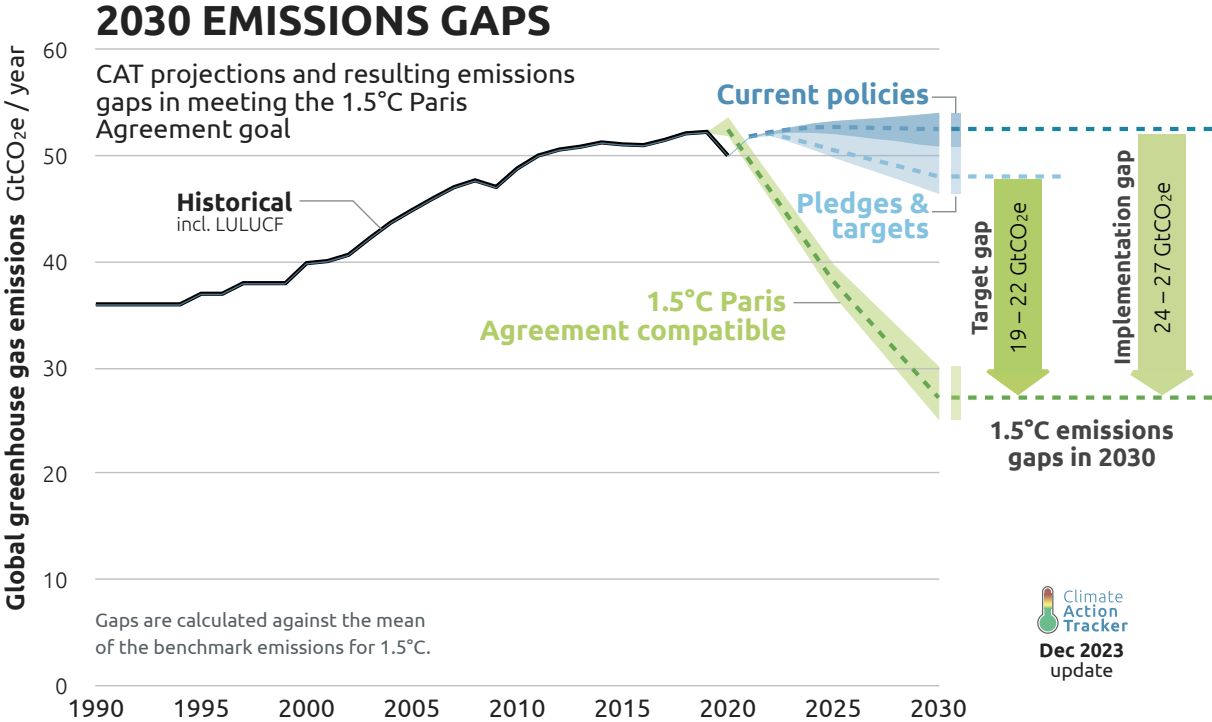


Figure 2 2030 emissions gap between NDC targets (‘target gap’) and policies and action (‘implementation gap’) and levels consistent with 1.5°C.

Every continent saw record breaking heat, wildfires, tropical cyclones or some other extreme events in 2023 (WMO 2023). Governments must re-double their efforts to cut emission today, not in the next decade. It starts at this COP with a clear commitment to phase out all fossil fuels.

2 Warming outlook has improved since Paris but stalled in recent years

The CAT has been tracking the impact of governments’ targets and policy action against end of century global warming for more than a decade (Figure 3). Our analysis shows that the Paris Agreement is working, with both warming levels decreasing for both targets and policies since the Agreement was adopted, but it has really stalled in the last few years.

As governments turn their attention to 2035: much stronger targets and much faster policy implementation is needed to keep 1.5°C alive.

Several organisations now track temperature estimates. While at first glance, the headline figures may appear different, a closer examination of the underlying methods reveals that these are closely aligned and offer the same general message: 2030 targets are totally inadequate and put achieving 1.5°C at risk (see Annex 2 for further details).

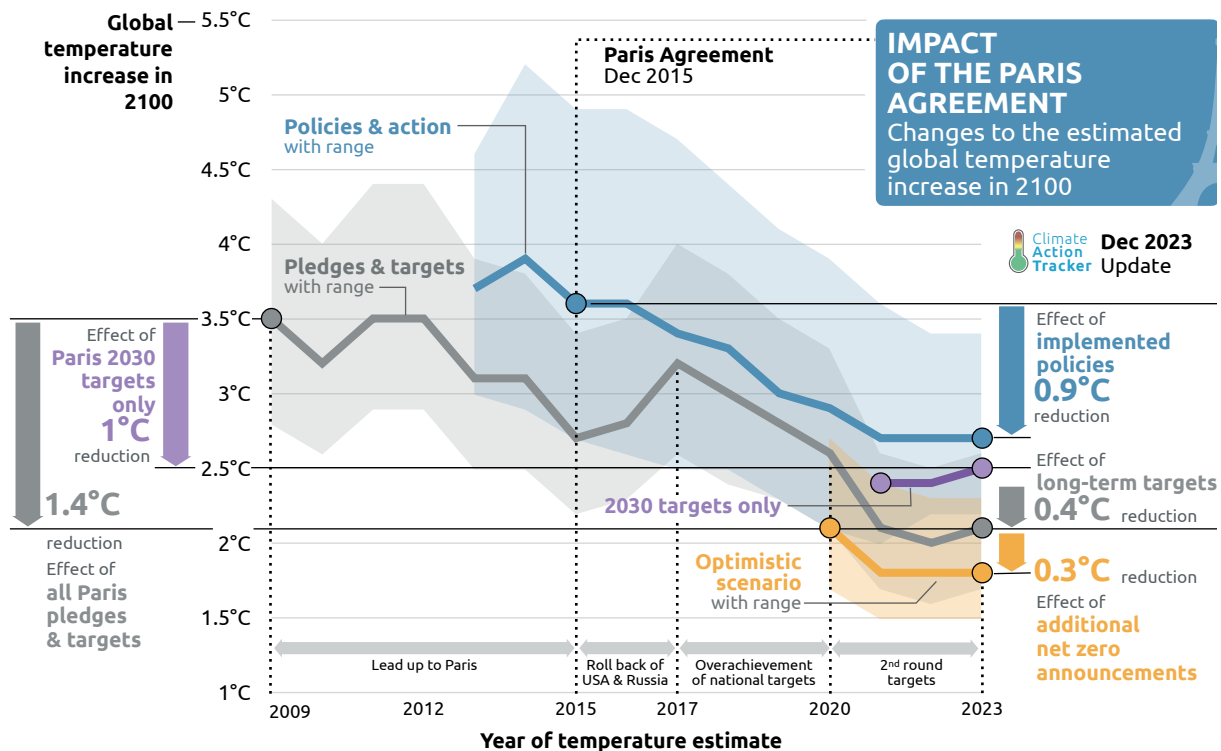


Figure 3 Impact of the Paris Agreement on the estimated global warming increase in 2100. Figure shows the estimates of the Climate Action Tracker from 2009-2023 for 'pledges and targets' and 'policies & action'.

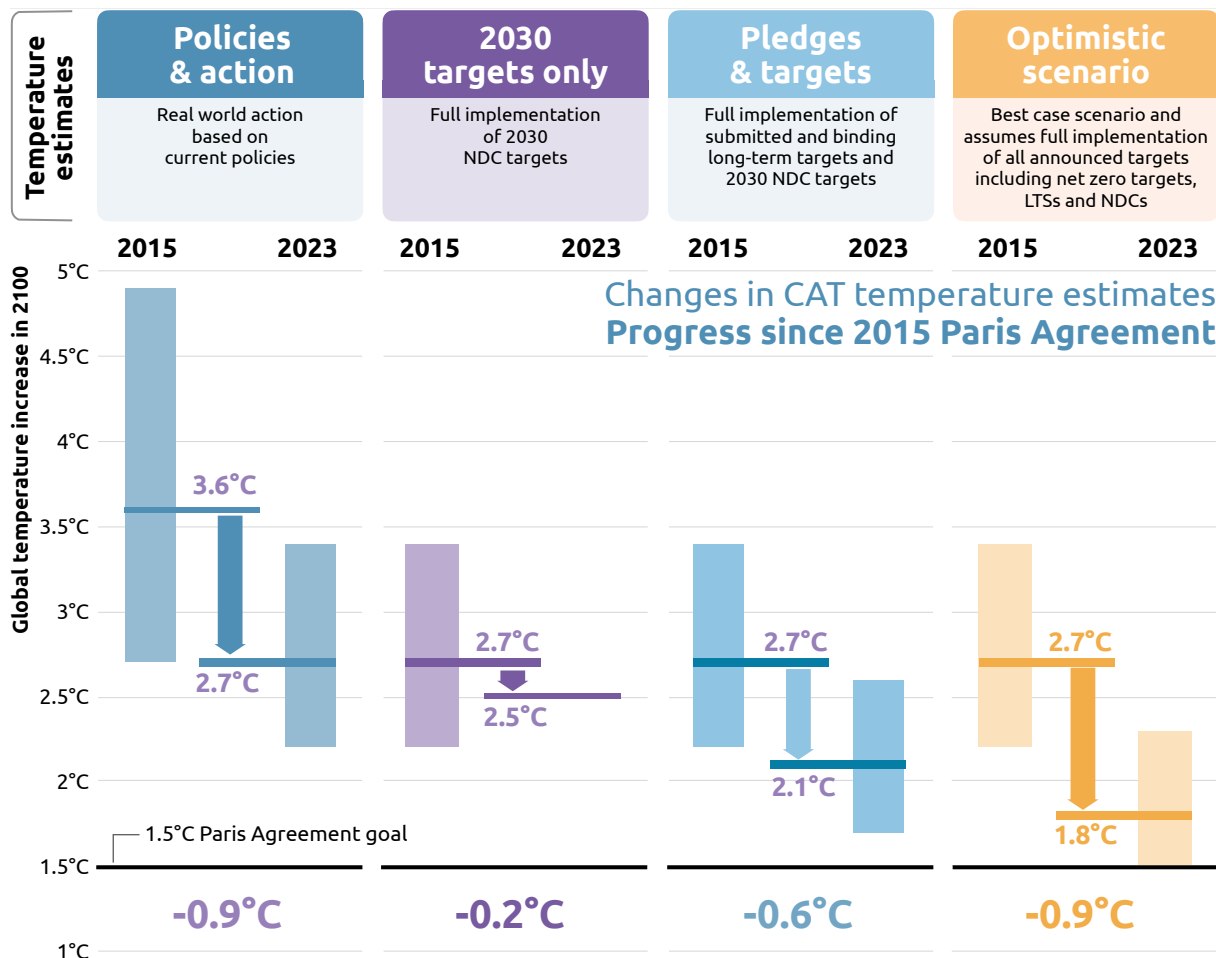


Figure 4: Impact of the Paris Agreement on the estimated global warming increase in 2100. Figure shows the difference between the Climate Action Tracker's 2015 and 2022 estimates.

* The Climate Action Tracker is continuously updating and refining its methodology. As a result, the temperature estimates in this figure cannot solely be attributed to target improvements or real-world action; however, the figure does show the overall progression of our estimates.

3 Do not fall for “false solutions”

The fossil fuel industry and governments that rely on fossil fuel revenues seem to have understood that the end of fossil fuels is near and have embarked on their final fight by proposing and supporting false solutions and unrealistic technological fixes (Table 1).





















They promote carbon capture and storage (CCS) as an excuse to continue exploring fossil fuels. They propose to reduce operation emissions to “net zero” without reducing the real cause: the fossil fuels that they sell.

There is also a proposed suite of unrealistic technological fixes including E-fuels for cars, hydrogen for gas boilers, co-firing of ammonia in coal-fired power plants, and gas-fired power with CCS. It is clear today that these will not be cost competitive, even in the long run, so they will probably never be applied at scale. But pushing for them now will lead to more new fuel cars, more gas boilers, more coal and gas-fired power plants and therefore more oil, gas and coal use - and more emissions. This is counterproductive to what is needed to meet 1.5°C: to stop investing in fossil technology and instead invest in alternatives.

The burning of fossil fuels is THE main cause of climate change and hence fossil fuel use needs to be phased out. Eight years ago, the Paris Agreement set the signal of a phase out of fossil fuels with the requirement to balance emission sources and sinks in the second half of the century. If the COP28 summit, eight years later, makes the same point, it really is a step backwards.

The UAE COP28 Presidency’s stance on the matter – with continued large-scale fossil fuel investments and support for CCS – brings into question its ability to reach a meaningful agreement on phasing out fossil fuels.

Table 1: False solutions that only prolong the use of fossil fuels.

False solutions that only prolong the use of fossil fuels		
FOSSIL FUEL PRODUCTION/ OPERATIONS		
?	Issue 1: “Phase down of fossil fuels” or “phase out of unabated fossil fuels”	
	Argument: “Phase down of fossil fuels” or “phase out of unabated fossil fuels”	
✗	Governments moving in the wrong direction	
	 China	 India
	 Saudi Arabia	 United States
	 European Union	
✓	Full decarbonisation options: “Phase out of fossil fuels”	
	 Costa Rica	 Denmark
?	Issue 2: “Abated” fossil fuel operations with CCS	
	Argument: Does not work at scale	
✗	Governments moving in the wrong direction	
	 Canada	 China
	 UAE	 United States
	 Norway	
✓	Full decarbonisation options: End investment in new fossil fuel production projects	
	 Costa Rica	 Denmark
	 Ireland	 Portugal
	 Tuvalu	 Vanuatu
	 France	
	 Sweden	


UNREALISTIC TECHNOLOGICAL FIXES





Issue 3: Gas/coal-fired power stations with CCS


Argument: Does not work at scale




 ASEAN

 Australia

 Canada

 Japan

 Saudi Arabia



Full decarbonisation options: Wind and solar with storage




Issue 4: Co-firing of ammonia in coal fired power plants

Argument: Needs 4 times more electricity



Governments moving in the wrong direction

 Japan



Full decarbonisation options: Wind and solar with storage




Issue 5: E-fuels or biofuels for passenger cars


Argument: Needs 5-6 times more electricity



 Brasil


 European Union


 Germany

 United States



Full decarbonisation options: Battery electric passenger cars

 China

 Norway





Issue 6: Hydrogen in gas boilers

Argument: Needs 5-6 times more electricity



Governments moving in the wrong direction


 Germany


 United Kingdom




Full decarbonisation options: Heat pumps

 European Union

 Norway

 Switzerland

 United States

DISTRACTIONS FROM OWN EMISSIONS REDUCTIONS



Issue 7: Relying on offsetting through Article 6 to meet short term targets

Argument: Need reductions at home AND financing reductions elsewhere



Governments moving in the wrong direction



Japan



New Zealand



South Korea



Full decarbonisation options: Wind and solar with storage



European Union



Issue 8: Relying on carbon dioxide removal to meet net zero targets

Argument: Any emissions that can be reduced must be avoided as net negative emissions are necessary in the long run



Governments moving in the wrong direction



Canada



Chile



New Zealand



Russia



Saudi Arabia



Viet Nam



Full decarbonisation options: Wind and solar or other storage options

3.1 “Phase out of fossil fuels” instead of “phase down” or “unabated”

In 2015, the Paris Agreement set the goal to “achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century” (Article 4.1).

At the time of adoption, the common understanding was that a certain share of emissions could not be reduced completely and therefore needed to be compensated by removals. The “unavoidable” emissions are often assumed to be those from agriculture, which originate from soils and animals, or from chemical processes such as cement production. All uses of fossil fuels today have an alternative that does not involve greenhouse gas emissions. So the Paris Agreement already includes the requirement to at least phase “out” fossil fuels.

To keep the door open to some fossil fuel use, proponents use the term “phase down of fossil fuels” or “phase out of unabated fossil fuels” (see also Box 1). Others still label fossil gas as a “bridge fuel” which is not true, since the very limited carbon budget left for meeting the 1.5°C limit requires immediate reductions, and the same goes for fossil gas ([Climate Action Tracker, 2022](#)). Leaving the door open will be a welcome excuse to the fossil industry to construct new infrastructure and sell more fossil fuels.

Accordingly, any new global targets or decisions should be crystal clear that the era of fossil fuels will end by using the term “phase out of fossil fuels”. If the COP, eight years after the Paris Agreement, uses “phase down” or “phase out of unabated fossil fuels” and makes the same point, it would be a clear step backwards.

The UAE Presidency summarises the status of his deliberations in his note of 9 November ([COP28 Presidency, 2023](#)) to include both options: “phaseout or phase down of fossil fuels, or unabated fossil fuels, including unabated coal power”.

Country governments are divided on the issue at COP28:

- ▶ **Saudi Arabia** has a track record of obstructing international climate negotiations by repeatedly opposing any mention of fossil fuels ([The Guardian, 2022](#)).
- ▶ **India** supported a phase down of “fossil fuels”, instead of “coal” alone, at COP27. It argued at that time that only including coal would be discriminating against developing countries and all fossil fuels would be more inclusive ([Reuters, 2022](#)).
- ▶ **EU’s** position lacks teeth ([EU Council, 2023](#)). It still refers to “phase out of unabated fossil fuels”, yet it recognises fossil fuel ‘abatement technologies’ such as CCS should only be used for hard to abate sectors.
- ▶ The joint statement by the **US** and **China** introduces new language of “accelerate the substitution for coal, oil and gas generation” and lacks a reference to fossil fuel phase out ([US Department of State, 2023](#)).

Positive examples calling for full phase out without a reference to “unabated”:

- ▶ **Costa Rica** and **Denmark** are the founding members of the [Beyond Oil and Gas Alliance](#), an initiative seeking to facilitate a managed phase-out of oil and gas production.

Box 1: The false promise of “abated” fossil fuels with CCS and why it is different to CDR

Current debates on the future of fossil fuels in a zero-carbon energy system often mix “abated” fossil fuels, where Carbon Capture and Storage (CCS) is used to reduce CO₂ emissions from a point source, and carbon dioxide removal (CDR), where CO₂ is removed from the atmosphere as permanently as possible. They are quite different technologies.

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 (IPCC, 2022). This is defined as capturing over 90% of emissions from a power plant, and 50-80% of fugitive emissions from energy supply.

CCS

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 (Martin-Roberts et al, 2021). 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 (Global CCS Institute, 2022). There have been multiple failed demonstration plants in recent years (Wang et al, 2021), and the Boundary Dam plant has a lifetime underperformance of ~50% (IEEFA, 2022).

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.

CCS in the power sector is no longer essential. And while CCS suffered its “lost decade”, the cost of renewables plummeted (IRENA, 2023), significantly eroding the value of CCS in the power sector (Grant et al, 2021).

As such, the latest modelling assessed by the CAT finds no role for coal-fired CCS in 1.5°C compatible transitions, and, at best, a marginal role for fossil gas equipped with CCS (Climate Action Tracker, 2023). 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 and phase out.

CDR

For carbon dioxide removal (CDR) the picture is different: almost all IPCC scenarios that limit global temperature increase to 1.5°C include some sort of carbon dioxide removal in the second half of the century. Removal can be through the biosphere, e.g. forests, with high risk of reversal, and through novel technological options.

Some of the technological options also include elements of the CCS technology tested for fossil fuels, e.g. the transport and underground storage of CO₂. Only here, the input is not fossil fuels but biomass which, during its growth period has removed CO₂ from the atmosphere, or CO₂ directly captured from the air.

3.2 Production phase-out plans instead of “abated” fossil fuel operations with CCS

The Paris Agreement goals can only be met when fossil fuel production is minimised and eventually stopped.

However, large oil and gas producers are trying to find loopholes to continue their business-as-usual operations. One potential tactic is to attempt to claim the production of fossil fuels is “emissions free” through the capture of fugitive methane, and by employing renewables or CCS in the extraction, refining and transportation of the fossil fuels.

This is insufficient in two ways: first CCS is still not a viable proposition. Existing plants have closed down as they simply did not achieve the claimed capture of carbon, or because of massive costs blowouts. Applying CCS for fossil fuels at large scale has simply not been proven possible to date (see Box 1). Eliminating these emissions does not address the bigger problem: the emissions of the *use* of fossil fuels, by far the largest part, are not covered and still occur.

The fossil fuel industry must face facts: its very existence is not climate friendly. Production has to stop.

This has now been acknowledged by the International Energy Agency with a statement by its head Fatih Birol, who has stated that the oil and gas industry needs to let “go of the illusion that implausibly large amounts of carbon capture are the solution.”

Meeting 1.5°C with current fossil fuel demand would need “an entirely inconceivable 32 billion tonnes of carbon captured for utilisation or storage by 2050, including 23 billion tonnes via direct air capture. The amount of electricity needed to power these technologies would be greater than the entire world’s electricity demand today” (IEA 2023).

Several oil companies, both private and national, have come forward with “net zero” operations plan, e.g. ADNOC (UAE’s national oil company), Aramco (Saudi Arabia’s national company).

Countries supporting this notion:

- ▶ The **UAE** Presidency is gathering an alliance of zero operation oil companies pledging to reduce their production emissions to zero - to be presented at the COP (UNFCCC, 2023; POLITICO, 2023).
- ▶ The **UAE** set out a target to reduce operational emissions by up to 10 MtCO₂e per year by 2030 with the use of CCS, which is only around 4% of its current emissions and less than 2% of its exported emissions (Bloomberg, 2023).
- ▶ The joint statement by the **US** and **China** includes that “the two countries aim to advance at least 5 large-scale cooperative CCUS projects each by 2030, including from industrial and energy sources” (US Department of State, 2023).
- ▶ **Canada** uses CCS technologies in the oil and gas sector as part of enhanced oil recovery (IISD, 2023).
- ▶ In 2023, **Norway** issued new CO₂ storage licences to three oil companies (Upstream, 2023).

Positive examples of countries addressing the need to shut down oil and gas production include the members of the “Beyond Oil and Gas Alliance” (BOGA, 2023) including **Denmark, Costa Rica, France, Greenland, Ireland, The Marshall Islands, Portugal, Quebec, Sweden, Tuvalu, Vanuatu, Wales, Washington State**, which agreed to phase out oil and gas production entirely.

Other countries have pledged or already achieved to phase out coal entirely, which come together in the Power Past Coal Alliance and include amongst others **several EU member states, Ukraine, Peru, Panama, Niue, Fiji, Costa Rica, Colombia, Marshall Island, Mauritius, New Zealand, Ethiopia, El Salvador, Senegal, Singapore, Switzerland, UK, Uruguay, Tuvalu, Vanuatu, Angola, Mexico, Albania, Azerbaijan, Canada, Chile and Israel.**

3.3 Wind and solar with storage instead of gas/coal-fired power stations with CCS

The future of electricity generation centres around wind and solar with storage. However, some argue that for situations with no sun and no wind, alternative CO₂-free sources are necessary and the available seasonal storage options are not sufficient. In this context, often fossil gas power plants with CCS are introduced as an option (see Box 1).

Fossil gas or coal with CCS will never be an economically competitive electricity source for the mass market scale, and if at all only in niche markets where other electricity storage options are needed but not available, in particular seasonal storage.

To keep the door open for gas, several governments, and in particular the fossil fuel industry, promote fossil gas or coal power plants with CCS. In particular the idea of “CCS-ready” is popular, as one can continue the current practice and speculate that at some time in the future CCS will be applied. A few examples:

- ▶ **Saudi Arabia** is in the process of building a CCS hub at the industrial complex of Jubail, which will capture up to six million tonnes of CO₂ per year from three fossil gas power plants ([The CCUS Hub, 2023](#)).
- ▶ In a joint statement published in August 2023, **ASEAN** Energy Ministers have endorsed the use of CCUS in fossil gas power plants ([ASEAN, 2023](#)).
- ▶ **Australia** has been promoting CCS technologies not only on gas power plants, but also on gas exploration as a means to continue investing in fossil fuel extraction. The 2022–23 federal budget included funding for feasibility studies into CCS for four different gas fields. However, the only operating CCS project and the world’s largest, Chevron’s Gorgon gas project in Western Australia that captures carbon from LNG processing, has encountered numerous problems, resulting in it capturing only one third of the carbon contractually agreed, and starting years later than planned, as emissions from the project continue to rise. The project partners have had to buy 7.5 million tonnes of offsets to make up for the shortfall in captured emissions ([Energy intelligence, 2023](#)).
- ▶ The **Japanese government** intends to rely on CCS to decarbonise thermal power generation ([METI, 2023a](#)).
- ▶ **Canada** is home to Boundary Dam, the world’s only commercial CCS-abated coal-fired power plant in operation. The project, which regularly runs into technical issues, has never met its annual CO₂ capture target ([Schlissel, 2021](#)).

Since this technology is unlikely to ever be competitive, the support for it will only lead to more fossil gas- and coal-fired power plants being built and therefore to more fossil fuel use.

Instead, governments should expand renewables and other storage options and refrain from support for fossil gas and coal with CCS.

3.4 Wind and solar or other storage options instead of co-firing ammonia in coal-fired power plants

The future of electricity generation centres around wind and solar with storage. However, since many coal-fired power plants will have to be shut down before the end of their economic life to comply with the global 1.5°C limit, the idea of co-firing ammonia was introduced. Electricity from renewable sources would be used to synthesise ammonia, which can be stored and shipped to coal-fired power stations, where it replaces part of the fuel coal.

However, this approach is highly inefficient, resulting in around 75% of the original electricity being lost along the way (Figure 5). This means that four times more electricity needs to be generated by wind and solar if it is used for co-fired ammonia, than if the electricity were used directly. Hence, co-firing ammonia will never be economically competitive on the mass market scale, and if at all, only in niche markets where other electricity storage options are needed but not available, in particular seasonal storage.

Evaluating full-chain energy efficiency of

Ammonia co-firing

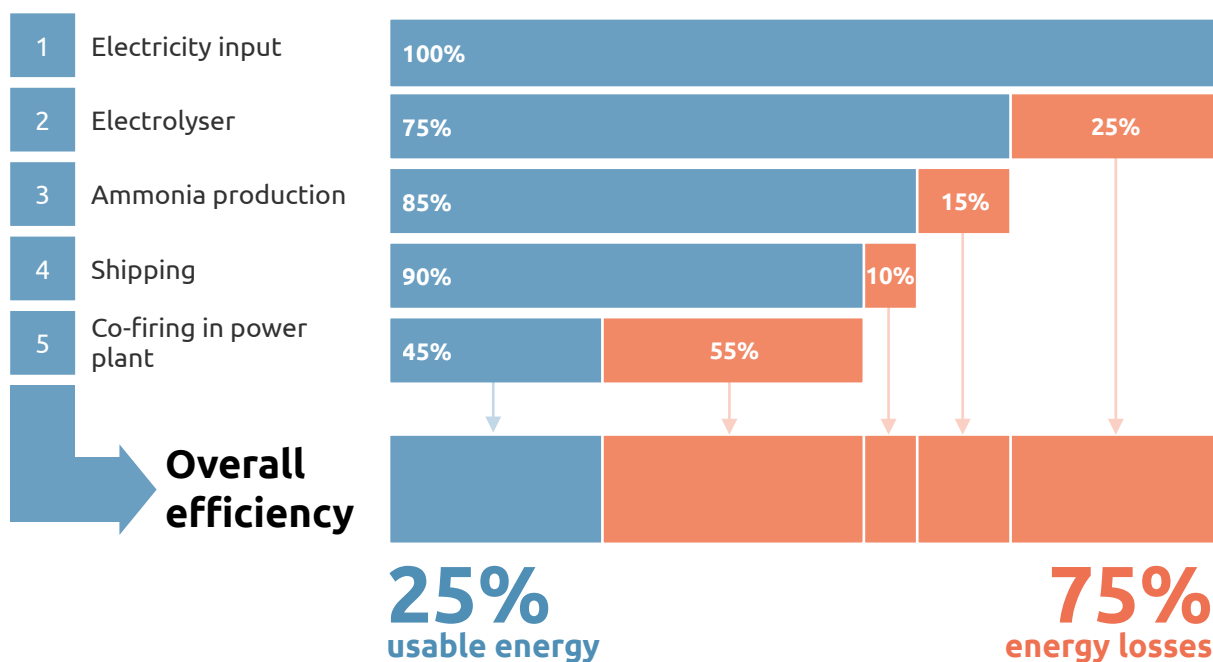


Figure 5: Efficiency of ammonia co-firing (NewClimate Institute, 2023)

To keep the door open for fossil fuels, several governments and in particular the fossil fuel industry promote co-firing of ammonia in coal-fired power plants. Examples:

- ▶ In its Green Transformation Basic Plan, the **Japanese government** puts a strong emphasis on the need to develop ammonia co-firing in thermal power plants (METI, 2023a)
- ▶ **Japan** is also pushing for ammonia co-firing in coal-reliant countries in South East Asia, particularly in Indonesia (METI, 2023b).

Since this technology will never be competitive, the support for it will only lead to more coal-fired power plants being built and therefore to more fossil fuel use, and continued emissions contributing to warming.

Instead, governments should expand renewables and other storage options and refrain from support for ammonia co-firing.

3.5 Battery electric cars instead of e-fuels or biofuels

The decarbonised future for cars is clear: battery electric. The route along hydrogen to a fuel cell is more than three times less efficient, and through e-fuels (synthetic fuels made from renewable electricity) around five to six times less efficient (Figure 6). This means that to drive the same distance, three to six times more wind and solar needs to be installed compared to a battery electric car. These alternatives will never be economically competitive on the mass market scale. If at all, they will be applied for other markets, e.g. e-fuels may be useful for aviation.

Biofuels blended into fossil fuels for passenger cars is also not a solution to phase out emissions completely. Biofuels still lead to greenhouse gas emissions due to potential deforestation, fertiliser use and processing, provide additional stress on alternative uses of land, and may conflict with biodiversity. Biowaste is not available at scale needed (IPCC 2022).

Passenger car technologies

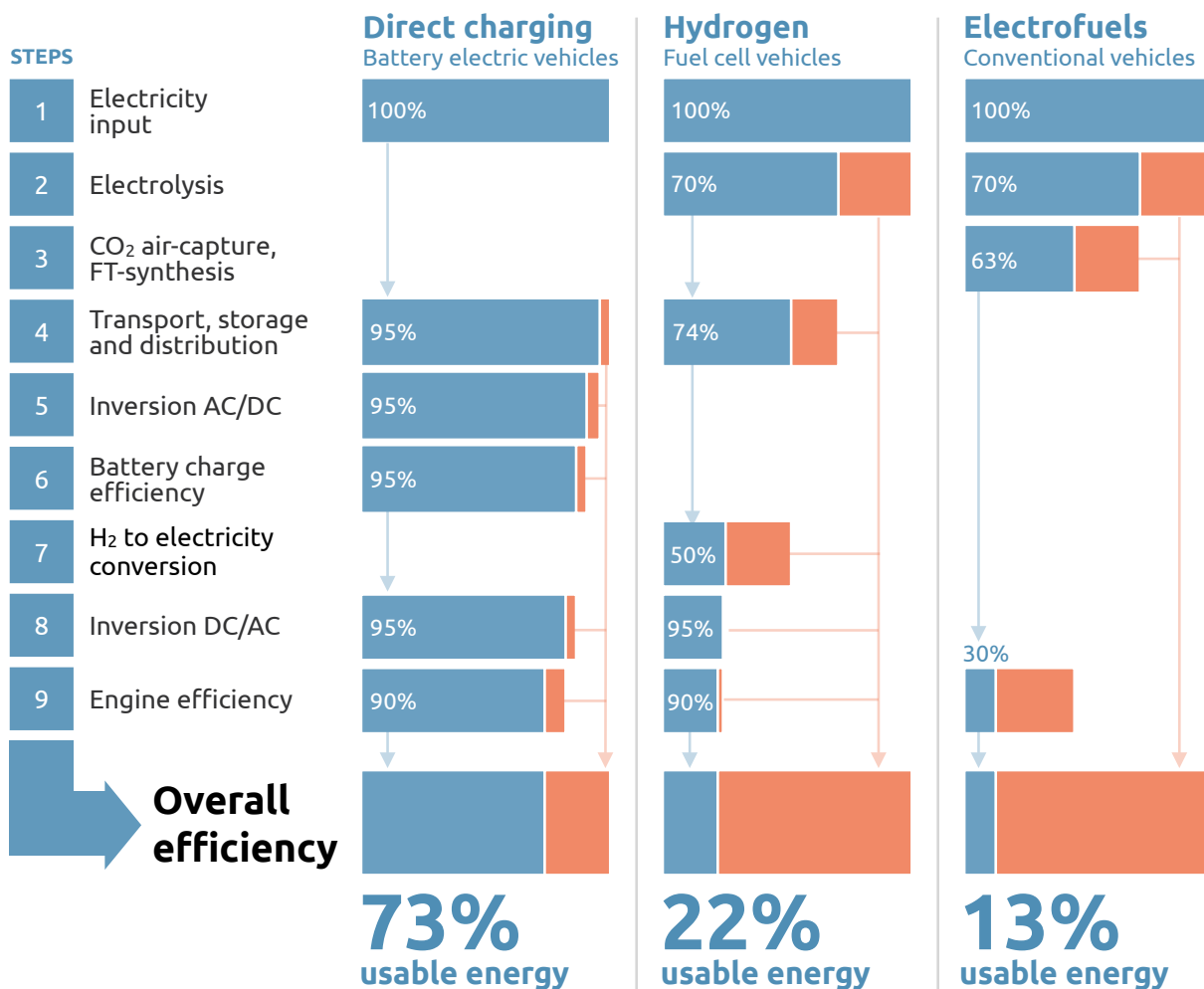


Figure 6: Efficiency of different technologies for passenger cars. Adapted from T&E 2018.

To keep the door open, several governments, car manufacturers and in particular the fossil fuel industry promote e-fuels and biofuels for cars. Examples:

- ▶ **Germany** blocked the EU adopting a standard for the sales of emission free cars as of 2035 by insisting on including a special category of cars that can run only on E-fuels (European Commission, 2023).
- ▶ In the EU's discussion around the new CO₂ standard for trucks and buses, several member states backed a proposal to account for biofuels and e-fuels, effectively weakening the standard and allowing sales of more fossil fuel trucks and buses (EURACTIV, 2023).
- ▶ **The Global Biofuel Alliance** was initiated at the Indian G20 summit to promote biofuel use. It covers 19 countries and 12 international organisations (Weforum, 2023).
- ▶ The **US** is the largest biofuel producer and continues to promote the biofuel industry. The Biden administration recently announced plans to increase the amount of biofuels that oil refiners must blend into the nation's fuel mix over the next three years (Reuters, 2023).
- ▶ **Brazil**, the world's second largest producer and consumer of biofuels, lags behind other countries when it comes to EV adoption.

E-fuels for cars will never be competitive; they will simply not be available. Biofuels still emit carbon and will not be available at scale for all cars. Hence, any support for e-fuels and biofuels for passenger cars will only lead to more sales of internal combustion engines, i.e. fossil fuel cars, and therefore to more fossil fuel use and a delay in the transition to electric mobility.

Instead, governments should support battery electric cars and refrain from support for e-fuels or biofuels for passenger cars. Global uptake of electric vehicles is faster than expected and at a speed that is compatible with the 1.5°C limit (State of Climate Action, 2023).

Positive examples include:

- ▶ **Norway**, which leads the world on EV adoption thanks to a long track record of government support and regulation, is on track to achieve its 2023 phase out of fossil fuel vehicle sale ahead of schedule (Holland, 2022).
- ▶ Thanks to generous subsidies provided both by the national and local governments, EV sales in **China** reached 22% of total new car sales in 2022, already exceeding the 2025 target (State of Climate Action, 2023).

3.6 Heat pumps instead of hydrogen-ready gas boilers

The path to decarbonising space heating involves three main strategies: improving the energy efficiency of buildings, promoting the use of heat pumps and deploying district heating systems (Climate Action Tracker, 2022).

Hydrogen boilers have gained attention as a potential solution for decarbonising home heating. However, they are on average between 5-6 times less efficient than heat pumps. This is partly because more energy is lost when converting electricity to hydrogen, as opposed to using electricity directly in a heat pump (Figure 7).

Heat pumps use less energy than boilers to produce the same amount of heat. In practical terms, this means that to heat the same home with a hydrogen boiler, five to six times more wind and solar infrastructure would need to be installed, compared to using a heat pump. Hence, hydrogen for space heating will never be economically competitive on the mass market scale.

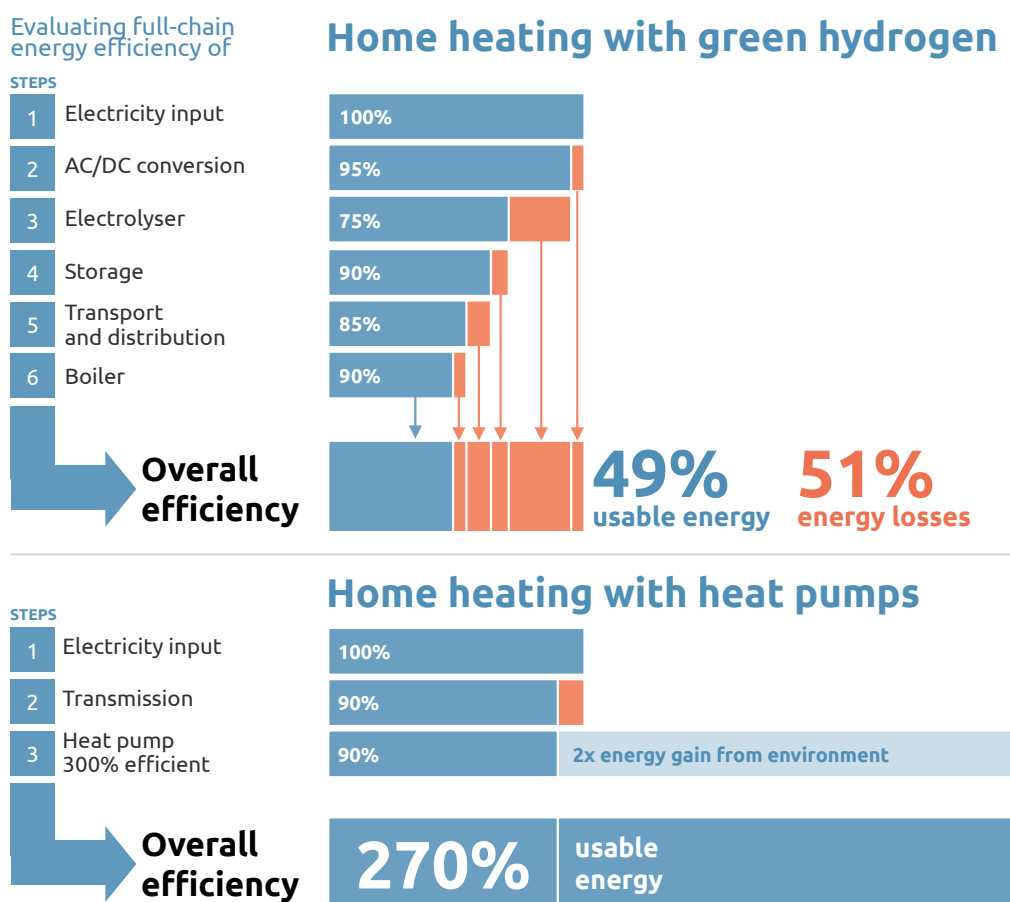


Figure 7: Efficiency of different technologies for space heating. Adapted from Hydrogen coalition 2023.

Several governments have been promoting hydrogen for space heating. Examples:

- ▶ The **UK** government keeps pushing for hydrogen for home heating against the recommendation of its National Infrastructure Commission (NIC, 2023). The UK, which has the lowest levels of heat pumps installations per capita in Europe, also announced that the ban on the installation of new gas boilers by 2025 it planned to introduce, will be delayed to 2035 and only be partial.
- ▶ In **Germany** the new heat law includes provisions that “hydrogen ready” gas boilers can be installed if the network provider has a plan to build a hydrogen network.

Since this technology will never be competitive at scale, hydrogen will not be available in distribution networks for heating. The support for this technology, in particular for “hydrogen ready” gas boilers, will only lead to more fossil gas boilers being sold and therefore to more fossil fuel use.

Instead, governments should support efficient buildings, heat pumps and district heating systems and refrain from support for hydrogen for space heating.

Positive examples include:

- ▶ **Denmark, Netherland, Ireland, Norway** and **California** have banned - or plan to ban gas boilers in new and existing buildings (Ehpa, 2023).
- ▶ The **EU** REPowerEU Plan set the objective to install at least 10 million additional heat pumps by 2027 (EU, 2022). The EU also plans to adopt a specific heat pumps action plan before the end of 2023 (EU, 2023).
- ▶ The **US** government established tax credits for heat pumps through the IRA (US Department of Energy, 2023).
- ▶ In **Norway**, the government was successful in promoting heat pumps, which are used by almost two thirds of households (World Economic Forum, 2023).
- ▶ In **Switzerland**, heat pumps are the main heating source in new buildings, thanks to the introduction of a carbon tax on heating fuels and a federal grant programme (World Economic Forum, 2023).

3.7 Domestic emissions reductions in NDCs instead of offsetting through Article 6

Emission scenarios compatible with the 1.5°C limit are clear: all countries, everywhere, have to reduce emissions in all sectors, as fast as possible. This is the only way to drive rapid decarbonisation that would see a halving of global emissions by 2030. Developed countries have largely exhausted their emissions budgets. Their highest priority should be reducing their own emissions as fast as possible, and complement (not substitute) these efforts by financing reductions and removals elsewhere.

Using carbon credits to offset domestic emissions and meet NDC targets will only lead to a delay in reducing own emissions and add to the ambition gap. NDCs, in aggregate, are grossly insufficient (leading to twice as high emissions in 2030 compared to what is necessary for a 1.5°C pathway) and very few countries have a reduction target in line with the 1.5°C limit. Hence, no country should offset its emissions and no country has anything to sell.

There are also serious concerns about the quality of the reductions and removals sold, with fundamental issues related to crucial aspects such as permanence and additionality very often poorly addressed by crediting standards. Carbon credits offered in today’s market are under high scrutiny as many projects turned out to not deliver the reductions they promised (see e.g. Guardian 2023).

Some governments have announced that they plan to use carbon credits sourced from elsewhere to achieve their NDC targets. The mechanism under Article 6 of the Paris Agreement allows countries to finance emission reductions in other countries and use those reductions for meeting own targets.

Current practice is diluting integrity and transparency in two ways:

- ▶ First, several governments, e.g. Japan, South Korea and New Zealand, combine domestic and international targets into one, making it difficult to assess what they intend to do domestically and what they plan to achieve with credits from abroad.
- ▶ Second, there is very little information about the projects that countries are financing (or intend to support) under this mechanism. It is almost impossible to assess the quality of these projects. Switzerland provides the most transparency in terms of credit buyers to date, which reveals support to several projects that are close to business as usual in the host countries and therefore do not contribute to raising ambition beyond what the host countries should deliver with their own resources to align with the 1.5°C goals.

Instead, governments should focus on reducing their own emissions, while financing emission reductions outside of their territory – either via carbon credits, or alternative mechanisms such as climate partnerships – without claiming the credits to reach their own targets.

A good example is the EU: It intends to meet its NDC without any offsetting. In the times of the Kyoto Protocol, allowing carbon credits from the Clean Development Mechanism into the EU Emissions Trading Scheme led to an oversupply of allowances and to extremely low prices, which rendered the system ineffective.

To avoid this mistake for the 2030 target and to focus on delivering necessary domestic ambition, the EU's NDC includes a clear commitment to achieve its target without the use of international credits.

3.8 Achieving long-term targets by reducing *own* emissions instead of relying on carbon dioxide removal

Emission scenarios compatible with the 1.5°C Paris Agreement temperature limit are clear: in addition to achieving deep cuts in emissions across all sectors of the global economy, global emissions need to become net negative as soon as possible. This mandates the accelerated scale-up of carbon dioxide removal (CDR) globally (Smith et al, 2023, Geden et al., 2023, Chapter 7). The reliance on CDR to limit global warming to 1.5°C, however, must be kept as low as possible, acknowledging the tremendous uncertainties around reliability, costs, and permanence.

The latest research defines CDR as “capturing CO₂ from the atmosphere and storing it away for decades to millennia” (Smith et al, 2023, page 11). Removal options at this stage are either reversible (e.g., forestry sinks) or expensive and technologically immature (e.g., direct air capture and storage). While strong policy support will be required to accelerate CDR deployment overtime, governments might opt to prioritise an overreliance on potentially available CDR instead of effectively reducing their own emissions.

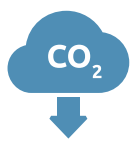
Detailed information on governments' plans to rely on CDR remains scarce. Among the 34 countries assessed by the Climate Action Tracker that have pledged net zero, only 13 countries provide more detailed information on LULUCF sinks and/or engineered CDR and storage in their net zero target year.⁷

Most governments plan to heavily rely on carbon dioxide removal or leave out a share of their emissions from the target. We conservatively estimate this to be almost a fifth of their current emissions. For this estimation, we have taken a closer look at 28 of the 34 governments with net-zero targets⁸ which jointly cover 81% of global 2019 emissions.

Based on the latest available information, we estimate the remaining emissions in the respective net-zero target years to amount to a minimum of 16–20% compared to 2019 emissions (see Figure 4, conservative estimate). Countries like Canada, Chile, New Zealand, Russia, Saudi Arabia and Viet Nam would still emit more than 30% of their 2019 emissions even after meeting their “net zero target”.

7 For more information see climateactiontracker.org/global/cat-net-zero-target-evaluations/assumptions-on-carbon-dioxide-removals/

8 Australia, Brazil, Canada, Chile, China, Colombia, Costa Rica, European Union, Germany (analyzed separately but not aggregated as included in EU), India, Indonesia, Japan, Kazakhstan, Nepal, New Zealand, Nigeria, South Korea, Russia, Saudi Arabia, Singapore, South Africa, Switzerland, Thailand, Türkiye, UAE, UK, US, and Viet Nam.



Governments' plans for remaining emissions in net-zero targets

Estimating the remaining greenhouse gas emissions in net-zero target years despite varying degrees of available information in governments' net-zero plans

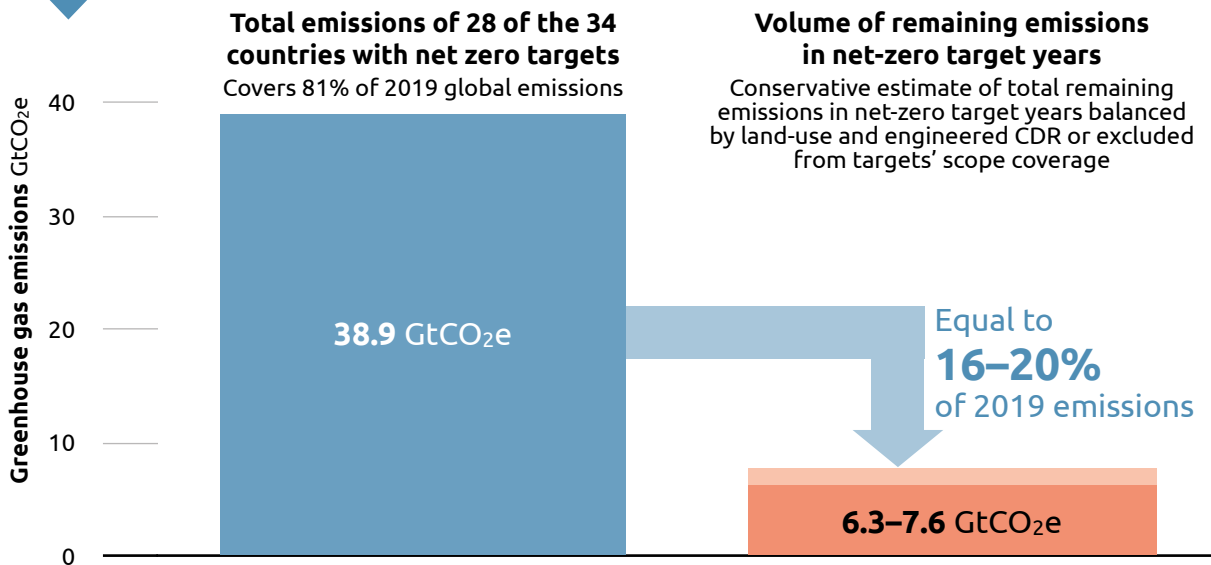


Figure 8: Conservative estimates of total remaining emissions in respective net-zero target years by 28 countries that cover 81% of 2019 global emissions. Estimates based on information and data tracked by the Climate Action Tracker (CAT) as of December 2023.

Governments are relying on forestry sinks (referred to as land use, land-use change and forestry, LULUCF) in particular to balance remaining emissions. As of 1 December 2023, we estimate that the same 28 governments mentioned above jointly assume LULUCF sinks of 4.7–5.7 GtCO₂e, representing 12–15% of their 2019 emissions. Forestry sinks face issues of both permanence and scarcity.

On permanence, climate change and direct human interferences lead to uncertainty on the performance of stored carbon in forests and other ecosystems (Geden et al., 2023, Chapter 7). On scarcity, the Land Gap Report found that countries' climate pledges, including NDCs and LTSs, would require around 1 billion hectares of land prioritised for CDR (Dooley et al., 2023), more than the more than the combined areas of South Africa, India, Türkiye and the European Union. These plans critically exceed the potential for global sustainable potential for nature-based CDR.

Only eight governments⁹ currently communicate some information on engineered CDR underpinning their net-zero targets. Their plans jointly amount to 0.7–1.3 GtCO₂e, representing 5–10% of their 2019 emissions.

These results for LULUCF sinks and engineered CDR are in line with other recently published literature in the field for different country samples (Smith et al, 2022, Buck et al, 2023, Mooldijk et al., 2023).

As carbon removals face uncertainties on permanence, sustainability and availability at this stage and may not happen at the pace, scale and costs as currently planned for, governments should focus their attention on reducing their own emissions to real zero while at the same time accelerating CDR to achieve net negative emissions in the second half of this century.

Several governments transparently communicate their plans to rely on LULUCF sinks and/or engineered CDR underpinning their net-zero targets, among them are Chile, Costa Rica, and South Korea. Alongside the need for transparency, countries should aim for a minimum reliance on LULUCF sinks and engineered CDR to meet their net-zero targets and underpin their targets with deep cuts in emissions across all sectors of the global economy.

9 Australia, Canada, EU, Germany, South Korea, Switzerland, UK, and the US.

4 NDC targets – 2030 and beyond

2030 emission targets remain woefully inadequate.

Since governments agreed to ‘revisit and strengthen’ their 2030 targets in 2022 as part of the Glasgow Climate Pact, only 38 countries plus the EU – covering less than half of global population and only about a quarter of global emissions - have made additional NDC submissions (see Figure 9). Far fewer have actually adopted stronger targets.

Governments have not delivered on their past promise to revisit and strengthen these targets.

In 2024, the conversation will shift to submitting 2035 targets, which are due, at the latest, by February 2025. 2035 target setting cannot be viewed as yet another opportunity to kick the can down the road. These targets need to be part of a broader pathway to net zero and show how countries will surpass their current 2030 targets and ramp up emissions cuts this decade.

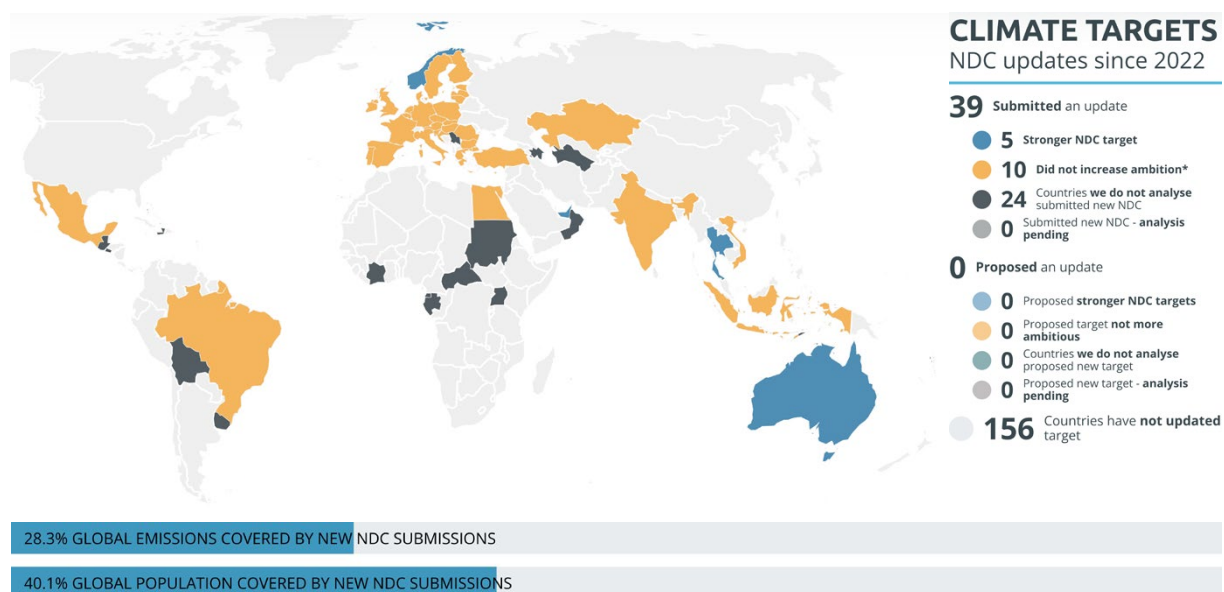


Figure 9: Status of NDC updates as of 8 November 2022. See our [Climate Target Update Tracker](#) page for further details

In 2023, ten governments¹⁰ plus the **EU27** made NDC submissions. Of the countries we track, only the **UAE** actually strengthened its target. **Türkiye's** target appears stronger on paper, but can be met with the current level of policy action. **Egypt** does not have an economy wide target, but made a minor improvement to its power sector target. It can also easily achieve its updated NDC with its current level of policy action. **Brazil** undid the damage of the Bolsonaro years, reverting to its original NDC, but did not increase its ambition beyond that. The **EU** and **Kazakhstan** provided further information on how they will meet their existing targets.

10 As of 3 December 2023: Azerbaijan, Brazil, Egypt, Holy See, Kazakhstan, Kiribati, Oman, Türkiye, Turkmenistan, and the UAE.

Box 2: Little progress on strengthening NDC targets in 2023

- ▶ **Brazil:** Reverted to its original NDC targets, submitted when Brazil joined the Paris Agreement, doing away with the creative accounting of the Bolsonaro years. These ‘new, old’ targets set emission limits in 2025 and 2030. We did not consider these targets to be particularly ambitious when they were first proposed in 2016 as the 2005 base year had high levels of deforestation (and thus land sector emissions), which had subsequently fallen. Lack of climate action and high levels of deforestation under Bolsonaro’s administration make the emission limits more difficult to achieve now, though deforestation has fallen significantly since Lula took office. Reverting to the old target was the least Brazil could do and does not represent an increase in ambition. The structure of the target – focusing on clear emission limits and on a five-year time frame – is good.
- ▶ **Egypt:** Submitted minor improvements to its power sector target, but still lacks an economy-wide target. It can meet its updated NDC with existing policies, so these minor tweaks will hardly drive any additional emissions reductions.
- ▶ **EU:** Did not strengthen its target in its latest NDC submission. The submission provided further details on EU policy development, but without a stronger headline target, we do not consider it to have increased ambition.
- ▶ **Kazakhstan:** Included significantly more detail in its latest update, but left the mitigation targets unchanged. It is not on track to meet its targets. Recent policy developments pull in opposite directions but continue to support fossil fuels more, driving emissions in the wrong direction.
- ▶ **Türkiye:** Target appears stronger on paper, but is still met by current policies, and so unlikely to drive additional real world emission cuts. The ‘business-as-usual’ projection (on which the reduction target is based) has not been updated since Türkiye first proposed an NDC target. It starts in 2012 and projects much faster emission increases than have actually taken place in the intervening years.
- ▶ **UAE:** Submitted an additional NDC update this year, having already strengthened its target last year. Not only is the target itself stronger, but the structure of the target has improved: it is now a clear emissions limit rather than a reduction from some business-as-usual projection. Notwithstanding these improvements, the UAE is not on track to meet this target and needs to accelerate implementing the necessary policies and actions to achieve it. It is also still short of the necessary level of action to limit warming to 1.5°C, so further target updates are still needed.

2035 targets – from critical decade to halfway point

Governments should submit new NDCs, with 2035 targets, by February 2025 at the latest.

One of the critical outcomes that the Global Stocktake needs to deliver on at COP28 is to inform the preparation of 1.5°C aligned 2035 targets. 2035 target setting cannot be viewed as yet another opportunity to kick the can down the road.

Reducing emissions in line with 1.5°C is the most important element of new NDCs. Prior to that, there also remains an urgent need for governments to revisit and strengthen 2030 targets in current NDCs, as requested two years in a row by the Glasgow Climate Pact 2021 and Sharm el-Sheikh Implementation Plan 2022.

If action is not increased so that global emissions are halved by 2030, limiting warming to 1.5°C without significant overshoot will no longer be possible, even with much deeper 2035 targets in new NDCs.

The other critical outcome of the Global Stocktake is to increase momentum on real action this decade, meaning peaking emissions by 2025, tripling renewables and doubling energy efficiency by 2030, and cutting fossil fuel production 40% by 2030.

Improvements in the architecture and transparency of these targets can help with providing market certainty and holding governments accountable, but it is not an alternative to the main objective of reducing emissions. With that caveat in mind, the CAT has prepared its top six elements for the 2035 NDC submissions. We will have more to say on this topic in the new year.

Here are our top six.

1. Cut emissions substantially

To keep 1.5°C alive, global emissions need to [peak before 2025](#), be halved by 2030 and continue on a steep downward trend thereafter.

For most countries, this means that their 2035 targets need to cut emissions substantially from today's levels. Many currently have emissions trajectories inconsistent with such a pathway.

These emissions cuts are what is needed for 1.5°C: to make the level of effort fair for all, many countries will need significant levels of climate finance to achieve these targets.

2. Align the target to a net-zero pathway and overachieve 2030 targets

2035 will be the halfway point for many countries towards achieving net zero emissions. It is therefore critical that these targets be developed with that trajectory in mind.

Many countries claim that their NDCs are compatible with their net zero targets in their latest NDC updates, but few provide any evidence to back this up.

- ▶ Colombia has included modelling showing its 2030 NDC is consistent with a net zero pathway in its long-term strategy ([Government of Colombia, 2021](#)). While we think its 2030 target still falls short of 1.5°C compatible, we applaud the modelling effort and transparency.
- ▶ Germany was forced to develop a more robust emissions reduction pathway after its Constitutional Court ruled in 2021 that its targets were not strong enough. The Court requested more clarity on the trajectory after 2030, which led to [a revision](#) of the country's climate law to add an interim 2040 target and bring forward the climate neutrality target to 2045. The CAT hopes that other governments will develop and include such pathways in their 2035 target submissions without having to involve the courts.
- ▶ In addition to looking forward for compatibility with a net zero pathway, governments should also look backwards and see how policy measures implemented to meet their 2035 targets can also help them overachieve their 2030 targets. As noted above, governments have failed to deliver on their promise to strengthen these targets, so the next best thing they can do is to surpass the targets through real world action.

3. Set absolute, economy wide, emission reduction targets

The structure or architecture of the target should match the need to cut emissions rapidly.

- ▶ Its scope should be economy-wide and cover all greenhouse gases.
- ▶ Its focus should be on emissions reductions (as opposed to energy targets or other non-emissions objectives).
- ▶ Its nature should be fixed, meaning a quantified emissions limit or reduction for historic base year.

Almost all countries we track already have economy wide targets that cover the major gases. In a recent joint statement with the US, China committed to setting an economy wide target covering all emissions in its 2035 NDC ([US Department of State, 2023](#)).

Many governments improved on the type and quantifiability of their targets in their most recent updates compared to the original NDCs, but there are several that still need to improve for their 2035 targets (see Figure 10 below).

- ▶ Only a handful of countries that we track still lack emission reduction targets, including China (though it has a CO₂ peaking target, its others are carbon intensity and energy focused) and India (which has emissions intensity and energy targets). However, we assume that China will move to an emissions reduction target as part of its economy-wide commitment.
- ▶ Several countries still formulate their targets as reductions from a business-as-usual (BAU) trajectory (e.g. Indonesia, Mexico, Saudi Arabia, Thailand). Such a formulation makes the underlying commitment uncertain, difficult to quantify and hard to track. Governments may also fail to update their BAUs as

the situation changes (e.g. Türkiye) or fail to provide one altogether (e.g. Egypt).

Formulating targets as emission limits provides the greatest certainty in assessing the level of action to which a government has committed (and is used by several governments already, especially in Latin America). Reductions from a historic base year can also provide certainty as to the level of commitment, so long as the underlying GHG inventory is robust. (Brazil's recent escapade with its NDC updates was due to significant revisions in its historic base year which substantially altered the strength of its target).

Have countries set NDC targets based on a good structural basis?	Is NDC emissions reduction focused? NDC is not based on emissions intensity, energy related or activity based targets		Does NDC have fixed emissions targets? NDC is not based on a reduction from business-as-usual baseline and must reach a non-shifting, absolute value	
	1st NDC	Current NDC	1st NDC	Current NDC
Chile	✗	✓	✗	✓
China	—	—	✗	✗
Colombia	✓	✓	✗	✓
Egypt	✗	✓	✗	✗
Ethiopia	✓	✓	✗	✓
The Gambia	✗	✓	✗	✗
India	✗	✗	✗	✗
Indonesia	✓	✓	✗	✗
Iran	✓		✗	
Kenya	✓	✓	✗	✗
Mexico	✓	✓	✗	✗
Morocco	✓	✓	✗	✗
Nepal	✓	✗	✗	✗
Nigeria	✓	✓	✗	✗
Peru	✓	✓	✗	✓
Philippines	✓	✓	✗	✗
Saudi Arabia	✓	✓	✗	✗
Singapore	✓	✓	✗	✓
South Korea	✓	✓	✗	✓
Thailand	✓	✓	✗	✗
Turkey	✓	✓	✗	✗
UAE	✓	✓	✗	✓
Viet Nam	✓	✓	✗	✗

Figure 10: Improvements in target architecture and remaining gaps. All other CAT countries not shown have fixed emission reduction targets.

4. Scaling up climate finance

Existing climate finance is nowhere near sufficient to support the level of action needed in developing countries. Developed countries are confident that the USD 100bn target will be met in 2023; the OCED says that it may even have been met in 2022, though no one will know for sure until the necessary reporting is submitted in 2024 or 2025 ([German Federal Foreign Office, 2023](#); [OECD, 2023](#)). Whether it is two or three years past the time developed countries promised to deliver, the USD 100bn still falls far short of what is needed to support the transition.

Substantial increases in available climate finance are needed to support 2035 targets and clarity on these support levels is needed as soon as possible to allow developing countries to plan with certainty.

5. Focus on domestic reductions, not trees or carbon markets

Keeping 1.5°C alive means cutting emissions as far and as fast as possible and not getting distracted by (or actively trying to obfuscate with) false solutions (as discussed at length in Section 3 of this briefing).

Stopping deforestation is critical and a key part of the climate commitment of some countries (e.g. Brazil, Indonesia, Colombia). Several others plan to enhance their existing carbon sinks. Reforesting and otherwise enhancing the land sector can benefit the climate, but this cannot be done as an alternative to phasing out fossil fuels and cutting GHG emissions. **2035 targets should clearly distinguish between emission reduction targets and any land sector objectives.**

Developed countries must focus on cutting their domestic emissions. Supporting additional mitigation action in developing countries can help developed countries in making their fair share contribution to climate action (provided the underlying credits are robust and just). What international markets cannot be is a crutch or a substitute for domestic action.

Japan, South Korea, and New Zealand intend to use international credits but do not provide any details on how much. Canada is still deciding on its approach. (The EU is a notable exception as its target is explicitly domestic only). This lack of clarity makes it difficult to assess their level of domestic action. Switzerland had originally provided clarity on the extent upon which it would rely on credits, and even improved the percentage of domestic action in its [first NDC update](#), but this transparency has been lost in its [latest NDC submission](#). **Developed countries should specify the extent to which they will use international market credits to meet their 2035 targets**, if at all.

6. Start developing and implementing policies now!

Policy development and implementation takes time. Whether governments are able to achieve (or beat) their 2035 targets will depend on decisions taken today. The current state of climate action is not encouraging. Our warming estimates show that current policies lag 0.2°C behind 2030 targets and even more if you consider net zero ambitions.

Canada, unfortunately, highlights the dangers of slow policy implementation. It has not met a single emission reduction target in the last 30 years due to a lack of policy action ([Office of the Auditor General of Canada, 2021](#)). Its own watchdog had already concluded in 2014 that it would miss its 2020 target for this precise reason (which is exactly what happened).



A1 Scenario definition

What is included in the Climate Action Tracker's various temperature scenarios?

- ▶ **2030 targets only:** Country 2030 targets and international bunkers targets
- ▶ **Pledges & targets:** 2030 targets and binding net zero country targets, plus international bunker targets. We consider targets to be binding if they have been adopted in domestic legislation or submitted, with sufficient clarity, in long-term strategies to the UNFCCC. We exclude older submissions if we deem that the country has abandoned its target.
- ▶ **Optimistic scenario:** All announced net zero targets, plus 2030 country and international bunkers targets
- ▶ **Policies & action:** Emissions in 2030 or 2035 under current policies

Table 2: Overview of inputs for each country under the Climate Action Tracker's various temperature projections for 2100 (December 2023 update).

Country	2030 targets only (no hot air)*	Pledges & Targets		Optimistic targets		Policies & action	
		2030 NDC target*	Net Zero targets	NZT included?	Method	Last updated	Policies until
Argentina	Updated NDC (2021)	Updated NDC (2021)	Yes	Yes	Conservative global estimate	October 2023	2035
Australia	Updated NDC (2022)	Updated NDC (2022)	Yes (max)	Yes (min)	CAT estimate	November 2023	2035
Bhutan	Current policies	Current policies	No ¹¹	Yes	Conservative global estimate	July 2023	2030
Brazil	Updated NDC (2023)	Updated NDC (2023)	No	Yes	CAT estimate	November 2023	2035
Canada	Updated NDC - domestic target(2021)	Updated NDC - domestic target (2021)	Yes	Yes	CAT estimate	November 2023	2035
Chile	Updated NDC (2020)	Updated NDC (2020)	Yes	Yes	CAT estimate	November 2022	2030
China	NDC (avg) ¹²	NDC (ave)	Yes	Yes	CAT estimate	November 2023	2035
Colombia	Updated NDC (2020)	Updated NDC (2020)	Yes	Yes	CAT estimate	November 2022 ¹³	2030
Costa Rica	Updated NDC (2020)	Updated NDC (2020)	Yes (max)	Yes (min)	CAT estimate	April 2023	2030
Egypt	Current policies	Current policies	--	No target	--	August 2023	2030
Ethiopia	Current policies	Current policies	Yes	Yes	Conservative global estimate	November 2022	2030
EU27	Updated NDC (2023)	Updated NDC (2023)	Yes (max)	Yes (min)	CAT estimate	November 2023	2035
Germany	Covered in EU27						

11 22 September 2023 LTS submission not considered.

12 Please discussion in the [Assumptions](#) tab for China for our approach to NDC quantification for the purposes of our temperature estimates.

13 We updated historic emissions to 2022, but the current policies pathway is based on our November 2022 assessment.

Country	2030 targets only (no hot air)*	Pledges & Targets		Optimistic targets		Policies & action	
		2030 NDC target*	Net Zero targets	NZT included?	Method	Last updated	Policies until
India	Current policies	Current policies	No	Yes	CAT estimate	November 2023	2035
Indonesia	Current policies	Current policies	No	Yes	CAT estimate	November 2023	2030
Iran	Current policies	Current policies	--	No target	--	October 2023	2030
Japan	Updated NDC (2021)	Updated NDC (2021)	Yes (max)	Yes (min)	CAT estimate	November 2023	2030
Kazakhstan	Updated NDC (2023)	Updated NDC (2023)	Yes	Yes	CAT estimate	November 2023	2035
Kenya	Current policies	Current policies	--	No target	--	May 2022	2030
Mexico	Current policies	Current policies	--	No target ¹⁴	--	November 2023	2030
Morocco	Updated NDC (2021)	Updated NDC (2021)	No ¹⁵	Yes	Conservative global estimate	April 2023	2030
Nepal	Current policies	Current policies	Yes	Yes	CAT estimate	November 2022	2030
New Zealand	Updated NDC (2021)	Updated NDC (2021)	Yes (max)	Yes (min)	CAT estimate	November 2022	2030
Nigeria	Updated NDC (2021)	Updated NDC (2021)	No	Yes	CAT estimate	July 2023	2035
Norway	Updated NDC (2022)	Updated NDC (2022)	Yes (max)	Yes (min)	CAT estimate	November 2023	2030
Peru	Current policies	Current policies	No	Yes	Conservative global estimate	September 2022	2030
Philippines	Current policies	Current policies	--	No target	--	October 2022	2030
Russian Federation	Current policies	Current policies	Yes	Yes	CAT estimate	November 2023	2035
Saudi Arabia	Updated NDC (2021)	Updated NDC (2021)	No	Yes	CAT estimate	November 2023	2030
Singapore	Current policies	Current policies	Yes	Yes	CAT estimate	November 2023	2035
South Africa	Updated NDC (2021)	Updated NDC (2021)	Yes	Yes	CAT estimate	November 2023	2035
South Korea	Updated NDC -domestic target (2021)	Update NDC -domestic target (2021)	Yes	Yes	CAT estimate	July 2023	2030
Switzerland	Updated NDC -domestic target (2021)	Updated NDC -domestic target (2021)	Yes	Yes	CAT estimate	June 2023	2035
Thailand	Updated NDC (2022)	Updated NDC (2022)	Yes	Yes	CAT estimate	November 2023	2035
The Gambia	Current policies	Current policies	Yes	Yes	Conservative global estimate	July 2022	2030
Türkiye	Updated NDC (2023)	Updated NDC (2023)	No	Yes	CAT estimate	May 2023	2030

14 We no longer consider Mexico's mid-century strategy (published in 2016) to be valid, however the 2021 court ruling, which invalidated the country's 2020 NDC update, did reinstate this strategy.

15 Morocco submitted an LTS on 21 December 2021, however it lacks sufficient information to evaluate this target, and so we do not consider it to be sufficiently binding to include in this scenario.

Country	2030 targets only (no hot air)*	Pledges & Targets		Optimistic targets		Policies & action	
		2030 NDC target*	Net Zero targets	NZT included?	Method	Last updated	Policies until
UAE	Updated NDC (2023)	Updated NDC (2023)	No	Yes	CAT estimate	November 2023	2030
UK	Updated NDC (2022)	Updated NDC (2022)	Yes	Yes	CAT estimate	September 2023	2035
Ukraine**	Updated NDC (2021)	Updated NDC (2021)	No	Yes	CAT estimate	December 2021	2030
USA	Updated NDC (2021)	Updated NDC (2021)	Yes (max)	Yes (min)	CAT estimate	November 2023	2035
Viet Nam	Current policies	Current policies	Yes	Yes	CAT estimate	November 2023	2035
International Aviation ***	CAT estimate of 2030 emissions under carbon neutral target & 2050 target					September 2022	2050
International Shipping***	2030, 2040 and 2050 targets					October 2023	2050

* For weak targets, we take a country's estimated 2030 level under current policies, if that level is lower than the target.

** We have suspended our rating for Ukraine as the country defends itself from the unlawful Russian invasion. We have used the data from our last assessment as it is not possible to estimate more recent emissions given the uncertainty created by the war.

*** International bunkers targets are included in all pathways as they have been formally adopted by their respective governing bodies.

CAT temperature estimates are done using the MAGICC climate model. More information on the model is available [here](#).

A2 Comparison to other warming estimates

UNEP GAP report¹⁶

The UNEP gap report assesses the end-of-century warming under a current policy scenario to be 3.0°C (range: 1.9–3.8°C), while this year's assessment of the Climate Action Tracker provides a central estimate of 2.7°C. This difference is primarily explained by the different quantified exceedance probabilities used in the two reports. The UNEP Gap Report uses a temperature estimate with 66% chance of limiting warming to that level, while the CAT uses a temperature estimate with a 50% chance. Our assessment for a 66% chance is also 3.0°C.

Table 3 Summary of CAT warming estimates compared to UNEP Gap Report estimates.

Temperatures	50% chance		66% chance		Comments
	CAT	UNEP	CAT	UNEP	
Current Policies	2.7°C	2.7°C	3.0°C	3.0°C	
2030 targets only	2.5°C	2.6°C 2.3°C	2.7°C	2.9°C 2.5°C	CAT/UNEP unconditional NDCs UNEP conditional NDCs
Pledges plus binding net zero targets	2.1°C		2.3°C		
Optimistic (all net zero targets)	1.8°C	1.8°C	2.0°C	2.0°C	

16 United Nations Environment Programme (2023). Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again). Nairobi. <https://doi.org/10.59117/20.500.11822/43922>

Despite having comparable temperature estimates, there are several methodological differences between the two assessments:

- ▶ UNEP GAP Report highlights the value with a 66% chance of warming, while the CAT highlights the one with a 50% chance.
- ▶ For the first time this year, the CAT has included emissions estimates up to the year 2035 in its current policy pathways for some countries, before extending the scenario to the end of century using statistical methods based on IAM pathways. UNEP uses 2030 values and then extends.
- ▶ The used methods to extend pathways over the century are different. The UNEP GAP report is extending current policies and NDCs throughout the century based on their implied carbon price by 2030. Over the century carbon prices are adapted to follow the same growth path as global GDP. Following the method published by Rogelj et al. 2023,¹⁷ the emissions implied by these carbon price trajectories are estimated based on the relationships found in five IAM modelling frameworks. The CAT uses the equal quantile extension framework,¹⁸ based on a similar set of IAM models.
- ▶ The UNEP GAP Report uses the FaIR19 climate emulator, while the CAT uses MAGICC7.²⁰

These are the main differences between the two reports, but is not an exhaustive list.

UNFCCC Synthesis report²¹

The UNFCCC Synthesis report only assesses the warming associated with the conditional and unconditional NDCs. It also considers a different timeframe than the CAT. The UNFCCC provides estimates for the highest level of warming to be reached during this century, while the CAT's focus is on end-of-century warming levels. For the NDC scenario, this is however the same, as temperature would continue to increase after 2100. Both estimates are assessed based on a 50% chance to stay below a given temperature limit.

Table 4: Summary of CAT 2030 targets only warming estimate compared to UNFCCC Synthesis Report estimate.

Temperatures	50% chance	
	CAT	UNEP
2030 targets only	2.5°C in 2100	2.1 – 2.8°C peak

17 Rogelj, J., Fransen, T., den Elzen, M., Lamboll, R.D., Schumer, C., Kuramochi, T. et al. (2023). Credibility gap in net-zero climate targets leaves world at high risk. *Science* 380(6649), 1014-1016. <https://doi.org/10.1126/science.adg6248>

18 Lamboll, R. D., Nicholls, Z. R. J., Kikstra, J. S., Meinshausen, M., and Rogelj, J.: Silicone v1.0.0: an open-source Python package for inferring missing emissions data for climate change research, *Geosci. Model Dev.*, 13, 5259–5275, <https://doi.org/10.5194/gmd-13-5259-2020>, 2020a

19 Leach, N. J., Jenkins, S., Nicholls, Z., Smith, C. J., Lynch, J., Cain, M., Walsh, T., Wu, B., Tsutsui, J., and Allen, M. R.: FaIRv2.0.0: a generalized impulse response model for climate uncertainty and future scenario exploration, *Geosci. Model Dev.*, 14, 3007–3036, <https://doi.org/10.5194/gmd-14-3007-2021>, 2021

20 Meinshausen, M., S. C. B. Raper and T. M. L. Wigley (2011). "Emulating coupled atmosphere-ocean and carbon cycle models with a simpler model, MAGICC6: Part I – Model Description and Calibration." *Atmospheric Chemistry and Physics* 11: 1417-1456. doi:10.5194/acp-11-1417-2011

21 UNFCCC Synthesis report, UNFCCC. Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA), 2023

A3 Country ratings summary

Table 5: Summary of Climate Action Tracker's Overall rating and rating components.

Country	Climate Action Tracker Overall rating Combined rating based on rating components Climate Action Tracker Dec 2023 Update	Rating components				Additional components	
		Policies & action	Domestic or supported target	Fair share target	Climate finance	Land use & forestry	Net zero target
Bhutan	ALMOST SUFFICIENT	✓	✓	✓	✗	✓	✗
Costa Rica	ALMOST SUFFICIENT	✓	✓	✓	✗	✓	✓
Ethiopia	ALMOST SUFFICIENT	✓	✗	✓	✗	✗	✗
Kenya	ALMOST SUFFICIENT	✓	✗	✓	✗	✗	✗
Morocco	ALMOST SUFFICIENT	✓	✓	✓	✗	✗	✗
Nepal	ALMOST SUFFICIENT	✓	✗	✓	✗	✓	✓
Nigeria	ALMOST SUFFICIENT	✓	✓	✓	✗	✗	✓
Norway	ALMOST SUFFICIENT	✓	✓	✗	✗	✓	✗
The Gambia	ALMOST SUFFICIENT	✓	✓	✓	✗	✓	✗
Australia	INSUFFICIENT	✗	✓	✗	✗	✗	✗
Brazil	INSUFFICIENT	✗	✓	✓	✗	✗	✗
Chile	INSUFFICIENT	✓	✓	✗	✗	✓	✓
Colombia	INSUFFICIENT	✓	✓	✓	✗	✗	✓
EU	INSUFFICIENT	✓	✓	✓	✗	✗	✓
Germany	INSUFFICIENT	✓	✓	✗	✗	✗	✓
Japan	INSUFFICIENT	✓	✓	✓	✗	✗	✗
Kazakhstan	INSUFFICIENT	✓	✓	✓	✗	✗	✗
Peru	INSUFFICIENT	✓	✓	✓	✗	✗	✗
Philippines	INSUFFICIENT	✓	✓	✓	✗	✓	✗
South Africa	INSUFFICIENT	✓	✓	✓	✗	✗	✗
Switzerland	INSUFFICIENT	✓	✓	✓	✗	✗	✓
United Kingdom	INSUFFICIENT	✓	✓	✓	✗	✗	✓
United States	INSUFFICIENT	✓	✓	✓	✗	✗	✓
Canada	HIGHLY INSUFFICIENT	✗	✓	✗	✗	✗	✓
China	HIGHLY INSUFFICIENT	✗	✗	✗	✗	✗	✗
Egypt	HIGHLY INSUFFICIENT	✓	✗	✗	✗	✗	✗
India	HIGHLY INSUFFICIENT	✓	✗	✗	✗	✗	✗
South Korea	HIGHLY INSUFFICIENT	✗	✓	✗	✗	✗	✓
New Zealand	HIGHLY INSUFFICIENT	✗	✓	✗	✗	✓	✗
Argentina	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✗	✗
Indonesia	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✗	✗
Iran	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✗	✗
Mexico	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✓	✗
Russia	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✓	✗
Saudi Arabia	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✗	✗
Singapore	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✗	✗
Thailand	CRITICALLY INSUFFICIENT	✗	✓	✗	✗	✓	✓
Türkiye	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✗	✗
UAE	CRITICALLY INSUFFICIENT	✗	✓	✗	✗	✗	✗
Vietnam	CRITICALLY INSUFFICIENT	✗	✗	✗	✗	✗	✓



Authors



Climate Analytics

Andreas Geiges
Bill Hare
Claire Fyson
Claire Stockwell
Deborah Ramalope
Sarah Heck



NewClimate Institute

Ana Missirliu
Hanna Fekete
Mia Moisis
Niklas Höhne
Frederic Hans

IESR

Fabby Tumiwa

Acknowledgments

We would like to thank the wider [CAT team](#) for their work on country assessments, which contributed to this briefing.

Editing and Design

Cindy Baxter
Designers For Climate

The Consortium



The Climate Action Tracker (CAT) is an independent scientific analysis produced by two research organisations 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.

climateactiontracker.org



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.

climateanalytics.org



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.

newclimate.org