Climate Action Tracker

Three key near-term actions could bend the warming curve; bringing projected warming below 2˚C

November 2025

Summary

Tripling renewables, doubling energy efficiency and cutting methane by 2030 and beyond would cut warming rate by a third in ten years, and halve it by 2040.

It would cut projected warming this century significantly (about 0.9˚C from 2.6˚C to 1.7˚C).

Scaled up financial support to achieve this will be needed for many poorer countries.

Rapidly reducing the rate of warming is critical for adaptation.

Under current government climate policies, the world is hurtling towards a catastrophic 2.6°C of warming, with little improvement seen over the last four years. The gap between current and pledged emissions for 2030 and 2035 and the 1.5°C pathway keeps growing.

At COP28 in Dubai, 2023, as part of the first Global Stocktake (GST1) discussion, the world's governments negotiated and agreed on a clear set of 2030 energy and methane goals that aligned with limiting warming to 1.5°C. These included tripling renewable energy capacity, doubling the rate of energy efficiency improvements, and cutting methane emissions—referred to herein as the COP28 Energy and Methane goals.

We show for the first time the huge climate benefits if governments were to actually **implement** what they have **negotiated** and agreed for these three critical energy and methane goals.

These actions would bring projected 21st century warming below 2°C. The outlook improves significantly (by about 0.9°C), almost as much as the entire 1°C improvement in the global warming outlook seen over the ten years since the Paris Agreement was adopted in 2015, and would be a major step towards keeping the 1.5°C limit in sight.

This shows the power of **implementing** these three critical, already agreed, actions - and this does not include other important measures such as reducing deforestation. The tripling and doubling goals are the foundations of many other of the GST1 goals and, c**ritically, begin to implement the negotiated and agreed transition away from fossil fuels in energy systems**. These measures accelerate the phase-out of coal in the power sector, the reduction of emissions from road transport and would require addressing fossil fuel subsidies.

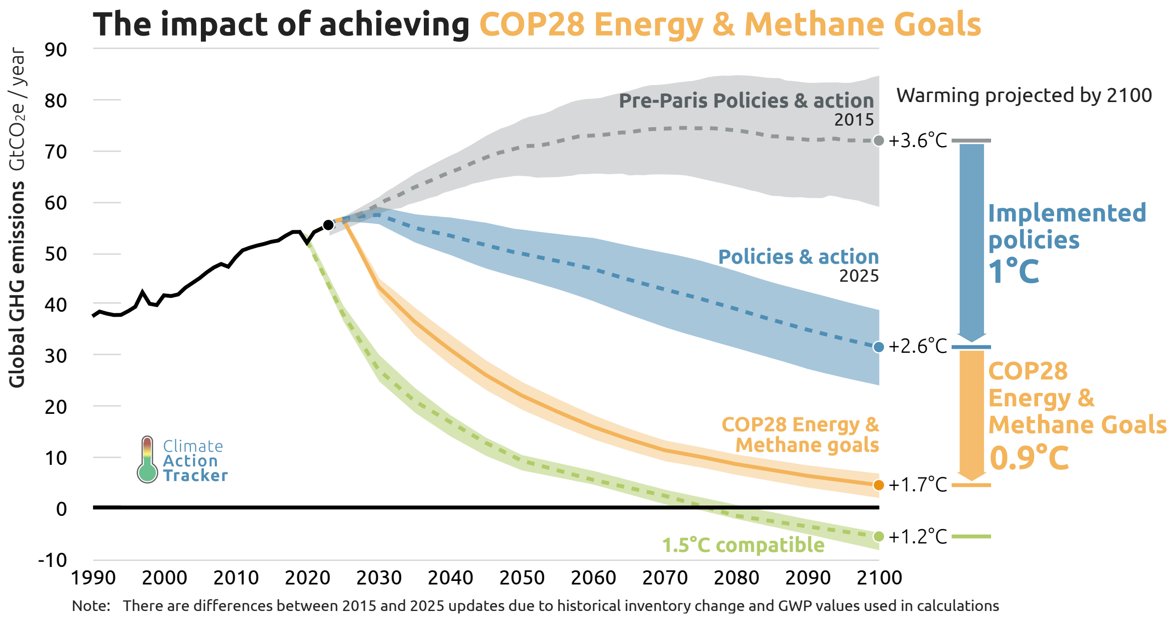

Figure 1 Emissions pathways and projected warming based on achieving all three COP28 Energy and Methane Goals, compared to action achieved to date.

Unlike any other action taken by, or under, the Paris Agreement, tripling renewable energy by 2030, doubling the rate of energy efficiency improvements, and reducing methane would rapidly reduce the rate of warming in the next decade and result in warming peaking at 1.7–1.8°C.

The rate of human-induced warming is currently (in 2025) around ~0.25°C per decade. These actions would reduce this by around 10% by 2030 and, when continued, essentially halve it by 2040. Contrast this with the fact that under governments' current policies, the warming rate even accelerates slightly by 2030 before very slowly declining—but warming will not peak this century and would continue increasing in 2100.

Implementation of these GST1 goals form a central component of the COP30 Presidency's action agenda, and constitute the backbone of a feasible path to course-correct this decade.

In this analysis, we evaluate the global benefits of governments taking concerted action to deliver on these goals by 2030 and 2035, both in terms of emission trajectories and warming implications.

We take a detailed look at what individual countries within the G20 can do for each of these goals. This is important, because the Paris Agreement is made up of countries that need to individually implement their shares of global action, including these energy and methane goals that may be different in each case. The G20 accounts for around 80% of global emissions (excl. LULUCF).

These actions, if governments were to implement them as they agreed to in 2023, would be the biggest step forward since the Paris Agreement was adopted in 2015

If all countries were to take this action, global emissions would be approximately 14 $GtCO_2e$ lower than expected under current policies in 2030, and 18 $GtCO_2e$ lower in 2035.

Impact of all countries achieving the COP28 Energy and Methane goals		
Impact	**2030**	**2035**
Emissions reductions below levels expected under current policies	**14** $GtCO_2e$	**18** $GtCO_2e$
Reduction of implementation gap	**44–49%** (from 29–32 $GtCO_2e$ to 15–18 $GtCO_2e$)	**50–59%** (from 31–37 $GtCO_2e$ to 13–18 $GtCO_2e$)
Reduction of targets gap If G20 NDCs were to be aligned with these energy and methane goals	**40–43%** (from 26–29 $GtCO_2e$ to 15–18 $GtCO_2e$)	**42–51%** (from 26–31 $GtCO_2e$ to 13–18 $GtCO_2e$)
Reduction of expected 2100 warming	**about -0.9°C ± 0.2°C**	

Unlike any previous improvements in targets and policies under the Paris Agreement, the implementation of these measures would quickly begin to slow the rate of warming from about 0.25°C per decade at present, rather than under current policies which would see a slight acceleration by 2030.

The implementation of these three of the global COP28 Energy and Methane goals would mark a decisive step toward global alignment with the Paris temperature goal and would keep expected warming below 2°C rather than increasing to 2.6°C by 2100. Further efforts to **implement the already negotiated and agreed** Global Stocktake goals—for example on halting deforestation by 2030—would yield additional climate benefits.

For this to happen, however, it is critical that richer countries step up to provide the critical climate finance for those countries that need it.

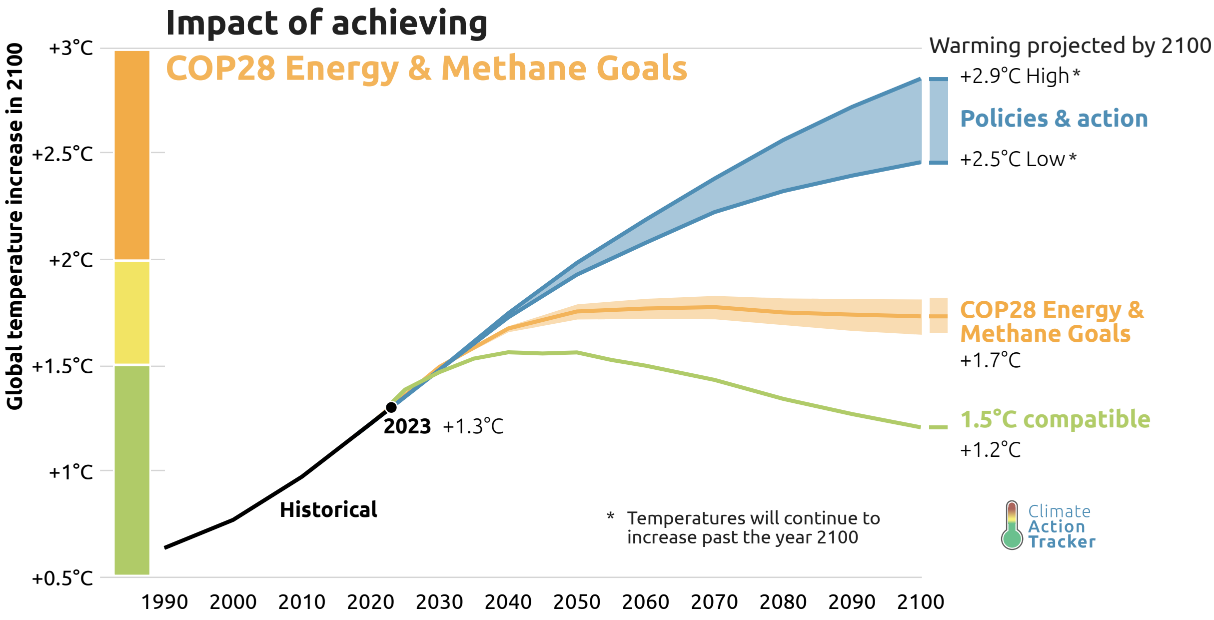

Figure 2 Temperature overshoot and stabilisation in the COP28 Energy and Methane goals scenario in comparison with other possible pathways.

Tripling renewable energy within the G20 would account for roughly 40 % of total emissions reductions. Expanding renewables is the backbone of the energy transition as it delivers dual benefits: displacing fossil fuels directly and powering electrification across sectors, which in turn drives greater energy efficiency.

Doubling energy efficiency would contribute another 40% of the G20's total reductions, almost half of which through the electrification of energy end use sectors.

Methane mitigation would deliver a further 20%, providing rapid, near-term benefits. These percentages would be roughly the same for the extrapolation at the global level.

The COP28 Energy and Methane goals		
Tripling renewables	**Doubling energy efficiency**	**Reducing methane**
Driving fossil fuels out of the power system towards net zero emissions electricity, providing clean energy to the demand sectors	Striving for the most efficient use of energy in buildings, industry and transport, minimising waste and maximising electrification	Cutting methane in line with the Global Methane Pledge, especially in the energy sector as fossil fuel production phases down

The combination of reduced CO_2 emissions—and the resulting slowdown in CO_2 concentration in the atmosphere—together with rapid reductions in methane emissions, would slow and then rapidly reduce the human induced forcing of the climate system.

Under the COP28 Energy and Methane goals, measures to reduce CO2 and methane emissions both contribute to cutting the warming rate by half by 2040, compared to current policies and present-day rates of warming.

While the methane reductions are just 20% of the total emissions reductions from implementing the COP28 Energy and Methane goals, the warming benefit is much greater. Methane contributes a third to a half of the reduction in the warming rate, and methane and CO_2 reductions need to work together to rapidly reduce the rate of warming. The delivery of the global COP28 Energy and Methane goals is technically feasible, but would require significant commitment from governments, including financial support for those countries that lack the resources to act on the scale required.

While technology costs have fallen and solutions are widely available, success depends on accelerating deployment, overcoming policy and infrastructure barriers, and scaling up finance. These goals are mutually reinforcing and can be achieved with existing technologies and proven policy instruments.

While these three goals alone will not fully close the implementation gap, they represent a decisive advance—a gamechanger at a moment when global climate action must focus on limiting the scale and duration of the temperature overshoot of 1.5°C. These measures would set the stage for further action, including on deforestation, which would bring global emissions much closer to a 1.5°C pathway.

This analysis underscores a clear imperative: the accelerated expansion of renewable energy, expansion of electrification and the associated phase-out of fossil fuels are indispensable to achieving the Paris goal. Delivering on these agreed targets would not only narrow the emissions gap but also lay the foundation for a resilient, low-carbon global economy. The action agenda of the COP30 Presidency represents a key space to mobilise commitment in the delivery of these goals.

If the G20 were to implement the three goals...

If individual G20 countries were to implement the COP28 goals for renewable energy, energy efficiency and methane, they would deliver total emissions reductions of around 11 $GtCO_2e$ by 2030 and 14 $GtCO_2e$ by 2035, compared to current policy projections.

Impact of G20 achieving the COP28 Energy and Methane goals		
Impact	**2030**	**2035**
Emissions reductions below levels expected under current policies	**11** $GtCO_2e$	**14** $GtCO_2e$
Reduction of implementation gap	**34–37**% (from 29–32 $GtCO_2e$ to 18–21 $GtCO_2e$)	**39–45**% (from 31–37 $GtCO_2e$ to 17–22 $GtCO_2e$)
Reduction of targets gap If G20 NDCs were to be aligned with these energy and methane goals	**28–30**% (from 26–29 $GtCO_2e$ to 18–21 $GtCO_2e$)	**29–36**% (from 26–31 $GtCO_2e$ to 17–22 $GtCO_2e$)
Reduction of expected 2100 warming	**~ -0.75°C**	

Slowing the pace of warming is critical for "catching up" on adaptation worldwide…

In the past year, new scientific evidence indicates that total observed warming has accelerated. This poses serious challenges for global adaptation efforts. Many countries are already facing mounting adaptation deficits, with most regions struggling to keep up with current rates of warming, let alone an acceleration, resulting in increasing loss and damage.

Halving the rate of warming in the near term would give communities a realistic chance to cope with rising climate impacts, and—with adequate international climate finance—begin to "catch up" and close the adaptation gap.

For ecosystems, slowing the pace of climate change is equally as important: it gives species the time needed to adapt or to migrate to areas with suitable climatic conditions. Scientific evidence shows that the current rate of global warming is already too rapid for many species across tropical, mountain, cool, and cold habitats.

Even existing preservation areas are under pressure, as climatic conditions shift more quickly than species can move, leading to growing mismatches between preservation areas and the conditions required by the species they are meant to protect.

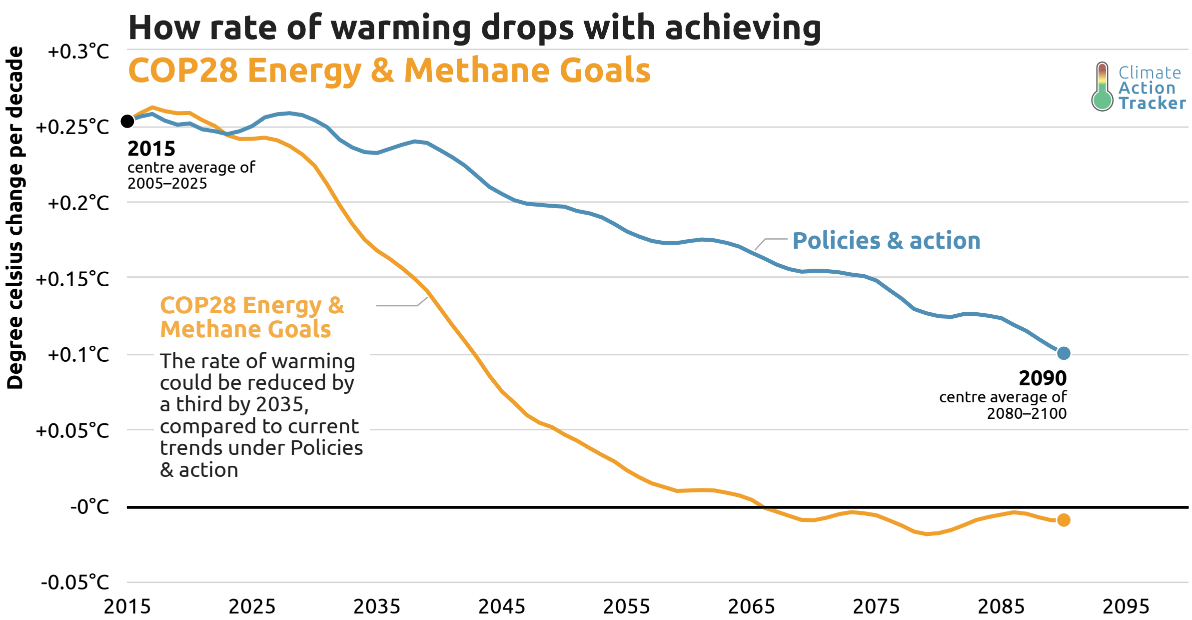

Figure 3 The rate of global temperature increase (20 year centered average) with achieving the COP28 Energy and Methane goals.

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Introduction

On its tenth anniversary, it's clear the Paris Agreement has transformed global climate action by mobilising actors beyond governments. Its effectiveness is evidenced by the fact that policies in place have cut about 1°C of global warming by 2100 from 3.6°C to 2.6°C.

However, we must face the fact that efforts are well below what is required to deliver on the Paris Agreement. Our latest global assessment indicates that progress has stagnated, at best, in the last four years, with policies and actions still leading to warming of 2.6°C (Climate Action Tracker, 2025).

Due to insufficient action in the last five to ten years, it is now very likely that irrespective of action undertaken in the next five years or so, we will reach, or breach, the Paris Agreement's 1.5°C warming limit by the early 2030s, leaving an overshoot to deal with.

As a consequence, it is imperative that efforts should now focus as much as possible on limiting the magnitude and duration of this overshoot by bringing CO_2 emissions to net zero by 2050 and of all greenhouse gases no later than 2060. In fact, Governments have a legal obligation to set their ambition high as stated in a recent Advisory Opinion by the International Court of Justice

> "States parties to the Paris Agreement have an obligation to act with due diligence in taking measures in accordance with their common but differentiated responsibilities and respective capabilities capable of making an adequate contribution to achieving the temperature goal set out in the Agreement" (International Court of Justice, 2025).

Fortunately, technology development, cost improvements and policy guidance within the UNFCCC provide not only hope but, more importantly, a clear signal that society is counting on the tools to address climate change. Limiting global warming to 1.5°C represents an ethical and moral boundary. Exceeding it would significantly increase the likelihood of severe, widespread, and irreversible impacts (Climate Analytics, 2025; Roeglj and Rajmani, 2025).

To keep warming to 1.5°C with no or minimal overshoot, global greenhouse gas emissions must fall by roughly half by 2030 and by about 60% by 2035, below 2019 levels. This means cutting emissions to no more than 27 $GtCO_2e$ in 2030 and 21 $GtCO_2e$ in 2035. Achieving this pathway requires carbon dioxide to reach net zero around mid-century, with total greenhouse gas emissions following soon after.

Emissions, however, continue to increase: in 2024 they reached 53.2 $GtCO_2e$ (without LULUCF), a 1.3% increase from the previous year. First estimates indicate that global CO_2 emissions in 2025 were also higher than 2024. In fact, during the 21st century, emissions only experienced a decline in 2009 (financial crisis) and 2020 (COVID 19) but have otherwise been on the rise, primarily due to the increased burning of fossil fuels in emerging economies (EDGAR, 2025).

Our estimates of climate action put forward by countries indicate that NDC targets and policy actions are well below the efforts required to reach the levels implied by the Paris Agreement (see Table 1). Even the most optimistic scenario would result in about twice the level of allowed emissions to limit global warming to 1.5°C.

Table 1 Estimated global emissions in 2030 and 2035 for different scenarios and implied gaps to 1.5°C compatible levels.[1]

Scenario	2030 Emissions	2035 Emissions	Expected warming in 2100
Levels consistent with limiting global warming to 1.5°C	**27** $GtCO_2e$	**21** $GtCO_2e$	**1.2**°C
Policies and actions	**56–59** $GtCO_2e$	**52–58** $GtCO_2e$	**2.6**°C
Pledges and targets	**53–57** $GtCO_2e$	**48–52** $GtCO_2e$	**2.2**°C
Optimistic scenario	**55** $GtCO_2e$	**49** $GtCO_2e$	**1.9**°C
Implementation gap	**29–32** $GtCO_2e$	**31–37** $GtCO_2e$	Not applicable
Targets gap	**26–29** $GtCO_2e$	**26–31** $GtCO_2e$	Not applicable

- The resulting gap for policies and actions (or implementation gap) stands at about 29–32 $GtCO_2e$ in 2030, and 31–37 $GtCO_2e$ in 2035;
- The targets gap stands at about 26-29 $GtCO_2e$ in 2030 and 26–31 $GtCO_2e$ in 2035.
- The expected level of warming under current policies and actions is estimated at 2.6°C (2.1°C–3.3°C);
- Warming under the pledges and targets scenario, which includes 2030 & 2035 NDCs and long-term goals submitted to the Paris Agreement, is estimated at 2.2°C (1.8°C–2.8°C).
- In the most optimistic scenario, which assumes full implementation of all submitted and announced targets, global temperatures will rise by 1.9°C (1.5°C–2.4°C) above pre-industrial levels.

The lack of climate action that's consistent with the objectives of the Paris Agreement has been fully recognised in various UNFCCC COP decisions and, most importantly in the first Global Stocktake (GST1) at COP28 in 2023. This first assessment of global progress highlighted that, despite some advances, collective efforts remain insufficient to achieve the Agreement's goals—particularly the goal of limiting global warming to 1.5°C.[2]

In response to this insufficient action, the Global Stocktake[3] identified a set of actions on energy and other sectors that governments should pursue to get back on track with the Paris temperature limit (hereinafter referred to as "COP28 Energy and Methane Goals"). These include:

- Tripling renewable energy capacity globally;
- Doubling the global average annual rate of energy efficiency improvements; and
- Substantial reduction of methane emissions.

The COP28 Energy and Methane goals were also used as a basis for the COP30 Presidency's Action Agenda. This agenda consists of six thematic areas and 30 objectives to be delivered by countries, businesses and subnational entities.

In this analysis, we investigate the benefit of governments, collectively and individually implementing these already negotiated and agreed goals (renewables, efficiency and methane) in terms of expected emissions reductions compared to current policy pathways. We focus on the "gross emissions gap", that is, the gap of emissions that excludes the land sector.

1 Based on C1a pathways from AR6
2 See Decision 1/CMA5, paragraphs 24 and 25
3 Decision 1/CMA.5, paragraph 27

Here, we calculate these impacts explicitly for the G20 countries with a view to identifying opportunities for enhancing their climate targets—or NDCs—in the light of the effect that efforts from these countries can have on global emission trajectories:

- We focus on current policies to estimate the individual and aggregate reductions resulting from tripling renewable energy, doubling energy efficiency and reducing methane.
- We estimate the reduction in the policies and action gap and the implied temperature benefit (e.g., the resulting reduction in warming by 2100).
- We also estimate the reduction in the targets gap by evaluating what would happen if governments were to set their targets at the level of the reductions estimated on the basis of policies and actions.
- We then scaled the emissions reductions within the G20 to the global level, to assess the benefits of all countries acting on the COP28 Energy and Methane goals.

Approach

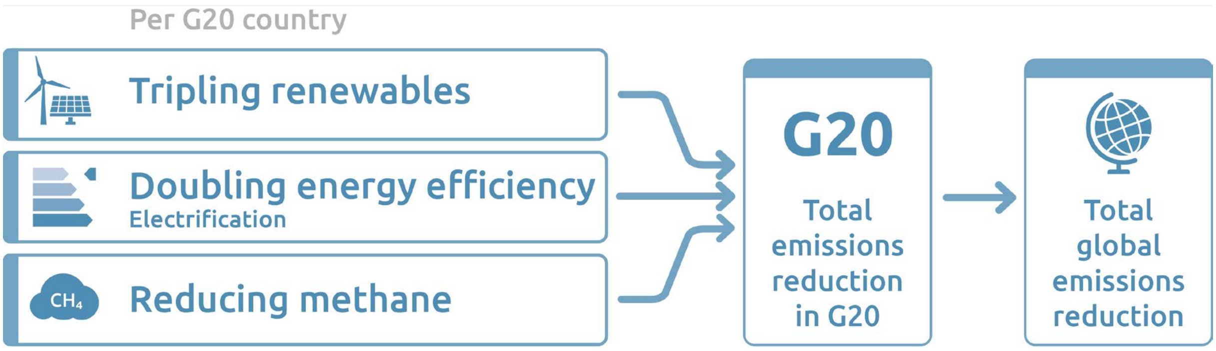
To estimate the impact of achieving these key COP28 Energy and Methane goals, we analysed each of the G20 countries individually, before scaling their combined emissions reductions to the global level. Since each country has a different starting point in terms of renewables rollout, efficiency achievements and methane emitting activities, each country has a slightly different contribution to make to achieving the global goals.

For the **tripling renewables target**, we created an energy mix for the power system for each country which would be consistent with the global tripling goal, then calculated the savings from the displaced fossil generation.

For the **doubling energy efficiency target**, we took a stepwise approach: we first set electrification targets per sector and country, consistent with the overall global goal, and then estimated the saved emissions from the fossil fuels that this electrification displaced in the demand sectors.

In the second step, we calculated the expected change in energy intensity[4] from the doubling energy efficiency goal per country and whether this goal was already reached with the combination of both, electrification and renewables deployment as per the approach above. If there was still a gap, we calculated the additional energy efficiency needed to reach the required energy intensity improvement (e.g. from insulation or modal shift).

For **methane**, we used a set of pathways from integrated assessment models (IAMs) which cut methane by 30% by 2030 compared to 2020 and down-scaled these from the macro region level to the country level.[5]



A full discussion of the methodology can be found in the Annex III.

4 Energy intensity is defined here as primary energy required to support one unit of GDP generation. A lower value indicates a more efficient economic system

5 These IAMs represent the world in 10 major regions

Key findings

We find that concerted actions by G20 governments on the COP28 Energy and Methane goals—to triple renewables, double energy efficiency and reduce methane—would deliver reductions of ~11 $GtCO_2e$ by 2030 and ~14 $GtCO_2e$ by 2035, compared to the levels delivered by their current policies (see Table 2).

Table 2 Impact on emissions and gap reductions of G20 achieving all three goals

Impact of G20 achieving the COP28 Energy and Methane goals		
Impact	**2030**	**2035**
Emissions reductions below levels expected under current policies	**11** $GtCO_2e$	**14** $GtCO_2e$
Reduction of implementation gap	**34–37**% (from 29–32 $GtCO_2e$ to 18–21 $GtCO_2e$)	**39–45**% (from 31–37 $GtCO_2e$ to 17–22 $GtCO_2e$)
Reduction of targets gap If G20 NDCs were to be aligned with these energy and methane goals	**28–30**% (from 26–29 $GtCO_2e$ to 18–21 $GtCO_2e$)	**29–36**% (from 26–31 $GtCO_2e$ to 17–22 $GtCO_2e$)
Reduction of expected 2100 warming	**~ -0.75°C**	

This will reduce the global implementation gap of policies and actions by up to 45%. If G20 countries would set their NDC targets consistent with these goals, this would reduce the targets gap to the same final emissions levels, achieving a reduction of up to 36% (see Table 2).

Together, these policy actions would realise and exceed the ambition of the current set of NDC targets, pave the way for more ambitious targets in the next update round, and contribute to limiting the magnitude and duration of the 1.5°C overshoot. The climate benefit will be an effective reduction of about 0.9°C ± 0.2°C in warming by 2100 implied by policies and actions, from 2.6°C to 1.7°C.

On the global level, the reductions achieved by implementing the renewable, efficiency and methane goals would amount to ~14 $GtCO_2e$ by 2030 and ~18 $GtCO_2e$ by 2035 (see Table 3).

Table 3 Impact on emissions and gap reductions of global achievement of all three goals

Impact of all countries achieving the COP28 Energy and Methane goals		
Impact	**2030**	**2035**
Emissions reductions below levels expected under current policies	**14** $GtCO_2e$	**18** $GtCO_2e$
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Reduction of expected 2100 warming	**about -0.9°C ± 0.2°C**	

This would reduce the implementation gap by about 46% in 2030 and 54% in 2035; as well as the targets gap by ~41% in 2030 and 47% in 2035. Likewise, the climate benefit will be an effective reduction of about 0.9°C in warming by 2100 implied by policies and actions, from 2.6°C to 1.7°C and representing the first sizeable improvement in the warming outlook in nearly five years (see Figure 4).

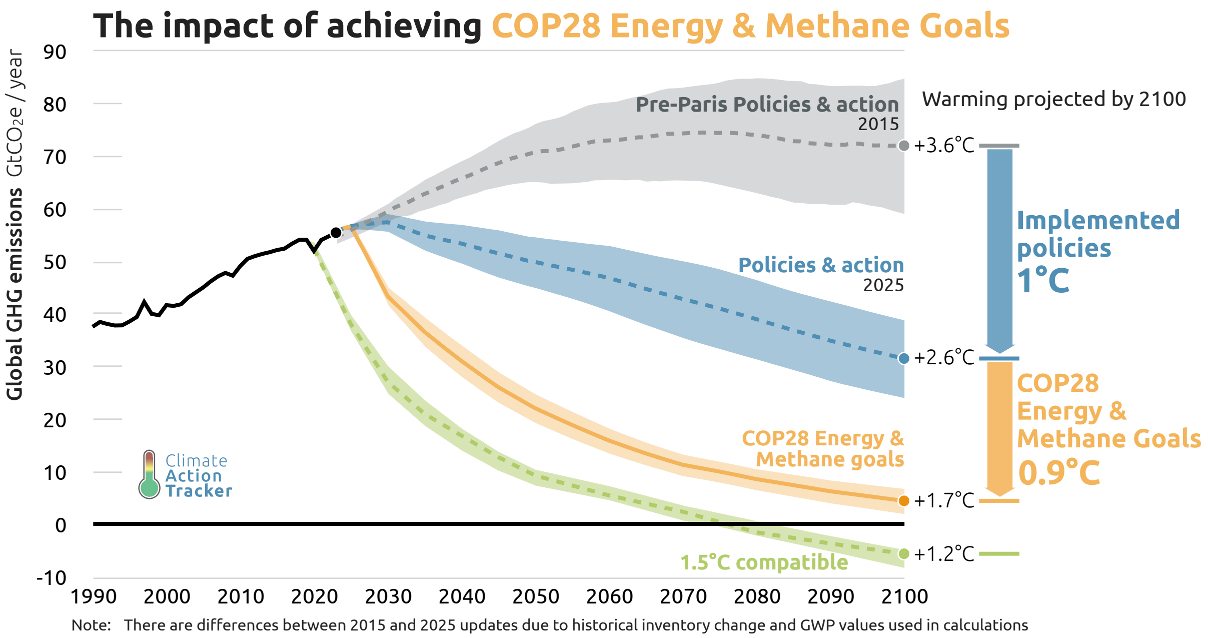

Figure 4 Emissions and temperature impact until 2100 of reaching the three main goals globally

The rate of human-induced warming is currently (in 2025) around 0.25°C per decade. These actions would reduce this by around 10% by 2030, and essentially halve it by 2040 (see Figure 5).

Slowing the pace of warming is critical for "catching up" on adaptation worldwide

In the past year, new scientific evidence indicates that total observed warming has accelerated. This poses serious challenges for global adaptation efforts. Many countries are already facing mounting adaptation deficits, with most regions struggling to keep up with current rates of warming, let alone an acceleration, resulting in increasing loss and damage (UNEP, 2022).

Halving the rate of warming in the near term would give communities a realistic chance to cope with rising climate impacts, and—with adequate international climate finance—begin to "catch up" and close the adaptation gap.

For ecosystems, slowing the pace of climate change is equally as important: it gives species the time needed to adapt or to migrate to areas with suitable climatic conditions (Williams et al, 2021). Scientific evidence shows that the current rate of global warming is already too rapid for many species across tropical, mountain, cool, and cold habitats (IPCC, 2022).

Even existing preservation areas are under pressure, as climatic conditions shift more quickly than species can move, leading to growing mismatches between preservation areas and the conditions required by the species they are meant to protect (Elsen, 2020).

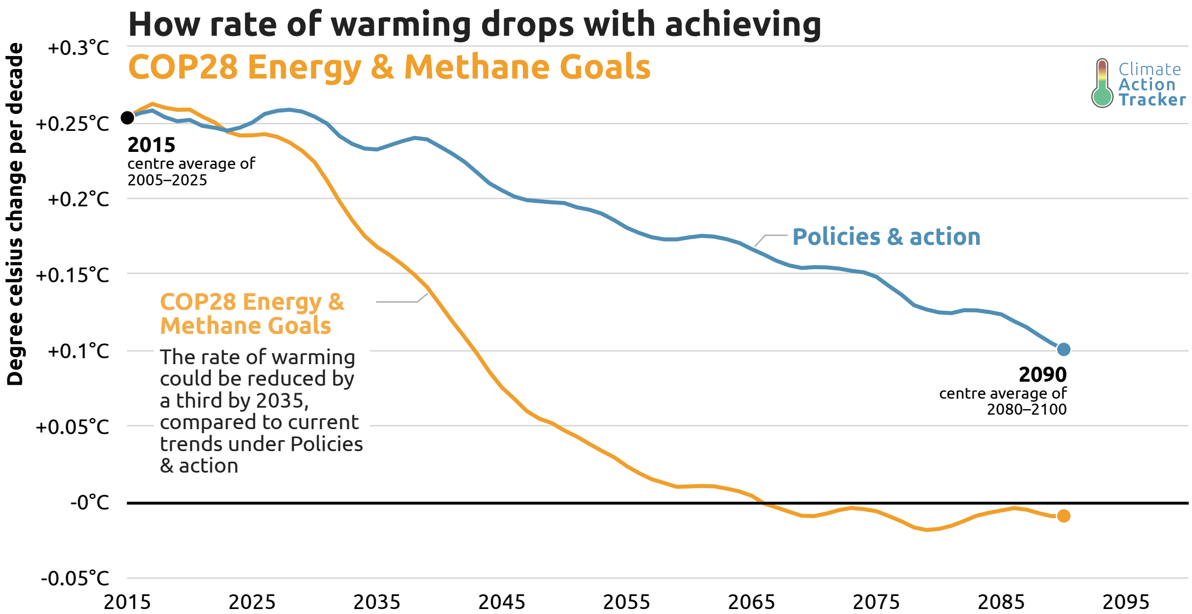

Figure 5 Change in rate of warming with achievement of the COP28 Energy and Methane goals

The bulk of the reductions occurs by tripling renewables (about 40%) and doubling the rate of energy efficiency (also about 40%) (see Figure 6). Overall, electrification becomes a key lever both in terms of decarbonising power and enhancing efficiency of demand across transport, buildings and industry. Other efficiency measures include a wide variety of energy saving measures from insulation to efficient appliances and motors in buildings and industry, as well as modal shifts in transport. Methane reductions would contribute about 20% of the expected emissions reductions. These percentages would be roughly the same for the extrapolation at the global level.

Individual country analyses are summarised in the Country Pages below.

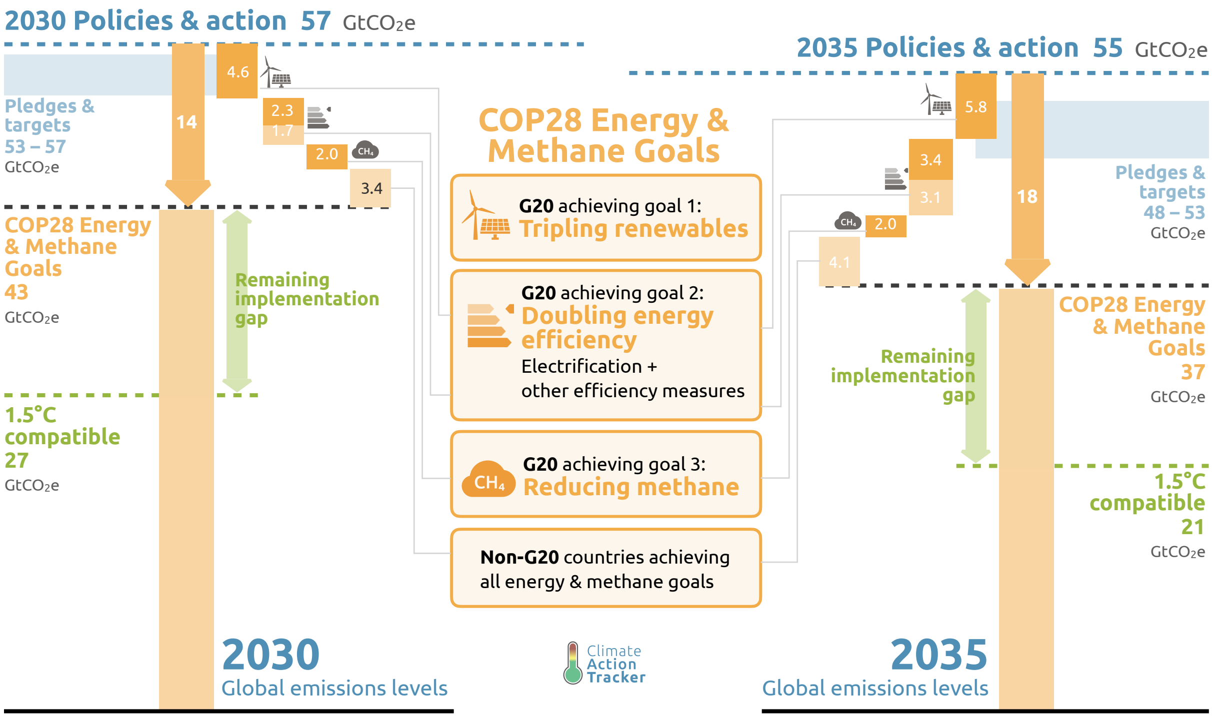

Figure 6 Emissions impact of reaching each of the three COP28 Energy and Methane goals in the G20 in 2030 and 2035

Impact of Tripling Renewable energy capacity in G20 countries

Today, the power sector is responsible for over a quarter of total GHG emissions, resulting from a system that still relies heavily on fossil fuels. Coal and fossil gas currently account for over half of global electricity generation. In order to limit global warming to 1.5°C, the global power sector must reach net zero emissions by around 2040, which would require deep emission cuts of 70–80% below 2019 levels by 2030 (IPCC AR6).

Deploying wind and solar energy is the most impactful measure that the world can take to reduce GHG emissions. According to the IPCC's Sixth Assessment Report, wind and solar energy have a greater mitigation potential than any other individual measure or technology. As the demand sectors such as transport, buildings, and industry increasingly switch from fossil fuel combustion to electric solutions, reducing the carbon intensity of the global power mix becomes even more important.

In our analysis, we establish a baseline of 3.2 TW of installed capacity across all renewable power sources within the G20 countries in 2022. Tripling would imply reaching a total of 10–11 TW in 2030. This growth will be primarily driven by solar and wind power expansion, growing from 3.2 PWh to over 16 PWh by 2030, displacing fossil generation. Such growth would translate into emissions reductions of 4.6 $GtCO_2e$ and 5.8 $GtCO_2e$, in 2030 and 2035, respectively, across the G20, compared to current policies (see Figure 6).

Fortunately, clean energy continues to gain ground in the global electricity mix. In 2025, renewables have overtaken coal generation for the first time on record—driven primarily by a strong rise in solar (Ember,2025). The IEA forecasts that the share of low-emission sources will further increase from 41% in 2024 to 47% in 2027 (IEA, 2025).

Policy and economic forces since 2015, when the Paris Agreement was signed, resulted in a significant increase in the share of renewable sources in installed capacity from 28.2% to 43.2% in 2023, representing an increase of about 35%. Scaling up renewable energy is not only a requirement for limiting global warming to 1.5°C but also an opportunity for energy access and security.

According to IRENA, levelised costs of electricity have fallen dramatically since 2010: 90% for solar, 70% for onshore wind, and 62% for offshore wind by 2024 (IRENA, 2025). Today, power generation from solar and onshore wind is already cheaper than fossil fuel-based generation, with 81% of capacity added in 2023 producing electricity at lower costs than their fossil fuel alternatives.

Total renewable installed capacity has increased from 1.9 TW in 2015 to 4.4 TW in 2024 (IRENA, 2025). Despite this remarkable progress, most of the journey still lies ahead: according to IRENA, by 2030, total renewable energy capacity installed needs to amount to 11 TW to be consistent with a 1.5°C trajectory (IRENA, ND). According to recent IEA projections, the world is likely to fall short (main scenario), or only narrowly miss it (accelerated scenario, IEA, 2025). The G20 countries—most notably China, the US, the EU, India, Japan, and Brazil—account for the majority of current capacity and will be decisive in determining whether the global goal is achieved.

Impact of Doubling Energy Efficiency in G20 countries

Energy efficiency plays a critical role in global climate efforts and is recognised as one of the fastest, most cost-effective strategies for reducing emissions while supporting economic growth and energy security. According to the IEA's Net Zero scenario, accelerating energy efficiency improvements can deliver over 70% of the required decline in oil demand and 50% of the reduction in fossil gas demand by 2030. Efforts to increase energy efficiency delivered a cumulative reduction of 7 $GtCO_2$ between 2010–2022 (IEA, 2024).

In our analysis, we establish a baseline energy intensity of ~3.8 $PJ_{primary}$/billion USD GDP in 2022 across the G20, which has been improving slowly at about 1.8% per year. Doubling this rate of improvement to 4% per year would imply reaching 2.6 $PJ_{primary}$/billion USD GDP in 2030 and 2.1 $PJ_{primary}$/billion USD GDP in 2035. This reduction in energy demand would deliver emissions reductions of ~4.0 $GtCO_2e$ in 2030 and ~6.4 $GtCO_2e$ in 2035 across the G20, respectively. The majority of this reduction, between 40–50%, comes from efforts to electrify the demand sectors alone (see Figure 6).

There are many strategies to improving energy efficiency. Some solely focus on reducing the energy intensity of products or processes—for instance, by deploying more efficient appliances, insulating buildings, or optimising industrial operations. Others also involve shifting from carbon-intensive energy sources and technologies to zero-carbon alternatives, such as replacing conventional cars with electric vehicles, gas or oil boilers with heat pumps, and fossil fuel furnaces with electric arc furnaces in industry.

These electrification strategies realise their full potential when paired with renewable energy. Heat pumps consume up to 75% less energy than gas boilers, while electric motors are 70–80% more efficient than combustion engines. A fully electrified energy system today could reduce primary energy demand by as much as 40%, and—if combined with a fully decarbonised power sector—bring energy-related emissions close to zero (Ember, ND).

The COP28 target of doubling energy efficiency is surrounded by some uncertainty, as primary energy intensity improved by 2% in 2022, but by only 1.1% when using the 2021–2023 average (IEA 2025). Nevertheless, most scenarios suggest that the necessary rate of energy efficiency improvement to keep global warming below 1.5°C is between 3.5–4% per year until 2030.

In 2024, global energy intensity improved by only about 1%, matching 2023's weak pace of change and reaching half the average rate of 2010–2019. Advanced economies have seen reduced efficiency gains, while emerging and developing economies have maintained or slightly improved their performance, narrowing regional disparities (IEA, 2024).

For example, China achieved around a 3.5% annual energy intensity improvement over 2010–19, while India is expected to see about a 2.5% improvement in 2024, driven by strong industrial and EV policies. Canada and Russia's action has been much slower, with decadal average improvement rates below 1% or even reductions in efficiency. Southeast Asia is promoting efficient cooling to manage rising electricity demand from heatwaves, and several African countries are enforcing efficiency regulations for second-hand appliances and vehicles (IEA, 2024).

Impact of Reducing Methane emissions in G20 countries

Methane is a highly potent greenhouse gas, with a warming effect of around 80 times that of CO_2 over 20 years. It is estimated to be responsible for about 30% of warming seen today (IEA, 2022). Anthropogenic methane emissions are primarily from agriculture (47%), leaks from fossil fuel operations (33%) and waste (20%) (Climate Analytics, 2025). In 2024, these emissions accounted for about 17.9% of global greenhouse gas emissions, concentrated mostly in China, the US, India, Brazil, Russia, the EU and Indonesia (Crippa et al, 2025).

To limit global warming to 1.5°C, methane emissions should be reduced by 34% below 2019 levels by 2030, with energy-related methane emissions needing an even steeper reduction of 66% in this decade (Climate Analytics, 2023). However, methane emissions continue to rise, from 274 Mt CH_4 in 1990 to 345 Mt CH_4 in 2022, an increase of 26%, driven by the expansion of fossil fuel extraction, growing demand for agricultural and livestock products, and increased waste generation (Climate Analytics, 2025).

In our analysis, we define the objective of reducing methane as achieving a reduction of ~35% by 2030 and ~40% by 2035, below 2020 levels, in line with the Global Methane Pledge. This global goal implies a reduction of global methane emissions of 111 $MtCH_4$ in 2030 and 127 $MtCH_4$ in 2035, or 3.1 $GtCO_2e$ and 3.6 $GtCO_2e$, from 2020 levels, respectively. Efforts by G20 countries alone would yield a reduction of 76 $MtCH_4$ in 2030 and 85 $MtCH_4$ in 2035, or 2.1 $GtCO_2e$ and 2.4 $GtCO_2e$, respectively, compared to 2020 levels.[6]

Reducing methane emissions is considered a rapid means to address global warming given its short-term warming effect and also because measures foresee rapid fossil fuel phase out, thus also reducing CO_2. Initiatives like the Global Methane Pledge, launched at COP26, have been established to advance action in this area. The pledge brings together 150 countries with an aim to cut global methane emissions by at least 30 % from 2020 levels by 2030. While progress on meeting its goal has been limited, the initiative has driven stronger monitoring and reporting standards, promoted new national regulations, and mobilised over USD 1 billion in funding for methane reduction projects.

6 When compared to emissions levels under current policies and actions, the emissions savings amount to 2 $GtCO_2e$ in both, 2030 and 2035

Moving forward with delivery

Tripling global renewable power capacity, doubling energy efficiency, and reducing methane by 2030 represents a significant challenge and rests on policy commitment and cooperation, particularly on the financing front as some G20 countries lack the resources to implement these goals in full. The action agenda of the COP30 presidency provides a key space for mobilising commitment to advance policy and increase finance.

An in-depth analysis of feasibility is out of the scope of this report; however, we note that, across these three goals, the necessary technologies already exist and are commercially viable. G20 economies are well positioned to lead implementation through policy, investment, and innovation. At the same time, reinforcement and synergy between them further contribute to feasibility: electrification increases efficiency and clean energy contributes to reducing methane emissions from fossil fuel production and use.

The world is already witnessing an unprecedented renewables boom, providing a strong foundation to triple global renewable power capacity within this decade. Renewable energy capacity additions are outpacing fossil fuels as cost reductions continue to advance. Annual investment in renewable power must roughly double to around USD 1.3 trillion per year by 2030 (IRENA, 2023). Mobilising this amount is challenging, but possible in light of overall energy finance flows and specifically given that subsidies for fossil fuels amounted to USD 7 trillion in 2022 (IMF, ND) and global profit of fossil fuel companies (The Guardian, 2022). Hurdles remain, however, including those relating to the cost of capital in emerging economies, supply chain challenges with key input materials, permitting, and the modernisation of grids among others (IEA, 2024). Well-designed policies and international cooperation are required to address these challenges.

Increasing energy efficiency from 2% to 4% is ambitious, but attainable. Technologies across sectors—such as heat pumps and alternative materials in buildings; electric cars and mass transit in transport; and equipment upgrade and process optimisation in industry—not only are already available but many generate savings to end consumers.

Overall, electrification paired with renewable energy represents a key opportunity for increasing energy efficiency. Electrotech is poised to revolutionise the way we produce and use energy (Ember, 2025). Policy measures are critical to unlock efficiency improvements through financial incentives, efficiency codes and standards, and other measures.

Methane emissions will represent a key opportunity for mitigation. For example, fossil fuel phase out will address methane emissions from oil, gas and coal production and use at no extra cost. According to the EPA (2025) about 27% of all non-CO_2 emissions are abatable by 2030 at low or no cost. These include about 55% in natural gas and oil systems; 65% in coal mining and 68% in croplands and landfills. Furthermore, the IEA (2025) estimates that about "70% of methane emissions from the fossil fuel sector could be avoided with existing technologies, often at a low cost". G20 countries account for a majority of fossil fuel methane emissions and have the regulatory tools and financial capacity to lead.

How much would implementation of the COP28 Energy and Methane goals pathway close the temperature gap to 1.5°C?

Our analysis shows that the COP28 Energy and Methane goals, if fully implemented in 2030 and 2035, and then paired with equivalent ambition over the rest of the century, could bring 2100 temperatures down to 1.7°C. This is a reduction of about 0.9°C from our current central estimate of the 2.6°C of warming that current policies would result in by 2100. As explained in the following section, this estimate is associated with uncertainty and could be higher or lower depending on the actual emission levels achieved in 2030 and 2035 and on how the global pathway is extended beyond 2035 out to 2100.

Temperatures would peak at around 1.8°C in 2070 in the COP28 Energy and Methane goals implementation scenario, and then broadly stabilise, declining only 0.1°C by 2100 to 1.7°C (see Figure 7).

Peak temperatures would therefore overshoot 1.5°C by at least 0.2–0.3°C. This is much higher than for most of the IPCC-assessed 1.5°C compatible scenarios (Byers et al., 2022), where peak temperatures are limited to 1.6°C or less.

Peak 21st century warming in the COP28 Energy and Methane goals implementation scenario would also still be at least 0.1°C above the levels seen in the most recent scenarios that quantify what the lowest possible overshoot above 1.5°C would be, given the failure to cut global emissions in the first half of this decisive decade (Climate Analytics, 2025).

Critically, rather than warming dropping significantly after peaking close to 1.8°C in the COP28 Energy and Methane goals implementation scenario, warming remains close to these levels throughout the rest of the 21st century.

In 1.5°C compatible scenarios that are consistent with the Paris Agreement, global GHG emissions reach net zero in the second half of the century, driven in part by scaling carbon dioxide removal. This ensures that temperatures peak and are then reduced to well below 1.5°C by 2100. In the IPCC's Sixth assessment report, temperatures fall to 1.2°C by 2100 (with a 90% confidence interval of 1.1–1.4°C). End of century temperatures in the COP28 Energy and Methane goals scenario would therefore still be around 0.5°C higher in 2100 than in these scenarios.

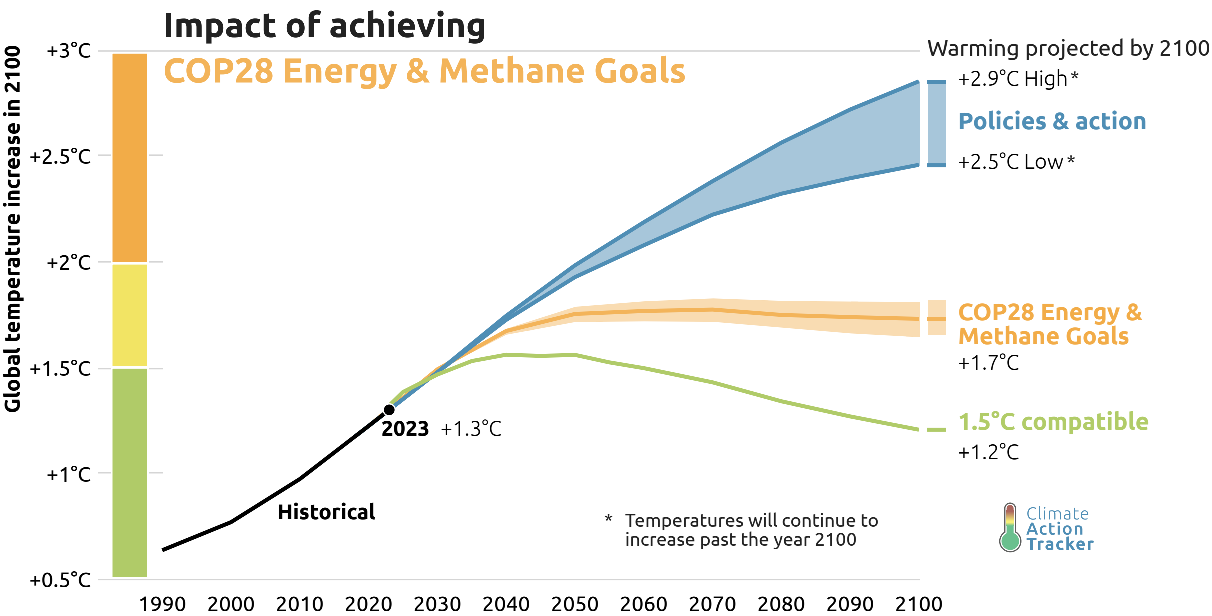

Figure 7 Temperature overshoot and stabilisation in the COP28 Energy and Methane goals scenario in comparison with other possible pathways.

In addition, in 1.5°C compatible scenarios, temperatures are declining at about 0.05°C per decade by the end of the century and are on a pathway to fall back below 1°C in the 2100s. This is critical for reducing long-term catastrophic impacts such as multi-metre sea level rise due to tipping of ice sheets (Stokes et al, 2025) and provide any space for the recovery of tropical coral reef systems. Meanwhile in the COP28 Energy and Methane goals scenario, temperatures would likely not fall below 1.5°C until well in the 2100s.

To align with the Paris Agreement and keep 1.5°C within reach, further action beyond the COP28 Energy and Methane goals would be needed to limit the magnitude and duration of the overshoot as much as possible, and to get temperatures back below 1.5°C before 2100.

This would require additional actions to phase out fossil fuels via other zero-carbon energy carriers beyond electricity (e.g. hydrogen and synthetic fuels), cutting other non-CO2 emissions beyond methane such as nitrous oxide and F-gases, and scaling up carbon dioxide removal. The COP28 Energy and Methane goals are a critical booster towards a 1.5°C pathway, but do not fully close the gap to getting there.

? How much temperature rise could the COP28 Energy and Methane goals shave off? An assessment of uncertainty

Our briefing shows that the COP28 Energy and Methane goals, if fully implemented in 2030 and 2035, and then paired with equivalent ambition over the rest of the century, could bring median 2100 temperatures down to 1.7°C, after peak warming of 1.8°C. This is a reduction of about 0.9°C from our current central estimate of the 2.6°C of warming that current policies would result in by 2100.

For reference, the peak median warming of the IPCC AR6 Paris aligned pathways was 1.5–1.6°C and 2100 warming 1.2°C (90^{th} percentile range of 1.1°C – 1.4°C) (Byers et al., 2022), and the new highest possible ambition pathway that quantifies how low peak temperatures could be, given our failure to cut emissions in the first half of this critical decade, has a peak median warming of 1.7°C and a median end of century warming of 1.2°C (Climate Analytics, 2025).

In other words, the implementation of the COP28 Energy and Methane goals agreed in the global stocktake, whilst producing a major step forward, will still be substantially short of meeting the Paris Agreement's 1.5°C limit. See previous section for more details.

The COP28 Energy and Methane goals were defined for 2030. We developed assessments of what these goals would require in 2035 based on a range of evidence, including a review of high ambition national decarbonisation pathways in each country, the IEA's Net Zero scenario and global 1.5°C compatible pathways. This is the underpinning of our finding that implementing these goals could reduce global emissions by 14 $GtCO_2e$ in 2030 and 18 $GtCO_2e$ in 2035, relative to a current policies scenario.

To provide temperature outcomes out to 2100, we then must extend this emissions timeseries out to 2100. Here, we use a similar methodology to that used in the CAT's global temperature update (CAT 2025), which compares emissions in 2035 in our COP28 Energy and Methane goals scenario to the global pathways in the IPCC's Sixth Assessment Report. The underlying pathways assessed in AR6 are based on cost-effective mitigation over the whole of the 21^{st} century.

This means that the mitigation actions in each of these scenarios over the 2030–2035 period are representative of the "level of effort" over the rest of the century for that same pathway. Comparing CAT scenarios with these AR6 pathways allows us to find an "equivalent pathway" that covers the full century, and extends the 2030–2035 "level of effort" of the CAT scenarios to the rest of the century. A very low level of effort over 2030–2035 will result in further increases of emissions after 2035, while deep reductions over this period will result in further reductions post 2035.

There are a range of methods choices that can be altered to produce pathway extensions, including whether this extension is done at the global level or the regional level, what pathway database is used for the extension, and whether the extension is done for individual gases or the total of greenhouse gas emissions.

Global pathway extensions are deployed by a number of different groups to estimate the longer-term consequences of emissions pathways that were only explicitly quantified through to 2030 or 2035, including by the UNEP emission gap report (UNEP, 2025). There are a wide range of uncertainties in doing this, but in general these assessments produce very similar median estimates of end-of-century warming (Hausfather, 2025).

We here summarise four key uncertainties that could influence the size of the temperature reductions found in our analysis.

1. Regional vs. global extensions

In the CAT's annual global temperature update, this extension is done at the regional level, extending pathways for each of five macro-regions (e.g. Latin America, Asia) separately. However, in this analysis, we are not able to define fully where the emissions reductions from the COP28 Energy and Methane goals are coming from, as 4 GtCO2e of the 18 GtCO2e reductions comes from the non-G20 countries, who are distributed across the world. We therefore applied the extension at the global level here.

However, CAT scientists have calculated that the CAT's estimate of the warming from current policies would be higher by up to 0.1°C in 2100 if a global extension was applied instead of a regional extension. They also showed the difference is smaller for a lower emissions pathway. This suggests that applying a regional extension to the COP28 Energy and Methane goals scenario could potentially lower the warming outcome in 2100 compared to what has been estimated here, so that our estimates of the benefit of these pledges is likely on the conservative side. However, the change in results would likely be by less than 0.1°C.

2. Gas-specific extensions vs. all gas extensions

In the CAT's annual global temperature update, we extend pathways based on total greenhouse gas emissions, and only after disaggregating this basket of emissions into carbon dioxide, methane, nitrous oxide and the other gases and air pollutants necessary to run a climate model and provide a temperature outcome. We do this using the Silicone tool (Lamboll et al., 2020).

While in this analysis we have a specific methane reduction pathway (and so could theoretically do an extension for methane separate to the rest of the gases), we apply the same gas-agnostic extension method that extends the total Kyoto basket and then breaks this into individual species later. This is to ensure comparability with the CAT's current policies assessment.

Separate analysis has explored what the impact of splitting the total greenhouse gas emissions differently into CO_2 versus methane and other non-CO_2 emissions can be on global temperatures (Climate Analytics, 2025). This found that 2100 temperatures could vary by 0.1°C to + 0.15°C, depending on whether there is less methane (leading to lower temperatures) or more methane (leading to higher temperatures) in the gas breakdown. Similar uncertainty analysis could be conducted for other gases, including influential aerosol pre-cursors such as sulphur and organic carbon.

3. Uncertainty across current policies scenarios

In addition, the current policy pathway that additional action occurs against is uncertain. The CAT produces a range in the estimate of future emissions from current policies, with an estimate of end-of-century warming that varies from 2.5°C to 2.9°C, with a central estimate of 2.6°C.

The COP28 Energy and Methane goals scenario would reduce end of century warming to 1.7°–1.8°C, which is a saving of 0.8°C–1.0°C, with a central estimate of 0.9°C.

4. Uncertainty in action outside of the G20

This work performs a detailed analysis of the potential to cut emissions in the G20 countries, and then scales this to the global level. This also introduces uncertainty into our calculations. A lower bound on the temperature reductions could be estimated by looking at the warming outlook if only G20 countries implemented these measures. This is potentially an unrealistic assumption, given that the technological benefits of renewables deployment and electrification in the G20 would overflow to the rest of the world, for instance by reducing global market prices of these technologies.

Nonetheless, if only the G20 acted then peak warming would be 1.8–2.0°C with the best estimate of 1.9°C and end-of-century warming essentially similar. This means the reduction from current policy warming of 2.6°C in 2100 would be around 0.7 ± 0.1°C.

Conclusion on uncertainty

This initial analysis highlights a range of uncertainties in our temperature assessment:

- There is uncertainty from the regional resolution of the pathway extension analysis, which has not been fully quantified but appears to be in the range of 0.1°C.
- There is uncertainty in the breakdown of greenhouse gas emissions into the individual components, which introduces an uncertainty on the scale of 0.15°C, and
- there is uncertainty around the current policies baseline from which emissions are reduced, which introduces an uncertainty on the scale of 0.1°C.

Taken together, these would indicate an overall uncertainty of around ± 0.2°C in our assessment, but which could be somewhat broader.

If the whole world implements the COP28 Energy and Methane goals, then our best estimate uncertainty range, acknowledging that this is not the result of a formal uncertainty analysis, is a temperature reduction in 2100 of 0.9°C ± 0.2°C.If only the G20 does so, then the reduction is 0.7°C ± 0.2°C.

The 0.9°C temperature reduction should be seen as an indicative calculation, with an associated uncertainty range that is consistent with the current policy warming estimate methodologies used by the CAT (which in turn align with the central estimates from methods used by other groups).

However, this does not change the overall findings of the analysis, which is that the COP28 Energy and Methane goals, if implemented in full by 2030 and 2035, and followed on with equivalent ambition action across the rest of the century, would drive a very substantial reduction in global emissions, temperatures and warming rates that would represent the biggest move forwards in global action on climate change since the Paris Agreement.

In addition, the significant reductions in the rate of global warming by 2035 that are calculated are not substantially dependent on the pathway extension methods above but rather on the bottom-up assessment of what each country in the G20 and rest of the world need to do to implement the COP28 Energy and Methane goals.

Country analysis

Our assessment of the emissions impact of achieving the three energy and methane goals agreed at COP28 builds on a country level analysis of the G20, where the EU is treated as one geography. The factsheets in this section provide results for each of the G20 geographies.

Each of the three COP28 Energy and Methane goals, Tripling Renewables, Doubling Energy Efficiency and Reducing Methane, follow slightly different implementation paths in each country, depending on the country's starting position and ability to drive rapid change. Key indicators are presented for each goal for both, 2030 and 2035, showing the policy outcomes each country needs to aim for, to contribute to the global goal.

The emissions graph at the top presents total GHG emissions (excl. LULUCF) for the target year of the country's latest NDC (2030 or 2035). It shows the full emission reduction achievable if the indicators for each goal are reached by that country, in comparison with the expected emissions level under current policies for that year. Also shown for comparison are:

- the emissions level the country has committed to achieving in their (conditional) NDC as well as
- the emissions level that would align with a 1.5°C-compatible pathway .

The country pages below will be published shortly

Annex I: Summary table of results

Annex Table 1 Full results for emissions reference values and reductions per goal; for the G20 and the global level; for both target years

Results	2030 ($GtCO_2e$)	2035 ($GtCO_2e$)
Global 1.5°C pathway	27	21
Global emissions under current policies and action	56 – 59	52 – 58
Global emissions under pledges and targets	53 – 57	48 – 52
Global implementation gap	29 – 32	31 – 37
Global targets gap	26 – 29	26 – 31
Emissions reduction in G20 from Tripling Renewables	- 4.6	- 5.8
Emissions reduction in G20 from Doubling Energy Efficiency*	- 4	- 6.4
Emissions reduction in G20 from Reducing Methane	- 2	- 2
Total G20 emissions reduction from all three goals	- 10.7	- 14.2
Scaled global emissions reduction from all three goals	- 14	- 18
Global emissions if all three global goals are achieved	42 – 45	34 – 39
Reduced global implementation / targets gap**	15 – 18	13 – 18

* of which electrification	- 1.3 – -2.1	-2.5 – -3.7

** gap between 1.5°C compatible pathway and new NDC pathway if new NDCs were set at the level of emissions expected with achievement of these three goals

Annex II: Comparison between CAT and IEA

Annex Table 2 Comparison of the estimates of savings relative to the CAT and IEA baselines

Goal	Year	CAT estimate of savings relative to baseline*	IEA estimate of savings relative to baseline*
Tripling Renewables	2030	–6	–4
	2035	–7	–7
Doubling energy Efficiency	2030	–5	–6
	2035	–8	–11
Reducing Methane	2030	–4	–3
	2035	–4	–3

**The IEA and CAT analysis assume different baselines. In the IEA scenario, energy-related emissions grow by 4 $GtCO_2e$, or 10% over 2023–2035. Meanwhile in the CAT current policy scenario, global emissions in the average current policy pathway fall 0.5 $GtCO_2e$ over 2023–2035, or 1%. As the CAT has a more ambitious baseline, this drives some of the higher reductions estimated by the IEA. IEA data extracted from the report (IEA, 2024) using WebPlotDigitiser.*

The table above compares the savings from each of these goals as calculated by the CAT with recent analysis from the IEA that also quantified the impact of the energy package agreed at COP28 (IEA, 2024). The emissions reductions that this analysis calculates broadly align with the IEA's analysis. For 2030 the total reductions from baseline in the CAT estimates for these measures is 15 $GtCO_2e$ versus the IEA estimate of 13 $GtCO_2e$. By 2035 the total reductions from baseline in the CAT estimates for these measures is 19 $GtCO_2e$ versus where is the IEA estimate is slightly higher at 21 $GtCO_2e$.

Our analysis identifies a greater reduction coming from tripling renewables, which is because the benchmarks used in our analysis would lead to slightly more than tripling of renewables capacity in 2030, with renewables capacity growing around 3.4-fold in 2030 relative to 2022. Partly as a consequence of this, our analysis finds slightly lower emissions savings from Doubling Energy Efficiency. In addition, the IEA has a less ambitious baseline scenario, in which emissions continue to grow, which therefore results in higher savings quantified than in our analysis. Meanwhile both reports find similar potential for methane reductions by 2030 or 2035.

We find that tripling renewables and doubling energy efficiency, combined, would result in emissions reductions of around 15 GtCO2e relative to current policies. This is a very significant reduction.

This shows that the tripling and doubling goals identified in Paragraph 28a in the Global Stocktake cannot be viewed in isolation from the rest of Paragraph 28 (UNFCCC, 2023). They are the foundation of many other GST1 goals. By tripling and doubling renewables, the world would also accelerate the phaseout of coal in the power sector (§ 28b), drive a transition away from fossil fuels in energy systems (§ 28d), accelerate the reduction of emissions from road transport (§ 28f), and would require addressing fossil fuel subsidies (§ 28g). Tripling and doubling are at the heart of the entire energy package. This aligns with other analysis from Ember, which shows that these two goals would deliver 85% of the reduction in fossil fuels required by 2030 in the IEA's Net Zero scenario (Ember, 2023).

Annex III: Methodology

To assess the global impact of achieving the COP28 Energy and Methane goals—tripling renewable energy capacity, doubling energy efficiency, and reducing methane emissions—we conducted a bottom-up analysis across all G20 countries.

Each country's unique energy and emissions profile, including its current mix of renewables, fossil fuel use, and sectoral energy demand, informed a tailored approach to estimating its contribution toward the global targets. These national results were then scaled to the global level using sector-specific indicators. Note that the EU was treated as a single unit for the purpose of this analysis, resulting in 17 distinct geographies covered.

Tripling Renewables

The renewables analysis focussed on constructing power generation scenarios consistent with a tripling of global renewable capacity and comparing this to a baseline. This allowed us to calculate emissions savings from the difference in total power sector emissions between the tripling scenario and the baseline (see Figure 8).

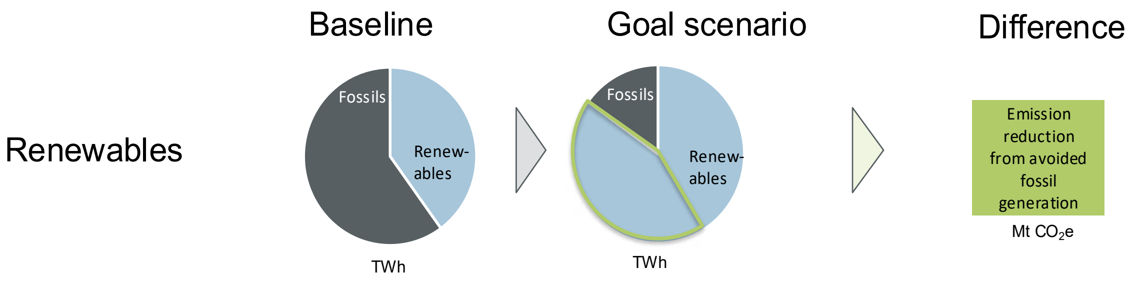

Figure 8 Approach to quantifying emissions savings versus baseline for the Tripling Renewables goal

Baseline construction

The baseline was built using the IEA's STEPS scenario from the IEA's 2024 World Energy Outlook (WEO) (IEA, 2024). We harmonise the WEO data to historical generation values from Ember's electricity data explorer (Ember, 2025). Since the IEA does not provide data for all G20 geographies separately, we used slightly different approaches for "WEO countries" (countries which have their own IEA WEO STEPS scenario) and "non-WEO countries" (countries that are embedded in a larger region in IEA WEO).

For WEO countries, renewable generation was based directly on STEPS values. Non-renewable generation was derived by subtracting renewable values from total generation, then distributing the remainder across non-renewable technologies using the generation shares seen in the STEPS scenario. Total generation is consistent with the electricity demand baseline from the Doubling Energy Efficiency goal (see Electrification).

For non-WEO countries, renewable generation was based on IEA country forecasts and extended beyond 2030 using the technology specific growth rates from the country's STEPS region (IEA, 2024). Future projections for non-renewable technologies were developed using one of three approaches—regional STEPS growth, an extrapolation of current trends, or a hybrid average—depending on each country's alignment with its regional profile. These projections were scaled to ensure consistency with total generation targets.

Goal scenario construction

Wind and solar generation levels in the scenario where global renewables capacity triples were constructed using our 1.5°C compatible benchmark values (Climate Analytics and NewClimate Institute, 2024) or national pathways produced by downscaling global 1.5°C pathways to the national level (Climate Analytics, 2025). Adjustments were made to exclude hydrogen-related generation where relevant. For other 'clean' power generation (bioenergy, geothermal, hydro- and nuclear power), either benchmark or baseline values were used, depending on data availability.

The amount of fossil generation was then determined by the share of total generation not yet met by the renewable generation above. Total generation was linked to the electricity demand transition goal scenario from the Doubling Energy Efficiency goal (see Electrification).

To model the displacement of fossil generation, three approaches were considered: prioritising coal phase-out, proportional reduction across all fuels, or a hybrid of the two approaches.

Emissions from the power sector were calculated using emissions factors from Ember (Ember, 2025), scaled from CO_2 only to total GHG emissions. Renewable technologies were assigned zero emissions for consistency with countries' emissions inventories.

Capacity values were derived from the final generation mix using capacity factors based on recent historical averages per technology and country as published by IEA (IEA, 2024).

Doubling Energy Efficiency, including electrification

The analysis of the doubling energy efficiency goal was conducted in two complementary stages: electrification of demand sectors and an overall efficiency analysis to close any remaining gaps in energy intensity improvements.

Electrification

Electrification is a key driver of the Doubling Energy Efficiency goal. Similar to the approach to Goal 1, for electrification we also compared emissions under a baseline scenario to a scenario with increased electrification. The reduction in fossil fuel demand between these two scenarios allowed us to calculate emissions savings from electrification (see Figure 9).

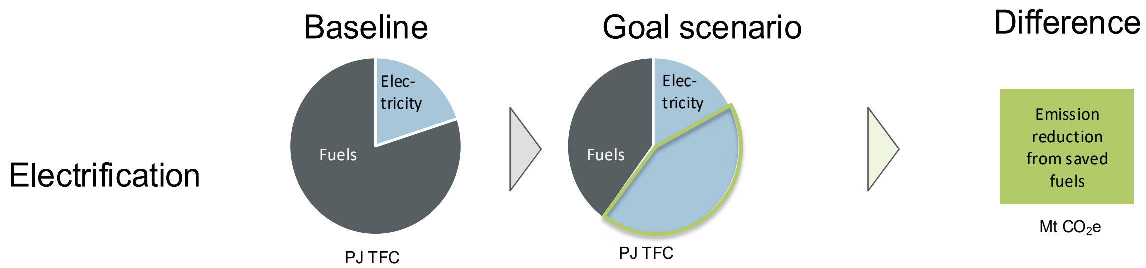

Figure 9 Approach to quantifying emissions savings versus baseline for electrification

Baseline construction

The baseline consists of final energy demand by sector—industry, buildings, transport—and by energy carrier (electricity, heat, and fuels). It was constructed using historical data from the IEA World Energy Balances (IEA, 2024), harmonised with IEA WEO data to ensure full coverage, with adjustments made for missing or misallocated consumption.

Country-specific forecasts of future energy demand were also developed similarly to the baseline for Goal 1 using one of three approaches: growth rates from IEA STEPS scenario, trend extrapolation from historical data, or a hybrid.

Goal scenario construction

Electricity demand under a scenario compatible with reaching the COP28 Energy and Methane goals was calculated using either benchmark electricity generation values (adjusted for transmission and distribution losses) where these were available (Climate Analytics and NewClimate Institute, 2024), or growth rates from 1.5°C aligned pathways (Climate Analytics, 2025). In cases where benchmark data included electricity for hydrogen production (e.g., Australia), this was subtracted to avoid overestimation.

The resulting electricity demand was then translated into displaced fossil fuel volumes using sector- and fuel-specific efficiency factors (for example, the extent to which electricity displaces oil in transport via switching from ICEs to EVs is different to the extent to which electricity displaces gas in the buildings sector via switching from gas boilers to heat pumps). This allowed us to estimate the emissions savings from electrification, which were calculated using standard emission factors per fuel.

Overall Doubling Energy Efficiency calculation

To assess whether the combined impact of electrification and renewables deployment met the required improvement in energy intensity, we conducted a gap analysis. Past energy intensity—defined as primary energy per unit of GDP—was calculated using historical primary energy and GDP data from the IEA and World Bank. The rate of change in energy intensity over the past decade was used as a reference point.

Future targets were set for 2030 and 2035, typically aiming for a 4% annual reduction in energy intensity, but higher for countries where historical improvement rates and rates expected under the IEA's Announced Pledges Scenario (APS) scenario were already higher than 4% (see Figure 10).

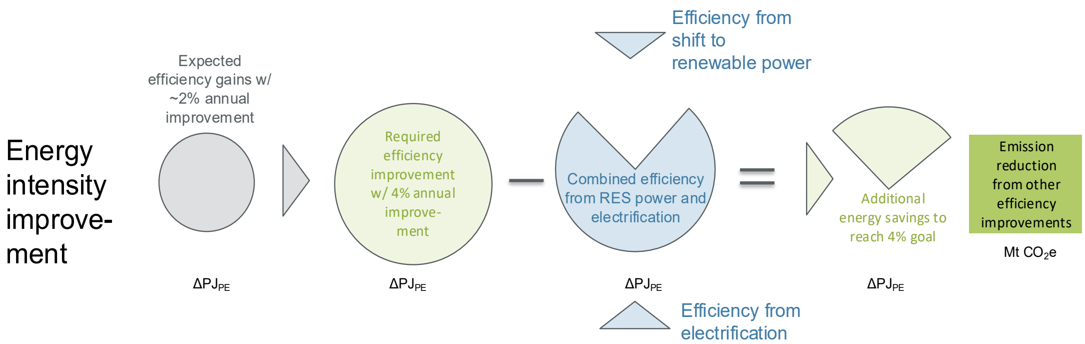

Figure 10 Approach to quantifying emissions savings versus baseline for the Doubling Energy Efficiency goal

For each country, we estimated the future energy intensity under the combined effects of electrification and renewables, by calculating the reduction in primary energy demand from renewables replacing fossil fuels in the power sector, and renewable electrification displacing fossil demand in the end-use sectors.

If this fell short of the doubling target, we calculated the additional efficiency improvements needed—these would need to be achieved through measures such as insulation, appliance standards or modal shifts in the transport sector. The difference in primary energy between the target scenario and the combined electrification + renewables scenario was then converted into an additional emissions saving using a fixed conversion factor (the average CO2 intensity of fossil primary energy over the past five years).

This gap-filling step ensured that the full ambition of the Doubling Energy Efficiency goal was captured, even in cases where electrification and renewables alone were insufficient to meet the required energy intensity improvements.

Reducing Methane

As for renewables and electrification, emissions savings were calculated by constructing a current policies baseline and a methane goal scenario.

Baseline construction

Historical methane emissions were taken from the EPA, converted to AR5 GHG equivalents, or in-country inventories (EPA, 2025). Country-level forecasts were developed using a variety of methods involving either national projections in line with the CAT's official current policies and actions pathway, a historical trend or a hybrid approach.

Goal scenario construction

Methane emissions in line with the global 30% reduction goal were derived from down-scaled country-level IAM pathways aligned with 1.5°C scenarios, harmonised to historical 2020 values (see Figure 11).

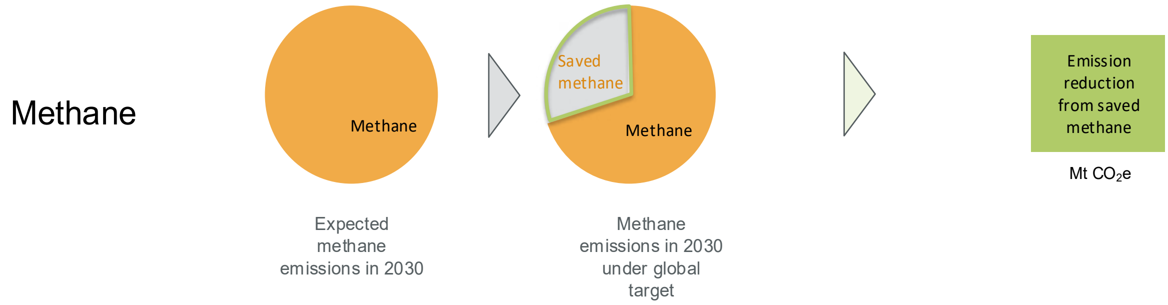

Figure 11 Approach to quantifying emissions savings versus baseline for the Reducing Methane goal

Integration and Global Scaling

Emissions savings from the three goals— renewables, efficiency and methane—were aggregated at the country level for 2030 and 2035. Additional adjustments were made to reconcile discrepancies between our baseline and CAT current policy baselines, ensuring alignment with the most recent national projections.

To scale the results from the G20 to the world, each goal was matched with a relevant indicator:

- Renewables: G20 share of global power sector emissions in 2022
- Electrification: G20 share of global electricity demand in 2022
- Efficiency mop-up: G20 share of global primary energy use in 2022
- Methane: G20 share of global methane emissions in 2020

Final global emissions under the goals were calculated by combining the maximum reductions from the transition goals with the minimum of the current policies range, and vice versa, to provide a full possible range of outcomes. These results were compared against the latest NDCs and modelled domestic pathways at both country and global levels.

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CAT 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.

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NewClimate Institute is an independent non-profit organisation that develops solutions to tackle climate change and drives their implementation worldwide. Through research, policy advice and knowledge sharing, we aim to raise the ambition for climate action and support sustainable development.

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Institute for Essential Services Reform (IESR) is an energy and environment focused think-tank that aims to accelerate the energy transition by supporting sustainable mobility, green economy, and well designed climate change policy. IESR has experience mainly in Indonesia, but is expanding its focus to work in other regions and countries.

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