ACHIEVE

ACHIEVING HIGH-INTEGRITY

VOLUNTARY CLIMATE ACTION

Policy Brief

From Agenda to Action: Accountability Through Measurable Goals

June / 2026

Mark Roelfsema, PBL

Mathijs Harmsen, PBL

Ioannis Dafnomilis PBL

Michel den Elzen PBL

www.achieve-project.eu

Funded by the European Union

Mark Roelfsema, Mathijs Harmsen, Ioannis Dafnomilis, and Michel den Elzen (PBL Netherlands Environmental Assessment Agency, the Netherlands). This Policy Brief is prepared by the ACHIEVE project, a Horizon Europe-funded initiative to strengthen and scale high-integrity voluntary climate action for net-zero emissions by mid-century. For more information, visit https://achieveproject.eu/ or contact mark.roelfsema@pbl.nl.

Funded by the European Union

Summary

In this policy brief, we emphasise the importance of establishing robust, measurable, and long-term goals to support the mitigation objectives outlined in the Global Action Agenda. To illustrate this process, we identify relevant quantitative indicators that support the mitigation objectives. These indicators can be used to set measurable goals. Using these indicators, we assess the ambition of climate mitigation initiatives announced at recent Conferences of the Parties (COPs) and to assess the goals of climate initiatives and comparing them with below 2 °C and 1.5 °C pathways.

From Action Agenda objectives to robust, measurable, and long-term goals

The recent Global Action Agenda adopted during COP 30 indicates that the focus of current climate actions involving non-Party stakeholders is on implementation. The most recent Action Agenda has 30 objectives, of which six are related to direct mitigation, which are addressed in this policy brief. At the moment, significant gaps remain regarding the accountability and assessment of progress of these objectives. One reason is the lack of quantitative indicators to track systemic change and that can be translated into concrete emissions reductions.

Assessment of COP initiatives based on proposed quantitative indicators for measurable goals

To assess progress against the Global Action Agenda objectives, we suggest the following indicators:

Funded by the European Union

Objective number	Objective	Quantitative indicator
1.1	Tripling Renewables & Doubling Energy Efficiency	CO_2 energy emissions/GDP (PPP)
1.2	Promoting Zero & Low-Emission Technologies	Low carbon share in total primary energy supply (TPES)
1.3	Ensuring Universal Energy Access	Electricity access rates
1.4	Transitioning Away from Fossil Fuels	Fossil fuel energy without CCS
2.1	Investments to Halt Deforestation	CO_2 emissions from deforestation
6.25	Reduction of Non-CO_2 Emissions	Non-CO_2 emissions

To illustrate the potential role of deriving measurable goals using relevant indicators, we look at the implementation of existing climate initiatives announced at recent COPs. The assessment shows that these initiatives could significantly reduce global GHG emissions through 2030, bringing us closer to achieving the well-below-2 °C and 1.5 °C goals. Notably, if all initiatives were successfully implemented globally, we calculate that this would result in an 11% reduction in GHG emissions relative to current policies by 2030. In particular, the initiative related to renewable energy and energy efficiency has by itself the potential to deliver a 7% emissions reduction. Although the initiative goals could bring the world closer to Paris aligned pathways by 2030, it is also important to focus on longer-term goals as we move toward 2050. Furthermore, comprehensive initiatives aimed at reducing N_2O and fluorinated gas emissions are lacking. In addition, initiatives to reduce emissions from the light industry are absent. It is also critical to enhance energy access in underserved regions, to improve living standards, as well as to realize synergies with climate action.

Funded by the European Union

Conclusion

While the goals set forth in the Global Action Agenda reflect considerable ambition, the critical focus now is on translating these goals into actionable implementation aligned with the Paris temperature goals. Enhanced monitoring and clear, measurable targets are essential to ensure progress toward implementation of the climate commitments.

Funded by the European Union

Contents

Funded by the European Union

Assessing the mitigation outcomes of climate initiatives under the Action Agenda against quantitative indicators

In order to track the progress of climate initiatives against the mitigation objectives of the Global Action Agenda, it is essential to develop robust, measurable, and long-term goals. In this policy brief, we demonstrate how relevant indicators can be used for setting these goals and use them to assess climate mitigation initiatives announced at previous COPs.

The current climate actions involving non-Party stakeholders under the United Nations Framework Convention for Climate Change (UNFCCC) emphasise the need for implementation (UNFCCC, 2025a). In this context, the latest Global Climate Action Agenda, adopted during COP30, is an important instrument and aims to strengthen the impact of voluntary climate action through regular progress tracking by setting objectives for different thematic areas (UNFCCC, 2025a).

The latest Global Climate Action Agenda was initiated to bring together a global movement with bottom-up, self-organised initiatives from all sectors of society. At the same time, it interacts with the Global Stocktake by utilising its outcomes and providing new input for the next Stocktake in 2028. This agenda will continue at COP31, where the plans will be further refined. It is structured around six thematic axes and 30 key objectives covering mitigation, adaptation, and means of implementation, designed to scale up existing initiatives from previous COPs (see Figure 1). This policy brief specifically focuses on the six objectives related to (direct) climate mitigation.

Funded by the European Union

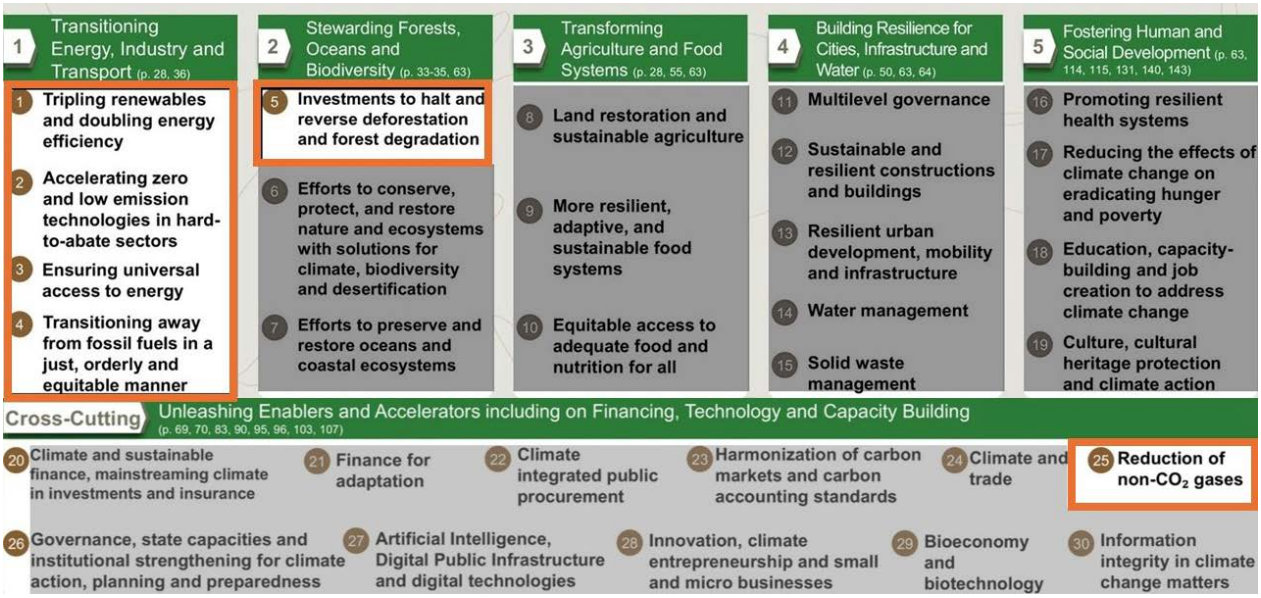

Figure 1 Six thematic areas and 30 key objectives of the Global Action Agenda. The mitigation objectives are assessed in this policy brief (in orange boxes and white colour). Source: https://cop30.br/en/action-agenda/what-is-the-action-agenda

The new Global Action agenda is supported by Activation Groups, one for each of the 30 key objectives. These Activation Groups gather leading existing initiatives from past COPs into a "Granary of Solutions," specifically working to identify synergies and close gaps among these diverse voluntary efforts (COP30 Presidency, 2025a, 2025b).

As the Action Agenda invites both UNFCCC Parties and non-Party stakeholders (e.g. cities, regions, and companies) to collaborate toward the full implementation of the Paris Agreement (COP30 Presidency, 2025a), it demonstrates the evolving interplay between voluntary climate initiatives and UNFCCC negotiations. Particularly for mitigation, the global goals emerging from these initiatives are progressively integrated as efforts agreed upon in the negotiation outcomes (Roelfsema et al., 2026). Examples include the goals of the Global Renewables and Energy Efficiency Pledge and Global Coal to Clean Power initiative, which were reflected in the global efforts included in the Global Stocktake outcomes (UNFCCC, 2024). These

Funded by the European Union

initiatives received endorsement from various stakeholders, such as countries, international institutes (e.g. International Energy Agency (IEA)), and other actors, such as companies.

The Yearbook of Global Climate Action (UNFCCC, 2025b) tracks the progress of climate initiatives against global historical (baseline) indicators linked to the ambition agenda objectives. However, this could be improved by tracking against robust, measurable, and long-term goals based on relevant indicators aligned with the global targets of well below 2 °C or 1.5 °C. Therefore, the goal of this policy brief is to establish relevant indicators for the six Action Agenda objectives that can be used to set measurable and long-term goals. While this policy brief does not determine the specific levels of these Action Agenda goals, it illustrates the use of such goals. This is achieved by assessing the mutual ambition of climate initiatives categorised under the Action Agenda objectives using the established indicators and examining their alignment with the well below 2 °C and 1.5 °C limits of the Paris Agreement. Defining the exact level of the goals is a necessary next step and will require the cooperation of experts, climate initiative coordinators, and signatories.

Funded by the European Union

Assessing the mitigation outcomes of climate initiatives against the Paris temperature goals

The ambitious goals announced at recent COPs by climate initiatives have the potential to align global GHG emissions and indicator levels with pathways below 2 °C by 2030, but not with below 1.5 °C pathways. In addition, greater ambition, clearer goals, and expansion to more thematic areas are needed after that.

The objectives of the Global Action Agenda lack concrete mitigation goals, making it difficult to assess the overall impact and progress of the climate initiatives under this Agenda. In this context, it would be beneficial if the climate initiatives involved in the Activation Groups, together with experts, collectively provide measurable goals towards implementing the Paris goals. These goals should be robust yet flexible enough to accommodate diverse solutions and ensure common but differentiated responses by various actors.

To illustrate the process of assessing climate initiatives under Action Agenda objectives against Paris-aligned goals, we provide an initial assessment. To this end, we first defined relevant indicators linked to the six Action Agenda objectives on mitigation (see Table 1). Second, we categorised the climate initiatives announced around recent COPs under the six mitigation objectives (see Table 2). For instance, the Breakthrough Agenda on steel and cement and the International Aviation Climate Ambition Coalition all support accelerating zero and low-emission technologies in hard-to-abate sectors. Third, we assessed their aggregate goals per Action Agenda objective based on the selected indicators (results are based on the study from Roelfsema et al. (2026)).

Funded by the European Union

The selection of indicators followed a common logic: the indicator quantitatively describes the objective, supports systemic change, and ensures data availability at the global level. In addition, the availability in the IPCC AR6 database (Byers et al., 2022) was another favourable factor. The indicator 'CO_2 energy emissions per GDP (PPP)' (Table 1, Objective 1.1) derives from the Kaya identity[1] and decreases if renewable energy is installed or energy efficiency improves. Since hard-to-abate sectors are not clearly defined, we selected 'low carbon share in Total Primary Energy Supply (TPES)' (1.2) as a high-level indicator that is impacted by low emissions technologies. For universal access to energy, we selected 'electricity access' (1.3) as this was the only indicator, for which we were able to find global data in the literature. For transitioning away from fossil fuels, we selected the 'total primary energy produced from fossil fuels, excluding CCS' (1.4) as reducing this would lead to zero CO_2 emissions in the supply sector. As no global investment data was found in the literature, we used the 'CO_2 emissions from deforestation' (2.5). The indicator for 'non-CO_2 emissions' (6.25) is straightforward, and includes all emissions from CH_4, N_2O, F-gases converted with the 100-year GWP from the IPCC AR5 report (IPCC, 2014).

[1] Based on Kaya identity: CO2/GDP = (TPES/GDP) x (CO2/TPES), where TPES=Primary Energy; energy efficiency decreases energy intensity (TPES/GDP) and adding renewable energy decreases CO2 intensity (CO2/TPES).

Funded by the European Union

Table 1: Translation of the six Action Agenda objectives related to mitigation into relevant indicators

Objective number[2]	Action Agenda objective	Suggested quantitative indicator for a measurable, long-term goal
1.1	Tripling renewables and doubling energy efficiency	CO_2 energy emissions/GDP (PPP)
1.2	Accelerating zero and low-emission technologies in hard-to-abate sectors	Low carbon share in TPES (renewables, nuclear, fossil with CCS)
1.3	Ensuring universal access to energy	Electricity access
1.4	Transitioning away from fossil fuels in a just, orderly and equitable manner	Fossil fuel energy without CCS
2.5	Investments to halt and reverse deforestation and forest degradation	CO_2 emissions from deforestation
6.25	Reduction of non-CO_2 emissions	Non-CO_2 emissions

A scenario analysis was conducted based on existing goals of climate initiatives (COP Initiatives scenario, see Box 1). After the target years, the initiative goals were kept constant, representing equivalent effort. We also assessed the aggregate goals for signatories of these initiatives (Signatories COP Initiatives), but only for global GHG emissions. As the Triple Renewable power and double energy efficiency goal overlaps with many sectors included in the other initiatives, this was also modelled as a separate scenario (Triple renewable/double efficiency). In addition, we assessed the aggregate goals of these initiatives per Action Agenda objective on alignment with pathways from the IMAGE model for the 2 °C (with probability > 67%)

[2] See https://cop30.br/en/action-agenda/what-is-the-action-agenda

Funded by the European Union

and 1.5 °C (high overshoot, with probability > 50%) temperature increase limits. Finally, the results were compared to similar scenarios from the AR6 database (Byers et al., 2022) categorised as C2 (return warming to 1.5 °C (>50%) after a high overshoot) and C3 (limit warming to 2 °C (>67%)).

Funded by the European Union

Table 2 Action Agenda goals, contributing initiatives announced around COPs since 2021 (COP initiatives), and linked paragraphs of the Global Stocktake outcomes.

Action Agenda objective	Contributing COP initiatives	Global Stocktake paragraph
Tripling renewable power and doubling energy efficiency	(COP28) Global renewables and energy efficiency pledge (Triple renewable power, Double energy efficiency)	28a
	(COP28) Global cooling pledge	28d
Accelerating zero and low emission technologies in hard-to abate sectors	(COP26) Breakthrough Agenda on steel	28e
	(COP28) COP28 Breakthrough Agenda on cement	28e
	(COP26) International Aviation Climate Ambition Coalition	28c
Transitioning away from fossil fuels in a just, orderly and equitable manner	Coal phaseout initiative:	28b
	(COP26) Global Coal to Clean Power Transition	
	(COP26) Breakthrough Agenda (coal)	
	Passenger Transport initiative:	28g
	(COP26) COP26 Declaration on Accelerating the transition to 100% zero emissions cars and vans	
	(COP26) Breakthrough Agenda (transport)	
	Trucks initiative:	28g
	(COP26) Global Memorandum of Understanding for Zero-emissions Medium- and Heavy-Duty Vehicles	
Investments to halt and reverse deforestation and forest degradation	(COP26) Glasgow Leaders' Declaration on Forests and land use	33
Reduction of non-CO_2 emissions	Methane initiative	28f
	(COP26) Global Mitigation Pledge	

Funded by the European Union

Box 1: Scenario implementation to assess the global impact on GHG emissions of the COP initiatives

The aggregated global initiative goals per Action Agenda objective were implemented in the IMAGE model (Stehfest et al., 2014; Vuuren et al., 2021), which is a global integrated assessment model, encompassing 26 large world regions and five major economic sectors. To calculate potential emissions reductions beyond the current policies scenario, scenarios were developed that outline various policy futures. These scenarios are normative, describing possible futures where specific policy goals and targets are assumed to be fully achieved. This scenario approach allowed for the comparison of different emissions outcomes, based on various forms of policy implementation. The scenarios were categorised into three groups:

1) **Current situation**
   - **Current Policies.** This scenario assumes full implementation of domestic climate policies that are enacted by law or executive orders since May 2025 (Roelfsema et al., 2020)
2) **Ambition for specific thematic areas by groups of actors**

   (including national governments, international institutions, cities, regions, and companies)
   - **Triple renewable/double efficiency.** These scenarios assume global implementation of the Global Renewables and Energy Efficiency Pledge (3R2E) initiative.
   - **COP initiatives, Signatories COP initiatives.** These scenarios include multiple climate goals linked to the Global Ambition Agenda. It has two versions: 1) representing full global implementation; 2) representing implementation solely by the signatories of the climate initiatives
3) **Global ambition of the Paris Agreement**
   - **Below 2 °C (>67% probability), Below 1.5 °C (high overshoot, >50% probability).** These scenarios represent the global implementation of the well below 2 °C or 1.5 °C limit (UNFCCC, 2015), providing a range of outcomes. The below 1.5 °C scenario assumes high overshoot. Due to uncertainties in climate outcomes, each scenario represents a specific probability of keeping the global temperature increase below these limits.

Funded by the European Union

If the twelve initiatives were collectively implemented globally, global emissions reductions by 2030 would be approximately 11% lower than the Current Policies scenario, positioning them between the below 2 °C and 1.5 °C pathways (see Figure 2). However, with a continuation of equivalent efforts beyond 2030, this would not align with these temperature goals by 2050. If only the signatories of the initiatives were to implement the stated goals, this would result in a 6% reduction compared to the Current Policies scenario by 2030.

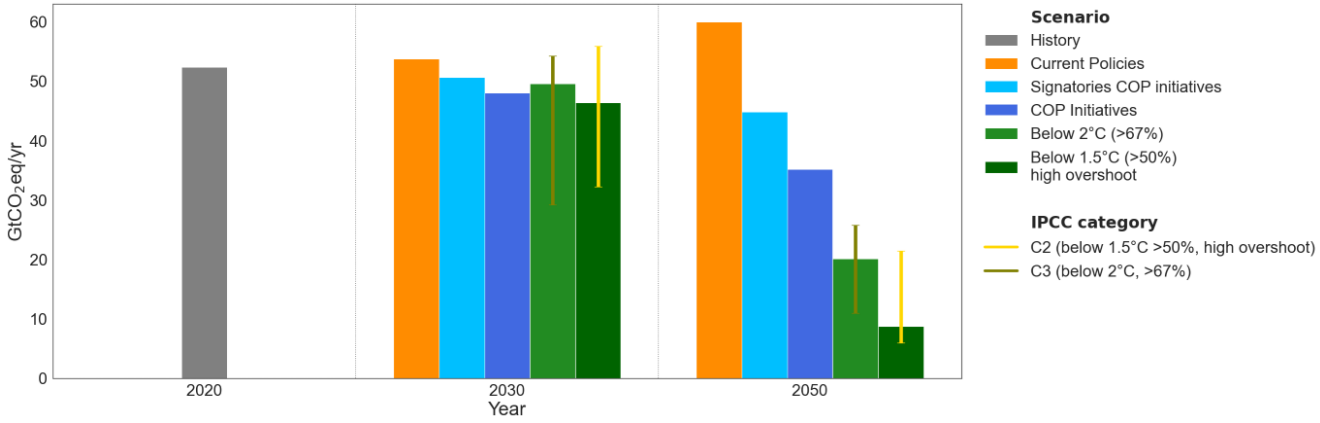

Figure 2 Global scenario comparing the emissions of COP initiatives (blue) and for Signatories COP initiatives (light blue) with Current Policies and 2/1.5 °C scenarios. The yellow/olive for the Below 1.5 °C (>50%probability, high overshoot) and Below 2 °C (>67%probability) scenarios from the IPCC AR6 Scenario Database (Byers et al., 2022)

Funded by the European Union

Tripling renewables and doubling energy efficiency

Implementing the global goal to triple renewable power and double energy efficiency could significantly reduce emissions beyond current implemented policies by 2030. However, its alignment with the 1.5 °C temperature limit in terms of renewable energy capacity and energy efficiency improvements depends on the underlying assumptions of the model used to represent these goals.

The 'Tripling renewables and doubling energy efficiency' objective from the Global Action Agenda is the only objective with a measurable goal, although the base year is not made explicit. This objective originates from the Global Renewable and Energy Efficiency pledge (3R2E) that has the goal to triple the installed renewable energy capacity and double the annual rate of global energy efficiency improvements by 2030, aiming to keep the Paris Agreement's 1.5°C climate target within reach (IRENA, 2023). The key targets were translated to tripling global renewable energy capacity to at least 11 terawatts by 2030 and doubling the annual improvement rate in global energy efficiency from about 2% to 4% by 2030 (IRENA, 2023). In this study, we assume the base year is 2021.

The initiative was initially proposed at the Major Economies Forum in April 2023 by European Commission President Ursula von der Leyen and was officially launched as the Global Pledge on Renewables and Energy Efficiency at COP28 in Dubai, supported by 118 countries. It is based on the net-zero roadmap of the IEA (2023, 2021). The initiative received support from industry and civil society, with contributions from the private sector and NGOs such as the Global Renewables Alliance, RMI, IRENA, and the World Economic Forum. It was then included in the outcomes of the Global Stocktake and secured by the mitigation and ambition programme towards 2030 (UNFCCC, 2024). In addition, it is one of the objectives in the COP30 Global Action Agenda.

Funded by the European Union

Assessment of the initiatives' aggregate goals under the Action Agenda against quantitative indicators

In our IMAGE-based assessment, implementing the tripling of renewable capacity and doubling of energy efficiency by 2030, while not including other initiatives, brings global CO_2 energy emissions per GDP (PPP) down from the level of current policies towards the below 2 °C and 1.5 °C pathways by 2030 (see Figure 3). This is equivalent to a 7% reduction relative to the current policies scenario for global Kyoto emissions, including CO_2, CH_4, N_2O, and fluorinated gases. If we assume this initiative continues beyond 2030 with sustained equivalent efforts, global implementation significantly increases the reductions, almost halving the CO_2 energy emissions per GDP between 2030 and 2050 However, more reductions are needed to close the emissions gap with the below 2 °C (>67% probability) pathway. A comparison of the IMAGE results with the IPCC AR6 scenario database (Byers et al., 2022), shows that multiple pathways exist with different renewable capacity and energy efficiency improvements that keep the temperature increase below 2 °C or 1.5 °C. Therefore, it will be necessary to use the results of multiple models to define the target level of specified goals.

Funded by the European Union

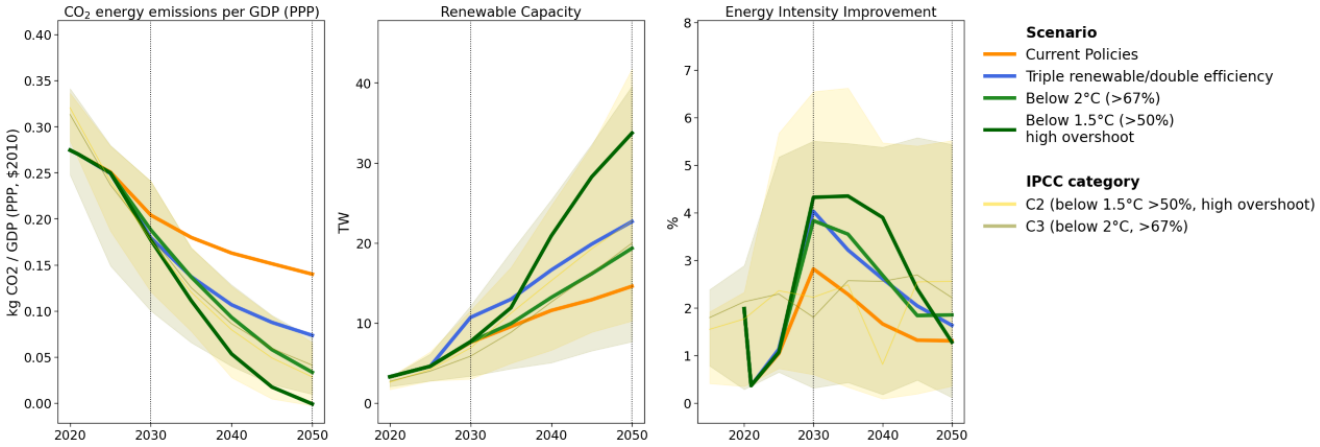

Figure 3 Comparing emissions levels for total CO_2 energy emissions per GDP (PPP) (indicator) from scenarios for current policies, Triple renewable/double efficiency (Global Renewable and Energy Efficiency pledge) with below 2 °C and 1.5 °C pathways, including a comparison (in light yellow/olive) with scenarios from the AR6 database representing limiting warming to 1.5 °C with a high overshoot (>50% probability) (C2), and limit warming to 2°C (>67% probability) (C3).

Funded by the European Union

Accelerating zero and low-emission technologies in hard-to-abate sectors

The goals that secure ambition of hard-to-abate sector initiatives, measured in terms of low carbon share, are aligned with well below 2 °C and 1.5 C °pathways in the short term. But zooming into different sectors gives a mixed picture, with large uncertainty in implementation and the need to focus on more concrete and consistent roadmaps towards net-zero emissions in these sectors.

In so-called "hard-to-abate sectors", it is more challenging to lower emissions due to technical mitigation limitations, complex value chains, specific conditions of the location, long capital turnover, long lifetimes, or low societal support (Edelenbosch et al., 2024). The hard-to-abate initiatives for which concrete goals exist are the cement industry, steel industry and the aviation sector. The first two are part of the Glasgow Breakthroughs. They aim for near-zero cement and steel to be the preferred choice by 2030 (Breakthrough Agenda, 2024a, 2024b). Both initiatives are endorsed by several countries and backed by other initiatives such as the Industrial Deep Decarbonization Initiative and Responsible Steel. At the same time, the near-zero goal by 2030 is very difficult to achieve and impossible to reach in the IMAGE model (see Figure 4). The goal of the aviation sector is based on the ICAO 1.5 °C scenario (ICAO, 2022).

Assessment of the initiatives' aggregate goals under the Action Agenda against the defined quantitative indicators

The *COP initiatives* scenario (including all initiatives from

Table 2), brings the low carbon share (incl. renewable energy, nuclear power, and fossil fuels with CCS) toward the 2 °C and 1.5 °C pathways by 2030, but this differs significantly for individual sectors. When we assess the individual sectors, reductions beyond current policies by 2030 are projected to bring sectoral

emissions halfway towards the below 2 °C scenario for steel, and closer to the Below 2 °C pathway for cement. In practice, this means that a combination of technical advancements, strengthened policy frameworks, adaptations to business structures (e.g. split-ups), and relocating industry to favourable locations is needed to align with the Paris goals (Bataille et al., 2021).

The goal of the aviation sector is highly ambitious compared to the IMAGE below 2 °C and 1.5 °C scenarios (see Figure 4). Achieving net-zero emissions in this sector is a complex process of improving the maturity of technologies, implementing effective policies, stimulating changes in consumer behaviour and incentivising innovation (Gössling and Humpe, 2024; Hasan et al., 2021).

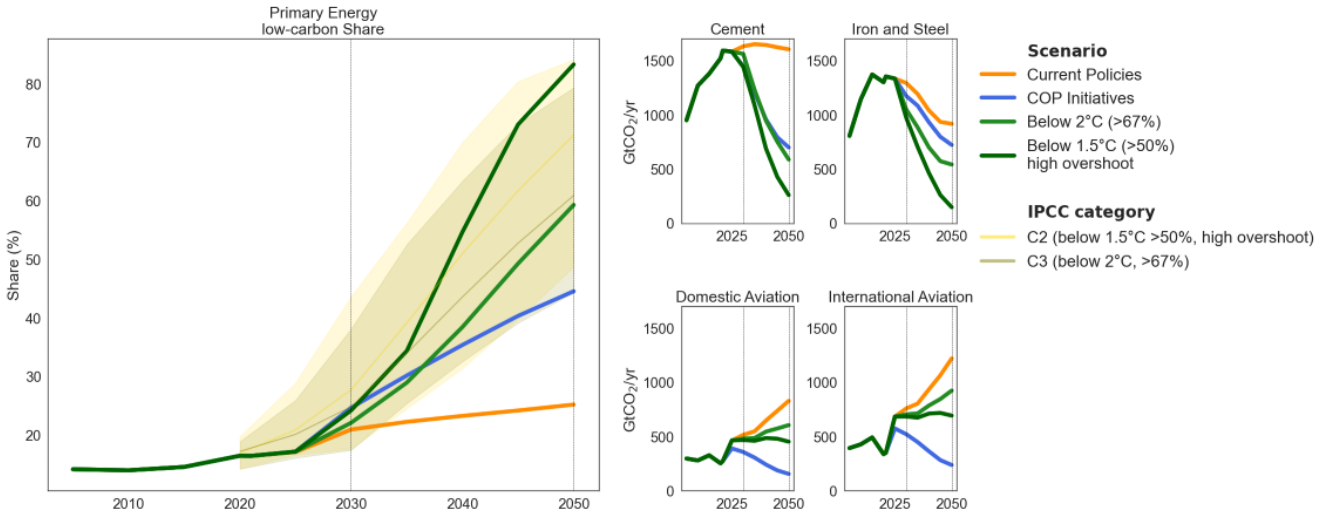

Figure 4 Comparison of projected emissions of current policies, COP initiatives, and 2°C and 1.5°C scenarios for primary energy low carbon (renewable energy, nuclear, fossil with CCS) share and the cement, iron and steel, domestic and international aviation sectors. The primary energy low carbon shares are supplemented with AR6 database results for the C2 (1.5 °C (50%probability) with high overshoot) and C3 (2 °C (>67%probability)) scenario categories.

Ensuring universal access to energy

Current implemented policies fall short of achieving universal energy access. Therefore, significant investment and integrated mitigation strategies are needed to enhance electrification rates and potentially reduce GHG emissions, particularly in regions such as Sub-Saharan Africa, where the electricity access gap is the largest.

As we did not find initiatives with concrete and measurable energy access goals, we use the results from Zapata et al. (2025) to illustrate that the implementation of climate policies does not automatically result in sufficiently improved energy access. In this context, Sustainable Development Goal 7 aims to ensure access to 'affordable, reliable, sustainable and modern energy for all' (UN, 2015, 2015).

Assessment of the initiatives' aggregate goals under the Action Agenda against the defined quantitative indicators

Under current policies, if we focus on electricity access, the world will fall short of achieving this goal, reaching only a 93% electrification rate and leaving over 650 million people without access, 91% of whom live in Sub-Saharan Africa (Zapata et al., 2025). The regions of Latin America (within Central America), South and East Asia, Other (mostly Yemen), and Sub-Saharan Africa will not achieve 100% electrification by 2030 under this scenario, with Sub-Saharan Africa reaching only 66% (see Figure 5). Achieving basic universal access by 2030 is estimated to require an additional annual investment of USD 15 billion on top of the projected USD 98 billion baseline (ibid).

However, providing access with consideration to more decent living standards, guaranteeing sufficient electricity access for all essential household appliances (e.g. refrigeration, heating, cooling) would bring

Funded by the European Union

most countries close to meeting full electricity access. This would more than double the total required investment, demanding an additional USD 48 billion annually. Importantly, significant synergy exists with climate action; integrating climate mitigation policies can reduce residential electricity CO_2 emissions by nearly 30% with a small increase in investment (<10%) compared to the universal access scenarios without climate policies (Zapata et al., 2025). These findings are particularly relevant to Sub-Saharan Africa, especially West and East Africa, which requires the largest share of new capacity to close the access gap. Off-grid systems have been identified as the least-cost solution for over half of the newly connected population

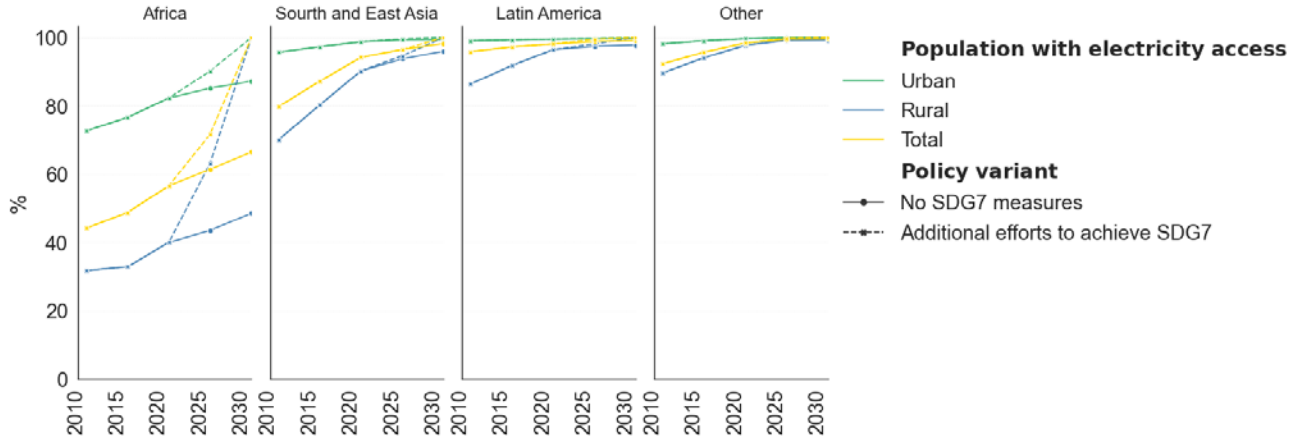

Figure 5 Population with electricity access between 2010 and 2030 for the regions Africa, South and East Aisa, Latin America and Other (countries not within the other regions)

Although we were not able to find climate initiatives with measurable goals for energy access, several initiatives exist that either support clean energy access (SDG 7) or have it as their primary goal (Chan, S. et al., 2025, see Table 3). For example, the Clean Energy Ministerial supports the Glasgow breakthroughs by providing a dedicated staff to enhance capacity for managing and implementing activities (Kuramochi et al., 2024). In this context, output performance is an indicator that measures the extent to which initiatives

Funded by the European Union

produced outputs consistent with their main functions[3] (Chan et al., 2022). Using this indicator, REN21 and GWEC score high, whereas the Africa Renewable Energy Initiative and Clean Energy Solutions Center receive the lowest scores (Chan, S. et al., 2025; Kuramochi et al., 2024).

Table 3 Climate initiatives that include the topic of energy access;

Source: https://globaldatalab.org/c-cid/initiatives/

Africa Renewable Energy Initiative
Breakthrough Energy Coalition
Center for Climate and Energy Solutions
Clean Energy Solutions Center
Energy Vehicles Initiative (EVI)
European Alliance to Save Energy (EU-ASE)
Global Bioenergy Partnership (GBEP)
Global Wind Energy Council (GWEC)
No New Coal Compact and the Energy Transition Council
REN21 (Renewable Energy Policy Network for the 21st Century)

[3] See https://globaldatalab.org/c-cid/methodology/ for details

Transitioning away from fossil fuels in a just, orderly, and equitable manner

The initiatives categorised under the objective of 'transitioning away from fossil fuels' have the potential to considerably reduce GHG emissions. If implemented globally and executed successfully, these initiatives could bring fossil fuel levels reasonably close to the below 2 °C pathway for fossil fuels without CCS by 2050. Policies aimed at reducing coal use and increasing the share of low-carbon vehicles can benefit from ongoing trends. However, the initiatives' targets seem to be unattainable without legal support.

The COP30 initiated a roadmap on "just, orderly, and equitable transition away from fossil fuels" building on the agreement reached at COP28. In addition, this was the primary focus at the Transitioning Away conference in Santa Marta, Colombia, in 2026. This topic is captured by the Action Agenda objective 'Transitioning away from fossil fuels in a just and orderly and equitable manner' and involves phasing out fossil fuel dependence, scaling up renewable energy capacity, electrifying sectors like heat and transport, and providing financial support for affected communities. As stated in the objective, the transition should be 1) 'just', ensuring that the shift from fossil fuels does not disproportionately harm vulnerable communities or workers, 2) 'orderly', meaning it does not impact economic stability, and 3) 'equitable', addressing the different capacities and needs of countries, particularly by providing financial and technological support to low-income nations in climate mitigation and adaptation.

Although the goal is supported by initiatives discussed in previous sections such as those aiming at promoting renewable and energy efficient energy sources, here we focus on COP26 initiatives that directly target fossil fuel supply and demand: 1) coal phaseout initiatives, including the "Global Coal to Clean Power

Transition" and "Breakthrough Agenda (coal), 2) two passenger transport initiatives, which are the "Declaration on Accelerating the transition to 100% zero emissions cars and vans" and the "Breakthrough Agenda (transport), and 3) one trucks initiative, which is the Global Memorandum of Understanding for Zero-emissions Medium- and Heavy-Duty Vehicles.

The coal phaseout initiative is aimed at transitioning away from unabated coal power generation in the 2030s for major economies and in the 2040s globally. The two road transport initiatives aim to realize 100% sale of zero-emission vehicles/trucks by 2030/2035 in leading markets and 2040/2045 in low- and middle-income countries. If achieved, these targets would lead to substantial emission reductions, considering that coal and road transport have been responsible for 17.5% and 12.6% of global emissions (in 2020), respectively.

Despite economic growth and increased energy demand, global coal consumption has roughly remained constant over the past decade. In 2024, clean energy generation surpassed coal globally for the first time, and OECD countries have seen coal generation drop below half of its 2007 peak. However, China and India, the world's largest coal users, have experienced an increase in coal use, i.e. about 18% rise combined in the last 10 years. Global sales of electric vehicles have significantly increased in the last five years, with more than 20% of new cars being electric. The three initiatives have welcomed an increasing number of signatories, with the coal initiative now at 60, the passenger and truck transport initiatives at 50 and 37, respectively. However, even with full global coverage, the voluntary nature of the initiatives would make it difficult to meet the targets without additional legislation.

Funded by the European Union

Assessment of the initiatives' aggregate goals under the Action Agenda against the defined quantitative indicators

The goals of the coal phaseout and transport initiatives have been implemented in the IMAGE model by increasing premium costs for these technologies, representing policy instruments such as CO_2 and efficiency standards. The transport goals were achieved in all regions except in Western Africa, Eastern Africa, Korea, and the Rest of Southern Africa, where the model does have enough potential for low-carbon vehicles.

The fossil fuel energy without CCS indicator is aligned with the below 1.5 °C pathway by 2030, but decreases much more slowly towards 2050, remaining somewhat above the below 2 °C pathway by 2050 (see Figure 6). The global energy breakdown in the different scenarios shows a large increase in low carbon fuels (e.g. renewables, nuclear, fossil with CCS) by 2050 (see Figure 6). The coal phasedown under the Global Climate Initiatives scenario goes beyond Current Policies and is found to be in line with the below 2 °C scenario in both 2030 and 2050. However, to align with the below 1.5 °C scenario, additional climate policy is needed to fully abandon unabated coal. The decrease in oil use in the COP initiatives scenario largely reflects the impact of the road transportation initiatives. Despite dropping substantially below current policies' levels, oil use in 2050 remains slightly above the below 2 °C scenario but would need to be almost halved to be in line with the 1.5 °C pathway, requiring a substantial increase in ambition.

Funded by the European Union

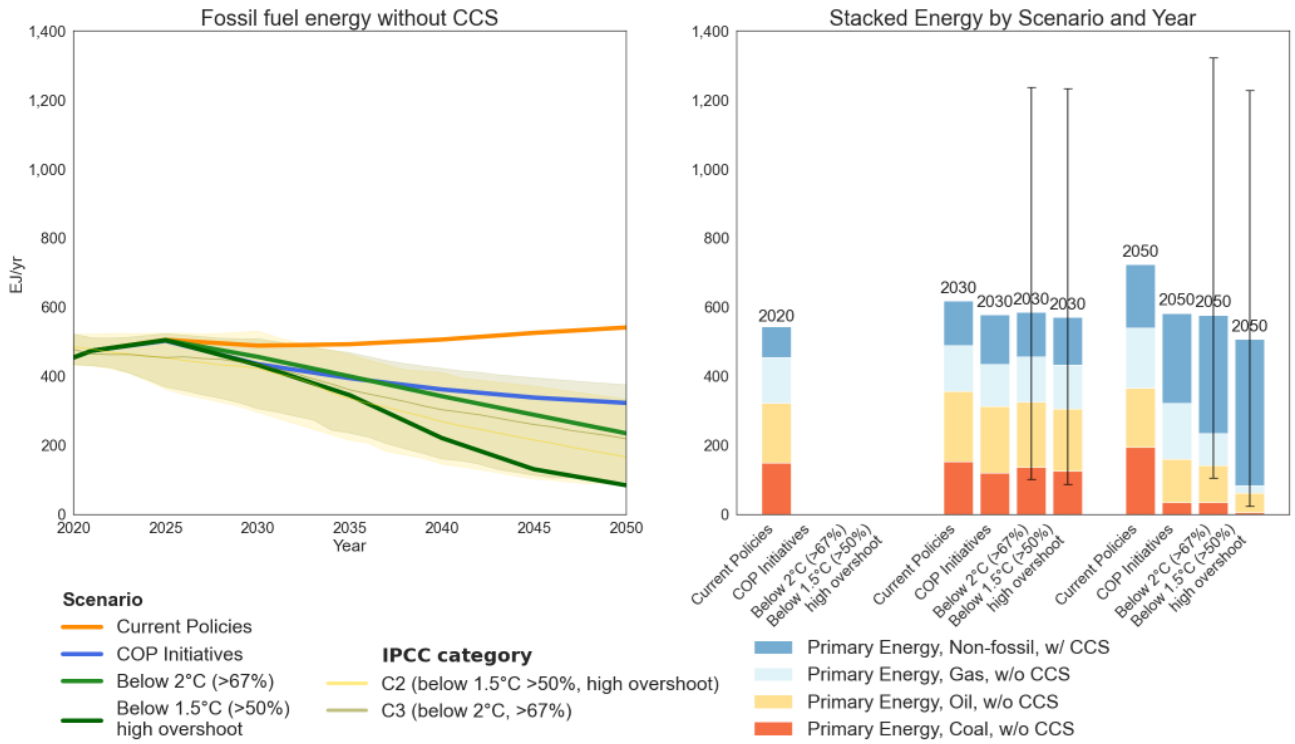

Figure 6 Primary energy for fossil fuels without CCS and the global primary energy breakdown in 2030 and 2050. The primary energy for fossil fuels without CCS are supplemented with AR6 database results for the C2 (1.5 °C (50% probability) with high overshoot) and C3 (2 °C (>67% probability)) scenario categories.

Investments to halt and reverse deforestation

Efforts to reverse deforestation through initiatives such as the Glasgow Leaders' Declaration on Forests and Land Use promise significant emissions reductions, but realising the full goals requires comprehensive strategies and curbing agricultural expansion. Globally, the deforestation pledge alone is not sufficient to provide a pathway for the land-use sector in line with the 2°C or 1.5°C goals.

The climate initiative that is categorised under the objective to enhance investments to halt and reverse deforestation and degradation is the Glasgow Leaders' Declaration on Forests and Land Use (GDFLU), which has the goal to halt and reverse deforestation and land degradation by 2030. This initiative could, if implemented successfully, lead to substantial emissions reductions. This commitment was launched at COP26 in 2021, signed by over 144 countries. The declaration acknowledges forests' vital role in balancing GHG emissions, adapting to climate change, and maintaining ecosystem services, contributing to healthy societies. It seeks to achieve these goals through collective action, sustainable trade policies, and increased financial support for forest-rich nations. The signatories of the GDFLU represent over 90% of the world's forests. The potential climate mitigation benefit of the agreement is therefore substantial, considering that between 7.5% and 10.5% of global GHG emissions in 2020 were caused by deforestation (Crippa, M et al., 2023).

The success of the initiative will depend on global collaboration and enforcement, monitoring and transparency and credible, effective national policies that support the global agreement. The Forest and Climate Leaders' Partnership (FCLP) is tasked with ensuring governments and organisations adhere to their commitments. It aims to do that by promoting high-level dialogue, increasing financial mobilisation, strengthening accountability, and fostering practical on-the-ground solutions. Nevertheless, major

Funded by the European Union

challenges remain in fully eradicating deforestation from commodity supply chains. Independent assessments, such as those by the Forest Declaration Assessment, are used to monitor progress and hold governments accountable for transparency and data.

Assessment of the initiatives' aggregate goals under the Action Agenda against the defined quantitative indicators

The GDFLU goal has been represented in the IMAGE model by not allowing deforestation starting from 2030, based on (Doelman et al., 2018; Vuuren et al., 2021). This goal is not fully achieved due to CO_2 leakage to non-forested areas. The implementation of the goal leads to significant changes in forested areas in the COP initiatives scenario compared to the other policy scenarios (see Figure 7). Compared to the current policies scenario, there are only minor reductions in the short term. Before 2030, it is found to be unlikely that deforestation reduction goes beyond the impact of existing policies, due to competition between food production and natural areas (Popp et al., 2017). After 2040, with equivalent effort, the GDFLU pledge results in significantly reduced forest loss, leading to decreased CO_2 emissions. However, globally, the deforestation pledge alone is not sufficient to provide a pathway for the land use sector in line with the 2°C or 1.5°C goals. This would require additional measures, notably afforestation, but also measures aimed at avoiding agricultural expansion in non-forested natural areas.

The results differ significantly for countries as forest cover increases significantly towards the below 2 °C and 1.5 °C pathways in West and Central Africa, it ends up halfway for Brazil, but follows current policies in Indonesia, which is already relatively ambitious (see right of Figure 7).

Funded by the European Union

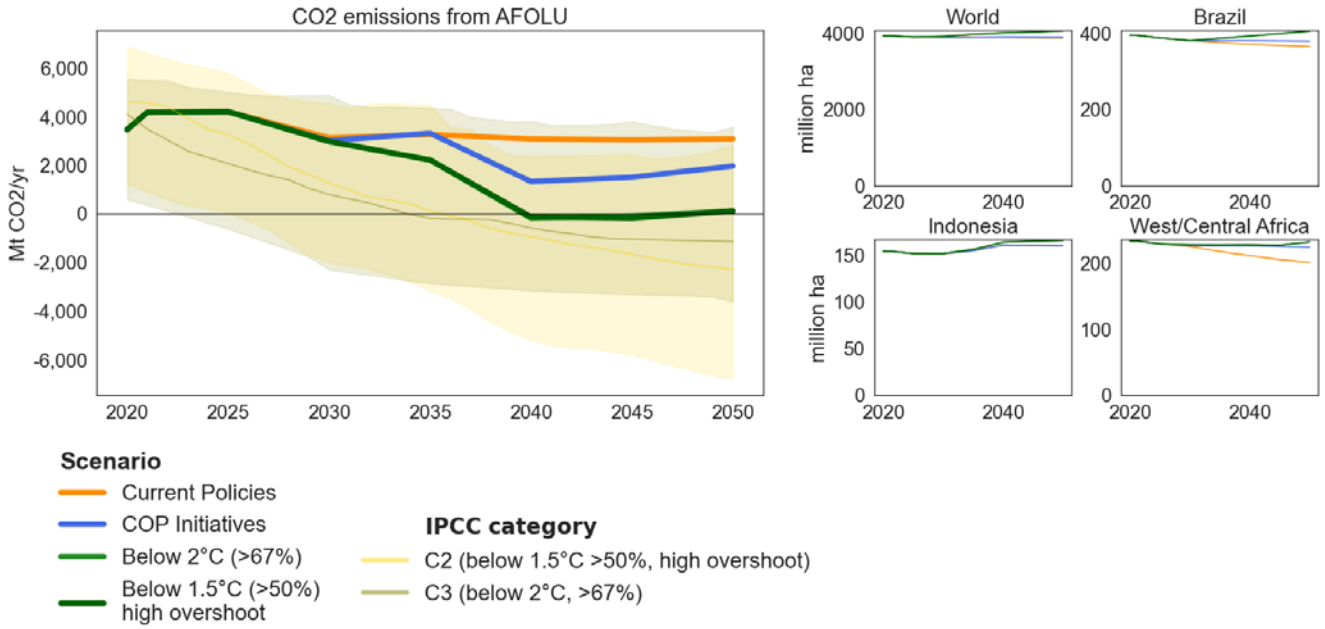

Figure 7 CO_2 emissions from forestry and other land use and forest area under scenarios with different climate policy assumptions, shown for the world and key highly forested regions. The CO2 AFOLU emissions are supplemented with AR6 database results for the C2 (1.5 °C (50%probability) with high overshoot) and C3 (2 °C (>67%probability)) scenario categories.

Reduction of non-CO_2 emissions

The recent COPs, in terms of non-CO_2 emissions, have predominantly focused on the Global Methane Pledge, aiming to reduce methane emissions by 30% by 2030, highlighting the need for ambitious sectoral mitigation actions. In terms of emissions, our assessment indicates that by 2050, methane could become the dominant greenhouse gas in scenarios that aim for deeper decarbonisation, as CO_2 emissions are reduced significantly. This underscores the necessity for further initiatives targeting non-CO_2 gases, including N_2O and F-gases.

The only initiative from the last few COPs aimed at the mitigation of non-CO_2 emissions has been the Global Methane Pledge (GMP). Methane emissions are projected to continue rising under current national policies. Methane accounts for about 20% of global GHG emissions and has contributed approximately one-third of present-day warming. The Global Methane Pledge was launched by the United States and the European Union at COP26 in November 2021. The primary aim for participating countries is to collaborate to collectively reduce global anthropogenic methane emissions by at least 30% below 2020 levels by 2030 (GMP, 2024). This global goal has been signed by 159 countries and the European Union, totalling 150 participants who collectively account for approximately 55% of global methane emissions. Achieving this requires ambitious implementation of mitigation actions across key sectors such as fossil fuel production, agriculture, and waste (Malley et al., 2023).

Assessment of the initiatives' aggregate goals under the Action Agenda against the defined quantitative indicators

The emission reduction goals from the Methane pledge were implemented in the IMAGE model by assuming the global reduction potential (with lenient assumptions) is implemented (see Roelfsema et al.

(2026) for details). The share of CH_4 emissions in total GHG emissions in the IMAGE projections remains relatively stable by 2030, but changes significantly across scenarios by 2050 (IEA, 2025), see Figure 8. By 2030, CO_2 dominates all scenarios at approximately 73%, but by 2050, there is a large difference: Current Policies maintains 73% CO_2, while the share decreases sharply in below 1.5 °C (>50%probability), to 6% CO_2, with CH_4 becoming dominant at 65%. In 2050, the CH_4 share comprises 23.3% under COP Initiatives, significantly lower than the below 2 °C scenario (33.8%) and especially the below 1.5 °C scenario (65.1%).

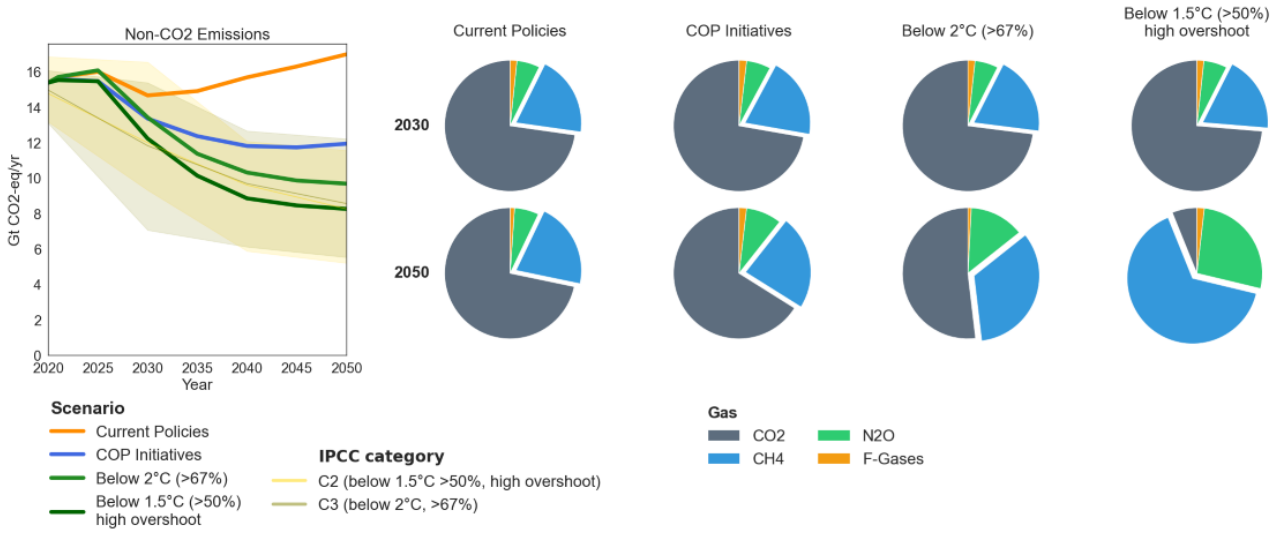

Figure 8 Global non-CO_2 emissions and share of CH_4, N_2O, f-gases, and CO_2 emissions in the Current Policies, COP initiatives, below 2 °C (>67%probability), and Below 1.5 °C (>50%probability) scenarios for the years 2030 and 2050. The non-CO_2 emissions are supplemented with AR6 database results for the C2 (1.5 °C (50% probability) with high overshoot) and C3 (2 °C (>67% probability)) scenario categories.

Other non-CO_2 emissions are not covered by mitigation initiatives. However, F-gases are partly regulated through the Kigali Amendment (aimed only at HFCs), which is coordinated outside the UNFCCC, under the Montreal Protocol (UNEP, 2016). Although the Kigali Amendment establishes a successful framework for phasing down HFC production and consumption by 80%–85% by 2047, its true climate effectiveness depends on implementing Best Environmental Practices (BEPs) globally to mitigate the significant volume

of time-lagged emissions (Liu et al., 2024). Therefore, for both N_2O and F-gases, there is a need for additional climate mitigation initiatives.

Discussion and way forward

If COP initiatives since 2021 were to fully achieve their goals globally, the collective ambition of voluntary climate mitigation is projected to result in greater emissions reductions than those expected from the successful implementation of current policies. Full global implementation by 2030 could align with a below 2 °C pathway by 2030, but not with a below 1.5 °C pathway. Furthermore, more ambition and expansion to more thematic areas are needed in the long term.

The analysis presented in this policy brief is a first effort to attach indicators to the Action Agenda objectives, supporting the establishment of clear, measurable, and long-term goals that align with the Paris Agreement temperature targets. This allows for evaluating the progress of climate initiatives that are categorised under these objectives using these indicators. To demonstrate this approach, we have categorised existing climate initiatives announced around COPs under these objectives. The overall goals of the initiatives are assessed on their ambition relative to Current Policies and the Paris temperature goals. The results indicate that the goals from climate initiatives launched at COPs since 2021, if globally implemented, could reduce global emissions by 11% relative to currently implemented policies by 2030. Nevertheless, maintaining equivalent efforts over the long term falls short of keeping temperature increase at or below the Paris agreement pathways by 2050.

The Global Action Agenda needs to address missing thematic areas such as emissions from N_2O and F-gases, and light-industry energy use.

From the non-CO_2 emissions, only methane is covered by climate initiatives from the last few COPs. As the share of non-CO_2 emissions is projected to increase towards 2050, it is a very relevant topic for effective

Funded by the European Union

climate actions. N_2O reductions can be achieved by changing common fertiliser use, tillage, irrigation, and rotation of crops (Hassan et al., 2022). For F-gases, new initiatives should focus on regulating PFCs and SF_6 emissions, which are not regulated under the Kigali amendment of the Montreal Protocol. In addition, light industry, including SME companies, is not explicitly addressed in initiatives with quantifiable goals, while they represent around 5% of global emissions.

Given that the ambitions of climate initiatives often go beyond those of many current implemented policies by governments, it is vital to ensure the effectiveness of the Global Action Agenda. Therefore, this agenda should remain a priority at all future COPs, with goals made more concrete while accommodating diverse pathways in specific thematic areas for both Party and non-Party stakeholders.

The objectives in the Action Agenda provide a promising way forward as they encompass several thematic areas, each presenting unique challenges. This supports UNFCCC Party and non-Party stakeholders in implementing the Paris goals. The COP30 presidency's call to focus on ongoing and effective initiatives is commendable, given that many past COP announcements did not result in concrete actions. However, the objectives of the agenda must be made more concrete to monitor progress and serve as a guiding framework for Party and non-Party stakeholders. Currently, these objectives lack clear goals that specify ambition in the form of targets and target years.

While it is important to be concrete, the framework should allow for diverse pathways that keep temperature increase well below 2 °C or 1.5 °C. First, it should accommodate various technical and societal solutions, such as balancing renewable energy with efficiency improvements and technological solutions with behavioural change. Second, it should accommodate differentiated responsibilities, allowing for

Funded by the European Union

differentiation among high-, middle-, and low-income countries. Third, uncertainty needs to be accounted for by balancing overall permanent country-wide targets with sufficiently adaptable targets for specific thematic areas, allowing adaptation to evolving circumstances and knowledge.

There are several next steps to improve the current presented assessment framework for assessing the climate initiatives under the Action Agenda objectives.

First, since only initiatives announced during recent COPs were included, the assessment should be extended to include climate initiatives from the Activation Groups. This should be accompanied by evaluating the effectiveness of the COP initiatives based on the criteria from the CoAct Database (Global Data Lab, 2026). Second, the indicators need to be reassessed and discussed to determine whether they best represent the Action Agenda objectives. Third, the information used to highlight uncertainty and the existence of multiple pathways toward mitigation goals is sourced from the IPCC AR6 database supporting the IPCC WGIII report (P.R. Shukla et al., 2022), which includes data from before 2022. Therefore, an update based on ScenarioMIP (Van Vuuren et al., 2026) or Scenario Compass Initiative (2026) is needed, as it has more up-to-date below 2 °C and 1.5 °C pathways. Fourth, after the discussion with experts, initiative coordinators, and signatories on representative indicators and the update of well below 2 °C and 1.5 °C indicators, a measurable and long-term goal can be attached to the Action Agenda objectives, possibly as a range to represent multiple feasible pathways.

Funded by the European Union

References

Bataille, C., Nilsson, L.J., Jotzo, F., 2021. Industry in a net-zero emissions world: New mitigation pathways, new supply chains, modelling needs and policy implications. Energy and Climate Change 2, 100059. https://doi.org/10.1016/j.egycc.2021.100059

Breakthrough Agenda, 2024a. Cement & Concrete.

Breakthrough Agenda, 2024b. Steel.

Byers, E., Krey, V., Kriegler, E., Riahi, K., Schaeffer, R., Kikstra, J., Lamboll, R., Nicholls, Z., Sandstad, M., Smith, C., van der Wijst, K., Al -Khourdajie, A., Lecocq, F., Portugal-Pereira, J., Saheb, Y., Stromman, A., Winkler, H., Auer, C., Brutschin, E., Gidden, M., Hackstock, P., Harmsen, M., Huppmann, D., Kolp, P., Lepault, C., Lewis, J., Marangoni, G., Müller-Casseres, E., Skeie, R., Werning, M., Calvin, K., Forster, P., Guivarch, C., Hasegawa, T., Meinshausen, M., Peters, G., Rogelj, J., Samset, B., Steinberger, J., Tavoni, M., van Vuuren, D., 2022. AR6 Scenarios Database. https://doi.org/10.5281/zenodo.7197970

Chan, S., Denault, A., Hale, T., 2025. Climate Cooperative Initiatives Database (C-C-CID).

Chan, S., Hale, T., Deneault, A., Shrivastava, M., Mbeva, K., Chengo, V., Atela, J., 2022. Assessing the effectiveness of orchestrated climate action from five years of summits. Nat. Clim. Chang. 12, 628–633. https://doi.org/10.1038/s41558-022-01405-6

COP30 Presidency, 2025a. Letter from COP 30 President-Designate.

COP30 Presidency, 2025b. COP30 Action Agenda Activation Groups [WWW Document]. URL https://cop30.br/en/action-agenda/activation-groups

Crippa, M, Guizzardi, D, Pagani, F, Banja, M, Muntean, M, Schaaf, E, Becker, W, Monforti-Ferrario, F, Quadrelli, R, Risquez Martin, A, Taghavi-Moharamli, P, Köykkä, J., Grassi, G, Brandeao De Melo, J., Oom, D., Branco, A, San-Miguel, J, Vignati, E, 2023. GHG emissions of all world countries (No. JRC134504). JRC. https://doi.org/10.2760/953332

Doelman, J.C., Stehfest, E., Tabeau, A., van Meijl, H., Lassaletta, L., Gernaat, D.E.H.J., Hermans, K., Harmsen, M., Daioglou, V., Biemans, H., van der Sluis, S., van Vuuren, D.P., 2018. Exploring SSP land-use dynamics using the IMAGE model: Regional and gridded scenarios of land-use change and land-

based climate change mitigation. Global Environmental Change 48, 119–135. https://doi.org/10.1016/j.gloenvcha.2017.11.014

Edelenbosch, O.Y., Hof, A.F., van den Berg, M., de Boer, H.S., Chen, H.-H., Daioglou, V., Dekker, M.M., Doelman, J.C., den Elzen, M.G.J., Harmsen, M., Mikropoulos, S., van Sluisveld, M.A.E., Stehfest, E., Tagomori, I.S., van Zeist, W.-J., van Vuuren, D.P., 2024. Reducing sectoral hard-to-abate emissions to limit reliance on carbon dioxide removal. Nat. Clim. Chang. 14, 715–722. https://doi.org/10.1038/s41558-024-02025-y

Global Data Lab, 2026. CoAct Database.

GMP, 2024. Global Methane PLedge. URL https://www.globalmethanepledge.org/

Gössling, S., Humpe, A., 2024. Net-zero aviation: Transition barriers and radical climate policy design implications. Science of The Total Environment 912, 169107. https://doi.org/10.1016/j.scitotenv.2023.169107

Hasan, M.A., Mamun, A.A., Rahman, S.M., Malik, K., Al Amran, M.I.U., Khondaker, A.N., Reshi, O., Tiwari, S.P., Alismail, F.S., 2021. Climate Change Mitigation Pathways for the Aviation Sector. Sustainability 13, 3656. https://doi.org/10.3390/su13073656

Hassan, M.U., Aamer, M., Mahmood, A., Awan, M.I., Barbanti, L., Seleiman, M.F., Bakhsh, G., Alkharabsheh, H.M., Babur, E., Shao, J., Rasheed, A., Huang, G., 2022. Management Strategies to Mitigate N2O Emissions in Agriculture. Life 12, 439. https://doi.org/10.3390/life12030439

IAMC, Bezos Earth Fund, 2026. Scenario Compass Initiative.

ICAO, 2022. Report on the feasibility of a long-term aspirational goals (LTAG) for international civil aviation CO2 emission reductions.

IEA, 2025. Global Methane Tracker.

IEA, 2023. Energy Efficiency - The Decade for Action.

IEA, 2021. Net zero by 2050. A roadmap for the global energy sector. Paris, France.

IPCC, 2014. Working Group III Contribution to the IPCC 5th Assessment Report “Climate Change 2014: Mitigation of Climate Change.” Cambridge University Press PP - Cambridge.

IRENA, 2023. Tripling renewable power and doubling energy efficiency by 2030: Crucial steps forwards 1.5

°C.

Kuramochi, T., Deneault, A., Chan, S., Smit, S., Pelekh, N., 2024. Supporting the Paris Agreement through international cooperation: potential contributions, institutional robustness, and progress of Glasgow climate initiatives. npj Clim. Action 3, 31. https://doi.org/10.1038/s44168-024-00106-4

Liu, H., Duan, H., Zhang, N., Ma, Y., Liu, G., Miller, T.R., Mao, R., Xu, M., Li, J., Yang, J., 2024. Rethinking time-lagged emissions and abatement potential of fluorocarbons in the post-Kigali Amendment era. Nat Commun 15, 6687. https://doi.org/10.1038/s41467-024-51113-2

Malley, C.S., Borgford-Parnell, N., Haeussling, S., Howard, I.C., Lefèvre, E.N., Kuylenstierna, J.C.I., 2023. A roadmap to achieve the global methane pledge. Environ. Res.: Climate 2, 011003. https://doi.org/10.1088/2752-5295/acb4b4

Popp, A., Calvin, K., Fujimori, S., Havlik, P., Humpenöder, F., Stehfest, E., Bodirsky, B.L., Dietrich, J.P., Doelmann, J.C., Tabeau, A., 2017. Land-use futures in the shared socio-economic pathways. Global environmental change : human and policy dimensions 42, 331–345.

P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.), 2022. Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC.

Roelfsema, M., Dafnomilis, I., Elzen, M. den, Harmsen, M., de Boer, H.-S., Doelman, J., van Vuuren, D., 2026. Staying on track: a bottom-up Paris-aligned pathway driven by COP initiatives. Energy and Climate Change 7, 100237. https://doi.org/10.1016/j.egycc.2026.100237

Roelfsema, M., van Soest, H.L., Harmsen, M., van Vuuren, D.P., Bertram, C., den Elzen, M., Höhne, N., Iacobuta, G., Krey, V., Kriegler, E., Luderer, G., Riahi, K., Ueckerdt, F., Després, J., Drouet, L., Emmerling, J., Frank, S., Fricko, O., Gidden, M., Humpenöder, F., Huppmann, D., Fujimori, S., Fragkiadakis, K., Gi, K., Keramidas, K., Köberle, A.C., Aleluia Reis, L., Rochedo, P., Schaeffer, R., Oshiro, K., Vrontisi, Z., Chen, W., Iyer, G.C., Edmonds, J., Kannavou, M., Jiang, K., Mathur, R., Safonov, G., Vishwanathan, S.S., 2020. Taking stock of national climate policies to evaluate implementation of the Paris Agreement. Nature Communications 11, 2096. https://doi.org/10.1038/s41467-020-

15414-6

Stehfest, E., Van Vuuren, D.P., Bouwman, L., Kram, T., Alkemade, R., Bakkenens, M., Biemans, H., Bouwman, A., den Elzen, M.G.J., Janse, J., Lucas, P., Van Minnen, J., Müller, C., Prins, A., 2014. Integrated Assessment of Global Environmental Change with Model description and policy applications IMAGE 3.0. PBL Netherlands Environmental Assessment Agency, Bilthoven.

UN, 2015. Transforming our world: the 2030 Agenda for Sustainable Development; Resolution adopted by the General Assembly on 25 September 2015.

UNEP, 2016. The Kigali Amendment to the Montreal Protocol: HFC phase-down - Ozon Action Fact sheet, http://www.unep.fr/ozonaction/information/mmcfiles/7897-e-OzonAction_Kigali_FS_quick_links.pdf, http://multimedia.3m.com/mws/media/1365924O/unep-fact-sheet-kigali-amen.

UNFCCC, 2025a. Note from the Climate High-Level Champions.

UNFCCC, 2025b. Yearbook of Global Climate Action 2025. Marrakech Partnership for Global Climate Action.

UNFCCC, 2024. First global stocktake Draft decision -/CMA.5 Outcome of the first global stocktake.

UNFCCC, 2015. Paris Agreement.

Van Vuuren, D.P., O'Neill, B.C., Tebaldi, C., Sanderson, B.M., Chini, L.P., Friedlingstein, P., Hasegawa, T., Riahi, K., Govindasamy, B., Bauer, N., Eyring, V., Fall, C.M.N., Frieler, K., Gidden, M.J., Gohar, L.K., Högner, A., Jones, A.D., Kikstra, J., King, A., Knutti, R., Kriegler, E., Lawrence, P., Lennard, C., Lowe, J., Mathison, C., Mehmood, S., Nicholls, Z., Prado, L.F., Zhang, Q., Rose, S.K., Ruane, A.C., Sandstad, M., Schleussner, C.-F., Seferian, R., Sillmann, J., Smith, C., Sörensson, A.A., Panickal, S., Tachiiri, K., Vaughan, N., Vishwanathan, S.S., Yokohata, T., Zecchetto, M., Ziehn, T., 2026. The Scenario Model Intercomparison Project for CMIP7 (ScenarioMIP-CMIP7). Geoscientific Model Development 19, 2627–2656. https://doi.org/10.5194/gmd-19-2627-2026

Vuuren, D.P., Stehfest, E., Gernaat, D., Boer, H.S., D., Daioglou, V., Doelman, J., Edelenbosch, O., Harmsen, M., Zeist, W., van den Berg, M., Dafnomilis, I., Sluisveld, M., Tabeau, A., Vos, L., Waal, L., D., van den Berg, N.J., Beusen, A.H.W., Bos, A., Biemans, H., Bouwman, L., Chen, H.-H., Deetman, S., Dagnachew, A., Hof, A., Meijl, H., Mikropoulos, S., Roelfsema, M., Schipper, A., Soest H., V., Tagomori, I., Zapata,

V., 2021. The 2021 SSP scenarios of the IMAGE 3.2 model. https://doi.org/10.31223/x5cg92

Zapata, V., Dagnachew, A., Edelenbosch, O.Y., Vuuren, D. van, 2025. High-resolution Global Pathways to Achieve 100% Electricity Access in 2030. https://doi.org/10.21203/rs.3.rs-3388210/v1

Funded by the European Union