

Climate Action Tracker
**Evaluation methodology
for national net zero targets**
June 2021

1 Introduction

Since the adoption of the Paris Agreement and the release of the IPCC Special Report on Global Warming of 1.5°C, a growing number of countries have committed to net zero emissions targets. As of June 2021, 31 countries and the European Union have set such a target, either in law or in a policy document. More than 100 countries have proposed - or are considering - a net zero target (ECIU, 2021).

This is in line with Article 4.1 of the Paris Agreement, which stipulates the need to “to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century [...]” (UNFCCC, 2015). Implementation of national net zero targets can play a crucial role in limiting global warming to 1.5°C, which requires carbon dioxide (CO₂) and other greenhouse gas (GHG) emissions to rapidly decrease to net zero around 2050 and 2070, respectively. After that, emissions should decrease to be net negative (IPCC, 2018).

Reaching net zero GHG emissions is more difficult than reaching net zero CO₂ emissions, as reducing some sources of non- CO₂ emissions towards zero remains very difficult, especially for methane and nitrous oxide from agriculture. Typically, net zero GHG emissions are achieved with significant negative CO₂ emissions balancing the remaining GHG emissions (IPCC, 2018). There is also uncertainty in modelled scenarios around the pathway to - and timing of - global net zero and net negative emissions. The faster countries decarbonise, the lower the level of cumulative emissions released by the time global net zero is achieved, and the higher the probability of limiting peak warming to 1.5°C (Rogelj *et al.*, 2019).

While it is encouraging that many governments are committing to net zero emissions, their targets vary in terms of timeframe, what GHG emissions and economic sectors are covered, whether the country intends to rely on removals and reductions outside its own borders, legal status, and other aspects. This has important implications for the strength of net zero targets, and whether they are likely to contribute sufficiently to reaching net zero emissions globally.

In this Climate Action Tracker (CAT) evaluation methodology for national net zero targets, we outline a design blueprint for transparent, comprehensive, and robust net zero targets. This blueprint contains ten key elements of good practice that governments setting net zero targets should consider.

We use these elements to evaluate the net zero targets that countries covered by the CAT committed to. The identified *good practice* for each of the ten elements can further serve countries in designing and enhancing their net zero targets. Note that the CAT Net Zero Methodology is specifically designed for national net zero targets and is not necessarily applicable for evaluating net zero targets set by subnational and non-state actors.

2 Terminology

The Climate Action Tracker uses the term ‘net zero target’ to refer to any national or regional target for achieving net zero GHG or net zero CO₂ emissions. We use the term ‘net negative’ if a country explicitly commits to such a target. Governments use a number of different terms to describe these targets, which we explain below.

Net zero GHG emissions, or GHG neutrality, occurs if anthropogenic GHG emissions to the atmosphere are balanced by anthropogenic removals over a specific period (IPCC, 2018). Under the UNFCCC and Paris Agreement, the appropriate metric to compare different greenhouse gases is the global warming potential with a 100-year timeframe (GWP100).

Climate neutrality is the “concept of a state in which human activities result in no net effect on the climate system”. This requires that residual GHG emissions are balanced by removals and that regional or local bio-geophysical effects are accounted for (IPCC, 2018). Climate neutrality can be achieved with net zero emissions, but it is possible to interpret the term ambiguously to include (as-yet untested and possibly dangerous) measures, such as solar radiation management or geo-engineering techniques, that modify the energy balance of the planet locally, regionally or globally.

Net zero CO₂ emissions, or carbon neutrality, requires a balance between anthropogenic emissions by sources and removals by sinks of carbon dioxide emissions over a specified time period and physical region.

Removals are also known as **negative emissions** (IPCC, 2018). Anthropogenic removals refer to removals of GHGs from the atmosphere that result from deliberate human activities. These include enhancing biological sinks of CO₂, for instance through reforestation, and using chemical engineering to achieve long-term removal and storage, for instance bioenergy with carbon dioxide capture and storage (BECCS) and direct air carbon capture and storage (DACCS) (IPCC, 2018). Some countries, for instance Sweden, have set a ‘**net negative emissions**’ target, which implies that removals would be larger than emissions (Swedish Ministry of the Environment and Energy, 2018).

Following the above definitions, net zero GHG targets, and GHG and climate neutrality targets cover all greenhouse gases. Net zero carbon and carbon neutrality targets cover only carbon dioxide emissions. However, some countries use various terms interchangeably, which causes confusion and makes it more challenging to evaluate targets (see also Rogelj et al., 2021).

It is important to note that scientists use the terms outlined above to refer to emissions, removals, and climate impacts at the global scale. To the best of our knowledge, no country has committed to a net zero target that covers imported emissions. Accordingly, countries that achieve a balance of emissions and removals on their territory are still likely to have a relevant impact on the climate system. While we have not included this as a separate key element, we encourage governments to consider imported emissions when setting their net zero targets and implementing climate policies.

There are a few positive examples of governments that are already considering imported emissions, although not as part of their net zero targets. For example, France adopted a strategy to combat imported deforestation in 2018 (MTES, 2018). The European Union is currently working on regulations designed to halt EU-driven deforestation, and on the implementation of a carbon border adjustment mechanism that should incentivise foreign producers and EU importers to reduce their carbon emissions (European Commission, 2020b, 2020a; European Parliament, 2020).

3 A detailed typology of net zero targets

National net zero targets vary with regards to the target year; what emissions and economic sectors are covered; whether the country intends to use reductions or removals outside its own borders; the role of carbon dioxide removals; whether the net zero target consists of two separate reduction and removal targets; governance and planning processes; and fairness considerations.

3.1 Overview of the ten key elements

The CAT looks at ten key elements of each country’s net zero target to assess whether the target’s **scope, architecture, and transparency** meet what we define as *good practice* (Figure 1). The elements are grouped as follows:

- I. **Scope** – (1) target year, (2) emissions coverage, (3) International aviation and shipping, (4) reductions or removals outside of own borders;
- II. **Target architecture** – (5) legal status, (6) separate emissions & removals targets, (7) review process;
- III. **Transparency** – (8) carbon dioxide removals, (9) comprehensive planning, (10) clarity on fairness of target.

Figure 1: Identified good practice for all ten key elements in the Climate Action Tracker’s evaluation methodology for countries’ net zero targets

Good practice for ten key elements of national net zero target setting			
Scope	Target year		
	Emissions coverage	International aviation and shipping	Reductions or removals outside of own borders
	All sectors and gases covered	The net zero target fully covers emissions from international aviation and shipping	Reaching net zero within own borders
Architecture	Legal status	Separate reduction & removal targets	Review process
	Legally binding target	Separate targets for emission reductions and removals	Legally binding review of target and progress against it at regular intervals
	Transparency	Carbon dioxide removal	Comprehensive planning
Transparent & scientifically robust assumptions on LULUCF and carbon removals & storage		Transparent and scientifically robust pathway / intermediate targets with clear measures for achieving net zero	Clear statement on why the target is fair

3.2 Grouping principle #1: Scope

3.2.1 Target year

The IPCC Special Report on Global Warming of 1.5°C found that to avoid the most dangerous climate change, global CO₂ emissions must reach net zero around 2050. Total GHG emissions must also rapidly reduce and reach net zero around 2070 (IPCC, 2018). Based on global benchmarks, many countries set net zero targets for 2050, but some aim to reach net zero earlier or later. For instance, Finland aims to reach carbon neutrality by 2035 and China by 2060.

For a target to be meaningful, **governments should communicate a specific target year or short time period** (e.g., between 2045 and 2050). Vague timelines, e.g. “in the second half of this century” are hard to interpret and do not necessitate rapid decarbonisation (Levin *et al.*, 2020).

Target years should align with global decarbonisation pathways and **countries should also aim to achieve net zero emissions as early as feasible**. What is feasible depends on various factors, including a country’s financial capabilities, its removal and storage potential, its current status of decarbonisation and future technological breakthroughs that would allow for steeper emission reductions in harder-to-abate sectors. In addition, equity considerations are relevant when evaluating net zero target years. Generally, countries with larger historical responsibilities and more financial resources, those that are already more advanced in their decarbonisation, and/or those with a larger sink capacity should set target years earlier than 2050.

At this stage we do not evaluate governments’ net zero target years. Such evaluation requires a robust estimation of feasible emissions and removals trajectories for individual countries domestically. We are still developing this.

3.2.2 Emissions coverage

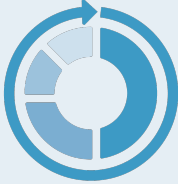




The most transparent and comprehensive net zero targets cover all GHGs and all economic sectors.

Some governments have set net zero targets that cover the full basket of greenhouse gas emissions, whereas other targets cover only a subset. New Zealand, for instance, excludes methane emissions from its target (Parliamentary Counsel Office of New Zealand, 2019). Existing net zero targets cover GHGs emitted within a country’s national border and correspond to national GHG inventories.

There is the risk that **net zero targets result in emissions leakage** (Levin *et al.*, 2020). This may happen, for instance, when a country decides to shut down its coal-fired power plants and imports fossil-based electricity from neighbouring countries; or when industrial processes are outsourced to other countries. Countries should try to avoid leakage to the largest extent possible, for instance by imposing policy measures such as a carbon border adjustment tax.

Table 2 shows which criteria a net zero target must meet for the element “emissions coverage” to be evaluated as “advanced”, “intermediate” or “poor”. For governments that have announced a target, but not yet included it in a policy document or in law, we assess this element as “no information provided”.

Table 2. Criteria to evaluate emissions coverage

		Categories	Further explanation
 <p>Target design element 2 Emissions coverage</p>		Complete coverage: the target covers all sectors and gases (excl. international bunkers)	We evaluate the inclusion of emissions from international bunkers separately in Section 3.2.3.
		Partial coverage: the target covers >95% of emissions (excl. international bunkers).	We calculate the 95% emissions threshold based on the most recent inventory data available to CAT or 2020 emissions if available; in either case excluding international bunkers.
		Incomplete coverage: the target covers less than 95% of emissions (excl. bunkers) OR Coverage is not specified	The option “not specified” applies to net zero targets that are included in a policy document or law. If the target is merely announced or under discussion, category D applies. As specified above, we calculate the 95% emissions threshold based on the most recent inventory data available to CAT or 2020 emissions if available; in either case excluding international bunkers.
		No information provided.	This category only applies to targets that are announced or under discussion. As soon as a government includes its net zero targets in a policy document or law, we expect clarity on target coverage.

3.2.3 International aviation and shipping

The most transparent and comprehensive net zero targets cover emissions from international aviation and shipping.

Greenhouse gas emissions from international aviation and shipping have increased substantially in recent decades. In 2019, emissions from international aviation and shipping accounted for 2GtCO_{2e} (UNEP, 2020) and will likely continue increasing until 2050 without further measures (CAT, 2020a, 2020b; UNEP, 2020).

Whereas the Kyoto Protocol stipulated that Annex I countries are to reduce emissions from international bunkers through the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO), the Paris Agreement does not explicitly mention IMO and ICAO but calls for “economy-wide” reductions, which implies that emissions from international bunkers should be included in government climate targets.

Further, although discussions on the reduction of greenhouse gas emissions from international bunkers have taken place at those organisations since 1997, they have made limited progress. Both the IMO and ICAO have committed to long-term targets, but the CAT, in a June 2020 assessment, considers these to be critically insufficient (CAT, 2020a, 2020b).

To keep the Paris Agreement temperature goal within reach, it is imperative that national governments take responsibility for emissions from international bunkers, and actively work to bring those to zero. This includes developing alternative modes of transport, alternative fuels,

and improving aircraft and vessel efficiency. In addition, governments should make all feasible efforts to balance out any residual emissions within their own territory (see Section 3.2.4 below).






We assess whether net zero targets cover emissions from international bunkers separately from coverage of economic sectors and gases. This serves two purposes: to highlight the importance of including these sectors in a net zero target; and to better distinguish between countries that include international bunkers in their net zero target and those that do not.

We distinguish between full and partial coverage of international bunkers. Full coverage means that the target covers emissions from international aviation *and* shipping on all routes. Partial coverage implies that one of the sectors is not covered, or that the target only covers emissions from international bunkers within a certain region.

While it is relatively straightforward to assign responsibility for emissions from international aviation to individual countries, this is more complicated for emissions from international shipping. A ship’s flag; the ports it calls at; where it refuels; and the registration or nationality of its owners, its charterers and ship financiers are not necessarily related (Kachi, Mooldijk and Warnecke, 2019). How to determine the exact emissions from international bunkers a specific country is responsible for requires further discussion that is outside the scope of this methodology paper.

Table 3 below shows which criteria a net zero target must meet for the element “international shipping and aviation” to be evaluated as “advanced”, “intermediate” or “poor”. For governments that have announced a target, but not yet included it in a policy document or in law, we assess this element as “no information provided”.

Table 3: Criteria to evaluate coverage of international aviation and shipping

		Categories	Further explanation
 <p>Target design element 4 International aviation & shipping</p>		The net zero target fully covers emissions from international aviation and shipping.	
		The net zero target covers emissions from international aviation or from international shipping, but not both. <i>OR</i> The net zero target covers emissions from international bunkers within a certain region only.	If land-locked countries explicitly include emissions from international aviation, they may be upgraded to the category above (full coverage).
		The net zero target explicitly excludes emissions from international aviation and shipping. <i>OR</i> The inclusion of international aviation and shipping is not specified.	The option “not specified” applies to net zero targets that are included in a policy document or law. If the target is merely announced or under discussion, category D applies.
		No information provided.	This category only applies to targets that are announced or under discussion. As soon as governments include their net zero target in a policy document or law, we expect clarity on the inclusion of emissions from international aviation and shipping.

3.2.4 Reductions or removals outside of own borders

The most transparent and comprehensive net zero targets explicitly state that the country will reach net zero emissions within its own borders.

To stand a reasonable chance of limiting global warming to 1.5°C above pre-industrial levels, global emissions must reach net zero around mid-century and decrease to net negative thereafter (IPCC, 2018). For each country that does not achieve net zero emissions on its territory, another country needs to increase its efforts to realise net negative emissions.

As the global potential of carbon dioxide removal (CDR) is limited and uncertain, reliance on CDR needs to be kept to a minimum by reducing emissions as quickly and as comprehensively as possible. Countries that delay their domestic emissions reductions and rely on reductions or removals outside of their own borders to achieve their net zero target may ultimately hinder the achievement of net zero global emissions and the Paris Agreement's temperature limit of 1.5°C (IPCC, 2018). This applies to emission reduction credits (e.g. installing a windfarm) and emission removal credits (e.g. planting forests or technological carbon dioxide removal).

To achieve net zero GHG emissions in the second half of the century at the global level, some countries will need to achieve net zero earlier to balance out the residual emissions of countries that will take longer to fully decarbonise. It will be important to have clear and transparent information on when they will achieve net zero domestically to enable the assessment of whether their policies and measures are on track.

If a government plans to use international reductions and removals to achieve its net zero target, it will be difficult to assess whether these reductions and removals are consistent with a 1.5°C-compatible trajectory. In the case of land-based CDR deployed outside of a country's borders, there are additional governance challenges, for example relating to measuring and ensuring the permanence and sustainability of removals.






The use of international carbon credits to achieve net zero emissions may also have equity implications. Governments that have indicated they are considering the use of international credits to achieve their net zero target are amongst the wealthiest nations and carry a relatively large responsibility for historical emissions. Any international credits these countries purchase cannot be used to neutralise hard-to-abate emissions in developing countries.

Recognising that few countries are unable to balance residual emissions on their own territory, especially by the mid-century mark needed for CO₂ under Paris-compatible pathways, we rate this element as "intermediate" if countries intend to rely to a **limited** extent on removals outside of their own borders. These removals should only come from technological carbon dioxide removal options and should only be used after all technically feasible emissions have been abated by the target year. In addition, governments should transparently explain why they cannot reach net zero within their own borders.

If the country relies on international carbon credits that do not fulfil these criteria, we assess that as "poor".

Table 4 shows which criteria a net zero target must meet for the element “reductions or removals outside of own borders” to be evaluated as “advanced”, “intermediate” or “poor”. For governments that have announced a target, but not yet included it in a policy document or in law, we assess this element as “no information provided”.

Table 4: Criteria to evaluate reductions and removals outside own borders

		Categories	Further explanation
 <p>Target design element 4 Reductions & removals outside own borders</p>		The government explicitly states it will reach net zero emissions within its own borders.	
		The government states it will achieve deepest possible decarbonisation within its own borders and rely to a limited extent on technological removals outside of own borders. These removals should only come from technological options and should be used only for emissions that are technically infeasible to abate by the target year. In addition, countries should transparently explain why they cannot reach net zero within their own borders.	If land-locked countries explicitly include emissions from international aviation, they may be upgraded to the category above (full coverage).
		<p>The government intends to rely on removals outside own borders and these do not meet the criteria outlined above.</p> <p>OR</p> <p>The government intends to rely on reductions outside own borders.</p> <p>OR</p> <p>The government reserves the right to use reductions and removals outside own borders and which do not fulfil the criteria above.</p> <p>OR</p> <p>The government does not specify whether it will reach net zero within its own borders.</p>	The option “not specified” applies to net zero targets that are included in a policy document or law. If the target is merely announced or under discussion, category D applies.
		No information provided.	This category only applies to targets that are announced or under discussion. As soon as governments include their net zero target in a policy document or law, we expect clarity on the inclusion of international bunker emissions.

Grouping principle #2: Target architecture

3.2.5 Legal status

The most transparent and comprehensive net zero targets are enshrined in law.

Net zero targets vary in terms of their legal status: while some are enshrined in law (the United Kingdom) or included in a policy document (Costa Rica or South Korea); other countries have only announced a net zero target (Japan or China as of June 2021).

A target that is enshrined in law provides a good safeguard that governments will work towards their target and makes it more likely that intermediate targets in the near-to-medium term will be aligned with net zero. Policy documents may also provide certainty that the government will develop and implement the necessary measures to reach its target. However, net zero targets that are stated in a policy document, for instance a coalition agreement or a parliamentary decision, may be quite weak, especially if the parliamentary composition has changed since the net zero target was adopted.

We consider “long-term low greenhouse gas emission development strategies” (LTS) that governments submit to the UNFCCC as a policy document. In our country net zero assessments, we outline whether governments’ LTSs are in line with their net zero targets. Importantly, we do not evaluate the adequacy of governments’ LTSs.

Targets that are announced, for instance in a presidential speech, may carry significant political weight. However, as policy priorities - and presidents - change over time, continuous implementation of mitigation measures are best ensured if the target is formalised and enshrined in law or in an important policy document.

Table 5 shows which criteria a net zero target must meet for the element “legal status” to be evaluated as “advanced” or different degrees of “intermediate”. We do not necessarily consider the third category – “target announced by Head of Government or equivalent” – to be poor: as stated above, announced targets may carry significant weight. They may also reflect that a country is still in the first phase of developing a net zero target and implementation strategy. For these reasons, we evaluate this element as “intermediate”. For governments that have announced a target, but not yet included sufficient information in a policy document or in law for us to evaluate the target, we give an overall evaluation of “target information incomplete” (see Table 11).

Table 5: Criteria to evaluate the net zero target’s legal status

		Categories
 <p data-bbox="244 1839 453 1899">Target design element 5 Legal Status</p>		The target is enshrined in law.
		The target is included in proposed legislation or in a policy document.
		The target is announced by the Head of Government or equivalent.
		Target under discussion.

3.2.6 Separate reduction and removal targets

The most comprehensive and ambitious net zero targets include separate sub-targets for emission reductions and removals.





This provides transparency, makes it easier to track progress, highlights that the Paris Agreement temperature goal requires both rapid emission reductions and the removal of residual emissions, and recognises that the outcome of CDR activities is generally not equivalent to the outcome of emission reduction activities (McLaren *et al.*, 2019; NewClimate Institute and Data-Driven EnviroLab, 2020; Mace *et al.*, 2021).

Some governments recognise the importance of separate targets. For example, Finland plans to amend its Climate Change Act and set a target for “strengthening carbon sinks”, but without providing further details (Finnish Government, 2019; Ministry of Economic Affairs and Employment, 2020; Ministry of the Environment, 2021). The European Climate Law specifies that the European Commission will provide a projected indicative greenhouse gas budget for the period 2030-2050, with separate information on emissions and removals (Council of the European Union, 2021).

However, experience from the NDCs has shown that the contribution of land-based activities to mitigation targets is often ambiguous (Fyson and Jeffery, 2019). Governments should set a separate target for removals, outline what measures they will implement to this end, and specify how risks relating to for instance non-permanence and biodiversity degradation will be managed (see Section 3.3.1) (Rogelj *et al.*, 2021).

Table 6 shows which criteria a net zero target must meet for the element “separate reduction and removal targets” to be evaluated as “advanced”, “intermediate” or “poor”. For nations that have announced a target, but not yet included it in a policy document or in law, we assess this element as “no information provided”.

Table 6: Criteria to evaluate separate targets for emission reductions and removals

		Categories	Further explanation
 <p>Target design element 2 Emissions coverage</p>		Yes, separate targets for emission reductions and removals.	
		No separate targets for emission reductions and removals. <i>OR</i> Not specified.	The option “not specified” applies to net zero targets that are included in a policy document or law. If the target is merely announced or under discussion, category C applies.
		No information provided.	This category only applies to targets that are announced or under discussion.






3.2.7 Review process

The most comprehensive and ambitious net zero targets are complemented with regular, legally binding reviews of the target, and progress against it. While there are different ways governments can structure and time their review processes, these should always include regular tracking of progress against the target and the review of the target itself.

Technological breakthroughs and economic and societal development may enable governments to increase ambition in their net zero target, for instance by committing to an earlier target year. Further, developing scientific insights may raise the bar of what is necessary to limit global warming to 1.5°C above pre-industrial levels (Hans *et al.*, 2020). Legally binding review cycles at specific time intervals ensure that governments regularly review and ensure that their net zero targets reflect (1) highest possible ambition and (2) an adequate contribution to the global temperature goal.

Table 7 shows which criteria a net zero target must meet for the element “review process” to be evaluated as “advanced”, “intermediate” or “poor”. For governments that have announced a target, but not yet included it in a policy document or in law, we assess this element as “no information provided”.

Table 7: Criteria to evaluate the review process

		Categories	Further explanation
 <p>Target design element 7 Review process</p>		Yes, legally binding of target and progress against it at regular intervals.	
		Yes, but non-legally binding. <i>OR</i> In the process of establishing a review cycle. <i>OR</i> Review process is vague and/or does not include the tracking of progress.	
		No legally binding review cycle exists. <i>OR</i> There is no information on whether such a review cycle exists.	The option “not specified” applies to net zero targets that are included in a policy document or law. If the target is merely announced or under discussion, category D applies.
		No information provided.	This category only applies to targets that are announced or under discussion.

3.3 Grouping principle #3: Transparency

3.3.1 Carbon dioxide removal

The most comprehensive and ambitious net zero targets are accompanied by transparent assumptions on the role of the LULUCF sector and separate assumptions on the role of other carbon dioxide removal (CDR) options in achieving net zero.

All mitigation pathways that are consistent with the Paris Agreement's long-term temperature goal rely on CDR to balance residual emissions and achieve net zero. These include nature-based solutions, such as increasing forest cover, and technological options, including Direct Air Carbon Capture and Storage (DACCS).

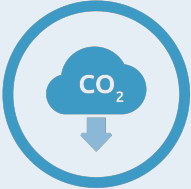




In the longer term, carbon dioxide removals are necessary to achieve net negative emissions (IPCC, 2018). However, technological CDR options are not yet operational at scale and all CDR options have their limits in terms of scale, feasibility, sustainability and permanence (Fuss *et al.*, 2018; IPCC, 2018; Nemet *et al.*, 2018). Land-based and coastal CDR options also come with their own specific challenges, including high measurement uncertainties, risks of indirect land-use change, land tenure issues, and high risks of carbon storage reversal under increasing climate change impacts (IPCC, 2019).

While carbon dioxide removals and storage will play a crucial role in limiting global warming to 1.5°C, and countries should scale up investments in these technologies, removals cannot replace deep emission reductions and should only be used to balance emissions that cannot be rapidly abated and to realise net negative emissions later on. A large theoretical removal potential should not distract from the need for deep decarbonisation.

Governments need to provide transparent assumptions on the role of the LULUCF sector and other carbon dioxide removal options in achieving net zero (Mace *et al.*, 2021). Such assumptions should be accompanied by the transparent planning, tracking and monitoring of carbon storage requirements (Smith, 2021), ideally by type of storage such as biological and geological. This allows observers to understand the implications of net zero targets on global emission levels. It would also incentivise governments to critically consider the feasibility of CDR.

Table 8 shows which criteria a net zero target must meet for the element "carbon dioxide removals" to be evaluated as "advanced", "intermediate" or "poor". For governments that have announced a target, but not yet included it in a policy document or in law, we assess this element as "no information provided".

Table 8: Criteria to evaluate transparency in carbon dioxide removal assumptions.

		Categories	Further explanation
 <p>Target design element 8 Carbon dioxide removal</p>		Transparent assumptions for both LULUCF (negative) emissions and other removals and storage.	
		Transparent assumptions for LULUCF only, but not for other types of removals and storage only. <i>OR</i> Transparent assumptions for other types of removals and storage only, but not for LULUCF.	If land-locked countries explicitly include emissions from international aviation, they may be upgraded to the category above (full coverage).
		No assumptions for LULUCF and other carbon dioxide removals / storage. <i>OR</i> Non-transparent assumptions for LULUCF and other carbon dioxide removals / storage.	The option “no transparent assumptions” applies to net zero targets that are included in a policy document or law. If the target is merely announced or under discussion, category D applies.
		No information provided.	This category only applies to targets that are announced or under discussion. As soon as governments include their net zero target in a policy document or law, we expect clarity on LULUCF and CDR assumptions.

3.3.2 Comprehensive planning






The most comprehensive and ambitious net zero targets are complemented with a comprehensive planning process and actionable short and medium-term measures to reach net zero in the long term. This provides a net zero target with credibility and help to ensure timely implementation of deep decarbonisation.

Immediate action is crucial in limiting global warming. Specifically, governments need to align short-term policies with the overall net zero goal and set sector-specific interim targets. These should be based on detailed analysis of emission pathways that take into account the country’s specific circumstances, for instance economic sectors and geography (Levin *et al.*, 2020). Regular review of interim measures is necessary to account for new scientific insights and correct for measures that do not bring expected results (Sasse *et al.*, 2020).

One option to make achievement of the net zero target more likely is to establish short and medium-term carbon budgets that set an ambitious restriction on total emissions over time. These budgets and related implementation measures can be regularly reviewed and revised accordingly.

Table 9 shows which criteria a net zero target must meet for the element “comprehensive planning” to be evaluated as “advanced”, “intermediate” or “poor”. For governments that have announced a target, but not yet included it in a policy document or in law, we assess this element as “no information provided”.

Table 9: Criteria to evaluate comprehensive planning

		Categories	Further explanation
 <p>Target design element 9 Comprehensive planning</p>		Underlying (governmental or government-endorsed) analysis that identifies a pathway to and key measures for reaching net zero. The analysis includes sector-specific details.	
		Some information on the anticipated pathway or measures for achieving net zero is available, but with limited detail.	
		There is no information or underlying analysis available on the anticipated pathway or measures to achieve net zero emissions.	This option applies to net zero targets that are included in a policy document or law. If the target is merely announced or under discussion, category D applies.
		No information provided.	This category only applies to targets that are announced or under discussion. As soon as governments include their net zero target in a policy document or law, we expect clarity on LULUCF and CDR assumptions.

3.3.3 Clarity on fairness of target

The most comprehensive and ambitious net zero targets are accompanied by an explanation of why that target is a fair contribution to the global goal of limiting warming to 1.5°C above pre-industrial levels.

Parties to the Paris Agreement aim to “achieve a balance between anthropogenic emissions [...] and removals [...] in the second half of this century, **on the basis of equity** [...]” (UNFCCC, 2015, Article 4.1, emphasis added).






What is considered an “equitable” or “fair contribution” to achieving global net zero emissions depends on normative assumptions (Clarke *et al.*, 2014; Höhne, den Elzen and Escalante, 2014; Robiou du Pont *et al.*, 2016; Fyson, C.L., Baur, S., Gidden, M., & Schleussner, 2020). Should emerging economies achieve net zero in the same year as industrialised countries? Should countries that have a large greenhouse gas reduction or removal potential achieve net zero earlier than those with limited potential? Should countries with higher per capita emissions or a greater ability to pay decarbonise their economies and/or scale up CDR at a faster pace than others?

As explained in Section 3.2.1 on target year, the CAT does not yet have a methodology to determine what is a fair contribution to the global goal by mid-century. However, we consider it important that governments explain why their net zero target is fair and adequate (Rogelj *et al.*, 2021). We do not currently assess whether governments’ claims regarding fairness are well justified – this is an area for future development – but for now we look at whether the government itself or a governmental advisory body has at least clearly explained why they consider the target to be fair contribution.

Developed countries should also explain how to make up for the difference between what would be a fair contribution and what would be a realistic contribution. For instance, the CAT's fair share range rating system shows that it would be fair for the European Union to commit to net zero roughly around 2030, but to achieve this domestically would very likely be infeasible. We therefore ask governments to explain how they will fill any gap between what a fair target would be and what is a realistic but ambitious target. For example, governments could commit to supporting other countries in decarbonising their economies, without claiming credits for those reductions toward their targets.

Table 10 shows which criteria a net zero target must meet for the element "clarity on fairness of target" to be evaluated as "advanced", "intermediate" or "poor". For governments that have announced a target, but not yet included it in a policy document or in law, we assess this element as "no information provided".

Table 10: Criteria to evaluate clarity on fairness of target.

		Categories	Further explanation
 <p>Target design element 10 Clarity on fairness of target</p>		The government clearly explains why its net zero target is a fair contribution to the global goal of limiting warming to 1.5°C above pre-industrial levels. For developed countries, this statement needs to include an explanation of how the government addresses the gap between its net zero target and what would be a fair target.	
		A statement that explains why the target reflects the country's fair share is included in an advisory document, but not in a governmental document.	
		There is no reference to equity or fairness in either a government or an advisory document, or only vague statement with missing explanation.	
		No information provided.	This category only applies to targets that are announced or under discussion. As soon as governments include their net zero target in a policy document or law, we expect clarity on LULUCF and CDR assumptions.

4 Headline evaluation

The **headline evaluation** aims to categorise existing net zero targets into broad categories to distinguish their *level of comprehensiveness* and, where possible, *level of ambition*. The headline evaluation explicitly does not assess whether a net zero target is aligned with the Paris Agreement’s 1.5°C temperature limit. Table 11 introduces the five headline rating categories.

Table 11: Introduction of headline rating categories

Categories	Definitions
1.5°C Paris Agreement compatible	The CAT currently does not assess the compatibility of net zero targets with the temperature limit.
Acceptable	<p>The ‘<i>acceptable</i>’ rating category includes net zero targets that cover key aspects of the CAT’s net zero typology and meet a <i>good practice</i> standard for most of them. A target is rated <i>acceptable</i> if:</p> <ul style="list-style-type: none"> at least five elements are rated ‘advanced’, including <i>emissions coverage</i> is at least ‘intermediate’, and expert judgement by CAT country experts confirms this categorisation (including <i>target year</i> in the country context).
Average	<p>An ‘<i>average</i>’ rating category includes net zero targets that cover key aspects of the CAT’s net zero typology but fails to meet a best practice standard for some of them. A target is rated ‘average’ if:</p> <ul style="list-style-type: none"> at least five elements are rated ‘advanced’ or ‘intermediate’. These should include at least two of the following: <i>emissions coverage, reductions and removals inside own borders, carbon dioxide removals</i>, or at least one of <i>emissions coverage, reductions and removals inside own borders, carbon dioxide removals</i> is ‘advanced’ or ‘intermediate’ and legal status is ‘advanced’ and expert judgement by CAT country experts confirms this categorisation.
Poor	<p>The ‘<i>poor</i>’ rating category includes net zero targets that do not cover key aspects of the CAT’s net zero typology and/or clearly fails to meet a <i>best practice</i> standard for most of them. Target is rated ‘poor’ if:</p> <ul style="list-style-type: none"> fewer than five elements rated ‘advanced’ or ‘intermediate’, or fewer than two of <i>emissions coverage, reductions and removals inside own borders</i>, and <i>carbon dioxide removals</i> are ‘advanced’ or ‘intermediate’, and expert judgement by CAT country experts confirms this categorisation.
Target information incomplete	<p>The <i>no rating possible</i> rating category includes net zero targets for which an assessment remains impossible given the preliminary status of net zero announcement (e.g., a first announcement by the head of state).</p> <p>These include all targets that are “announced by Head of State or equivalent” or “under discussion” (see the <i>Status</i> element), and specific other cases (e.g., net zero target only included as vague visionary statement in a policy document).</p> <p>The <i>CAT Net Zero Checkbox</i> and headline assessment text would already provide some details on the target based on currently available information (for example, for announcement itself or other insights available to the CAT).</p>
No target	The country has no net zero target communicated or submitted.

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Authors



NewClimate Institute

Silke Mooldijk
Frederic Hans
Louise Jeffery
Niklas Höhne



Climate Analytics

Claire Fyson
Claire Stockwell
Bill Hare

Editing and Design

Cindy Baxter
Dilara Arslan
Matt Beer

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 climate science and policy institute based in Berlin, Germany with offices in New York, USA, Lomé, Togo and Perth, Australia, which brings together interdisciplinary expertise in the scientific and policy aspects of climate change. Climate Analytics aims to synthesise and advance scientific knowledge in the area of climate, and by linking scientific and policy analysis provide state-of-the-art solutions to global and national climate change policy challenges.

Contact: Dr. h.c. Bill Hare, +61 468 372 179

climateanalytics.org



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Contact: Prof. Dr. Niklas Höhne, +49 173 715 2279

newclimate.org

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