



SCIENCE
BASED
TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

FOUNDATIONS FOR SCIENCE-BASED NET-ZERO TARGET SETTING IN THE CORPORATE SECTOR

EXECUTIVE SUMMARY

SEPTEMBER 2020

DEVELOPED BY



EXECUTIVE SUMMARY

HIGHLIGHTS

The scientific community has clearly stated the need to reach net-zero global CO₂ emissions by mid-century in order to limit global warming to 1.5°C and to reduce the destructive impacts of climate change on human society and nature.

As public awareness of the need to reach net-zero emissions at the global level has grown, the number of companies committing to reach net-zero emissions has increased rapidly in recent years.

The growing interest in net-zero targets represents an unparalleled opportunity to drive climate ambition from companies. However, it also creates the pressing need for a common understanding on what net-zero means for companies and how they can get there, so that the growing momentum behind net-zero targets translates into action that is consistent with achieving a net-zero world by no later than 2050.

For the past five years, the SBTi has pioneered translating climate science into a framework that allows companies to set ambitious climate targets, and that allows for independent assessment of these targets based on a set of robust criteria and transparent validation protocols. As of August 2020, close to 1,000 companies are setting science-based GHG emission reduction targets through the Science Based Targets initiative.

Acknowledging the growth in net-zero target setting, the SBTi is developing a science-based framework for the formulation and assessment of net-zero targets in the corporate sector.

This paper provides the initial conceptual foundations for science-based net-zero target setting. These foundations will be translated into specific criteria and guidance following a transparent and balanced multi-stakeholder process.

CONTEXT

In 2018, the Intergovernmental Panel on Climate Change (IPCC) confirmed that in order to limit global warming to 1.5°C, the world needs to halve CO₂ emissions by around 2030 and reach net-zero CO₂ emissions by mid-century. In addition, the IPCC stresses the need for deep reductions in non-CO₂ emissions across the economy to achieve this limit.

The IPCC defines net-zero as that point when “anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period”. The Paris Agreement sets out the need to achieve this balance by the second half of this century.

The concept of net-zero has risen in prominence ever since, as countries, cities, companies and others are increasingly committing to reaching this ambitious goal. As of July 2020, a quarter of global CO₂ emissions and more than half of the global economy were covered by net-zero commitments, according to the Race to Zero campaign led by the High-Level Climate Action Champions in the run up to COP 26.

Corporate net-zero targets are being approached inconsistently, making it difficult to assess these targets’ contribution to the global net-zero goal. A close examination shows that corporate net-zero targets to date differ across three important dimensions: (1) the range of emission sources and activities included; (2) the timeline, and most importantly; (3) how companies are planning to achieve their target. The three most common tactics in corporate net-zero strategies are: eliminating sources of emissions within the value chain of the company (i.e. a company’s scope 1, 2, and 3 emissions); removing CO₂ from the atmosphere; and compensating for value chain emissions by helping to reduce emissions outside of the value chain (e.g. through the provision of finance). Without a common understanding, today’s varied net-zero target setting landscape makes it difficult for stakeholders to compare goals and to assess consistency with the action needed to meet our global climate and sustainability goals.

ABOUT THIS PAPER

This paper provides a conceptual foundation for setting and assessing corporate net-zero targets based on robust climate science. The paper explores the scientific literature that informs how the global economy can reach a state of net-zero emissions within the biophysical limits of the planet and in line with societal climate and sustainability goals.

This paper intends to provide clarity on key concepts, rather than a definitive set of criteria or detailed guidance. Some of the key questions explored in this paper include: What does it mean to reach net-zero emissions at the global level? What can be inferred from mitigation scenarios that are consistent with limiting warming to 1.5°C? What does it mean to reach net-zero emissions at the corporate level? What is the role of decarbonisation and offsetting in science-based corporate net-zero strategies?

Translating planetary climate science into actionable criteria at the level of an individual company requires some normative decisions that do not directly emerge from the science. Recognising this, the SBTi will build on this paper with a transparent and inclusive multi-stakeholder process to develop actionable criteria, detailed guidance and technical resources to support companies with the formulation and implementation of science-based net-zero targets.

The recommendations shared in this paper should be implemented in consideration of broader social and environmental goals, in addition to climate mitigation. While the analyses in this paper have been designed primarily to ensure that corporate net-zero targets are consistent with climate science, we acknowledge that this is only one of the dimensions that need to be considered by corporates when developing their climate and sustainability strategies.

KEY FINDINGS

What is the underlying science behind science-based net-zero targets?

Researchers have explored a wide range of scenarios that limit warming to 1.5°C. Generally speaking, the lower the level of near-term emissions abatement in a pathway, the higher the need to remove carbon from the atmosphere at a later time to stabilise temperatures at a certain level. While some level of atmospheric carbon removal is necessary and can be achieved in synergy with other social and environmental goals, the deployment of negative emission technologies at a large scale is subject to a number of uncertainties and constraints, including potential adverse effects on the environment and trade-offs with other Sustainable Development Goals. Acknowledging these risks and trade-offs, the analysis presented in this paper is based on mitigation pathways that limit warming to 1.5°C with limited reliance on the deployment of carbon dioxide removals at scale.

These pathways achieve rapid and profound reductions in CO₂ and non-CO₂ emissions in the first half of the century while scaling up measures to remove carbon from the atmosphere to neutralise the impact of emission sources that remain unavoidable.

What does it mean to reach net-zero emissions at the corporate level?

To reach a state of net-zero emissions for companies consistent with achieving net-zero emissions at the global level in line with societal climate and sustainability goals implies two conditions:

1. To achieve a scale of value-chain emission reductions consistent with the depth of abatement achieved in pathways that limit warming to 1.5°C with no or limited overshoot and;
2. To neutralise the impact of any source of residual emissions that remains unfeasible to be eliminated by permanently removing an equivalent amount of atmospheric carbon dioxide.

Companies may reach a balance between emissions and removals before they reach the depth of decarbonisation required to limit warming to 1.5°C. While this represents a *transient* state of net-zero emissions, it is expected that companies will continue their decarbonisation journey until reaching a level of abatement that is consistent with 1.5°C pathways.

What is the level of abatement expected in science-based net-zero targets?

Mitigation pathways that limit warming to 1.5°C without relying on unsustainable levels of carbon sequestration require a profound and far-reaching abatement of GHG emissions across the economy. Scenarios with a 66% probability of limiting warming to 1.5°C reach a level of abatement of about 90% of all GHG emissions by mid-century. The level of emissions abatement for different activities and emission sources in these scenarios depends on the technical and economic feasibility to abate them. While some emission sources are fully eliminated before mid-century (e.g. deforestation, power generation), other activities are decarbonised at a slower pace (e.g. industrial process CO₂ emissions) or have some remaining, unavoidable emissions (e.g. some non-CO₂ emissions from agriculture).

Companies setting science-based net-zero targets are expected to attain a level of reduction in value-chain emissions consistent with the depth of abatement achieved in scenarios that limit warming to 1.5°C with no or limited overshoot. How this is translated into specific criteria to define the scope of net-zero targets and expectations for different sources of emissions in the value-chain, will be defined in the next phase of this process.

How are residual emissions defined?

According to scenarios that limit warming to 1.5°C with no or limited overshoot, most of the emissions that our economy generates today will have to be eliminated by mid-century. However, there are some residual emissions that remain unabated by the time net zero is reached. Some of these emissions continue to be reduced throughout the second half of the century, after net-zero is reached, while others remain unabated throughout the 21st century due to technical or economic constraints. Mitigation pathways can help determine the level of residual emissions for different activities and sectors of the economy at different points in time.

What is the role of offsetting in science-based net-zero targets?

This paper differentiates between actions that companies take to help society avoid or reduce emissions outside of their value chain (compensation measures) and measures that companies take to remove carbon from the atmosphere within or beyond the value chain (neutralisation measures). Both, neutralisation and compensation measures are being used by companies to offset emissions. Generally speaking, offsetting can play two roles in science-based net-zero strategies:

1. **In the transition to net-zero:** Companies may opt to compensate or to neutralise emissions that are still being released into the atmosphere while they transition towards a state of net-zero emissions;
2. **At net-zero:** Companies with residual emissions within their value chain are expected to neutralise those emissions with an equivalent amount of carbon dioxide removals;

Both compensation and neutralisation measures by companies can play a critical role in accelerating the transition to net-zero emissions at the global level. However, they do not replace the need to reduce value-chain emissions in line with science.

What is the role of nature-based climate solutions in science-based net-zero strategies?

The accumulation of carbon and other GHGs in the atmosphere is driven not only by energy, industrial and agricultural processes, but also by the loss of carbon contained in soils and in terrestrial ecosystems. The IPCC has determined that up to 13% of anthropogenic emissions are due to deforestation and land-use change. From a climate mitigation perspective, the loss of nature is not only causing further accumulation of carbon in the atmosphere, but also decreasing the ability of our natural systems to reduce atmospheric carbon concentrations. With this dual role, nature can and must play a critical role in climate mitigation strategies. It is an undeniable priority that ambitious action must be taken to eliminate deforestation and to halt nature loss. In addition, protecting, restoring and enhancing ecosystems can improve our ability to withdraw carbon from the atmosphere. Mitigation pathways that limit warming to 1.5°C with no or limited overshoot reduce net carbon emissions from land-use

change to zero by 2030. After that, the land system becomes a net carbon sink.

In line with this, nature-based climate solutions can play the following key roles in corporate science-based net-zero strategies:

1. **As part of a company's emissions abatement plan:** Companies with land-use intensive business models (e.g. due to consumption or production of agricultural commodities) must aim to eliminate deforestation from their supply chains by no later than 2030.
2. **As a compensation measure:** Companies in all sectors can catalyse action that preserves or enhances existing carbon stocks as part of an effort to compensate emissions as they transition toward a state of net zero emissions. It is strongly recommended that companies prioritise interventions with strong co-benefits and that contribute to achieving other social and environmental goals.
3. **As a neutralisation measure:** Companies with emissions that are not feasible for society to abate can resort to nature-based carbon sequestration measures to counterbalance the impact of unabated emissions. Interventions that contribute to restoring natural ecosystems are preferred, and companies should avoid interventions with the potential to create additional land-use pressure.

In all cases, land-based mitigation strategies should follow a robust mitigation hierarchy and should adhere to strict social and environmental safeguards. As stated above, nature-based climate solutions used as compensation and neutralisation measures do not replace the need to reduce value-chain emissions in line with science.

What is the difference between net zero targets and GHG emission reduction targets, if both are science-based?

Science-based GHG emission reduction targets ensure that companies reduce their emissions at a rate that is consistent with the level of decarbonisation required to limit warming to 1.5°C or well-below 2°C.

Science-based net-zero targets go beyond this. Building on science-based GHG emission reduction targets, they ensure that companies also take responsibility for emissions that have yet to be reduced, or that remain unfeasible to be eliminated.



Initial recommendations for corporate net-zero target setting

On the basis of the analysis conducted in this paper, the following initial recommendations are provided for companies seeking to set and implement robust net-zero targets. These recommendations will be followed by development of more detailed guidance and criteria that the SBTi will develop using an inclusive and transparent multi-stakeholder process:

- 1. Boundary:** A company's net-zero target should cover all material sources of GHG emissions within its value chain.
- 2. Transparency:** Companies should be transparent about the sources of emissions included and excluded from the target boundary, the timeframe for achieving net-zero emissions, the amount of abatement and neutralization planned in reaching net-zero emissions, and any interim targets or milestones.
- 3. Abatement:** Companies must aim to eliminate sources of emissions within its value-chain at a pace and scale consistent with mitigation pathways that limit warming to 1.5°C with no or limited overshoot. During a company's transition to net zero, compensation and neutralization measures may supplement, but not substitute, reducing value chain emissions in line with science. At the time that net zero is reached, emissions that are not feasible for society to abate may be neutralized with equivalent measure of CO₂ removals.
- 4. Timeframe:** Companies should reach net-zero GHG emissions by no later than 2050. While earlier target years are encouraged, a more ambitious timeframe should not come at the expense of the level of abatement in the target.
- 5. Accountability:** Long-term net-zero targets should be supported by interim science-based emission reduction targets to drive action within timeframes that are aligned with corporate planning and investment cycles and to ensure emission reductions that are consistent with Paris-aligned mitigation pathways.
- 6. Neutralization:** Reaching net-zero emissions requires neutralizing a company's residual GHG emissions with an equivalent amount of carbon removals. An effective neutralization strategy involves removing carbon from the atmosphere and storing it for a long-enough period to fully neutralize the impact of any GHG that continues to be released into the atmosphere.
- 7. Compensation:** While reaching a balance between emissions and removals is the end goal of a net-zero journey, companies should consider undertaking efforts to compensate unabated emissions in the transition to net-zero as a way to contribute to the global transition to net-zero.
- 8. Mitigation hierarchy:** Companies should follow a mitigation hierarchy that prioritizes eliminating sources of emissions within the value chain of the company over compensation or neutralization measures. Land-based climate strategies should prioritize interventions that help preserve and enhance existing terrestrial carbon stocks, within and beyond the value chain of the company.
- 9. Environmental and social safeguards:** Mitigation strategies should adhere to robust social and environmental principles, ensuring amongst others, protection and/or restoration of naturally occurring ecosystems, robust social safeguards, and protection of biodiversity, amongst others.
- 10. Robustness:** Compensation and neutralization measures should: (a) ensure additionality, (b) have measures to assure permanence of the mitigation outcomes, (c) address leakage and (d) avoid double-counting.

Areas for further development

Following publication of this paper, the SBTi intends to develop the following outputs following a robust and transparent process:

- **Criteria** for the formulation of science-based net-zero targets in the corporate sector;
- **A validation protocol** to assess net-zero targets against the set of criteria to be developed as part of this process;
- **Detailed guidance** for science-based net-zero target setting in the corporate sector, including guidance for **credible claims**.

To support the next phase of this process, further research and consultation is planned to address some of the key technical questions, including:

- **Understanding suitable residual emissions for different sectors of the economy:** At the sector or activity level, how much emissions abatement is needed, and which emissions sources are infeasible to abate in scenarios that limit warming to 1.5°C?
- **Interim targets:** What are credible transition pathways that are consistent with limiting warming to 1.5°C, and how should the use of transition pathways differ by emissions scope for each company?
- **Neutralization mechanisms:** What factors need to be considered to effectively counterbalance the impact of a source of emissions that remains unabated?
- **Compensation mechanisms:** What are effective mechanisms through which companies can accelerate the transition to net-zero beyond their value chain? What factors should be considered in deploying compensation tactics?
- **Claims:** What are the conditions that a company needs to meet to claim that they have reached net-zero emissions?

This report was developed by CDP on behalf of the Science Based Targets initiative (SBTi).

The Science Based Targets initiative mobilizes companies to set science-based targets and boost their competitive advantage in the transition to the low-carbon economy. It is a collaboration between CDP, the United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF), and one of the We Mean Business Coalition commitments. The initiative defines and promotes best practice in science-based target setting, offers resources and guidance to reduce barriers to adoption, and independently assesses and approves companies' targets.

Primary authors:

Alberto Carrillo Pineda, CDP
Andres Chang, CDP
Pedro Faria, CDP

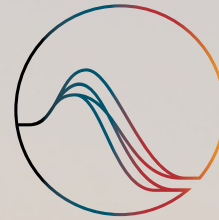
Editorial contributions and review from:

Alexander Farsan (WWF), Brad Schallert (WWF), Brett Cotler (CDP), Charlotte Bloomestijn (B Team/Shell), Christa Anderson (WWF), Christopher Weber (WWF), Cynthia Cummis (WRI), Emily Hickson (B Team), Frances Seymour (WRI), Heidi Huusko (UN Global Compact), Jennifer Austin (COP 26), Jenny Gleed (CDP), John Sottong (WRI), Kelly Levin (WRI), Kevin Kennedy (WRI), Lisa Grice (Anthesis), Martha Stevenson (WWF), Matt Ramlow (WRI), Nate Aden (WRI), Nicolette Bartlett (CDP), Paola Delgado (WWF), Ramiro Fernández (COP 25), Rodrigo Cassola (CDP), Sarah Savage (CDP), Stephan Singer (CAN), Tim Juliani (WWF), Tom Coleman (CDP), Tom Dowdall (CDP), Yelena Akopian (WRI)

We would also like to thank everyone who participated in the consultation survey to help strengthen this paper.

Disclaimer: This research paper explores a selection of technical concepts related to corporate climate action and their relevance for corporate net-zero targets. The paper is not intended to provide a fully formalized framework for corporate net-zero targets, nor to comprehensively address all relevant dimensions of corporate climate targets and strategies. The Science Based Targets initiative will build on the conceptual foundations established in this paper to develop detailed criteria and guidelines to formulate, assess, and implement science-based corporate net-zero targets, following a transparent and inclusive process.

Read the full paper at:
sciencebasedtargets.org/net-zero



SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION



sciencebasedtargets.org



[linkedin.com/company/
science-based-targets/](https://www.linkedin.com/company/science-based-targets/)



[@ScienceTargets](https://twitter.com/ScienceTargets)

PARTNER ORGANIZATIONS



United Nations
Global Compact



WORLD
RESOURCES
INSTITUTE



**WE MEAN
BUSINESS**

IN COLLABORATION WITH: