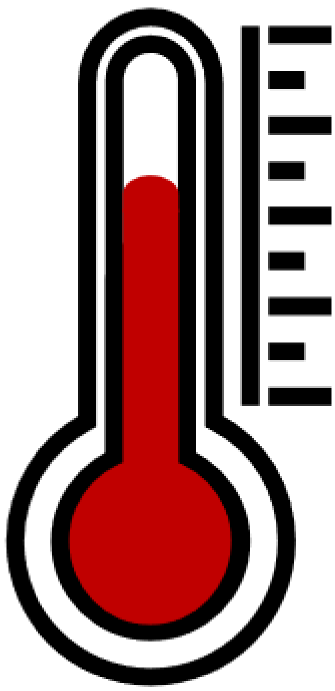

CDP–WWF Temperature Scoring Methodology

A temperature scoring method for targets, corporates, and portfolios

Open-source methodology to translate the ambition of corporate greenhouse gas (GHG) emission reductions into temperature scores for corporates and investment portfolios

CDP Worldwide and WWF International
Version 1.5.
May, 2024

Partnering to enable climate action for corporates and financial institutions

ABSTRACT

This methodology is an open-source method to enable the translation of corporate greenhouse gas (GHG) emission reduction targets into temperature scores at a scope, company, and portfolio level. The methodology allows generating temperature scores for individual scope level targets (e.g., Scope 1, Scope 2, Scope 3). It also provides a protocol to aggregate scope level scores into a common intuitive metric reflecting the ambition of the company's GHG reduction targets. Finally, the method defines a series of weighting options that enable Financial Institutions (FI) and others to aggregate the temperature scores of companies in a portfolio to a portfolio temperature score. This is an update (version 1.5) of the initial publication of the methodology, which was published in 2020.

The methodology provides a public, transparent, and science-based protocol to assess the ambition of corporates and portfolios based on the ambition of GHG reduction targets. It enables users to assess the ambition of public GHG emission reduction targets and can help users compare the relative ambition of one company's target versus another. Likewise, the method allows comparing different portfolio ambitions and FIs to calculate their own portfolio temperature score, which is a key starting point for aligning the portfolio with long-term temperature goals such as 1.5C.

CDP Worldwide and WWF International

About CDP

CDP is a global non-profit that runs the world's environmental disclosure system for companies, cities, states, and regions. Founded in 2000 and working with more than 740 financial institutions with over US$136 trillion in assets, CDP pioneered using capital markets and corporate procurement to motivate companies to disclose their environmental impacts, and to reduce greenhouse gas emissions, safeguard water resources and protect forests. Over 24,000 organizations around the world disclosed data through CDP in 2023, with more than 23,000 companies – including listed companies worth two thirds of global market capitalisation – and over 1,100 cities, states, and regions. Fully TCFD aligned, CDP holds the largest environmental database in the world, and CDP scores are widely used to drive investment and procurement decisions towards a zero carbon, sustainable, and resilient economy. CDP is a founding member of the Science Based Targets initiative, We Mean Business Coalition, The Investor Agenda, and the Net Zero Asset Managers initiative.

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About WWF

WWF is an independent conservation organization, with over 30 million followers and a global network active in nearly 100 countries. Our mission is to stop the degradation of the planet's natural environment and to build a future in which people live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption. Find out more at panda.org.

KEY TERMINOLOGY

Carbon dioxide removal, or "CDR": a process in which carbon dioxide (CO_2) is removed from the atmosphere by deliberate anthropogenic activities and durably stored in geological, terrestrial, or ocean reservoirs, or in products[1].

Compound Annual Reduction, or "CAR": the annualized emissions reduction rate over a specific period of time, as implied by climate scenarios and corporate GHG emissions reduction targets.

Default temperature score: default °C-value applied to companies in the absence of valid climate target data (here: 3.4°C, derived from Climate Action Tracker's "policies & action emission scenario").

Warming function: a linear regression model used to project the impact of GHG emissions reduction rates on global warming by the end of the century.

Global climate models, simulations, and scenarios: Climate models are a mathematical description of the earth's climate system. Global coupled climate models include physical principles of the atmosphere, ocean, land surface, and sea ice. The results from running global climate models are referred to as model simulations. The scenarios are primarily derived from Integrated Assessment Models (IAMs) and serve as boundary conditions for global climate models. They describe possible future pathways, covering a wide range of assumptions regarding, e.g., GHG emission trajectories, socio-economic trends, and technological developments. For simplicity, we refer to the model simulations (based on different scenarios) as "scenarios".

Temperature scores, or "TS": a forward-looking metric that expresses the GHG emissions reduction targets of a company, portfolio, or fund with the associated annual global mean surface temperature rise.

Total GHG emissions: refer to the total of a company's emission scope 1, scope 2, and scope 3 emissions. Scope 1 refers to direct emissions from sources that are owned or controlled by the company, scope 2 refers to indirect emissions from purchased energy, and scope 3 refers to indirect emissions (not included in scope 2) that occur upstream and downstream of a company's value chain. In the regression models, the GHG considered depend on the variable used for each respective scope (see Chapter 4 for more details).

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[1] See IPCC_AR6_WGIII_Factsheet_CDR.pdf for further information.

Contents

1. Fundamentals

Given the diversity in climate target scopes, timeframes, and metrics used by companies across various sectors, understanding, and comparing the adequacy of companies' decarbonization goals can be challenging. Initially published in October 2020, this methodology document was designed to serve as a protocol for assessing and comparing the ambition of companies' GHG emissions reduction targets. The key audience of this methodology are Financial Institutions (FIs) and large corporates wishing to assess, steer, and set targets on their scope 3 emissions as well as data providers offering ITR metrics. Other users of this methodology include academia and civil society, as well as supervisory authorities and regulators.

1.1. Understanding temperature scores

The first version of this method introduced a scoring methodology which translates diverse GHG reduction targets into an intuitive metric expressed in projected warming by 2100. This metric, sometimes referred to as an Implied Temperature Rise (ITR), can be used to compare the ambition of different companies' decarbonization goals as expressed in their public GHG emissions reduction targets. Henceforth, this output metric will be referred to in this document as a temperature score (TS).

These scores should not be interpreted like IPCC results (i.e., global climate projections) nor does the metric predict a certain temperature outcome. Temperature scores instead allow a relative comparison of climate ambition with respect to the temperature goals of the Paris Agreement. The scores should be interpreted as follows: This company's GHG reduction target implies an annual reduction rate that is consistent with an ambition heading towards X°C – under the assumption that all companies behave the same.

Users of TS can use this metric to engage with companies to set targets (or improve existing ones), compare the ambition of corporate GHG emissions targets, measure the alignment of their own scope 3, and set targets accordingly (e.g., at the portfolio level for FIs, or at the supply chain level for large companies).

1.2. What a temperature score does not cover

Temperature scores are not intended to serve as a comprehensive metric summarising a company's climate transition performance or overall "green credentials". Temperature scores do not provide insights into a company's operational or financial performance relative to these ambitions, the current trajectory of the company's historical GHG emissions, or the existence of a credible climate transition plan to achieve these goals.

The primary purpose of this methodology's TS is to assess a company's climate target ambition through a broad benchmark of climate scenarios. It is therefore suggested that temperature scores are used as a comparative tool for assessing the climate ambition across multiple companies (e.g., within a supply chain or financial portfolio) or, on an aggregated level, of portfolios and supply chains and that other complementary metrics are consulted to obtain a complete picture of a company's climate profile. Also, TS should not be used as a predictive tool for estimating a precise degree of global warming.

1.3. Warming Function versus Single Scenario

To calculate a temperature score, this methodology benchmarks companies' committed GHG reduction ambition against a statistical regression model based on all vetted modelled scenarios of the IPCC's Sixth Assessment Report (AR6) (see Chapter 4). This approach is referred to as the "Warming Function" and establishes a linear statistical relationship between the rates of GHG emissions reduction and the projected temperature outcomes these scenarios imply by the end of the century.

The Warming Function differs from a Single Scenario approach. A Single Scenario approach relies on one single scenario and assumes that the future will unfold as per the selected single scenario's underlying assumptions. Because the Warming Function approach relies on multiple scenarios, it reduces the scenario selection bias inherent to the Single Scenario approach. It also provides greater comparability between implementations of the CDP–WWF method from different data providers and users. This is as comparability between temperature scores using single scenario approaches rely on the use of the same scenario for TC computation. However, the robustness the CDP–WWF warming function provides is traded against less transparency on the effects of the different assumptions underlying the input models and scenarios of a Warming Function on the temperature scores. Another difference is that the Single Scenario approach, by using only one scenario, can more easily allow for more granular, sector-specific analysis compared to this methodology's Warming Function. Further research and development are needed to allow the use of more sector-specific warming functions, in addition to the sectors currently covered with their own warming functions: steel, aluminium, cement, and power generation.

CDP and WWF have considered the different approaches and concluded that the robustness of the warming function is preferable, despite its trade-offs, as it provides a more comprehensive, comparable, and unbiased view of potential temperature outcomes.

Please refer to Annex 1: Warming Function versus Single Scenario for further details about the rationale supporting that conclusion.

2. Key changes to the previous version

This version 1.5 of the CDP–WWF Temperature Scoring methodology (formerly known as CDP–WWF Temperature Rating) marks the first update since its initial publication in October 2020 (version 1.0).

The primary objectives of this update revolve around refreshing this methodology's benchmarks with the latest climate science. It also implements adjustments and improvements on specific aspects to ensure it remains relevant, fair, and effective. Finally, this version adds transparency on methodological choices and implications through the presentation of additional analysis, enhanced explanation, and dedicated sections.

Key changes introduced in this version include (please refer to the change log in Chapter 9 for more details):

- Update of the input climate model simulations and scenarios of the linear regression models by substituting the Intergovernmental Panel on Climate Change (IPCC) SR15 model simulations and corresponding scenarios with the **IPCC's AR6 set of climate simulations with scenarios**, including adjustments of scenario filtering decisions (see Chapter 4 for more details).
- Revision of the calculation formula for the annual rate of GHG emissions reduction, transitioning from a Linear Annual Reduction to a **Compound Annual Reduction approach** (see Section 4.2 for more details).
- Introduction of a **specific scope 2 benchmark** relying on energy related variables. Scope 1 and scope 2 assessments are now carried out at the single scope level (see Section 4.2.1 for more details).
- **Clarification and enhancement of the target selection process** ("waterfall") to prioritize targets when a company reports multiple targets within the same scope category and timeframe (see Section 6.3 for more details).
- Update of the **target timeframe definition** for short-, medium-, and long-term (see Chapter 6 for more details).
- Update of the **default score from 3.2°C to 3.4°C** for companies without valid targets or insufficient data disclosure, reflecting the latest projection based on real-world action and current policies (see Section 5.3 for more details).
- Clarification on the best possible temperature score for a company, introducing a **1.5°C temperature floor** (see Section 5.4 for more details).
- Addition of a dedicated chapter detailing this methodology's **purpose and intended outcomes** (Chapter 1). Another new chapter focuses on **the methodology's key limitations** and a **roadmap for further updates** planned (Chapter 8). Finally, a presentation of the **rationale for relying on a warming function over single-scenario-based benchmarks** was added in Chapter 1 and in Annex 1: Warming Function versus Single Scenario.

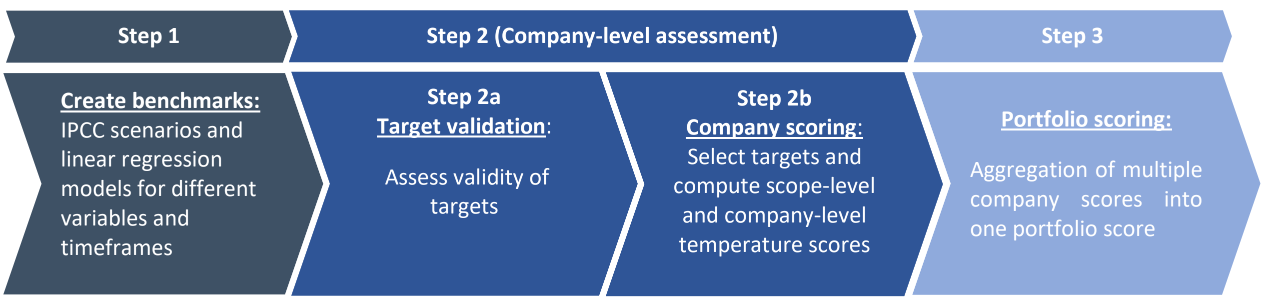
3. Introduction and methodological overview

Companies are directly responsible for a significant portion of global GHG emissions (Intergovernmental Panel on Climate Change (IPCC) (Ed.), 2022). GHG emission reduction targets are a partial but relatively crucial forward-looking marker of a company's ambition to mitigate its climate impact. In 2023, close to 5000 companies covering approximately 10 gigaton (GT) of scope 1+2 GHG emissions, publicly reported GHG emissions targets through CDP (based on CDP data 2023). However, assessing and comparing the ambition of corporate targets has traditionally been complex as targets can be expressed with different metrics, over multiple timeframes and cover various types of emission scopes.

The aim of a temperature score is to translate GHG emission targets into a single intuitive metric that is linked to the long-term temperature projections associated with the ambition of the target. In the initial publication of this methodology (version 1.0), a protocol for expressing ("scoring") climate targets in a temperature metric referring to projected warming by 2100, was presented. This updated version builds on the original method and further develops that protocol.

The methodology is composed of three steps, represented in Figure 1:

Figure 1: Steps of the Temperature Scoring methodology



The benchmark creation step (Step 1, Chapter 4) consists in running linear regression models. The outputs of these models are based on a warming function, derived from all vetted model-based scenarios in the IPCC Sixth Assessment Report (AR6) Scenario Explorer and Database

[2] hosted by the International Institute for Applied Systems Analysis (IIASA) (Byers et al., 2022). The linear regression models allow the assessment of end-of-century temperature outcomes expected from short, medium, and long-term projected changes in absolute GHG emissions or GHG emissions intensity metrics. As such, the regression models are used to relate target ambition (measured in committed rate of GHG emission reduction) to warming projections by the end of the century (expressed in centigrade temperature change compared to preindustrial levels).

[2] Accessible through this link: https://data.ece.iiasa.ac.at/ar6/#/login?redirect=%2Fworkspaces.

As companies often have multiple climate targets, covering different emission scopes and timeframes, and users may receive data from several sources, Step 2a (Chapter 5) defines the process and criteria for validating the various company's GHG reduction targets. This step can be seen as an eligibility screening of targets allowed as input for temperature score computation. In Step 2b (Chapter 6), scope-level targets are selected using the selection hierarchy ("waterfall"), and scope-level temperature scores are calculated. Finally, these TS are then aggregated into combined company-level scores. The target validation step (Step 2a) defines the minimum quality criteria for determining the acceptability of a GHG emissions reduction target to be scored. The company scoring step (Step 2b) specifies the process required to select target data to be used for scoring and how to aggregate multiple targets to produce company-level scores.

The final step (Step 3, Chapter 7) is used to weight company scores when assessing an aggregation of companies, such as a financial portfolio or a company value chain.

In addition to computing temperature scores for disclosed targets, the methodology also defines an approach to address non-disclosing companies. Default scores are introduced, also to allow TS aggregation for company-, portfolio- or supply chain-level TS (see Section 5.3 on default scores).

4. Step 1: Create benchmarks

4.1. Underlying data of linear regression models

The linear regression models used in this methodology are based on underlying data from global climate models with scenarios from the IPCC's AR6 (see Section 4.2 for more information about the linear regression models). The data is collected and downloaded from the AR6 Scenarios Database hosted on a Scenario Explorer by the International Institute for Applied Systems Analysis (IIASA), released in 2022 (Byers et al., 2022)[3].

Climate models are a mathematical description of the earth's climate system. Global coupled climate models include physical principles of the atmosphere, ocean, land surface, and sea ice. The results from running global climate models are referred to as model simulations. The scenarios, on the other hand, are primarily derived from Integrated Assessment Models (IAMs) and serve as boundary conditions for global climate models. They describe possible future pathways, covering a wide range of assumptions regarding, e.g., GHG emission trajectories, socio-economic trends, and technological developments. The AR6 Scenarios Database contains a large number of model simulations with different scenarios which in turn could be classified into categories based on the projected change in temperature by the end of this century and the respective probability[4]. The IPCC undertook a vetting process for all model simulations and scenarios reporting global data to ensure that key indicators such as GHG emissions and energy are within reasonable ranges[5] (Intergovernmental Panel on Climate Change (IPCC) (Ed.), 2023). In total, approximately 1,200 different model simulations and scenarios related to GHG emissions passed this vetting process (Byers et al., 2022). To allow for higher reliability when generating the linear regression models within this methodology, only model simulations with scenarios that passed the IPCC's vetting process are considered. For simplicity, we refer to the model simulations (based on different scenarios) as "scenarios".

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[3] Copyright 2022 IIASA, Publication date: 09/11/2022. Downloaded from this link: https://data.ece.iiasa.ac.at/ar6/#/data-download.

[4] Scenarios are classified into the following categories (C): C1: limit warming to 1.5°C (>50%) with no or limited overshoot, C2: return warming to 1.5°C (>50%) after a high overshoot, C3: limit warming to 2°C (>67%), C4: limit warming to 2°C (>50%), C5: limit warming to 2.5°C (>50%), C6: limit warming to 3°C (>50%), C7: limit warming to 4°C (>50%), and C8: exceed warming of 4°C (>=50%).

[5] For more information regarding the IPCC's vetting process, please read Annex III: Scenarios and Modelling Methods.

4.2. Linear regression models

The underlying data described in Section 4.2.1 is processed and modelled into linear regression models in two R scripts: CDP–WWF_ITR_preparation_of_data.R and CDP–WWF_ITR_Regression.R processes AR6 data from two different data file publications[6], while the linear regression models are created in CDP–WWF_ITR_Regression.R. The R scripts are open source and are available upon publication of this methodology https://github.com/WWF-Sweden/ITR-regression.

One linear regression model is created for each of the following variables and time horizon[7].

Table 1: Linear regression models associated with different time horizons and variables

Emissions | Kyoto Gases	**Emissions | CO_2 | Energy | Supply**	**Emissions | CO_2 | Energy and Industrial Processes**	**Emissions | Kyoto Gases / GDP | PPP**	**Emissions| CO_2 | Energy | Supply / Secondary energy**
Regression on 5-year horizon	Regression on 5-year horizon	Regression on 5-year horizon	Regression on 5-year horizon	Regression on 5-year horizon
Regression on 10-year horizon	Regression on 10-year horizon	Regression on 10-year horizon	Regression on 10-year horizon	Regression on 10-year horizon
Regression on 30y horizon	Regression on 30-year horizon	Regression on 30-year horizon	Regression on 30-year horizon	Regression on 30-year horizon

This gives a total of 15 linear regression models that we refer to as benchmarks. The regression coefficients are outlined in Table 3 in Section 4.2.3.

Equation 1: Linear regression formula

$$Projected\ temperature\ outcome\ in\ 2100 = \alpha + \beta * (-1) * annualized\ reduction\ rate\ of\ mitigation\ variable_{between\ 2020\ and\ 2020+t} + \varepsilon$$

where:

ε = *error term of the regression model.*

$Projected\ temperature\ outcome\ in\ 2100$ = *dependent variable, derived from MAGICC v7.5.3 (Model for Assessment of Greenhouse Gas Induced Climate Change)[8] (Byers et al., 2022), and collected from the AR6 Scenario Database.*

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[6] Two published data files are used: AR6_Scenarios_Database_World_v1.1 containing time series of different variables, and AR6_Scenarios_Database_metadata_indicators_v1.1 containing metadata related to the climate models and scenarios. Copyright 2022 IIASA, Publication date: 09/11/2022. Downloaded from this link: https://data.ece.iiasa.ac.at/ar6/#/data-download.

[7] Unique variables: Emissions|Kyoto Gases, Emissions|CO2|Energy|Supply, Emissions|CO2|Energy and Industrial Processes, Emissions|CO2|Energy|Supply / Secondary energy and Emissions|Kyoto Gases / GDP|PPP.

Three different time horizons: 5y, 10y and 30y.

[8] Based on the variable AR6 climate diagnostics | Surface Temperature (GSAT) | MAGICCv7.5.3|50.0th Percentile.

This variable is suitable for this methodology's aim – to translate GHG emission reduction targets into a single common and intuitive metric – as it returns a single unambiguous value expressed in projected temperature change in 2100.

$annualized\ reduction\ rate\ of\ mitigation\ variable_{between\ 2020\ and\ 2020+t}$ = *independent variable, is the annualized reduction rate implied by the variable's absolute change between two points in time, starting in 2020. This is expressed as the compound annual reduction rate (CAR) for different time horizons – from five to 30 years (in five-year intervals).*

Equation 2: Compound Annual Reduction Rate

$$\boldsymbol{CAR} = \left(1 + \%\ change\ in\ emissions\ from\ base\ year\ to\ end\ year\right)^{\frac{1}{end\ year\ -\ base\ year}} - 1$$

where:

$\boldsymbol{CAR}$ = *compound annual reduction*

$base\ year$ = *in the context of scenarios the year of reference is 2020. In the context of corporate targets, the year the target was set.*

$end\ year$ = *in the context of scenarios, the 5-year interval period after 2020 analyzed. In the context of corporate targets, the year the target should be met.*

$\%\ change\ in\ emissions\ from\ base\ year\ to\ end\ year$ = *the percentage change of emissions between the base year and end year (e.g., if the scenario's GHG emission pathway shows a reduction in emissions by 50% between the two periods, then the value should be −0.5). Note that when targeted reduction is 100%, the equation for CAR does not give a meaningful value. Therefore, in the context of corporate targets, the method assigns the temperature floor (see Section 5.4) as the TS (see more under limitations in Section 8.1.2)*

In this methodology, the time frames used for benchmarking targets are 5 years (short term), 10 years (medium term) and 30 years (long term). Year 2020 represents the base year. For example, to run a regression model of projected temperature change in 2100 and GHG emissions' evolution in the next 30 years, the GHG emissions CAR from all scenarios' emissions pathways between 2020 and 2050 are first calculated.

For an absolute reduction in emissions between two intervals, CAR will be negative as per the formula above. To run the regression models the sign of CAR is flipped (a reduction in emissions will be counted as a positive CAR) so that slopes in the regressions are negative and a reduction in emissions can be more intuitively interpreted as an improvement in temperature outcomes when calculating targets' temperature scores. This transformation has no impact on the outcome of the methodology and similar temperature scores would be observed without it, but it should be noted if applying the regression coefficients provided in this paper.

Box 1: from *Linear Annual Reduction (LAR)* to *Compound Annual Reduction (CAR)*.

The change in the annual reduction rate formula from linear annual reduction (LAR), used in the initial publication of the methodology (version1.0), to compound annual reduction (CAR) has an expected effect on the fit of the linear model as calculated by R^2. *LAR* expresses changes in the independent variable over the period in terms of percentage points (i.e., GHG emissions reduced by two percentage points each year indicates that they are reduced from 100% to 98% to 96% from a given baseline value), as opposed to annualized percentages with CAR (reduction of 2% from the 2020 baseline value, and reduction of 2% from the 2021 value the following year, and so on). *LAR* is normalized by nature with a significantly smaller variance, which mechanically increases R^2 of the regressions, especially for long-time horizons. *CAR* represents a cumulative reduction rate that is more accurately modelled by an exponential function as highlighted in Figure 2 (see Section 4.2.3). Investigating the possibility of using another statistical model will be subject for a next update of this methodology.

The main reason for changing from *LAR* to *CAR* is to improve the interpretation of the model results with respect to real economy changes in GHG emissions that are usually expressed in annualized percentage changes as opposed to reduction in percentage points from a base year. This change also incentivizes earlier action, as the *CAR* implies a higher absolute reduction in GHG emissions in the short term given the higher baseline.

4.2.1. Sector-specific variables and benchmarks

Table 2 outlines which regression models that are used to benchmark sector specific targets in this methodology. Some benchmarks are common across sectors and scopes.

Table 2: Sector variables and associated linear regression models for each target type and scope category.[9]

Sector[10]	**Target type**	**Scope 1 benchmarks: AR6 regression model variable**	**Scope 2 benchmarks: AR6 regression model variable**	**Scope 3 benchmarks: AR6 regression model variable**
All sectors (except for the ones listed below)	Absolute	Emissions | Kyoto Gases	Emissions | CO_2 | Energy | Supply	Emissions | Kyoto Gases
	Intensity	Emissions | Kyoto Gases / GDP | PPP	Emissions | CO_2 | Energy | Supply / Secondary energy	Emissions | Kyoto Gases / GDP | PPP

[9] Some of the variables in the table are expressed in CO2 rather than CO2e or Kyoto Gases. However, this is the nature of the specific AR6 variable, and CO2 is considered the best proxy for CO2e/Kyoto Gases in this methodology.
[10] In this paper, sectors are defined following the CDP-Activity classification system.

Power Generation	Absolute	Emissions | CO_2 | Energy | Supply	The regression model for *all sectors* applies	The regression model for *all sectors* applies
	Intensity	Emissions| CO_2 | Energy | Supply / Secondary energy	The regression model for *all sectors* applies	The regression model for *all sectors* applies
Cement/ Steel/ Aluminium	Absolute	Emissions | CO_2 | Energy and Industrial Processes	The regression model for *all sectors* applies	The regression model for *all sectors* applies
	Intensity	The regression model for *all sectors* applies	The regression model for *all sectors* applies	The regression model for *all sectors* applies

These are used to assess corporate GHG targets according to their type (using absolute or intensity metrics), sectors (All sectors, Power Generation, and Cement/Steel/Aluminium), and emission scope category (scope 1, 2, and 3). The sector variables used to benchmark absolute targets are directly available from the AR6 Scenario Database. The intensity variables are calculated from AR6 scenarios data for the purpose of this methodology (this calculation is included as part of the CDP_WWF_ITR_Regression.R script mentioned in Section 4.2).

The benchmarks are selected and allocated to a sector based on a combination of criteria: data availability, suitability of the AR6 variable to proxy the specific sector emissions, and the fit of the linear regression model when using this benchmark.

The following updates are introduced in this methodology compared to the initial version (1.0):

- A specific benchmark for scope 2 targets based on the following variables to proxy indirect emissions from energy consumption: *Emissions | CO_2 | Energy | Supply,* and *Secondary energy* output for the intensity targets[11]. This change relies on the assumption that energy consumption's absolute emissions and intensity should follow a similar path as the supply of energy. This benchmark is now also used to assess Power Generation scope 1 targets. Previously, one common benchmark is used to assess both scope 1 and scope 2 targets for all sectors, and the Power Generation scope 1 emissions are assessed according to a different benchmark[12].
- The sector-specific benchmark for Primary Energy is removed in this methodology since the variable used in the initial version (version 1.0) is considered too generic and

[11] These two variables are related to GHG emissions from fuel combustion and fugitive emissions from fuels: electricity and heat production and distribution, other energy conversion (e.g. refineries, synthetic fuel production, solid fuel processing) including pipeline transportation fugitive emissions from fuels and emissions from transport and storage (Byers et al., 2022).

[12] The variable Emissions | CO_2 | Energy and Industrial Processes is used for absolute targets and Emissions | CO_2 | Energy | Supply | Electricity / Secondary Energy | Electricity for intensity targets

alternative suitable variables yielded low linear fits in regression models. Therefor the “all sectors” benchmarks are now used to assess companies’ targets in the fossil fuel sector.

See Annex0 for a more detailed description of the variables. Future updates of this methodology aim to conduct further research to inform the possible inclusion of additional sector specific regression models.

4.2.2. Analysis for scenario selection

In this version of the methodology, all scenarios that passed the vetting process from the IPCC are selected to feed into the linear regression models. After conducting analysis on the potential impact of excluding certain scenarios based on additional considerations detailed below, the overall conclusion is not to perform any exclusionary filters.

In the initial publication of this methodology (version 1.0), the IPCC’s SR15[13] scenarios were first filtered before the linear regression models were generated. This was done by creating different scenario sets that matched normative and precautionary preferences concerning overshoot and the level of plausible carbon dioxide removal (CDR above 10 Gt CO_2/year considered as not plausible)[14,15]. Baseline scenarios, i.e., scenarios where no deliberate mitigation action was taken, were also removed from the initial SR15 dataset. Besides these normative, precautionary preferences, the best model fit over medium- and long-term horizons[16] was the basis for selecting and applying scenario set 4 in the version 1.0 methodology. This scenario set applied a CDR limit to maximum 10 Gt CO_2/year as well as excluding baseline scenarios.

When applying a similar CDR-related precautionary consideration to the AR6 dataset, the results are contradictory to the ones using data from the SR15. While intuitively, excluding scenarios based on high CDR (defined as >10 Gt CO_2/year) is expected to increase the GHG emission reduction ambition[17] reflected in the regression models, the opposite outcome was found. After investigation, the potential reasons identified are the following: firstly, and most significantly, the underlying dataset of AR6 is fundamentally different compared to the one of SR15 (e.g., different report purpose, other and updated climate models and scenarios are used, etc.), hence why similar normative precautionary preferences and filter options will not necessarily lead to

[13] Global Warming of 1.5°C, IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Accessible through this link: [Download Report — Global Warming of 1.5 ºC (ipcc.ch)].

[14] 56 unique scenario sets were generated in the initial methodology (version 1.0).

[15] For more information about the scenario filtering process of the initial methodology (version 1.0), please review https://www.cdp.net/en/investor/temperature-ratings/CDP–WWF-temperature-ratings-methodology

[16] Represented by R^2.

[17] The ambition is defined as the GHG emission annual reduction rate required to reach 1.5°C warming in 2100 based on the regression coefficients. The lower estimate rate, then the lower the ambition.

regression outcomes as in the initial methodology. Secondly, in AR6, the levels of yearly CDR tend to be high and increase by the end of the century compared to the first half. This is also the case for scenarios with an ambitious GHG emissions reduction rate that project to limit warming to 1.5°C by the end of the century. As a result, excluding scenarios based on such CDR criteria (i.e., CDR>10 Gt CO_2/year) also means excluding ambitious 1.5°C-scenarios, leading to an overall decrease of the GHG emission reduction ambition reflected in the linear regression models (rather than in an increase). Following these findings, no CDR filter is applied to the AR6 dataset.

Further analysis shows that excluding baseline scenarios from the AR6 dataset has no significant impact on the annual GHG emission reduction ambition reflected in the regression models. This insight, in combination with the possibility that these baseline scenarios are potential future trajectories of the world's development, leads to the conclusion to keep baseline scenarios in the dataset used to derive the benchmarks.

Additional analysis to inform the filter choices was conducted. The effect on the projected temperature change at the end of the century (dependent variable in the linear regression models) and the annual GHG emissions reduction rate (independent variable in the linear regression models) was tested for two additional filters: 1) the exclusion of scenarios with a GHG emission peak year before year 2024, and 2) outlier analysis using statistical analysis of Cook's D, leverage, and residuals.

The results from filter test 1) shows that the GHG emission reduction ambition significantly decreases from a short time frame perspective. However, the effect is less noticeable in the longer term. One possible explanation for this outcome could be that very few scenarios with a projected 1.5°C temperature outcome by the end of the century[18] assume a peak year of GHG emissions after 2020. Thus, removing scenarios based on such condition will decrease the overall GHG emissions reduction ambition, leading to steeper regression lines. In addition, as demonstrated in the linear regression models (see Figure 2 in Section 4.2.3) the variability of the scenarios' GHG emission reduction is, in general, larger in the shorter time frames compared to the longer time frames, which could explain why the effect is less noticeable in the longer term. This result leads to the conclusion not to remove any scenarios from the dataset based on the results from filter test 1.

The outlier analysis (filter test 2) highlights that the number of scenarios considered as outliers according to the three approaches (Cook's D, leverage, and residuals) is limited. The result also shows that no scenario alone is deemed to influence the linear regression model to a significant extent, and hence, no scenario is removed from the data set based on the results from filter test 2.

[18] Scenarios classified as Category 1: limit warming to 1.5°C (>50%) with no or limited overshoot, and Category 2: return warming to 1.5°C (>50%) after a high overshoot.

The overall conclusion from the scenario selection analysis is that the vetting process from IPCC is considered sufficient criteria for selecting scenarios for the linear regression models in this methodology. As a result, the linear regression models computed and used in this methodology include all scenarios that passed the IPCC's vetting process.

4.2.3. Regression results

Figure 2 provides an illustration of the linear regression model applied to the variable *Emissions | Kyoto Gases* on the 30-year horizon[19]. The remaining linear regression results for different time horizons are found in Annex 3: Result of linear regression model.

Figure 2: Example of the result of the linear regression model for Emissions | Kyoto Gases for a 30-year time horizon

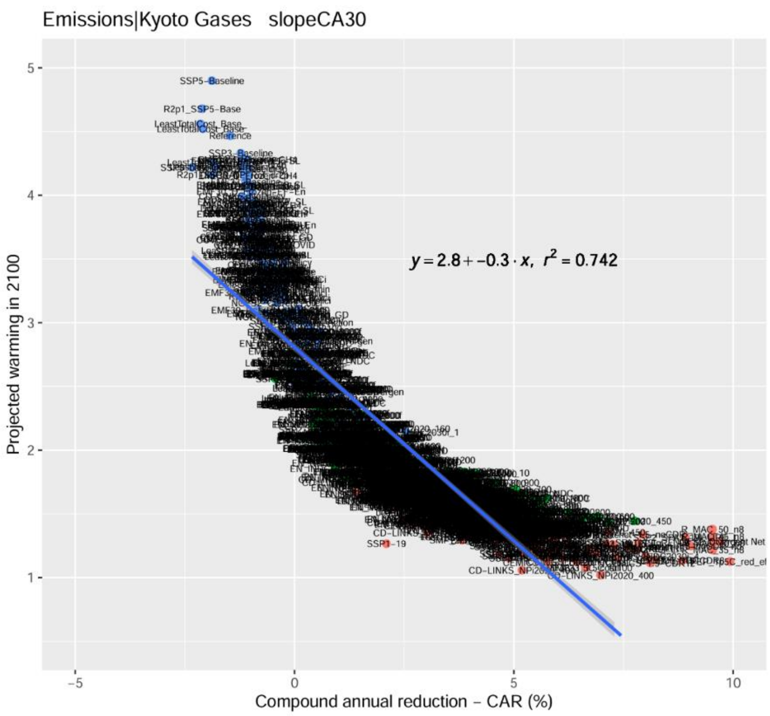


Table 2 summarizes the details of the linear regression models for 5-, 10- and 30-year horizons representing short-, medium- and long-term targets, for each variable used in this methodology. The fit of the regression line, represented by R^2, and the intercept increase as the time horizon increases (intercept of 2.4, R^2 of 0.40 for 5 years; intercept of 2.8, R^2 of 0.74 for 30 years). This is logical since the degree of variability between scenarios decreases over longer horizon and the range of possible annualized reduction rates leading to a given temperature outcome is lower for

[19] Time horizons used in this methodology: 5-year (short term), 10-year (medium term), and 30-year (long term). Base year is 2020.

longer time horizons. In addition, no action (zero year-on-year reduction) will lead to higher temperature outcomes if observed over longer time horizons.

Compared to the initial methodology (version 1.0) where the scenarios were grouped into different scenario sets based on the filtering process (see Section 4.2.2), this methodology only contains one scenario set including all the vetted scenarios from the IPCC AR6 database (see Section 4.2.24.2.2).

Table 3: Summary of linear regression results (note that rounding differences may occur).

Regression model variable	**5-year horizon**				**10-year horizon**				**30-year horizon**			
	Sample size	**Intercept**	**Slope**	**R^2**	**Sample size**	**Intercept**	**Slope**	**R^2**	**Sample size**	**Intercept**	**Slope**	**R^2**
Emissions | Kyoto Gases	1,115	2.40	−0.21	0.40	1,115	2.46	−0.24	0.46	1,112	2.81	−0.30	0.74
Emissions | CO_2 | Energy | Supply	1,160	2.35	−0.12	0.32	1,156	2.40	−0.11	0.36	851	2.85	−0.15	0.63
Emissions | CO_2 | Energy and Industrial Processes	1,171	2.27	−0.22	0.37	1,170	2.33	−0.24	0.43	1,155	2.58	−0.19	0.56
Emissions | Kyoto Gases / GDP | PPP	986	3.13	−0.21	0.38	986	3.21	−0.23	0.44	983	3.57	−0.30	0.70
Emissions| CO_2 | Energy | Supply / Secondary energy	764	2.19	−0.08	0.15	764	2.22	−0.07	0.17	575	2.61	−0.11	0.41

To calculate the temperature score of a company's climate target, the target is first mapped to the most representative benchmark available in the methodology (see Table 2). Depending on the target's time-horizon, the appropriate regression parameters (see Table 3) can be applied according to the following formula:

Equation 3: Temperature Score

$$Temperature\ Score_{target} = \alpha_{time\ horizon,model\ variable} + \beta_{time\ horizon,model\ variable} * (-1) * CAR_{time\ horizon,target\ variable}$$

where:

α = intercept of the regression model for a given time horizon and variable

β = slope of the regression model for a given time horizon and variable

CAR = compound annual reduction of the variable over time horizon implied by the target set by the company.

Using the formula expressed above, if *CAR* is 0 (i.e., the company's absolute reduction of emissions over the next 10 years is zero) then the projected temperature outcome of the target will amount to the intercept of the linear regression.

The next section provides further details on the validation and assessment of targets (Step 2).

5. Step 2a: Target validation

5.1. Assigning a temperature score to disclosed targets

The methodology assumes that there is a linear relationship between the change in common climate target metrics (e.g., absolute or intensity GHG emissions) for a specific timeframe and the projected global warming in 2100. This assumption is applied for corporate targets, for target horizons set out in the Section 4.2. Limitations to this assumption of linearity are covered in Section 8.1.1.

The first step in assigning temperature scores to disclosed corporate GHG targets is to assess which types of targets could be adequately matched to a scenario variable, and consequently, which associated linear regression model should be applied. Disclosed corporate GHG targets refer to either absolute GHG reduction targets and/or GHG intensity reduction targets. Table 2 in Section 4.2.1 shows the sector variables and the associated linear regression model applicable in this methodology. Table 4 showcases examples of climate target wording applicable for the respective variables.

Table 4: Target class, wording, and scenario variables

Target Class	Example of target wording	AR6 benchmark variable
Absolute GHG reduction targets	Company X commits to reduce absolute scope 1 GHG emissions 60% by 2030 from a 2022 base year. Company X commits to reduce absolute scope 2 GHG emissions 60% by 2030 from a 2022 base year. Company X commits to reduce absolute scope 3 emissions GHG with 50% by 2030 from a 2022 base year.	• Emissions | Kyoto Gases • Emissions | CO_2 | Energy | Supply • Emissions | CO_2 | Energy and Industrial Processes
GHG economic intensity target	Company X commits to reduce scope 1 GHG emissions 60% per unit of added value by 2030 from a 2022 base year. Company X commits to reduce scope 2 GHG emissions 60% per unit of added value by 2030 from a 2022 base year. Company X commits to reduce scope 3 GHG emissions 50% per unit of added value by 2030 from a 2022 base year.	• Emissions | Kyoto Gases / GDP | PPP • Emissions | CO_2 | Energy | Supply / Secondary energy

The second step is to convert the corporate target into a corresponding annual reduction rate to match the format of the independent variable of the regression models. These annualized reduction rates are calculated using the formula for CAR *(see Equation 2 in Section 4.2)4.2. As per*

Equation 3, the *CAR* of a target is used in the linear equation specified by the model's parameters to convert the target's ambition into a temperature score. For example, an absolute GHG reduction target of 30% between the base year 2020 and the target year 2035, mapped to the scenario variable *Emissions | Kyoto Gases*, would result in a compound annual reduction rate of 2.3%. Applying the *Emissions | Kyoto Gases* linear equation for the long-term timeframe (corresponding to the 2035 target year), this target's ambition would translate to a 2.1°C temperature score (calculated as 2.81 − 0.30 * 2.3).

5.2. Target validation

All targets are subjected to a validation procedure to assure their usefulness in generating company-level temperature scores. The method also attempts to split targets covering multiple scopes into single-scope targets. The target validation process checks that each target is accompanied by the data required to calculate temperature scores in later steps.
The following criteria need to be met for a target to be valid:

1) The scope coverage of the target, any single scope or combination of scopes 1, 2, or 3.
2) Target type must be absolute or intensity with valid metric.
3) Target progress < 100% on the date the relevant target was first published.
4) Base year < target year.
5) Target year ≥ current year.
6) Base year GHG data must be available for the emission scope of the target, i.e., scope 1 GHG data for a scope 1 target, etc.
7) Boundary coverage of the target is required for the emission scope(s) of the target, for instance, 60% of the scope 1 emissions. If this number is missing, the value will be set to zero.
8) Target reduction ambition must not be negative.

Targets which do not meet the criteria are removed from further calculation.

Temperature scores are calculated on the most disaggregated level of targets that the provided data allows. A scope 1+2+3 target is split into one scope 1+2 target and one scope 3 target, and a scope 1+2 target (including those split from a scope 1+2+3 target) will be split into one scope 1 target and one scope 2 target. Targets for the three scopes will then be scored separately and a combined score will later be calculated in the target aggregation procedure, see Section 6.5. It should be noted, however, that temperature scores are aggregated using the company's current GHG emissions. Therefore, the presence of current GHG data must be verified before a scope 1+2 target is split. If the data is missing, the scope 1+2 target is kept and scored using the provided target data.
When splitting a valid scope 1+2 target, the scope 1 target is assigned the scope 1 boundary coverage from the original target and the scope 2 target is assigned the scope 2 boundary

coverage from the original target. Both targets are assigned the reduction ambition of the original target.

The procedure for splitting targets thus means that a target covering scopes 1+2+3 ideally results in three targets for the individual scopes, where each target consists of its respective boundary coverage and the reduction ambition from the original target. However, even if current GHG data is missing, a scope 1+2+3 target will be split into a scope 1+2 target and a scope 3 target for separate scoring. For the scope 1+2 target the boundary coverage is calculated as follows:

Equation 4: Boundary coverage

$$Scope\ 1+2\ bc = \frac{S1_{bc} * S1_{baseyearghg} + S2_{bc} * S2_{baseyearghg}}{S1_{baseyearghg} + S2_{baseyearghg}}$$

where bc = boundary coverage

The reduction ambition is copied from the original scope 1+2+3 target. The resulting scope 3 target keeps the scope 3 boundary coverage and the target reduction ambition from the original target. Note that if reduction ambition is missing or has a value of zero, the TS will be calculated as the intercept of the applicable regression function.

Finally, the boundary coverage is used to adjust each target's reduction ambition according to the procedure described in Section 6.3.2.

5.3. Default temperature score for companies without valid targets

5.3.1. Purpose of a default temperature score

The purpose of assigning a default temperature score is to provide a means for scoring a full portfolio or value chain although some portfolio constituents lack publicly disclosed targets or fail to meet specific criteria for target coverage or quality.

In instances where companies do not have valid targets, it is assumed that they are following a business-as-usual trajectory, as they have not publicly articulated their GHG emissions reduction strategies through GHG targets. Therefore, default scores represent the anticipated business-as-usual GHG emissions trajectory. In essence, the default score reflects the pathway expected to be followed if companies continue operating under existing governmental policies, and thus adhering to the minimum requirements of current regulation.

5.3.2. Default score approaches

Business-as-usual trajectories can be defined at a company, sector, and/or economy-wide level. This version 1.5 of the methodology still focuses on uniform default scores at an economy-wide level but will aim to provide more sectoral granularity in version 2.0 (see Section 8.2). While economy-wide default scores assume the company's temperature score is aligned with that of the global economy, sector-specific approaches define business as usual pathways at a sector level and assume the company's trajectory is consistent with that of the sector.

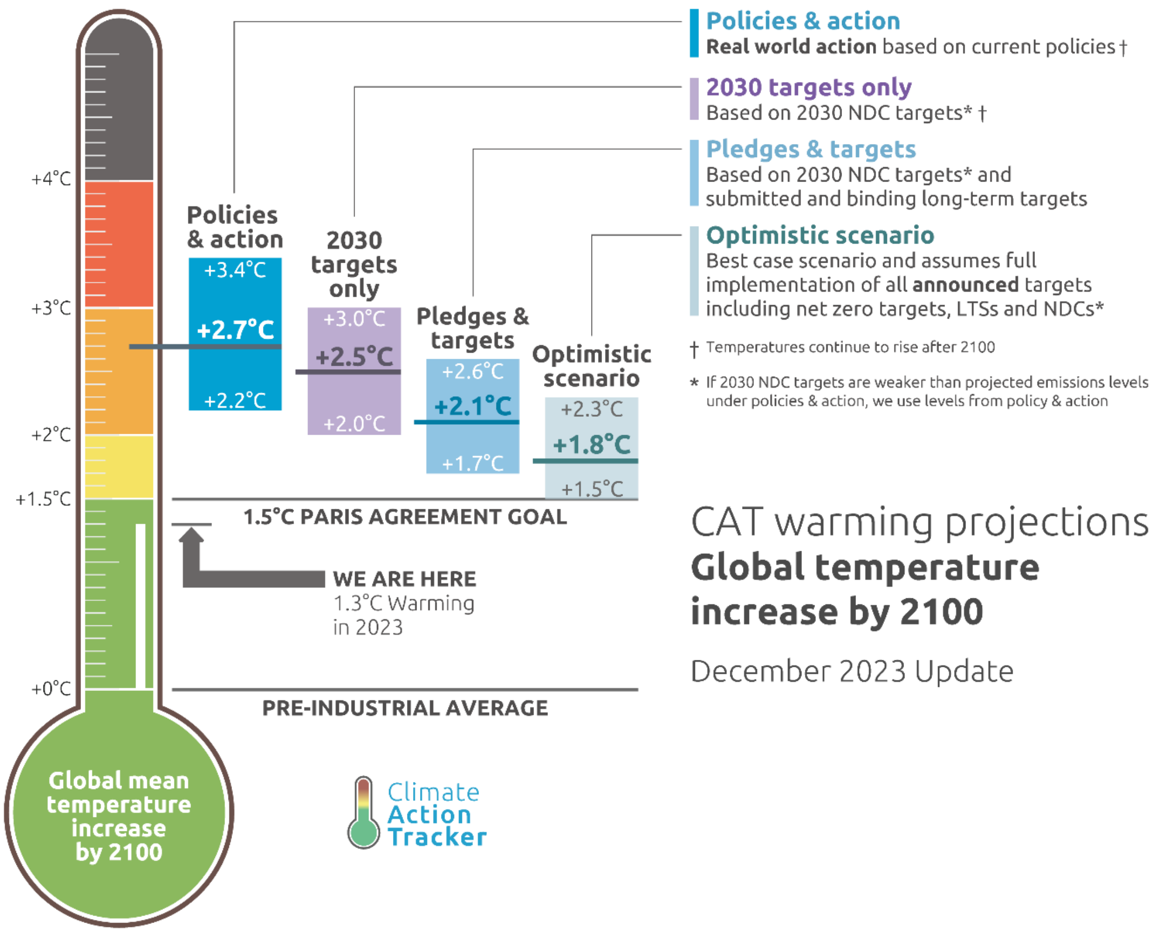
5.3.2.1. Economy-wide default scores

An economy-wide default score applies the score uniformly to all companies, regardless of sector or current performance.

The first version of this methodology relied on the December 2019 end-of-century warming projections from the Climate Action Tracker ("CAT") to establish a 3.2°C economy-wide default score. At the time, this value corresponded to the upper bound of the range of median temperatures expected from the continuation of current policies being implemented by governments (i.e., real-world action based on current policies).

Using the same source (updated in December 2023, see Figure 3) and the same "policies & action" projections, a range of warming between 2.2°C and 3.4°C is expected by the end of the century, with a median projection of 2.7°C (50% probability).

Figure 3: Summary and breakdown of 2100 warming projections based on a range of future scenarios (Source: Climate Action Tracker, December 2023)



Global Mean Temperature above pre-industrial levels in 2100

Temperature in °C		Lower bound	Median	Upper bound
Policies and action	Combined	**+2,2**	**+2,7**	**+3,4**
	High	+2,3	+2,9	+3,6
	Low	+2,0	+2,5	+3,1
2030 Targets only		**+2,0**	**+2,5**	**+3,0**
Pledges and Targets	High	**+1,7**	**+2,1**	**+2,6**
	Low	+1,5	+1,8	+2,3
Optimistic scenario (net-zero pledges)		**+1,5**	**+1,8**	**+2,3**

This aligns with the conclusions of the 2023 UNEP Emissions Gap Report (United Nations Environment Programme, 2023), which finds that a continuation of the level of mitigation effort under current governmental policies would result in a warming of 2.7°C at the end of the century (range: 1.8–3.5°C, with a 50% probability).

Table 5: End-of-century warming projections based on a range of future scenarios (UNEP Emissions Gap Report, 2023)

Peak warming throughout the twenty-first century (°C)			
Scenario	**50% chance**	**66% chance**	**90% chance**
Current policies continuing	2.7°C (range: 1.8–3.5)	**3.0°C** (range: 1.9–3.8)	3.5°C (range: 2.3–4.5)
Unconditional NDCs continuing	2.6°C (range: 1.8–3.4)	**2.9°C** (range: 2.0–3.7)	3.4°C (range: 2.3–4.4)
Conditional NDCs continuing	2.3°C (range: 1.7–3.3)	**2.5°C** (range: 1.9–3.6)	3.0°C (range: 2.2–4.2)
Unconditional NDCs and net-zero pledges using strict criteria	2.5°C (range: 1.8–3.2)	**2.7°C** (range: 1.9–3.5)	3.2°C (range: 2.3–4.1)
Conditional NDCs and all net-zero pledges (most optimistic case)	1.8°C (range: 1.6–2.3)	**2.0°C** (range: 1.8–2.5)	2.4°C (range: 2.0–3.0)

When presenting temperature estimates with a 66% probability, CAT's median projections of 3.0°C also align with the UNEP Emissions Gap Report's warming estimates.

This updated version of the methodology uses a 3.4°C value (i.e., the upper bound of the range of temperature outcomes from CAT's "policies & action" projections) to derive temperature scores for companies with no valid forward-looking targets. This implies that these companies are expected to decarbonize along a 3.4°C pathway, consistent with global policies implemented to ensure the reduction of GHG emissions at this rate.

While it could be argued that the ambition of current policies has improved somewhat over recent years (as reflected in the UNEP Emissions Gap Report 2023's projections, for instance), their impact at the company level remains uncertain. Bearing in mind the purpose and objectives of the default temperature score outlined in Section 5.3.1, the shift from 3.2°C to 3.4°C in this version aims primarily at reinforcing the continued need for a conservative approach when considering companies without valid targets.

Chapter 8 outlines the plan for future methodological development, where we aim to provide more granular and sector specific default scores for companies with no valid GHG emission reduction targets.

5.4. Temperature floor

The best score applicable to a company's climate ambition under this methodology is 1.5°C (i.e., in the case where a calculated score results in a temperature that is lower than 1.5°C, the applied score shall be 1.5°C).

The reasoning behind flooring all temperature scores to 1.5°C is grounded in the prevailing scientific consensus[20] which, at the time of drafting this version of the methodology, remains that 1.5°C represents the lower bound of feasible outcomes within the most optimistic climate scenarios. In addition, this aligns with the conclusions of the Climate Action Tracker's latest

[20] Intergovernmental Panel on Climate Change (2021) – AR6 Synthesis Report: Climate Change 2023

publication (see Figure 3), which is also used to determine this methodology's default score (Climate Action Tracker, December 2023).

1.5°C-aligned companies can still be differentiated by comparing their Compound Annual Reduction, CAR.

6. Step 2b: Company scoring

Companies set targets across different timeframes, emissions scopes, and units. Target data is also often collected from several sources and a target database may include multiple targets for the same company, scope, and timeframe. This section describes how the method selects and prioritizes which relevant valid targets to be scored.

6.1. Target timeframe

The timeframe sorting first defines the range of target timeframes as applied in this methodology. Targets are scored depending on which year the target ends in relation to the current year. The target timeframes are divided into the following three buckets:

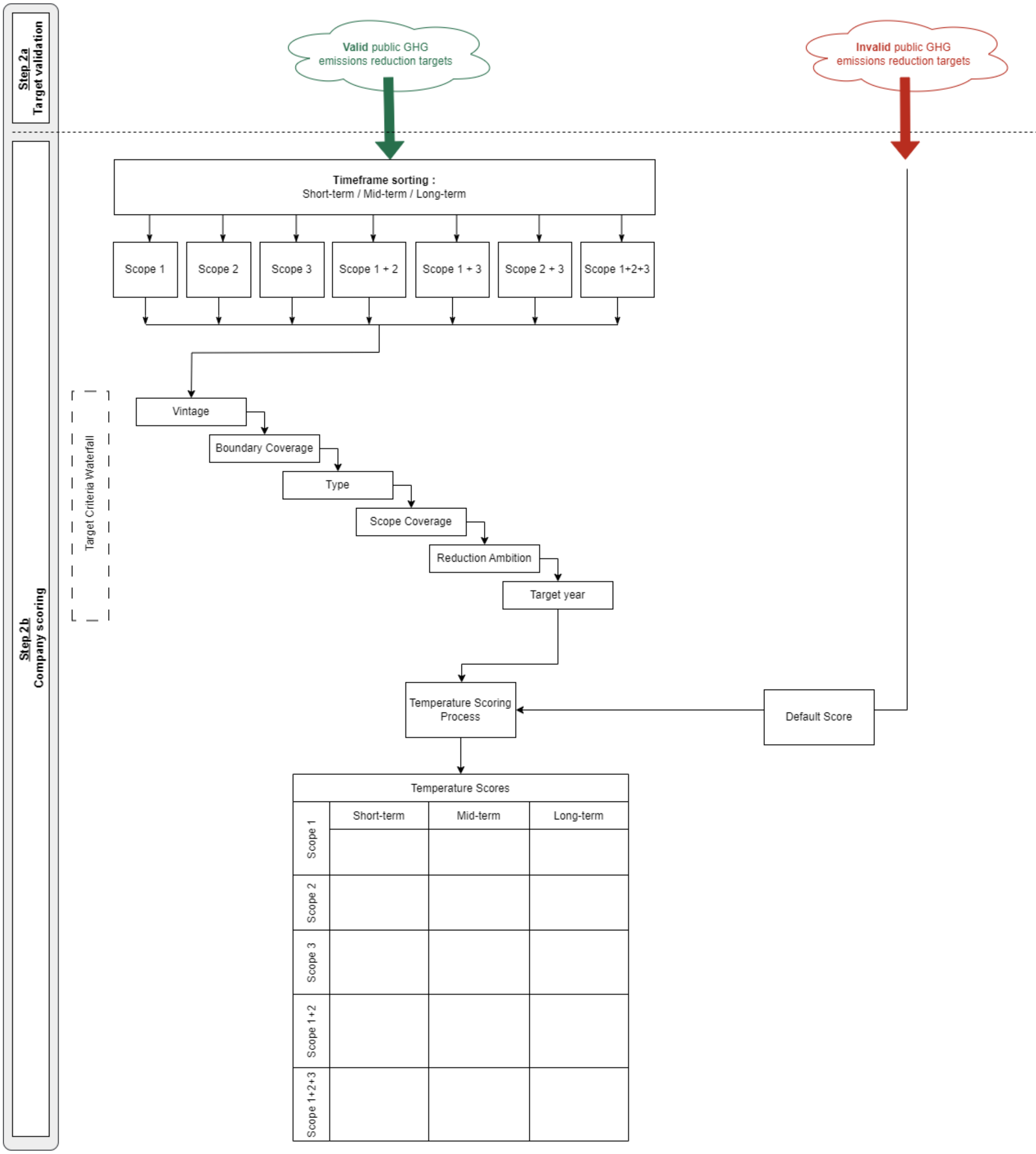
- Short-term: targets ending in up to 5 years from the current year, e.g., −2029 (current year 2024)
- Mid-term: target ending 5–10 years from the current year, e.g., 2030–2034 (current year 2024)
- Long-term: target ending in more than 10 years from the current year, e.g., 2035–2050 (current year 2024)

Targets can then be scored across these three different timeframes, providing insights on the short-, medium-, and long-term ambition of companies' GHG emissions reduction targets.

Target timeframe also defines how long a target is used for scoring in a target timeframe bucket, i.e., when a mid-term target becomes a short-term target and for how long a target is considered as valid for scoring by this methodology. For instance, targets with end dates during the calendar year (CY) 2024 would be valid throughout 2024 and would become invalid on January 1, 2025. A mid-term target with an end date during CY 2030 would become a short-term target on January 1, 2026, as mid-term targets are defined as targets with 5–10 years left to run. There are exceptions to this rule set out in Section 6.3.6.1 below.

Figure 4 displays a summary of the company protocol steps, including the waterfall, leading to the output of a matrix of temperature scores for each timeframe and scope combination.

Figure 4: Step 2b – generating temperature scores at a company level, based on valid publicly disclosed targets or a default approach for companies with no valid targets.



6.2. Target quality criteria

Targets are classified in terms of seven key criteria, presented in Table 6. Key requirements for valid targets across these seven key criteria are further detailed in the different paragraphs of this section. A description of how these criteria are prioritized in the selection process is provided in Section 6.3.

Table 6: Target quality criteria

Criteria	Description
Target vintage	Defines the age of the target, based on the date the target was last publicly communicated.
Boundary coverage	Within a given GHG emissions scope, companies define how much of that scope will be included in the boundary of the target, e.g., 50% of scope 1 or 95% of combined scope 1+2 is covered by the target.
Target Type	Defines whether the target ambition is based on an absolute or intensity GHG emissions reduction.
Target scope coverage	Defines the GHG emissions scope(s) covered by the target. Targets can be set across individual or combined GHG emission scopes, as defined in the GHG Protocol (World Business Council for Sustainable Development & World Resources Institute, 2015), e.g., scope 1, scope 2, scope 3, scope 1+2, scope 1+2+3, etc.
Reduction ambition	Defines the GHG emissions reduction ambition over the target duration, e.g., absolute emission reduction of 30% by 2030.
Target timeframe	Classifies targets according to the duration between the current year and the target end date. Targets can cover different timeframes.
Target progress	Describes the rate of achievement at the time the target was first published. To be scored, target achievement has to be less than 100% at the time the target is published.

6.3. Target criteria waterfall

As mentioned in the introduction to this and displayed in Figure 4, a company's targets are sorted by scope coverage and according to three timeframes.

Some target quality criteria may be conflicting. Therefore, the method has established a waterfall for these criteria, to determine which criteria should take precedence and be used for scoring.

For instance, companies may be reporting multiple targets within the same scope and timeframe, e.g., two mid-term targets covering scope 1+2, covering different parts of their operation. Further, users of this method may use different databases to collect target and emissions data which may be updated with different frequencies, resulting in a combined user database with multiple targets that may be conflicting. The below waterfall approach is used to select a single target for each timeframe and scope category for scoring.

Table 7: Target waterfall criteria

Rank	Criteria	Priority
1	Vintage	More recently published targets
2	Boundary coverage	Highest coverage
3	Type	1) Absolute 2) Intensity 3) Other
4	Scope coverage	Prefer single scope S1, S2, and S3 targets before combined scope targets that cannot be broken down into single scope components.
5	Reduction ambition	Higher reduction ambition preferred
6	Timeframe	Longer-term targets are preferred within each timeframe bucket (i.e., short-, medium-, long-term). If there are several targets with same target year the more recent base year is preferred.

6.3.1. Target vintage

A company's latest statement of emission reduction ambition is preferred to older communicated targets. Thus, a target to reduce GHG emissions by 30% by 2030 that was communicated last month will take priority and be scored, instead of a target of 40% GHG emissions reduction by 2032 communicated last year, ceteris paribus. If the latest statement date is not available, the method uses the target start year.

6.3.2. Boundary coverage

How much of companies' emissions are covered in the GHG emissions reduction target, i.e., the boundary coverage, often differ between companies and targets. Therefore, the ambition of the target is normalized with the boundary coverage of the target. The boundary coverage of a target can be expressed in percentage terms (e.g., 80% of the company's scope 1 emissions in the base year) or in emissions terms (e.g., 800,000 tons of scope 1 emissions out of a total 1,000,000 tons of scope 1 emissions in the base year, i.e., 80%).

For combined GHG emissions scope targets, e.g., targets covering more than one scope, the boundary coverage of the target is defined as the weighted average of the boundary coverage of each of the scopes included in the target, using base year GHG as weights.

For all targets with less than 100% boundary coverage, the ambition of the target is adjusted by the boundary coverage percentage. For instance, consider an absolute target of 30% reduction in scope 1 and 2 GHG emissions, but that this target only covers 20% of the company's scope 1 and 2 emissions. The ambition would then be adjusted to 6% (30% × 20% = 6%).

Without the quantified boundary coverage data, the method assumes 0% boundary coverage. Given the adjustment to ambition is done based on the level of boundary coverage, as explained above, any reduction ambition without boundary coverage data will be reduced to 0%. The temperature score will then become the intercept of the regression.

6.3.3. Target types

Only GHG emission reduction targets are currently acceptable for scoring, i.e., absolute and intensity GHG targets. Other targets, such as procurement, renewable electricity targets, or engagement are currently not scored (see exception in Section 6.3.3.1). Long-term ambitious or aspirational targets that are not quantitative (e.g., climate neutral/net-zero in 2050) are not scored currently as these types of targets are difficult to objectively translate to a rate of change.

GHG emission reduction target types can broadly be divided into absolute and intensity targets. All types of absolute targets based on GHG emissions and intensity targets based on GHG reductions per unit of X are valid for scoring in the method, such as:

- Physical intensity targets: based on GHG emissions per unit of production – e.g. CO2eq / kWh for Power Generation
- Economic intensity targets: based on GEVA (GHG emissions per unit of value added) or revenue.
- Intensity targets where the conversion to absolute GHG emissions is disclosed.

6.3.3.1. Target type exception

The exception to this rule is scope 3 targets set using the CDP–WWF Temperature Rating method version 1.0 or CDP–WWF Temperature Scoring method version 1.5 (this method).

The CDP–WWF methodology is an engagement method. Financial institutions (and corporates in other sectors) can use this methodology to assess the temperature score of their portfolio (or value chain) based on the portfolio (value chain) constituents' current ambition. Users of this methodology can use it to derive a temperature trajectory for their scope 3 emissions. It is the underlying constituent of the portfolio or value chain that needs to reduce emissions and adapt its ambition accordingly. To give constituents time to implement emissions reduction action, the method needs to allow for implementation time. A common mid-term target setting period is 10 years, which for instance is used by the SBTi in its target setting framework (Science Based Targets initiative, 2024). So, to allow for all constituents in a portfolio or value chain to complete their emissions reduction action before 2050, the target must have been set and communicated before this, i.e., by 2040 at the latest, to allow for 10 years of implementation. Thus, for a financial institution, or other corporate, to be able to reach 1.5°C by 2050, all the constituents in the portfolio or value chain must have set their 1.5°C-targets no later than 2040.

Therefore, financial institutions' scope 3 targets set with the CDP–WWF method are scored by linear extrapolation of the targeted TS reduction ambition until 2040, using Equation 5.

For instance, consider financial institution A with a target to reduce its portfolio's TS to 2.5°C by 2030 from a 2025 base year TS of 3.0°C. This would equate to a TS of 1.5°C by 2040 [3.0 − (2040 − 2025) × ((3.0 − 2.5) / (2030 − 2025) = 1.5]. Thus, financial institution A's scope 3 target set using this method would then get a TS of 1.5°C. To better understand the practical implications of this target type exception, assume that FI A's scope 1+2+3 TS is also 1.5°C, and consider FI B whose portfolio is entirely composed of FI A stock. Applying this target type exception, FI B's scope 3 TS would then be 1.5°C. In another example, consider FI C with a target to reduce its portfolio TS to 2.5°C by 2029 from a 3.0°C base in 2022. This would equate to a TS of 1.71°C [3.0 − (2040 – 2022) × ((3.0 − 2.5) / (2029 – 2022)], when scored as a constituent in another FI's portfolio.

Equation 5: Scoring of targets using CDP–WWF Temperature rating method v 1.0 and CDP–WWF Temperature Scoring method v1.5

$$TS = TS_{base\ year} - (2040 - Base\ year) \times \frac{TS_{Base\ year} - TS_{Target\ year}}{Target\ year - Base\ year}$$

To clarify, absolute and intensity targets take precedence over the CDP–WWF-method-based targets in the waterfall.

6.3.4. Scope coverage

Single scope targets covering only scope 1, 2, or 3 emissions are assessed and scored separately. Targets covering several scopes (combined scope targets), are first disaggregated to compute single score targets, as described in Section 5.2, and later aggregated into a company level temperature score. If data allows (see Annex 5: Summary of required data for applying the Temperature Scoring method), single scope and combined scope targets are also scored as combined and single scopes respectively.

6.3.5. Reduction ambition

More ambitious targets are preferred, as measured by CAR. Thus, a target A) to reduce GHG emissions by 50% by 2030, from a 2020 base year, with a CAR of 6.7% [(1 − 50 / 100) ^ (1 / (2030 – 2020)) − 1] will be preferred before a target B) with GHG emissions reduction of 60% by 2034 from a 2020 base year, giving a CAR of 6.4%. Therefore, target A will be used for TS calculation, ceteris paribus. In cases where reduction ambition is missing or is equal to zero, the value will be set to zero which implies that the resulting temperature score will be equal to the intercept of the applicable regression model.

6.3.6. Target year

Within each timeframe bucket, targets with a later target year are preferred as these are more forward-looking. If the target years are the same, the more recent base year is preferred.

6.3.6.1. Target timeframe exception

Under the Financial Sector Science-Based Targets Guidance (Science Based Targets initiative, 2022), engagement targets are set for a maximum of five years. This currently includes targets set with this CDP–WWF Temperature Rating method. This would mean that targets set using this method would be treated as short-term targets in the CDP–WWF Temperature Scoring method, which in many FI portfolios would make it impossible to use this method for setting targets under the SBTi framework (Science Based Targets initiative, 2022).

Therefore, when financial institutions have assets in their portfolios that have set targets with this method it prohibits, e.g., an FI from setting a meaningful medium target themselves, as the portfolio constituents don't have valid mid-term targets, according to the target validation laid out in Chapter 5.

However, as this method relies on other companies setting or improving their targets, as explained in Section 6.3.3.1, the engagement targets will naturally take some time to deliver GHG emissions reduction. Therefore, an engagement target of up to five years could then be seen to be similar in timeframe to a medium-term non-engagement target.

Therefore, the CDP–WWF Temperature Scoring method adds five years to all targets based on SBTi engagement methods to enable this method to treat them as medium-term targets and therefore allow companies with assets and activities with engagement targets in their portfolios to set relevant medium-term targets.

Currently, the CDP–WWF Temperature Scoring method only makes this exception for this engagement method.

6.4. Multiple scope 3 targets

Some companies publish multiple targets for scope 3 GHG emissions. This can take the shape of an overall scope 3 target alongside separate targets for certain scope 3 categories, e.g., where the company has significant GHG emissions, or the company wants to set a specific target for a specific category.

There are also cases where there are multiple targets for a single scope 3 category. This is more common for scope 3 category 15, investments. Targets by FIs validated by the SBTi often use this approach, sometimes without a headline scope 3 target that includes all S3 targets. Often boundary coverage for the individual categories is not published, nor is current or baseline GHG emissions for the categories. Scope 3 category 15 targets are also often engagement targets, instead of based on GHG emissions. This creates several issues for the company scoring.

- It becomes difficult to use the target criteria waterfall to select a target for scoring, as there are several targets of the same vintage for the same scope and even for the same category.
- As boundary coverage and GHG data often is not available it becomes difficult to weight multiple scope 3 targets to one headline scope 3 target.
- Engagement targets are often stated as aligning portfolio coverage or temperature score of a part of a portfolio to a certain coverage or temperature score targets. This is very different compared to the GHG emissions reduction targets mostly used for scope 1 and 2 targets, both absolute and intensity targets.

Therefore, when companies set multiple targets for scope 3 targets, the method treats these targets differently, based on the following principles:

1. Any target should be assessed with the current temperature scoring method, as if it was a single scope 3 target.
2. If a headline scope 3 target is available, this will take priority and be scored as a single scope 3 target, provided it can be scored under the current method.
3. If a headline target is not available or it cannot be scored and multiple scope 3 targets are available, these targets will be scored and aggregated to a single companywide scope 3 target.
4. The selection of scope 3 targets to be scored follows the target criteria waterfall, but allows for several targets in scope 3 and in each scope 3 category. This is common in scope 3 category 15 targets for investments, where parts of an investment portfolio may be addressed with different targets. In these cases the waterfall should be applied to the individual asset class and activity targets, within the scope 3 category, before aggregation. All scope 3 targets must be of the same vintage to be scored as separate scope 3 targets. Older scope 3 targets will be excluded from scope 3 scoring, when aggregating several scope 3 TS to a headline TS.
5. This means that for instance for a target set with the sectoral decarbonization approach (SDA) (Science Based Targets initiative, 2022), the target will be assessed based on the reduction ambition of the target and mapped to the scenarios that the Temperature Scoring methodology uses for the particular industry, as laid out in Table 4 in Section 5.1.
6. Engagement type targets such as portfolio coverage and supplier engagement cannot be scored unless these targets can be converted to GHG emissions reduction ambition. If no such conversion is possible, these targets will be given default scores.
7. Temperature score targets using the CDP–WWF temperature score method will inherit its current or most recently calculated temperature score.
    a. If underlying assets for this temperature score is available, these assets are reprocessed and be given an up-to-date temperature score, as described in Section 6.4.1.

6.4.1. Aggregation of multiple scope 3 temperature scores

As GHG emissions data for the individual scope 3 targets are often not available, the method cannot apply the same approach as described in target aggregation, where share of GHG emissions is used as weights. Therefore, the method also allows for an equal weight average to aggregate multiple scope 3 targets:

- GHG emissions, or
- Equal weight average.

This means that if GHG data is available, the method weights multiple scope 3 targets using Equation 6:

Equation 6: Aggregation of multiple S3 TS

$$S3\ TS = \frac{(S3\ TS_1) \times (S3\ GHG_1) + (S3\ TS_2) \times (S3\ GHG_2) + \cdots + (S3\ TS_n) \times (S3\ GHG_n)}{S3\ GHG}$$

and,

$$GHG = \sum_{i}^{n} GHG_i$$

Note that current GHG emissions data must be present for all scope 3 categories for which there are targets, if weighting of TS with GHG is to be performed. If GHG data is lacking, the weighting will be done using the equal weight mean of TS for the timeframe in question.

6.5. Temperature score aggregation

The method accepts targets that cover either a single scope or the combinations of scopes 1+2, scopes 1+3, scopes 2+3, and scopes 1+2+3. Temperature scores are calculated for each validated target. The temperature scores are then aggregated using the company's current GHG data into a combined score for each scope and scope combination and time frame.

To combine single scope TS to combined scope TS, the single scope TS are aggregated by the scope's weighting in the company's GHG profile, for instance:

$$S123\ TS = \frac{(S1\ TS) \times (S1\ GHG) + (S2\ TS) \times (S2\ GHG) + (S3\ TS) \times (S3\ GHG)}{S1\ GHG + S2\ GHG + S3\ GHG}$$

where:
S = scope
S123 = scope 1, 2, and 3
TS = temperature score
GHG = greenhouse gas emissions in the current year

Combined TS, e.g., scope 1 and 2, can also be further aggregated into a full combined scope 1, 2, and 3 TS, as in this example:

Equation 7: Temperature score aggregation

$$S123\ TS = \frac{(S12\ TS) \times (S12\ GHG) + (S3\ TS) \times (S3\ GHG)}{S1\ GHG + S2\ GHG + S3\ GHG}$$

where:
S12 = scope 1 and 2

6.6. Using temperature scores

Depending on the option chosen for timeframe coverage, up to 15 temperature scores can be calculated per company based on target timeframe and scope coverage.

The mid-term timeframe is considered the key timeframe as it currently represents the main period for corporate ambition and aligns with the SBTi's target setting criteria of 5–10 years from the reporting year. The short and long-term scores can be used to better understand if companies have more immediate and longer-term goals in place.

See Annex 4: Calculation examples, which illustrates how these scores are calculated.

7. Step 3: Portfolio scoring

The final step of the temperature scoring method describes the portfolio scoring step, including the different weighting options for aggregating the temperature scores of companies at an index or portfolio level.

Portfolio scores are calculated by aggregating TS of the same timeframe. Several weighting options are provided, that may be used in different applications.

7.1. Weighting objectives and principles

Before developing weighting approaches, a set of objectives were first developed to help evaluate proposed weighting options (Table 8).

Table 8: Default weighting method objectives

Objective	Description
Enable Net-zero / Paris alignment	The method should emphasize climate impact and support investors in accurately assessing the °C temperature score of an index or a portfolio and in aligning their investments with a 1.5°C pathway.
Support better disclosure of GHG emissions by corporations	The method should foster more and higher quality disclosure of GHG emissions along the entire value chain (scope 1+2+3) by global corporations.
Support standardization of methods	The method should be aligned with existing portfolio GHG accounting methods.

In addition to meeting these objectives, the default weighting method should best adhere to a set of weighting principles, presented in Table 9.

Table 9: Default weighting principles

Principle	Description
Comparability	Results should be comparable across different asset classes, where applicable, and investment products.
Applicability	Investors should be able to perform the aggregation at a reasonable cost with public / accessible data.
Reliability	The weighting method should produce results which are reliable and verifiable.
Clarity	The weighting method should be understandable and practical to implement.

Timeliness	The weighting method should produce results that are timely and current.
Completeness	The weighting method should allow for complete portfolio assessments.

7.2. Weighting options

Seven potential options for aggregating individual company temperature scores at the index / portfolio are currently included in the method. These include:

- Option 1: Weighted average temperature score (WATS)
- Option 2: Total emissions[21] weighted temperature score (TETS)
- Option 3: Market Owned[22] emissions weighted temperature score (MOTS)
- Option 4: Enterprise Owned[23] emissions weighted temperature score (EOTS)
- Option 5: EV + Cash emissions weighted temperature score (ECOTS)
- Option 6: Total Assets emissions weighted temperature score (AOTS)
- Option 7: Revenue owned emissions weighted temperature score (ROTS)

Table 10 provides a description and formula for calculating the portfolio temperature scores using each of these options.

[21] The total of a company's scope 1, 2, and 3 reported and modelled GHG emissions of the latest reporting period.
[22] Based on a company's market capitalisation, i.e., the total euro market value of a company's outstanding shares of stock. Commonly referred to as "market cap", it is calculated by multiplying the total number of a company's outstanding shares by the current market price of one share.
[23] Based on Enterprise value (EV). EV is a measure of a company's total value and includes in its calculation the market capitalisation of a company but also short-term and long-term debt.

Table 10: Details of portfolio aggregation methods

Weighting Option	Method	Temperature score formula (where TS = Company temperature score)
Weighted average temperature score (WATS)	Temperature scores are allocated based on portfolio weights	$\sum_{i}^{n}(Portfolio\ weight_i \times TS_i)$
Total emissions weighted temperature score (TETS)	Temperature scores are allocated based on historical emission weights using total company GHG emissions	$\sum_{i}^{n}\left(\frac{Company\ emissions_i}{Portfolio\ emissions}\ x\ TS_i\right)$
Market Owned emissions weighted temperature score (MOTS)	Temperature scores are allocated based on an equity ownership approach	$\sum_{i}^{n}\left(\left(\frac{\frac{Investment\ value_i}{Company\ market\ cap} \times Company\ emissions_i}{Portfolio\ market\ value\ owned\ emissions}\right) \times TS_i\right)$
Enterprise Owned emissions weighted temperature score (EOTS)	Temperature scores are allocated based on an enterprise ownership approach	$\sum_{i}^{n}\left(\left(\frac{\frac{Investment\ value_i}{Company\ enterprise\ value} \times Company\ emissions_i}{Total\ enterprise\ owned\ emissions}\right) \times TS_i\right)$
Enterprise Value + Cash emissions weighted temperature score (ECOTS)	Temperature scores are allocated based on an enterprise value (EV) plus cash & equivalents ownership approach	$\sum_{i}^{n}\left(\left(\frac{\frac{Investment\ value_i}{Company\ EV + Cash} \times Company\ emissions_i}{Total\ EV + Cash\ owned\ emissions}\right) \times TS_i\right)$
Total Assets emissions weighted temperature score (AOTS)	Temperature scores are allocated based on a total assets ownership approach	$\sum_{i}^{n}\left(\left(\frac{\frac{Investment\ value_i}{Company\ Total\ Assets} \times Company\ emissions_i}{Total\ Assets\ owned\ emissions}\right) \times TS_i\right)$

Revenue owned emissions weighted temperature score (ROTS)	Temperature scores are allocated based on the share of revenue	$\sum_{i}^{n}\left(\left(\frac{\frac{Investment\ value_i}{Company\ Revenue} \times Company\ emissions_i}{Total\ Revenue\ owned\ emissions}\right) \times TS_i\right)$

The denominators in the formulas presented in Table 10 are defined as follows:

TETS: Portfolio GHG emissions are the sum of the portfolio company GHG emissions.

MOTS: Portfolio market value owned GHG emissions is the sum of portfolio company owned GHG emissions weighted on the market cap of investee companies.

EOTS: Total enterprise owned GHG emissions is the sum of portfolio company owned GHG emissions weighted on the enterprise value of investee companies.

ECOTS: Total EV + Cash owned GHG emissions is the sum of portfolio company owned GHG emissions weighted on the enterprise value + cash of investee companies.

AOTS: Total Assets owned GHG emissions is the sum of portfolio company owned GHG emissions weighted on the total assets of investee companies.

ROTS: Revenue owned GHG emissions is the sum of portfolio company owned GHG emissions weighted on the share of revenue of investee companies.

7.3. Weighting method assessment

The analysis presented in this section is the result of assessments developed for version 1.0 of this methodology (CDP–WWF Temperature Rating Methodology). In-depth revision of weighting options was not part of the update to version 1.5. Future versions may consider providing more guidance on weighting options and related analysis. Therefore, this section is unchanged from version 1.0.

In Table 11, each proposed weighting method is compared against the objectives outlined in Section 7.1 (Table 8).

Table 11: Assessment of options against weighting objectives

Objective	WATS	TETS	MOTS	EOTS	ECOTS	AOTS	ROTS	Comment
Enable Net-zero / Paris alignment	✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	Exposure to high impact companies is best reflected under TETS; exposure under the ownership methods could be masked by high market cap / EV / revenue, etc., of these companies.
Support better disclosure of GHG emissions by corporations	✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	WATS does not take current GHG emissions into account, therefore the incentive for companies to report is lower.
Support standardisation of methods	✓✓✓	✓	✓✓✓	✓✓	✓✓✓	✓✓	✓✓	WATS aligned to TCFD's[24] main recommended WACI method for measuring the carbon intensity of a portfolio. MOTS aligned to TCFD's approach for carbon footprinting. ECOTS aligned to PCAF[25] method for carbon footprinting of listed equities and corporate debt.

Table 12 provides an assessment of each option against the principles outlined above.

[24] TCFD (Task Force on Climate-related Financial Disclosures, 2017): Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures
[25] PCAF (Partnership for Carbon Accounting Financials, 2019): Accounting GHG emissions and taking action: harmonised approach for the financial sector in the Netherlands

Table 12: Assessment of options against weighting principles

Objective	WATS	TETS	MOTS	EOTS	ECOTS	AOTS	ROTS	Comment
Comparability	✓✓✓	✓✓✓	✓	✓✓	✓✓	✓✓✓	✓✓✓	MOTS cannot be applied to corporate bonds. EOTS and ECOTS are not always meaningful as e.g. EV is not widely used for banks.
Applicability	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	TETS requires GHG data, the ownership methods require GHG and additional corporate financial data. Specific corporate financial data may be difficult to obtain for non-listed companies.
Reliability	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	All options besides WATS are based on self-reported and modelled GHG data.
Clarity	✓✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	Ownership based methods reduces transparency / results are somewhat less intuitive.
Timeliness	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	All options besides WATs are dependent on timely GHG data.
Completeness	✓✓✓	✓✓	✓	✓	✓	✓	✓	TETS dependent on GHG data for all portfolio companies; The ownership approaches (MOTS, EOTS and ECOTS) require additional corporate financial data.

The AOTS and ROTS methods best support the stated objectives whereas WATS is the least supportive method. In contrast, WATS is better aligned to the principles compared to the ownership approaches. Yet, some of the related disadvantages of EOTS/ECOTS/AOTS/ROTS would be less significant with better corporate reporting of GHG emission inventories.

7.4. Additional notes on the portfolio scoring

Double counting: Potential double counting of GHG emissions and their respective targets when weighting and aggregating temperature scores should not impact the validity of this metric. A TS is reflective of the climate target ambition of a company and/or a portfolio. This methodology provides temperature scores at the most disaggregated, single-scope level over different target timeframes, allowing flexibility for users to consider all scopes of a given company or portfolio as relevant. Yet, the company-level score is representative of a company's total ambition, across all scopes.

8. Limitations and outlook

While temperature scores computed according to this methodology provide a robust assessment of a company's GHG emissions reduction ambition, they also come with inherent limitations. The following section will elaborate on this methodology's main limitations.

8.1. Methodology limitations

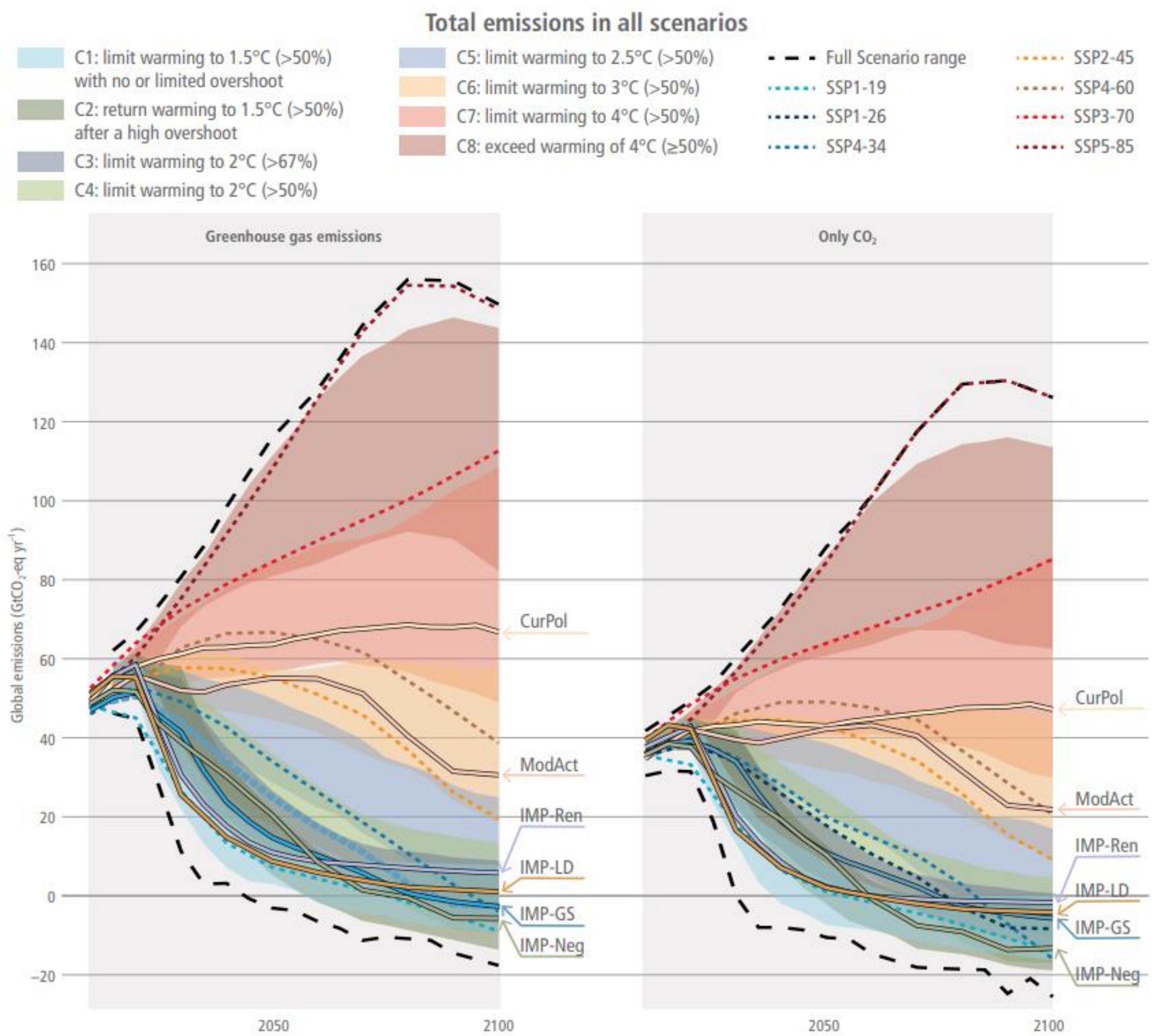
8.1.1. Linear regression model

The use of a linear regression model to evaluate the relationship between annual reduction rates of GHG emissions and projected temperature outcomes is a simplification choice that has inherent limitations.

First, the AR6 scenarios that form the basis of the linear regression models are different in their respective underlying assumptions, and the purpose of the scenarios is not necessarily to combine them in one linear regression, aiming to explain such as relationship. It is expected that this general limitation will be true for any approach that uses several scenarios to evaluate GHG targets, the reason being that benchmarks must either be based on a single scenario or some statistical averaging of scenario results.

Second, a linear regression model is applied to AR6 scenarios' variables that, as illustrated in Figure 5, do not follow a linear pathway. To capture part of that curvature, the regression models are applied to various time horizons. For short term horizons, however, the model fit is lower because a wider range of annual reduction rates could lead to similar end-of-century temperature outcomes.

Figure 5: Example of GHG and CO2 emissions pathways for a subset of scenarios, for illustrative purposes only (Source: Figure 3.10 IPCC AR6 Chapter 3)



Finally, other models – e.g., an exponential decay model – might provide a better fit to the CAR, as observed in Figure 2. The trade-off is an additional complexity in the application of the methodology and coefficients that can be less intuitive to interpret (see Box 1: from LAR to CAR in Section 4.2).

8.1.2. Formula to compute annual reduction rates

The calculation of annual reduction rates is a central part of this methodology. However, it has inherent limitations.

There are different definitions of annual rate of change, and this choice has implications on the model. Both linear annual reduction (LAR) and compounded annual reduction (CAR) present their own advantages and disadvantages. The LAR has a lower variance compared to the CAR, especially for long time horizons, which improves the fit of the linear model. As an example, 99% over 30 years and 90% over 30 years have a respective LAR of 3.3% and 3.0%. For similar percentage changes, the respective CAR are −14.2% and −7.4%. Additionally, the LAR can handle targets of −100% which is not feasible with the CAR.

On the other hand, the linearity implied by the LAR is in contradiction with the scientific understanding that early action (reducing emissions in the next several years) is crucial to achieve 1.5°C with limited overshoot. A constant annual reduction in absolute tons of GHG emissions suggests that the efforts should be spread equally over the years. In relative terms, for LAR, the reductions in early years would represent a much smaller share of current year emissions than at the end of the target period. On the other hand, the CAR implies a constant share of reductions out of the current year's emissions, but a larger initial reduction in absolute terms in the early years of the target period. While the LAR and the CAR should both lead to the same GHG emissions level at the end of the target period, the impact on cumulated carbon budget can be significantly different. It is worth noting that neither of these two applications can accurately capture the carbon budget associated with the different scenarios.

Alternative solutions to address the challenges of assessing 100% and near 100% reduction targets with the CAR need to be explored. It is worth noting, however, that this specific case will occur only when companies plan to reduce 100% of emissions and covering 100% boundary. While the model currently does not treat gross and net targets separately (as per Section 8.1.6), the plausibility of a case where companies can achieve zero emissions should be further discussed. In the AR6 database of scenarios, there are 1,115 scenarios with Kyoto gases data available. Out of those 1,115 scenarios, three scenarios imply that GHG emissions (Kyoto gases variable) reach zero tons or less in 2050.

8.1.3. Sector granularity

Currently, most companies' target ambition is assessed against a cross-sectoral benchmark (except for power generation and minor exceptions for cement/steel/aluminum companies, see Section 4.2.1). Likewise, the applied default score of 3.4°C to companies with no or no valid target data is applied consistently, without differentiating by a company's sector affiliation.

Developing warming functions for sectors requires a minimum of available sectoral climate scenarios. Currently, the AR6 Scenarios Database does not provide sufficient sector-specific variables that fit a linear regression model, nor are they designed with the main aim to project a sectoral GHG trajectory useful for benchmarking. Whether the inclusion of scenarios with more sector granularity provided by other institutions (e.g., International Energy Agency) will result in enough input data for constructing sectoral warming functions has to be investigated.

The choice of applying a uniform default score is an interim solution to enable the generation of portfolio-level temperature scores by also weighting companies that do not have valid, forward-looking targets. However, it can be argued that companies with an already low-emission profile are unfairly scored with a 3.4°C TS, even in the absence of any climate target, unjustifiably worsening the portfolio temperature score. This potential flaw could be addressed with a sector-specific default temperature score for each sector. Companies operating in these sectors that have no valid targets would then be assumed to decarbonize along the sector averages. Whilst reasonable from a climate performance and contribution perspective, the temperature score – as introduced by this methodology – aims to score a company's climate target ambition and set incentives accordingly. Moreover, new types of target metrics are being introduced by relevant climate frameworks to equip those low-carbon companies with more suited target metrics (e.g., "maintenance targets"). Finally, this methodology scores climate targets across all emission scopes (scope 1–3). This means, the emission performance or contribution of all emission scopes of a company must inform a potential sector-specific default score. Future solutions will need to balance adequacy target incentivisation.

8.1.4. Climate target metric(s)

This methodology allows scoring absolute and intensity GHG emission reduction targets. Other metrics used for climate target setting, such as procurement, engagement, renewable electricity targets, etc. as well as long-term qualitative commitments cannot be scored currently – partly due to a lack of suitable variables in AR6 scenarios. Temperature scores might therefore not capture a company's whole climate ambition. Yet, one could argue that any climate target set using other metrics should materialize in absolute and / or intensity GHG emission reduction.

Relying only on GHG emission reduction targets might come with further limitations: the assessment of one metric type, GHG emission reductions, does not necessarily provide the full picture of a company's alignment with long-term or structural changes needed to meet the temperature goals of the Paris Agreement. For example, two approaches to reducing power related GHG emissions by 30% in 10 years (e.g., 2020–2030) may correspond to very different outlooks for the subsequent 10 years (e.g., 2030–2040) based on the lifespan of assets, etc., which are not captured by GHG emissions targets. This uncertainty can be reduced by assessing the temperature alignment of all short-, mid-, and long-term GHG emission reduction targets for a company in cases where they have been disclosed and to consider further metrics informing a company's actions taken to transition.

8.1.5. Forward- versus backward-looking assessment

Providing companies with a temperature score based on the ambition of stated targets implicitly assumes that the targets will be met. If the targets are not met, companies may be given unfairly low temperature scores. The converse is also true; if companies exceed GHG reduction targets, their scores are biased high.

Moreover, the methodology only scores companies based on their forward-looking ambition as indicated by GHG targets without considering prior actions the company has taken to reduce GHG emissions. This might penalise companies that have already reduced GHG emissions considerably and whose cost of emissions reductions will likely increase as low-cost / high-return options are already exhausted. Besides “early movers”, companies that, by nature of their business model, are already operating at low emissions might similarly be disadvantaged.

Due to those limitations, FIs are well advised to consider further complementary climate metrics of companies (e.g., metrics tracking past and current emissions and climate performance). Further research will explore approaches combining forward-looking and backward-looking indicators.

8.1.6. Carbon credits and carbon offsets

Currently, temperature scores based on this methodology do not capture whether and to what extent carbon credits and offsets are built in a company’s climate target. This means, companies that have a higher ambition in numeric terms but relying on carbon credit and / or offsets to achieve this higher GHG reduction commitment might be unfairly rewarded with a better temperature score compared to companies with lower numeric GHG reduction ambition, though building on own mitigation efforts along the value chain only. One main constraint to solve this issue is the lack of data around carbon credits and offsets usage by companies. With the expected increase in transparency of climate related disclosure by companies worldwide, future updates of this methodology will aim to explore the treatment of carbon credits and offsets in climate targets. Specifically, whether and how temperature scores can be adjusted to reflect carbon credits and offsets usage will be part of future research.

8.1.7. Assurance of GHG and GHG reduction target data

GHG emission data considered for computing TS according to this methodology is not required to have some level of assurance. This means reported GHG emission data is taken at face value. There is evidence that non-assured carbon accounting underestimates actual emissions and that assurance has an influence on a company reducing future emissions (Berg et al., 2024[26]). Future research might explore how to account and potentially adjust for assurance in this context.

8.2. Outlook: Next steps and future research

This version represents an updated version of the CDP-WWF Temperature Rating methodology (version 1.0, released in October 2020) (CDP & WWF, 2020). This methodology will continue to evolve over time to include latest climate science in addition to further improvement to address current methodological limitations.

Future versions may consider further development and research on the following issues:

- Expand the assessment scope to include backward-looking indicators (in terms of past emission performance tracking and/or progress against targets).
- Adequacy and possibility of developing non-linear models, which might give a better fit.

[26] Accessible through this link: http://dx.doi.org/10.2139/ssrn.4734240.

- Exploring the possibility of developing sector-specific warming functions for more adequate benchmarking.
- Enhance sector representativity of default scores (sector-specific default scores), including for low-emitting companies (e.g., renewable energy producers, clean transport solutions, energy storage, climate solutions, etc.).
- Further guidance on portfolio aggregation approaches for different applications (e.g., scoring an equity portfolio vs. an index).
- Increase the assessment scope of climate target metrics (e.g., renewable energy consumption targets), including exploring a potential default treatment of SBTi targets.
- Account for the usage of carbon credits in company climate targets.

9. Version control

Table 13: Document version history

Version Name	Description	Date published
Consultation method	Draft method published to coincide with the method consultation period which ran from April 30 – May 22, 2020.	April 30, 2020
Beta method	Beta version to be used for testing.	June 30, 2020
Version 1.0	Updated methodology incorporating feedback from beta testing process.	October 1, 2020
Version 1.5 consultation	Updated methodology. See Table 14: Change log.	May, 2024
Version 1.5	Updated methodology incorporating feedback from public consultation.	July, 2024

9.1. Change log

Main changes from version 1.0 to version 1.5 are summarized in Table 14: Change log.

Table 14: Change log

Section	Version 1.5	Version 1.0
1.2.	Method purpose and limitations	n/a
4.2.	Changed from LAR (linear annual reduction) to CAR (compound annual reduction)	LAR formula (1.3.)
5.	AR6: Update model simulations with scenarios to latest IPCC Sixth Assessment report	SR15: Based on IPCC Special Report 1.5°C
5.2.	Emissions reduction ambition of zero or less gets a TS equal to intercept	n/a
5.2., 5.3.2	All climate model simulations with scenarios that passed IPCC' s vetting process are considered sufficient criteria for selecting the scenarios for the linear regression models	SR15 model simulations with scenarios were filtered before the linear regression models were generated, based on a set of normative precautionary preferences concerning overshoot and the level of CDR
5.3.	Default score 3.4°C to reflect CAT (Climate Action Tracker) projection December 2023	Default score 3.2°C to reflect CAT projections December 2019
5.3.1.	Update sector variables/benchmarks and associated regression models and clarification of sector benchmarks. The sector variables were selected and allocated to a sector based on a combination of data availability, how well the AR6 variable was suitable to the specific sector and the fit of the linear regression model. Sector variables/benchmarks available: Power Generation (absolute and intensity), Cement/Steel/Aluminium (absolute)	Limited sector variables/benchmarks based on SR15 data
5.3.1.	Introducing a linear regression model for Scope 2 targets (for all sectors). The two variables applied for absolute	n/a

	and intensity targets: Emissions | CO2 | Energy | Supply and Emissions | CO2 | Energy | Supply / Secondary energy	
5.4.	Introduction of a temperature score floor at 1.5°C	n/a
6.1.	Introducing target vintage and reduction ambition criteria for target selection for scoring	Target quality criteria (2.1.)
6.1.2.	All targets are now calculated on a pro-rata basis, based on boundary coverage and CAR is adjusted accordingly	Target boundary of 67% and 95% respectively were treated as full targets. LAR was adjusted if boundary coverage was below these thresholds
6.1.6.	- Short term for targets with target year (TY) < 5 years - Mid-term for targets with 5 ≤ TY < 10 years - Long term for targets with TY ≥ 10 years	Broader mid-term definition including targets with target years in 5–15 years
6.1.6.	Targets are now valid during the calendar year when the target expires	Targets were not valid in end year
6.2.	New target criteria waterfall with target vintage as first consideration	Target vintage was not considered for target selection. Boundary coverage was a more important criterion
6.3.	Introducing explicit target criteria waterfall to prioritize target selection	Less detailed target filtering
6.3.	Introducing aggregation for single scope targets for all scopes	Less flexible target aggregation based on combined scope 1 and 2 targets and separate scope 3 targets
8.2.	Method roadmap	n/a
12.1	Warming function vs single scenario	n/a
12.5	Data requirements	n/a

10. Consultation questions

Please fill in the survey here: https://forms.office.com/e/rMbZEYFnba

10.1. Step 2b

10.1.1. Should older targets be considered in the absence of recent target data?

In the target criteria waterfall (Section 6.3) target vintage is determined as the most important criteria for target selection. Following this hierarchy, the methodology would use whatever the company has communicated publicly most recently about their targets as input in the target validation process.

At times, companies communicate targets for different scopes at different times and they may update and restate parts of their targets at different times. For example, company A has set a combined scope 1 and 2 targets in 2021. At the same time, they also set a scope 3 target. Two years later, in 2023, the company updates its scope 1 and 2 targets. For the scope 3 target should the methodology:

A) Be conservative and assume that the scope 3 target is no longer valid, as the company has not confirmed that the old scope 3 target is still active, or
B) Assume that the scope 3 target is still active, even though the company has only communicated about scope 1 and 2 and not actively restated the old target.

One rationale supporting option A is to better capture potential corporate strategy changes, e.g., due to CEO changes, or changes in political context, which could imply a withdrawal, or an ambition pause. The assumption that companies would likely report active targets in their updated target, further supporting option A.

On the contrary, option B would allow to cover cases where companies do not expressly reiterate targets from one year to the next in their annual reports – a company could set a scope 1+2 target in year N and announce a scope 3 target in year N+1 without formally reiterating that the recently set scope 1+2 target remains active. Option B gives companies more leniency by looking at the latest available target per scope component, while option A incentivizes consistent, thorough target communication.

10.1.2. Should TS aggregation based on GHG weighting be conducted based on base year or current year data?

For combined TS, version 1.0 of this methodology is used to weigh scope 1 and 2 TS using base year emissions. The resulting scope 1+2 TS would then be aggregated with the scope 3 TS to calculate a scope 1+2+3 TS, and that aggregation was carried out using current year GHG data (mostly because scope 1+2 and scope 3 targets might have very different base years, as well as due to the volatility of scope 3 data).

This version 1.5 currently envisages to aggregate all single-scope TS (as opposed to combined 1+2 TS with scope 3) using only current year GHG data. The benefit is that GHG weighting is consistent across all scopes, and reflects the latest available data as well as the scope breakdown evolution over the target's lifetime. It also provides better consistency in terms of GHG accounting.

The drawback is that this creates a discrepancy between the way other target parameters are calculated (namely ambition and boundary coverage, which rely on base year data). This also means that a combined scope TS will evolve over the target's lifetime, as the breakdown between scope 1 and scope 2 changes (in some cases, this can result in scope 1+2 TS marginally increasing if the company delivers on the scope component with the higher ambition – i.e., the part of the target that had the most positive influence on the TS in the first place).

A) I agree with the approach proposed for Version 1.5.
B) I think there are alternative aggregation approaches that are more appropriate. Please explain.

10.1.3. Aggregation when missing GHG data

There may be cases where a company's targets produce valid TS for single scopes, but where GHG data is missing for the aggregation step. In such cases, there are two options the method can use:

i) Assign a default score to the combined TS (for example scope 1 TS = 1.8 and scope 2 TS = 1.5 would be combined to a scope 1+2 TS of 3.4). This option accentuates the necessity for companies to improve their reporting of GHG emissions.
ii) Use a function such as MAX(TS_1, TS_2), whereby the example above would give a scope 1+2 TS of 1.8. This is mathematically reasonable as the average must be somewhere between TS_1 and TS_2. Furthermore, this option would contribute to a portfolio score which is closer to the actual ITR performance of the portfolio and it would also give recognition to the fact that valid targets have been set.

In your opinion, which alternative is the most reasonable?

A) Alternative i) is the more reasonable approach, or
B) Alternative ii) is the more reasonable approach.

10.1.4. Weighting of multiple scope 3 targets

As GHG emissions data is often not available for individual scope 3 targets, an alternative aggregation approach is needed, to be able to score a companywide scope 3 target. In Chapter 6, the method allows for the use of an equal weight average as described in Section 6.4.1.

A) I agree with this approach
B) I think there are alternative aggregation approaches that are more appropriate. Please explain.

10.1.5. Scoring of portfolios including targets using the CDP–WWF Temperature Score- or Temperature Rating methodology

Do you agree with the scoring approach taken in step 2b, section 6.2.3.1. (see "Target type exception")?

10.1.6. Do you agree with the scoring approach taken in Step 2b, Section 6.3.3.1. (see "Target type exception")? If not, what alternative suggestion do you have?

10.1.7. Do you agree with the general approach taken in Step 2b, Chapter 6 "Company scoring"?

Yes or No. If no, please explain.

10.2. Step 1

10.2.1. Do you agree with the approach taken in Step 1, "Create benchmarks"?

Yes or No. If no, please explain.

10.3. Step 2a

10.3.1. Do you agree with the approach taken in Step 2a, Chapter 5 "Target validation"?

Yes or No. If no, please explain.

10.4. Step 3

10.4.1. Do you agree with the approach taken in Step 3, Chapter 7 "Portfolio scoring"?

Yes or No. If no, please explain.

10.5. General questions

10.5.1. Do you have suggestions for future research that could inform the next version of the CDP–WWF Temperature Score methodology?

10.5.2. Do you have any other comments?

11. References

Berg, F., Oliver Huidobro, J., & Rigobon, R. (2024). *On the Importance of Assurance in Carbon Accounting* (S&P Global Market Intelligence Research Paper Series). S&P Global Market Intelligence. https://ssrn.com/abstract=4734240

Byers, E., Krey, V., Kriegler, E., Riahi, K., Schaeffer, R., Kikstra, J., Lamboll, R., Nicholls, Z., Sanstad, M., Smith, C., van der Wijst, K.-I., Al Khourdajie, A., Lecocq, F., Portugal-Pereira, J., Saheb, Y., Strømann, A., Winkler, H., Auer, C., Brutschin, E., … van Vuuren, D. (2022). AR6 Scenarios Database hosted by IIASA. *International Institute for Applied Systems Analysis*. https://doi.org/10.5281/zenodo.5886911

CDP Worldwide & WWF International (2020, April 24). *Temperature Rating Methodology A temperature rating method for targets, corporates, and portfolios*. https://cdn.cdp.net/cdp-production/comfy/cms/files/files/000/003/741/original/Temperature_scoring_-_beta_methodology.pdf.

Climate Action Tracker (2023). *Warming Projections Global Update*. https://climateactiontracker.org/documents/1187/CAT_2023-12-05_GlobalUpdate_COP28.pdf

Intergovernmental Panel on Climate Change (IPCC) (Ed.). (2023). *Annex III: Scenarios and Modelling Methods. In Climate Change 2022 - Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 1841–1908). Backmatter, Cambridge: Cambridge University Press. https://dx.doi.org/10.1017/9781009157926

Intergovernmental Panel on Climate Change (IPCC) (Ed.). (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. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg3/chapter/chapter-2/*

Liljedahl, I., & Rondahl, E. (2022). *Evaluation of warming function vs single scenario* [Master's thesis, KTH]. DIVA. https://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-318130

Science Based Targets initiative. (2022, August). *Financial Sector Science-Based Targets Guidance version 1.1.* https://sciencebasedtargets.org/resources/files/Financial-Sector-Science-Based-Targets-Guidance.pdf

Science Based Targets initiative. (2024, March). *SBTi Corporate Net-Zero Standard version 1.2.* https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf

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

World Business Council for Sustainable Development & World Resources Institute. (2015). *The Greenhouse Gas Protocol. A Corporate Accounting and Reporting Standard. Revised Edition.* https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

12. Annex

Annex 1: Warming Function versus Single Scenario

When it comes to temperature alignment assessments, there are two related approaches to benchmark construction: the Warming Function approach and the Single Scenario approach.

The **Warming Function approach** (upon which this methodology relies) involves choosing a set of suitable climate scenarios based on the company's sector and target scope(s). A function of the scenario set is constructed using a regression, which is then used as a benchmark for assessing company alignment. The Warming Function relies on the Contraction Approach (or Rate of Change approach), whereby all companies are expected to decarbonize at the same pace (within a sector – this methodology provides four sector-specific benchmarks – or the wider economy) along a linear path. The company's annual rate of GHG emissions reduction (as implied by its targets) is then compared to the Warming Function's benchmark.

This approach reduces the risk of scenario selection bias in the benchmark construction (essentially by taking a diversification approach to scenario selection, akin to portfolio management). The warming function approach also makes it easier to compare temperature scores from different sources, as scenario selection has less impact on the resulting temperature score. This way, the Warming Function approach helps harmonizing the market and provides necessary conditions for standardized temperature scores. This could help reducing some of the criticism ESG metrics have received recently and drive acceptance in the marketplace for ESG metrics in general and temperature scores in particular.

However, the warming function approach has drawbacks. It requires a higher number of varied climate scenarios and tends to be less case-specific, which can lead to less accurate results. For example, assessing a cement company and a wind power company based on the same benchmark would yield an unfair result due to the different emission reduction levels required by these sectors. In addition, the warming function approach has been criticized for its lack of transparency. It has been perceived as a "black box", as the implications of and dependencies of the ITR results on the different underlying scenario assumptions are difficult to understand.

In the **Single Scenario approach**, a single scenario is chosen as a benchmark, which can be adapted to a specific company and target. This allows for a granular assessment of the target alignment to the chosen scenario. However, it also opens the possibility for bias, as the scenario can be chosen to benefit the company and the targets assessed. It also involves an inherent overreliance on the assumptions of one scenario, which is all the more problematic if a scenario is chosen relying on assumptions which ultimately might not be plausible.
The Single Scenario method can either rely on:

- the **Contraction/Rate of Change Approach** (as does the Warming Function),

- the **Convergence Approach**, whereby the physical GHG emissions intensities of companies within a sector are expected to converge towards the same sectoral value over time, and
- the **Fair Share Budget Approach**, which combines a Rate of Change with a Carbon Budget Approach. To compute a temperature score, the company's rate of change and its cumulative GHG emissions are compared to their assigned budget, often calculated through its market share.

While scenarios chosen for a Single Scenario analysis are generally more detailed in terms of sector granularity, regions, and units available for analysis, they can infer a false sense of security for users, and lead to misinterpretation due to the significant variations in available mitigation pathways. In other words, even though the motivation for selecting certain assumptions might seem robust, the alignment result would be highly dependent on those assumptions to materialize. It is also worth mentioning that scenarios chosen for a Single Scenario analysis can also be used in a scenario sample applied in a Warming Function.

Recent research conducted at KTH, the Royal Institute of Technology, Stockholm, Sweden (Liljedahl & Rondahl, 2022), concluded that the influence of scenario selection on the company-level outcome was very high, with some temperature scores varying by 0.95°C depending on the scenario used (which represents up to 50% of the range of temperature scores expected from the CDP–WWF Temperature Score methodology, i.e. from the temperature floor of 1.5°C to the 3.4°C default score.

According to Liljedahl and Rondahl (2022), because scenarios present only a certain trajectory based on a set of assumptions and not a range of outcomes with associated probabilities, a scenario cannot replace a thorough analysis of different outcomes.

The research by Liljedahl and Rondahl (2022) concludes that Warming Functions enable less bias in the choice of scenarios, but also finds that under such methodologies, companies within different sectors are often assessed against the same cross-sectoral benchmark. Ultimately, Liljedahl and Rondahl recommend introducing more sectoral granularity in Warming Function methodologies. The CDP–WWF Temperature Scoring Methodology currently includes sector warming functions for power generation, steel, aluminium and cement. For version 2.0 CDP and WWF intend to introduce more sector warming functions, as described in Section 8.1.3.

Annex 2: Details of sector variables

Table 15: Details of sector variables

Name of AR6 variable	Name of AR6 variable in code	Description of variable
Emissions | Kyoto Gases	Emissions|Kyoto Gases	Emissions including the seven GHG gases under the Kyoto Protocol; Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6), Nitrogen trifluoride (NF_3).
Emissions | Kyoto Gases / GDP | PPP	INT.emKyoto_gdp	Emissions including the seven GHG gases under the Kyoto Protocol (see above) divided by gross domestic product.
Emissions | CO_2 | Energy | Supply	Emissions|CO_2|Energy|Supply	CO_2 emissions from fuel combustion and fugitive emissions from fuels: electricity and heat production and distribution, other energy conversion (e.g., refineries, synthetic fuel production, solid fuel processing, incl. pipeline transportation, fugitive emissions from fuels and emissions from carbon dioxide transport and storage (Byers et al. 2022).
Emissions| CO_2 | Energy | Supply / Secondary energy	INT.emCO_2energysupply_SE	CO_2 emissions from fuel combustion and fugitive emissions from fuels: electricity and heat production and distribution, other energy conversion (e.g., refineries, synthetic fuel production, solid fuel processing incl. pipeline transportation, fugitive emissions from fuels and emissions from carbon dioxide transport and storage divided by the total secondary energy – (the sum of all secondary energy carrier production)) (Byers et al., 2022).
Emissions | CO_2 | Energy and Industrial Processes	Emissions|CO_2| Energy and Industrial Processes	CO_2 emissions from energy use on supply and demand side and from industrial processes (Byers et al., 2022).

Annex 3: Result of linear regression model

The figures below show the result of the linear regression model for the variable Emissions | Kyoto Gases (applied as a default variable for all sectors for scope 1 and scope 3 targets) for the 5- to 30-year time horizon (with a 5-year interval). The time frames that are used in this methodology are 5-year (for short term targets), 10-year (for medium term targets) and 30-year (for long term targets). To demonstrate the pattern of the linear regression model across time, all time frames are shown in figures 6–11.

Figure 6: Result of the linear regression model for Emissions | Kyoto Gases for a 5-year time frame

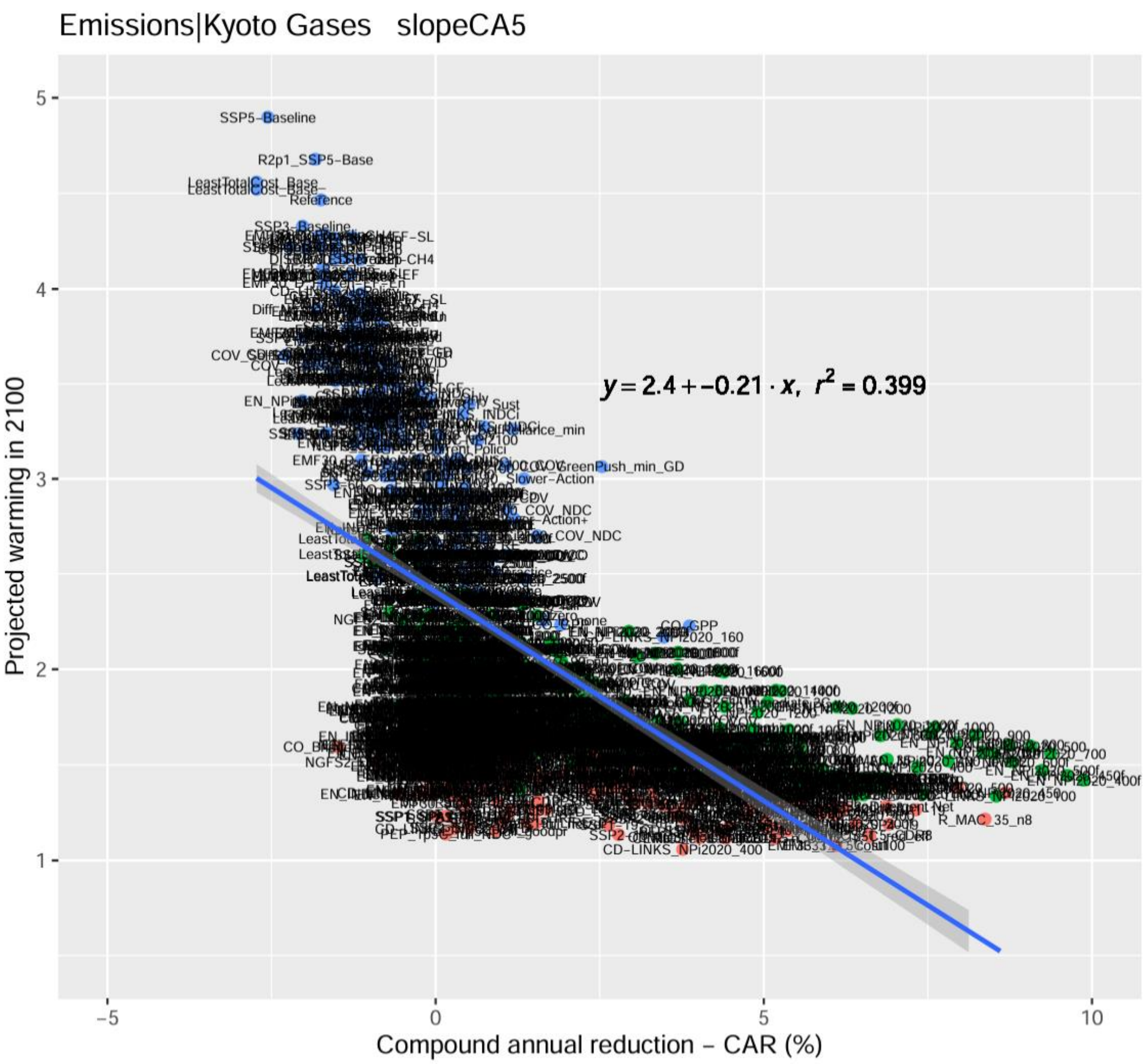


Figure 7: Result of the linear regression model for Emissions | Kyoto Gases for a 10-year time frame

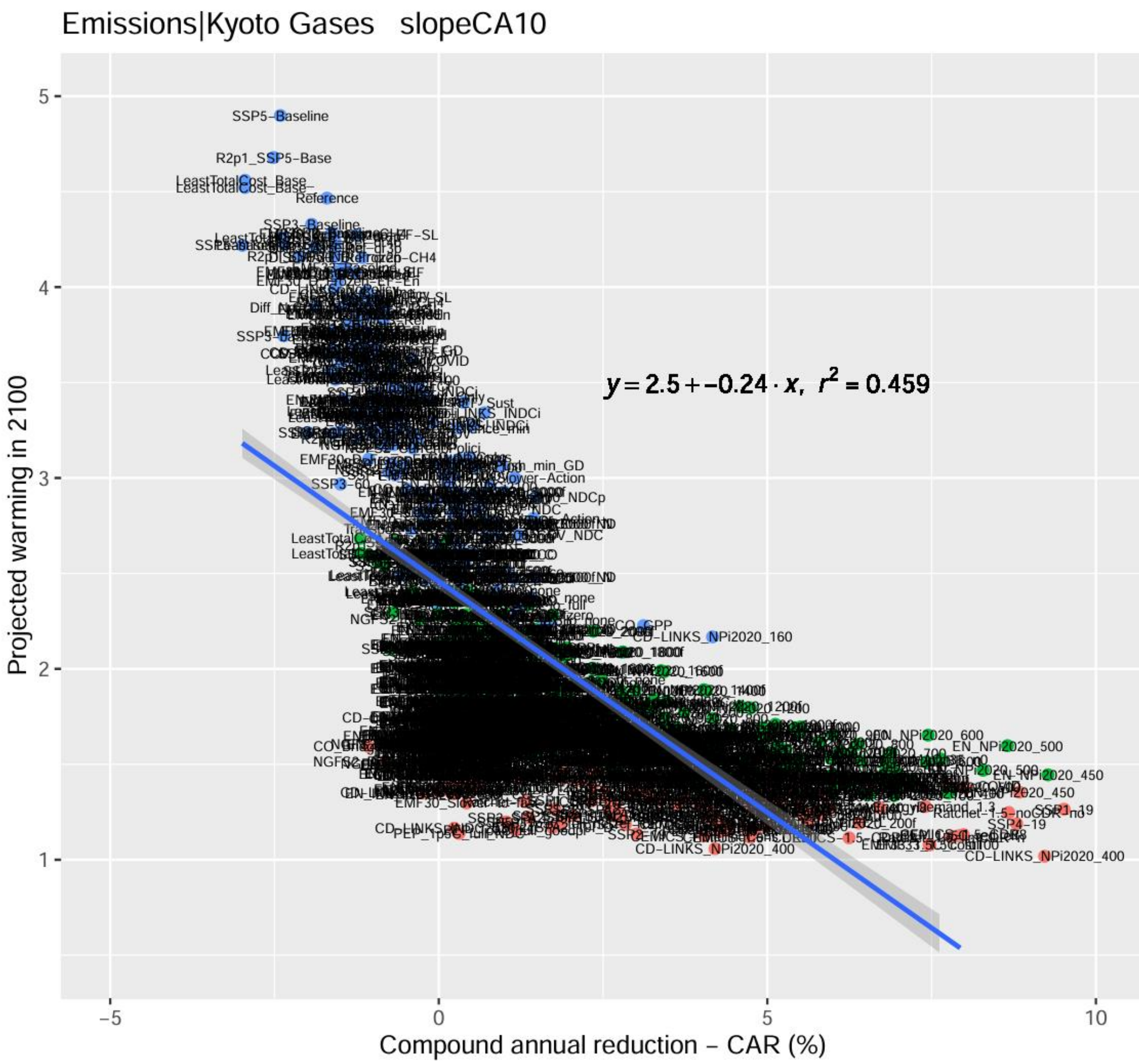


Figure 8: Result of the linear regression model for Emissions | Kyoto Gases for a 15-year time frame

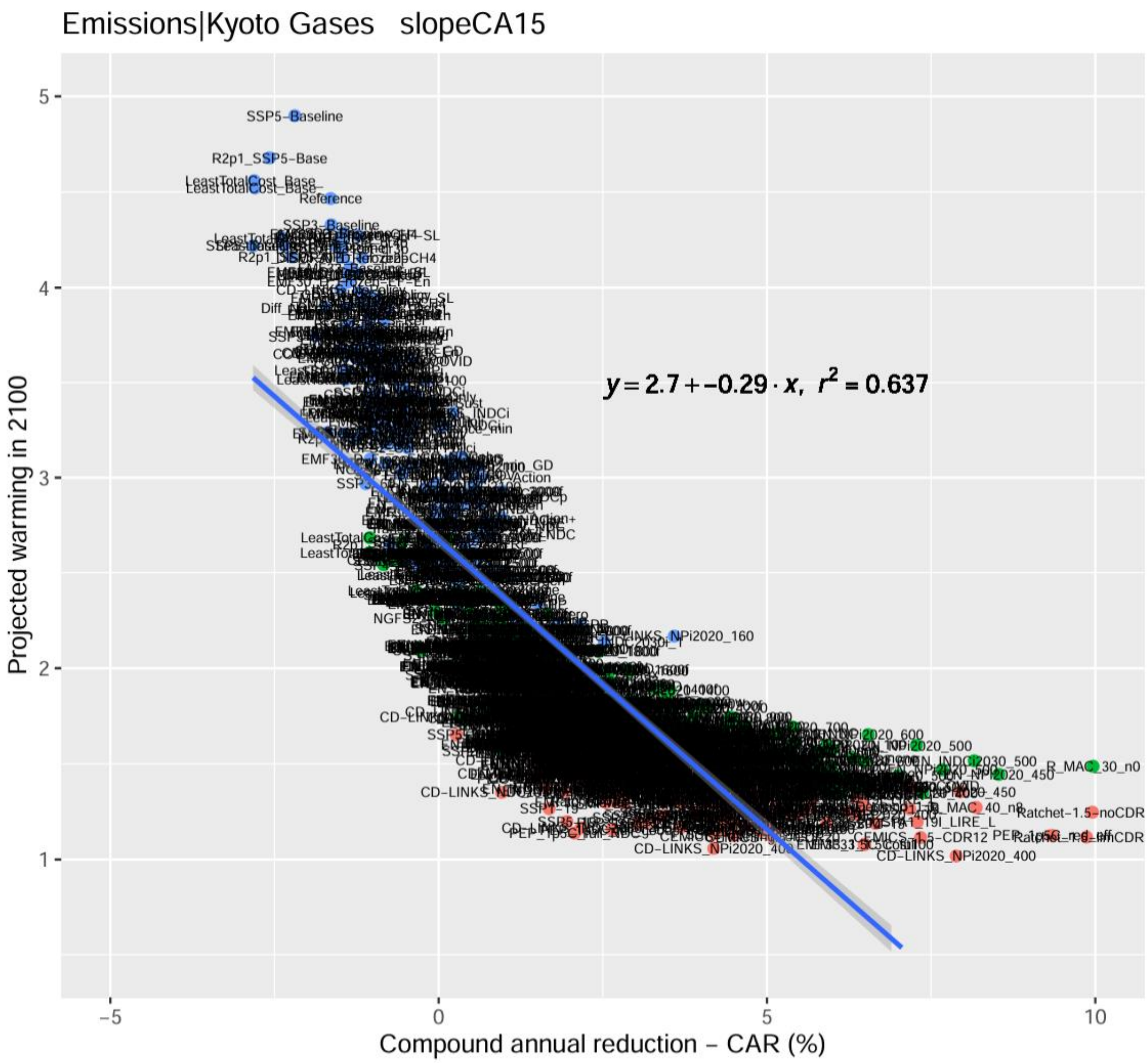


Figure 9: Result of the linear regression model for Emissions | Kyoto Gases for a 20-year time frame

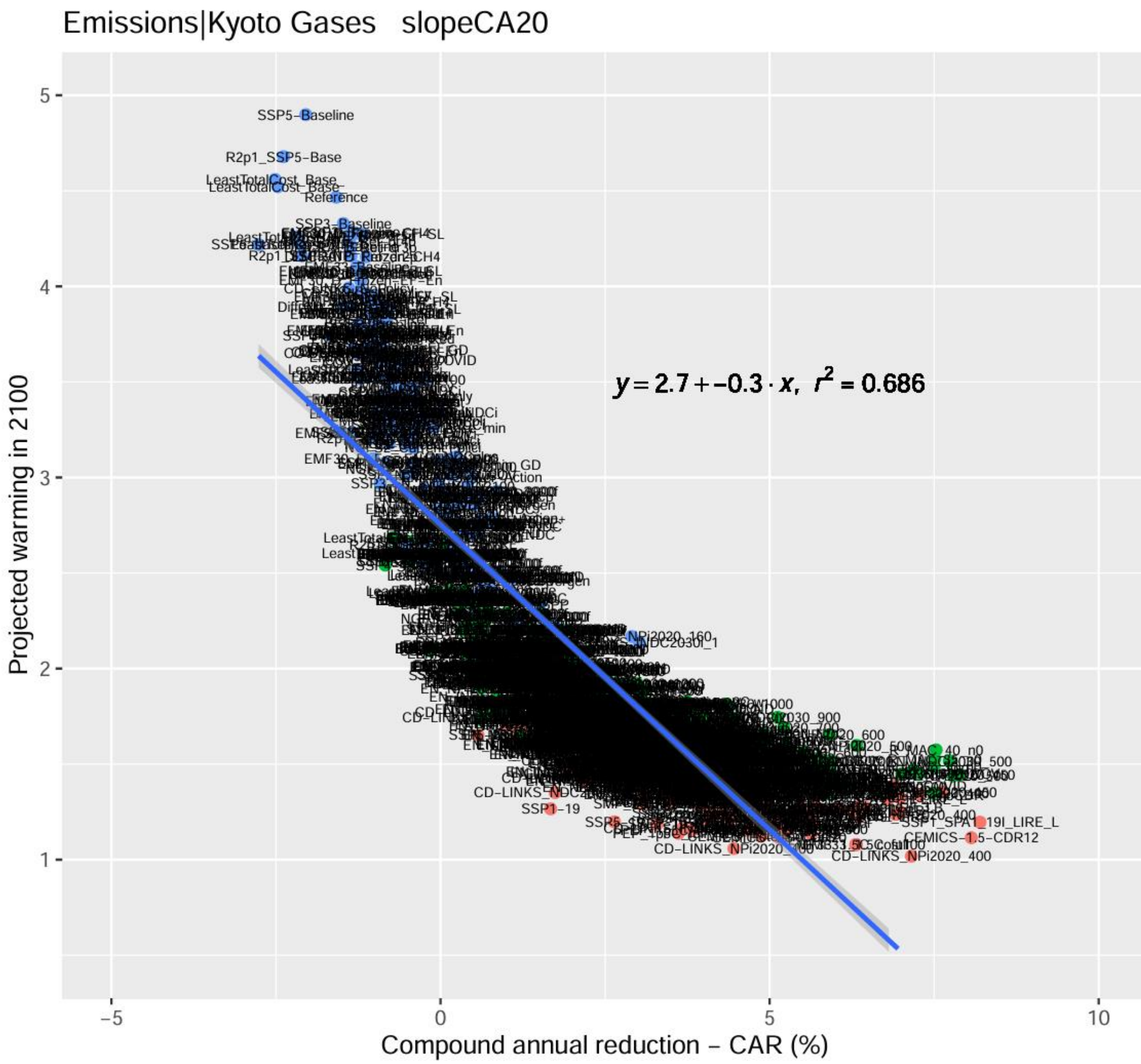


Figure 10: Result of the linear regression model for Emissions | Kyoto Gases for a 25-year time frame

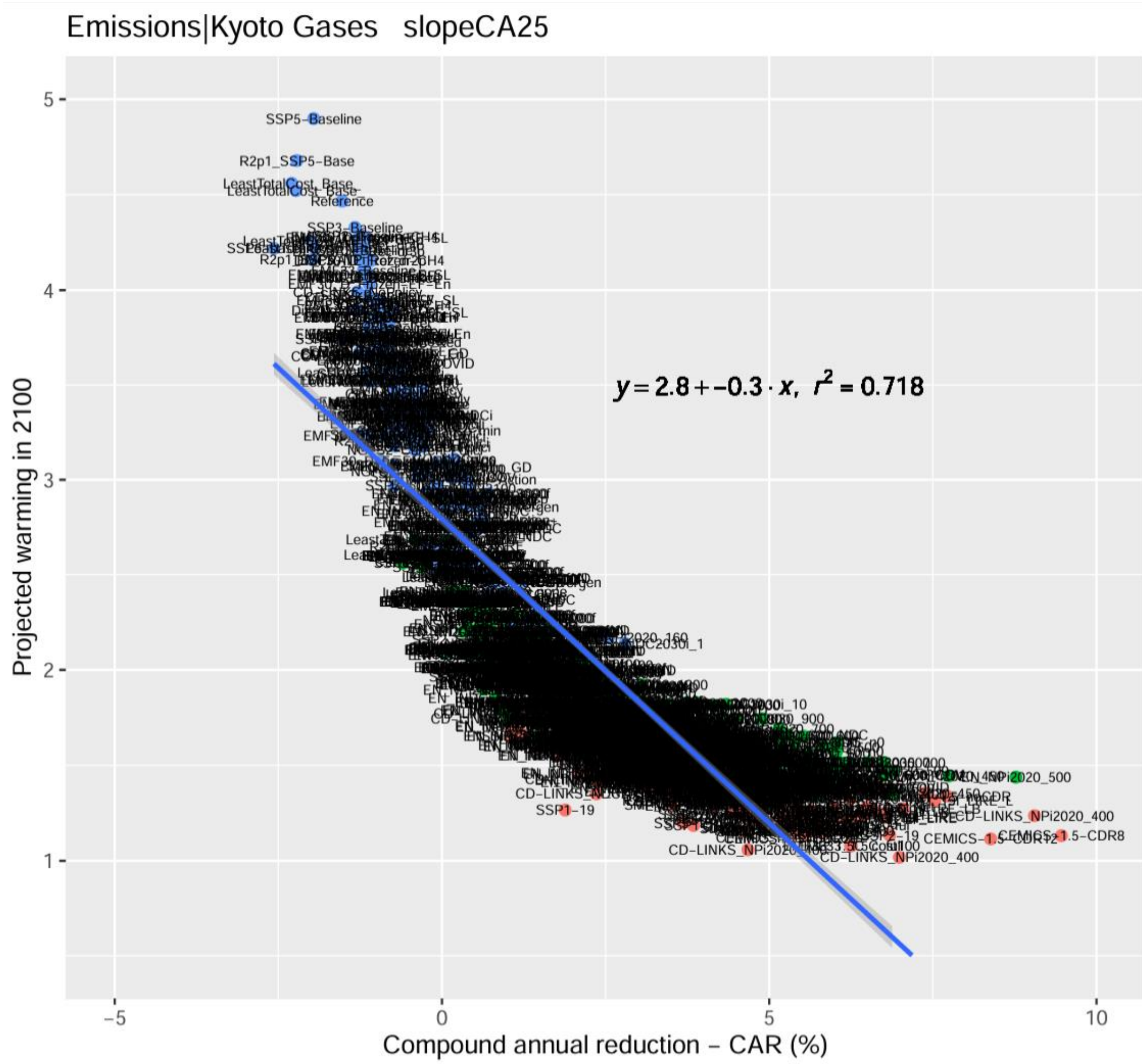
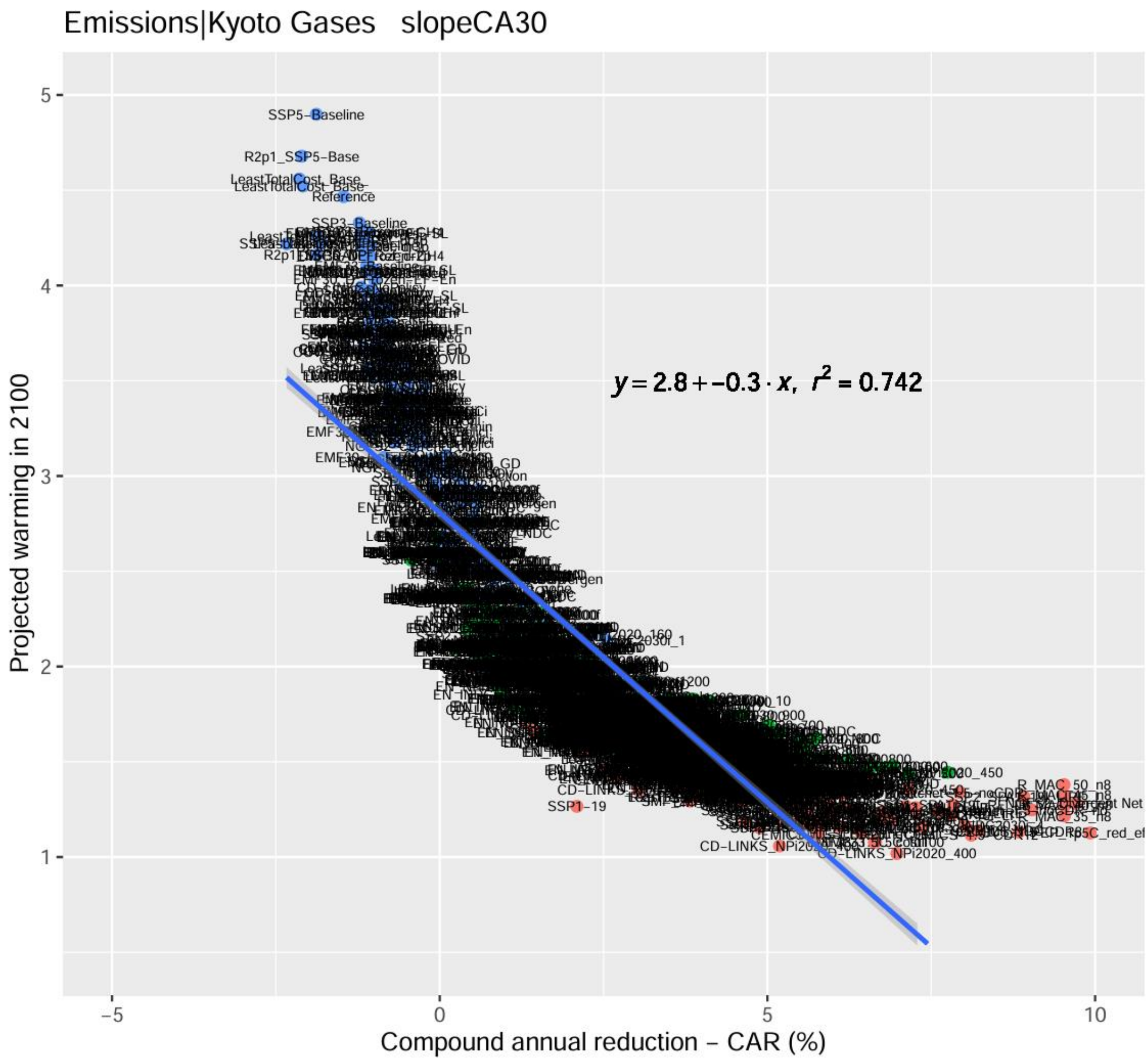


Figure 11: Result of the linear regression model for Emissions | Kyoto Gases for a 30-year time frame



Annex 4: Calculation examples

Table 16: Company Alpha (combined scope 1+2 target)

Label	Variable	Company Alpha	Calculation details
	Company activity	Retail	
	Target scope(s)	Scope 1; Scope 2	
	Target type	Absolute	
A	**Base year**	2019	
B	**Base year total emissions (Scope 1, tCO2e)**	5,000,000	
C	**Base year total emissions (Scope 2, tCO2e)**	2,500,000	
D	**Base year value covered (Scope 1, tCO2e)**	3,000,000	
E	**Base year value covered (Scope 2, tCO2e)**	2,000,000	
F	**Current Year total emissions (Scope 1, tCO2e)**	4,500,000	
G	**Current Year total emissions (Scope 2, tCO2e)**	2,250,000	
H	**Target year**	2034	
	Target timeframe	Mid-term (10-year horizon)	
I	**Targeted reduction from base year (%)**	50.0%	
J	**Boundary coverage (Scope 1)**	60.0%	=D/B
K	**Boundary coverage (Scope 2)**	80.0%	=E/C
L	**Boundary coverage (Scope 1+2)**	66.7%	=(D+E)/(B+C)
M	**Normalized reduction ambition (Scope 1)**	30.0%	=J*I
N	**Normalized reduction ambition (Scope 2)**	40.0%	=K*I
O	**Normalized reduction ambition (Scope 1+2)**	33.3%	=L*I
P	**Normalized CAR S1**	-2.3%	=(1+M)^(1/(H-A))-1
Q	**Normalized CAR S2**	-3.3%	=(1+N)^(1/(H-A))-1
R	**Normalized CAR S12**	-2.7%	=(1+O)^(1/(H-A))-1
	Scope 1 benchmark	Emissions | Kyoto Gases	
S	**Scope 1 TS (°C)**	1.90	=2,46-0,24*(-P)*100
	Scope 2 benchmark	Emissions | CO2 | Energy | Supply	
T	**Scope 2 TS (°C)**	2.03	=2,40-0,11*(-Q)*100
	Scope 1 + Scope 2 TS	1.94	=(S*F+T*G)/(F+G)

Table 17: Company Beta (Scope 1 intensity target + no Scope 2 target)

Label	Variable	Company Beta		Calculation details
	Company activity	Power generation		
	Target scope(s)	Scope 1	No Scope 2 target disclosed	
	Target type	Intensity	N/A	
A	**Base year**	2020	N/A	
B	**Base year total emissions (Scope 1, tCO2e)**	20,000,000		
C	**Base year total emissions (Scope 2, tCO2e)**	2,500,000		
D	**Base year value covered (Scope 1, tCO2e)**	18,000,000	N/A	
E	**Base year value covered (Scope 2, tCO2e)**	N/A	N/A	
F	**Current Year total emissions (Scope 1, tCO2e)**	19,500,000		
G	**Current Year total emissions (Scope 2, tCO2e)**	3,000,000		
H	**Target year**	2026	N/A	
	Target timeframe	Short-term (5-year horizon)	N/A	
I	**Targeted reduction from base year (%)**	-25.0%	N/A	
J	**Boundary coverage (Scope 1)**	90.0%	N/A	=D/B
K	**Boundary coverage (Scope 2)**	N/A	N/A	=E/C
L	**Boundary coverage (Scope 1 + Scope 2)**	N/A	N/A	=(D+E)/(B+C)
M	**Normalized reduction ambition (Scope 1)**	-22.5%	N/A	=J*I
N	**Normalized reduction ambition (Scope 2)**	N/A	N/A	=K*I
O	**Normalized reduction ambition (Scope 1+2)**	N/A	N/A	=L*I
P	**Normalized CAR S1**	-4.2%	N/A	=(1+M)^(1/(H-A))-1
Q	**Normalized CAR S2**	N/A	N/A	=(1+N)^(1/(H-A))-1
R	**Normalized CAR S12**	N/A	N/A	=(1+O)^(1/(H-A))-1
	Scope 1 benchmark	Emissions| CO2 | Energy | Supply / Secondary energy	N/A	
S	**Scope 1 TS (°C)**	1.78	N/A	=2,11-0,08*(-P)*100
	Scope 2 benchmark	N/A	Default score	
T	**Scope 2 TS (°C)**	N/A	3.40	
	Scope 1 + Scope 2 TS	1.99		=(S*F+T*G)/(F+G)

Table 18: Company Gamma (single Scope 1 + single Scope 2 target)

<table>
<tr><th>Label</th><th>Variable</th><th colspan="2">Company Gamma</th><th>Calculation details</th></tr>
<tr><td></td><td>Company activity</td><td colspan="2">Cement</td><td></td></tr>
<tr><td></td><td>Target scope(s)</td><td>Scope 1</td><td>Scope 2</td><td></td></tr>
<tr><td></td><td>Target type</td><td>Absolute</td><td>Absolute</td><td></td></tr>
<tr><td>A</td><td>Base year</td><td>2022</td><td>2021</td><td></td></tr>
<tr><td>B</td><td>Base year total emissions (Scope 1, tCO2e)</td><td colspan="2">9,000,000</td><td></td></tr>
<tr><td>C</td><td>Base year total emissions (Scope 2, tCO2e)</td><td colspan="2">1,000,000</td><td></td></tr>
<tr><td>D</td><td>Base year value covered (Scope 1, tCO2e)</td><td>5,000,000</td><td>N/A</td><td></td></tr>
<tr><td>E</td><td>Base year value covered (Scope 2, tCO2e)</td><td>N/A</td><td>1,000,000</td><td></td></tr>
<tr><td>F</td><td>Current Year total emissions (Scope 1, tCO2e)</td><td colspan="2">8,000,000</td><td></td></tr>
<tr><td>G</td><td>Current Year total emissions (Scope 2, tCO2e)</td><td colspan="2">700,000</td><td></td></tr>
<tr><td>H</td><td>Target year</td><td>2040</td><td>2035</td><td></td></tr>
<tr><td></td><td>Target timeframe</td><td>Long-term (30-year horizon)</td><td>Long-term (30-year horizon)</td><td></td></tr>
<tr><td>I</td><td>Targeted reduction from base year (%)</td><td>-35.0%</td><td>-75.0%</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>J</td><td>Boundary coverage (Scope 1)</td><td>55.6%</td><td>N/A</td><td>=D/B</td></tr>
<tr><td>K</td><td>Boundary coverage (Scope 2)</td><td>N/A</td><td>100.0%</td><td>=E/C</td></tr>
<tr><td>L</td><td>Boundary coverage (Scope 1 + Scope 2)</td><td colspan="2">60.0%</td><td>=(D+E)/(B+C)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>M</td><td>Normalized reduction ambition (Scope 1)</td><td>-19.4%</td><td></td><td>=J*I</td></tr>
<tr><td>N</td><td>Normalized reduction ambition (Scope 2)</td><td></td><td>-75.0%</td><td>=K*I</td></tr>
<tr><td>O</td><td>Normalized reduction ambition (Scope 1+2)</td><td colspan="2">-27.8%</td><td>=(M*B+N*C)/(B+C)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>P</td><td>Normalized CAR S1</td><td>-1.2%</td><td></td><td>=(1+M)^(1/(H-A))-1</td></tr>
<tr><td>Q</td><td>Normalized CAR S2</td><td></td><td>-9.4%</td><td>=(1+N)^(1/(H-A))-1</td></tr>
<tr><td>R</td><td>Normalized CAR S12</td><td colspan="2">-1.8%</td><td>=(1+O)^(1/(H-A))-1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Scope 1 benchmark</td><td>Emissions | CO2 | Energy and Industrial Processes</td><td></td><td></td></tr>
<tr><td>S</td><td>Scope 1 TS (°C)</td><td>2.35</td><td></td><td>=2,58-0,19*(-P)*100</td></tr>
<tr><td></td><td>Scope 2 benchmark</td><td></td><td>Emissions | CO2 | Energy | Supply</td><td></td></tr>
<tr><td>T</td><td>Scope 2 TS (°C)</td><td></td><td>1.50 (*)</td><td>=2,85-0,15*(-Q)*100</td></tr>
<tr><td></td><td><u>Scope 1 + Scope 2 TS</u></td><td colspan="2">2.28</td><td>=(S*F+T*G)/(F+G)</td></tr>
</table>

(*) 1.44°C before application of temperature floor

Table 19: Company Delta (Scope 3 target)

Label	Variable	Company Delta	Calculation details
	Company activity	Auto manufacturer	
	Target scope(s)	Scope 3	
	Target Scope 3 categories covered	Cat. 1 Purchased goods and services Cat. 11 Use of sold products	
	Target type	Absolute	
A	**Base year**	2019	
B	**Base year total emissions (total Scope 3, tCO2e)**	10,000,000	
C	**Base year total emissions (Scope 3, cat. 1 & 11 only, tCO2e)**	8,000,000	
D	**Base year value covered (Scope 3, cat. 1 & 11 only, tCO2e)**	5,000,000	
E	**Current year total emissions (total Scope 3, tCO2e)**	9,250,000	
F	**Current year total emissions (Scope 3, cat. 1 & 11 only, tCO2e)**	7,000,000	
G	**Target year**	2034	
H	**Target timeframe**	Mid-term (10-year horizon)	
I	**Targeted reduction from base year (%)**	35.0%	
J	**Boundary coverage (Scope 3, cat. 1 & 11 only, tCO2e)**	62.5%	=D/C
K	**Boundary coverage (total Scope 3, tCO2e)**	50.0%	=J*C/B
L	**Normalized reduction ambition (Scope 3, cat. 1 & 11 only, tCO2e)**	21.9%	=J*I
M	**Normalized reduction ambition (total Scope 3, tCO2e)**	17.5%	=K*I
N	**Normalized CAR (Scope 3, cat. 1 & 11 only, tCO2e)**	-1.6%	=(1+L)^(1/(G-A))-1
O	**Normalized CAR (total Scope 3, tCO2e)**	-1.3%	=(1+M)^(1/(G-A))-1
P	**Scope 3 benchmark**	Emissions | Kyoto Gases	
Q	**Scope 3 TS (°C)**	2.15	=2,46-0,24*(-O)*100

Annex 5: Summary of required data for applying the Temperature Scoring method

The following tables present a legend of the data required to apply the Temperature Scoring method for a portfolio using data tools.

Table 20: Data legend for portfolio data

Portfolio data

Data field	*Optional/Required*	*Format*	*Explanation*
company_name	Optional	Text	Name of the company in your portfolio.
company_id	Required	Text	Identifier for the company in your portfolio, used to map target and fundamental data to the company.
company_isin	Optional	Text	ISIN and/or LEI are used to map companies to the SBTi database.
company_lei	Optional	Text	ISIN and/or LEI are used to map companies to the SBTi database.
investment_value	Required	Number	The monetary value invested in the company. Used for aggregation.
engagement_target	Optional	TRUE or FALSE	Used for engagement analysis.

Table 21: Data legend for target data

Data field	*Optional/Required*	*Format*	*Explanation*
company_name	Optional	Text	Name of the company in your portfolio.
company_id	Required	Text	Identifier for the company in your portfolio, used to map target and fundamental data to the company.
target_type	Required	Absolute, Intensity, T_score or other	Type of target. Can be absolute or intensity based GHG emission reduction target. From v1.5 can also be a temperature score (eg for and FI).
intensity_metric	Required for intensity targets	Text	The metric the intensity based GHG emission reduction target is based on.
input_temp_score	Required for T_score targets	Number in decimals	For targets set using the CDP/WWF temperature scoring approach.
scope	Required	S1, S2, S1+S2, S1+S2+S3, S3	The scope(s) covered by the target.
s3_category	Required for S3 targets	Integer between 1 and 15	The scope 3 category of the target.
coverage_s1	Required for S1 targets	Number in decimals, between 0 and 1	The part of emissions covered in scope 1 for the target.
coverage_s2	Required for S2 targets	Number in decimals, between 0 and 1	The part of emissions covered in scope 2 for the target.
coverage_s3	Required for S3 targets	Number in decimals, between 0 and 1	The part of emissions covered in scope 3 for the target.
reduction_ambition	Required	Number in decimals, between 0 and 1	The emission reduction that is set as ambition in the target.
base_year	Required	Year (4-digit integer)	Base year of the target. Defines time frame together with end year.
end_year	Required	Year (4-digit integer)	End year of the target. Defines time frame together with base year.
start_year	Optional	Year (4-digit integer)	Year the target was announced.
statement_date	Required	Number in decimals, between 0 and 1	The date the target was confirmed or updated. If not specified, the start year will be assumed.
base_year_ghg_s1	Required	tCO2e	Total reported GHG emissions for scope 1 for the company at the base year of the target.
base_year_ghg_s2	Required	tCO2e	Total reported GHG emissions for scope 2 for the company at the base year of the target.
base_year_ghg_s3	Required	tCO2e	Total reported GHG emissions for scope 3 for the company at the base year of the target.
achieved_reduction	Optional	Number in decimals, between 0 and 1	Part of the reduction ambition of the target that is already achieved by the company.
target_ids	Optional	Text	Identifier of individual targets.

Table 22: Data legend for fundamental company data

Data field	*Optional/Required*	*Format*	*Explanation*
company_name	Optional	Text	Name of the company in your portfolio.
company_id	Required	Text	Identifier for the company in your portfolio, used to map target and fundamental data to the company.
Isic	Required	Text	Sector classification code for the company based on the International Standard Industrial. Used to map targets to the correct regression model. Should include at least the first two levels: Section and Division.
country	Optional	Text	Country where the company has its headquarter. Used for analysis purposes only.
region	Optional	Text	Region where the company has its headquarter. Used for analysis purposes only. Can be continental or more granular.
industry_level_1	Optional	Text	Level 1 through 4 of the industry classification of the company. Used for analysis purposes only. Can be based on any industry classification system.
industry_level_2	Optional	Text	Level 1 through 4 of the industry classification of the company. Used for analysis purposes only. Can be based on any industry classification system.
industry_level_3	Optional	Text	Level 1 through 4 of the industry classification of the company. Used for analysis purposes only. Can be based on any industry classification system.
industry_level_4	Optional	Text	Level 1 through 4 of the industry classification of the company. Used for analysis purposes only. Can be based on any industry classification system.
sector	Optional	Text	Sector of the company. Used for analysis purposes only. Can be based on any classification system.
ghg_s1	Required*	tCO2e tCO2e	Total GHG emissions for scope 1 for the company. Used for aggregation of temperature scores on company level.
ghg_s2	Required*	tCO2e	Total GHG emissions for scope 2 for the company. Used for aggregation of temperature scores on company level.
ghg_s3	Required*	tCO2e	Total GHG emissions for scope 3 for the company. Used for aggregation of temperature scores on company level.
company_revenue	Required**	Number	In single currency (can be any currency you choose). Revenue of the company in the most recent year.
company_market_cap	Required**	Number	Market capitalization of the company in single currency.
company_enterprise_value	Required**	Number	Enterprise value of the company in single currency.
company_total_assets	Required**	Number	Total assets of the company in single currency.
company_cash_equivalents	Required**	Number	Cash equivalents of the company in single currency.

*Note: GHG data needed for aggregation of Scope 1+2 temperature scores as of version 1.5 of methodology.
**Note: Required if needed for the selected portfolio aggregation method.

Annex 6: Tables, figures, and equations

Tables

Figures

Equations