Executive summary

Background

The Implied Temperature Rise metric provides an indication of how companies and investment portfolios align to global climate targets. Some institutional investors would like to understand if their portfolios are 2°C-aligned, referring to the Paris Agreement goal of limiting to below 2°C the global mean temperature increase in the year 2100, compared with pre-industrial levels. Another important target is the 1.5°C limit, the maximal objective of the Paris Agreement. This limit has been advocated strongly by small island states, which are most threatened by sea-level rise in a world with temperatures exceeding a rise of 1.5°C.

Key to understanding the Implied Temperature Rise (ITR) is the concept of a carbon budget, i.e., how much the world can emit so that global warming doesn’t exceed 2°C by 2100 and, by analogy, how much a company can emit for its fair share of global decarbonization. Indeed, Implied Temperature Rise is about extrapolating the global implied temperature rise (at horizon 2100) as if the whole economy “overshot/undershot” its budget in the same way as the given company (or portfolio) overshoots/undershoot its specific company-specific carbon budget.

A company whose projected emissions are below budget can be said to “undershoot” while those whose projected emissions exceed the budget “overshoot.”

We use Intergovernmental Panel on Climate Change (IPCC) guidance to understand how much global carbon budget is left. The next step is to derive company-level carbon budgets consistent with this. Then we calculate companies’ projected emissions out over the next five decades based on their emissions track record, stated reduction targets and other data.
Company Implied Temperature Rise

The calculation of the company-level Implied Temperature Rise involves four key steps:

**Exhibit 1. Modeling steps to compute a company’s Implied Temperature Rise.**

1. **Transpose a 2°C carbon budget at company level**
   Each year, we calculate a global 2°C carbon budget based on the global remaining carbon budget available to limit warming to 2°C, obtained from the IPCC.\(^1\) Consistent with this global budget, we derive decarbonization pathways and company-specific carbon budgets expressed in absolute terms. We account for sector, country and business activities in determining a company’s “fair share.”

2. **Project companies’ future emissions, considering their targets**
   Using companies’ current emissions and reported emissions reduction targets, we project an absolute emissions timeseries for each company until 2070 for Scopes 1, 2 and 3 emissions.

3. **Calculate the companies’ over/undershoot of their carbon budgets**
   We compute each company’s carbon budget over-/undershoot by calculating the difference between each company’s projected carbon emissions and its allocated 2°C budget. We then express this as a relative over-/undershoot of the 2°C budget of the company (X% of the budget has been over-/undershot).

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\(^1\) The IPCC Special Report on 1.5 °C provides the remaining global carbon budget for different temperature rises and probabilities ([https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf) (in Table 2.2)).
4. **Convert the relative over/undershoot to a degree of temperature rise**

We apply the relative emissions over-/undershoot to the global budget and convert the impact in degrees of warming (Celsius) using the science-based Transient Climate Response to Cumulative Emissions (TCRE) approach:

\[
\text{Implied Temperature Rise} = 2^\circ C + \text{company level relative over/undershoot} \times \text{Global 2^\circ C Budget} \times \text{TCRE Factor}.
\]

We perform this analysis on each scope of emissions (Scopes 1, 2 and 3) to capture both direct and indirect contributions to global warming. Additionally, we provide both the Implied Temperature Rise on each scope and an aggregated Implied Temperature Rise for each company. This allows users to understand the contribution of each scope.
Portfolio Implied Temperature Rise

A portfolio's Implied Temperature Rise measures, in aggregate, a portfolio's temperature alignment (in °C) to keeping the world's temperature rise to 2°C by 2100. The calculation uses an aggregated budget approach that compares the sum of financed emission budget overshoot against the sum of financed carbon emission budgets for the underlying portfolio holdings. The total portfolio carbon emission over/undershoot is then converted to a degree of temperature rise using the science-based ratio approach of TCRE.

Transient Climate Response to Cumulative Carbon Emissions

The Transient Climate Response to Cumulative Carbon Emissions (TCRE) was established by the IPCC and provides a relationship that links each additional unit of emissions emitted beyond the available remaining global 2°C carbon budget to degrees of additional warming. We use a TCRE factor of 0.000545°C warming per Gt CO₂. In other words, for each GtCO₂ exceeding the global 2°C carbon budget, we can expect an additional ~0.000545°C warming over 2°C.

This relationship is used in the Implied Temperature Rise methodology to convert a company’s or portfolio’s allocated carbon budget over-/undershoot into a degree of warming. The Implied Temperature Rise estimates an answer to the following question: What is the additional warming if the whole economy over-/undershoots the global 2°C carbon budget at the same proportion as the company or portfolio analyzed? As described in the 2021 Measuring Portfolio Alignment report, the relationship from above can be used to derive following formula:

\[
\text{Additional Warming} = \text{Relative company-level over/undershoot} \times \text{Global 2°C Budget} \times \text{TCRE Factor}
\]

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To then calculate the Implied Temperature Rise, we need to add the additional warming to the base temperature of 2°C:

**Implied Temperature Rise = 2°C + Relative company-level over/undershoot × Global 2°C Budget × TCRE Factor**

To illustrate, consider a hypothetical company overshooting its allocated carbon budget by 50%, and subsequently assume the whole economy overshoots at the same rate. Using the above formula, a TCRE factor of 0.000545°C/Gt CO₂ and a global 2°C budget of 1491 Gt CO₂e⁴, we estimate the Implied Temperature Rise to be 2.42°C (2°C + 50%×1491 Gt CO₂e×0.000545°C/Gt CO₂ = 2.4°C).

**Incorporating a company’s emission-reduction targets into the Implied Temperature Rise model**

MSCI ESG Research has developed an approach to analyze and compare emission-reduction targets reported by companies, despite differences in target metrics and time frames. The methodology provides an assessment by scope and allows us to project the absolute emissions of a company, assuming its targets are fully met.

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⁴ Please see the section Global 2°C carbon budget for more details.
**Implied Temperature Rise Bands**

The *Implied Temperature Rise* output is a continuous variable. For ease of comparison among various Implied Temperature Rises, MSCI uses *Implied Temperature Rise Bands* that encompass temperate ranges with clear alignment labels, from “1.5°C aligned” to “Strongly Misaligned.”

Alignment is defined by the two temperature thresholds set by the Paris Agreement climate objectives (+1.5°C, +2°C global mean temperature compared with pre-industrial levels). Misalignment, consequently, corresponds to any Implied Temperature Rise output exceeding those thresholds. We distinguish two categories of misalignment:

- **Misaligned**, defined by a business-as-usual emissions profile; and
- **Strongly Misaligned**, for outputs that fall short even of today’s insufficient country policies.

The NGFS REMIND “Current Policies” scenario that corresponds to the first category of misalignment yields a (rounded) 3.2°C temperature at horizon 2100, which helps us draw the line with the second category. 6

The table below describes the Implied Temperature Rise Bands as well as what they mean.

### Exhibit 26. Overview of Implied Temperature Rise Bands

<table>
<thead>
<tr>
<th>ITR Band</th>
<th>Range (°C)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MISALIGNED</strong></td>
<td></td>
<td><strong>Strongly Misaligned</strong> &gt; 3.2 This company/portfolio is misaligned even by business-as-usual standards. Its contribution to catastrophic climate change is higher than most companies'/portfolios'.</td>
</tr>
<tr>
<td><strong>Misaligned</strong></td>
<td>&gt; 2.0 – 3.2</td>
<td>This company/portfolio does not comply with the Paris Agreement goals. Its pace of decarbonization is too slow to mitigate catastrophic climate change. The threshold is determined by the NGFS REMIND “Current policies” scenario yielding an estimated 3.24°C at the 2100 horizon (rounded 3.2°C).</td>
</tr>
</tbody>
</table>

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5 See Article 2 of the Paris Agreement ([https://unfccc.int/sites/default/files/english_paris_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf))

<table>
<thead>
<tr>
<th>Aligned</th>
<th>Temperature Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2°C Aligned</td>
<td>&gt; 1.5 – 2.0</td>
<td>This company/portfolio meets the Paris Agreement’s minimum objective(^7) of +2°C global mean temperature compared with pre-industrial levels. It is engaged in the low-carbon transition.</td>
</tr>
<tr>
<td>1.5°C Aligned</td>
<td>&lt;= 1.5</td>
<td>This company/portfolio is in line with the Paris Agreement’s maximal objective of keeping global mean temperature to +1.5°C compared with pre-industrial levels. It is a transition leader, significantly contributing to mitigating catastrophic climate change.</td>
</tr>
</tbody>
</table>

Source: MSCI ESG Research.

### Implied Temperature Rise data updates

To best reflect the current state of the world, Implied Temperature Rise scores may evolve as new data becomes available. For instance, when a company sets a new decarbonization target, we take that into account and recalculate the company’s projected emissions, which will, in turn, change the company’s Implied Temperature Rise.

We run a regular update cycle: biweekly for targets inputs and quarterly for the rest of the data inputs. However, the total cycle from the moment primary data is available (e.g., the company has announced a new target) to the moment the Implied Temperature Rise integration is finalized can take more time.

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\(^7\) See article 2 of the Paris Agreement (https://unfccc.int/sites/default/files/english_paris_agreement.pdf)
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