# Understanding MSCI Climate Indexes

Methodologies, Facts and Figures

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# Executive Summary

Integrating climate considerations into an investor's set of benchmarks is one way to build a consistent framework for integrating climate risk across an entire portfolio. Climate change has been widely recognized as both a financial risk to investment portfolios and a risk to the future living standards of humankind.[1]

Investors often aim to capture more than one objective through their capital allocations: They may seek to align their objectives to an investment policy that simultaneously addresses financial risks and opportunities in their portfolios, incentivizes companies to change their business models and steers capital toward green technology companies that can provide positive environmental impact.

In addition, investors may have different preferences when it comes to selecting a climate index: Some may prefer a broad market index that invests in most companies in the broader universe and has low tracking error. On the other hand, some investors may prefer holding only leaders in climate technology solutions, to maximize the climate impact of their portfolio. To address these different preferences, MSCI has developed four categories of climate indexes. The first three are broad-based, with limited tracking error, while the fourth takes a more concentrated approach.

1. **Improving the carbon footprint of the index.** The MSCI ex Fossil Fuels Index excludes companies holding fossil-fuel reserves. The MSCI Low Carbon Leaders and MSCI Low Carbon Target Indexes reduce exposure to both fossil-fuel reserves and heavy greenhouse-gas ("GHG") emitters while controlling for tracking error.
2. **Reducing exposure to heavy emitters and overweighting companies in green technology.** The MSCI Climate Change Index takes this more symmetrical approach: In addition, it decarbonizes the index by 7% per year in line with the EU Climate Transition Benchmark requirement.
3. **Aligning the index with a 1.5-degree-Celsius (1.5°C) temperature rise.** The MSCI Climate Paris Aligned Index overweights green technology more than what is required by the EU Paris-aligned benchmark standard.
4. **Taking a more concentrated approach.** The MSCI Global Environmental Index focuses on companies that have high revenue exposure from green technology. With its relatively high tracking error, it is suited for investors that want to make a positive environmental impact.

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[1] "Human cost of disasters: An overview of the last 20 years, 2000-2019." Centre for Research on the Epidemiology of Disasters and UN Office for Disaster Risk Reduction, Nov. 3, 2020.

# Introduction

Climate change is the single greatest challenge humankind has faced, and its consequences are already all too apparent. To safeguard the welfare of the planet and the living standard of future generations, global political leaders adopted a goal of limiting the increase in the world's average temperatures to well below 2°C above pre-industrial levels under the 2015 Paris agreement.[2]

At the same time, institutional investors started to recognize that shifting capital toward issuers that align their business with climate change may drive the transition to a low-carbon economy and help them manage climate transition risks and opportunities. This has led to a proliferation of climate investment strategies, both active and passive, reflecting both a more diverse set of investor objectives and improved technical capability to implement more tailored solutions. In addition, they have drawn off the increased breadth and quality of climate data. This paper aims to explain different methodologies one can use to integrate climate considerations into a benchmark and to illuminate the resulting differences in financial and climate characteristics.

Climate risks are typically categorized along two dimensions:[3,4]

- **Transition risks**: the risks associated with transitioning to a low-carbon economy — for instance, shifts in policy, technology or supply and demand in certain sectors; and
- **Physical risks**: the risks associated with the physical impacts of climate change on companies' operations, e.g., those resulting from extreme temperatures, floods, storms or wildfires.

These risks may also present opportunities, which companies may capitalize on by providing climate solutions such as producing or using renewable energy or leasing green buildings. These can have an impact on financial performance in the short to long term.

We find that investors typically pursue both financial and social objectives, which represent the four objectives of MSCI climate indexes.

Climate change has been recognized widely as a financial risk for businesses involved in the fossil-fuel value chain. Therefore, **reducing emissions** and **mitigating**

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[2] "The Paris Agreement." United Nations Climate Change.

[3] Although we usually refer to climate "risks," there also can be upside opportunities resulting from climate change, as we will discuss in subsequent sections of this paper.

[4] For a further description, see Task Force on Climate-related Financial Disclosures 2017, "Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures," Section B1 (Pgs. 5-6).

**stranded-asset risks** is the first of the four objectives that investors may pursue to protect their portfolios.

At the same time, there may be financial opportunities from investing in **climate solutions** businesses, which may form a "natural hedge" against stranded-asset risks. Substantial investments in green technologies may be needed over the next decade and beyond to finance the energy transition.[5]

The third objective involves aligning investments with the Paris Agreement's goal of limiting global warming to well below 2°C by the year 2100. Setting an appropriate benchmark can help investors track their progress in meeting this long-term goal.[6] For example, one can decarbonize the index at a rate that is in line with **reaching net-zero**.

The fourth investment objective is focused on creating a more sustainable economy and therefore making a **positive environmental impact**.

These investment objectives are illustrated in Exhibit 1.

**Exhibit 1: Objectives of Climate Change Investing**
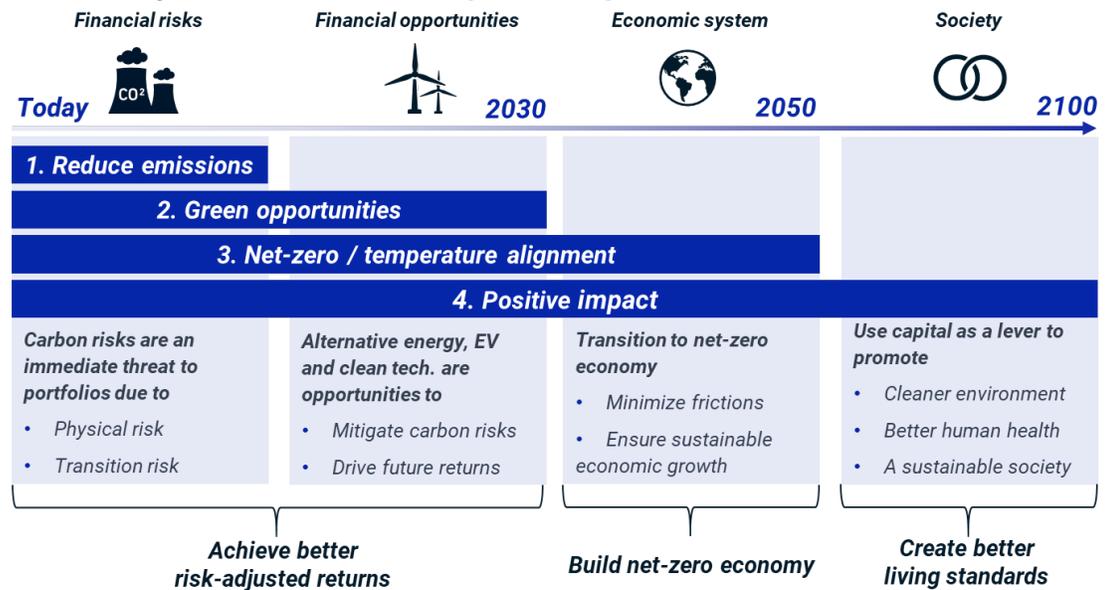


We now return to "net-zero alignment," which is widely used in the public debate about climate change investing but its definitions sometimes vary. To construct climate-index methodologies, we need a precise definition of what this term means.

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[5] "Net Zero by 2050." International Energy Agency, 2021.

[6] Ibid.

Giese et al. (2021) defined net-zero alignment as indexes or portfolios that follow emission reduction trajectories that reach net-zero emissions no later than 2050 and whose cumulative emissions by 2050 stay within remaining emission budgets. The emission budget defines the temperature a net-zero pathway is aligned with: the lower the temperature, the tighter the budget and the faster the portfolio must decarbonize. MSCI Research has calculated that an annual decarbonization rate of 7% (as proposed by the European Union) is sufficient for MSCI ACWI IMI to align with a temperature well below 2°C, while a strict 1.5°C temperate alignment requires a decarbonization rate of 10% per year. These two rates are used in MSCI climate indexes.

Integrating climate considerations into an investor's set of benchmarks is one way to build a consistent framework for the integration of climate risk across the entire portfolio. In the financial industry, benchmarks are used at a strategic level (i.e., as policy benchmarks for defining the eligible investment universe of an investor or to help determine asset allocation), as well as at an implementation level (i.e., as a performance benchmark for actively or passively managed allocations or as a benchmark for financial products).

## MSCI Climate Index Construction Methodologies

MSCI has developed different categories of climate indexes to address different priorities investors may have in terms of mitigating climate-related risks, availing themselves of climate solutions investment opportunities and providing positive social impact.

All these climate indexes follow the three-step index construction approach summarized in Exhibit 2.

**Exhibit 2: MSCI's Three-Step Modular Approach to Creating Climate Indexes**
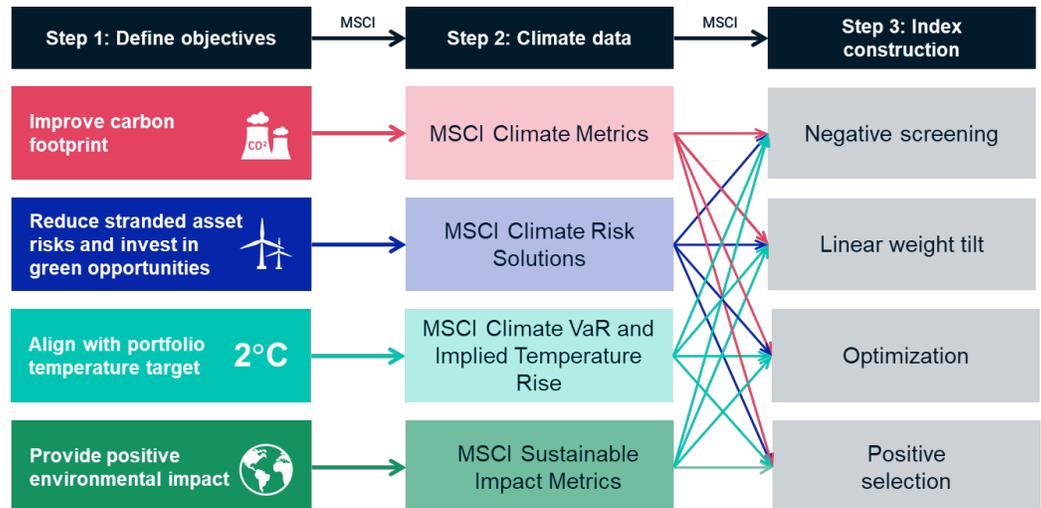


In choosing or creating a climate benchmark, an investor first defines climate-related investment objectives, and then maps these objectives to climate-related metrics. Finally, the investor chooses an index construction approach, based on these metrics.

The choice of objectives, datasets and index methodologies may be assessed using the following questions:

- **Objective**: What is my climate-related investment objective? Do I want to improve my carbon footprint to mitigate stranded-asset risks, or do I want to address transition risks and/or physical risks as well? Do I want to increase my exposure to companies pursuing climate solutions?
- **Index methodology**: Do I want to use sophisticated but potentially opaque portfolio optimization techniques to manage the trade-off between climate risk integration and other variables (such as tracking error, country and sector deviations) efficiently? Or do I prefer simple and more transparent index methodologies based on component selection or component reweighting?
- **Breadth**: Do I prefer a broad climate benchmark that keeps most of the opportunity set of the parent index, or do I wish to focus my investments on a smaller number of companies with the highest possible exposure to leaders in climate transition? Do I seek to divest from companies with the worst emission footprint, or should I account for those who are setting credible emission reduction targets?

We now consider index construction steps in more depth.

# Step 1: Defining Objectives and Preferences

Broadly speaking, there are four categories of standard MSCI climate indexes, all of which follow strict rules-based approaches and use the MSCI ACWI Index as their starting point. These four categories implement different combinations of the four investment objectives shown in Exhibit 1.

1. **MSCI Low Carbon Indexes** are focused on one objective: reducing the carbon emission intensity of the index and lowering exposure to fossil-fuel reserves (which constitute potential future emissions). This approach helps reduce index exposure to potentially stranded assets.
2. **MSCI Climate Change Indexes** combine three objectives: They reduce risk exposure to carbon-intense companies — including companies that are exposed through their supply chain (Scope 3 emissions). They also overweight climate solutions opportunities and implement an annual decarbonization rate of 7% that is aligned with achieving a temperature of below 2°C, as explained earlier.
3. **MSCI Climate Paris Aligned Indexes** implement an even stronger shift from fossil-based companies toward "green" solutions companies and decarbonize at an annual rate of 10% to ensure a temperature aligned with 1.5°C.
4. **The MSCI Global Environmental Index focuses on positive environmental impact,** targeting companies that provide solutions in key areas such as renewable energy, green buildings or pollution prevention.

The MSCI Climate Change Index aims to meet the requirements of the EU Climate Transition Benchmark regulation, as spelled out in the related delegated act. The MSCI Climate Paris Aligned Index aims to exceed those requirements, i.e., it decarbonizes at an annual rate of 10% to ensure strict alignment with a 1.5°C temperature.

These four categories of climate indexes reflect different investor preferences that lead investors to the climate index approach that may be best-aligned to their objectives. We illustrate these preferences in a decision tree (Exhibit 3)

**Exhibit 3: Decision Tree for Investors' Preferences**
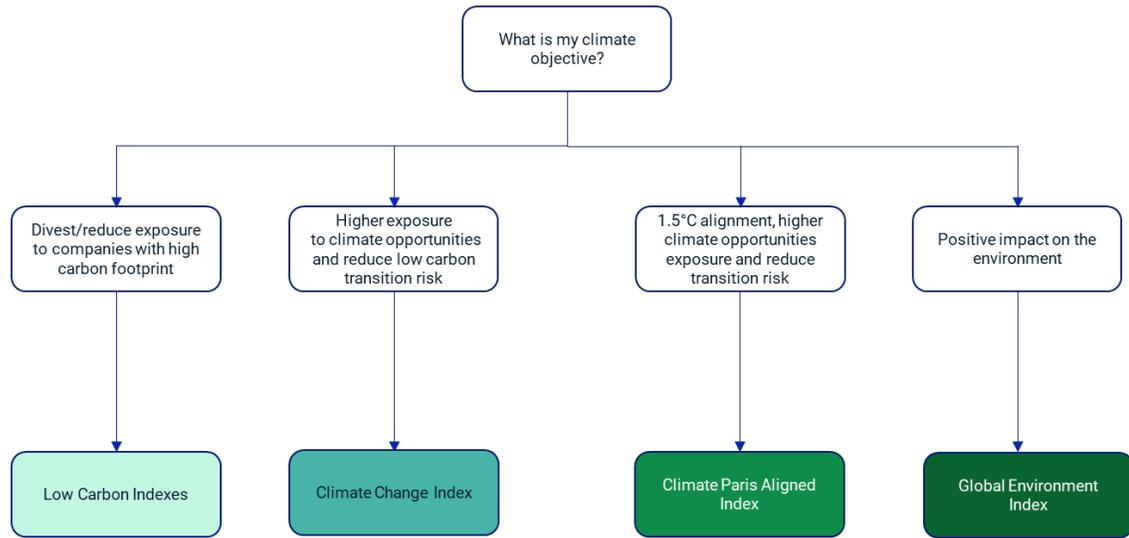


As we detail later, low-carbon indexes comprise both ex Fossil Fuel and Low Carbon Leader/Target indexes.

# Step 2: Detailing Data Used in MSCI Climate Indexes

We provide an overview of the datasets used in the different climate index methodologies in the exhibit below.

**Exhibit 4: Data Used for Four Categories of MSCI Climate Indexes**

| Suites and Objectives | MSCI Indexes | MSCI input data used | | | | | |
|---|---|---|---|---|---|---|---|
| | | MSCI ESG data | | MSCI Climate Metrics | | | |
| | | Controversies/ Business Involvement | Sustainable Impact Metrics (Green revenues) | Fossil Fuel Reserves | GHG Emissions | Low Carbon Transition Score | Climate Value-at-Risk |
| 1. Improve Carbon footprint | • Ex Fossil Fuel<br>• Low Carbon Leaders/Target | ✔ | | ✔ | ✔ | | |
| 2. Manage climate transition risk | • Climate Change | ✔ | ✔ | ✔ | ✔ | ✔ | |
| 3. Paris alignment | • Climate Paris Aligned | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 4. Climate Impact | • Global Environment | ✔ | ✔ | | | | |

## MSCI ESG Data

- **MSCI ESG Controversy Score:** Provides an assessment of controversial events linked to companies and their severity for stakeholders and financial relevance. Scores range between zero (very severe) to 10 (no recent incidents). The controversies also can be assessed on individual ESG pillars.
- **MSCI Business-Involvement Screens:** Provide an analysis of the percentage of revenue companies derive from certain business activities, such as alcohol or tobacco production.

## MSCI Climate Metrics

- **Weighted Average Carbon Intensity:** The amount of Scopes 1 and 2 GHG (direct emissions and electricity use) in tons of CO2-equivalent (tCO2e) per USD 1 million of sales.

- **Scope 3 Carbon Intensity:** The amount of Scope 3 GHG emissions in $tCO_2e$ per USD 1 million sales, based on MSCI's Scope 3 Estimation Model, generated by a company's supply chain. This covers all 15 categories of upstream and downstream Scope 3 emissions, as defined by the Greenhouse Gas Protocol. Details on the methodology can be found in Hadjikyriakou et al. (2020).

- **Fossil-Fuel Reserves:** Potential GHG emissions in million $tCO_2e$ embedded in companies' coal, oil and gas reserves per USD 1 million market capitalization.

- **Low Carbon Transition Score (LCT Score):** A measure of a company's climate transition risk arrived at by aggregating Scope 1, 2 and 3 emissions, avoided emissions and the quality of companies' climate management into a score between 0 (highest risk) and 10 (lowest risk/highest opportunity).

- **Low Carbon Transition Category (LCT Category):** A category assigned to a company that highlights the predominant transition risks and opportunities the company is most likely to face. The LCT Category is based on the LCT Score. There are five LCT Categories: stranded assets, product transition, operation transition, neutral and solutions. Details can be found in Badani et al. (2019).

- **Climate Value-at-Risk:** Forward-looking scenario-based analysis of companies' transition risk, physical risk and technology opportunities as a percentage of current market capitalization. MSCI calculates companies'

Climate VaR for 3°C, 2°C and 1.5°C warming scenarios. A company's total Climate VaR is the sum of three sub-components:

1. Policy Climate VaR: estimating the business impact of decarbonization

2. Technology Climate VaR: estimating financial opportunities from climate solutions technology

3. Physical Climate VaR: estimating companies' future cost form physical risk

### MSCI Sustainable Impact Metrics

- **Sustainable Impact Metrics:** Designed to identify companies that derive revenue from products or services with a positive impact on society and the environment. Sustainable Impact Metrics comprise of six Environmental Impact categories and seven Social Impact categories, arranged by theme.

- **Green Revenue Share:** Is part of MSCI Sustainable Impact Metrics and denotes the recent-year percentage of revenue, or maximum estimated percent, a company has derived from products or services related to alternative energy, energy efficiency, green building, pollution prevention, sustainable water or sustainable agriculture.

## Step 3: Climate Index Construction Methodologies

All MSCI Climate Indexes follow transparent and rules-based index-construction methodologies that allow for cost-efficient index replication and are based on a standard market-capitalization benchmark. Depending on investor objectives, different climate indexes can be designed using one or more index-methodologies

1. **Exclusions** of certain companies from the underlying benchmark universe. The purpose can be to either align with general ESG considerations (divest from controversial activities or when breaches of global norms such as the UN Global Compact occur) or to specifically divest from certain fossil-fuel-intense exposures.
2. **Selection** of companies with superior climate profiles.
3. **Weight tilt** of companies within the benchmark universe toward companies with superior climate profile.
4. **Optimization** of the climate profile of the index, while controlling for additional climate-related or financial objectives, such as active sector and regional exposures, index turnover or tracking error limits.

# MSCI Climate Indexes

Exhibit 5 summarizes MSCI's four standard climate index series.

**Exhibit 5: Overview of MSCI Climate Indexes**
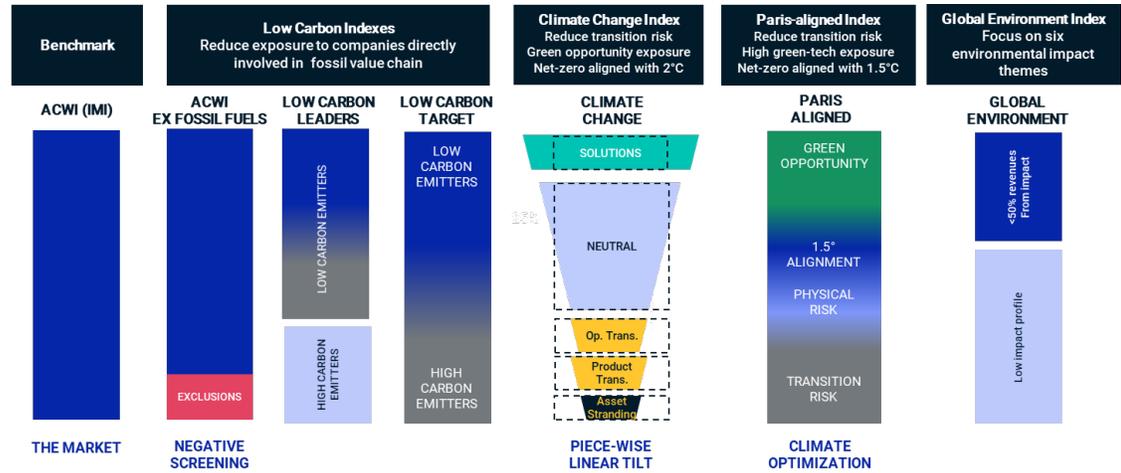


*Gradient fills denote indexes using optimization techniques.*

## Low Carbon Indexes

The **MSCI ex Fossil Fuels Index** is designed for investors that aim to reduce their fossil-fuel reserves exposure in their investments, excluding companies that own oil, gas and/or coal reserves.

**MSCI Low Carbon indexes** (MSCI Low Carbon Leaders and MSCI Low Carbon Target indexes) reduce climate-transition risks while representing the performance of the broad equity market. These indexes were designed to address two dimensions of carbon exposure: carbon emissions and fossil-fuel reserves but excludes Scope 3 emissions.

**MSCI Low Carbon Leaders Index Methodology:**

| Step | Description |
|---|---|
| **1. Exclude high emitters** | Exclude highest 20% (by number) of carbon emitters in terms of Scopes 1 and 2 emission intensity (up to 30% benchmark weight per sector can be excluded) |
| **2. Exclude high reserves** | Exclude highest fossil-fuel reserves ownership until 50% of fuel reserves have been excluded from the benchmark |
| **3. Optimize** | Use optimizer to reduce GHG emissions per USD of market cap by at least 50% under active sector exposure, active country exposure and turnover constraints. |

**MSCI Low Carbon Target Index Methodology:**

| Step | Description |
|---|---|
| **Optimize climate profile** | **Minimize carbon exposure of the index** (defined as carbon-emission intensity and potential emissions per dollar of market capitalization)<br><br>**Optimization constraints:**<br><br>• 30 bps ex-ante tracking error<br>• Active sector weight and active country weight<br>• Turnover (one-way) of max. 10% at each index review |

## MSCI Climate Change Index

The MSCI Climate Change Index addresses climate risks and opportunities. The methodology uses the MSCI Low Carbon Transition (LCT) Score and Low Carbon Transition Categories to increase exposure to companies associated with climate transition opportunities and reduce exposure to those related to transition risks.

The MSCI Low Carbon Transition Score is a more comprehensive risk measure than emission intensity: the LCT score incorporates Scope 3 emissions (which indicate companies' upstream and downstream climate-transition risks) as well as companies' climate-related management quality. The index is based on a re-weighting approach designed to exceed the minimum standards of the EU Climate Transition Benchmark (CTB).[7]

**MSCI Climate Change Index Methodology:**

| Step | Description |
|---|---|
| **1. ESG exclusions** | Excludes companies from the benchmark that are involved in the manufacturing of controversial weapons, tobacco-related businesses or thermal coal extraction and mining and companies with very severe ESG Controversies or severe environmental controversies. |
| **2. Weight tilt** | Company weights are tilted using MSCI Low Carbon Transition Category (companies in the solutions category are upweighted, while transition-risk categories such as asset stranding and product transition get downweighted). The MSCI Low Carbon Transition Score is used to re-weight companies within each category according to their climate transition profile. |
| **3. Align with net-zero / below 2 °C** | Afterward, an additional iterative component reweighting is applied to fulfill the requirements of the EU Climate Transition Benchmark, including an annual self-decarbonization rate of at least 7% per year. |

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[7] In the event of changes in the EU-delegated acts (Regulation (EU) 2016/1011 as amended by Regulation (EU) 2019/2089) and an update to the index methodology is required, MSCI will issue an announcement before implementing the changes in the methodology. MSCI will not conduct a formal consultation for such an update.

## MSCI Climate Paris Aligned Indexes

The MSCI Climate Paris Aligned Indexes aim to align with a net-zero world. They seek to mitigate climate transition and physical risks, emphasize opportunities arising from the transition to a lower-carbon economy and allocate capital in a way that supports the decarbonization of the economy in line with the Paris agreement requirements. The indexes incorporate the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), and are designed to exceed the minimum requirements for the EU Paris Aligned Benchmark.[8]

**MSCI Climate Paris Aligned Index Methodology:** MSCI Climate Paris Aligned Indexes optimizes constituents to achieve these different climate-related objectives.

| Step | Description |
|---|---|
| **1. ESG exclusions** | Exclude companies that are involved in controversial weapons, ESG Controversies, tobacco-related activities, environmental harm, thermal coal mining, oil and gas and power generation from fossil fuels. |
| **2. Optimize climate profile** | **Optimize index to improve climate profile:**<br><br>**1. Reduce transition risk:**<br>• At least 50% reduction of emission intensity (Scopes 1, 2 and 3)<br>• At least 50% reduction in potential emissions<br>• Underweight companies facing transition risk through at least 10% improvement in LCT score<br>• At least 20% overweight in companies with credible emission-reduction targets<br>• Neutral exposure to high climate-impact sector<br><br>**2. Invest in green opportunities:**<br>• Weighted average of green revenue over fossil-based revenue ratio at least four times that of the parent index<br>• Weighted average green revenue at least twice the parent index<br>• Overweight companies providing climate solutions through at least 10% improvement in LCT score<br><br>**3. Net-zero / 1.5°C temperature alignment**<br>• Annual emission-intensity reduction rate of at least 10% per year<br>• Neutral Aggregate Climate VaR under 1.5°C scenario<br><br>**4. Reduce physical risk**<br>• At least 50% reduction in Extreme Weather Climate Value-At-Risk<br><br>**Additional optimization constraints:**<br>• Active security weight, active sector weight and active country weight<br>• Limit one-way turnover to 5% at each semi-annual rebalance |

[8] The EU Paris Aligned Benchmark is contained in the EU Commission's Technical Expert Group on Sustainable Finance's Final Report on Climate Benchmarks and Benchmark ESG Disclosures.

## MSCI Global Environment Index

The MSCI Global Environment Index identifies a select set of companies whose products and services can have a positive impact on the environment.

**The MSCI Global Environment Index Methodology**

| Step | Description |
|------|-------------|
| **1. ESG exclusions** | Exclude companies with ties to controversial weapons and severe controversies |
| **2. Select leaders** | Select companies that derive 50% or more of their revenue cumulatively from the following six clean-tech themes:<br>1. Alternative (renewable) energy<br>2. Energy efficiency<br>3. Green buildings<br>4. Sustainable water<br>5. Pollution prevention<br>6. Sustainable agriculture |

# Climate Characteristics

To better understand how different MSCI Climate Indexes reflect various investor climate objectives, we looked at each climate index along the following dimensions: Carbon footprint, fossil-fuel reserves and green versus fossil-fuel-based revenue.

In the carbon-footprint comparison in Exhibit 6, we observe that the series of MSCI Low Carbon Indexes has achieved a significant reduction in emissions intensity, potential emissions and weight of fossil-fuel-reserve holding companies compared with the parent index. The Climate Paris Aligned Index was the only index achieving an even better footprint than the series of Low Carbon Indexes, while the ACWI Global Environment Index showed the smallest reduction in terms of emissions intensity, which is not surprising because the index methodology does not explicitly target emissions reduction.

**Exhibit 6: Carbon Footprint Comparison of MSCI ACWI Climate Indexes**
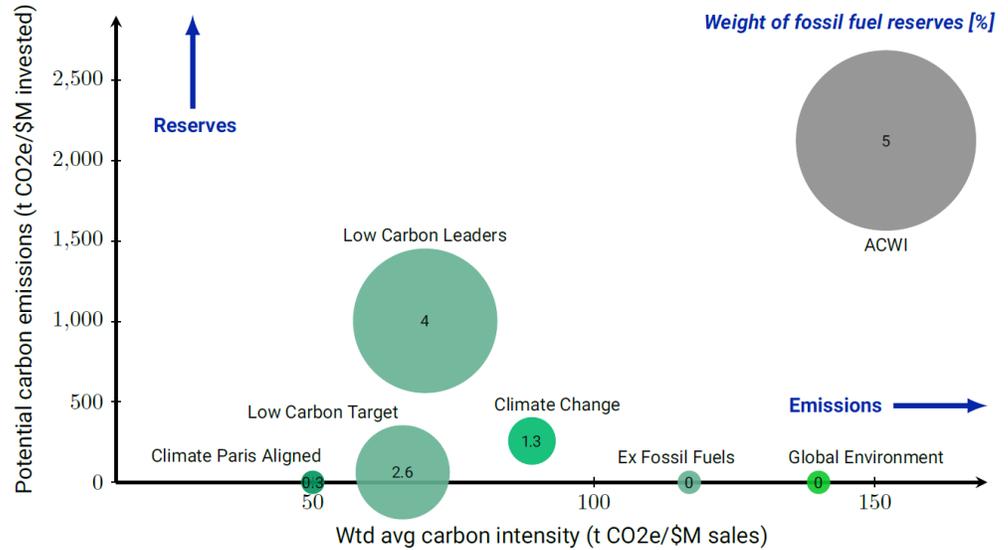


*As of June 30, 2021. Bubble sizes represent the weight of companies holding fossil-fuel reserves. Carbon intensity includes Scopes 1 and 2 emissions.*

However, when looking at exposure to green technology in Exhibit 7, we see the ACWI Climate Change, ACWI Climate Paris Aligned Index and especially the Global Environment Index showing significantly higher exposure to green technology, with the latter 100%-invested in green technology companies.

**Exhibit 7: Fossil-Based vs. Green Profile of MSCI ACWI Climate Indexes**
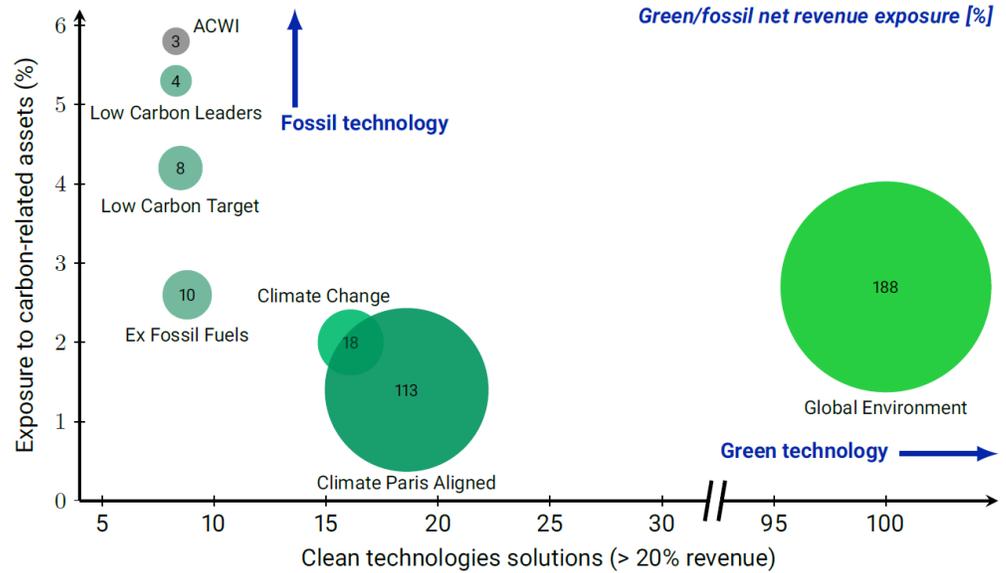


*As of June 30, 2021. Bubble sizes represent the ratio of green versus fossil-based revenue.*

More details on the climate profile of these indexes can be found in the Appendix.

## Index Profile

In the following section, we look at the potential climate-versus-diversification trade-off, as well as the climate-versus-tracking-error profile of the different MSCI Climate indexes.

Exhibit 8 looks at the trade-off between achieving an improved carbon footprint versus diversification (which we measure as the effective number of stocks in the index) and coverage of the underlying market.[9] We observe that the Low Carbon

Index series, the Climate Change Index and the MSCI Climate Paris Aligned Index experienced only a slight decline in diversification and market coverage.

By contrast, the MSCI Global Environmental Index showed a significant reduction in both diversification and market coverage. This is in line with its underlying investment objective to focus solely on companies that provide green solutions.

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[9] The effective number of stocks of a portfolio is defined as 1 / Herfindahl index, which is a standard measure for portfolio diversification.
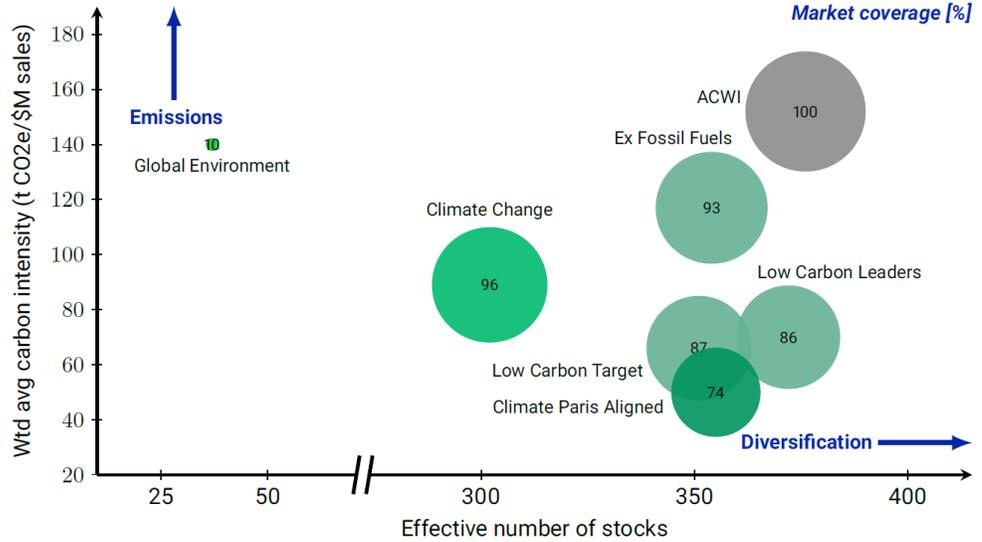
*As of June 30, 2021. Bubble sizes represent the market coverage of the indexes. Carbon intensity includes Scopes 1 and 2 emissions.*

Exhibit 9 shows the trade-off between emission intensity versus tracking error and turnover.
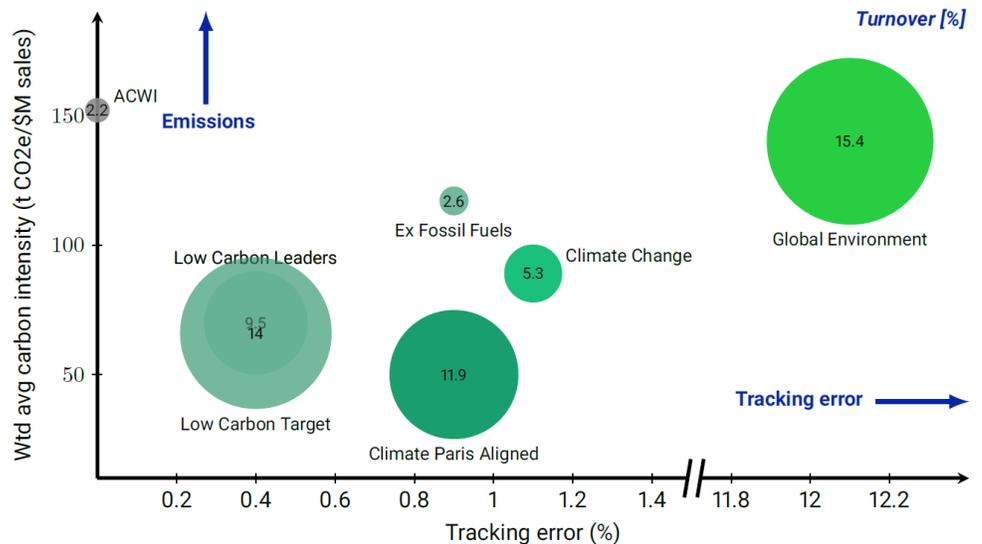


*As of June 30, 2021. Bubble sizes represent the turnover of the indexes. Carbon intensity includes Scopes 1 and 2 emissions. Tracking error and turnover were calculated from Nov. 29, 2013, to June 30, 2021.*

The ACWI Low Carbon Leaders Index and the ACWI Low Carbon Target Index (which are both tracking error-controlled using an optimization framework) showed very low levels of tracking error and moderate turnover. The MSCI ACWI Climate Paris Aligned Index also controls for tracking error. However, due to more stringent climate-related optimization constraints, the resulting tracking error was higher. The Global Environment Index had by far the highest tracking error due to its relatively concentrated investment profile.

## Financial Risk and Performance Profile

Exhibits 10 and 11 summarize the historical performance and risk characteristics of MSCI ACWI Climate indexes.

**Exhibit 10: Historical Performance of MSCI ACWI Climate Indexes**



MSCI ACWI Index
MSCI ACWI ex Fossil Fuels Index
MSCI ACWI Low Carbon Leaders Index
MSCI ACWI Low Carbon Target Index

MSCI ACWI Climate Change Index
MSCI ACWI Climate Paris Aligned Index
MSCI Global Environment Index
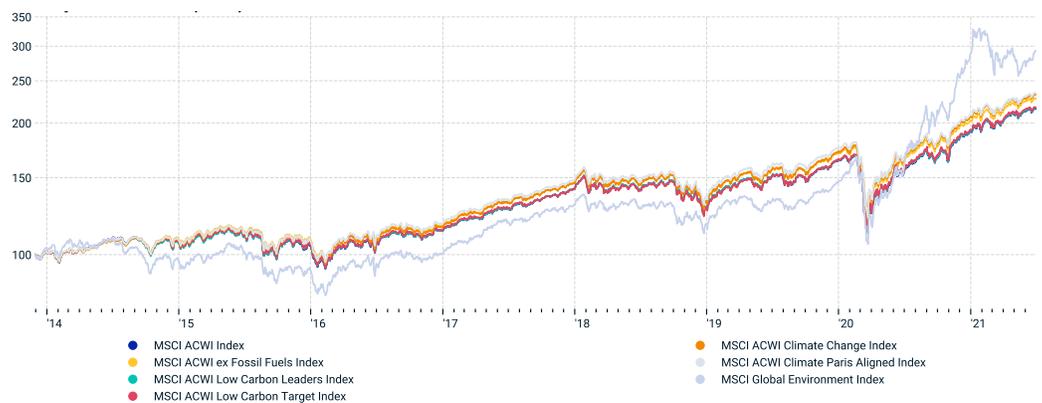
*Data from Nov. 29, 2013, to June 30, 2021.*

The MSCI Low Carbon Index series, Climate Change Index and Climate Paris Aligned Index have tracked the performance of the broad market (defined as the MSCI ACWI Index) quite closely with similar levels of risk, in accordance with their design.

None of these indexes underperformed between during the study period — in fact, except for the MSCI ACWI Low Carbon Leaders Index, all of them showed a slight degree of outperformance during the study period. The MSCI Global Environment Index experienced much higher tracking error from the parent index due to its higher concentration. It also showed the strongest cumulative outperformance during the study period.

**Exhibit 11: Performance and Risk Characteristics**

| | MSCI ACWI Index | MSCI ACWI ex Fossil Fuels Index | MSCI ACWI Low Carbon Leaders Index | MSCI ACWI Low Carbon Target Index | MSCI ACWI Climate Change Index | MSCI ACWI Climate Paris Aligned Index | MSCI Global Environment Index |
|---|---|---|---|---|---|---|---|
| Total return* (%) | 10.7 | 11.4 | 10.7 | 10.8 | 11.8 | 11.9 | 15.2 |
| Total risk (%) | 13.7 | 13.5 | 13.7 | 13.7 | 13.6 | 13.6 | 20.6 |
| Return / risk | 0.78 | 0.85 | 0.78 | 0.79 | 0.87 | 0.87 | 0.74 |
| Sharpe ratio | 0.72 | 0.79 | 0.73 | 0.73 | 0.81 | 0.82 | 0.70 |
| Active return (%) | 0.0 | 0.8 | 0.0 | 0.1 | 1.1 | 1.2 | 4.5 |
| Tracking error (%) | 0.0 | 0.9 | 0.4 | 0.4 | 1.1 | 0.9 | 12.1 |
| Information Ratio | nan | 0.89 | 0.14 | 0.26 | 1.03 | 1.27 | 0.37 |
| Historical beta | 1.00 | 0.98 | 1.00 | 1.00 | 0.99 | 0.99 | 1.24 |
| Number of constituents*** | 2651 | 2508 | 2053 | 1803 | 2495 | 1383 | 213 |
| Turnover** (%) | 2.2 | 2.6 | 9.5 | 14.0 | 5.3 | 11.9 | 15.4 |
| Price to book*** | 2.2 | 2.3 | 2.2 | 2.3 | 2.4 | 2.3 | 2.1 |
| Price to earnings*** | 19.1 | 19.2 | 19.0 | 18.9 | 19.2 | 19.4 | 25.6 |
| Dividend yield*** (%) | 2.4 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.1 |

*Data from Nov. 29, 2013, to June 30, 2021.*

What explains these returns? Exhibit 12 looks at active return contributions from countries, industries, equity style factors and currency exposures. The ACWI Low Carbon Leaders and Low Carbon Target indexes had very little active-factor exposure due to their tight tracking-error controls. However, the other climate indexes showed significant positive performance contributions from industry exposures. This has two implications: 1) industries that were heavily involved in fossil-based technology and that were underweight in these climate indexes underperformed, and/or 2) green industries that were overweight in these climate indexes outperformed. In addition, the Global Environmental Index showed a significant positive specific performance contribution, which means selecting companies that had high exposure to green technology was a driver of returns.

**Exhibit 12: Active Annualized Return Contributions**

| Active return contribution | ACWI ex Fossil Fuels | ACWI Low Carbon Leaders | ACWI Low Carbon Target | ACWI Climate Change | ACWI Climate Paris Aligned | Global Environment |
|---|---|---|---|---|---|---|
| **Total Active** | **0.78%** | **0.05%** | **0.10%** | **1.11%** | **1.21%** | **4.53%** |
| Country | 0.02% | -0.02% | -0.01% | 0.06% | -0.02% | 0.19% |
| Industry | 0.41% | -0.01% | -0.12% | 0.70% | 0.50% | 0.49% |
| Styles | 0.09% | 0.03% | -0.04% | 0.17% | 0.08% | 1.76% |
| Currency | 0.05% | -0.02% | -0.01% | 0.01% | -0.10% | -0.45% |
| Specific | 0.21% | 0.07% | 0.30% | 0.17% | 0.74% | 2.53% |

# Security Allocations of the Climate Paris Aligned Index

Using an optimization approach allows for the targeting of multiple climate-related investment objectives while controlling for financial variables such as turnover, active sector weights or tracking error. However, an optimization process makes it more difficult to assess the impact of each constraint used on the resulting index composition. Therefore, we took a closer look at how the Climate VaR and Extreme Weather Climate VaR constraints used in optimizing the MSCI Climate Paris Aligned Index affected the index's asset allocation (Exhibit 13).

**Exhibit 13: Impact on Index Allocation Due to Climate VaR Constraints**
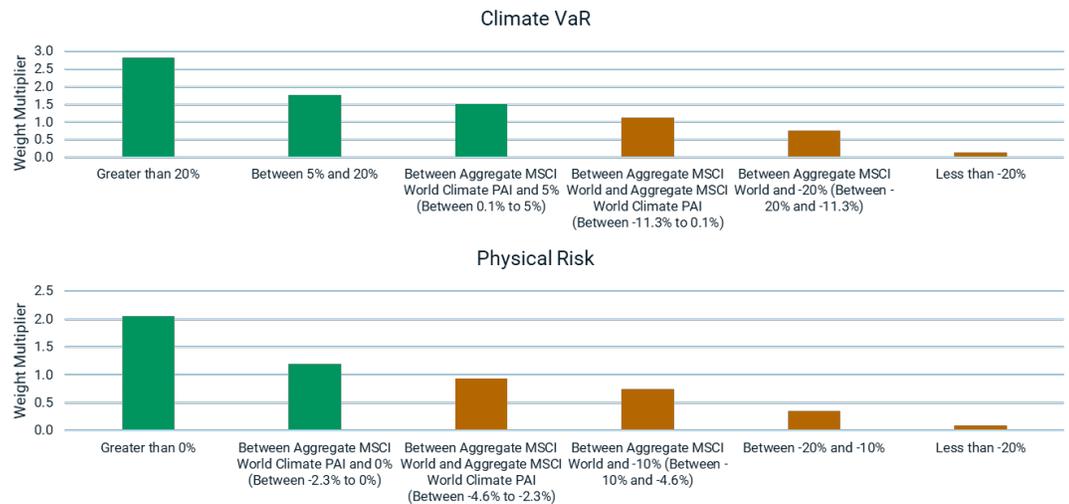


*As of MSCI's May 2021 index review.*

Exhibit 13 shows the aggregate weight multiplier for companies within each range of Climate VaR values (e.g., between 5% and 20%) in the MSCI Climate Paris Aligned Index relative to the parent index weight. Companies with positive Climate VaR were overweighted as a group in the MSCI Climate Paris Aligned Index. Similarly, companies with poor Climate VaR values were significantly downweighted as a group. We saw similar behavior for physical-risk climate metrics as well.

# Conclusion

MSCI has developed a range of climate indexes to address the preferences of various investors. At the top level, these indexes can be classified by four investment objectives:

1. Decarbonize the index
2. Address climate transition risk in the index's construction
3. Align the index with the objectives of the Paris Agreement
4. Focus the index on companies providing clean technologies and solutions

The MSCI ACWI ex Fossil Fuels Index, the MSCI ACWI Low Carbon Leaders Index and Low Carbon Target indexes are the first series of indexes that focus on decarbonizing the index compared with their parent index. While the first one simply excludes companies that own fossil-fuel reserves, the latter two reduce both the emissions intensity and fossil-fuel reserves while keeping their tracking error at a very low level.

The MSCI ACWI Climate Change Index reduces transition risks in a symmetrical way: The weight of carbon-intense companies is scaled down, while green-solutions companies' weight is scaled up. Therefore, the index addresses both financial risks and financial opportunities in its construction. In addition, the index decarbonizes at a rate of 7%per year to align with a temperature of below 2°C.

The MSCI ACWI Climate Paris Aligned Index goes beyond the Paris Agreement, implementing an annual decarbonization pathway of 10% per year. to align with a strict 1.5°C target temperature. In addition, it reduces physical-risk exposures in the index construction.

While these climate index series offer broad coverage of the underlying market with modest to low levels of tracking error, the MSCI Global Environment Index is a concentrated index that focuses solely on green technology companies, which led to higher tracking error and lower levels of diversification than the parent index.

Different investors may have varying climate-related objectives and preferences for their equity portfolios. The four categories of climate indexes discussed in this paper offer them options in deciding how to choose an appropriate benchmark.

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# Appendix

## Exhibit A1: Climate Profile of MSCI ACWI Climate Indexes

| | MSCI ACWI Index | MSCI ACWI ex Fossil Fuels Index | MSCI ACWI Low Carbon Leaders Index | MSCI ACWI Low Carbon Target Index | MSCI ACWI Climate Change Index | MSCI ACWI Climate Paris Aligned Index | MSCI Global Environment Index |
|---|---|---|---|---|---|---|---|
| **Climate footprint** | | | | | | | |
| Carbon emissions (t CO2e/$M invested) | 90 | 59 | 47 | 20 | 41 | 13 | 38 |
| Carbon intensity (t CO2e/$M sales) | 205 | 145 | 102 | 50 | 114 | 40 | 176 |
| Wtd avg carbon intensity (t CO2e/$M sales) | 152 | 117 | 70 | 66 | 89 | 50 | 140 |
| **Low carbon transition risks** | | | | | | | |
| Low carbon transition score | 6.1 | 6.3 | 6.2 | 6.2 | 6.5 | 6.7 | 8.2 |
| Solutions (%) | 6.6 | 6.9 | 6.7 | 7.0 | 15.4 | 20.4 | 71.4 |
| Product & operational transition (%) | 14.2 | 10.7 | 11.6 | 10.5 | 6.2 | 0.9 | 2.7 |
| Asset stranding (%) | 0.4 | 0.1 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 |
| **Exposure to asset stranding risks** | | | | | | | |
| Potential carbon emissions (t CO2e/$M invested) | 2125 | 0 | 1004 | 62 | 257 | 0 | 0 |
| Fossil fuel reserves (%) | 5.0 | 0.0 | 4.0 | 2.6 | 1.3 | 0.3 | 0.0 |
| Thermal coal mining (%) | 1.1 | 0.0 | 1.1 | 0.8 | 0.1 | 0.0 | 0.0 |
| Thermal coal-based power generation (%) | 2.6 | 1.4 | 1.6 | 1.3 | 1.7 | 0.7 | 2.5 |
| Unconventional oil & gas extraction (%) | 2.4 | 0.0 | 2.1 | 1.0 | 0.4 | 0.0 | 0.0 |
| **Exposure to clean technology solutions** | | | | | | | |
| Clean technologies solutions (> 20% revenue) | 8.3 | 8.8 | 8.3 | 8.5 | 16.1 | 18.6 | 100.0 |
| Clean technologies solutions revenue (wtd avg %) | 4.8 | 5.0 | 4.7 | 4.9 | 8.9 | 11.2 | 83.3 |
| Green/brown net revenue exposure | 2.9 | 9.9 | 4.1 | 8.2 | 17.7 | 113.4 | 188.4 |
| **Other climate metrics** | | | | | | | |
| Exposure to carbon-related assets (%) | 5.8 | 2.6 | 5.3 | 4.2 | 2.0 | 1.4 | 2.7 |
| Climate-related controversies (%, score ≤ 4) | 0.2 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| Low carbon transition management score (% top quartile) | 57.0 | 58.0 | 56.7 | 58.2 | 60.0 | 61.4 | 74.2 |

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