

MSCI Climate Paris Aligned Indexes Methodology

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1. Introduction

The MSCI Climate Paris Aligned Indexes¹ (“the Indexes”) are designed to support investors seeking to reduce their exposure to transition and physical climate risks and who wish to pursue opportunities arising from the transition to a lower-carbon economy while aligning with the Paris Agreement requirements. The Indexes incorporate the TCFD recommendations and are designed to exceed the minimum standards of the EU Paris-Aligned Benchmark². The Indexes are constructed from their corresponding market capitalization weighted indexes (“the Parent Indexes”) through an optimization process that aims to:

- Exceed the minimum technical requirements laid out in the EU Delegated Act
- Align with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)³
- Achieve a maximum Implied Temperature Rise of 2.0°C for the Index
- Align with a 1.5°C climate scenario using aggregated cumulative projected emissions, the MSCI Climate Value-at-Risk and a “self-decarbonization” rate of 10% year on year
- Reduce the Index’s exposure to physical risk arising from extreme weather events by at least 50%
- Shift index weight from companies facing climate transition risks to companies having climate transition opportunities, using the MSCI Low Carbon Transition Score, and by excluding categories of fossil fuel-linked companies
- Increase the weight of companies which are exposed to climate transition opportunities and reduce the weight of companies which are exposed to climate transition risks
- Reduce the weight of companies assessed as high carbon emitters using scope 1, 2 and 3 emissions
- Increase the weight of companies with credible carbon reduction targets through the weighting scheme
- Achieve a modest tracking error compared to the Parent Index and low turnover.

¹ The Indexes are governed by a set of methodology and policy documents (“Methodology Set”), including the present index methodology document. Please refer to Appendix IX for more details.

² On December 3, 2020, the European Commission has published the delegated acts in the Official Journal (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R1818&from=EN>) which contain the minimum technical requirements for the EU Paris-aligned Benchmarks. In case there are changes in the EU delegated acts and an update to the Index methodology is required, MSCI will issue an announcement prior to implementing the changes in the methodology. MSCI will not conduct a formal consultation for such an update.

³ <https://www.fsb-tcfd.org/publications/final-recommendations-report/>

2. Constructing the Indexes

The Indexes use company ratings and research provided by MSCI ESG Research⁴ to determine eligibility for index inclusion.

2.1 Eligible Universe

The Eligible Universe is constructed from the constituents of the Parent Index by excluding securities based on the exclusion criteria listed below:

1. **Controversial Weapons:** All companies involved in Controversial Weapons as defined by the methodology of the MSCI Ex-Controversial Weapons Indexes.
2. **Environmental Harm:** All companies assessed as having involvement in environmental controversies that are classified as Red (MSCI Environmental Controversy Score of 0) or Orange Flags (score of 1).
 - A Red Flag indicates an ongoing, Very Severe ESG controversy implicating a company directly through its actions, products, or operations.
 - An Orange Flag indicates an ongoing Severe ESG controversy implicating a company directly, or a Very Severe ESG controversy that is either partially resolved or indirectly attributed to the company's actions, products, or operations.
3. **ESG Controversies:** All companies assessed as having involvement in ESG controversies that are classified as Red Flags (MSCI ESG Controversy Score of 0). A Red Flag indicates an ongoing, Very Severe ESG controversy implicating a company directly through its actions, products, or operations.
4. **Oil & Gas:** All companies deriving 10% or more revenue from oil and gas related activities, including distribution / retail, equipment and services, extraction and production, petrochemicals, pipelines and transportation and refining but excluding biofuel production and sales and trading activities.
5. **Power Generation:** All companies deriving 50% or more revenue from thermal coal based power generation, liquid fuel based power generation and natural gas based power generation⁵.
6. **Tobacco:** All companies with involvement in Tobacco as defined by the methodology of the MSCI Global ex Tobacco Involvement Indexes.
7. **Thermal Coal Mining:** All companies deriving 1% or more revenue (either reported or estimated) from the mining of thermal coal (including lignite, bituminous, anthracite and steam coal) and its sale to external parties. It excludes revenue from metallurgical coal, coal mined for internal power generation (e.g. in the case of vertically integrated power

⁴ See section 4 for further information regarding ESG and climate data used in the Indexes that MSCI Limited and MSCI Deutschland GmbH source from MSCI ESG Research LLC, a separate subsidiary of MSCI Inc. MSCI ESG Research is solely responsible for the creation, determination and management of such data as a provider to MSCI Limited and MSCI Deutschland GmbH. MSCI Limited and MSCI Deutschland GmbH are the benchmark administrators for the MSCI indexes.

⁵ As per https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter7.pdf, thermal coal based power generation, liquid fuel based power generation and natural gas based power generation have median lifecycle emissions exceeding 100gCO₂/kWh.

producers), intra-company sales of mined thermal coal, and revenue from coal trading (either reported or estimated)

8. Civilian Firearms:

- All companies classified as “Producer” of firearms and small arms ammunitions for civilian markets. It does not include companies that cater to the military, government, and law enforcement markets.
- All companies deriving 5% or more aggregate revenue from the production and distribution (wholesale or retail) of firearms or small arms ammunition intended for civilian use.

9. Nuclear Weapons: All companies involved meeting specific Nuclear Weapons business involvement criteria as described in Appendix V.

2.2 Optimization Constraints

At each Semi-Annual Index Review, the indexes are constructed using an optimization process that aims to achieve replicability and investability as well as minimize ex-ante tracking error relative to the Parent Index subject to the following constraints:

1. Transition and physical risk objectives – constraints detailed in Table 1
2. Climate transition opportunities objectives – constraints detailed in Table 2
3. Diversification objectives – constraints detailed in Table 3

The definitions of the target metrics for the optimization are detailed in Appendix III.

Table 1: Constraints imposed to meet transition and physical risk objectives

No.	Transition and Physical Risk Objective	Target Value
1	Minimum reduction in Greenhouse Gas (GHG) Intensity (Scope 1+2+3 ⁶) relative to Parent Index	50%
2	Minimum average reduction (per annum) in GHG Intensity relative to GHG Intensity at the Base Date ⁷	10%
3	Minimum active weight in High Climate Impact Global Industry Classification Standard (GICS®) ⁸ sector relative to Parent Index as defined in Appendix III	0%
4	Minimum increase in the aggregate weight of Companies Setting Targets relative to the aggregate	20%

⁶ Prior to the May 2020 Semi-Annual Index Review (SAIR) of the Indexes, the Weighted Average Carbon Emissions Intensity has been calculated based on Scope 1+2 Emissions.

⁷ Prior to the May 2020 Semi-Annual Index Review (SAIR) of the Indexes, the average reduction in WACI has been calculated using Scope 1+2 Emissions since Inception.

⁸ GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence.

No.	Transition and Physical Risk Objective	Target Value
	Parent Index weight of such companies that meet the eligibility criteria. Companies Setting Targets are defined in Appendix III and eligibility criteria are defined in Section 2.1.	
5	Minimum reduction in Weighted Average Potential Emissions Intensity relative to Parent Index	50%
6	Aggregated Climate Value-at-Risk ⁹ Please see more detail on Aggregated Climate Value-at-Risk in Appendix II and Appendix III.	$\geq \text{Max}(-5\%, \text{Aggregated Climate VaR of Parent Index})$
7	Minimum increase in weighted average Low Carbon Transition (LCT) Score relative to Parent Index Please see more detail on LCT Score in Appendix I	10%
8	Minimum reduction in Weighted Average Physical Risk Climate Value-at-Risk (Aggressive Scenario) relative to Parent Index	50% ¹⁰

Table 2: Constraints imposed in order to meet transition opportunity objectives

No.	Transition Opportunity Objective	Target Value
9	Minimum increase in weighted average LCT Score ¹¹ relative to the Parent Index ¹²	10%
10	Minimum ratio of Weighted Average Green Revenue/ Weighted Average Fossil fuels-based Revenue relative to the Parent Index	4 times
11	Minimum increase in Weighted Average Green Revenue relative to the Parent Index	100%

⁹ Prior to the May 2020 Semi-Annual Index Review (SAIR) of the Indexes, the Policy Risk Climate VaR using Scope 1 Emissions was applied since Inception.

The Aggregated Climate VAR constraint was applied at " $\geq \text{Max} (-10\%, \text{Aggregated Climate Value-at-Risk of Parent Index})$ ":

- at the November 2023 Index Review for the MSCI EM, MSCI AC Asia Pacific ex Japan, MSCI AC Asia ex Japan, MSCI Japan, MSCI China, and MSCI China A, Climate Paris Aligned Indexes
- at the May 2024 Index Review for the MSCI Japan, and MSCI China Climate Paris Aligned Indexes
- at the November 2024 Index Review for the MSCI China Climate Paris Aligned Index

¹⁰ In case the Parent Index has a positive Weighted Average Physical Risk Climate VaR, the floor will be applied at the level of the Weighted Average Physical Risk Climate VaR of the Parent Index

¹¹ The constraint on increase in LCT Score is designed to underweight companies with a low LCT Score (assessed as companies facing risks from a low carbon transition) and overweight companies with a high LCT Score (assessed as companies which may have opportunities from a low carbon transition). Thus, the constraint has been repeated in Table 2 to illustrate how the constraint meets both the objectives.

¹² For the MSCI USA Climate Paris Aligned Index and the MSCI Japan Climate Paris Aligned Index, the minimum Increase in weighted average LCT Score relative to the Parent Index constraint is applied at 5% instead of 10%.

No.	Transition Opportunity Objective	Target Value
12	Index Implied Temperature Rise (ITR) ¹³	<=2.0°C
13	Aggregate Cumulative Projected Emissions ¹³	Aligned with <=1.5°C ITR

Table 3: Constraints imposed to meet diversification objectives

No.	Diversification Objective	Target Value
14	Constituent Active Weight ¹⁴	+/- 2%
15	Minimum constituent weight	0.01%
16	Security Weight as a multiple of its weight in the Parent Index	20x
17	Active Sector Weights (the Energy GICS Sector is not constrained)	+/- 5%
18	Active Country Weights ¹⁵	+/- 5%
19	One Way Turnover ¹⁶	5%
20	Common Factor Risk Aversion	0.0075
21	Specific Risk Aversion	0.075

During the Semi-Annual Index Review, in the event that there is no optimal solution that satisfies all the optimization constraints, the following constraints will be relaxed, until an optimal solution is found:

- Relax the one-way index turnover constraint in steps of 1% up to 20%
- Relax the active sector weight constraint in steps of 1% up/down to +/-20%
- The one-way index turnover constraint and the active sector weight constraint are alternately relaxed until a feasible solution is achieved.

¹³ For further details on the Implied Temperature Rise and Cumulative Projected Emissions calculations, please refer to Appendix VI.

¹⁴ For the MSCI Canada Climate Paris Aligned Index, the constituent active weight constraint is set to +/- 5% instead of +/- 2%.

During the November 2024 Index Review, the constituent active weight constraint was set to +/-5% for the MSCI China Climate Paris Aligned Index, and to +/-4% for the MSCI Japan Climate Paris Aligned Index.

¹⁵ In case there are countries in the parent index which weigh less than 2.5% in the parent index then for such countries the active country upper bound of +5% is not applicable. When a country weighs less than 2.5% in parent index then the upper bound of country weight in the Index is set at three times of the country's weight in parent index.

¹⁶ The May 2022 Index review for MSCI Canada Climate Paris Aligned Index was conducted by relaxing the one-way turnover constraint to 25%.

In the event that no optimal solution is found after the above constraint relaxations are exhausted, the relevant Index will not be rebalanced for that Semi-Annual Index Review.

2.3 Determining the Optimized Index

The Indexes are constructed using the Barra Open Optimizer¹⁷ in combination with the relevant Barra Equity Model. The optimization uses universe of eligible securities and the specified optimization objectives and constraints to determine the constituents of the Indexes.

2.4 Treatment of Unrated Companies

Companies not assessed by MSCI ESG Research on data for any of the following MSCI ESG Research products are not eligible for inclusion in the Indexes:

- MSCI ESG Controversies
- MSCI Climate Change Metrics
- MSCI Business Involvement Screening Research (BISR)

For the treatment of unrated companies in the calculation of target metrics for the optimization process, please refer to Appendixes III and VI.

¹⁷ Please refer to Appendix VII and VIII for more details.

3. Maintaining the Indexes

3.1 Semi-Annual Index Reviews

The Indexes are rebalanced on a semi-annual basis, as of the close of the last business day of May and November, coinciding with the May and November Index Review of the MSCI Global Investable Market Indexes. The pro forma Indexes are in general announced nine business days before the effective date.

In general, MSCI uses MSCI ESG Research data (including MSCI Climate Change Metrics, MSCI Climate Value-at-Risk, MSCI ESG Sustainable Impact Metrics, MSCI ESG Controversies and MSCI Business Involvement Screening Research) as of the end of the month preceding the Index Reviews for the rebalancing of the Indexes.

3.2 Ongoing Event Related Changes

The general treatment of corporate events in the Indexes aims to minimize turnover outside of Index Reviews. The methodology aims to appropriately represent an investor’s participation in an event based on relevant deal terms and pre-event weighting of the index constituents that are involved. Further, changes in index market capitalization that occur as a result of corporate event implementation will be offset by a corresponding change in the Variable Weighting Factor (VWF) of the constituent.

Additionally, if the frequency of Index Reviews in the Parent Index is greater than the frequency of Index Reviews in the Index, the changes made to the Parent Index during intermediate Index Reviews will be neutralized in the Index.

The following section briefly describes the treatment of common corporate events within the Index.

No new securities will be added (except where noted below) to the Index between Index Reviews. Parent Index deletions will be reflected simultaneously.

EVENT TYPE

EVENT DETAILS

New additions to the Parent Index

A new security added to the Parent Index (such as IPO and other early inclusions) will not be added to the index.

Spin-Offs

All securities created as a result of the spin-off of an existing Index constituent will be added to the Index at the time of event implementation. Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

Merger/Acquisition

For Mergers and Acquisitions, the acquirer’s post event weight will account for the proportionate amount of shares involved in deal consideration, while cash proceeds will be invested across the Index.

If an existing Index constituent is acquired by a non-Index constituent, the existing constituent will be deleted from the Index and the acquiring non-constituent will not be added to the Index.

Changes in Security Characteristics

A security will continue to be an Index constituent if there are changes in characteristics (country, sector, size segment, etc.) Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

Further detail and illustration regarding specific treatment of corporate events relevant to this Index can be found in the MSCI Corporate Events Methodology book under the sections detailing the treatment of events in Capped Weighted and Non-Market Capitalization Weighted indexes.

The MSCI Corporate Events methodology book is available at: <https://www.msci.com/index-methodology>.

4. MSCI ESG Research

The Indexes are products of MSCI Inc. that utilize information such as company ratings and research produced and provided by MSCI ESG Research LLC (MSCI ESG Research), a subsidiary of MSCI Inc. In particular, the Indexes use the following MSCI ESG Research products: MSCI Climate Change Metrics, MSCI Climate Value-at-Risk, MSCI Impact Solutions, MSCI ESG Controversies and MSCI ESG Business Involvement Screening Research. MSCI Indexes are administered by MSCI Limited and MSCI Deutschland GmbH.

4.1 MSCI Climate Change Metrics

MSCI Climate Change Metrics provides climate data & tools to support institutional investors seeking to integrate climate risk & opportunities into their investment strategy and processes. This includes investors seeking to achieve a range of objectives, including measuring and reporting on climate risk exposure, implementing low carbon and fossil fuel-free strategies, alignment with temperature pathways and factoring climate change research into their risk management processes, in particular through climate scenario analysis for both transition and physical risks.

The dataset spans across the four dimensions of a climate strategy: transition risks, green opportunities, physical risks and 1.5° alignment.

4.1.1 Fossil Fuels and Power Generation Metrics

MSCI ESG Research identifies companies involved in fossil fuel-related assets and activities including fossil fuel reserves, resource extraction, power generation and generation capacity, revenue from such assets and activities and capital investments in such assets and activities. The metrics are based on disclosed activities, disclosed revenue and estimates of revenue that are extrapolated from company disclosures and eligible third-party sources (such as NGOs).

4.1.2 Greenhouse Gas (GHG) Emissions

MSCI ESG Research collects reported emissions and uses proprietary estimation methodologies that follows the GHG Protocol in including carbon dioxide (CO₂) and the five other principal GHGs: hydrofluorocarbons (HFCs), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Emissions of these other gases are accounted for in terms of the quantity of CO₂ that has an equivalent global warming potential.

4.1.3 Low-Carbon Transition (LCT) Risk Assessment

MSCI ESG Research's LCT data assesses companies' exposure to risks and opportunities related to the low-carbon transition (the transition) based on the carbon-intensive nature of their business lines. In particular, in the event that the transition takes place, demand for carbon-intensive products would decline in favor of low- and zero-carbon products, which would put carbon-intensive companies and industries (for example, coal-based power generation and coal mining) at risk of having stranded assets over the long term (5+ years). MSCI ESG Research considers a company exposed to low-carbon transition risks and opportunities through two main transmission channels: (1) exposure through involvement in carbon-intensive operations, and (2) exposure through involvement in or solutions for carbon-intensive products.

4.1.4 Implied Temperature Rise (ITR)

ITR is a forward-looking temperature alignment metric for companies and portfolios. Specifically, the ITR methodology evaluates if companies and portfolios are aligned with the Paris Agreement temperature goals — in particular, the maximal goal of limiting global mean surface temperature to an increase no more than 1.5°C in the year 2100 compared with preindustrial levels. A key consideration to ITR is the concept of a carbon budget, that is, how much the world can emit so that global warming doesn't exceed 1.5°C by 2100 and, by extension, how much a company can emit to take its fair share of global decarbonization. ITR extrapolates the global implied temperature rise at a 2100 horizon if the entire economy had the same budget overshoot or undershoot as a given company or portfolio.

4.1.5 Climate Value-at-Risk (VaR)

Climate VaR provides a forward-looking and return-based valuation assessment to measure climate-related risks and opportunities. Climate VaR is a quantitative assessment calculated at the company and security level. The aggregated company Climate VaR is calculated as a percentage of market value (from -100% to +100%) for multiple climate scenarios and includes the valuation impacts arising from technology opportunities, policy risks and physical risks. The Climate VaR model uses a data-driven approach, examining a company's positioning within its industry and the regions where it operates. It considers the potential costs and profits associated with different climate scenarios, including the impacts of carbon pricing, regulatory changes, and physical climate events. By simulating these scenarios, the model estimates how climate change could affect a company's financial performance and overall valuation.

4.1.6 Other metrics: Targets and Management

MSCI ESG Research also provides a number of other climate-related metrics such as MSCI ESG Ratings-based Key Issues (e.g., Carbon Emissions, Product Carbon Footprint, etc.) and their underlying metrics (e.g., targets, mitigation, performance), which are referenced and governed within the MSCI ESG Ratings Methodology (see Section 2C of this document). In addition, MSCI ESG Research collects additional target-level datapoints, including whether the target has been submitted to the Science Based Targets initiative (SBTi), whether SBTi has approved the target and whether the company is committed to setting a science-based target in the future.

For more details on MSCI Climate Change Metrics, please refer to

<https://www.msci.com/legal/disclosures/climate-disclosures>

4.2 MSCI Impact Solutions: Sustainable Impact Metrics

MSCI Impact Solutions' Sustainable Impact Metrics is designed to identify companies that derive revenue from products or services with positive impact on society and the environment. The Sustainable Impact Metrics are comprised of six Environmental Impact categories and seven Social Impact categories arranged by theme.

MSCI Sustainable Impact Taxonomy

Pillar	Themes	Categories
Environmental Impact	Climate Change	<ol style="list-style-type: none"> 1. Alternative energy 2. Energy efficiency 3. Green building
	Natural capital	<ol style="list-style-type: none"> 4. Sustainable water 5. Pollution prevention 6. Sustainable agriculture
Social Impact	Basic needs	<ol style="list-style-type: none"> 7. Nutrition 8. Major Disease Treatment 9. Sanitation 10. Affordable Real Estate
	Empowerment	<ol style="list-style-type: none"> 11. SME Finance 12. Education 13. Connectivity – Digital divide

Under each of the actionable environmental and social impact themes, MSCI ESG Research has identified specific categories of products and services that it has determined companies can offer as potential solutions to environmental and social challenges.

For more details on MSCI Sustainable Impact Metrics, please refer to <https://www.msci.com/legal/disclosures/esg-disclosures>.

4.3 MSCI Impact Solutions: SDG Alignment

MSCI ESG Controversies provide assessments of controversies concerning the potential negative environmental, social, and/or governance impact of company operations, products and services. The evaluation framework used in MSCI ESG Controversies is designed to be consistent with international norms represented by the UN Declaration of Human Rights, the ILO Declaration on Fundamental Principles and Rights at Work, and the UN Global Compact. MSCI ESG Controversies Score falls on a 0-10 scale, with “0” being the most severe controversy.

The MSCI ESG Controversies methodology can be found at: <https://www.msci.com/legal/disclosures/esg-disclosures>.

4.4 MSCI ESG Business Involvement Screening Research

MSCI ESG Business Involvement Screening Research (BISR) aims to enable institutional investors to manage environmental, social and governance (ESG) standards and restrictions reliably and efficiently.

The MSCI Business Involvement Screening Research methodology can be found at: <https://www.msci.com/legal/disclosures/esg-disclosures>.

Appendix I: MSCI Low Carbon Transition Risk Assessment

MSCI ESG Research’s Low Carbon Transition Risk assessment¹⁸ is designed to identify potential leaders and laggards by measuring companies’ exposure to and management of risks and opportunities related to the low carbon transition. The assessment is derived from company disclosures and estimates.

The final output of this assessment is two company-level factors:

- (1) **Low Carbon Transition Category:** This factor groups companies in five categories that highlight the predominant risks and opportunities they are most likely to face in the transition (Exhibit 1).
- (2) **Low Carbon Transition Score:** This score is based on a multi-dimensional risks and opportunities assessment and considers both primary and secondary risks a company faces. It is an industry agnostic assessment of a company’s position vis-à-vis the transition.

Exhibit 1: Low Carbon Transition Categories and Scores

LOW CARBON TRANSITION SCORE	LOW CARBON TRANSITION CATEGORY		LOW CARBON TRANSITION RISK / OPPORTUNITY	INDUSTRY EXAMPLES
SCORE = 0	ASSET STRANDING		Potential to experience “stranding” of physical / natural assets due to regulatory, market, or technological forces arising from low carbon transition.	Coal mining & coal-based power generation; industries in the Oil & Gas value chain
	TRANSITION	PRODUCT	Reduced demand for carbon-intensive products and services. Leaders and laggards are defined by the ability to shift product portfolio to low-carbon products.	Petrol/diesel-based automobile manufacturers
		OPERATIONAL	Increased operational and/or capital cost due to carbon taxes and/or investment in carbon emission mitigation measures leading to lower profitability of the companies.	Cement, Steel
	NEUTRAL		Limited exposure to low carbon transition carbon risk. Though companies in this category could have exposure to physical risk and/or indirect exposure to low carbon transition risk via lending, investment etc.	Consumer Staples, Healthcare
SCORE = 10	SOLUTIONS		Potential to benefit through the growth of low-carbon products and services.	Renewable electricity, Electric vehicles, Solar cell manufacturers

Calculation methodology

The Low Carbon Transition Categories and Scores are determined by a combination of each company’s current risk exposure and its efforts to manage the risks and opportunities presented by the low carbon transition. The 3-step process followed by MSCI ESG Research is explained below.

¹⁸ For more details on MSCI Climate Change Metrics: <https://www.msci.com/climate-change-solutions>

Step 1: Measure Low Carbon Transition Risk Exposure

The first step towards measuring the Low Carbon Transition Risk Exposure for a company is the computation of its estimated total net carbon intensity – which considers operational and product carbon emissions. In the next step, we compute Low Carbon Transition Risk Exposure Category and Score based on total net carbon intensity.

Step 2: Assess Low Carbon Transition Risk Management

In the second step, MSCI ESG Research assesses a company's management of risks and opportunities presented by the low carbon transition. This assessment is based on policies and commitments to mitigate transition risk, governance structures, risk management programs and initiatives, targets and performance, and involvement in any controversies.

Step 3: Calculate Low Carbon Transition Category and Score

In the final step, the Low Carbon Transition Risk Exposure Category and Score that was calculated in Step 1 is adjusted for the strength of management efforts. Following this adjustment, Low Carbon Transition Risk Exposure Score of companies with top or second quartile risk management improves and some top and second quartile companies may move up one category.

Appendix II: MSCI Climate Value-at-Risk

The MSCI Climate Value-at-Risk measurement helps investors to assess future costs related to climate change and understand what those future costs could mean in the current valuation of securities. The premise of Climate Value-at-Risk is to aggregate costs related to specific climate risks and calculate what these costs might signify about financial performance into the foreseeable future.

1.5°C Aggregated Policy Risk Equity Climate VaR (REMIND NGFS Orderly) [%]

An equity's aggregated downside policy risk exposure according to all emission sources (Scope 1, 2, 3), expressed as a percentage of the equity's market value, assuming a global 1.5°C target and using carbon prices from the REMIND model under the NGFS Orderly scenario. Please refer to the Climate VaR methodology document for further details on scenario options.

1.5°C Technology Opportunities Equity Climate VaR (REMIND NGFS Orderly) [%]

An equity's upside technology opportunity exposure, expressed as a percentage of the equity's market value capped at 100%, assuming a global 1.5°C target and calculated using carbon prices from the REMIND model under the NGFS Orderly scenario. Please refer to the Climate VaR methodology document for further details on scenario options.

4°C Aggregated Physical Risk Equity Climate VaR (IPCC SSP3-7.0, Aggressive Outcome) [%]

An equity's "worst-case" (95th percentile) downside or upside potential, expressed as a percentage of the equity's market value, assuming trends in extreme cold, extreme heat, extreme precipitation, heavy snowfall, extreme wind, coastal flooding, fluvial flooding, river low flow, tropical cyclones and wildfires continue along the 4°C IPCC SSP3-7.0 scenario.

Appendix III: Calculation of Target Metrics

Greenhouse Gas (GHG) Emissions Intensity

MSCI ESG Research collects company-specific direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions (GHG) data from company public documents and/or the Carbon Disclosure Project. If a company does not report GHG emissions, then MSCI ESG Research estimates Scope 1 and Scope 2 GHG emissions.

MSCI ESG Research estimates company-specific indirect (Scope 3) GHG emissions from the Scope 3 Carbon Emissions Estimation Model. The data is generally updated on an annual basis.

Calculation of GHG Intensity

Carbon emissions of a company are normalized for size by dividing annual carbon emissions by Enterprise Value including Cash (EVIC). The Carbon Emissions Intensity is calculated using the latest Scope 1+2 carbon emissions, Scope 3 carbon emissions and EVIC of a company.

Security Level GHG Intensity (Scope 1+2+3) =

$$(\text{Unadjusted Security Level GHG Intensity (Scope 1+2)} + \text{Unadjusted Security Level GHG Intensity (Scope 3)}) * (1 + \text{EVIAF})$$

Unadjusted Security Level GHG Intensity (Scope 1+2) =

$$\frac{(\text{Scope 1 + 2 Carbon Emissions})}{\text{EVIC (in M\$)}}$$

If Scope 1+2 carbon emissions and/or EVIC are not available, the average Scope 1+2 intensity of all the constituents of the MSCI ACWI in the same GICS Industry Group in which the security belongs is used.

Unadjusted Security Level GHG Intensity (Scope 3) =

$$\frac{(\text{Scope 3 Carbon Emissions})}{\text{EVIC (in M\$)}}$$

If Scope 3 carbon emissions and/or EVIC are not available, the average Scope 3 intensity of all the constituents of the MSCI ACWI in the same GICS Industry Group in which the security belongs is used.

Enterprise Value Inflation Adjustment Factor (EVIAF) =

$$\left(\frac{\text{Average(EVIC)}}{\text{Previous (Average(EVIC))}} \right) - 1$$

Weighted Average GHG Intensity of Parent Index =

$$\sum (\text{Weight in Parent Index} * \text{Security Level GHG Intensity})$$

Weighted Average GHG Intensity of Derived Index =

$$\sum (Index\ Weight * Security\ Level\ GHG\ Intensity)$$

Calculation of Potential Carbon Emissions Intensity

Security Level Potential Carbon Emissions (PCE) Intensity =

$$\frac{Absolute\ Potential\ Emissions}{EVIC\ (in\ M\$)}$$

If Absolute Potential Emissions data is not available, MSCI uses zero fossil fuel reserves.

Weighted Average Potential Emissions Intensity of Parent Index =

$$\sum (Weight\ in\ Parent\ Index * Security\ Level\ PCE\ Intensity)$$

Weighted Average Potential Emissions Intensity of Derived Index =

$$\sum (Index\ Weight * Security\ Level\ PCE\ Intensity)$$

Calculation of Average Decarbonization

On average, the Indexes follow a 10% decarbonization trajectory since the Base Date. The Weighted Average GHG Intensity at the Base Date (W_1) is used to compute the target Weighted Average GHG Intensity at any given Semi-Annual Index Review (W_t) as per the below formula.

$$W_t = W_1 * 0.90^{\frac{(t-1)}{2}}$$

Where 't' is the number of Semi-Annual Index Reviews since the Base Date.

Thus, for the 3rd Semi-Annual Index Review since the Base Date (t=3), the target Weighted Average GHG Intensity will be $W_1 * 0.90$.

Companies Setting Targets

The Index requires a minimum 20% increase in the aggregate weight of companies setting emissions reduction targets relative to the aggregate Parent Index weight of such companies that meet the eligibility criteria. Companies setting targets are defined as companies having one or more active carbon emissions reduction target(s) approved by the Science Based Targets initiative (SBTi), or companies meeting all the following requirements:

- Companies publishing emissions reduction targets
- Companies publishing their annual emissions and

- Companies reducing their GHG intensity by 7% over each of the last 3 years.

Calculation of Green Revenue to Fossil fuels-based Revenue Multiple

Green Revenue

For each constituent in the Parent Index, the Green Revenue% is calculated as the cumulative revenue (%) from the six Clean Tech themes which are as follows:

- **Alternative Energy** – products and services that support the transmission, distribution and generation of renewable energy and alternative fuels to reduce carbon and pollutant emissions in supporting affordable and clean energy to combat climate change.
- **Energy Efficiency** – products, and services that support the maximization of productivity in labor, transportation, power and domestic applications with minimal energy consumption to ensure universal access to affordable, reliable and modern energy services.
- **Sustainable Water** – products, services, infrastructure projects and technologies that resolve water scarcity and water quality issues, through minimizing and monitoring current water demand, improving the quality and availability of water supply to improve resource management in both domestic and industrial use.
- **Green Building** – design, construction, redevelopment, retrofitting, or acquisition of green-certified properties to promote mechanisms for raising capacity for effective climate change mitigation and adaptation.
- **Pollution Prevention** – products, services, infrastructure projects and technologies that reduces volume of waste materials through recycling, minimizes introduction of toxic substances, and offers remediation of existing contaminants such as heavy metals and organic pollutants in various environmental media to significantly address pollution in all levels and its negative effects
- **Sustainable Agriculture** - revenues from forest and agricultural products that meet environmental and organic certification requirements to address significantly biodiversity loss, pollution, land disturbance, and water overuse

The Weighted Average Green Revenue% is calculated as:

$$= \sum (Weight\ in\ Index * Green\ Revenue\%)$$

Fossil fuels-based Revenue

For each constituent in the Parent Index, the Fossil fuels-based Revenue% is calculated as the cumulative revenue (%) from the following sources:

- Revenue% (either reported or estimated) from the mining of thermal coal (including lignite, bituminous, anthracite and steam coal) and its sale to external parties. It excludes revenue from metallurgical coal, coal mined for internal power generation (e.g. in the case of vertically integrated power producers), intra-company sales of mined thermal coal and revenue from coal trading (either reported or estimated)
- Revenue% from the extraction, production and refining of Conventional and Unconventional Oil & Gas. Conventional Oil and Gas includes Arctic onshore/offshore, deep water, shallow

water and other onshore/offshore. Unconventional Oil and Gas includes oil sands, oil shale (kerogen-rich deposits), shale gas, shale oil, coal seam gas, and coal bed methane.

- Revenue% from thermal coal based power generation, liquid fuel based power generation and natural gas based power generation.

The Weighted Average Fossil fuels-based Revenue% is calculated as:

$$= \sum (Weight\ in\ Index * Brown\ Revenue\%)$$

The Green Revenues to Fossil fuels-based Revenues multiple for either the Parent Index or the Index is calculated as a ratio of the Weighted Average Green Revenue to the Weighted Average Fossil fuels-based Revenue as per the formula below:

$$= \frac{Weighted\ Average\ Green\ Revenue\%}{Weighted\ Average\ Brown\ Revenue\%}$$

Aggregated Climate Value-at-Risk (VaR)

The Index-level Aggregated Climate Value-at-Risk for any Index is calculated as the sum of the below 3 components:

1. **Policy Risk Climate VaR¹⁹ (1.5 Degrees):** Weighted average of security level 1.5°C Aggregated Policy Risk Equity Climate VaR (REMIND NGFS Orderly) [%]
2. **Technology Opportunities Climate VaR (1.5 Degrees):** Weighted average of security level 1.5°C Technology Opportunities Equity Climate VaR (REMIND NGFS Orderly) [%]
3. **Physical Risk Climate VaR (4 Degrees, Aggressive Outcome):** Weighted average of security level Aggregated Physical Risk Equity Climate VaR (Aggressive Outcome) [%]

Climate Impact Sectors

NACE²⁰ is the European Union’s classification of economic activities. As per the draft DA, stocks in the NACE Section codes A, B, C, D, E, F, G, H, L are classified as “High Climate Impact” sector and other stocks are classified ‘Low Climate Impact’ sector. The GICS²¹ Sub-Industry code for each security is mapped to the corresponding “Climate Impact Sector” using a mapping. This mapping is constructed in the following steps:

1. MSCI has published a mapping²² between the NACE classes and GICS Sub-Industry.

¹⁹ Starting from the May 2020 Semi-Annual Index Review, the Policy Risk Climate VaR used in the Indexes incorporate Scope 2 and Scope 3 emissions as well. The Policy Risk Climate VaR used in the May 2020 Semi-Annual Index Review of the Indexes is as of September 30, 2020.

²⁰ For further details regarding NACE, please refer to https://ec.europa.eu/eurostat/statistics-explained/index.php?title=NACE_background

²¹ For further information regarding GICS, please refer to <https://www.msci.com/gics>

²² This mapping is available in the [Handbook of Climate Transition Benchmarks, Paris-Aligned Benchmark and Benchmarks’ ESG Disclosures](#). Please note that the mapping does not reflect changes in the GICS structure that were implemented in the MSCI indexes on June 1, 2023.

2. For each GICS Sub-Industry, the number of NACE classes which fall under the High Climate Impact Sector (say the number of classes is N_H) and Low Climate Impact Sector (say the number of classes is N_L) is identified
3. If all the NACE classes for a given GICS Sub-Industry are identified in the High Climate Impact Sector ($N_L = 0$), then the GICS Sub-Industry is mapped to the High Climate Impact Sector. Conversely, if all the NACE classes for a given GICS Sub-Industry are identified in the Low Climate Impact Sector ($N_H = 0$) then the GICS Sub-Industry is mapped to the Low Climate Impact Sector
4. In case a GICS Sub-Industry is mapped to some NACE classes in the High Climate Impact Sector and the others in the Low Climate Impact Sector, the GICS Industry is mapped to the Climate Impact Sector in the following manner:
 - a. **$N_H \geq N_L$** : If the number of NACE classes in the High Climate Impact Sector is at least equivalent to the number of NACE classes in the Low Climate Impact Sector, the GICS Sub-Industry is mapped to the High Climate Impact Sector
 - b. **$N_H < N_L$** : If the number of NACE classes in the High Climate Impact Sector is less than the number of NACE classes in the Low Climate Impact Sector, the GICS Sub-Industry is mapped to the Low Climate Impact Sector
5. Using the GICS Sub-Industry to Climate Impact Sector mapping created in Step 4, and the security-level GICS Sub-Industry, each security in the Parent Index is classified in either High Climate Impact Sector or Low Climate Impact

Appendix IV: Decarbonization Trajectory of Indexes

The Weighted Average GHG Intensity on the Base Date (W_1) is used to compute the target Weighted Average GHG Intensity at any given Semi-Annual Index Review (W_t) as per the below formula.

$$W_t = W_1 * 0.90^{\frac{(t-1)}{2}}$$

Where 't' is the number of Semi-Annual Index Reviews since the Base Date. The table below shows the Weighted Average GHG Intensity on the Base Date (W_1) for each of the regions where the Indexes are constructed:

Index	Parent Index	Base Date	W_1 (tCO ₂ /M\$ Enterprise Value + Cash)
MSCI ACWI Climate Paris Aligned Index	MSCI ACWI Index	June 01, 2020	231.29
MSCI J-Series ACWI Climate Paris Aligned Index	MSCI J-Series ACWI Index	June 01, 2020	231.29
MSCI ACWI ex USA Climate Paris Aligned Index	MSCI ACWI ex USA Index	June 01, 2020	316.55
MSCI World Climate Paris Aligned Index	MSCI World Index	June 01, 2020	227.32
MSCI World ex USA Climate Paris Aligned Index	MSCI World ex USA Index	June 01, 2020	299.55
MSCI World ex EMU Climate Paris Aligned Index	MSCI World ex EMU Index	June 01, 2020	211.72
MSCI EM (Emerging Markets) Climate Paris Aligned Index	MSCI EM (Emerging Markets) Index	June 01, 2020	316.75
MSCI J-Series EM Climate Paris Aligned Index	MSCI J-Series EM Index	June 01, 2020	316.75
MSCI EAFE Climate Paris Aligned Index	MSCI EAFE Index	June 01, 2020	294.75
MSCI Europe Climate Paris Aligned Index	MSCI Europe Index	June 01, 2020	270.23
MSCI Europe Small Cap Climate Paris Aligned Index	MSCI Europe Small Cap Index	June 01, 2020	264.20
MSCI EMU Climate Paris Aligned Index	MSCI EMU Index	June 01, 2020	306.37
MSCI North America Climate Paris Aligned Index	MSCI North America Index	June 01, 2020	192.33
MSCI USA Climate Paris Aligned Index	MSCI USA Index	June 01, 2020	208.81
MSCI Canada Climate Paris Aligned Index	MSCI Canada Index	June 01, 2020	226.52
MSCI Japan Climate Paris Aligned Index	MSCI Japan Index	June 01, 2020	400.80

Index	Parent Index	Base Date	W ₁ (tCO ₂ /M\$ Enterprise Value + Cash)
MSCI AC Asia ex Japan Climate Paris Aligned Index	MSCI AC Asia ex Japan Index	June 01, 2020	302.43
MSCI AC Asia Pacific ex Japan Climate Paris Aligned Index	MSCI AC Asia Pacific ex Japan Index	June 01, 2020	289.77
MSCI China Climate Paris Aligned Index	MSCI China Index	June 01, 2020	128.08
MSCI China A Climate Paris Aligned Index	MSCI China A Index	June 01, 2020	193.44
MSCI EM (Emerging Markets) ex China Climate Paris Aligned Index	MSCI EM (Emerging Markets) ex China Index	June 1, 2020	393.56

Appendix V: Companies Involved in Nuclear Weapons Business

Companies, whose activities meet the following criteria, as determined by MSCI ESG Research, are excluded from the Index:

- All companies that manufacture nuclear warheads and/or whole nuclear missiles
- All companies that manufacture components that were developed or are significantly modified for exclusive use in nuclear weapons (warheads and missiles)
- All companies that manufacture or assemble delivery platforms that were developed or significantly modified for the exclusive delivery of nuclear weapons.
- All companies that provide auxiliary services related to nuclear weapons.
- All companies that manufacture components that were not developed or not significantly modified for exclusive use in nuclear weapons (warheads and missiles) but can be used in nuclear weapons.
- All companies that manufacture or assemble delivery platforms that were not developed or not significantly modified for the exclusive delivery of nuclear weapons but have the capability to deliver nuclear weapons.

All companies that manufacture components for nuclear-exclusive delivery platforms.

Appendix VI: Calculation of Implied Temperature Rise and Cumulative Projected Emissions

Implied Temperature Rise (ITR)

The index-level ITR is calculated through an aggregated budget approach. The sum of emissions overshoot is compared against the sum of emissions budget for the portfolio and converted to a degree of temperature rise using the TCRE approach²³.

$$\text{Index-level ITR} = \text{Base Temperature} + \frac{\sum(\text{Global Budget} * \text{TCRE Factor} * \text{Security Weight in Index} * \frac{\text{Emissions Overshoot}}{\text{EVIC}})}{\sum(\text{Security Weight in Index} * \frac{\text{Emissions Budget}}{\text{EVIC}})}$$

where

- Base Temperature = 1.5 degrees²⁴, as per the MSCI ITR Model
- Global Budget = remaining total carbon budget available to limit global warming to 1.5 degrees
- Emissions Overshoot [Budget] = company-level cumulative emissions overshoot [budget] projected until 2050, as per the MSCI ITR Model

Cumulative Projected Emissions

Each company’s cumulative projected emissions overshoot is calculated from four different estimates, using the formula “Max (Min (O1, O2, O3), O4)”, where:

- O1 = Cumulative Emissions Overshoot published by MSCI ESG Research, as per the MSCI ITR Model
- O2 = Cumulative Emissions Overshoot Cap, imputed from assuming a maximum ITR of 10 degrees for the company²⁵
- O3 = Cumulative Emissions Overshoot assuming decarbonization of the company’s current Scopes 1+2+3 emissions at a constant rate of 10% until 2050
- O4 = Cumulative Emissions Overshoot Floor, imputed from assuming the company will not decarbonize further once aligned with the minimum ITR of 1.3 degrees²⁵

²³ The Transient Climate Response to Cumulative Carbon Emissions (TCRE), established by the IPCC, provides a relationship that links each additional unit of emissions emitted beyond the available remaining global carbon budget to degrees of additional warming.

²⁴ The MSCI ITR Model references a global warming scenario of 1.55°C by the year 2100. Please note that “1.5°C” is generally used as a shorthand in the MSCI ITR Methodology.

²⁵ The Company-level ITR calculation compares the Cumulative Emissions Overshoot for the company against its Cumulative Emissions Budget and is converted to a degree of temperature rise using the TCRE approach.

Note that at index level, the company-level cumulative projected emissions overshoot are aggregated with the company-level projected emissions budget using the Index-level ITR formula above, to assess Constraint 13 as per Section 2.2.

Missing Data Treatment: Companies with missing data for emissions budget and emissions overshoot are not considered for the Index Implied Temperature Rise calculation.

Appendix VII: Barra Equity Model Used in the Optimization

The Indexes currently use an optimization setup using the MSCI Barra Global Equity Model for Long-Term Investors (GEMTL).

Appendix VIII: New Release of Barra® Equity Model or Barra® Optimizer

A major new release of the relevant Barra Equity Model or Barra Optimizer may replace the former version within a suitable timeframe.

Appendix IX: Methodology Set

The Indexes are governed by a set of methodology and policy documents (“Methodology Set”), including the present index methodology document as mentioned below:

- Description of methodology set – <https://www.msci.com/index/methodology/latest/ReadMe>
- MSCI Corporate Events Methodology – <https://www.msci.com/index/methodology/latest/CE>
- MSCI Fundamental Data Methodology – <https://www.msci.com/index/methodology/latest/FundData>
- MSCI Index Calculation Methodology – <https://www.msci.com/index/methodology/latest/IndexCalc>
- MSCI Index Glossary of Terms – <https://www.msci.com/index/methodology/latest/IndexGlossary>
- MSCI Index Policies – <https://www.msci.com/index/methodology/latest/IndexPolicy>
- MSCI Global Industry Classification Standard (GICS) Methodology – <https://www.msci.com/index/methodology/latest/GICS>
- MSCI Global Investable Market Indexes Methodology – <https://www.msci.com/index/methodology/latest/GIMI>
- MSCI Global ex Controversial Weapons Indexes Methodology – <https://www.msci.com/index/methodology/latest/XCW>
- MSCI Global ex Tobacco Involvement Index – <https://www.msci.com/index/methodology/latest/ExTobacco>
- ESG Factors in Methodology*

The Methodology Set for the Indexes can also be accessed from MSCI’s webpage <https://www.msci.com/index-methodology> in the section ‘Search Methodology by Index Name or Index Code’.

* ‘ESG Factors in Methodology’ contains the list of environmental, social, and governance factors considered, and how they are applied in the methodology (e.g., selection, weighting or exclusion). It can be accessed in the Methodology Set as described above

Appendix X: Changes to this Document

The following sections have been updated effective June 01, 2022:

- Section 3.3: Added footnotes for the constraints that were relaxed during May 2022 SAIR.

The following sections have been updated effective December 01, 2022:

- Section 1: Updated the references to the delegated acts.
- Section 3.3: Added footnotes for the constraints that were relaxed during November 2022 SAIR.

The following sections have been modified as of February 2023:

- Methodology book was updated to reflect the transition of the MSCI Global Investable Market Indexes (GIMI) to Quarterly Comprehensive Index Reviews.
- All references to “Semi-Annual Index Reviews” and “Quarterly Index Reviews” of the MSCI GIMI were replaced with “Index Reviews”
- Section 3.3: Added footnote to clarify the constituent active weight constraint applied to the MSCI Canada Climate Paris Aligned Index.

The following sections have been modified as of May 2023:

- Methodology book was updated to reflect the change in the target for Aggregated Climate Value -At-Risk from greater than or equal to 0% to greater than or equal to -5%.
- The definition of Companies Setting Targets was expanded to include any company which has received Science Based Targets from the Science Based Targets Initiative (SBTi)
- The calculation of aggregate weight of ‘Companies Setting Target’ will only include companies which are not excluded from the index, as per the exclusion criteria described in section 3.2 of the methodology document.
- Section 2: The reference to the Applicable Universe was removed to simplify the Index Construction methodology.
- The ESG Research Product descriptions were moved from section 2 to section 4

The following sections have been modified as of November 2023:

- The ESG Screening criteria was updated in Section 2.1 to include civilian firearms and nuclear weapons.
- The treatment of companies with ratings and research not available from MSCI ESG Research was added to Section 2.4
- The Climate Value-at-Risk models and scenarios used were updated in Appendix II and III.
- The references on NACE and GICS mapping was updated in Appendix III.
- The calculation of GHG Intensity was updated to reflect the missing data treatment for Scope 1+2. Scope 3 and EVIC in Appendix III.
- The calculation of Potential Emissions was clarified in Appendix III.

- The detailed description for the Nuclear Weapons screening criteria was added in Appendix V.

The following sections have been modified as of January 2024:

- Appendix 4: Added decarbonization trajectory of additional Indexes.
- Appendix 8: Added details on the Methodology Set for the Indexes.

The following sections have been modified as of May 2024:

- Section 2.2: Added Implied Temperature Rise constraints.
- Appendix I: Updated language and the Low Carbon Transition Categories and Scores table
- Appendix IV: Additional Index added in the table
- Appendix III: Updated language for Companies Setting Targets
- Appendix VI: Added details on the calculation of Implied Temperature Rise and Cumulative Projected Emissions

The following sections have been modified as of July 2024

- Appendix VI: Added a new footnote to clarify the base temperature used by the MSCI ITR methodology

The following sections have been modified as of November 2024

Section 2.2 Optimization Constraints

- Added special treatment applied to the MSCI China Climate Paris Aligned Index, and the MSCI Japan Climate Paris Aligned Index.

Section 2.4: Treatment of Unrated Companies

- Added the treatment of companies when data on business involvement screening research or climate change metrics research is not available from MSCI ESG Research

The following section has been modified as of December 2024

Section 4.1: MSCI Climate Change Metrics

- Added sub-sections under Climate Change Metrics to provide additional details on Fossil Fuels related activities, Greenhouse Gas Emissions, Low-Carbon Transition, Implied Temperature Risk, Climate Value-at-Risk, and other metrics such as Science Based Targets initiative.

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