

MSCI Climate Paris Aligned Indexes Methodology

February 2023

Contents

- 1 Introduction 3
- 2 MSCI ESG Research 4
 - 2.1 MSCI Climate Change Metrics.....4
 - 2.2 MSCI Climate Value-At-Risk.....4
 - 2.3 MSCI ESG Sustainable Impact Metrics.....4
 - 2.4 MSCI ESG Controversies.....5
 - 2.5 MSCI ESG Business Involvement Screening Research 6
- 3 Index Construction Methodology 7
 - 3.1 Applicable Universe7
 - 3.2 Eligible Universe.....7
 - 3.3 Optimization Constraints8
 - 3.4 Determining the Optimized Portfolio 11
- 4 Maintaining the MSCI Climate Paris Aligned Indexes 12
 - 4.1 Semi-Annual Index Reviews.....12
 - 4.2 Ongoing Event Related Changes12
- Appendix I: MSCI Low Carbon Transition Risk Assessment 14
- Appendix II: MSCI Climate Value-At-Risk..... 16
- Appendix III: Calculation of Target Metrics 17
- Appendix IV: Decarbonization Trajectory of Indexes..... 22
- Appendix V: Barra Equity Model Used in The Optimization..... 23
- Appendix VI: New release of Barra® Equity Model or Barra® Optimizer 24

1 Introduction

The MSCI Climate Paris Aligned 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 MSCI Climate Paris Aligned Indexes incorporate the TCFD recommendations and are designed to exceed the minimum standards of the EU Paris-Aligned Benchmark¹. The MSCI Climate Paris Aligned Indexes are constructed from their corresponding Parent Indexes following an *optimization-based* approach and aim 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)²
- Align with a 1.5°C climate scenario using 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 “fossil fuels-based” to “green” 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 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.

² <https://www.fsb-tcdf.org/publications/final-recommendations-report/>

2 MSCI ESG Research

The Indexes use company ratings and research provided by MSCI ESG Research. 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

For details on MSCI ESG Research’s full suite of ESG products, please refer to: <https://www.msci.com/esg-investing>

2.1 MSCI CLIMATE CHANGE METRICS

MSCI Climate Change Metrics provide 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.

For more details on MSCI Climate Change Metrics, please refer to <https://www.msci.com/climate-solutions>

2.2 MSCI CLIMATE VALUE-AT-RISK

Climate Value-at-Risk (Climate VaR) is designed to provide a forward-looking and return-based valuation assessment to measure climate related risks and opportunities in an investment portfolio. The fully quantitative model offers deep insights into how climate change could affect company valuations.

For more details on MSCI Climate Value-At-Risk, please refer to <https://www.msci.com/climate-data-and-metrics>

2.3 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	1. Alternative energy 2. Energy efficiency 3. Green building
	Natural capital	4. Sustainable water 5. Pollution prevention 6. Sustainable agriculture
Social Impact	Basic needs	7. Nutrition 8. Major Disease Treatment 9. Sanitation 10. Affordable Real Estate
	Empowerment	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.

More detailed taxonomy for each category can be found in Section 2.4 of the MSCI ACWI Sustainable Impact Index Methodology available at <https://www.msci.com/index-methodology>

2.4 MSCI ESG CONTROVERSIES

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/esg-and-climate-methodologies>

2.5 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.

For more details on MSCI ESG Business Involvement Screening Research, please refer to http://www.msci.com/resources/factsheets/MSCI_ESG_BISR.pdf

3 Index Construction Methodology

3.1 APPLICABLE UNIVERSE

The applicable universe includes all the existing constituents of the parent index (“Parent Index”). This approach aims to provide an opportunity set with sufficient liquidity and investment capacity.

3.2 ELIGIBLE UNIVERSE

The Eligible Universe is constructed from the Applicable Universe by excluding securities of companies based on the exclusion criteria below:

1. **Controversial Weapons:** All companies involved in Controversial Weapons as defined by the methodology of the MSCI Ex-Controversial Weapons Indexes.
2. **ESG Controversies:** All companies having faced very severe controversies pertaining to ESG issues – Defined as companies with an ESG Controversy Score of 0.
3. **Tobacco:** All companies with involvement in Tobacco as defined by the methodology of the MSCI Global ex Tobacco Involvement Indexes.
4. **Environmental Harm:** All companies having faced very severe and severe controversies pertaining to Environmental issues – Defined as companies with an Environment Controversy Score of 0 or 1.
5. **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 producers), intra-company sales of mined thermal coal, and revenue from coal trading (either reported or estimated)
6. **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.

7. **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 generation³.

3.3 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. 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	MSCI Climate Paris Aligned Indexes
1.	Minimum reduction in Greenhouse Gas (GHG) Intensity (Scope 1+2+3 ⁴) relative to Parent Index	50%
2.	Minimum average reduction (per annum) in GHG Intensity relative to GHG Intensity at the Base Date ⁵	10%
3.	Minimum active weight in High Climate Impact Sector relative to Parent Index as defined in Appendix III	0%

³ 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.

⁴ 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.

⁵ 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.

4.	Minimum Increase ⁶ in aggregate weight in companies setting targets relative to the aggregate weight of such companies in the Parent Index. Companies Setting Targets are defined in Appendix III	20%
5.	Minimum reduction in Weighted Average Potential Emissions Intensity relative to Parent Index	50%
6.	Aggregate Climate Value-At-Risk under 1.5 degree scenario ⁷ Please see more detail on Aggregate Climate Value-At-Risk in Appendix II and Appendix III.	$\geq \text{Max}(0, \text{Aggregate Climate VaR of Parent Index})$
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 Extreme Weather Climate Value-At-Risk (Aggressive Scenario) relative to Parent Index	50% ⁸

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

No.	Transition Opportunity Objective	MSCI Climate Paris Aligned Indexes
9.	Minimum increase in weighted average LCT Score relative to Parent Index ^{9,10}	10%

⁶ During the May 2022 Index review and November 2022 Index review for MSCI Canada Climate Paris Aligned Index, constraint 4 mentioned in table 1 was not applied.

⁷ For more details on Climate value-At-Risk, please refer to Appendix II. Prior to the May 2020 Semi-Annual Index Review (SAIR) of the Indexes, the Policy Risk Climate VaR using Scope 1 Emissions since Inception.

⁸ In case the Parent Index has a positive Weighted Average Extreme Weather Climate VaR, the floor will be applied at the level of the Weighted Average Extreme Weather Climate VaR of the Parent Index

⁹ 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.

¹⁰ 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%.

10.	Minimum ratio of Weighted Average Green Revenue/ Weighted Average Fossil fuels-based Revenue relative to Parent Index	4 times
11.	Minimum increase in Weighted Average Green Revenue relative to the Parent Index	100%

Table 3: Constraints imposed to meet diversification objectives

No.	Diversification Objective	MSCI Climate Paris Aligned Indexes
12.	Constituent Active Weight ¹¹	+/- 2%
13.	Minimum constituent weight	0.01%
14.	Security Weight as a multiple of its weight in the Parent Index	20x
15.	Active Sector Weights (the Energy GICS Sector is not constrained)	+/-5%
16.	Active Country Weights ¹²	+/-5%
17.	One Way Turnover ¹³	5%
18.	Common Factor Risk Aversion	0.0075
19.	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% upto 20%
- Relax the active sector weight constraint in steps of 1% upto +/-20%

¹¹ For the MSCI Canada Climate Paris Aligned Index, the constituent active weight constraint is set to +/- 5% instead of +/- 2%.

¹² 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.

¹³ The May 2022 Index review for MSCI Canada Climate Paris Aligned Index was conducted by relaxing the one-way turnover constraint to 25%.

- The one-way index turnover constraint and the active sector weight constraint are alternately relaxed until a feasible solution is achieved.

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.

3.4 DETERMINING THE OPTIMIZED PORTFOLIO

The Index is constructed using the Barra Open Optimizer¹⁴ 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.

¹⁴ Please refer to Appendix V and VI for more details.

4 Maintaining the MSCI Climate Paris Aligned Indexes

4.1 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.

4.2 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>

Appendix I: MSCI Low Carbon Transition Risk Assessment

MSCI ESG Research’s Low Carbon Transition Risk assessment¹⁵ is designed to identify potential leaders and laggards by holistically measuring companies’ exposure to and management of risks and opportunities related to the low carbon transition.

The outputs of this assessment are 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 predominant and secondary risks a company faces. It is industry agnostic and represents an absolute 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	
Score = 0 Score = 10	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; Oil sands exploration/production
	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.	Oil & gas exploration & production; Petrol/diesel based automobile manufacturers, thermal power plant turbine manufacturers etc.
		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.	Fossil fuel based power generation, cement, steel etc.
	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, etc.
	SOLUTIONS		Potential to benefit through the growth of low-carbon products and services.	Renewable electricity, electric vehicles, solar cell manufacturers etc.

¹⁵ For more details on MSCI Climate Change Metrics: <https://www.msci.com/climate-change-solutions>

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.

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 Carbon Intensity profile – which is informed by its Product Carbon Intensity, Operational Carbon Intensity and Total Carbon Intensity. In the next step, we compute Low Carbon Transition Risk Exposure Category and Score based on Total Carbon Intensity.

Step 2: Assess Low Carbon Transition Risk Management

In the second step, we assess 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 are 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 over the next 15 years and calculate what these costs might signify about financial performance into the foreseeable future.

1.5°C Aggregated Policy Risk Equity Climate VaR (AIM CGE) [%]

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 AIM CGE model. Please refer to the Climate VaR methodology document for further details on scenario options.

1.5°C Technology Opportunity Equity Climate VaR (AIM CGE) [%]

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

Aggregated Extreme Weather Equity Climate VaR (Aggressive Scenario) [%]

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 and tropical cyclones continue along a Business-As-Usual pathway.

Appendix III: Calculation of Target Metrics

Calculation of GHG Intensity

For Parent Index constituents where the Scope 1+2+3 Emissions Intensity is not available, the average Scope 1+2+3 Emissions Intensity of all the constituents of the MSCI ACWI in the same GICS Industry Group in which the constituent belongs is used.

Security Level GHG Intensity =

$$\frac{\text{Scope 1 + 2 + 3 Carbon Emissions} * (1 + EVIAF)}{\text{Enterprise Value} + \text{Cash(in M\%)}}$$

Enterprise Value Inflation Adjustment Factor (EVIAF) =

$$EVIAF = \left(\frac{\text{Average(Enterprise Value} + \text{Cash)}}{\text{Previous (Average(Enterprise Value} + \text{Cash))}} \right) - 1$$

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 =

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

Calculation of Potential Carbon Emissions Intensity

For newly added companies to the index where data is not available yet, MSCI uses zero fossil fuel reserves.

Security Level Potential Carbon Emissions (PCE) Intensity =

$$\frac{\text{Absolute Potential Emissions} * (1 + EVIAF)}{\text{Enterprise Value} + \text{Cash(in M\%)}}$$

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

Relative to their corresponding Parent Indexes, the Indexes require a minimum 20% increase in the aggregate weight of companies setting emissions reduction targets

- 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:

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

Aggregate Climate Value-at-Risk (VaR)

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

1. **Policy Risk Climate VaR¹⁶ (1.5 Degrees):** Weighted average of security level 1.5°C Aggregated Policy Risk Equity Climate VaR (AIM CGE) [%]
2. **Technology Opportunities Climate VaR (1.5 Degrees):** Weighted average of security level 1.5°C Technology Opportunity Equity Climate VaR (AIM CGE) [%]
3. **Extreme Weather Climate VaR (Aggressive Scenario):** Weighted average of security level Aggregated Extreme Weather Equity Climate VaR (Aggressive Scenario) [%]

Climate Impact Sectors

NACE¹⁷ 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

¹⁶ 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.

¹⁷ For further details regarding NACE, please refer to https://ec.europa.eu/eurostat/statistics-explained/index.php?title=NACE_background

Climate Impact” sector and other stocks are classified ‘Low Climate Impact’ sector. The GICS¹⁸ 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 mapping¹⁹ between the NACE classes and GICS Sub-Industry.
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 Sector

¹⁸ For further information regarding GICS, please refer to <https://www.msci.com/gics>

¹⁹ This mapping is available in the [Handbook of Climate Transition Benchmarks, Paris-Aligned Benchmark and Benchmarks’ ESG Disclosures](#)

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 (tCO2/M\$ Enterprise Value + Cash)
MSCI ACWI Climate Paris Aligned Index	MSCI ACWI Index	June 01, 2020	231.29
MSCI World Climate Paris Aligned Index	MSCI World Index	June 01, 2020	227.32
MSCI EM (Emerging Markets) Climate Paris Aligned Index	MSCI EM (Emerging Markets) Index	June 01, 2020	316.75
MSCI Europe Climate Paris Aligned Index	MSCI Europe Index	June 01, 2020	270.23
MSCI EMU Climate Paris Aligned Index	MSCI EMU Index	June 01, 2020	306.37
MSCI USA Climate Paris Aligned Index	MSCI USA Index	June 01, 2020	208.81
MSCI Japan Climate Paris Aligned Index	MSCI Japan Index	June 01, 2020	400.80
MSCI World ex USA Climate Paris Aligned Index	MSCI World ex USA Index	June 01, 2020	299.55

Appendix V: Barra Equity Model Used in The Optimization

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

Appendix VI: 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.

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.

Contact us

clientservice@msci.com

AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
San Francisco	+ 1 415 836 8800
São Paulo	+ 55 11 3706 1360
Toronto	+ 1 416 628 1007

EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100
Frankfurt	+ 49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
Milan	+ 39 02 5849 0415
Paris	0800 91 59 17 *

ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
Mumbai	+ 91 22 6784 9160
Seoul	00798 8521 3392 *
Singapore	800 852 3749 *
Sydney	+ 61 2 9033 9333
Taipei	008 0112 7513 *
Thailand	0018 0015 6207 7181 *
Tokyo	+ 81 3 5290 1555

* = toll free

ABOUT MSCI

MSCI is a leader provider of critical decision support tools and services for the global investment community. With over 50 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process.

The process for submitting a formal index complaint can be found on the index regulation page of MSCI's website at: www.msci.com/index-regulation.

To learn more, please visit www.msci.com.

Notice and disclaimer

- This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or disseminated in whole or in part without prior written permission from MSCI. All rights in the Information are reserved by MSCI and/or its Information Providers.
- The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.
- The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.
- Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.
- Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.
- The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.
- None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.
- It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.
- Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.
- The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.
- Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.
- Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.
- MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of www.msci.com.
- MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Except with respect to any applicable products or services from MSCI ESG Research, neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Issuers mentioned or included in any MSCI ESG Research materials may include MSCI Inc., clients of MSCI or suppliers to MSCI, and may also purchase research or other products or services from MSCI ESG Research. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body.
- Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor's. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and Standard & Poor's.
- MIFID2/MIFIR notice: MSCI ESG Research LLC does not distribute or act as an intermediary for financial instruments or structured deposits, nor does it deal on its own account, provide execution services for others or manage client accounts. No MSCI ESG Research product or service supports, promotes or is intended to support or promote any such activity. MSCI ESG Research is an independent provider of ESG data, reports and ratings based on published methodologies and available to clients on a subscription basis. We do not provide custom or one-off ratings or recommendations of securities or other financial instruments upon request.

Privacy notice: For information about how MSCI collects and uses personal data, please refer to our Privacy Notice at <https://www.msci.com/privacy-pledge>.