

MSCI Fixed Income Climate Paris Aligned Indexes Methodology

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1 Introduction

The MSCI Fixed Income 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 Fixed Income Climate Paris Aligned Indexes incorporate the Task Force on Climate-related Financial Disclosures (TCFD)¹ recommendations and are designed to exceed the minimum standards of the EU Paris-Aligned Benchmark under the EU Benchmark Regulation (EU delegated acts)². The MSCI Fixed Income Climate Paris Aligned Indexes are constructed from their corresponding Parent Indexes following an optimization-based approach and aim to:

- Reweight or exclude securities to exceed the minimum requirements³ of the EU Paris-Aligned Benchmark designation
- Align with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)
- 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 “brown” 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

¹ <https://www.fsb-tcf.org/publications/final-recommendations-report/>

² Regulation (EU) 2016/1011 as amended by Regulation (EU) 2019/2089. 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 Minimal requirements include ESG exclusions as defined in Section 3.2, 50% reduction in Scope 1+2+3 carbon emission relative to Parent Index and 7% reduction in Scope 1+2+3 carbon emission per year relative to the base date

- Achieve an effective duration and credit rating similar to the Parent Index
- Minimize active share⁴ compared to the Parent Index and achieve low turnover.

2 MSCI ESG Research

MSCI ESG Research provides in-depth research, ratings and analysis of the environmental, social and governance-related business practices of thousands of companies worldwide. It consists of an integrated suite of tools and products to efficiently manage research, analysis and compliance tasks across the spectrum of ESG factors.

The Index uses company ratings and research provided by MSCI ESG Research. In particular, this index uses the following MSCI ESG Research products: MSCI Climate Change Metrics, MSCI Climate Value-at-Risk, MSCI ESG Sustainable Impact Metrics, 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 is designed to support investors seeking to achieve a range of objectives, including measuring and reporting on climate risk exposure, implementing low carbon and fossil fuel-free strategies, and factoring climate change research into their risk management processes. It provides Carbon Emissions, Fossil Fuel exposure, environmental impact (i.e., clean technology) data and screens, as well as climate-related risk exposure and management assessment on companies such as Low Carbon Transition scores and categories.

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

⁴ Active Share is a measure of the turnover that will be incurred in shifting from the Parent Index to the derived Index. Active Share minimization is achieved by minimizing the sum of squared active weights.

For more details on MSCI Climate Value-At-Risk, please refer to

<https://www.msci.com/climate-data-and-metrics>.

2.3 MSCI ESG SUSTAINABLE IMPACT METRICS

MSCI ESG Research’s Sustainable Impact Metrics is designed to identify companies that currently offer products or services that address at least one of the major social and environmental challenges as defined by the UN Sustainable Development Goals. Designed as a positive screen, it is designed to highlight companies that are deriving sales from products or services that may have a positive impact on society and the environment.

For more details on the MSCI ESG Sustainable Impact Metrics, please refer to

<https://www.msci.com/esg-sustainable-impact-metrics>.

2.4 MSCI ESG CONTROVERSIES

MSCI ESG Controversies (formerly known as MSCI Impact Monitor) provides assessments of controversies concerning the 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.

For more details on MSCI ESG Controversies, please refer to :

<https://www.msci.com/documents/10199/acbe7c8a-a4e4-49de-9cf8-5e957245b86b>

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 ‘Screening Criteria’ section of 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 ‘Screening Criteria’ section of 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 generation⁵.

3.3 OPTIMIZATION CONSTRAINTS

At each Monthly Index Review, the indexes are constructed using an optimization process that aims to achieve replicability and investability as well as minimize active share 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 Fixed Income Climate Paris Aligned Indexes
1.	Minimum reduction in absolute Greenhouse Gas (GHG) Emission ⁶ (Scope 1+2+3 ⁷) relative to Parent Index	50%
2.	Minimum average reduction (per annum) in absolute GHG Emission relative to absolute GHG Emission at the Base Date ⁸	10%
3.	Minimum active weight in High Climate Impact Sector relative to Parent Index as defined in Appendix III	0%

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.

⁶ Based on EU Delegated Act, absolute GHG Emissions may be used as a measure of carbon exposure for fixed income indexes

⁷ Prior to the May 2020 Monthly Index Review of the Indexes, the absolute Weighted Average Carbon Emissions has been calculated based on Scope 1+2 Emissions.

⁸ Prior to the May 2020 Monthly Index Review of the Indexes, the reduction in absolute Weighted Average Carbon Emission has been calculated using Scope 1+2 Emissions since Inception.

No.	Transition and Physical Risk Objective	MSCI Fixed Income Climate Paris Aligned Indexes
4.	Minimum Increase 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 relative to Parent Index	50%
6.	Aggregate Climate Value-At-Risk under 1.5 degree scenario ⁹ 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% ¹⁰

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

No.	Transition Opportunity Objective	MSCI Fixed Income Climate Paris Aligned Indexes
9.	Minimum increase in weighted average LCT Score relative to Parent Index ¹¹	5%

⁹ For more details on Climate value-At-Risk, please refer to Appendix II. Prior to the May 2020 Monthly Index Review of the Indexes, the Policy Risk Climate VaR used Scope 1 Emissions since Inception.

¹⁰ 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

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.

10.	Minimum ratio of Weighted Average Green Revenue/ Weighted Average Brown 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 Fixed Income Climate Paris Aligned Indexes
12.	Constituent Active Weight	+/- 2%
13.	Issuer capping	3%
14.	Security Weight as a multiple of its weight in the Parent Index	10x
15.	Active Sector Weights (the Energy GICS Sector is not constrained)	+/-5%
16.	Active Country Weights ¹²	+/-5%
17.	One Way Turnover	4%
18.	Active Effective Duration of Index ¹³	+/-0.25
19.	Active Credit Rating of Index ¹⁴	+/-0.25

During the Monthly 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 10%
- Relax the maximum security weight multiple constraint in steps of 2 up to 20

¹² Based on country of domicile. 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 Defined in Section 3 of the MSCI Fixed Income Index Calculation Methodology

¹⁴ Based on credit rating scale defined in Appendix Section 4.2 of MSCI Fixed Income Index Calculation Methodology

- The one-way index turnover constraint and the maximum security weight multiple 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 Monthly Index Review.

3.4 DETERMINING THE OPTIMIZED PORTFOLIO

The Index is constructed using the Barra Open Optimizer¹⁵. The optimization uses universe of eligible securities and the specified optimization objectives and constraints to determine the constituents of the Indexes.

¹⁵ Please refer to Appendix V for more details.

4 Maintaining the MSCI Fixed Income Climate Paris Aligned Indexes

4.1 MONTHLY INDEX REVIEWS

The MSCI Fixed Income Climate Paris Aligned Indexes are reviewed on a monthly basis to coincide with the Monthly Index Review of the Parent Index. In general, the pro forma indexes are announced three business days before the effective date. In general, MSCI uses latest available MSCI ESG Research data on the announcement date for the rebalancing of the MSCI Fixed Income Climate Paris Aligned Indexes.

At each Monthly Index Review, the eligible universe is updated, and the composition of the index is reassessed based on the methodology described in Section 3.

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) [%]

A security's aggregated downside policy risk exposure according to all emission sources (Scope 1, 2, 3), expressed as a percentage of the security'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) [%]

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

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

A security's "worst-case" (95th percentile) downside or upside potential, expressed as a percentage of the security'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 absolute GHG Emission

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

Security Level absolute GHG Emission =

$$\text{Scope 1 + 2 + 3 Carbon Emissions}$$

Weighted Average absolute GHG Emission of Parent Index =

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

Weighted Average absolute GHG Emission of Derived Index =

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

Calculation of Potential Carbon Emissions Emission

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) =

$$\text{Absolute Potential Emissions}$$

Weighted Average Potential Emissions of Parent Index =

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

Weighted Average Potential Emissions Emission of Derived Index =

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

Calculation of Average Decarbonization

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

$$W_t = W_1 * 0.90^{\frac{(t-1)}{12}}$$

Where 't' is the number of Monthly Index Reviews since the Base Date.

Thus, for the 13th Monthly Index Review since the Base Date (t=13), the target Weighted Average absolute GHG Emission 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 absolute GHG emission by 7% over each of the last 3 years

Calculation of Green Revenue to Brown 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:

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

Brown Revenue

For each constituent in the Parent Index, the Brown 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 Brown Revenue% is calculated as:

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

The Green Revenues to Brown 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 Brown Revenue as per the formula below:

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

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 VaR¹⁷ (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) [%]

¹⁷ Starting from the May 2020 Monthly 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 Monthly Index Review of the Indexes is as of September 30, 2020.

Appendix IV: Decarbonization Trajectory of Indexes

The Weighted Average absolute GHG Emission on the Base Date (W_1) is used to compute the target Weighted Average absolute GHG Emission at any given Monthly Index Review (W_t) as per the below formula.

$$W_t = W_1 * 0.90^{\frac{(t-1)}{12}}$$

Where ‘t’ is the number of Monthly Index Reviews since the Base Date. The table below shows the Weighted Average absolute GHG Emission on the Base Date (W_1) for each of the regions where the Indexes are constructed:

Index	Parent Index	Base Date ¹⁸	W_1 (tCO2)
MSCI USD IG Climate Paris Aligned Corporate Bond Index	MSCI USD IG Corporate Bond Index	October 01, 2020	42997461.01
MSCI EUR IG Climate Paris Aligned Corporate Bond Index	MSCI EUR IG Corporate Bond Index	October 01, 2020	33057760.96

¹⁸ The Base Date used for the indexes currently is October 1, 2020. At a given Monthly Index Review, if there is significant change in the calculation methodology of absolute GHG emission, the Delegated Act allows for selection of a new base date.

Appendix V: New release of Barra® Optimizer

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

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

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