MSCI ESG Climate Paris Aligned Benchmark Select Indexes Methodology

November 2024

Contents

1 Introduction

The MSCI ESG Climate Paris Aligned Benchmark Select Indexes (the 'Indexes')[1] are designed to minimize its exposure to transition and physical climate risks while targeting alignment with the Paris Agreement requirements. The Indexes are designed to exceed the minimum standards of the EU Paris-Aligned Benchmark. Additionally, the Index applies certain values-based exclusion criteria. The Indexes are constructed from the corresponding market capitalization weighted indexes (the "Parent Indexes") through an optimization process approach and aim to:

- Exceed the minimum technical requirements laid out in the EU Delegated Act[2]
- 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 "fossil-fuel 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.
- Increase the weight of companies with credible carbon reduction targets through the weighting scheme.
- Reduce the weight of companies assessed as high carbon emitters using scope 1, 2 and 3 emissions. 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 VI 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

2 Index Construction Methodology

The Indexes use company ratings and research provided by MSCI ESG Research[3] for the Index construction.

The Indexes and their respective Parent Indexes are listed in the table below:

Index Name	Parent Index
MSCI World ESG Climate Paris Aligned Benchmark Select Index	MSCI World Index
MSCI USA ESG Climate Paris Aligned Benchmark Select Index	MSCI USA Index
MSCI Europe ESG Climate Paris Aligned Benchmark Select Index	MSCI Europe Index
MSCI Japan ESG Climate Paris Aligned Benchmark Select Index	MSCI Japan Index
MSCI Emerging Markets ESG Climate Paris Aligned Benchmark Select Index	MSCI Emerging Markets Index

2.1 Eligible Universe

The Eligible Universe is constructed from the constituents of the Parent Index by excluding securities 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 assessed as having involvement in ESG controversies that are classified as Red (MSCI ESG 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 Ratings**: The Indexes use MSCI ESG Ratings to identify companies that have demonstrated an ability to manage their ESG risks and opportunities. For indexes with MSCI Emerging Markets Index as Parent Index, companies are required to have an MSCI ESG Rating of 'BB' or above to be eligible. For indexes with MSCI World, MSCI USA, MSCI Europe or MSCI Japan as Parent Indexes, companies are required to have an MSCI ESG Rating of 'BBB' or above to be eligible.

[3] 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.

4. **Tobacco**: All companies with involvement in Tobacco as defined by the methodology of the MSCI Global ex Tobacco Involvement Indexes.
5. **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.
6. **Thermal Coal Mining**: All companies deriving more than 0% 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), intracompany sales of mined thermal coal, and revenue from coal trading (either reported or estimated).
7. **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.
8. **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 generation[4].

Further, companies based on the following values-based exclusion criteria are also excluded from the Applicable Universe:

- Nuclear Weapons
- Civilian Firearms
- Alcohol
- Conventional Weapons
- Gambling
- Nuclear Power
- Thermal Coal Power
- Adult Entertainment
- Conventional and Unconventional Oil and Gas
- Oil Sands

[4] As per https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapte`r7.pdf, thermal coal based power generation, liquid fuel based power generation and natural gas based power generation have median lifecycle emissions exceeding 100gCO_2/kWh.

- Shale Oil and Shale Gas
- GMO
- Recreational Cannabis
- Uranium Mining
- Oil and Gas Power Generation
- Oil and Gas Refining
- Fossil Fuel Reserves Ownership

Please refer to Appendix I for more details.

2.1.1. Specific Stock Exclusions

The Indexes exclude all securities identified as Investment Trusts by Invesco. The exclusion list is determined and signed off by Invesco in accordance with the referenced methodology document and is also made publicly available. The exclusion list[6] is sent by Invesco to MSCI via e-mail at least 14 business days prior to the effective date of the index review and is also publicly available. The exclusions are reviewed and updated semi-annually and made effective to coincide with the MSCI Semi-Annual Index Reviews as of the close of the last business day of May and November

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 corresponding Parent Indexes 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

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[7]) relative to Parent Index	50%
2.	Minimum average reduction (per annum) in GHG Intensity relative to GHG Intensity at the Base Date[8]	10%

[6] For more details, please refer to:

https://www.invesco.com/content/dam/invesco/emea/en/product-documents/etf/fund/other-document/identification-and-treatment-of-investment-companies-for-certain-msci-indicies_en.pdf

[7] 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.

[8] 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.

No.	Transition and Physical Risk Objective	Target Value
3.	Minimum active weight in High Climate Impact Sector relative to Parent Index	0%
4.	Aggregated Climate Value-at-Risk[9] Please see more detail on Aggregated Climate Value-at-Risk in Appendix II and Appendix III	>= Max(-5, Aggregate Climate VaR of Parent Index)
5.	Minimum increase in the aggregate weight of Companies Setting Targets relative to the aggregate 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	20%
6.	Minimum reduction in Weighted Average Potential Emissions Intensity relative to Parent Index	50%
7.	Minimum reduction in Weighted Average Extreme Weather Climate Value-At-Risk (Aggressive Scenario) relative to Parent Index	50%
8.	Minimum increase in weighted average Low Carbon Transition (LCT) Score relative to Parent Index Please see more detail on LCT Score in Appendix VI	5%

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

No.	Transition Opportunity Objective	Target Value
9.	Minimum ratio of Weighted Average Green Revenue/ Weighted Average Fossil fuels-based Revenue relative to Parent Index	4 times
10.	Minimum increase in Weighted Average Green Revenue relative to the Parent Index	100%
11.	Index Implied Temperature Rise (ITR)[10]	<=2.0°C

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

During the November 2023 Index review the Aggregated Climate VAR constraint was applied at “>= Max (-10%, Aggregated Climate Value-at-Risk of Parent Index)” for the MSCI Japan ESG Climate Paris Aligned Benchmark Select Index and the MSCI EM ESG Climate Paris Aligned Benchmark Select Index.

During the May 2024 and November 2024 Index Reviews the Aggregated Climate VAR constraint was applied at “>= Max (-10%, Aggregated Climate Value-at-Risk of Parent Index)” for the MSCI Japan ESG Climate Paris Aligned Benchmark Select Index. For more details on Climate value-At-Risk, please refer to Appendix II and III.

[10] For further details on the Implied Temperature Rise and Cumulative Projected Emissions calculations, please refer to Appendix IV.

No.	Transition Opportunity Objective	Target Value
12.	Aggregate Cumulative Projected Emissions	Aligned with <=1.5°C ITR

Table 3: Constraints imposed to meet diversification objectives

No.	Diversification Objective	MSCI ESG Climate Paris Aligned Select Index
13.	Constituent Active Weight[11]	+/- 2%
14.	Minimum constituent weight	0.01%
15.	Security Weight as a multiple of its weight in the Parent Index	20x
16.	Active Sector Weights (the Energy GICS Sector is not constrained)	+/-5%
17.	Active Country Weights[12]	+/-5%
18.	Specific Risk Aversion	0.0075
19.	Common Factor Risk Aversion	0.075
20.	One Way Turnover	10%

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

The Weighted Average GHG Intensity on the base Date and the base dates for the respective indexes are described in Appendix I.

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 to +/-20%
- 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.

[11] During the November 2024 Index Review, the constituent active weight constraint was set to +/-4% for the MSCI Japan ESG Climate Paris Aligned Benchmark Select Index.

[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.

2.3 Determining The Optimized Index

The Index is constructed using the Barra Open Optimizer[13] 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

For the treatment of unrated companies in the calculation of target metrics for the optimization, please refer to Appendix III and Appendix IV.

[13] Please refer to Appendix VI and VII for more details.

3 Index Maintenance

3.1 Semi-Annual Index Reviews

The Indexes are rebalanced on a semi-annual basis in May and November, to coincide with the May and November Index Reviews of the MSCI Global Investable Market Indexes, and the changes are implemented as of the close of the last business day of May and November.

In general, the pro forma Indexes are announced nine business days before the effective date. In general, MSCI uses MSCI ESG Research data[14] (including MSCI ESG Ratings, MSCI ESG Controversies, MSCI ESG Business Involvement Screening Research, MSCI Climate Change Metrics, MSCI Impact Solutions, MSCI ESG Ratings, and MSCI ESG Governance Metrics) as of the end of the month preceding the Index Reviews for the rebalancing of the Indexes.

3.2 Quarterly Index Reviews

The Indexes are also reviewed on a quarterly basis to coincide with the regular Index Reviews of the Parent Indexes. The changes are implemented at the end of February and August. In general, the pro forma indexes are announced nine business days before the effective date. For the Quarterly Index Reviews, MSCI ESG Ratings, MSCI ESG Controversies Score assessments and MSCI BISR data are taken as of the end of the month preceding the Index Reviews, i.e., January, July and October. For some securities, this data may not be published by MSCI ESG Research by the end of the month preceding the Index Review. For such securities, MSCI will use ESG data published after the end of month, when available, for the rebalancing of the MSCI ESG Climate Paris Aligned Benchmark Select Indexes. At the Quarterly Index Reviews, existing constituents are deleted from the MSCI ESG Climate Paris Aligned Benchmark Select Indexes if they do not meet the eligibility criteria described in Section 2.2. Existing constituents that meet the eligibility criteria are retained in the index.

3.3 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.

[14] See section 4 for details of data sourced from MSCI ESG Research used in the Indexes.

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 ESG Ratings, MSCI ESG Controversies, MSCI ESG Business Involvement Screening Research, MSCI Climate Change Metrics, MSCI Impact Solutions, MSCI ESG Ratings, and MSCI ESG Governance Metrics. MSCI Indexes are administered by MSCI Limited and MSCI Deutschland GmbH.

4.1 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, align 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/legal/disclosures/climate-disclosures.

4.2 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/legal/disclosures/climate-disclosures.

4.3 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

Pillar	Themes	Categories
	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.

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

4.4 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 in: https://www.msci.com/legal/disclosures/esg-disclosures.

4.5 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.

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

Appendix I: Additional ESG Exclusions Criteria

Nuclear Weapons

- 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).
- All companies that manufacture or assemble delivery platforms that were not developed or not significantly modified for the exclusive delivery of nuclear weapons.
- All companies that manufacture components for nuclear-exclusive delivery platforms.
- All companies that are 50 percent or more owned by a company with nuclear weapons involvement.
- All companies that own 20 to 49.99 percent of a company with involvement. When a company owns 50 percent or more of a subsidiary with involvement, MSCI treats it as a consolidated subsidiary.
- All companies that produce nuclear warheads, missiles, and delivery platforms capable of deploying nuclear weapons.
- All companies that produce essential intended or dual-use components for nuclear weapons and nuclear weapon delivery systems.

Civilian Firearms

- All companies deriving any revenue from the production of firearms and small-arms ammunition intended for civilian markets.
- All companies deriving 5% or more aggregate revenue from the production (wholesale or retail) of firearms or small arms ammunition intended for civilian use.

Adult Entertainment

- All companies deriving 5% or more revenue from the production of adult entertainment products or services.

  All companies deriving 15% or more aggregate revenue from the production, distribution or retail of adult entertainment products or services

Alcohol

- All companies deriving 5% or more revenue from the production of alcohol-related products

- All companies deriving 15% or more aggregate revenue from alcohol-related products

Conventional Weapons

- All companies deriving 5% or more revenue from the production of conventional weapons and components.
- All companies deriving 5% or more aggregate revenue from conventional weapons, or components, support systems, and services

Unconventional Oil & Gas Extraction

- All companies deriving more than 0% revenue (either reported or estimated) from unconventional oil and gas production. It includes revenue from the production of oil sands, oil shale (kerogen-rich deposits), shale gas, shale oil, coal seam gas, and coal bed methane, as well as revenue from onshore or offshore oil and gas production in the Arctic region. It excludes revenue from conventional oil and gas production including deep water, shallow water, and other onshore/offshore oil and gas.

Conventional Oil & Gas Extraction

- All companies deriving more than 0% revenue (either reported or estimated) from conventional oil and gas production. It includes revenue from the production of deep water, shallow water, and other onshore/offshore oil and gas. It excludes revenue from unconventional oil and gas production (oil sands, shale oil, shale gas) and onshore/offshore oil and gas production in the Arctic region.

Oil Sands

- All companies deriving more than 0% revenue from oil sands extraction. This factor does not include revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of oil sands reserves with no associated extraction revenues; revenue from intra-company sales.

Shale Oil and Shale Gas

- All companies deriving more than 0% revenue from Shale oil or Shale gas production. This factor does not capture revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of shale gas reserves with no associated extraction revenues; revenue from intra-company sales.

Recreational Cannabis

- All companies deriving 0% or more revenue from recreational cannabis.

Gambling

- All companies deriving 5% or more revenue from gambling operations, including online or mobile gambling
- All companies deriving 15% or more aggregate revenue from gambling operations, including online or mobile gambling, and supporting activities

Genetically Modified Organisms (GMO)

- All companies that derive 5% or more revenue from activities like genetically modifying plants, such as seeds and crops, and other organisms intended for agricultural use or human consumption

Uranium Mining

- All companies deriving 5% or more aggregate revenue from uranium mining.

Nuclear Power

- All companies deriving any revenue from nuclear power activities.
- All companies generating more than 0% of their total electricity from nuclear power in a given year
- All companies that have more than 0% of installed capacity attributed to nuclear sources in a given fiscal year.

Thermal Coal Power

- All companies deriving 5% or more revenue (either reported or estimated) from thermal coal-based power generation.

Oil and Gas Power:

- All companies deriving 5% or more revenue (either reported or estimated) from liquid fuel and natural gas-based power generation.

Oil and Gas Refining:

- All companies deriving 5% or more revenue (either reported or estimated) from oil and gas refining.

Fossil Fuel Reserves Ownership:

- All companies having any ownership of fossil fuel reserves.

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) =

*(Unadjusted Security Level GHG Intensity (Scope 1+2) + Unadjusted Security Level GHG Intensity (Scope 3)) * (1 + EVIAF)*

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

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

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[15] Industry Group in which the security belongs is used.

Unadjusted Security Level GHG Intensity (Scope 3) =

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

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) =

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

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

Weighted Average GHG Intensity of Parent Index =

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

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 VaR[15] (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

NACE[16] 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 GICS[17] 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 mapping[18] between the NACE classes and GICS Sub-Industry.

[15] 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.

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

[17] For further information regarding GICS, please refer to https://www.msci.com/gics

[18] 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. **$N_H >= N_L$**: 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

Appendix IV: 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 approach[19].

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

where

- Base Temperature = 1.5 degrees, 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 company[20]
- 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 degrees[Error! Bookmark not defined.]

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.

[19] 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.

[20] Similar to the Index-level ITR formula, 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.

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

Appendix V: 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 World ESG Climate Paris Aligned Benchmark Select Index	MSCI World Index	June 01, 2020	237.79
MSCI USA ESG Climate Paris Aligned Benchmark Select Index	MSCI J-Series ACWI Index	June 01, 2020	219.99
MSCI Europe ESG Climate Paris Aligned Benchmark Select Index	MSCI Europe Index	June 01, 2020	257.68
MSCI Japan ESG Climate Paris Aligned Benchmark Select Index	MSCI Japan Index	June 01, 2020	400.80
MSCI Emerging Markets ESG Climate Paris Aligned Benchmark Select Index	MSCI Emerging Markets Index	June 01, 2020	297.79

Appendix VI: MSCI Low Carbon Transition Risk Assessment

MSCI ESG Research's Low Carbon Transition Risk assessment[21] 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
	TRANSITION	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.

[21] 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 VI: 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 (GEMLTL).

Appendix VII: 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 VIII: 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 ESG Leader Indexes Methodology – https://www.msci.com/index/methodology/latest/ESG
- MSCI Climate Paris Aligned Indexes Methodology – https://www.msci.com/index/methodology/latest/ClimatePAB
- 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 IX: Changes to this Document

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

Section 2.2.1

- Added the "Specific Stock Exclusions"

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

Section 2: MSCI ESG Research

- Updated the ESG product descriptions.

Section 3: Constructing the MSCI ESG Climate Paris Aligned Benchmark Select Indexes

- Updated the link in the footnote of Section 2.1.1 Specific Stock Exclusions

The following sections have been modified effective May 01, 2023:

Section 1: Introduction

- The methodology book was updated with a description of the Index and footnotes on the Methodology Set

Section 2: Index Construction

- The exclusion criteria for companies involved in ESG Controversies was clarified.
- The target for Aggregate Climate Value -At-Risk was changed 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
- The link in the footnote of Section 2.1.1 Specific Stock Exclusions was updated for May 2023.

Section 3: Index Maintenance

- References to "Semi-Annual Index Reviews" and "Quarterly Index Reviews" of the MSCI Global Investable Market Indexes were replaced with "Index Reviews."

Section 4: MSCI ESG Research

- ESG Research Product descriptions were moved from section 2 to section 4.

The following sections have been modified effective Dec 01, 2023:

- The special treatment for the Aggregate Climate Value-at-Risk constraint at the November 2023 Index Review for two Indexes was noted in Section 2.2.

- 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 the calculation of target metrics were added in Appendix II and III.

The following sections have been modified effective May 2024

- Section 2.2: Added Implied Temperature Rise Objectives.
- Appendix III Updated language for Companies Setting Targets
- Appendix IV: Added details on the calculation of Implied Temperature Rise and Cumulative Projected Emissions.
- Appendix V: Added new appendix for Decarbonization Trajectory of indexes
- Appendix VI: Added new appendix for MSCI Low Carbon Transition Risk Assessment

The following sections have been modified effective November 2024

- Section 2.3: Added special treatment applied for the MSCI Japan ESG Climate Paris Aligned Benchmark Select Index at the November 2024 Index Review

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