MSCI Minimum Volatility ESG Low Carbon Target Select Indexes Methodology

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1 Introduction

The MSCI Minimum Volatility ESG Low Carbon Target Select Indexes (herein, 'the Indexes') are designed to represent the performance of a strategy that seeks systematic integration of environmental, social and governance (ESG) norms while minimizing ex-ante total risk.

The Indexes are constructed by selecting constituents of a market capitalization weighted index (the 'Parent Index') and applying an optimization process that aims to minimize volatility risk, reduce the carbon-equivalent exposure to CO_2 and other GHG, as well as the exposure to potential emissions risk of fossil fuel reserves by thirty percent (30%) and improve the weighted-average industry-adjusted ESG score of the Index with respect to their respective Parent Indexes under certain constraints described below.

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2 ESG Research Framework

The Indexes use company ratings and research provided by MSCI ESG Research. In particular, the Indexes use the following four MSCI ESG Research products: MSCI ESG Ratings, MSCI ESG Controversies Score, MSCI ESG Business Involvement Screening Research and MSCI Climate Change Metrics.

For details on MSCI ESG Research's full suite of ESG products, please refer to: http://www.msci.com/products/esg/about_msci_esg_research.html

2.1 MSCI ESG RATINGS

MSCI ESG Ratings provides research, analysis and ratings of how well companies manage environmental, social and governance risks and opportunities.

MSCI ESG Ratings provides an overall company ESG rating - a seven point scale from 'AAA' to 'CCC'. In addition, the product provides scores and percentiles indicating how well a company manages each key issue relative to industry peers.

For more details on MSCI ESG Ratings, please refer to https://www.msci.com/documents/1296102/1636401/MSCI_ESG_Ratings.pdf.

2.2 MSCI ESG CONTROVERSIES

MSCI ESG Controversies 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 Score, please refer to https://www.msci.com/documents/10199/acbe7c8a-a4e4-49de-9cf8-5e957245b86b.

2.3 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.

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2.4 MSCI CLIMATE CHANGE METRICS

MSCI Climate Change Metrics provides climate data & tools to support investors integrating climate risk & opportunities into their investment strategy and processes. It supports 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/climate-change-solutions.

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3 Index Construction Methodology

Constructing the Indexes involves the following steps:

- Defining the Parent Index
- Defining the exclusion criteria
- Defining the security level carbon exposure
- Defining the optimization constraints
- Determining the optimized index

The steps mentioned above are defined in detail in the subsequent sections.

3.1 DEFINING THE PARENT INDEX

Constructing the Indexes begins with selecting the Parent Index and the Eligible Universe to perform total risk minimizing optimization. The Parent Index serves as the universe of eligible securities for optimization.

Please refer to Appendix I for more details.

3.2 ELIGIBLE UNIVERSE

The Eligible Universe is constructed by excluding securities from the Parent Index based on the exclusion criteria described below.

3.3 DEFINING THE EXCLUSION CRITERIA

Securities of companies involved in Very Severe business controversies as defined by the MSCI ESG Controversies Methodology are not eligible for inclusion in the Indexes. This is implemented by excluding constituents of the Parent Index with ESG Controversy Score = 0 ('Red Flag' companies).

3.3.1 BUSINESS EXCLUSION CRITERIA

Companies that are involved in specific businesses which have high potential for negative social and/or environmental impact are ineligible for inclusion in the Indexes.

- Nuclear Weapons
- Conventional Weapons
- Controversial Weapons
- Civilian Firearms
- Tobacco

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- Thermal Coal
- Unconventional Oil and Gas
- Conventional Oil and Gas

In addition to the above, companies that fail to comply with the United Nations Global Compact Principles are also excluded from the Indexes.

Please refer to Appendix II for more details on these criteria.

3.4 DEFINING THE SECURITY LEVEL CARBON EXPOSURE

The carbon exposure of a security is measured in terms of its greenhouse gas emissions and its potential carbon emissions from fossil fuel reserves. The Indexes use MSCI Climate Change Metrics data from MSCI ESG Research.

3.4.1 GREENHOUSE GAS EMISSIONS

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

For newly added companies to the Indexes which do not report emission data and where MSCI ESG Research has not estimated the greenhouse gas emissions yet, MSCI uses the average emissions per dollar of sales for the companies in the same industry group of the MSCI ACWI Index, multiplied by the sales of the company as the estimated emission for the company.

3.4.2 POTENTIAL CARBON EMISSIONS FROM FOSSIL FUELS

MSCI ESG Research collects fossil fuel reserves data where relevant for companies which have reserves, typically in the Oil & Gas, Coal Mining and Electric Utilities industries. Fossil fuel reserves can be used for several applications including energy or industrial (e.g. coking coal used for steel production). Only fossil fuel reserves used for energy are taken into account. The data is updated on an annual basis and based on information disclosed by companies. Sources include company publications, other public records and third party data providers. For newly added companies to the index where data is not available yet, MSCI uses zero fossil fuel reserves. The size of reserves of a company typically influences its market valuation, and hence MSCI normalizes for size by dividing the potential carbon emissions of the company by its market capitalization.

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To convert reserves data to potential carbon emissions, MSCI ESG Research applies a formula from the Potsdam Institute for Climate Impact Research[1].

3.5 DEFINING THE OPTIMIZATION SETUP

The optimization objective is to perform total risk minimizing optimization. The optimization is performed from a base currency perspective and does not allow short selling of securities.

Please refer to Appendix I for more details.

3.6 DEFINING THE OPTIMIZATION CONSTRAINTS

At each Semi-Annual Index Review (SAIR), the following optimization constraints are employed, which aim to ensure replicability and investability:

- The weighted-average industry-adjusted ESG score of the Index will be at least 20% more than the weighted-average industry-adjusted ESG score of the Parent Index at the time of rebalancing
- The maximum weight of an index constituent will be restricted to the lower of (the weight of the security in the Parent Index + 2%) and 10 times the weight of the security in the Parent Index. The minimum weight of an Index constituent will be restricted to be the higher of the (weight of the security in the Parent Index - 2%) and 0. The minimum weight of a constituent in the final index will be 0.05%
- The number of constituents in the final index must be greater than or equal to 100
- For countries with weight greater than 2.5% in the Parent Index, the weight in the Index will not deviate more than +/-5% from the country weight in the Parent Index
- For countries with weight less than 2.5% in the Parent Index, the weight in Index will be capped at 3 times their weight in the Parent Index
- The sector weights of the Index will not deviate more than +/-5% from the sector weights of the Parent Index
- The factor exposures except beta and residual volatility of the Index will not deviate more than +/-0.25 standard deviations from the factor exposures of the Parent Index

[1] Malte Meinshausen, Nicolai Meinshausen, William Hare, Sarah C. B. Raper, Katja Frieler, Reto Knutti, David J. Frame & Myles R. Allen. Greenhouse-gas emission Target for limiting global warming to 2 °C. Nature 458, 1158-1162 (30 April 2009) | doi: 10.1038/nature08017; Received 25 September 2008; Accepted 25 March 2009. Supplementary Information, p. 7.

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- The minimum reduction in the Carbon Emissions Intensity[2] and in the potential emissions per dollar of market capitalization of the Index relative to the Parent Index will be 30% at the time of rebalancing
- The one-way turnover of the MSCI Minimum Volatility ESG Low Carbon Target Select Index is constrained to a maximum of 10% at each SAIR

The Carbon Emission Intensity and the Potential Emissions per Dollar of Market Capitalization of the Indexes are calculated using the formulae defined in Appendix I of the MSCI Global Low Carbon Leaders Indexes Methodology[3].

3.7 DETERMINING THE OPTIMIZED INDEX

The Indexes are constructed using the Barra Open Optimizer in combination with the relevant Barra Equity Model[4]. The optimization uses the Eligible Universe as the universe of eligible securities and the specified optimization objective and constraints to determine the Index. Infeasible optimizations are handled as explained in Appendix III.

[2] Security Carbon Intensity = Scope 1 & 2 Emission / Sales.

[3] For details about the methodology, please refer to: https://www.msci.com/index-methodology.

[4] Please refer to Appendix IV for the detailed information on model usage.

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4 Maintaining the Index

4.1 SEMI-ANNUAL INDEX REVIEWS

The Indexes are rebalanced on a semi-annual basis, usually as of the close of the last business day of May and November, coinciding with the May and November Semi-Annual Index Reviews (SAIRs) of the MSCI Global Investable Market Indexes. Barra Equity Model data as of the end of April and October are used respectively.

Similarly, the MSCI ESG Research data (including MSCI ESG Ratings, MSCI ESG Controversies Scores, MSCI Business Involvement Screening Research, and MSCI Climate Change Metrics) used for the Semi-annual Index Reviews will be taken as of the end of the month preceding the Index Review i.e., April and October. For some securities, such 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.

The pro forma Indexes are in general announced nine business days before the effective date.

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.

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

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

EVENT TYPE	EVENT DETAILS
New additions to the Parent Index	A new security added to the Parent Index (such as IPO and other early inclusion) 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

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	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/latest/CE

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Appendix I: The Parent Index and the Base Currency for Optimization

Minimum Volatility ESG Low Carbon Target Select Index	Parent Index	Base Currency for Optimization
MSCI USA Minimum Volatility ESG Low Carbon Target Select Index	MSCI USA Index	USD
MSCI Europe Minimum Volatility ESG Low Carbon Target Select Index	MSCI Europe Index	EUR

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Appendix II: Business Exclusion Criteria

MSCI ESG Research has developed a framework designed to define significant involvement in controversial activities. According to this framework, there are three tolerance levels: Zero Tolerance, Minimal Tolerance and Low Tolerance.

Each controversial activity screened by the MSCI Minimum Volatility ESG Low Carbon Target Select Indexes (except Civilian Firearms, Conventional Weapons, Thermal Coal, Unconventional Oil and Gas, Conventional Oil and Gas, and Global Norms) is assigned to one of these tolerance levels:

Activities classified under "Zero Tolerance"

- **Controversial Weapons**
  - All companies with any tie to Controversial Weapons (cluster munitions, landmines, depleted uranium weapons, biological/chemical weapons, blinding lasers, non-detectable fragments and incendiary weapons), as defined by the methodology of the MSCI Ex-Controversial Weapons Indexes available at https://www.msci.com/index-methodology.

Activities classified under "Minimal Tolerance"

- **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.

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

- **Tobacco**
  - All companies classified as a "Producer".
  - All companies deriving 5% or more aggregate revenue from the production, distribution, retail and supply of tobacco-related products.

Activities not classified under any specific tolerance level

- **Civilian Firearms**
  - All companies deriving 5% or more revenue from the manufacturing of firearms and small arms ammunitions for civilian markets.
  - All companies deriving 5% or more revenue from the distribution (wholesale or retail) of firearms or small arms ammunition intended for civilian use.
- **Conventional Weapons**
  - All companies deriving 5% or more revenue from the production of conventional weapons.
  - All companies deriving 10% or more aggregate revenue from weapons systems, components, and support systems and services.
- **Thermal Coal**
  - All companies deriving 5% 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.
  - All companies deriving 5% or more revenue (either reported or estimated) from the thermal coal-based power generation.
  - All companies generating 10% or more power from thermal coal.
  - All companies that provide evidence of owning thermal coal reserves.
- **Unconventional Oil and Gas**
  - All companies deriving 5% or more revenue from unconventional oil and gas. It includes revenues from oil sands, oil shale (kerogen-rich deposits), shale gas, shale oil, coal seam gas, and coal bed methane.

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- **Conventional Oil and Gas**
    - All companies deriving 5% or more revenue from conventional oil and gas. It includes all types of conventional oil and gas production including Arctic onshore/offshore, deep-water, shallow water and other onshore/offshore.
- **Global Norms – United Nations Global Compact Compliance**
    - All companies that fail to comply with the United Nations Global Compact principles.

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Appendix III: Handling Infeasible Optimizations

During the Semi-Annual Index Review, in the event that there is no optimal solution that satisfies all the optimization constraints defined in Section 3.6, the following constraints are relaxed, until an optimal solution is found:

- The turnover constraint is relaxed in steps of 5%, up to a maximum of 30% until a feasible solution is achieved.

Order of Relaxation	Turnover Limit
1	15%
2	20%
3	25%
4	30%

In the event that no optimal solution is found after the above turnover constraint has been relaxed, the Index will not be rebalanced for that Semi-Annual Index Review.

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Appendix IV: New release of Barra® Equity Model or Barra® Optimizer

The methodology presently uses MSCI Barra Global Equity Model for Long-Term Investors (“GEMLTL”) for the optimization. A new release of the relevant Barra Equity Model or Barra Optimizer may replace the former version within a suitable timeframe.

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