MSCI Global Low Carbon Target Core Indexes Methodology

February 2024

Contents

1 Introduction

The MSCI Global Low Carbon Target Core Indexes (the "Indexes") are designed to address two dimensions of carbon exposure – carbon emissions and fossil fuel reserves. The Index is constructed by selecting constituents of a market capitalization weighted index (the "Parent Index") through an optimization process that aims to:

- Maximize the reduction of carbon exposure compared to the Parent Index – in terms of carbon emissions and fossil fuel reserves.
- Control tracking error by applying an ex-ante tracking error constraint of 30 bps while minimizing carbon exposure.
- Have low active sector, country, and regional biases relative to the Parent Index[1].

[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 V for more details.

2 Constructing the MSCI Global Low Carbon Target Core Indexes

The Indexes use company ratings and research provided by MSCI ESG Research[2] for the Index construction.

Constructing the Index involves the following steps:

- Defining the Eligible Universe
- Defining the Carbon Exposure of each security in the underlying universe
- Defining the optimization parameters
- Determining the optimized index

2.1 Defining the Eligible Universe

The Eligible Universe for the Indexes is defined by all the constituents of the Parent Index.

2.2 Defining the Carbon Exposure of Each Security in the Underlying Universe

The Carbon Exposure of a security is measured in terms of its greenhouse gas (GHG) emissions and its potential emissions from fossil fuel reserves.

2.2.1 Greenhouse Gas Emissions

MSCI ESG Research collects company-specific direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions 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. The data is updated on an annual basis. Since the current carbon emissions of a company are directly influenced by its current business activity, MSCI normalizes for size by dividing the annual carbon emissions of the company by the annual sales of the company.

2.2.2 Potential 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[3]. Fossil fuel reserves can be used for several applications including energy or industrial purposes (e.g. coking coal used for steel production). For the construction of the MSCI Global Low Carbon Target Core Indexes, only fossil fuel reserves used for energy purposes are taken into account. The data is updated on an annual basis based on information disclosed by companies. Sources include company publications, other public records and third party data providers.

[2] See section 4 for further information regarding ESG and climate data used in the Indexes that MSCI Limited sources 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. MSCI Limited is the benchmark administrator for the MSCI indexes.

[3] For more information on MSCI Climate Change Metrics, please refer to https://www.msci.com/climate-change-solutions

To convert reserves data to potential carbon emissions, MSCI ESG Research applies a formula from the Potsdam Institute for Climate Impact Research.[4]

2.3 Defining the Optimization Parameters

The Index is constructed using an optimization process that applies the following objective and constraints:

- Minimize the carbon exposure subject to a tracking error constraint of 30 basis points relative to the Parent Index
- The maximum weight of an Index constituent will be restricted to 20 times its weight in the Parent Index
- The country weights in the Index will not deviate more than +/-2% from the country weights in the Parent Index
- The above country weight constraint will also apply on China A Stock Connect listings as a group separately in addition to the usual country weight constraint on China
- The sector weights in the MSCI Global Low Carbon Target Core Indexes will not deviate more than +/-2% from the sector weights in the Parent Index with the exception of the Energy Sector where no sector weight constraint is applied
- The one-way turnover of the Index is constrained to a maximum of 10% at each index review.

In the event that there is no optimal solution that satisfies all the optimization constraints, the turnover constraint will be relaxed up to a maximum turnover of 20% in steps of 1% until an optimal solution is found. If a feasible solution is still not found, the predicted tracking error is relaxed in steps of 10 basis points.

2.4 Determining the Optimized Index

The MSCI Global Low Carbon Target Core Indexes are constructed using the Barra Open Optimizer in combination with the relevant Barra Equity Model. The optimization uses the universe of eligible securities and the specified optimization objective and constraints to determine the constituents of the Index. After the optimization process, any securities with extremely low weights (less than 1/10th of the minimum weight in the Parent Index) are eliminated, and their weight is proportionately distributed over the remaining securities in order to determine the final Index constituents.

2.5 Treatment of Unrated Companies

For the treatment of unrated companies in the calculation of Carbon Exposure metrics, please refer to Appendix I.

[4] 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.

3 Maintaining the MSCI Low Carbon Target Core Indexes

3.1 Semi-Annual Index Reviews

The Index is reviewed 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 Index is announced nine business days before the effective date.

At each Index Review, the optimization process outlined in Section 2 is implemented.

In general, MSCI uses MSCI ESG Research data (i.e., MSCI Climate Change Metrics) as of the end of the month preceding the Index Reviews[5]. 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.

3.2 Ongoing Event-Related Maintenance

The general treatment of corporate events in the Index 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 MSCI Global Low Carbon Target Core Indexes, the changes made to the Parent Index during intermediate Index Reviews will be neutralized in the MSCI Global Low Carbon Target Core Indexes.

The following section briefly describes the treatment of common corporate events within the MSCI Global Low Carbon Target Core Indexes.

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

[5] Emissions data, whenever available, will be taken as of the same calendar year as sales data. Depending on availability, such data may be based on values reported at least two years prior.

EVENT TYPE	EVENT DETAILS
New additions to the Parent Index	A new security added to the Parent Index (such as IPO and other early inclusions) will not be added to the index.
Spin-Offs	All securities created as a result of the spin-off of an existing Index constituent will be added to the Index at the time of event implementation. Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.
Merger/Acquisition	For Mergers and Acquisitions, the acquirer's post event weight will account for the proportionate amount of shares involved in deal consideration, while cash proceeds will be invested across the Index. If an existing Index constituent is acquired by a non-Index constituent, the existing constituent will be deleted from the Index and the acquiring non-constituent will not be added to the Index.
Changes in Security Characteristics	A security will continue to be an Index constituent if there are changes in characteristics (country, sector, size segment, etc.) Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

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

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

4 MSCI ESG Research

The Indexes are products of MSCI Inc. that utilize information such as company ratings and research produced and provided by MSCI ESG Research LLC (MSCI ESG Research), a subsidiary of MSCI Inc. In particular, the Indexes use the following MSCI ESG Research products: MSCI Climate Change Metrics.

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, alignment with temperature pathways and factoring climate change research into their risk management processes, in particular through climate scenario analysis for both transition and physical risks.

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

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

Appendix I: Calculation of Carbon Exposure Metrics

Index Carbon Emissions –

Greenhouse Gas (GHG) Emissions

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.

Calculation of GHG Intensity

First, index level carbon emissions are calculated using the Scope 1+2 carbon emissions of a company.

Parent Index Carbon Emissions –

$$\sum_i \left(\frac{(Float\ Market\ Capitalization\ * Absolute\ Emissions)}{Issuer\ Market\ Capitalization} \right)$$

Derived Index Carbon Emissions –

$$\sum_i \left(\frac{(Derived\ Index\ Market\ Capitalization\ * Absolute\ Emissions)}{Issuer\ Market\ Capitalization} \right)$$

Parent Index Carbon Emission Intensity is defined as Parent Index Carbon Emissions, as defined above, divided by Parent Index Sales –

$$\sum_i \frac{\left(\frac{(Float\ Market\ Capitalization\ * Absolute\ Emissions)}{Issuer\ Market\ Capitalization} \right)}{/ \sum_i \left(\frac{(Float\ Market\ Capitalization\ * Sales)}{Issuer\ Market\ Capitalization} \right)}$$

Derived Index Carbon Emissions Intensity is defined as Derived Index Carbon Emissions, as defined above, divided by Derived Index Sales –

$$\sum_i \frac{\left(\frac{(Derived\ Index\ Market\ Capitalization\ * Absolute\ Emissions)}{Issuer\ Market\ Capitalization} \right)}{/ \sum_i \left(\frac{(Derived\ Index\ Market\ Capitalization\ * Sales)}{Issuer\ Market\ Capitalization} \right)}$$

Estimation of missing Carbon Intensity data

For a security, if Scope 1+2 carbon emissions are not available but Sales are available, MSCI estimates emissions by multiplying the Sales of the security with the average Sales intensity (i.e., Scope 1+2 emissions / Sales) of all constituents of MSCI ACWI in the same GICS Industry Group that have both Scope 1+2 Emissions and Sales available.

If Sales are not available for a security but Scope 1+2 emissions are available, MSCI estimates Sales by dividing the security's Scope 1+2 emissions by the average Sales intensity (i.e., Scope 1+2 emissions / Sales) of all constituents of MSCI ACWI in the same GICS Industry group that have both Scope 1+2 emissions and Sales available.

In case both Scope 1+2 emissions and Sales are not available for a security:

- The Sales are estimated by dividing the security's Issuer market capitalization by the average Issuer market capitalization to Sales ratio of all constituents of MSCI ACWI in the same GICS Industry Group that have Sales available.
- The emissions are estimated by multiplying the estimated Sales of the security by the average Sales intensity (i.e., Scope 1+2 emissions / Sales) of all constituents of MSCI ACWI in the same GICS Industry group that have both Scope 1+2 emissions and Sales available.

In case there are no securities in the GICS Industry Group with relevant data available for the estimation, then the estimation is applied at the level of the corresponding GICS Sector.

Index Potential Carbon Emissions from Fossil Fuels–

Parent Index Potential Carbon Emissions from Fossil Fuels–

$$\sum_i \left(\frac{(Float\ Market\ Capitalization\ * Absolute\ Potential\ Emissions)}{Issuer\ Market\ Capitalization} \right)$$

Derived Index Potential Carbon Emissions from Fossil Fuels–

$$\sum_i \left(\frac{(Derived\ Index\ Market\ Capitalization\ * Absolute\ Potential\ Emissions)}{Issuer\ Market\ Capitalization} \right)$$

For newly added companies to the index where data is not available yet, MSCI uses zero fossil fuel reserves. MSCI normalizes for the company's size by dividing the potential carbon emissions of the company by its market capitalization.

Appendix II: Barra Equity Model Used in The Optimization

The MSCI Global Low Carbon Target Core Indexes currently use an optimization setup using the MSCI Barra Global Equity Model for Long-Term Investors (GEMLTL).

Appendix III: 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 IV: Index History

The MSCI Global Low Carbon Target Core Indexes were launched in September 2022. The simulated history was entirely copied from the corresponding MSCI Global Low Carbon Target Indexes.

The MSCI Global Low Carbon Target Core Indexes will start to diverge from the MSCI Global Low Carbon Target Indexes on December 1, 2022, after changes are implemented in the MSCI Global Low Carbon Target Indexes methodology as part of the November 2022 Semi-Annual Index Review.

Appendix V: 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 – www.msci.com/index/methodology/latest/ReadMe
- MSCI Corporate Events Methodology – www.msci.com/index/methodology/latest/CE
- MSCI Fundamental Data Methodology – www.msci.com/index/methodology/latest/FundData
- MSCI Index Calculation Methodology – www.msci.com/index/methodology/latest/IndexCalc
- MSCI Index Glossary of Terms – www.msci.com/index/methodology/latest/IndexGlossary
- MSCI Index Policies – www.msci.com/index/methodology/latest/IndexPolicy
- MSCI Global Industry Classification Standard (GICS) Methodology – www.msci.com/index/methodology/latest/GICS
- MSCI Global Investable Market Indexes Methodology – www.msci.com/index/methodology/latest/GIMI
- 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 VI: Changes to this Document

The following section has been modified as of November 2022:

Section 4.1

- Added clarification on data cutoff dates

The following sections have been modified as of February 2023:

- Methodology book was updated to reflect the transition of the MSCI Global Investable Market Indexes (GIMI) to Quarterly Comprehensive Index Reviews.
- All references to "Semi-Annual Index Reviews" and "Quarterly Index Reviews" of the MSCI GIMI were replaced with "Index Reviews."

Section 3.3

- Added clarification on optimization infeasibilities

The following sections have been modified as of February 2024:

Section 2.5

- New section detailing the treatment of companies with ratings and research not available from MSCI ESG Research

Section 4

- Moved that section after the Section 3
- Updated the descriptions of MSCI ESG Research products

Appendix I

- Moved treatment of unrated companies in Section 2.2.1 and Section 2.2.2 to Appendix 1

Appendix V

- Added details on the Methodology Set for the Indexes

Contact us

msci.com/contact-us

AMERICAS

United States	+ 1 888 588 4567 *
Canada	+ 1 416 687 6270
Brazil	+ 55 11 4040 7830
Mexico	+ 52 81 1253 4020

EUROPE, MIDDLE EAST & AFRICA

South Africa	+ 27 21 673 0103
Germany	+ 49 69 133 859 00
Switzerland	+ 41 22 817 9777
United Kingdom	+ 44 20 7618 2222
Italy	+ 39 02 5849 0415
France	+ 33 17 6769 810

ASIA PACIFIC

China	+ 86 21 61326611
Hong Kong	+ 852 2844 9333
India	+ 91 22 6784 9160
Malaysia	1800818185 *
South Korea	+ 82 70 4769 4231
Singapore	+ 65 67011177
Australia	+ 612 9033 9333
Taiwan	008 0112 7513 *
Thailand	0018 0015 6207 7181 *
Japan	+ 81 3 4579 0333

* toll-free

About MSCI

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

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

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

Notice and disclaimer