

MSCI Global Low Carbon Target Core Indexes Methodology

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1 Introduction

The MSCI Global Low Carbon Target Core Indexes (the “Index”) 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.

2 MSCI ESG Research

The MSCI Global Low Carbon Target Core Indexes use company ratings and research provided by MSCI ESG Research. The Index uses the following MSCI ESG Research product: MSCI Climate Change Metrics.

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

2.1 MSCI Climate Change Metrics

MSCI Climate Change Metrics is designed to support investors seeking to achieve a range of objectives, including measuring and reporting on climate risk exposure, implementing low carbon and fossil fuel-free strategies, and factoring climate change research into their risk management processes. It provides Carbon Emissions, Fossil Fuel exposure, environmental impact (i.e., clean technology) data and screens, as well as climate-related risk exposure and management assessment on companies such as Low Carbon Transition scores and categories.

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

3 Constructing the MSCI Global Low Carbon Target Core Indexes

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

3.1 Defining the Eligible Universe

The Eligible Universe for the MSCI Global Low Carbon Target Core Indexes is defined by all the constituents of the Parent Index.

3.2 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.

3.2.1 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.

For newly added companies to the Index 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 issuer market capitalization for the companies in the same industry group, multiplied by the market capitalization of the company as the estimated emissions for the company.

3.2.2 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

industries¹. 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. 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.

To convert reserves data to potential carbon emissions, MSCI ESG Research applies a formula from the Potsdam Institute for Climate Impact Research.²

3.3 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.

¹ For more information on MSCI Climate Change Metrics, please refer to <https://www.msci.com/climate-change-solutions>

² 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.

3.4 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.

4 Maintaining the MSCI Low Carbon Target Core Indexes

4.1 Semi-Annual Index Reviews

The Index is reviewed on a semi-annual basis in May and November to coincide with the May and November Semi-Annual 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 3 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. 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.

4.2 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.

EVENT TYPE

EVENT DETAILS

New additions to the Parent Index

A new security added to the Parent Index (such as IPO and other early inclusions) will not be added to the index.

Spin-Offs

All securities created as a result of the spin-off of an existing Index constituent will be added to the Index at the time of event implementation. Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

Merger/Acquisition

For Mergers and Acquisitions, the acquirer’s post event weight will account for the proportionate amount of shares involved in deal consideration, while cash proceeds will be invested across the Index.

If an existing Index constituent is acquired by a non-Index constituent, the existing constituent will be deleted from the Index and the acquiring non-constituent will not be added to the Index.

Changes in Security Characteristics

A security will continue to be an Index constituent if there are changes in characteristics (country, sector, size segment, etc.) Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

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

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

Appendix 1: Calculation of Carbon Exposure Metrics

Index Carbon Emissions –

Parent Index Carbon Emissions –

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

Derived Index Carbon Emissions –

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

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

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

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

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

Index Potential Carbon Emissions from Fossil Fuels–

Parent Index Potential Carbon Emissions from Fossil Fuels–

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

Derived Index Potential Carbon Emissions from Fossil Fuels–

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

Appendix 2: 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 (GEMTLT).

Appendix 3: 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 4: 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.

Contact us

[msci.com/contact-us](https://www.msci.com/contact-us)

AMERICAS

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

EUROPE, MIDDLE EAST & AFRICA

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

ASIA PACIFIC

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

* = toll free

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