

MSCI World Carbon Transition Technologies Factor Select Index

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1 Introduction

The MSCI World Carbon Transition Technologies Factor Select Index (the ‘Index¹’) is designed to represent the performance of a strategy that seeks to maximize its exposure to a combination of a growth factor, a quality factor and to select carbon transition technologies, by applying an optimization process under certain constraints described below. The carbon transition technologies in scope of this Index are associated with the following products and services:

- Batteries
- Smart Grids
- Future Fuels & Technologies
- Alternative Food & Agriculture
- MSCI Hydro-power generation (>25MW)
- MSCI Sustainable Impact Metrics categories:
 - Alternative Energy
 - Energy Efficiency
 - Sustainable Agriculture
 - Sustainable Water
 - Pollution Prevention and Control

More details can be found in the methodology document of the MSCI World Carbon Transition Technologies Select Index².

¹ The Index is governed by a set of methodology and policy documents (“Methodology Set”), including the present index methodology document. Please refer to Appendix VII for more details.

2 Index Construction Using Optimization

- Defining the Parent Index and the base currency for optimization
- Defining the Eligible Universe
- Defining the Optimization setup
- Determining the Optimized Index

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

2.1 Defining the Parent Index and the Base Currency for Optimization

The Parent Index is the MSCI World Investable Market Index (IMI)³ and serves as the initial universe of potentially eligible securities for the optimization process. The index construction uses optimization with a selected base currency⁴ and does not allow short selling of securities. Please refer to Appendix I for more details.

2.2 Defining the Eligible Universe

The Eligible Universe is constructed in the following steps:

First, securities from the Parent Index which are not constituents of the MSCI World Carbon Transition Technologies Select Index are excluded from the Eligible Universe. Then, securities which have a 3-month Average Daily Traded Value (ADTV) of less than USD 3million are also excluded. Please refer to Appendix II for more details of the calculation of ADTV.

The remaining securities are split into two groups.

Group 1 consists of securities which have a float-adjusted market capitalization of less than USD 1 billion. Securities in this group are first ranked in descending order of their sector-relative winsorized Quality Z-scores (see Appendix IV for details of calculation of this metric) and then in descending order of their float-adjusted market capitalization-based weights. Securities in the bottom quartile of this ranking are then excluded from the Eligible Universe. All other securities from Group 1 are retained in the Eligible Universe.

Group 2 consists of securities which have float-adjusted market capitalization of USD 1 billion or more. All securities from Group 2 are retained in the Eligible Universe.

^{2,3} For details about the methodology, please refer to: <https://www.msci.com/index-methodology>

⁴ Any currency within the relevant Barra Equity Model can be used as an optimization currency. The default currency is the US Dollar.

2.3 Defining the Optimization Setup

The optimization objective is to maximize the “Alpha Score” of the Index at the time of rebalancing. There is no risk-related term in the optimization objective.

The Alpha Score, denoted by $\alpha(i)$, is calculated as a simple average:

$$\alpha(i) = [\text{Growth Factor Quartile Score}(i) + \text{Quality Factor Quartile Score}(i) + \text{Revenue Quartile Score}(i)] / 3$$

where i denotes the i^{th} security

If data on one or more of the 3 components of the simple average is missing for a security, then that component is ignored in the calculation of the simple average.

The Growth and Quality Factor Quartile scores for each security are calculated as explained in Appendix IV. The Revenue Quartile Score for each security is calculated as detailed in Appendix V.

2.3.1 Optimization Constraints

At each Quarterly Index Review, the following optimization constraints are employed, which aim to address the index objective while helping to ensure replicability and investability:

- The maximum weight of an index constituent will be restricted to the lower of 5%, 70 x the security weight in the Parent index and $(20\% / \text{USD } 10^9) * 3\text{-month ADTV in USD of the security}$.
- The minimum weight of an index constituent is limited to 0.01%.
- The ex-ante Tracking Error of the Index, relative to the Parent Index is less than or equal to 4%.
- For countries with weight greater than 2.5% in the Parent Index, their weight in the Index will not deviate more than +/-20% from the country weight in the Parent Index.
- The one-way turnover of the Index is limited to a maximum of 55% at each rebalancing.

2.4 Determining the Optimized Index

The Index is constructed using the Barra Open Optimizer in combination with the relevant Barra Equity Model⁵. The optimization uses 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.

⁵ Please refer to Appendix VI for the detailed information on model usage.

3 Maintaining the Index

3.1 Quarterly Index Review

The Index is rebalanced on a quarterly basis, usually as of the close of the last business day of February, May, August and November, coinciding with the February, May, August and November Index Reviews of the Parent Index. The Barra Equity Model data as of the previous month-end before the rebalancing date is used.

In general, the pro forma Index is announced nine business days before the effective date.

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.

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.

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 addition 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.

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

4 MSCI ESG Research

The Index is a product of MSCI Inc. that utilizes 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 Index uses the following MSCI ESG Research products: MSCI Impact Solutions, MSCI ESG Controversies, MSCI ESG Business Involvement Screening Research, and MSCI Climate Change Metrics. MSCI Indexes are administered by MSCI Limited.

4.1 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	<ol style="list-style-type: none"> Alternative energy Energy efficiency Green building
	Natural capital	<ol style="list-style-type: none"> Sustainable water Pollution prevention Sustainable agriculture
Social Impact	Basic needs	<ol style="list-style-type: none"> Nutrition Major Disease Treatment Sanitation Affordable Real Estate
	Empowerment	<ol style="list-style-type: none"> SME Finance Education 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.

More detailed taxonomy for each category can be found in Section 4.4 of the MSCI ACWI Sustainable Impact Index Methodology available at <https://www.msci.com/index-methodology>.

4.2 MSCI Impact Solutions: SDG Alignment

MSCI Impact Solutions' SDG Alignment is designed to provide a holistic view of companies' net contribution – both positive and negative – towards addressing each of the 17 UN Sustainable Development Goals (SDGs). SDG Alignment assessments and scores include analysis of companies' operations, products and services, policies, and practices and their net contribution – positive and adverse – to addressing key global challenges.

The MSCI SDG Alignment framework provides 17 SDG Net Alignment scores and 17 SDG Net Alignment assessments (including Strongly Aligned, Aligned, Neutral, Misaligned and Strongly Misaligned) for each of the 17 global goals. In addition, the model offers assessments and scores for two dimensions, product alignment and operation alignment, for each company and for each of the 17 goals.

For more details on MSCI Impact Solutions including MSCI SDG Alignment, please refer to <https://www.msci.com/our-solutions/esg-investing/impact-solutions>.

4.3 MSCI ESG Controversies

MSCI ESG Controversies provides 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 at: <https://www.msci.com/esg-and-climate-methodologies>.

4.4 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.

4.5 MSCI Climate Change Metrics

MSCI Climate Change Metrics provides 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: The Parent Index and the Base Currency for Optimization

Optimized Index	Parent Index	Base Currency for Optimization
MSCI World Carbon Transition Technologies Factor Select Index	MSCI World IMI Index	USD

Appendix II: Calculation of 3-Month Average Daily Traded Value (ADTV)

$$ADTV = ATV / 252$$

Where:

- ADTV = 3-month Average Daily Traded Value
- ATV = 3-month Annualized Traded Value

For details on the calculation of ATV, please refer to the MSCI Index Calculation Methodology (<https://www.msci.com/index-methodology>)

Appendix III: Handling Infeasible Optimizations

During the Index Review, in the event that there is no optimal solution that satisfies all the optimization constraints defined in Section 2.3.1, the following constraints are relaxed to find an optimal solution:

- The ex-ante Tracking Error and the Asset weight as a Parent weight multiple constraints are alternately relaxed until a feasible solution is achieved. The ex-ante Tracking Error constraint is relaxed in steps of 25bps up to 7.5%. The Asset weight constraint is relaxed in steps of 5x up to 100x Parent weight.

For example, constraints relaxation is executed in the sequence illustrated below:

Order of Relaxation	Tracking Error	Asset Weight as Parent Weight Multiple
1	4.25%	70 times the weight of the security in the Parent Index
2	4.25%	75 times the weight of the security in the Parent Index
3	4.50%	75 times the weight of the security in the Parent Index
4	4.50%	80 times the weight of the security in the Parent Index

If no optimal solution is found after all the above constraints have been relaxed, the Index will not be rebalanced for that Index Review.

Appendix IV: Calculation of the Growth and Quality Factor Quartile Scores

The Growth score for each security in the Parent Index is calculated by combining the security-level exposures to three factors, EPS Growth, SPS Growth and Long-term Earnings Growth from the GEMLT model. A sector-relative winsorized Z-score is derived from this combined score by standardizing the latter within each sector and winsorizing at +/- 3.

Growth Score = (0.1*EPS Growth) + (0.2*SPS Growth) + (0.7*Analyst Predicted Long-term Earnings Growth)

The Growth Factor Quartile score is then assigned to each security in the MSCI World Carbon Transition Technologies Select Index by ranking their sector-relative winsorized Growth Z-score and dividing into 4 quartiles. A score of 4 denotes the highest quartile (highest growth).

The Quality score for each security in the Parent Index is calculated by combining the security-level exposures to five factors, Profitability, Investment Quality, Earnings Quality, Leverage and Earnings Variability, from the GEMLT model. A sector-relative winsorized Z-score is derived from the combined score by standardizing the latter within each sector and winsorizing at +/- 3.

Quality Score = (0.2) * Profitability + (0.2) * Investment Quality + (0.2) * Earnings Quality + (-1) * (0.2) * Earnings Variability + (-1) * (0.2) * Leverage

The Quality Factor Quartile score is then assigned to each security in the MSCI World Carbon Transition Technologies Select Index by ranking their sector-relative winsorized Quality Z-score and dividing into 4 quartiles. A score of 4 denotes the highest quartile (highest quality).

Appendix V: Calculation of the Revenue Quartile Score

For each security in the MSCI World Carbon Transition Technologies Select Index, quartile scores (4 denoting the highest quartile) based on the exposure of the security to each of the 10 carbon transition technologies described in section 1.

Exposures of 0 or null are ignored for this calculation of quartiles.

In this way, for each security in the MSCI World Carbon Transition Technologies Select Index, 10 quartile scores are obtained. The final Revenue Quartile Score is calculated as the maximum of the 10 exposure quartile scores, for each security.

During the February and August index reviews, the exposure data to the 10 carbon transition technologies is used as of the immediately preceding November and May index reviews respectively. This is done to maintain consistency in the use of exposure data for the calculation of this Index and the calculation of the MSCI World Carbon Transition Technologies Select Index which rebalances at a semi-annual frequency in May and November.

Appendix VI: New release of Barra[®] Equity Model or Barra[®] Optimizer

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

Appendix VII: Methodology Set

The Index is 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
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- MSCI Global Investable Market Indexes Methodology – www.msci.com/index/methodology/latest/GIMI
- MSCI World Carbon Transition Technologies Select Index – www.msci.com/index/methodology/latest/WrldCarTranTech

The Methodology Set for the Index 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’.

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