

MSCI PACIFIC EX JAPAN LOW CARBON OPTIMIZED SELECT INDEX METHODOLOGY

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1 INTRODUCTION

The MSCI Pacific ex Japan Low Carbon Optimized Select Index is an optimized index that aims to reduce exposure to companies with high carbon footprint and high fossil fuel reserves while exhibiting risk and return characteristics similar to those of the MSCI Pacific ex Japan Index.

2 CONSTRUCTING THE MSCI PACIFIC EX JAPAN LOW CARBON OPTIMIZED SELECT INDEX

The MSCI Pacific ex Japan Low Carbon Optimized Select Index (“the Index”) is constructed from the MSCI Pacific ex Japan Index (“the Parent Index”). MSCI uses greenhouse gas emissions and fossil fuel reserves data to optimize the Index to have lower carbon exposure than the Parent Index.

2.1 CARBON EXPOSURE MEASUREMENT

The Carbon exposure of a security is measured in terms of greenhouse gas emissions intensity and potential carbon emissions intensity from fossil fuel reserves. The emission intensity and potential carbon emissions intensity is calculated by dividing the greenhouse gas emissions and potential carbon emissions by market capitalization of the company.

2.1.1 CARBON EMISSIONS

MSCI ESG Research collects annual 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 estimates Scope 1 and Scope 2 GHG emissions. Further, to normalize for size, MSCI divides the sum of Scope 1 and Scope 2 GHG emissions by the issuer market capitalization to calculate emission intensity.

2.1.2 POTENTIAL CARBON EMISSIONS FROM FOSSIL FUELS

MSCI ESG Research collects fossil fuel reserves data where relevant, typically in the Oil & Gas, Coal Mining and Electric Utilities industries. Sources for this data include company publications, other public records and third party data providers.¹

To convert reserves data to potential carbon emissions, MSCI ESG Research applies a formula from the Potsdam Institute for Climate Impact Research.² Further, the potential carbon emissions are converted to potential carbon emissions intensity by dividing them by the issuer market capitalization.

¹ Some of the raw data on which this research is based was supplied by GlobalData Publications Inc. (<http://energy.globaldata.com>).

² Malte Meinshausen, Nicolai Meinshausen, William Hare, Sarah C. B. Raper, Katja Frieler, Reto Knutti, David J. Frame & Myles R. Allen. *Greenhouse-gas emission targets 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.

2.2 OPTIMIZATION

The MSCI Pacific ex Japan Low Carbon Optimized Select Index is constructed using the Barra Open Optimizer³ in combination with the relevant Barra Equity Model to minimize carbon footprint while maintaining risk and return characteristics similar to the MSCI Pacific ex Japan Index.

For newly added issuers to pro-forma index with no data, MSCI uses the industry average emission intensity multiplied by the market capitalization of the security in the *pro forma* index, and zero fossil fuel reserves.

The carbon footprint is expressed in terms of z-score which is calculated for each security according to the method below:

- Carbon emission intensity is normalized and converted into a z-score which is factored into the optimization process. Additionally, a penalty based on the carbon reserves intensity is also factored into the optimization (-0.5 for issuers having reserves with reserves intensity below the median carbon reserves intensity of the issuers in the Parent Index which have reserves and -1 for issuers having reserves and having reserves intensity above the median reserves intensity of the issuers in the Parent Index which have reserves). The combined scores, after including the penalty for carbon reserves, are winsorized at +3 and -3.

The following optimization constraints are employed, aiming to reduce the tracking error of the Index with respect to the Parent Index while reducing the carbon footprint of the Index:

- The ex-ante tracking error of the Index is constrained to 0.90%
- The one way semi-annual turnover of the MSCI Pacific ex Japan Low Carbon Optimized Select Index is constrained to a maximum of 10%
- The sector weights of the Index will not deviate from the sector weights of the Parent Index by more than +/-2%.
- The country weights of the Index will not deviate from the country weights of the Parent Index by more than +/-2%.

2.2.1 RELAXATION MECHANISM

In case there is no optimal solution that satisfies all the optimization constraints described above, the tracking error constraint is relaxed in steps of 0.1% until a feasible solution is reached.

³ A brief description of Barra Optimizer can be found at https://www.msci.com/documents/10199/242721/Barra_Optimizer.pdf/5acf4515-dbd8-4d0c-8acc-ca70b7b68f69

3 MAINTAINING THE MSCI PACIFIC EX JAPAN LOW CARBON OPTIMIZED SELECT INDEX

3.1 SEMI-ANNUAL INDEX REVIEWS

The Index is rebalanced semi-annually in May and November to coincide with the regular Index Reviews of the MSCI Global Investable Market Indexes, and the changes are implemented on the effective date of the index reviews. The pro forma indexes are typically announced nine business days before the effective date.

3.2 ONGOING EVENT RELATED CHANGE

The general treatment of corporate events in the MSCI Pacific ex Japan Low Carbon Optimized Select 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 Pacific ex Japan Low Carbon Optimized Select Index, the changes made to the Parent Index during intermediate Index Reviews will be neutralized in the MSCI Pacific ex Japan Low Carbon Optimized Select Index.

The following section briefly describes the treatment of common corporate events within the MSCI Pacific ex Japan Low Carbon Optimized Select Index.

No new securities will be added (except where noted below) to the Index between Index Reviews. For cases where additions are noted below, securities will be added to the index only if added to the parent index. 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 I: BARRA EQUITY MODEL USED IN THE OPTIMIZATION

In order to meet its objective, the MSCI Pacific ex Japan Low Carbon Optimized Select Index construction, since inception, made use of the Barra Global Equity Model (GEM3L) within the optimization setup. However, starting from the November 2017 Semi-Annual Index Review, the index construction used an optimization setup that used the Barra Global Equity Model for Long-Term Investors (GEMTL). The change of optimization setup was completed without any change in the prevailing index methodology.

The following sections have been modified since January 2015:

Section 2.2: Optimization

- Updated link to the description of Barra Optimizer.

The following sections have been modified since September 2017:

Section 2.2: Optimization

- Updated the text to remove reference to GEM3 model.

Appendix I: Barra Equity Model Used In the Optimization

- Added Appendix I to update information on transition of MSCI Pacific ex Japan Low Carbon Optimized Select Index to GEMTL

The following sections have been updated since November 2017:

- The details on the Corporate Events treatment are now included in Section 3.2.

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