

BSG INDEX ON MSCI WORLD* METHODOLOGY

* An MSCI custom index based on the optimization constraints and stock exclusions provided by Blue Sky Group Holding BV

February 2023

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1 Introduction

The BSG Index on MSCI World Index (the 'Index') is designed to support investors seeking to reduce their exposure to transition and physical climate risks and who wish to pursue opportunities arising from the transition to a lower-carbon economy. The Index is constructed from MSCI World (the 'Parent Index') following an optimization-based approach and aims to:

- Reduce the weight of companies assessed as high carbon emitters using scope 1, 2 and 3 emissions
- Realize a “self-decarbonization” rate of 7% year on year
- Reduce the Index’s exposure to physical risk arising from extreme weather events under aggressive scenario
- Increase the weight of companies with approved science based carbon reduction targets
- Increase the weight of companies aligned with United Nations Sustainable Development Goals (UN SDGs)¹ 7, 8, 9, 12 and 13
- Increase the weight of companies with Carbon Disclosure Rating (CDP)² of A and A-
- Achieve a modest tracking error compared to the Parent Index and low turnover.

¹ For more details, please refer to <https://sdgs.un.org/goals>

² Please refer to Appendix I for more details on CDP rating

2 MSCI ESG Research

The Indexes use company ratings and research provided by MSCI ESG Research. In particular, the Indexes use the following MSCI ESG Research products: MSCI Climate Change Metrics and MSCI Impact Solutions.

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 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-change-solutions>.

2.2 MSCI ESG 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"> 1. Alternative energy 2. Energy efficiency 3. Green building
	Natural capital	<ol style="list-style-type: none"> 4. Sustainable water 5. Pollution prevention 6. Sustainable agriculture

Social Impact	Basic needs	7. Nutrition 8. Major Disease Treatment 9. Sanitation 10. Affordable Real Estate
	Empowerment	11. SME Finance 12. Education 13. 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 2.4 of the MSCI ACWI Sustainable Impact Index Methodology available at <https://www.msci.com/index-methodology>.

3 Index Construction Methodology

3.1 ELIGIBLE UNIVERSE

The Eligible Universe is constructed from the Parent Index by removing securities based on the exclusion list provided by BSG³.

3.2 OPTIMIZATION CONSTRAINTS

At each Semi-Annual Index Review, the index is constructed using an optimization process that aims to achieve replicability and investability as well as minimize ex-ante tracking error relative to the Parent Index subject to the following constraints:

1. Transition and physical risk objectives – constraints detailed in Table 1
2. Transition opportunities objectives – constraints detailed in Table 2
3. Diversification objectives – constraints detailed in Table 3

The definitions of the target metrics for the optimization are detailed in Appendix III.

Table 1: Constraints imposed to meet transition and physical risk objectives

No.	Transition and Physical Risk Objective	BSG INDEX ON MSCI WORLD
1.	Minimum reduction in Weighted Average Scope 1+2 Greenhouse Gas (GHG) Intensity relative to Parent Index ⁴	50%
2.	Minimum average reduction (per annum) in Scope 1+2 Greenhouse Gas (GHG) Intensity relative to the Scope 1+2 GHG Emission Intensity at the Base Date	7%
3.	Minimum reduction in Weighted Average Scope 1+2+3 Greenhouse Gas (GHG) Intensity relative to Parent Index	50%
4.	Minimum average reduction (per annum) in Scope 1+2+3 Greenhouse Gas (GHG) Intensity at the Base Date	7%
5.	Minimum increase in aggregate weight of companies which are in High Climate Impact Sector	20%

³ For more details, please refer to <https://klmcabinefonds.nl/ons-pensioenfondsen/beleggen-voor-uw-pensioen/verantwoord-beleggen/waar-we-niet-beleggen> No exclusion is applied in Nov 2022 SAIR.

⁴ Please refer to Appendix IV for more details on base reset.

No.	Transition and Physical Risk Objective	BSG INDEX ON MSCI WORLD
	(as defined in Appendix II) and have received carbon disclosure rating (CDP) of 'A-' or 'A'.	
6.	Minimum increase in aggregate weight of companies with one or more active carbon emissions reduction target(s) approved by the Science Based Targets initiative (SBTi) ⁵ relative to the aggregate weight of such companies in the Parent Index	20%
7.	Active Weights of companies with one or more active carbon emissions reduction target/s approved by the Science Based Targets initiative (SBTi) and have demonstrated 7% decarbonization over last 3 years relative to the weights of such companies in the Parent Index	≥ 0
8.	Aggregate active weight of companies which are classified as "Neutral", "Aligned" or "Strongly Aligned" on Sustainable Development Goals (SDGs) 7,8,9,12,13 relative to the aggregate weight of such companies in the Parent Index	≥ 0
9.	Minimum reduction in Weighted Average Extreme Weather Climate Value-At-Risk (Aggressive Scenario) relative to Parent Index Please see more detail on Aggregate Climate Value-At-Risk in Appendix I.	≥ 0
10.	Minimum increase in Weighted Average ESG Score relative to Parent Index	≥ 0

Table 2: Constraints imposed in order to meet transition opportunity objectives

No.	Transition Opportunity Objective	BSG INDEX ON MSCI WORLD
11.	Minimum ratio of Weighted Average Green Revenue/ Weighted Average Fossil fuels-based Revenue relative to Parent Index	2 times

⁵ For more details, please refer to <https://sciencebasedtargets.org/>

Table 3: Constraints imposed to meet diversification objectives

No.	Diversification Objective	BSG INDEX ON MSCI WORLD
12.	Active Factor exposures to style factors	+/- 0.25
13.	Constituent Active Weight	+/- 5%
14.	Security Maximum Weight as a multiple of its weight in the Parent Index	20x
15.	Active Sector Weights (the Energy GICS Sector is not constrained)	+/-5%
16.	Minimum aggregate weight in selected GICS Sub-Industry Groups shown below as a multiple of its aggregate weight in the Parent Index	0.5x
17.	Active Country Weights ⁶	+/-5%
18.	One Way Turnover ⁷	3%
19.	Maximum ex ante tracking error	2%

The selected GICS Sub-Industry Groups are defined as:

GICS Industry Group	Selected Sub-Industries
Energy (1010)	Oil & Gas Drilling (10101010), Oil & Gas Equipment & Services (10101020), Integrated Oil & Gas (10102010), Oil & Gas Exploration & Production (10102020), Oil & Gas Refining & Marketing (10102030), Oil & Gas Storage & Transportation (10102040), Coal & Consumable Fuels (10102050)
Materials (1510)	Construction Materials (15102010), Forest Products (15105010), Paper Products (15105020), Aluminum (15104010), Diversified Metals & Mining (15104020), Copper (15104025), Steel (15104050), Commodity Chemicals

⁶ In case there are countries in the Parent Index which weigh less than 2.5% in the Parent Index then for such countries the active country upper bound of +5% is not applicable. When a country weighs less than 2.5% in Parent Index then the upper bound of country weight in the Index is set at three times of the country's weight in Parent Index.

⁷ The one-way turnover constraint is relaxed at the November 2019 and November 2020 Semi-Annual Index Reviews to implement the base resets on Scope 1+2 emissions and Scope 1+2+3 emissions intensities.

GICS Industry Group	Selected Sub-Industries
	(15101010), Diversified Chemicals (15101020), Fertilizers & Agricultural Chemicals (15101030), Industrial Gases (15101040), Specialty Chemicals (15101050)
Capital Goods (2010)	Building Products (20102010), Construction & Engineering (20103010), Construction Machinery & Heavy Trucks (20106010), Agricultural & Farm Machinery (20106015), Industrial Machinery (20106020)
Transportation (2030)	Air Freight & Logistics (20301010), Railroads (20304010), Trucking (20304020), Airport Services (20305010), Highways & Railtracks (20305020), Marine Ports & Services (20305030), Marine (20303010), Airlines (20302010)
Consumer Durables & Apparel (2520)	Textiles (25203030)
Utilities (5510)	Independent Power Producers & Energy Traders (55105010), Renewable Electricity (55105020), Electric Utilities (55101010), Gas Utilities (55102010), Multi-Utilities (55103010), Water Utilities (55104010)

During the Semi-Annual Index Review, in the event that there is no optimal solution that satisfies all the optimization constraints, the following constraint will be relaxed, until an optimal solution is found:

- Relax the one-way index turnover constraint in steps of 1% up to 10%.

In the event that no optimal solution is found after relaxing turnover to 10%, the Index will not be rebalanced for that Semi-Annual Index Review.

3.3 DETERMINING THE OPTIMIZED PORTFOLIO

The Index is constructed using the Barra Open Optimizer⁸ in combination with the relevant Barra Equity Model. The optimization uses universe of eligible securities and the specified optimization objectives and constraints to determine the constituents of the Indexes.

⁸ Please refer to Appendix V and VI for more details.

4 Maintaining the BSG Index on MSCI World

4.1 SEMI-ANNUAL INDEX REVIEWS

The Index is rebalanced on a semi-annual basis, as of the close of the last business day of May and November. The pro forma Index is in general announced nine business days before the effective date.

In general, MSCI uses MSCI ESG Research data (including MSCI Climate Change Metrics, MSCI Climate Value-at-Risk, MSCI ESG Sustainable Impact Metrics, MSCI ESG Controversies and MSCI Business Involvement Screening Research) as of the end of the month preceding the Index Reviews for the rebalancing of the Indexes.

4.2 FEBRUARY AND AUGUST INDEX REVIEWS

The Index is reviewed on a quarterly basis, as of the close of the last business day of February and August. The pro forma Index is in general announced nine business days before the effective date.

During February and August Index Reviews, existing constituents in the exclusion list provided by BSG will be deleted from the Index, and the weights of remaining constituents are renormalized to 100%.

4.3 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.

Additionally, if the frequency of Index Reviews in the Parent Index is greater than the frequency of Index Reviews in the Index, the changes made to the Parent Index during intermediate Index Reviews will be neutralized in the Index.

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 continued inclusion in the Index will occur at the subsequent Index Review.
Merger/Acquisition	<p>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.</p> <p>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.</p>
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: Carbon Disclosure Rating

Carbon Disclosure Rating (CDP)⁹ is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states, and regions to manage their environmental impacts. By scoring companies and cities, CDP aims to incentivize and guide them on a journey through disclosure towards becoming a leader on environmental transparency and action.

⁹ For more details, please refer to <https://www.cdp.net>

Appendix II: MSCI Climate Value

The MSCI Climate Value-At-Risk measurement helps investors to assess future costs related to climate change and understand what those future costs could mean in the current valuation of securities. The premise of Climate Value-At-Risk is to aggregate costs related to specific climate risks over the next 15 years and calculate what these costs might signify about financial performance into the foreseeable future.

Aggregated Extreme Weather Equity Climate VaR (Aggressive Scenario) [%]

An equity's "worst-case" (95th percentile) downside or upside potential, expressed as a percentage of the equity's market value, assuming trends in extreme cold, extreme heat, extreme precipitation, heavy snowfall, extreme wind, coastal flooding, fluvial flooding and tropical cyclones continue along a Business-As-Usual pathway.

Appendix III: Calculation of Target Metrics

Calculation of GHG Intensity

For Parent Index constituents where the Scope 1+2+3 Emissions Intensity is not available, the average Scope 1+2+3 Emissions Intensity of all the constituents of the MSCI ACWI in the same GICS Industry Group in which the constituent belongs is used.

Security Level Scope 1+2 GHG Intensity =

$$\frac{\text{Scope 1 + 2 Carbon Emissions} * (1 + EVIAF)}{\text{Enterprise Value} + \text{Cash(in M\$\text{)}}}$$

Security Level Scope 1+2+3 GHG Intensity =

$$\frac{\text{Scope 1 + 2 + 3 Carbon Emissions} * (1 + EVIAF)}{\text{Enterprise Value} + \text{Cash(in M\$\text{)}}}$$

Enterprise Value Inflation Adjustment Factor (EVIAF) =

$$EVIAF = \left(\frac{\text{Average(Enterprise Value} + \text{Cash)}}{\text{Previous (Average(Enterprise Value} + \text{Cash))}} \right) - 1$$

Weighted Average GHG Intensity of Parent Index =

$$\sum (\text{Weight in Parent Index} * \text{Security Level GHG Intensity})$$

Weighted Average GHG Intensity of Derived Index =

$$\sum (\text{Index Weight} * \text{Security Level GHG Intensity})$$

Calculation of Average Decarbonization

On average, the Indexes follow a 7% decarbonization trajectory since the Base Date. The Weighted Average Carbon Emissions Intensity at the Base Date (W_1) is used to

compute the target Weighted Average Carbon Emissions Intensity at any given Semi-Annual Index Review (W_t) as per the below formula.

$$W_t = W_1 * 0.93^{\frac{(t-1)}{2}}$$

Where 't' is the number of Semi-Annual Index Reviews since the Base Date.

Thus, for the 3rd Semi-Annual Index Review since the Base Date (t=3), the target Weighted Average GHG Intensity will be $W_1 * 0.93$.

Calculation of Green Revenue to Fossil fuels-based Revenue Multiple

Green Revenue

For each constituent in the Parent Index, the Green Revenue% is calculated as the cumulative revenue (%) from the six Clean Tech themes which are as follows:

- Alternative Energy – products and services that support the transmission, distribution and generation of renewable energy and alternative fuels to reduce carbon and pollutant emissions in supporting affordable and clean energy to combat climate change.
- Energy Efficiency – products, and services that support the maximization of productivity in labor, transportation, power and domestic applications with minimal energy consumption to ensure universal access to affordable, reliable and modern energy services.
- Sustainable Water – products, services, infrastructure projects and technologies that resolve water scarcity and water quality issues, through minimizing and monitoring current water demand, improving the quality and availability of water supply to improve resource management in both domestic and industrial use.
- Green Building – design, construction, redevelopment, retrofitting, or acquisition of green-certified properties to promote mechanisms for raising capacity for effective climate change mitigation and adaptation.
- Pollution Prevention – products, services, infrastructure projects and technologies that reduces volume of waste materials through recycling, minimizes introduction of toxic substances, and offers remediation of existing contaminants such as heavy metals and organic pollutants in various environmental media to significantly address pollution in all levels and its negative effects.

- Sustainable Agriculture - revenues from forest and agricultural products that meet environmental and organic certification requirements to address significantly biodiversity loss, pollution, land disturbance, and water overuse.

The Weighted Average Green Revenue% is calculated as:

$$= \sum (Weight\ in\ Index * Green\ Revenue\%)$$

Fossil fuels-based Revenue

For each constituent in the Parent Index, the Fossil fuels-based Revenue% is calculated as the cumulative revenue (%) from the following sources:

- 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 (either reported or estimated).
- Revenue% from the extraction, production and refining of Conventional and Unconventional Oil & Gas. Conventional Oil and Gas includes Arctic onshore/offshore, deep water, shallow water and other onshore/offshore. Unconventional Oil and Gas includes oil sands, oil shale (kerogen-rich deposits), shale gas, shale oil, coal seam gas, and coal bed methane.
- Revenue% from thermal coal based power generation, liquid fuel based power generation and natural gas based power generation.

The Weighted Average Fossil fuels-based Revenue% is calculated as:

$$= \sum (Weight\ in\ Index * Fossil\ Fuels\ based\ Revenue\%)$$

The Green Revenues to Fossil fuels-based Revenues multiple for either the Parent Index or the Index is calculated as a ratio of the Weighted Average Green Revenue to the Weighted Average Fossil fuels-based Revenue as per the formula below:

$$= \frac{Weighted\ Average\ Green\ Revenue\%}{Weighted\ Average\ Fossil\ Fuels\ based\ Revenue\%}$$

Climate Impact Sectors

NACE¹⁰ is the European Union’s classification of economic activities. As per the draft DA, stocks in the NACE Section codes A, B, C, D, E, F, G, H, L are classified as “High Climate Impact” sector and other stocks are classified ‘Low Climate Impact’ sector. The GICS¹¹ Sub-Industry code for each security is mapped to the corresponding “Climate Impact Sector” using a mapping. This mapping is constructed in the following steps:

1. MSCI has published a mapping¹² between the NACE classes and GICS Sub-Industry.
2. For each GICS Sub-Industry, the number of NACE classes which fall under the High Climate Impact Sector (say the number of classes is N_H) and Low Climate Impact Sector (say the number of classes is N_L) is identified
3. If all the NACE classes for a given GICS Sub-Industry are identified in the High Climate Impact Sector ($N_L = 0$), then the GICS Sub-Industry is mapped to the High Climate Impact Sector. Conversely, if all the NACE classes for a given GICS Sub-Industry are identified in the Low Climate Impact Sector ($N_H = 0$) then the GICS Sub-Industry is mapped to the Low Climate Impact Sector
4. In case a GICS Sub-Industry is mapped to some NACE classes in the High Climate Impact Sector and the others in the Low Climate Impact Sector, the GICS Industry is mapped to the Climate Impact Sector in the following manner:
 - a. **$N_H \geq N_L$** : If the number of NACE classes in the High Climate Impact Sector is at least equivalent to the number of NACE classes in the Low Climate Impact Sector, the GICS Sub-Industry is mapped to the High Climate Impact Sector
 - b. **$N_H < N_L$** : If the number of NACE classes in the High Climate Impact Sector is less than the number of NACE classes in the Low Climate Impact Sector, the GICS Sub-Industry is mapped to the Low Climate Impact Sector
5. Using the GICS Sub-Industry to Climate Impact Sector mapping created in Step 4, and the security-level GICS Sub-Industry, each security in the Parent

¹⁰ For further details regarding NACE, please refer to https://ec.europa.eu/eurostat/statistics-explained/index.php?title=NACE_background

¹¹ For further information regarding GICS, please refer to <https://www.msci.com/gics>

¹² This mapping is available in the [Handbook of Climate Transition Benchmarks, Paris-Aligned Benchmark and Benchmarks’ ESG Disclosures](#)

Index is classified in either High Climate Impact Sector or Low Climate Impact Sector.

Appendix IV: Decarbonization Trajectory of Indexes

The Weighted Average Carbon Emissions Intensity on the Base Date (W_1) is used to compute the target Weighted Average Carbon Emissions Intensity at any given Semi-Annual Index Review (W_t) as per the below formula.

$$W_t = W_1 * 0.93^{\frac{(t-1)}{2}}$$

Where 't' is the number of Semi-Annual Index Reviews since the Base Date. The table below shows the Weighted Average Carbon Emissions Intensity on the Base Dates (W_1) for Scope 1+2 Carbon Emissions Intensity and Scope 1+2+3 Carbon Emissions Intensity:

Carbon Emissions Intensity	Base Date	W_1 (tCO ₂ /M\$ Enterprise Value + Cash)
Scope 1+2	December 03, 2018	34.19
Scope 1+2	November 27, 2019 (Reset Date)	33.54
Scope 1+2+3	December 01, 2020	201.38

Appendix V: Barra Equity Model Used in The Optimization

The BSG Index on MSCI World currently uses an optimization setup using the MSCI Barra Global Equity Model for Long-Term Investors (GEMTLT).

Appendix VI: 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.

The following sections have been updated effective December 01, 2022:

Section 3.1: Updated the footnote to remove the existing exclusion criteria

The following sections have been updated effective March 01, 2022:

Section 4.2: Added Section 4.2 to reflect quarterly exclusions

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