

**S&P Net Zero 2050 Carbon Budget
Enhanced Indices
*Methodology***

October 2024

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Introduction

Index Objective and Highlights

The S&P Net Zero 2050 Carbon Budget Enhanced Indices measure the performance of equity securities from the S&P 500 subject to exclusions based on companies' involvement in specific business activities, violations of the principles of the United Nations' Global Compact (UNGC), involvement in relevant ESG controversies, and weighted to target a defined carbon budget from each index's launch year to 2050 based on the Intergovernmental Panel on Climate Change (IPCC) estimate for worldwide emissions to limit global warming from pre-industrial levels to 1.5°C.¹ The index is weighted in order to minimize the difference in constituent weights relative to the S&P 500 index in terms of stocks, industries, and sectors.

The index aims to achieve the corresponding target carbon budget through a constraint on ownership of total Scope 1, 2 and 3 greenhouse gas (GHG) emissions that results in both the following conditions:

- an initial GHG footprint reduction in the index vintage year relative to the S&P 500, and;
- a yearly absolute geometric decarbonization rate
- capping the absolute decarbonization to 90%

Index Family

The family consists of the following headline index:

- S&P 500 Net Zero 2050 Carbon Budget Enhanced (2022 Vintage) Index

Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology	Equity Indices Policies & Practices
S&P Dow Jones Indices' Index Mathematics Methodology	Index Mathematics Methodology
S&P Dow Jones Indices' Float Adjustment Methodology	Float Adjustment Methodology
S&P Dow Jones Indices' Global Industry Classification Standard (GICS) Methodology	GICS Methodology

The methodology is created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

¹ With an 83% 'likelihood of limiting global warming to temperature limit'. IPCC (2021). [Summary for Policymakers \(ipcc.ch\)](#), available at https://www.ipcc.ch/report/ar6/wq1/downloads/report/IPCC_AR6_WGI_SPM.pdf.

Eligibility Criteria and Index Construction

Index Universe

At each rebalancing, the index universe is all constituents of the S&P 500 (the underlying index).

For information on the S&P 500, please refer to the S&P U.S. Indices Methodology, available at www.spglobal.com/spdji/.

Eligibility Factors

As of each rebalancing reference date, companies in the index universe must satisfy the following to be eligible for index inclusion:

GHG Emissions Coverage: have Scopes 1, 2 and 3 GHG emissions coverage from S&P Trucost Limited (Trucost) within four financial years prior to the rebalancing.

For information on Trucost's methodology, please refer [here](#).

Exclusions Based on Business Activities

As of each rebalancing reference date, exclude the following:

- companies without coverage
- companies involved in the following specific business activities at the relevant level of involvement. Revenue is used as a proxy for all categories.

S&P Global Business Involvement	S&P Global Category of Involvement and Description	S&P DJI Level of Involvement Threshold	S&P DJI Significant Ownership Threshold
Controversial Weapons	Customized Weapons: The screen covers companies involved in the manufacturing of the components of a weapon. These components are intended solely for use in the production and are essential for the functioning of AntiPersonnel Mines, Biological and Chemical Weapons, Blinding Laser Weapons, Cluster Munitions, Depleted Uranium, Incendiary Weapons and Nuclear Weapons.	>0%	≥25%
	Related Products and Services: The screen covers companies that supply products and/or services such as stockpiling and transferring, and sales for Anti-Personnel Mines, Biological and Chemical Weapons, Blinding Laser Weapons, Cluster Munitions, Depleted Uranium and Incendiary Weapons, and Nuclear Weapons.	>0%	≥25%
Military Contracting	Integral Military Weapons: The screen covers companies involved in the manufacturing, assembling, sale and transportation of integral military weapons.	≥10%	N/A
	Weapon-related: The screen covers companies involved in the manufacturing and sales of weapon-related products.	≥10%	N/A
Small Arms	Production of Small Arms Weapons for Civilian Use: The screen covers companies involved in the manufacturing of small arms weapon for civilian use.	>0%	≥25%
	Production of Small Arms Weapons for Non-Civilian Use: The screen covers companies involved in the manufacturing of small arms weapon for non-civilian use.	>0%	≥25%
	Production of Key components: The screen covers companies involved in the manufacturing of key components for assault weapons.	>0%	≥25%

S&P Global Business Involvement	S&P Global Category of Involvement and Description	S&P DJI Level of Involvement Threshold	S&P DJI Significant Ownership Threshold
	Retail and distribution of Small Arms Weapons: The screen covers companies involved in the retail or distribution of small arms weapons for civilian customers.	≥5%	N/A
Oil Sands or Tar Sands	Extraction and/or Production: The screen covers companies involved in the extraction and/or production of fossil fuels from oil sands/tar sands.	≥5%	N/A
Coal	Thermal Coal Mining: The screen covers companies that own/and or operate coal mines that engage in thermal coal mining.	≥5%	N/A
Thermal Coal:	Generation: : The screen covers companies involved in electricity generation using coal power plants.	≥5%	N/A
Tobacco	Production: The screen covers companies involved in the manufacturing of tobacco.	>0%	≥25%
	Related Products and Services: The screen covers companies that supply essential products/services for the tobacco industry.	≥5%	N/A
	Retail and Distribution: The screen covers companies involved in the retail and/or distribution of tobacco as part of their offerings.	≥5%	N/A

S&P DJI Level of Involvement refers to the company's direct exposure to such products, while Significant Ownership indicates where the company has indirect involvement via some specified level of ownership of a subsidiary company with involvement.

For more information on the S&P Global Business Involvement Screens data set, please refer [here](#).

Exclusions Based on Sustainalytics' Global Standards Screening

Sustainalytics' Global Standards Screening (GSS) provides an assessment of a company's impact on stakeholders and the extent to which a company causes, contributes or is linked to violations of international norms and standards. The basis of the GSS assessments are the United Nations Global Compact (UNGC) Principles. Information regarding related standards is also provided in the screening, including the Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights, as well as their underlying conventions. Sustainalytics classifies companies into the following three statuses:

- **Non-Compliant.** Classification given to companies that do not act in accordance with the UNGC principles and its associated standards, conventions, and treaties.
- **Watchlist.** Classification given to companies that are at risk of violating one or more principles, for which all dimensions for Non-Compliant status could not be established or confirmed.
- **Compliant.** Classification given to companies that act in accordance with the UNGC principles and its associated standards, conventions, and treaties.

As of each rebalancing reference date, exclude the following:

- companies without coverage
- companies classified as Non-Compliant

Please refer to <http://www.sustainalytics.com/> for more information.

Controversies: Media and Stakeholder Analysis Overlay

In addition to the above, S&P Global uses RepRisk, a leading provider of business intelligence on environmental, social, and governance risks, for daily filtering, screening, and analysis of controversies related to companies within the indices.

In cases where risks are presented, S&P Global releases a Media and Stakeholder Analysis (MSA) which includes a range of issues such as economic crime and corruption, fraud, illegal commercial practices,

human rights issues, labor disputes, workplace safety, catastrophic accidents, and environmental disasters.

The Index Committee will review constituents that have been flagged by S&P Global's MSA to evaluate the potential impact of controversial company activities on the composition of the indices. In the event that the Index Committee decides to remove a company in question, that company would not be eligible for re-entry into the index for one full calendar year, beginning with the subsequent rebalancing.

For more information on RepRisk, please refer to www.reprisk.com. This service is not considered a direct contribution to the index construction process.

Constituent Selection

At each rebalancing, select all eligible constituents and form the index, subject to the optimization constraints.

Constituent Weighting

At each rebalancing reference date, weights (w_i), are determined to minimize the following objective function:

$$\begin{aligned} \text{Objective Function} &= \sum_i \frac{1}{n} \frac{(w_i - \text{underlying weight}_i)^2}{\text{underlying weight}_i} \\ &+ \sum_j \frac{1}{l} \frac{(\text{industry weight}_j - \text{underlying industry weight}_j)^2}{\text{underlying industry weight}_j} \\ &+ \sum_k \frac{1}{m} \frac{(\text{sector weight}_k - \text{underlying sector weight}_k)^2}{\text{underlying sector weight}_k} \end{aligned}$$

where:

- n = number of stocks selected
- l = number of GICS Industries in the underlying index
- m = number of GICS Sectors in the underlying index

Initial Carbon Reduction and Decarbonization Rate. After defining each index's corresponding initial carbon reduction, the following decarbonization rate was determined for this index:

Initial Carbon Reduction	Decarbonization Rate
25%	11%

The 'Initial Carbon Reduction' is applied to the realized Annual Global Emissions ('AGE') for 2021. The calculation of the annual 'Decarbonization Rate' is then solved for as a rate that satisfies the equation described in *Appendix B* using the $GCBR_{2022}$ and a specified initial carbon reduction rate of 25% (rounded up to 2 decimal places).

For initial carbon reduction and decarbonization rate calculations, please refer to *Appendix B*.

Optimization Constraints²

² For history prior to December 2021 the rebalancings calculated using only the Scope 1 and 2 constraint, with the same initial carbon reduction and decarbonization rate but used anchor reference date of 11/30/2010 and anchor rebalancing date of 12/17/2010.

As of each rebalancing reference date, the optimizer seeks to minimize the above objective function for each index while satisfying the below constraints:

Constraint	Index	Data Source
Total Index Carbon Emissions _t	$\leq \text{Total Underlying Index Carbon Emissions}_{t=0} * \text{YearDecarbonization}_t$	Trucost
Scope 1 and 2 Index Carbon Emissions _t	$\leq \text{Scope 1 and 2 Underlying Index Carbon Emissions}_{t=0} * \text{YearDecarbonization}_t$	

The 't=0' indicates Anchor Reference Date and 't' is the number of years since Anchor Reference Date (See Anchor Dates section below).

The *Total Underlying Index Carbon Emissions*₀ is the total absolute emissions of companies in the underlying index as of the reference date of the first rebalancing, apportioned on an equity ownership basis, only capturing the share of each company's emissions in proportion to the share of each company's total market capitalization in the S&P Global BMI.

The *Scope 1 and 2 (Underlying) Index Carbon Emissions* calculate following the same formula for *Total (Underlying) Index Carbon Emissions* but removing $GHG3_{t=0,i}$ from the *Company Emissions* definition.

For further information on index carbon emissions calculations, please refer to Appendix C.

Anchor Dates

Reference Anchor Date	Reference Rebalancing Date
11/30/2021	12/18/2021

Index Calculations

The indices calculate by means of the divisor methodology used in all S&P Dow Jones Indices' equity indices.

For more information on the index calculation methodology, please refer to the *Non-Market Capitalization Weighted Indices of S&P Dow Jones Indices' Index Mathematics Methodology*.

Index Maintenance

Rebalancing

The indices rebalance annually, effective after the close of the third Friday of December. The rebalancing reference date for each rebalance is the last trading day of the prior month. As part of the rebalancing process, constituent stock weights are updated. Weights calculated as a result of the reference date data are implemented in the indices using closing prices seven business days prior to the rebalancing effective date.

Additions and Deletions

Additions. Except for spin-offs, no stocks are added to the index between rebalancings.

Spin-offs. Spin-offs follow the same treatment as the underlying index.

Deletions. Stocks removed from an underlying index are removed from the respective S&P Net Zero 2050 Carbon Budget Enhanced index simultaneously. Between rebalancings, a stock can be deleted from an index due to corporate events such as mergers, takeovers, delistings, suspensions, spin-offs/demergers, or bankruptcies.

Quarterly Eligibility Reviews

Business Activities. The indices review constituents for ongoing eligibility under the Business Activities criteria and remove, without replacement, all ineligible companies effective after the close of the third Friday day of March, June, and September using a reference date as of after the close of the last business day of the previous month. The review does not consider or include coverage changes.

UNGC. The indices review constituents for ongoing eligibility under the UNGC exclusion criteria and remove, without replacement, all ineligible companies effective after the close of the third Friday of March, June, September, using a reference date for as of after the close of the last business day of the previous month. The review does not consider or include coverage changes.

Corporate Actions

For more information on Corporate Actions, please refer to the Non-Market Capitalization Indices section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Ongoing Maintenance

Index constituents are drawn from the underlying index or component indices. Specific changes to index constituents, such as share changes, Investable Weight Factor (IWF) changes, dividend distributions, and price adjustments, follow the policies of the underlying index.

For more information on Share Updates, Float Adjustment, and IWFs, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology and S&P Dow Jones Indices' Float Adjustment Methodology.

The index is reviewed on an ongoing basis to account for corporate events such as mergers, takeovers, delistings, suspensions, spin-offs/demergers, or bankruptcies. Changes to index composition and related weight adjustments are made as soon as they are effective. These changes are typically announced prior to the implementation date.

Currency of Calculation and Additional Index Return Series

The indices calculate in U.S. dollars and EU euros.

WMR foreign exchange rates are taken daily at 4:00 PM London Time and used in the calculation of the indices. These mid-market fixings are calculated by WMR based on LSEG data and appear on LSEG pages.

In addition to the indices detailed in this methodology, additional return series versions of the indices may be available, including, but not limited to the following: currency, currency hedged, decrement, fair value, inverse, leveraged, and risk control versions. For a list of available indices, please refer to the [S&P DJI Methodology & Regulatory Status Database](#).

For information on index calculation, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

For the inputs necessary to calculate certain types of indices, including decrement, dynamic hedged, fair value, and risk control indices, please refer to the Parameters documents available at www.spglobal.com/spdji/.

Base Dates and History Availability

Index history availability, base dates, and base values are shown in the table below.

Index	Launch Date	First Value Date	Base Date	Base Value
S&P 500 Net Zero 2050 Carbon Budget Enhanced (2022 Vintage) Index	08/28/2023	12/31/2010	12/31/2010	1000

Index Data

Calculation Return Types

S&P Dow Jones Indices calculates multiple return types which vary based on the treatment of regular cash dividends. The classification of regular cash dividends is determined by S&P Dow Jones Indices.

- Price Return (PR) versions are calculated without adjustments for regular cash dividends.
- Gross Total Return (TR) versions reinvest regular cash dividends at the close on the ex-date without consideration for withholding taxes.
- Net Total Return (NTR) versions, if available, reinvest regular cash dividends at the close on the ex-date after the deduction of applicable withholding taxes.

In the event there are no regular cash dividends on the ex-date, the daily performance of all three indices will be identical.

For a complete list of indices available, please refer to the daily index levels file (“SDL”).

For more information on the classification of regular versus special cash dividends as well as the tax rates used in the calculation of net return, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

For more information on the calculation of return types, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

Index Governance

Index Committee

An S&P Dow Jones Indices Index Committee maintains the indices. The Index Committee meets regularly. At each meeting, the Index Committee reviews pending corporate actions that may affect index constituents, statistics comparing the composition of the index to the market, companies that are being considered as candidates for addition to the index, and any significant market events. In addition, the Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

S&P Dow Jones Indices considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to the daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Index Policy

Announcements

All index constituents are evaluated daily for data needed to calculate index levels and returns. All events affecting the daily index calculation are typically announced in advance via the Index Corporate Events report (.SDE), delivered daily to all clients. Any unusual treatment of a corporate action or short notice of an event may be communicated via email to clients.

Press releases are posted on our Web site, www.spglobal.com/spdji/, and are released to major news services.

Pro-forma Files

In addition to the corporate events file (.SDE), S&P Dow Jones Indices provides constituent pro-forma files each time the indices rebalance. The pro-forma file is typically provided daily in advance of the rebalancing date and contains all constituents as well as their corresponding weights and index shares effective for the upcoming rebalancing.

Please visit www.spglobal.com/spdji/ for a complete schedule of rebalancing timelines and pro-forma delivery times.

Holiday Schedule

The index is calculated daily, throughout the calendar year. The only days an index is not calculated are on days when all exchanges where an index's constituents are listed are officially closed or if WMR exchange rates services are not published.

A complete holiday schedule for the year is available at www.spglobal.com/spdji/.

Rebalancing

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with proper advance notice where possible.

Unexpected Exchange Closures

For information on Unexpected Exchange Closures, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Recalculation Policy

For information on the recalculation policy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

For information on Calculations and Pricing Disruptions, Expert Judgment and Data Hierarchy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Contact Information

For any questions regarding an index, please contact: index_services@spglobal.com.

Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at www.spglobal.com/spdji/, major quote vendors (see codes below), numerous investment-oriented Web sites, and various print and electronic media.

Tickers

The table below lists headline indices covered by this document. All versions of the below indices that may exist are also covered by this document. Please refer to the [S&P DJI Methodology & Regulatory Status Database](#) for a complete list of indices covered by this document.

Index	Return Type	BBG	RIC
S&P 500 Net Zero 2050 Carbon Budget (2022 Vintage) Index (USD)	Price Return	SP5NCEUP	.SP5NCEUP
	Total Return	SP5NCEUT	.SP5NCEUT
	Net Total Return	SP5NCEUN	.SP5NCEUN

Index Data

Daily constituent and index level data are available via subscription.

For product information, please contact S&P Dow Jones Indices, www.spglobal.com/spdji/en/contact-us.

Website

For further information, please refer to S&P Dow Jones Indices' Web site at www.spglobal.com/spdji/.

Appendix A

The appendix seeks to show how the carbon budgets, initial, and annual decarbonization rates are used at each rebalancing, and how the choice of annual decarbonization rate (when considered at the level of two decimal places) results in the remaining absolute emissions budget (as at the launch date of the indices) so as to not be exhausted at the 2050 rebalancing.

Rebalancing Since Launch 't'	Year 'y'	Remaining Absolute GtCO ₂ Budget, prior to the rebalancing before launch in 2022	Annual AGE _y , (GtCO ₂)	Annual Residual Carbon Allowance	Target AGE _y , (GtCO ₂)	Projected Remaining Absolute GtCO ₂ Budget after the annual rebalancing (GtCO ₂)
	2020	300.00	31.50			
	2021	268.50	33.00			
0	2022	235.50	33.00 ³	-25.00%	24.75	210.75
1	2023			-33.25%	22.03	188.72
2	2024			-40.59%	19.61	169.11
3	2025			-47.13%	17.45	151.66
4	2026			-52.94%	15.53	136.13
5	2027			-58.12%	13.82	122.31
6	2028			-62.73%	12.3	110.01
7	2029			-66.83%	10.95	99.06
8	2030			-70.48%	9.75	89.31
9	2031			-73.72%	8.68	80.63
10	2032			-76.61%	7.73	72.9
11	2033			-79.19%	6.88	66.02
12	2034			-81.48%	6.12	59.9
13	2035			-83.51%	5.45	54.45
14	2036			-85.33%	4.85	49.6
15	2037			-86.94%	4.32	45.28
16	2038			-88.38%	3.84	41.44
17	2039			-89.66%	3.42	38.02
18	2040			-90.00%	3.3	34.72
19	2041			-90.00%	3.3	31.42
20	2042			-90.00%	3.3	28.12
21	2043			-90.00%	3.3	24.82
22	2044			-90.00%	3.3	21.52
23	2045			-90.00%	3.3	18.22
24	2046			-90.00%	3.3	14.92
25	2047			-90.00%	3.3	11.62
26	2048			-90.00%	3.3	8.32
27	2049			-90.00%	3.3	5.02
28	2050			-90.00%	3.3	1.72

³ For the initial AGE reduction in the vintage year, the starting point for the reduction is the prior year's AGE.

Appendix B

Initial Carbon Reduction and Decarbonization Rate Calculations

For each vintage year in the index series, calculate a fixed annual global emissions decarbonization rate using the latest Intergovernmental Panel on Climate Change's (IPCC) estimate for the remaining global planetary greenhouse emissions budget that would limit global warming from pre-industrial levels to 1.5°C. This rate represents the required annual reduction in the observed global planetary emissions from at the start of each index vintage's launch year that would ensure the resultant cumulative global planetary emissions towards 2050 would be at, or below, the global emissions budget at the start of each index vintage's launch year. This global emissions reduction rate is then applied to all indices with the same vintage as the annual decarbonization rate ('Decarbonization Rate').

The carbon budget pathway from the 2022 to 2050 is derived using the following estimates, assumptions, and equations:

$$\text{Estimated Global Carbon Budget (GCB)}^4 \text{ from 2020} = 300 \text{ GtCO}_2$$

$$\text{Estimated Annual Global Emissions}^5 \text{ in year } y = (AGE_y)$$

Year, y	Estimated Annual Global Emissions in Year, y (AGE _y) (Gigatonnes of carbon dioxide emissions, GtCO ₂)
2020	31.50
2021	33.00

Global Carbon Budget Remaining from 2022 (GCB₂₀₂₂)

$$= GCB - \sum_{y=2020}^{\text{index launch year}-1} AGE_y$$

$$(GCB_{2022}) = \sum_{t=0}^{2050-2022} AGE_{2021} * \text{AnnualResidualCarbonAllowance}_t$$

where:

$$\text{AnnualResidualCarbonAllowance}_t = \max(10\%, (1 - \text{Initial Carbon Reduction}) * (1 - \text{Decarbonization Rate})^t)$$

Decarbonization Rate = An annual decarbonization rate (to one decimal place) of AGE that satisfies the equation. The rate is the first rate (to one decimal place) that results in positive remaining emissions budget in 2050.

t = Number of years since the year of index launch.

⁴ IPCC's global carbon budget estimate at the start of 2020 for all emitters to limit global warming from pre-industrial levels to 1.5°C with an 83% probability.

⁵ IEA Global Energy Review 2021 ([here](#)).

Appendix C

Index Carbon Emissions Calculations

The *Total Underlying Index Carbon Emissions*₀ is the total absolute emissions of companies in the underlying index as of the reference date of the first rebalancing, apportioned on an equity ownership basis, only capturing the share of each company's emissions in proportion to the share of each company's total market capitalization in the S&P Global BMI. It is calculated using the GHG emissions dataset provided by Trucost as follows:

$$\begin{aligned} \text{Total Underlying Index Carbon Emission}_{t=0,i} \\ = \sum_i \text{Underlying Index Equity Ownership}_{t=0,i} \times \text{Company Emissions}_{t=0,i} \end{aligned}$$

where:

$$\text{Underlying Index Equity Ownership}_{t=0,i} = \frac{\text{Underlying Index Mkt Cap}_{t=0,i}}{\text{Total Mkt Cap}_{t=0,i}}$$

$$\text{Company Emissions}_{t=0,i} = \text{GHG1}_{t=0,i} + \text{GHG2}_{t=0,i} + \text{GHG3}_{t=0,i}$$

where:

*Underlying Index Mkt Cap*_{t=0,i} = Index market capitalization (after free-float adjustment) for all stocks of company *i* in the underlying index as of the reference date of the rebalancing prior to launch.

*Total Mkt Cap*_{t=0,i} = The total market capitalization (without free float adjustment) for all the stocks of company *i* that are constituents of the S&P Global BMI as of the reference date of the rebalancing prior to launch.

*GHG1*_{t=0,i} = Scope 1 GHG emissions in tCO₂e for the company *i* as of the reference date of the rebalancing prior to launch.

*GHG2*_{t=0,i} = Scope 2 GHG emissions in tCO₂e for the company *i* as of the reference date of the rebalancing prior to launch.

*GHG3*_{t=0,i} = Scope 3 (upstream and downstream) GHG emissions in tCO₂e for the company *i* as of the reference date of the rebalancing prior to launch.

The *Total Index Carbon Emissions*_t is the total absolute emissions of companies in the index as of the *t*th rebalancing reference date, apportioned on an equity ownership basis, only capturing the share of each company's emissions in proportion to the share of each company's total market capitalization in the S&P Global BMI, and is calculated as follows:

$$\text{Total Index Carbon Emission}_t = \sum_i \text{Equity Ownership}_{t,i} \times \text{Company Emissions}_{t,i}$$

where:

$$\text{Equity Ownership}_{t,i} = \frac{\text{Adjusted Index Mkt Cap}_{t,i}}{\text{Total Mkt Cap}_{t,i}}$$

$$\text{Company Emissions}_{t,i} = \text{GHG1}_{t,i} + \text{GHG2}_{t,i} + \text{GHG3}_{t,i}$$

where:

$Adjusted\ Index\ Mkt\ Cap_{t,i}$	=	$Index\ Weight_{t,i} * Adjusted\ Index\ Total\ Mkt\ Cap_t$
$Adjusted\ Index\ Total\ Mkt\ Cap_t$	=	$Underlying\ Index\ Total\ Mkt\ Cap_{t=0} * (1 + Index\ Total\ Return\ since\ Anchor\ Rebalance\ Date)$
$Underlying\ Index\ Total\ Mkt\ Cap_{t=0}$	=	The sum of index market capitalization (after free-float adjustment) for all the stocks in the underlying index as of the rebalancing prior to launch.
$Total\ Mkt\ Cap_{t,i}$	=	The total market capitalization (without free float adjustment) for all the stocks of company i that are constituents of the S&P Global BMI as of the t^{th} rebalancing reference date.
$GHG1_{t,i}$	=	Scope 1 GHG emissions in tCO ₂ e for the company i as of the t^{th} rebalancing reference date
$GHG2_{t,i}$	=	Scope 2 GHG emissions in tCO ₂ e for the company i as of the t^{th} rebalancing reference date
$GHG3_{t,i}$	=	Scope 3 (upstream and downstream) GHG emissions in tCO ₂ e for the company i as of the t^{th} rebalancing reference date.

The *Scope 1 and 2 (Underlying) Index Carbon Emissions* calculate following the same formula for *Total (Underlying) Index Carbon Emissions* but removing $GHG3_{t=0,i}$ from the *Company Emissions* definition.

Appendix D

Methodology Changes

Methodology changes since August 28, 2023, are as follows:

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
Exclusions Based on Business Activities: Data Provider	12/20/2024	Sustainalytics provides the data for exclusions based on business activities.	S&P Global provides the data for exclusions based on business activities.
Quarterly Business Activities Eligibility Review	12/20/2024	--	The indices review constituents for ongoing eligibility under the Business Activities criteria and remove, without replacement, all ineligible companies effective after the close of the third Friday day of March, June, and September using a reference date as of after the close of the last business day of the previous month. The review does not consider or include coverage changes.
Quarterly UNGC Eligibility Review	12/20/2024	--	The indices review constituents for ongoing eligibility under the UNGC exclusion criteria and remove, without replacement, all ineligible companies effective after the close of the third Friday of March, June, September, using a reference date for as of after the close of the last business day of the previous month. The review does not consider or include coverage changes.

Disclaimer

Performance Disclosure/Back-Tested Data

Where applicable, S&P Dow Jones Indices and its index-related affiliates (“S&P DJI”) defines various dates to assist our clients by providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index’s Launch Date are considered back-tested. S&P DJI defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company’s public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed “Date of introduction”) is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index’s public release date.

Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Information presented prior to an index’s launch date is hypothetical back-tested performance, not actual performance, and is based on the index methodology in effect on the launch date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Also, the treatment of corporate actions in back-tested performance may differ from treatment for live indices due to limitations in replicating index management decisions. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate certain ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using “Backward Data Assumption” (or pulling back) of ESG data for the calculation of back-tested historical performance. “Backward Data Assumption” is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as “product involvement”) were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on “Backward Data Assumption” please refer to the FAQ. The methodology and factsheets of any index that employs backward assumption in the back-tested history

will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used. Index returns shown do not represent the results of actual trading of investable assets/securities. S&P DJI maintains the index and calculates the index levels and performance shown or discussed but does not manage any assets.

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