

**S&P Carbon Price  
Risk Adjusted Indices  
*Methodology***

July 2018

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# Introduction

## Index Objective and Highlights

The S&P Carbon Price Risk Adjusted Indices (each an “Index” and together “Indices”) measure the performance of the constituent companies of a respective underlying index, reweighted to account for the potential specific impact of future carbon prices on constituents’ stock prices. The indices are designed to be broad-based, non-market capitalization-weighted indices.

The indices apply a reweighting factor to all constituents of the underlying indices, which addresses the following elements:

- a) The estimated impact to a company’s operating profit if carbon prices increase to the levels believed to be necessary to restrict global warming to a maximum two degree increase by the year 2100
- b) The estimated impact of that loss of operating profit on a firm’s market valuation

Adjusting market valuations to account for the future possible cost of carbon emissions seeks to address potential company-specific financial value at risk attributable to carbon, rather than looking purely at quantity of emissions.

A company’s market valuation in the index is adjusted by a Carbon Price Risk Adjusted Valuation Factor.

The indices were designed in conjunction with Trucost, part of S&P Dow Jones Indices, environmental data specialists.

## Future Carbon Prices

The indices incorporate potential future carbon prices, more specifically the portion of future carbon pricing not covered by any current carbon prices.

Companies emit carbon dioxide and/or other CO<sub>2</sub> equivalents during the course of normal business activities. Currently, there may be a country, region, or sector specific price for such emissions. Carbon prices are normally determined by carbon pricing regulations such as emissions trading schemes or carbon taxes.

In the vast majority of cases, current prices are well below the level that the International Energy Association (‘IEA’) believes are required to restrict global warming to a two degree Celsius increase by the year 2100 as per the 2015 Paris Agreement at the 21st Conference of the Parties of the UNFCCC in December 2015 (‘COP21’). The gap between current and potential future carbon prices is supplied by Trucost’s Corporate Carbon Pricing Tool, and is termed the Carbon Price Risk Premium. There are specific carbon price risk premiums for both Scope 1 and Scope 2 emissions for each sector, geographic location of emissions, and year in the future.

## Available Index Series

Various indices can be constructed using theoretical carbon prices at various years in the future. The following series is available:

- *Carbon Price Risk 2030 Adjusted Series*

**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:

<b>Supporting Document</b>	<b>URL</b>
S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology	<a href="#">Equity Indices Policies &amp; Practices</a>
S&P Dow Jones Indices' Index Mathematics Methodology	<a href="#">Index Mathematics Methodology</a>
S&P Dow Jones Indices' Float Adjustment Methodology	<a href="#">Float Adjustment Methodology</a>
S&P Dow Jones Indices' Global Industry Classification Standard (GICS) Methodology	<a href="#">GICS Methodology</a>

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.

# Eligibility Criteria and Index Construction

## Index Universe

At each annual rebalancing, each index is constructed from the constituents of an underlying index, as defined below:

Index	Underlying Index
S&P 500 Carbon Price Risk 2030 Adjusted Index	S&P 500
S&P MidCap 400 Carbon Price Risk 2030 Adjusted Index	S&P MidCap 400
S&P SmallCap 600 Carbon Price Risk 2030 Adjusted Index	S&P SmallCap 600
S&P Europe 350 Carbon Price Risk 2030 Adjusted Index	S&P Europe 350
S&P Global 1200 Carbon Price Risk 2030 Adjusted Index	S&P Global 1200
S&P South Africa Composite Carbon Price Risk 2030 Adjusted Index	S&P South Africa Composite
S&P Global LargeMidCap Carbon Price Risk 2030 Adjusted Index	S&P Global LargeMidCap
S&P Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	S&P Developed LargeMidCap
S&P Emerging LargeMidCap Carbon Price Risk 2030 Adjusted Index	S&P Emerging LargeMidCap
S&P Europe Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	S&P Europe LargeMidCap
S&P North America LargeMidCap Carbon Price Risk 2030 Adjusted Index	S&P North America LargeMidCap
S&P AsiaPac Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	S&P Asia Pacific LargeMidCap

The eligible universe of constituents is constructed from each underlying index by subjecting each stock to a liquidity screen as of the rebalancing reference date, as follows:

Index	Three-Month Median Daily Value Traded	Buffer for Current Constituents
S&P 500 Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P MidCap400 Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P SmallCap 600 Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P Europe 350 Carbon Price Risk 2030 Adjusted Index	EUR €3 million	EUR €2.4 million
S&P Global 1200 Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P South Africa Composite Carbon Price Risk 2030 Adjusted Index	ZAR \$3 million	ZAR \$2.4 million
S&P Global LargeMidCap Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P Emerging LargeMidCap Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P Europe Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P North America LargeMidCap Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million
S&P AsiaPac Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	USD \$3 million	USD \$2.4 million

## Constituent Selection

All stocks in the eligible universe, as of the rebalancing reference date, are selected and form each index.

## Constituent Weightings

Selected constituents are weighted in proportion to their float-adjusted market capitalization multiplied by their Carbon Price Risk Adjusted Valuation Factor.

$$\text{Carbon Price Risk Adjusted Valuation Factor} = \frac{\text{Adjusted Company Valuation}}{\text{Current Company Market Capitalization}}$$

where:

$$\begin{aligned} \text{Adjusted Company Valuation} &= \text{Max}[0, \text{Current Company Market Capitalization} \\ &\quad - (\text{Estimated Loss in Earnings from Carbon Price Risk} \\ &\quad \times \text{Valuation Multiple})] \end{aligned}$$

And:

$$\begin{aligned} \text{Estimated Loss in Earnings from Carbon Price Risk} &= \text{Cost of Carbon Price Risk} \times \text{Profit Impact Ratio} \end{aligned}$$

The **Cost of Carbon Price Risk** is the hypothetical additional cost of a company's current carbon emissions if carbon prices were to rise to the target levels of a specific future year. This cost is determined by Trucost's Corporate Carbon Pricing Tool using a 'high carbon price' scenario.

The **Profit Impact Ratio** is the portion of a company's Cost of Carbon Price Risk that is assumed to correspond to the resultant loss of its operating profits. The ratio seeks to address the assumed varying price elasticities of demand and variable costs across industry groups.

The **Valuation Multiple** is the relationship observed in market prices between operating profits and market capitalization. Each valuation multiple reflects the average multiple for a company in the same region<sup>1</sup> and GICS industry group of the S&P Global LargeMidCap as of the rebalancing reference date.

If an eligible constituent has an Adjusted Company Valuation of zero, it will be added to the index with a weight of zero.

The calculations for each company's Cost of Carbon Price Risk and corresponding Price Elasticity Impact and Valuation Multiple are detailed in Appendices I, II and III.

## Multiple Classes of Stock

All publicly listed multiple share class lines are eligible for index inclusion, subject to meeting the eligibility criteria. For more information regarding the treatment of multiple share classes, please refer to Approach A within the Multiple Share Classes section of the S&P Dow Jones Indices' Equity Indices Policies & Practices document.

## Index Calculations

The index is calculated 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 Float-Adjusted Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.*

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<sup>1</sup> Companies are grouped into one of four regions: North America, Europe Developed, Asia Pacific Developed and Emerging.

# Index Maintenance

## Rebalancing

The indices are rebalanced annually, effective after the close of the third Friday of December. The rebalancing reference date, and the reference universe for constituent selection, is the third Friday of November.

## Additions and Deletions

**Additions.** Except for spin-offs, no stocks are added to the indices between rebalancings. Spinoffs are added to all indices where the parent security is a constituent at a zero price at the market close of the day before the ex-date (with no divisor adjustment) and are removed after at least one day of regular way trading (with a divisor adjustment).

**Deletions.** If a stock is dropped from an underlying index, it is also removed from the respective Carbon Price Risk 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.

## Corporate Actions

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 one to five business days prior to the implementation date.

*For more information on Corporate Actions, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document.*

## Ongoing Maintenance

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 and Float Adjustment Methodology documents.*

## Currency, Currency Hedged, and Risk Control Indices

The index is calculated in U.S. dollars and the respective local currency for the regional indices.

WM/Reuters foreign exchange rates are taken daily at 04:00 PM London Time and used in the end-of-day calculation of the indices. These mid-market fixings are calculated by The WM Company based on Reuters data and appear on Reuters pages WMRA.

Additional currency, currency hedged, and risk control versions of the indices may be available. For a list of available currency, currency hedged, and risk control indices, please contact Client Services at [index\\_services@spglobal.com](mailto:index_services@spglobal.com).

*For more information on currency, currency hedged, and risk control indices, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.*



## 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 Carbon Price Risk 2030 Adjusted Index	05/31/2018	12/21/2012	12/21/2012	100
S&P MidCap 400 Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P SmallCap 600 Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P Europe 350 Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P Global 1200 Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P South Africa Composite Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P Global LargeMidCap Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P Emerging LargeMidCap Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P Europe Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P North America LargeMidCap Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100
S&P AsiaPac Developed LargeMidCap Carbon Price Risk 2030 Adjusted Index	07/02/2018	12/21/2012	12/21/2012	100

# 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

The S&P Carbon Price Risk Adjusted Indices are managed by S&P Dow Jones Indices' Europe (EMEA) Index Committee. 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 document.*

# 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 via ftp to all clients. Any unusual treatment of a corporate action or short notice of an event may be communicated via email to clients.

## 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 and their corresponding weights and index shares effective for the upcoming rebalancing.

*Please visit [www.spdji.com](http://www.spdji.com) for a complete schedule of rebalancing timelines and pro-forma delivery times.*

## Holiday Schedule

The indices are 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 WM/Reuters' exchange rates services are not published.

A complete holiday schedule for the year is available at [www.spdji.com](http://www.spdji.com).

## 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 document.

## Recalculation Policy

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

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

## Contact Information

For any questions regarding an index, please contact: [index\\_services@spglobal.com](mailto:index_services@spglobal.com).

# Index Dissemination

## **FTP**

Daily constituent and index level data are available via FTP subscription.

*For product information, please contact S&P Dow Jones Indices, [www.spdji.com/contact-us](http://www.spdji.com/contact-us).*

## **Website**

*For further information, please refer to S&P Dow Jones Indices' Web site at [www.spdji.com](http://www.spdji.com).*

# Appendix I

## Cost of Carbon Price Risk

The Cost of Carbon Price Risk is the hypothetical additional cost of a company's current carbon emissions if carbon prices were to rise to the target levels of a specific future year. This cost is determined by Trucost's Corporate Carbon Pricing Tool using a 'high carbon price' scenario.

As of the rebalancing reference date, Trucost provides the following data items for each company:

- i. Carbon Scope 1 emissions (tonnes CO<sub>2</sub> equivalents)
- ii. Carbon Scope 2 emissions (tonnes CO<sub>2</sub> equivalents)

If emissions data is not available from Trucost for a specific company in an index, then S&P DJI estimate Scope 1 and Scope 2 emissions by utilizing the available carbon intensities of companies from the same GICS industry group, region, and size classification.

Trucost also provides the corresponding carbon price risk premiums, defined as the gap between current and potential future carbon prices.

There are specific carbon price risk premiums that relate to a future year's target level and are dependent on:

- whether the emissions are identified as either Scope 1 or 2
- in which country the carbon (CO<sub>2</sub> equivalents) is determined to be emitted
- in which of the Trucost Corporate Carbon Pricing Tool sectors the company is identified

The cost of carbon price is calculated for each company as follows:

$$\text{Cost of Carbon Price Risk} = \sum_{e=1}^{e=2} \left( \sum_{c=1}^{c=n} \text{Carbon Emissions}_{e,c} \times \text{Carbon Price Risk Premium}_{e,c,s,y} \right)$$

where:

$e$  = scope of carbon emissions, either scope 1 or 2

$c$  = country of carbon emissions

$n$  = total number of countries

$s$  = Trucost's Corporate Carbon Pricing Tool sector of company

$y$  = year of future carbon prices

$\text{Carbon Emissions}_{e,c}$  = CO<sub>2</sub> equivalents (tonnes) for the corresponding scope and country

$\text{Carbon Price Risk Premium}_{e,c,s,y}$  = gap between current and potential future carbon prices for the corresponding scope, country, sector and future year (\$ per tonne of CO<sub>2</sub> equivalents)

Each company's geographical distribution of emissions for both Scope 1 and Scope 2 are determined as follows:

- a) If available, the company's most recent CDP (formerly the Carbon Disclosure project) data from the last three years is used to determine the proportion of both Carbon Scope 1 and 2 emissions across countries.
- b) In the event of no CDP data availability for either Scope 1 or 2 for any company, then Factset's geographical revenue data (GeoRev) is used to approximate emissions distributions across countries.
- c) In the event of no Factset GeoRev data for a given company, then the Scope 1 or Scope 2 emissions are assumed to originate from the company's country of domicile.

# Appendix II

## Profit Impact Ratio

The Profit Impact Ratio is the portion of a company's Cost of Carbon Price Risk that is assumed to correspond to the resultant loss of its operating profits. The ratio seeks to address the assumed varying price elasticities of demand and variable costs across industry groups, and is used as follows:

$$\text{Estimated Loss in Earnings from Carbon Price Risk} = \text{Cost of Carbon Price Risk} \times \text{Profit Impact Ratio}$$

Companies are identified as belonging to one of four broad groups according to GICS Industry Group classification, and are assigned a corresponding Profit Impact ratio as defined below:

Elasticity of Demand	GICS Industry Groups	Profit Impact Ratio
Highly Inelastic	Software & Services	20%
	Diversified Financials	
	Health Care Equipment & Services	
	Food & Staples Retailing	
	Pharmaceuticals, Biotechnology & Life Sciences	
	Food Beverage & Tobacco	
	Household & Personal Products	
	Utilities	
	Insurance	
	Telecommunication Services	
	Banks	
Inelastic	Energy	45%
	Capital Goods	
	Retailing	
Elastic	Commercial & Professional Services	70%
	Transportation	
	Media	
	Real Estate	
	Consumer Durables & Apparel	
Highly Elastic	Technology Hardware & Equipment	95%
	Materials	
	Consumer Services	
	Automobiles & Components	
	Semiconductors & Semiconductor	



# Appendix III

## Valuation Multiple

To link each company's potential loss in earnings to the impact on its market valuation, a Valuation Multiple is used as follows:

$$\begin{aligned} & \textit{Adjusted Company Valuation} \\ &= \textit{Max}[0, \textit{Current Company Market Capitalization} \\ & - (\textit{Estimated Loss in Earnings from Carbon Price Risk} \\ & \times \textit{Valuation Multiple})] \end{aligned}$$

Using market prices, the relationship between operating profits and market valuation can be observed. The valuation multiple assigned to each company is not company-specific but reflects the average multiple for a company in the same region<sup>2</sup> and GICS industry group of the S&P Global LargeMidCap (as of rebalancing reference date).

For example, a valuation multiple of 10 for a particular group implies that if each company were to experience a \$1 loss in earnings then it is assumed it may typically result in a \$10 lower market capitalization for each.

To determine each regional-industry group's valuation multiple, the respective group's total market capitalization is divided by the group's average operating profit over the past 5 years (EBIT is used for non-financials and Pre-Tax Income for financials).

In the event the calculated valuation multiple is negative or greater than 30, then the grouping is relaxed from regional-industry group to regional-sector. If the valuation multiple is still negative or greater than 30, then the valuation multiple is assumed to be 30.

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<sup>2</sup> Companies are grouped into one of four regions: North America, Europe Developed, Asia Pacific Developed, and Emerging.

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