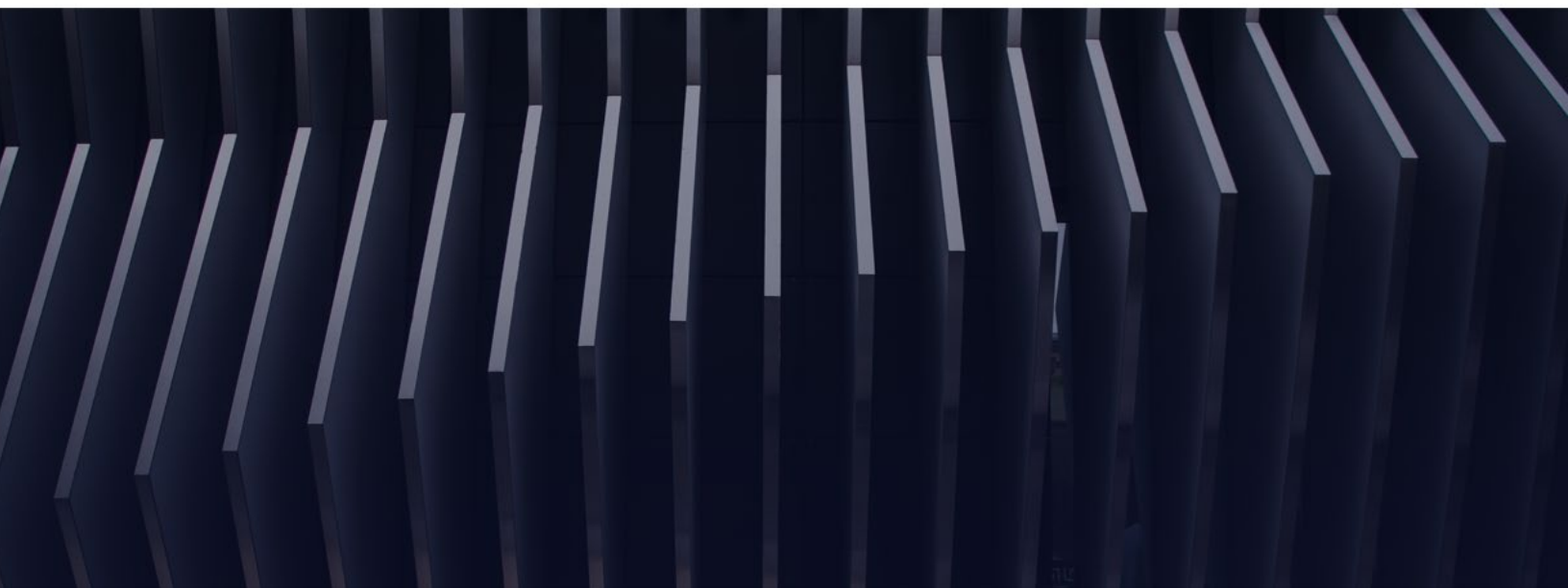


Wilshire Indexes

Climate Change Index Series Methodology

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1 Introduction

The indexes in the Climate Change Index Series are designed to meet the requirements of EU Paris-Aligned Benchmarks as set out in [Regulation \(EU\) 2020/1818 of the European Parliament and of the Council of 17 July 2020](#). The indexes that are currently available are listed in Section 3 below. All of the indexes in the Climate Change Index Series follow the methodology in this document, however their administrators differ. The administrators of the indexes currently available are:

FT Wilshire US Large Cap Climate Change 1.5°C Target Index: Wilshire Indexes¹

Hang Seng Climate Change 1.5°C Target Index: Hang Seng Indexes Company Limited

Nikkei 225 Climate Change 1.5°C Target Index: Nikkei Inc

Both the Hang Seng Climate Change 1.5°C Target Index and the Nikkei 225 Climate Change 1.5°C Target Index are made available in the UK in accordance with the EU third country transitional provisions that allow for third country administrators to provide benchmarks for use by UK Supervised Entities until 31 December 2025.

The requirements to meet the EU Paris-Aligned Benchmark designation are achieved through the targeting of specific emission intensity improvements in absolute terms and relative to their underlying benchmarks coupled with the sectoral allocation and company exclusion constraints set out in [Commission Delegated Regulation \(EU\) 2020/1818](#). The emission intensity improvements are achieved via a tilting methodology where an initial set of index weights is multiplied by positive scores to yield a new set of index weights with the required improvements. The details of the index construction are provided below.

2 Index Construction

2.1 Data Definitions

The data definitions are aligned with those found in [Commission Delegated Regulation \(EU\) 2020/1818](#).

2.1.1 GHG Emission Intensity.

A company's GHG Emission Intensity E_i is defined as the ratio of the sum of Scope 1, Scope 2 and phased-in Scope 3 GHG emissions, in metric tons of CO₂e, to enterprise value including cash (EVIC), in millions of USD. Details of reported carbon data and the modelling of un-reported carbon data are given in the document [Wilshire Indexes Carbon Emissions Model](#).²

2.1.2 Industry Factor

The industry factor is defined by the variable:

$$\delta_{i \in I_j} = \begin{cases} 1 & \text{if } i \in I_j \\ 0 & \text{if } i \notin I_j \end{cases} \quad (1)$$

In other words, this variable takes the value of one if the stock i is a member of industry I_j and zero otherwise. The industry classification used for each index is set out in Table 1 of Section 3.

¹ Wilshire Indexes is the trading name of Wilshire OpCo UK Limited, an FCA registered benchmark administrator.

² For universe constituents with neither reported nor modelled carbon emission data, their GHG emission intensity will comprise of: the second level classification average if there are at least three stocks with valid data in the same second level classification; otherwise, the first level classification average if there are at least three stocks with valid data in the same first level classification; otherwise, the universe average. For this purpose, the Scope 1 & 2 GHG emission intensity is treated separately from the Scope 3 GHG emission intensity.

2.1.3 High Climate Impact Sector Factor

The high climate impact sector factor is defined by the variable:

$$\delta_{i \in H} = \begin{cases} 1 & \text{if } i \in H \\ 0 & \text{if } i \notin H \end{cases} \quad (2)$$

In other words, this variable takes the value of one if the stock i is a member the high climate impact set of stocks H and zero otherwise. The high climate impact set is the union of stocks in the high climate impact sectors given in Appendix A.

2.2 Calculation of Z-Scores and S-Scores

Emission intensities are converted to Z-Scores by subtracting their cross-sectional mean μ from each raw value and then dividing by the cross-sectional standard deviation σ :

$$Z_{E,i} = \frac{E_i - \mu}{\sigma} \quad (3)$$

A winsorization process is then applied to ensure that all the results lie in the range -3 to +3. Emission Z-Scores, industry factors and high climate impact sector factors are then mapped to positive “S-Scores” according to:

$$S_{E,i} = \text{Exp}[Z_{E,i}], \quad S_{J,i} = \text{Exp}[\delta_{i \in I_J}] \quad \text{and} \quad S_{H,i} = \text{Exp}[\delta_{i \in H}] \quad (4)$$

respectively. Stocks are therefore assigned a set of positive numbers that increase monotonically with their Z-Scores, industry factors and high climate impact sector factors.

2.3 Multiple Tilt Equation

The climate index weights are given by the multiple tilt equation:

$$W_i = \frac{1}{\Omega} \times S_{E,i}^n \times S_{I_1,i}^t \times \dots \times S_{I_J,i}^u \times S_{H,i}^r \times \widehat{M}_i \quad (5)$$

where $S_{E,i}^n$ is the Emission Intensity tilt of strength n , $S_{I_1,i}^t$ is the J^{th} industry tilt of strength t , $S_{H,i}^r$ is the high climate impact sector tilt of strength r , \widehat{M}_i is the set of weights obtained by removing stocks specified in the exclusion lists of Appendix B from the set of underlying benchmark weights M_i and:

$$\Omega = \sum_{i=1}^N S_{E,i}^n \times S_{I_1,i}^t \times \dots \times S_{I_J,i}^u \times S_{H,i}^r \times \widehat{M}_i \quad (6)$$

Tilt strengths can take positive or negative values. Varying the tilt strengths in equation (5) gives rise to different levels of emission intensity reductions, industry and sector exposures. Other tilts that control maximum weight, capacity and turnover may also be applied.

2.4 Emission Intensity, Industry and Sector Targets

At each semi-annual index reconstitution, a range for Weighted Average Emission Intensity is specified by:

$$0 \leq \sum_{i=1}^N W_i \times E_i \leq \text{Min} \left[(1 - P) * \sum_{i=1}^N M_i \times E_i, \frac{E_B}{I_B} * (1 - Q)^{n/2} \right] \quad (7)$$

where E_B is the index Weighted Average Emission Intensity at a given decarbonization base date, n counts the number of semi-annual index reconstitutions since that decarbonization base date, P represents the point in time reduction relative to the benchmark, Q the required year-on-year reduction from that decarbonization base date, and I_B is an inflation adjustment calculated as the maximum of the ratio of average value of EVIC at the review to that at the decarbonization base date and one³. The floor of one prevents the year-on-year carbon emissions target increasing between base dates. See Table 1 in Section 3 for the P and Q values and Table 2 of Appendix C for the decarbonization base dates, for the Climate Change Indexes.

The active weight of stocks in the high carbon impact sectors is set to zero:

$$\sum_{i=1}^N (W_i - M_i) \times \delta_{i \in H} = 0 \quad (8)$$

Ranges are specified for active industry weights according to:

$$L_{I_j} \leq \sum_{i=1}^N (W_i - M_i) \times \delta_{i \in I_j} \leq U_{I_j} \quad (9)$$

where L_{I_j} and U_{I_j} represent the lower and upper allowable limits for the active weight of industry U_{I_j} .

2.5 Index Weights

Tilt strengths in equation (5) are found that satisfy equations (7), (8) and (9) along with constraints on maximum weight, minimum weight and capacity ratio (Climate Change Index weight / underlying benchmark weight)⁴.

Should the solution be infeasible, a hierarchical approach to constraint relaxation is applied:

- (1) Increase upper industry bound by 10bps and decrease lower industry bound by 10bps. Repeat until a solution is found or up to a maximum of 50 times.
- (2) Increase maximum stock weight by 10bps, reset initial industry bounds and re-apply relaxation scheme (1). Repeat until a solution is found or up to a maximum 50 times.
- (3) Seek a solution where neither industry nor maximum stock weight constraints are applied.

Should the relaxation process fail to yield a feasible solution, the index weights will consist of the pre-reconstitution index weights, renormalized to account for exclusion of stocks that are not members of the underlying benchmark on the effective date.

³ The floor of one will be applied in September 2024 for the Hang Seng Climate Change 1.5°C Target Index.

⁴ In exceptional circumstances an additional constraint on the 2-way turnover may be applied.

3 Available Indexes

Table 1 sets out the various Climate Change Indexes in the Climate Change Index Series, the stock universes, the emission intensity targets, the weighting constraints, and exclusion lists.

Table 1: Emission Intensity Targets and Index Parameters for Climate Change Indexes

Index Name	Emission Intensity (P%, Q%)	Industry Classification	Active Indust. Const. (%)	High Climate Impact (%)	Max. Weight (%)	Min. Weight (bps)	Max. Cap. Ratio	Excl. List	Recon-stitution
FT Wilshire US Large Cap Climate Change 1.5°C Target	(50, 7)	GATS	+/-5	0	5	5	10	PAB	MS
Hang Seng Climate Change 1.5°C Target	(50, 7)	HSICS	+/-5	0	10	5	10	PAB	MS
Nikkei 225 Climate Change 1.5°C Target	(50, 7)	Nikkei	+/-5	0	10	0	10	PAB	AO

*M=March, A=April, S=September and O=October

For details of GATS, HSICS and Nikkei industry classifications see the [“Wilshire Indexes Global Assets Taxonomy System”](#), [“Hang Seng Industry Classification System”](#) and [“Nikkei Stock Average Index Guidebook”](#) respectively.

4 Index Maintenance

4.1 Index Reconstitution

The FT Wilshire US Large Cap Climate Change 1.5°C Target Index is reconstituted semi-annually in March and September. The price data cutoff date is Wednesday before the first Friday of the review month. Constituent and free-float changes are updated after the close of trading on the third Friday of the reconstitution month.

The Hang Seng Climate Change 1.5°C Target Index is reconstituted semi-annually and becomes effective in March and September. The price data cutoff date and effective date will be the reconstitution announcement date and the effective date of the underlying Hang Seng Large-Mid Cap (Investable) Index as set out in “Index Operation Guide for Managing the Hang Seng Family of Indices”.⁵

The Nikkei 225 Climate Change 1.5°C Target Index will be reconstituted semi-annually in April and October. The price data cutoff date as of the close of second business day of the reconstitution month. Constituent and weight changes are updated at the open of trading on the last business day of the reconstitution month.

Emission data and exclusion lists will be updated at the end of January for March and April reconstitutions, and the end of July for September and October reconstitution.

4.2 Intra-Reconstitution Additions

Additions to the underlying FT Wilshire US Large Cap, Hang Seng and Nikkei 225 Index will be eligible for inclusion in the FT Wilshire US Large Cap Climate Change 1.5°C Target Index, Hang Seng Climate Change 1.5°C Target Index and Nikkei 225 Climate Change 1.5°C Target Index at the next index reconstitution.

4.3 Intra-Reconstitution Deletions

A constituent will be removed from a FT Wilshire US Large Cap Climate Change 1.5°C Target Index, Hang Seng Climate Change 1.5°C Target Index or Nikkei 225 Climate Change 1.5°C Target Index if it is removed from the corresponding underlying benchmark. The deletion will be concurrent with that from the underlying benchmark and its weight will be distributed pro-rata amongst the remaining constituents in the FT Wilshire US Large Cap Climate Change 1.5°C Target Index, Hang Seng Climate Change 1.5°C Target Index or Nikkei 225 Climate Change 1.5°C Target Index.

⁵ In the situation where the pro-forma weight of any constituent is increased and becomes higher than the level of weight cap * 1.3 on the Tuesday of the week before the effective date, the Hang Seng Climate Change 1.5°C Target Index will be recapped.

5 Corporate Events

5.1 Corporate Action Treatment

Corporate action treatment for the FT Wilshire US large Cap Climate Change 1.5°C Target Index can be found in the [Wilshire Indexes Equity Index Calculation and Corporate Action Guide](#). The index will be treated as a non-market capitalization index.

Corporate action treatment for the Hang Seng Climate Change 1.5°C Target Index can be found in the [“Index Operation Guide for Managing the Hang Seng Family of Indices”](#).

Corporate action treatment for the Nikkei 225 Climate Change 1.5°C Target Index will follow the rules for the Nikkei 225.

5.2 Suspension of Dealing

Suspension of Dealing rules for the FT Wilshire US Large Cap Climate Change 1.5°C Target Indexes can be found in the [Wilshire Indexes Equity Index Calculation and Corporate Action Guide](#).

Suspension of Dealing rules for the Hang Seng Climate Change 1.5°C Target Index can be found in the [“Index Operation Guide for Managing the Hang Seng Family of Indices”](#).

Suspension of Dealing rules for the Nikkei 225 Climate Change 1.5°C Target Indexes are in accordance with those for the Nikkei 225.

5.3 Takeovers, Mergers and Spinoffs

The treatment of takeovers, mergers and spinoffs for the FT Wilshire US Large Cap Climate Change 1.5°C Target Index can be found in the [Wilshire Indexes Equity Index Calculation and Corporate Action Guide](#).

The treatment of takeovers, mergers and spinoffs for the Hang Seng Climate Change 1.5°C Target Index can be found in the [“Index Operation Guide for Managing the Hang Seng Family of Indices”](#).

The treatment of takeovers, mergers and spinoffs for Nikkei 225 Climate Change 1.5°C Target Index are in accordance with those for the Nikkei 225.

Approval

This Methodology was approved by the Wilshire OpCo UK Limited Index Management Committee.

Appendix A: High Climate Impact Sectors

A.1 PAB High Climate Impact Sectors

The NACE definition of high climate impact sectors is as follows:

- Agriculture, forestry and fishing
- Mining and quarrying
- Manufacturing
- Electricity, gas, steam and air conditioning supply
- Water supply; sewerage, waste management and remediation activities
- Construction
- Wholesale and retail trade; repair of motor vehicles and motorcycles
- Transportation and storage
- Real estate activities

Each of these sectors is mapped to the equivalent sector in the GATS, HSICS and Nikkei classifications to define the high climate impact sectors for the FT Wilshire US Large Cap Climate Change 1.5°C Target Index, Hang Seng Climate Change 1.5°C Target Index and Nikkei 225 Climate Change 1.5°C Target Index respectively.

Appendix B: Exclusions

B.1 PAB Index Exclusions

Companies involved in the following activities are excluded from the PAB Indexes:

- Controversial weapons.
- Cultivation and production of tobacco.
- UN Global Compact violations.
- OECD Guidelines for Multinational Enterprises violations.
- Exploration, mining, extraction, distribution or refining of hard coal and lignite (1% or more of revenues).
- Exploration, extraction, distribution or refining of oil fuels (10% or more of revenues).
- Exploration, extraction, manufacturing or distribution of gaseous fuels (50% or more of revenues).
- Electricity generation with a GHG intensity of more than 100 g CO₂ e/kWh (50% or more of revenues).
- Significant harm to the environment.

For more details of the exclusion criteria please see [Wilshire Indexes Paris-Aligned Benchmark Exclusion Criteria](#).⁶

⁶ UNGC/OECD exclusions are applied by Hang Seng to the underlying Hang Seng Large-Mid Cap (Investable) Index for the Hang Seng Climate Change 1.5°C Target Index.

Appendix C: Decarbonization Base Dates & Phased Scope 3 GHG Emissions

Table 2 displays the decarbonization base dates for year-on-year reduction of Scope 1 + Scope 2 GHG Emissions for phased Scope 3 GHG Emissions for the Climate Change indexes. At the reviews corresponding to decarbonization base dates in Table 2, the review count in equation (7) is reset to zero.

Table 2: Base dates and phased in Scope 3 emissions

Index Name	Scope 1+ 2	Scope 3: Phase 1	Scope 3: Phase 2	Scope 3: Phase 3
FT Wilshire US Large Cap Climate Change 1.5°C Target	Sep 2015	Sep 2020	Sep 2022	Sep 2024
Hang Seng Climate Change 1.5°C Target	Sep 2015	Sep 2020	Sep 2022	Sep 2024
Nikkei 225 Climate Change 1.5°C Target	Oct 2015	Oct 2020	Oct 2022	Oct 2024

Scope 3 GHG Emission phases:

- Phase 1 - GHG Emissions data for energy and mining sectors
- Phase 2 - GHG Emissions data for transportation, construction, buildings, materials and industrial sectors
- Phase 3 - GHG Emissions data for all other sectors.

In collaboration with



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