

IHS Markit Global Carbon *Index Guide*

December 2022

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Introduction

The IHS Markit Global Carbon Index is designed to measure the performance of the global carbon credit market. Carbon credit futures are utilized to access carbon credit markets due to their liquidity and accessibility to investors. The eligible carbon credit futures for the index are selected based on the most liquid segments of the relevant markets. The index is weighted according to the trade volumes of eligible constituent programs subject to a capping methodology. Capping is applied on a regional basis with regions being defined as EMEA, the Americas, and APAC, as well as on a program-level basis within each region to ensure diversification.

The IHS Markit Global Carbon Index is rebalanced once a year on the last Index Calculation Day of November (the "rebalancing date"), is reweighted once a year on the last Index Calculation Day of May (the "reweighting date") and currently consists of European Union Allowance (EUA), UK Allowance (UKA), California Carbon Allowance (CCA), and Regional Greenhouse Gas Initiative (RGGI) carbon credit futures.

The carbon credit futures in the IHS Markit Global Carbon Index must meet all the criteria described below as of the close of business three business days prior to the rebalancing date provided that the relevant carbon credit futures data can be verified, at Markit Indices Limited's sole discretion, as of such date ("constituent selection cut-off date"). The new index composition becomes effective on the first Index Calculation Day of December.

The IHS Markit Global Carbon Index uses ICE Futures Pricing for all constituents. Prior to 22 December 2022, the IHS Markit Global Carbon Index used Oil Price Information Service (OPIS) pricing for CCA and RGGI contracts. This document covers the index selection rules and calculation methodology.

Publication of the Index

The index is calculated daily following the index calculation calendar below. The index is reweighted on the last Index Calculation Day of May and rebalanced on the last Index Calculation Day of November each year. The index is calculated on the basis of end-of-day futures exchange prices for the respective carbon credit futures on each trading day defined in the index calculation calendar. Index data and carbon credit futures price information is also available from the main information vendors. The index calculation calendar conforms to the New York Stock Exchange (NYSE) trading calendar:

- Index Calculation Day: The Index calculates on each NYSE Trading Day.

Carbon Credit Selection Rules

The following selection criteria are used to determine the index constituents:

- Accessibility of Futures Markets
- Liquidity and Contract Selection
- Maturity of the Program

Accessibility of Futures Markets

The IHS Markit Global Carbon Index includes only carbon credit futures that can be easily accessed by institutional investors for trading purposes. Markets restricting trading within carbon credit futures are not eligible. Specifically, the following markets have been deemed eligible:

- European Union Allowance (EUA)
- UK Allowance (UKA)
- California Carbon Allowance (CCA)
- Regional Greenhouse Gas Initiative (RGGI)

IHS Markit may consult with the IHS Markit Global Carbon Index Advisory Committee to review potential carbon credit futures for inclusion or existing carbon credit futures for exclusion dependent on the developments in the respective markets. Any decision as to the eligibility or ineligibility of a carbon credit futures contract will be published and the index rules will be updated accordingly.

Liquidity and Contract Selection

The IHS Markit Global Carbon Index includes only carbon credit futures that are liquid to ensure that the index can be replicated. Programs whose carbon credit futures have limited trading volume are not eligible in the index. Specifically, the following rules are applied regarding liquidity and selection for the carbon credit futures. Expiry refers to the year that a given futures contract matures, while Vintage, where applicable, refers to the year that the allowance may be used for compliance. Note that “Current” and “Next” expiries are from the perspective of the index basket at a given date. Hence, immediately after rebalancing in November, “Current” references the next calendar year, and the “Next” references the year after that. For example, in December 2022, “Current” references 2023 while “Next” refers to 2024.

- Current or Next Year December Expiry
- Current or Next Year Vintage Matching the Current or Next Future’s Year of Expiry, respectively
- Minimum of \$10 Million for Average Monthly Program Trade Volume (Prior Six-Month Period as described in section **Index Weights**)

Please refer to Appendix C for further historical information.

IHS Markit may consult the IHS Markit Global Carbon Index Advisory Committee to review potential carbon credit futures for inclusion or existing carbon credit futures for exclusion dependent on changes in overall liquidity within carbon credit markets. Any decision as to the eligibility or ineligibility of a carbon credit futures contract will be published and the index rules will be updated accordingly.

Maturity of the Program

The IHS Markit Global Carbon Index includes only carbon credit futures that belong to cap-and-trade programs with recognizable stability regarding the sustainability and future existence of the program. Carbon credit futures that are part of unstable or extremely uncertain cap-and-trade programs are not eligible for the index.

IHS Markit may consult with the IHS Markit Global Carbon Index Advisory Committee to review potential carbon credit futures for inclusion or existing carbon credit futures for exclusion dependent on the viewed stability of respective carbon credit markets by the industry. Any decision as to the eligibility or ineligibility of a carbon credit futures contract will be published and the index rules will be updated accordingly.

Index Calculation

Pricing Data

Carbon credit futures pricing is sourced from ICE Futures Pricing for European Union Allowance (EUA) and UK Allowance (UKA) futures as well as California Carbon Allowance (CCA) and Regional Greenhouse Gas Initiative (RGGI) physically settled futures contracts from 22 December 2022.

More details on the ICE Futures Pricing information used for EUA futures contracts can be found [here](#).

More details on the ICE Futures Pricing information used for UKA futures contracts can be found [here](#).

More details on the ICE Futures Pricing information used for CCA and RGGI physically settled futures contracts can be found [here](#).

More details on the Oil Price Information Service (OPIS) used for CCA and RGGI physically settled futures contracts prior to 22 December 2022 can be found [here](#).

Rebalancing and Reweighting

Rebalancing Process. The IHS Markit Global Carbon Index is rebalanced annually on the last Index Calculation Day of November after the close of business. Three business days before the last Index Calculation Day of November (“constituent selection cut-off date”), the constituents of the index are determined, and an updated membership list with constituent weights is published. On the last Index Calculation Day of each November, IHS Markit publishes the final membership with closing prices for the carbon credit futures and various analytics based on the securities.

Reweighting Process. In addition to the November rebalancing, the IHS Markit Global Carbon Index is reweighted on the last Index Calculation Day of May after the close of business. The constituent weights are re-set to match the November rebalancing weights and new contract units are calculated based on latest contract prices.

Index Data

An index level is calculated if there is at least one security available that matches all inclusion criteria. If no more securities qualify for the index, then its level will remain constant. If at least one security becomes available again, the index calculation will be resumed from the last calculated level.

Calculation occurs on a daily basis as soon as the consolidated quotes are available. Price quotes are provided, and the indices are calculated on every Index Calculation Day. Index calculation is based on market prices. In the event that no new quotes for a particular security are received, the index will continue to be calculated based on the last available prices. This might be the case in periods of market stress or disruption, as well as in illiquid or fragmented markets.

Note that the index converts all constituent pricing into United States dollars daily using the respective mid-rates for given currencies.

Index Weights

Once the composition of the IHS Markit Global Carbon Index has been determined, the rebalancing weight for each security is calculated. The weights and capping factors for the subsequent year are determined three Index Calculations days before the end of November using the average monthly USD

trade volume for each constituent program for the six-month lookback period prior to rebalancing. The end date of the lookback period is three Index Calculation days before the end of November and the start date starts six calendar months before the end date. For instance, in 2021, the lookback period ran from 25 May 2021 to 24 November 2021 included. The exposure to a given region or program is limited to the following capping rules at each annual rebalancing:

- Maximum Weight of 65% in Any Given Geographical Region (EMEA, Americas, APAC)
- Minimum Weight of 5% in Any Given Carbon Credit Program
- Weight of 5% for the Next Year Expiry Futures Contract for Any Given Carbon Credit Program Where the Rebalancing Weight is 20% or Greater

Index Calculus

Rebalancing Weight. On the rebalancing day of November each year, the rebalancing weight for each futures contract is calculated as the constituent program's average monthly trade volume during the lookback period divided by the aggregate average monthly trade volume during the lookback period of all index constituent programs. Daily trading volume is computed by multiplying the number of futures contracts traded by their respective daily end-of-day ICE price assessments, and any volumes that are not in USD are converted using the respective mid-rate exchange rate at 4:00 PM London time. After these weights are calculated, the index capping rules mentioned previously are applied if needed:

$$W_{i,Rebal} = \frac{LookbackVolume_{i,Rebal}}{\sum_{i=1}^n LookbackVolume_{i,Rebal}}$$

Number of Units. On the rebalancing day in November and reweighting day in May, the number of units is determined by taking the product of the total return level prior to rebalancing/reweighting and the calculated rebalancing weight for each given constituent of the index, and then dividing this figure by the respective constituent's price. Note that the number of units remains static in the index basket until the subsequent rebalancing/reweighting event, which is when said contract allocations change to match the new rebalancing composition and weights:

$$NumberOfUnits_{i,t} = \frac{TotalReturnLevel_{Rebal} * W_{i,Rebal}}{ContractPrice_{i,Rebal}}$$

Total Return Calculation. There are two considerations in the total return index level calculation: the changes in the market prices of the underlying contracts, and the yield earned on the cash collateral held for the futures. These are captured and discussed below. Note that the total return level for a given day is simply the previous calculation day's total return level times one plus the current day's total return:

$$TotalReturn_t = PriceReturn_t + CollateralYield_t$$

$$TotalReturnLevel_t = TotalReturnLevel_{t-1} * (1 + TotalReturn_t)$$

Price Return Calculation. The price return is determined as the daily change in the underlying futures prices. Each Calculation Day, the price level is calculated by multiplying the daily contract pricing for each constituent by the number of units assumed to be held in the index basket. Furthermore, an adjustment is made to rescale this price level in the price return calculation after the underlying index basket has changed immediately after the rebalancing event. Note that the price return level for a given day is simply the previous calculation day's price return level times one plus the current day's price return:

$$PriceLevel_t = \sum_{i=1}^n ContractPrice_{i,t} * NumberOfUnits_{i,t}$$

$$PriceReturn_t = \frac{PriceLevel_t}{PriceLevel_{t-1}} - 1$$

$$PriceReturnLevel_t = PriceReturnLevel_{t-1} * (1 + PriceReturn_t)$$

Collateral Yield Calculation. The yield earned on the cash collateral is determined daily as the product of the prior business day's weighted composite of overnight rates based on the currency exposure in the index and the ACT/360 day-count difference between the calculation days. Note that the Federal Funds Overnight Rate is used for USD currency exposure, the Euro Short Term Rate (ESTR) is used for EUR currency exposure and the Sterling Overnight Index Average (SONIA) is used for GBP exposure. Furthermore, note that the weighted composite of overnight rates is determined by summing up the products of a currency's selected overnight rate times the total market weight of all constituents sharing that given currency across all index currencies held:

$$CollateralYield_t = \frac{DayCount_{t-1,t}}{360} * CompositeRate_{t-1}$$

$$CompositeRate_t = \sum_{i=1}^n OvernightRate_{i,t} * \frac{ContractPrice_{i,t} * NumberOfUnits_{i,t}}{\sum_j^n ContractPrice_{j,t} * NumberOfUnits_{j,t}}$$

In the specific case where the Federal Funds Overnight Rate is not a valid business day (according to the U.S. rate calendar) and the last available rate is used from a prior date instead, the Euro Short Term Rate and Sterling Overnight Index Average will also be retrieved from that same Federal Funds Overnight Rate prior retrieval date.

Weighted Carbon Price Calculation. The weighted carbon price is determined daily as the product of each constituent's share weight in the index and the closing value of the constituent's contract price for a given day:

$$WeightedCarbonPrice_t = \sum_{i=1}^n ContractPrice_{i,t} * \frac{NumberOfUnits_{i,t}}{\sum_{j=1}^n NumberOfUnits_{j,t}}$$

Rolling Futures. On the last Index Calculation Day of May and November, after the daily returns are calculated against the existing index basket's components and weights, the index reweighting/rebalancing occurs and is reflected on the next business day. During the November index rebalancing, the existing index basket's futures are rolled such that all maturities and vintages are extended by a year with the number of units for the new index basket calculated as described above. Daily returns computed on the first business day of June and December are calculated against the components and weights featured in the new index basket after rebalancing.

Index Maintenance

Index History

The IHS Markit Global Carbon Index launched on July 25, 2019.

The index history starts on July 31, 2014. The index has a base value of 100 on that date.

Settlement Conventions

The IHS Markit Global Carbon Index is calculated using the assumption of $T+0$ settlement days.

Foreign Exchange Rates

Foreign exchange spot rates are sourced from WM/Refinitiv. The index calculation uses the foreign exchange mid rates at 4:00 PM London time. If the rebalancing day is a non-business day, the 4:00 PM London time foreign exchange rates from the previous business day are used.

Calendar

The IHS Markit Global Carbon Index is calculated on all NYSE trading days.

Index Dissemination

Data Publication and Access

The table below summarizes the publication of the IHS Markit Global Carbon Index in the *Indices* section of the IHS Markit website <https://ihsmarkit.com/products/indices.html> for registered users and on the FTP server.

Frequency	File Type	Access
Daily	Underlying File: Security Level	FTP Server
	Indices File: Index Level	FTP Server / IHS Markit website / Bloomberg (Index Levels Only)
Annually	End of Year Components	FTP Server / IHS Markit Website

Tickers

Below are the access codes for the different vendors and IDs of the Index:

Index	Bloomberg	RIC
Total Return Index	GLCARB	.GLCARB

Governance and Regulatory Compliance

IHS Markit Benchmark Administration Limited (IMBA UK) is the Administrator of the IHS Markit Global Carbon Indices. Information on IMBA UK's governance and compliance approach can be found [here](#). This document covers the following topics:

- Governance arrangements, including external committees
- Input data integrity
- Conflicts of interest management
- Market disruption and Force Majeure
- Methodology changes and cessations
- Complaints
- Errors and restatements
- Reporting of infringements and misconduct
- Methodology reviews
- Business continuity

More details about IMBA UK can be found on the Administrator's website: [Benchmark Administration by IMBA UK | IHS Markit](#).

Appendix A

Methodology Changes

Change	Effective Date	Methodology	
		Previous	Updated
Constituent Pricing Data Source	22 December 2022	Carbon credit futures pricing is sourced from ICE Futures Pricing for European Union Allowance (EUA) futures and IHS Markit OPIS Pricing for California Carbon Allowance (CCA) and Regional Greenhouse Gas Initiative (RGGI) physically-settled futures contracts.	Carbon credit futures pricing is sourced from ICE Futures Pricing for all physically-settled futures contracts.
Publication Schedule	1 December 2022	Index level is always calculated for the last calendar day in May and November	Index Level will be calculated only on the last NYSE trading day in May and November
Minimum Program Weight	27 September 2021	The minimum program weight is 10%.	The minimum program weight is 5%.
Rebalancing Frequency	27 September 2021	The index rebalances semi-annually.	The index rebalances annually.

Appendix B

ICE Futures Pricing Change for CCA and RGGI contracts

Effective 22 December 2022, the CCA and RGGI contracts are being sourced from ICE. The number of units for the new ICE contract effective 22 December 2022 (date t) is calculated as per below using end of day prices as of 21 December 2022 (date $t-1$):

$$NumberOfUnits_{i,t} = \frac{NumberOfUnits_{i,t-1} * ContractPrice_{i,t-1,OPIS}}{ContractPrice_{i,t-1,ICE}}$$

Where $ContractPrice_{i,t-1,OPIS}$ and $ContractPrice_{i,t-1,ICE}$ refer to the price of impacted futures contract sourced from OPIS and ICE respectively on 21 December 2022.

Appendix C

Contracts included in the IHS Markit Global Carbon Index

Constituent	Effective Date	Contract	Source
CCA 1 Year	22 December 2022 1 December 2022	Vintage 23 December 23 expiry Vintage 23 December 23 expiry	ICE OPIS
CCA 2 Year	22 December 2022 1 December 2022	Vintage 24 December 24 expiry Vintage 24 December 23 expiry	ICE OPIS
RGGI 1 Year	22 December 2022 1 December 2022	Vintage 23 December 23 expiry December 23 expiry	ICE OPIS
EUA 1 Year	1 December 2022	December 23 expiry	ICE
EUA 2 Year	1 December 2022	December 24 expiry	ICE
UKA 1 Year	1 December 2022	December 23 expiry	ICE
CCA 1 Year	1 December 2021	Vintage 22 December 22 expiry	OPIS
CCA 2 Year	1 December 2021	Vintage 23 December 22 expiry	OPIS
RGGI 1 Year	1 December 2021	December 22 expiry	OPIS
EUA 1 Year	1 December 2021	December 22 expiry	ICE
EUA 2 Year	1 December 2021	December 23 expiry	ICE
UKA 1 Year	1 December 2021	December 22 expiry	ICE

Further Information

Contractual or Content Issues

For contract- or content-related queries, please refer to the following:

Markit Indices Limited
Friedrich-Ebert-Anlage 35-37
60327 Frankfurt am Main
Germany

Tel +49 (0) 69 299 868 100 Fax +49 (0) 69 299 868 149

E-mail: indices@ihsmarkit.com
Internet: <https://ihsmarkit.com/index>

Technical Issues and Client Support

Please e-mail indices@ihsmarkit.com, or call the relevant telephone number below:

Asia Pacific	Europe	USA
Japan: +81 3 6402 0127	General: +800 6275 4800	General: +1 877 762 7548
Singapore: +65 6922 4210	UK: +44 20 7260 2111	

Formal Complaints

Formal complaints should be emailed to spdji_compliance@spglobal.com.

Please note: spdji_compliance@spglobal.com should only be used to log formal complaints.

For general index inquiries, please contact indices@ihsmarkit.com.

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Markit Indices Limited owns, manages, compiles, and publishes the iTraxx credit derivative indices and the iBoxx indices.

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 in 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. 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

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Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US \$100,000 investment for a 12-month period (or US \$10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US \$1,650), the net return would be 8.35% (or US \$8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US \$5,375, and a cumulative net return of 27.2% (or US \$27,200).

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