IHS Markit Global Carbon Index Guide

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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 constituent trade volumes subject to a capping methodology. Capping is applied on a regional basis with regions being defined as EMEA, Americas, and APAC, as well as on a contract-level basis within each region to ensure diversification.

The IHS Markit Global Carbon Index is rebalanced once a year at the month-end of November (the "rebalancing date") and currently consists of European Union Allowance (EUA), 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 business day of December.

All iBoxx indices are priced based on multiple data sources. The IHS Markit Global Carbon Index uses multi-source pricing: ICE Futures Pricing for EUA contracts, and IHS Markit OPIS Pricing for CCA and RGGI contracts.

This document covers the index selection rules and calculation methodology.

Index Governance

In order to ensure the independence and the objectivity of the IHS Markit Global Carbon Index, the index rules and their enforcement will be governed by the IHS Markit Global Carbon Index Advisory Committee in line with the governance structure for the main iBoxx index families.

The IHS Markit Global Carbon Index Advisory Committee

The IHS Markit Global Carbon Index Advisory Committee is composed of representatives from a broad range of market makers, banks, asset managers, consultants, and industry bodies. The purpose of this group is to provide assistance in the identification of eligible constituents, especially in instances where eligibility or classification is unclear or contentious. The Committee also provides consultation on market developments, recommendations on changes to the rules or additional indices, and insight on the impact of financial sanctions on specific constituents and the eligibility of others. The Committee meets semi-annually.

Publication of the Index

The index is calculated at the end of each whole business day and re-balanced at the end of November each year. The index is calculated on the basis of end-of-day ICE and OPIS prices for the respective carbon credit futures on each whole trading day defined in the index calculation calendar. The index calculation calendar is available in the Indices section on http://www.markit.com/indices under Calendar for registered users. Index data and carbon credit futures price information is also available from the main information vendors.

The index calculation calendar conforms to the recommendations of the Securities Industry and Financial Markets Association (SIFMA):

- Pricing Takes Place on Each Whole SIFMA Recommended US Trading Day

- Index is Calculated on Each Whole SIFMA Recommended US Trading Day and Last Calendar Day of November Each Year

Carbon Credit Selection Rules

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

- Accessibility of Futures Markets

- Liquidity

- 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)

- 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

The IHS Markit Global Carbon Index includes only carbon credit futures that are liquid to ensure that the index can be replicated. Carbon credit futures with limited trading volume are not eligible in the index. Specifically, the following rules are applied regarding liquidity for the carbon credit futures:

- December Expiry

- Current Year Vintage or Next Year Vintage

- Minimum of $10 Million for Average Monthly Trade Volume (Prior Six Month Period)

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 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

Static Data

Information used in the index calculation is sourced from offering circulars and checked against standard data providers.

Pricing Data

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.

More details on the ICE Futures Pricing information used for EUA futures contracts can be found at https://www.theice.com/products/197/EUA-Futures/specs.

More details on the IHS Markit OPIS Pricing information used for CCA and RGGI physically-settled futures contracts can be found at https://www.opisnet.com/about/methodology/#carbon-market-pricing.

Rebalancing Process

The IHS Markit Global Carbon Index is rebalanced annually on the last business day of November after the close of business.

Three business days before the end of each November ("constituent selection cut-off date"), the constituents of the index are determined and an updated membership list is published.

On the last business 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.

Index Data

An index is calculated if there is at least one security available that matches all inclusion criteria. If no more securities qualify for an 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 every whole day in the SIFMA calendar and for the last calendar day of each November. Index calculation is based on spot 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.

On the last trading day of November after the daily index calculation for the current year's list has been run, the set of active securities in the new year's list is updated. On the last trading day of November, pricing levels for all new securities will be featured which are to be included in the indices for the following year.

Index Weights

Once the composition of the IHS Markit Global Carbon Index has been determined, the weight for each security is calculated. The weights and capping factors are determined on the last business day of each November using the average monthly USD trade volume for each security for the six month lookback period prior to rebalancing. The exposure to a

given region or contract 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 10% in Any Given Carbon Credit Program

- Weight of 5% for the Next Year Vintage Futures Contract for Any Given Carbon Credit Program Where the Rebalancing Weighting is 20% or Greater

Index Calculus

Trade Volume Weighting

For an index of carbon credit futures, the trade volume weight is the share of each contract's average monthly trade volume during the lookback period in relation to the aggregate average monthly trade volume during the lookback period of the index constituents:

$$W_{i,t} = \frac{Volume_{i,t-s}}{\sum_{i=1}^{n} Volume_{i,t-s}}$$

Total Return Calculation

For futures indices, there are three major components to consider in the total return calculation: the changes in the spot prices of the underlying contracts, the roll yield (cost) earned on rolling expiring futures contracts into the new vintage contracts, and the yield earned on the cash collateral held for the futures:

$$TotalReturn_t = PriceReturn_t + RollYield_t + CollateralYield_t$$

Price Return Calculation

For futures indices, the price return is determined as the weighted average change in spot prices for the futures:

$$PriceReturn_t = \sum_{i=1}^{n} W_{i,t} * (\frac{ContractPrice_{i,t}}{ContractPrice_{i,t-1}} - 1)$$

Roll Yield Calculation

For futures indices, the roll yield is determined as the weighted average of roll yields of the constituents. The roll yield for an individual constituent is the current vintage contract price less the new vintage contract price divided by the current vintage contract price. Note that roll yield is zero for all days except immediately after rebalancing:

$$RollYield_t = \sum_{i=1}^{n} W_{i,t} * (\frac{ContractPrice_{i,t} - NewContractPrice_{i,t}}{ContractPrice_{i,t}})$$

Collateral Yield Calculation

For futures indices, the collateral yield is determined daily as the product of the prior day's US Daily Overnight rate and the closing value of the index (excluding interest cash):

$$CollateralYield_t = OvernightRate_{t-1} * \sum_{i=1}^{n} W_{i,t} * ContractPrice_{i,t}$$

Weighted Carbon Price Calculation

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

$$WeightedCarbonPrice_t = \sum_{i=1}^{n} ContractPrice_{i,t} * W_{i,t}$$

For additional information regarding index formulas, please refer to the *Markit iBoxx Bond Index Calculus* document available in the *Methodology* section of the iBoxx Documentation page on http://www.markit.com/Documentation/Product/IBoxx.

Index History

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

Settlement Conventions

All iBoxx indices are calculated using the assumption of T+0 settlement days.

Foreign Exchange Rates

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

Calendar

IHS Markit publishes an index calculation calendar in the *iBoxx Calendars* section of the iBoxx Documentation page on http://www.ihsmarkit.com. This calendar provides an overview of the index calculation holidays of the iBoxx bond index families in a given year. Furthermore, half-days will be considered holidays for this index.

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 http://www.markit.com/indices 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

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

Index	Bloomberg Ticker	RIC
Total Return Index	GLCARB	.GLCARB

Index Restatement

Index restatement follows the policy described in the *Markit iBoxx Index Restatement Policy* document available in the *Methodology* section of the Markit iBoxx Documentation page on http://www.ihsmarkit.com.

Index Review

The rules for the index are reviewed twice each year during the semi-annual index review process to ensure that the index provides a balanced representation of the relevant markets.

Decisions made following the semi-annual index reviews will be published on IHS Markit's website shortly after the Committee has been held. The publication will contain a detailed overview and timelines for the implementation of the rules changes.

Changes to the IHS Markit Global Carbon Index

July 25, 2019	Launch of the IHS Markit Global Carbon Index

Further Information

Glossary of Key Terms

The Markit iBoxx Glossary document of key terms is available in the *Methodology* section of the Markit iBoxx *Documentation* page on http://www.ihsmarkit.com.

Contractual and Content Issues

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Formal Complaints

Formal complaints can be sent electronically to our dedicated e-mail address complaints_indices@markit.com.

For any general index inquiries, please contact iBoxx indices support group at indices@ihsmarkit.com.

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Other Index Products

Markit Indices GmbH owns, manages, compiles and publishes the iTraxx credit derivative indices and the iBoxxFX Trade Weighted Indices.