



BNP PARIBAS
CORPORATE & INSTITUTIONAL BANKING

BNP PARIBAS INDICES INDEX METHODOLOGY SUPPLEMENT

OPTIMIZED ROLL SECTORIAL COMMODITY TR INDEX SERIES

Final Version dated 31 May 2023 amending and superseding all previous versions

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This document (the “**BNP Paribas Index Methodology Supplement**”) supplements, forms a part of and is subject to the BNP Paribas Index Handbook dated 20 November 2015 (the “**Handbook**”), as may be amended, supplemented or replaced from time to time. The Handbook and the BNP Paribas Index Methodology Supplement together comprise the “**BNP Paribas Index Rules**” for the BNP Paribas Index described herein. In the event of an inconsistency between the Handbook and this BNP Paribas Index Methodology Supplement, this BNP Paribas Index Methodology Supplement will govern. Terms used herein, but not defined, bear the meaning set forth in the Handbook.

Any information provided with respect to a BNP Paribas Index or the BNP Paribas Index Rules is solely for information purposes. BNP Paribas reserves the right to amend, supplement or update the BNP Paribas Index Rules from time to time and accepts no liability for any such modifications.

Nothing contained in the BNP Paribas Index Rules should be construed as an offer or solicitation of any transaction.

Description of the BNP Paribas Indices

The series of indices described in this BNP Paribas Index Methodology Supplement is comprised of two commodity indices (each a “**BNP Paribas Index**”, and together the “**BNP Paribas Indices**”), each providing Total Return exposure to the performance of the Optimized Roll Energy Excess Return Index and the Optimized Roll Industrial Metals Excess Return Index respectively (each an “**Index Component**”). The Total Return exposure is obtained by adding the performance of a synthetic cash position (remunerated at either Reference Rate 1 (before the Reference Rate Switch Date) or Reference Rate 2 (thereafter)) to the performance of the relevant Index Component, as described in Section 1 (*Calculation of the BNP Paribas Index Level for BNP Paribas Indices i=1 to 2*) and 2 (*Calculation of the Cash Amount Level*).

The Index Components

Each BNP Paribas Index is comprised of a synthetic portfolio of assets. There is no actual portfolio of assets to which any person is entitled or has any ownership interest. The BNP Paribas Index Methodology does not entail the actual execution of any transactions with respect to the Index Components. The BNP Paribas Index Methodology synthetically replicates all of the referenced components and transactions.

The Index Components are BNP Paribas Indices. They provide long-only Excess Return to a particular commodity sector (either Energy or Industrial Metals, as set out in Annex 2, Table 1 - Index Components), with the objective of reducing the carry costs usually associated with holding commodities futures, using a methodology set forth in an Index Methodology Supplement (the “**Index Rules**”).

The carry cost (“**Carry Cost**”) of a commodities futures contract refers to the total cost of holding a particular physical commodity (such as transport or storage costs) and the impact of shifting supply and demand levels. The Carry Cost is reflected in the prices of futures contracts for such commodity and therefore in the level of an index comprised of such futures contracts. The Carry Cost may be positive (thus impacting the performance negatively over time) or negative (thus being beneficial to performance over time) depending on whether the underlying commodities futures contracts are in contango (upward sloping) or backwardation (downward sloping).

Further details in respect of the methodology of any Index Component are as set forth in the Index Rules, a copy of which is available from the Index Sponsor on request.

Index Fees

None of the BNP Paribas Indices in the series incorporates any charge, cost or expense (the “**Index Fees**”) related to calculation or maintenance.



Version Control

This BNP Paribas Index Methodology Supplement has been amended. A summary of all amendments is available from the Index Sponsor on request.



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BNP Paribas Index Methodology

The following describes the composition of the BNP Paribas Indices in greater detail and the methodology used.

BNP Paribas Index:	Optimized Roll Energy Total Return Index (BBG: EBCIENTR) Optimized Roll Industrial Metals Total Return Index (BBG: EBCIINTR)
BNP Paribas Index Status:	Public Index
Index Family:	Commodity Index
Index Sponsor:	BNP Paribas
Index Calculation Agent:	S&P Dow Jones Indices LLC
BNP Paribas Index Launch Date	@LAUNCH_DATE@
BNP Paribas Index Start Date	@START_DATE@
Index Currency:	USD
BNP Paribas Index Composition	
Index Components:	As described in Annex 2, Table 1 - Index Components
Reference Rates:	As described in Annex 2, Table 2 – Reference Rates
Index Component Selection Indicators:	Not Applicable
Index Component Weighting Determination Dates:	Not Applicable
BNP Paribas Index Features	
Return Type:	Optimized Roll Energy Total Return Index : Total Return Optimized Roll Industrial Metals Total Return Index : Total Return
Rebalancing:	Not Applicable
Index Fees:	Not Applicable
Currency Conversion Mechanism:	Not Applicable.
Volatility Control Mechanism:	Not Applicable
Calculation and Publication of the BNP Paribas Index Level in respect of each BNP Paribas Index:	
Initial BNP Paribas Index Level:	100 as of the BNP Paribas Index Start Date. Historical backtesting is used to determine levels of the BNP Paribas Index for the period starting from



	the BNP Paribas Index Start Date, up to and including the BNP Paribas Index Launch Date
Frequency of calculation of BNP Paribas Index Level:	Each BNP Paribas Index Level Calculation Date
BNP Paribas Index Publication Date	The Business Day following each BNP Paribas Index Level Calculation Date
BNP Paribas Index Publication Page:	<p>The Optimized Roll Energy Total Return Index:</p> <ul style="list-style-type: none"> - Bloomberg Ticker: EBCIENTR Index - Reuters Ticker: .EBCIENTR <p>The Optimized Roll Industrial Metals Total Return Index:</p> <ul style="list-style-type: none"> - Bloomberg Ticker: EBCIINTR Index - Reuters Ticker: .EBCIINTR
Website where current composition of the BNP Paribas Index is published:	<p>The Optimized Roll Energy Total Return Index: https://indx.bnpparibas.com/EBCIENTR Index</p> <p>The Optimized Roll Industrial Metals Total Return Index: https://indx.bnpparibas.com/EBCIINTR Index</p>
Index Methodology Supplement URL	<p>The Optimized Roll Energy Total Return Index: https://indx.bnpparibas.com/nr/EBCIENTR.pdf</p> <p>The Optimized Roll Industrial Metals Total Return Index: https://indx.bnpparibas.com/nr/EBCIINTR.pdf</p>
<p>Price Disrupted Days</p> <p>Section 4.3 (<i>Price Disrupted Days</i>) of the BNP Paribas Index Handbook shall be deleted in its entirety and replaced with the following:</p> <p>“If any Scheduled Trading Day is a Price Disrupted Day, the Price Disrupted Day is deemed not to be a BNP Paribas Index Level Calculation Date.”</p>	
<p>Index Adjustment Events:</p> <p>Section 5 (<i>Index Adjustment Events and Consequences</i>) of the Handbook shall apply.</p>	
<p>BNP Paribas Index Potential Adjustment Events:</p> <p>Not Applicable</p>	
<p>Amended definitions applicable to the BNP Paribas Index:</p> <p>The defined terms below, which appear in the Master Definitions Annex in the BNP Paribas Index Handbook, shall be deleted and replaced as follows:</p> <p>“Commodity Index” means any Index Component in respect of which the Index Component Type specified in the BNP Paribas Index Methodology Supplement is “Commodity Index”, which shall include any options or futures contracts that reference or comprise such Commodity Index.</p> <p>“Scheduled Trading Day” means each London and New York Business Day.</p>	



Bespoke provisions applicable to the BNP Paribas Index:

The following new definitions shall be added to the Handbook:

“London and New York Business Day” means a day (other than a Saturday or Sunday) on which commercial banks are open for general business (including dealings in foreign exchange and foreign currency deposits) in London and in New York City.

“Reference Rate Switch Date” means 26 May 2023.

“Successor” means, in respect of an Index Component, a Successor Index.

“Successor Index” means, in respect of a Commodity Index, if the Commodity Index is (i) not calculated and announced by the component Index Sponsor but is calculated and announced by a successor sponsor acceptable to the Index Sponsor, or (ii) replaced by the component Index Sponsor with a successor index using, in the determination of the Index Sponsor, the same or a substantially similar formula for and method of calculation as used in the calculation of the Commodity Index, then in each case that index will be deemed to be the Commodity Index.

Date offsets:

For any BNP Paribas Index Level Calculation Date t , and for any integer value j , $t + j$ (respectively $t - j$) refers to the BNP Paribas Index Level Calculation Date that is j BNP Paribas Index Level Calculation Dates following (respectively preceding) BNP Paribas Index Level Calculation Date t . For example, $t - 1$ refers to the BNP Paribas Index Level Calculation Date immediately preceding BNP Paribas Index Level Calculation Date t , and $t - 2$ refers to the BNP Paribas Index Level Calculation Date immediately preceding BNP Paribas Index Level Calculation Date $t - 1$.



Annex 1

The BNP Paribas Index Methodology for the Optimized Roll Sectorial Commodity TR Index Series:

1 Calculation of the BNP Paribas Index Level for BNP Paribas Indices i = 1, 2

On each BNP Paribas Index Level Calculation Date t , the BNP Paribas Index Level (ITR_t) for each BNP Paribas Index $i=1, 2$ shall be calculated in accordance with the following formulae:

On the BNP Paribas Index Start Date ($t = t_0$):

$$ITR_{t_0} = 100$$

And for each BNP Paribas Index Level Calculation Date t subsequent to t_0 :

$$ITR_t = ITR_{t-1} \times \left(\frac{CSH_t}{CSH_{t-1}} + \frac{IER_t}{IER_{t-1}} - 1 \right)$$

Where:

- ITR_t is the BNP Paribas Index Level for BNP Paribas Index $i=1, 2$ on BNP Paribas Index Level Calculation Date t ;
- IER_t is the Settlement Price for the Index Component in BNP Paribas Index $i=1, 2$ on BNP Paribas Index Level Calculation Date t , as set out in Annex 2, Table 1 (*Index Components*);
- CSH_t is the Cash Amount Level on BNP Paribas Index Level Calculation Date t as calculated in accordance with Section 2 (*Calculation of the Cash Amount Level*) of Annex 1.

2 Calculation of the Cash Amount Level

On each BNP Paribas Index Level Calculation Date t , the Cash Amount Level (CSH_t) for each BNP Paribas Index $i=1, 2$ shall be calculated in accordance with the following formulae:

On the BNP Paribas Index Start Date ($t = t_0$):

$$CSH_{t_0} = 100$$

For each following BNP Paribas Index Level Calculation Date t up to and including the Reference Rate Switch Date:

$$CSH_t = CSH_{t-1} \times \left(\frac{1}{1 - \frac{91}{360} \times TBR1_{t-1}} \right)^{\frac{ACT(t-1,t)}{91}}$$

And for each BNP Paribas Index Level Calculation Date t after the Reference Rate Switch Date:

$$CSH_t = CSH_{t-1} \times \left(1 + TBR2_{t-1} \times \frac{Act(t-1,t)}{360} \right)$$

Where:

- $TBR1_t$ is Reference Rate 1 on BNP Paribas Index Level Calculation Date t as published on the corresponding Pricing Page;
- $TBR2_t$ is Reference Rate 2 on BNP Paribas Index Level Calculation Date t as published on the corresponding Pricing Page; and
- $ACT(t-1,t)$ is the number of calendar days elapsed between $t-1$ and t .



Annex 2

Table 1 – Index Components

i=	BNP Paribas Index	Index Component	Index Component Type	Index Component Currency	Price Source	Index Sponsor	BBG Ticker
1	Optimized Roll Energy Total Return Index	Optimized Roll Energy Excess Return Index	Commodity Index	USD	S&P Dow Jones Indices LLC	BNP Paribas	EBCIENTR Index
2	Optimized Roll Industrial Metals Total Return Index	Optimized Roll Industrial Metals Excess Return Index	Commodity Index	USD	S&P Dow Jones Indices LLC	BNP Paribas	EBCIINTR Index

Table 2 – Reference Rates

	Reference Rate	Type	Designated Maturity	Currency	Price Source	Pricing Page
1	United States Auction Result 3 Month Treasury Bill High Discount	Interest Rate	3-Month	USD	The US Department of the Treasury, Bureau of the Public Debt	USB3MTA
2	United States Federal Funds Effective Rate	Interest Rate	Daily	USD	The Federal Reserve Bank of New York	As published on Bloomberg page FEDL01

