SOLACTIVE
German Index Engineering

INDEX GUIDELINE

UBS NATURAL GAS ID-EOD CUSTOM INDEX

Version 1.0

14 October 2019

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INTRODUCTION

This document (the "GUIDELINE") is to be used as a guideline with regard to the composition, calculation and maintenance of the UBS Natural Gas ID-EOD Custom Index (the "INDEX"). Any amendments to the rules made to the GUIDELINE are approved by the OVERSIGHT COMMITTEE specified in Section 5.5. The INDEX is calculated, administered and published by Solactive AG ("SOLACTIVE") assuming the role as administrator (the "INDEX ADMINISTRATOR") under the Regulation (EU) 2016/1011 (the "BENCHMARK REGULATION" or "BMR"). The name "Solactive" is trademarked.

The text uses defined terms which are formatted with "SMALL CAPS. Such Terms shall have the meaning assigned to them as specified in Section 6 (Definitions).

The GUIDELINE and the policies and methodology documents referenced herein contain the underlying principles and rules regarding the structure and operation of the INDEX. SOLACTIVE does not offer any explicit or tacit guarantee or assurance, neither pertaining to the results from the use of the INDEX nor the level of the INDEX at any certain point in time nor in any other respect. SOLACTIVE strives to the best of its ability to ensure the correctness of the calculation. There is no obligation for SOLACTIVE – irrespective of possible obligations to issuers – to advise third parties, including investors and/or financial intermediaries, of any errors in the INDEX. The publication of the INDEX by SOLACTIVE does not constitute a recommendation for capital investment and does not contain any assurance or opinion of SOLACTIVE regarding a possible investment in a financial instrument based on this INDEX.

1. INDEX SPECIFICATIONS

1.1. SCOPE OF THE INDEX

Category	Description
Asset Class	Commodity Futures
Strategy	The Index aims to track the performance of a strategy that takes an intraday trending position and overnight mean-reverting position on the Natural Gas front future. In order to achieve the intraday trend exposure the Index notionally buys (or sells) the relevant future at an intraday point where the sizing of such position is proportional to the direction times magnitude of the future's return since previous day's close. Similarly, in order to achieve the end-of-day mean-reverting exposure the Index notionally buys (or sells) the relevant future at close of trading where the direction and sizing of such position is proportional to the negative of the direction times magnitude of the future's return since the intraday observation point. In order to reduce path dependency the Index represents the average return of four such strategies, each with a different intraday observation point. The intraday trend position and the end-of-day trend positions are only put-on if the returns meet certain threshold conditions which are employed to ensure that the market returns are significant for such an effect to exist. The trading costs and an appropriate time lag between observation and trading times are incorporated to ensure the tradability of the Index.

1.2. IDENTIFIERS AND PUBLICATION

The INDEX is published under the following identifiers:

Name	ISIN	Currency	Type	RIC	BBG ticker
UBS Natural Gas ID-EOD Custom Index	DE000SLA9UB0	USD	Excess Return	.UISKNIEE	UISKNIEE

The INDEX is published on the website of the INDEX ADMINISTRATOR (www.solactive.com) and is, in addition, available via the price marketing services of Boerse Stuttgart GmbH and may be distributed to all of its affiliated vendors. Each vendor decides on an individual basis as to whether it will distribute or display the INDEX via its information systems.

Any publication in relation to the INDEX (e.g. notices, amendments to the GUIDELINE) will be available at the website of the INDEX ADMINISTRATOR: https://www.solactive.com/news/announcements/.

1.3. INITIAL LEVEL OF THE INDEX

The initial level of the INDEX on the 01/10/2018, the START DATE, is 100. Historical values from the 14/10/2019, the LIVE DATE, will be recorded in accordance with Article 8 of the BMR. Levels of the INDEX published for a period prior to the LIVE DATE have been back-tested.

1.4. PRICES AND CALCULATION FREQUENCY

The level of the INDEX is calculated once for each CALCULATION DAY based on both the TRADING PRICES and the SETTLEMENT PRICES on the EXCHANGES on which the INDEX COMPONENTS are listed.

1.5. LICENSING

Licenses to use the INDEX as the underlying value for financial instruments, investment funds and financial contracts may be issued to stock exchanges, banks, financial services providers and investment houses by UBS AG.

2. CALCULATION OF THE INDEX

2.1. INDEX FORMULA

The INDEX is calculated as an excess return Index.

The Index level S_t on each CALCULATION DAY t is calculated in accordance with the following formula:

$$S_t = S_{t-1} + Multiplier_t \times \left\{ \sum_{k \in L_t} \sum_{i=1}^{N} Delta_{i,k,t}^{ID} \times \left(UI_{k,t} - TWAP_{i,k,t}^{Ex} \right) - \sum_{k \in L_t} abs \left[\sum_{i=1}^{N} \left(Delta_{i,k,t}^{EOD} - Delta_{i,k,t}^{ID} \right) \times UI_{k,t} \right] \times Cost_{EOD} \right\} + Multiplier_{t-1} \times \sum_{k \in L_t} \sum_{i=1}^{N} Delta_{i,k,t-1}^{EOD} \times \left(TWAP_{i,k,t}^{Ex} - UI_{k,t-1} \right) - \sum_{k \in L_t} \sum_{i=1}^{N} abs\left(Delta_{i,k,t}^{ID} \times Multiplier_t - Delta_{i,k,t-1}^{EOD} \times Multiplier_{t-1} \right) \times TWAP_{i,k,t}^{Ex} \times Cost_{ID} - AccruedFee_t$$

Where:

S_{t-1}	The Index level on the CALCULATION DAY immediately preceding t
$UI_{k,t}$	The SETTLEMENT PRICE of the Underlying Future k on CALCULATION DAY t
L_t	The future contracts traded on the CALCULATION DAY t. Two parts of traded future contracts are included: 1) the END OF DAY MEAN REVERSION SIGNAL calculated on the intermediately preceding CALCULATION DAY t. 2) the INTRADAY TREND SIGNAL calculated on the CALCULATION DAY t. If the immediately following CALCULATION DAY t+1 is a FUTURE SWITCH DAY, the trade future k for the END OF DAY MEAN REVERSION SIGNAL will be switched to the future contract with an expiry immediately following the closest contract expiry greater than t. If Strategy Business Day t is a FUTURE SWITCH DAY, the trade future k for INTRADAY TREND SIGNAL will be switched to the future contract with an expiry immediately following the closest contract expiry greater than t.

For avoidance of doubt: The last trade day of the March 2019 future contract (Reuters RIC: NGH19) is February 26, 2019. The corresponding FUTURE SWITCH DAY is February 21, 2019. On February 20, 2019, the trade future k for the INTRADAY TREND SIGNAL will still be the March 2019 future contract (NGH19) and the trade future k for the END OF DAY MEAN REVERSION SIGNAL will be the April 2019 future contract (NGJ19). On February 21, 2019, the trade future k for both the INTRADAY TREND SIGNAL and the END OF DAY MEAN REVERSION SIGNAL will be the April 2019 future contract (NGJ19).

$Multiplier_t$

If the CALCULATION DAY t is the START DATE:

$$Multiplier_t = 0$$

If the CALCULATION DAY t is the CALCULATION DAY after the START DATE or is a RESET DAY:

$$Multiplier_t = \frac{Leverage_t \times S_{t-1}}{UI_{k,t-1}}$$

where the future k is the same as the one used in the intraday trend calculation

Otherwise:

$$Multiplier_t = Multiplier_{t-1}$$

$Leverage_t$

3

$AccruedFee_t$

On the START DATE:

$$AccruedFee_t = 0$$

On any other CALCULATION DAY t:

$$AccruedFee_t = S_{t-1} \times Fee \times \tau_{t-1,t}^{CD}$$

Fee

Management Fee of the Index, i.e. 0.005

$\tau_{t-1,t}^{CD}$

The number of calendar days between CALCULATION DAY t-1 and t divided by 365

$TWAP_{i,k,t}^{Ex}$

Time-weighted average price of the Underlying Future k, calculated as defined in section 2.2, on the CALCULATION DAY t of Execution Period i, specified in section 5

$TWAP_{i,k,t}^{Ob}$

Time-weighted average price of the Underlying Future k, calculated as defined in section 2.2, on the CALCULATION DAY t of Observation Period i, specified in section 5

$TWAP^{Ob}_{EOD,k,t}$ Time-weighted average price of the Underlying Future k, calculated as defined in section 2.2, on the CALCULATION DAY t of EOD Observation Period, specified in section 5

N The number of intraday executions, specified in section 5

$Delta^{ID}_{i,k,t}$ The number of the Underlying Future k on CALCULATION DAY t corresponding to the INTRADAY TREND SIGNAL with return threshold R, specified in section 5, calculated in accordance to the following:

On the START DATE:

$$Delta^{ID}_{i,k,t} = 0$$

Else if $TWAP^{Ob}_{i,k,t} > 0$ and $\left|\ln\left(\frac{TWAP^{Ob}_{i,k,t}}{UI_{k,t-1}}\right)\right| > R$:

$$Delta^{ID}_{i,k,t} = \min\left[DeltaCap_t, \max\left(-DeltaCap_t, \ln\left(\frac{TWAP^{Ob}_{i,k,t}}{UI_{k,t-1}}\right)\right)\right]$$

Otherwise:

$$Delta^{ID}_{i,k,t} = 0$$

R Return threshold, i.e. 0.025

$DeltaCap_t$ The cap applied on the number of Underlying Future k to hold at the end of Execution Period i on CALCULATION DAY t, calculated in accordance to the following:

$$DeltaCap_t = \frac{DC \times S_{t-1}}{Multiplier_t \times UI_{k,t-1}}$$

where the future contract k is the same as the one used in the INTRADAY TREND SIGNAL calculation.

DC The overall notional cap for the Underlying Future, i.e. 0.25

$Delta^{EOD}_{i,k,t}$ The number of the Underlying Future contract k on CALCULATION DAY t, corresponding to the END OF DAY MEAN REVERSION SIGNAL with return threshold R, calculated in accordance to the following:

On the START DATE and if the BUSINESS DAY immediately following CALCULATION DAY t is a HALF TRADING DAY:

$$Delta^{EOD}_{i,k,t} = 0$$

Else if $TWAP^{Ob}_{i,k,t} > 0$ and $TWAP^{Ob}_{EOD,k.t} > 0$ and $\left|-\ln\left(\frac{TWAP^{Ob}_{EOD,k.t}}{TWAP^{Ob}_{i,k,t}}\right)\right| > R$:

$$Delta_{i,k,t}^{EOD} = -DeltaCapAdjFactor_t \times \ln\left(\frac{TWAP_{EOD,k.t}^{Ob}}{TWAP_{i,k,t}^{Ob}}\right)$$

Otherwise:

$$Delta_{i,k,t}^{EOD} = 0$$

$DeltaCapAdjFactor_t$ The delta adjustment factor applied to the end of day mean reversion signal on CALCULATION DAY t, calculated in accordance to the following:

$$DeltaCapAdjFactor_t = 1 + (-1) \times sign(EODRawDelta) \times \frac{\max\left(0, abs\left[EODRawDelta_t - \sum_{m \in L_{ID,t}} Delta_{i,m,t}^{ID}\right] - DeltaCap_t \times N\right)}{EODRawDelta_t}$$

Where:

$$sign(x) = \begin{cases} 1, & x > 0 \\ 0, & x = 0 \\ -1, & x < 0 \end{cases}$$

$EODRawDelta_t$ The end of day raw delta on CALCULATION DAY t, calculated in accordance to the following:

$$EODRawDelta = \sum_{i=1}^{N} -EODMRS_{i,k,t}$$

$EODMRS_{i,k,t}$ The END OF DAY MEAN REVERSION SIGNAL on CALCULATION DAY t for Observation Period i of future contract k, calculated in accordance to the following:

If $\left|-\ln\left(\frac{TWAP_{EOD,k.t}^{Ob}}{TWAP_{i,k,t}^{Ob}}\right)\right| > R$:

$$EODMRS_{i,k,t} = \ln\left(\frac{TWAP_{EOD,k.t}^{Ob}}{TWAP_{i,k,t}^{Ob}}\right)$$

Otherwise:

$$EODMRS_{i,k,t} = 0$$

$L_{ID,t}$ The future contract executed according to the INTRADAY TREND SIGNAL on the CALCULATION DAY t

$Cost_{EOD}$ The End of Day Trading Cost, i.e. 0.0003

$Cost_{ID}$ The Intraday Trading, i.e. 0.0003

2.2. TIME-WEIGHTED AVERAGE PRICE (TWAP) CALCULATION

The Time-weighted average price of the Underlying Future k on CALCULATION DAY t within Period i is computed as follows:

$$TWAP_{i,k,t} = \frac{\sum_{z=1}^{C} P_{z,i}(t)}{C}$$

Where:

z	represents each Observation Time-Stamp (or Execution Time-Stamp or EOD Observation Time-Stamp, as applicable) within the respective Observation Period i (or Execution Period i or EOD Observation Period i, as applicable). The time stamp is source from the Refinitiv Tick History field "Exch Time". If within the Execution Period i, any Execution Time-Stamp is affected by a limit event (as determined by Calculation Agent in good faith and commercially reasonable manner), then all Execution Time-Stamps on and after such affected Execution Time-Stamp shall be moved later by the Execution Lag in Limit Event. A Limit Event is determined to have happened if within the corresponding period i the Refinitiv Tick History provides an update of the fields "UpLim Price" and "LoLim Price".
$\mathbf{P_{z,i}(t)}$	means, for the Underlying Future k on each CALCULATION DAY t, the last traded price corresponding to the relevant Observation Time-Stamp z (or Execution Time-Stamp z or EOD Observation Time-Stamp z, as applicable). The trade price is sourced from the Refinitiv Tick History field "Trade" This function returns the last traded price strictly before such relevant Observation Time-Stamp z (or Execution Time-Stamp z or EOD Observation Time-Stamp z, as applicable).
$\mathbf{C}$	means the Observation Time-Stamp Count (or the Execution Time-Stamp Count or the EOD Observation Time-Stamp Count, as applicable).

If on any CALCULATION DAY t the Calculation Agent is unable to determine the value of the time-weighted average price using the above methodology, then the Calculation Agent will determine the relevant value of time-weighted average price on a best efforts basis in a commercially reasonable manner.

2.3. ACCURACY

The level of the INDEX will be rounded to three decimal places.

2.4. RECALCULATION

SOLACTIVE makes the greatest possible efforts to accurately calculate and maintain its indices. However, errors in the determination process may occur from time to time for variety reasons (internal or external) and therefore, cannot be completely ruled out. SOLACTIVE endeavors to correct all errors that have been identified within a reasonable period of time. The understanding of "a reasonable period of time" as well as the general measures to be taken are generally depending on the underlying and is specified in the Solactive Correction Policy, which is incorporated by reference and available on the SOLACTIVE website: https://www.solactive.com/documents/correction-policy/.

2.5. MARKET DISRUPTION

In periods of market stress SOLACTIVE calculates its indices following predefined and exhaustive arrangements as described in the Solactive Disruption Policy, which is incorporated by reference and available on the SOLACTIVE website: https://www.solactive.com/documents/disruption-policy/. Such market stress can arise due to a variety of reasons, but generally results in inaccurate or delayed prices for one or more INDEX COMPONENTS. The determination of the INDEX may be limited or impaired at times of illiquid or fragmented markets and market stress.

3. MISCELLANEOUS

3.1. DISCRETION

Any discretion which may need to be exercised in relation to the determination of the INDEX (for example the determination of the INDEX UNIVERSE (if applicable), the selection of the INDEX COMPONENTS (if applicable) or any other relevant decisions in relation to the INDEX) shall be made in accordance with strict rules regarding the exercise of discretion or expert judgement.

3.2. METHODOLOGY REVIEW

The methodology of the INDEX is subject to regular review, at least annually. In case a need of a change of the methodology has been identified within such review (e.g. if the underlying market or economic reality has changed since the launch of the INDEX, i.e. if the present methodology is based on obsolete assumptions and factors and no longer reflects the reality as accurately, reliably and appropriately as before), such change will be made in accordance with the Solactive Methodology Policy, which is incorporated by reference and available on the SOLACTIVE website: https://www.solactive.com/documents/methodology-policy/.

Such change in the methodology will be announced on the SOLACTIVE website under the Section "Announcement", which is available at https://www.solactive.com/news/announcements/. The date of the last amendment of this INDEX is contained in this GUIDELINE.

3.3. CHANGES IN CALCULATION METHOD

The application by the INDEX ADMINISTRATOR of the method described in this document is final and binding. The INDEX ADMINISTRATOR shall apply the method described above for the composition and calculation of the INDEX. However, it cannot be excluded that the market environment, supervisory, legal and financial or tax reasons may require changes to be made to this method. The INDEX ADMINISTRATOR may also make changes to the terms and conditions of the INDEX and the method applied to calculate the INDEX that it deems to be necessary and desirable in order to prevent obvious or demonstrable error or to remedy, correct or supplement incorrect terms and conditions. The INDEX ADMINISTRATOR is not obliged to provide information on any such modifications or changes. Despite the modifications and changes, the INDEX ADMINISTRATOR will take the appropriate steps to ensure a calculation method is applied that is consistent with the method described above.

3.4. TERMINATION

SOLACTIVE makes the greatest possible efforts to ensure the resilience and continued integrity of its indices over time. Where necessary, SOLACTIVE follows a clearly defined and transparent procedure to adapt Index methodologies to changing underlying markets (see Section 5.2 "Methodology Review") in order to maintain continued reliability and comparability of the indices. Nevertheless, if no other options are available the orderly cessation of the INDEX may be indicated. This is usually the case when the underlying market or economic reality, which an index is set to measure or to reflect, changes substantially and in a way not foreseeable at the time of inception of the index, the index rules, and particularly the selection criteria, can no longer be applied coherently or the index is no longer used as the underlying value for financial instruments, investment funds and financial contracts.

SOLACTIVE has established and maintains clear guidelines on how to identify situations in which the cessation of an index is unavoidable, how stakeholders are to be informed and consulted and the procedures to be followed for a termination or the transition to an alternative index. Details are specified in the Solactive Termination Policy, which is incorporated by reference and available on the SOLACTIVE website: https://www.solactive.com/documents/termination-policy/.

3.5. OVERSIGHT

An oversight committee composed of staff from SOLACTIVE and its subsidiaries (the "OVERSIGHT COMMITTEE") is responsible for decisions regarding any amendments to the rules of the INDEX. Any such amendment, which may result in an amendment of the GUIDELINE, must be submitted to the OVERSIGHT COMMITTEE for prior approval and will be made in compliance with the Methodology Policy, which is available on the SOLACTIVE website: https://www.solactive.com/documents/methodology-policy/.

4. DEFINITIONS

"BENCHMARK REGULATION" shall have the meaning as defined in Section "Introduction".

"BMR" shall have the meaning as defined in Section "Introduction".

"BUSINESS DAY" is every weekday where the EXCHANGE is scheduled to be open for its regular trading session of the INDEX COMPONENT (including HALF TRADING DAYS).

"CALCULATION DAY" is every weekday where the EXCHANGE is scheduled to be open for its regular trading session of the INDEX COMPONENT (excluding HALF TRADING DAYS).

"END OF DAY MEAN REVERSION SIGNAL" is the log return of the end of day TWAP $TWAP^{Ob}_{EOD,k,t}$ and the intraday TWAP $TWAP^{Ob}_{i,k,t}$ of the same future contract k.

The "EXCHANGE" is the Chicago Mercantile Exchange.

A "FUTURE SWITCH DAY" is the Calculation Day three Calculation Days before the closest Future Contract Last Trade Date greater than t.

"HALF TRADING DAY" is a weekday where the EXCHANGE is scheduled to be open for a shortened trading session of the INDEX COMPONENT. At the time of creating this guideline it is the day after Thanksgiving and Christmas Eve.

"GUIDELINE" shall have the meaning as defined in Section "Introduction".

An "INDEX COMPONENT" is a Natural Gas Future Contract listed on the EXCHANGE.

"INDEX" shall have the meaning as defined in Section "Introduction".

"INDEX ADMINISTRATOR" shall have the meaning as defined in Section "Introduction".

"INDEX COMPONENT" is each security reflected in the INDEX.

"INDEX CURRENCY" is the currency specified in the column "Currency" in the table in Section 1.2.

"INTRADAY TREND SIGNAL" is the log return of the intraday TWAP $TWAP^{Ob}_{i,k,t}$ and the SETTLEMENT PRICE $UI_{k,t}$ of the same future contract k.

"LIVE DATE" shall have the meaning as defined in Section 1.3.

"OVERSIGHT COMMITTEE" shall have the meaning as defined in Section 5.5.

A "RESET DAY" is the first Calculation Day in March, June, September and December.

The "SETTLEMENT PRICE" in respect of an INDEX COMPONENT is the official settlement price published by the EXCHANGE.

"SOLACTIVE" shall have the meaning as defined in Section "Introduction".

"START DATE" shall have the meaning as defined in Section 1.3.

The "TRADING PRICE" in respect of an INDEX COMPONENT and a TRADING DAY is a price at which the INDEX COMPONENT was traded on the respective EXCHANGE.

5. PERIOD DEFINITIONS

Number of Intraday Executions	4			
Observation Period i	1	2	3	4
	10:21-10:25 EST	11:21-11:25 EST	12:21-12:25 EST	13:21-13:25 EST
Observation Time-Stamp	With respect to each Observation Period, the starting timestamp of that Observation Period and every timestamp which is exactly a multiple of 30 seconds after such starting timestamp to (and including) the final timestamp in that Observation Period			
Observation Time-Stamp Count	9			
Execution Period i	1	2	3	4
	10:31-10:45 EST	11:31-11:45 EST	12:31-12:45 EST	13:31-13:45 EST
Execution Time-Stamp	With respect to each Execution Period, the starting timestamp of that Execution Period and every timestamp which is exactly a multiple of 10 seconds after such starting timestamp to (and including) the final timestamp in that Execution Period			
Execution Time-Stamp Count	85			
Execution Lag in Limit Event	600 seconds			
EOD Observation Period	14:18-14:23 EST			
EOD Observation Time-Stamp	With respect to each EOD Observation Period, the starting timestamp of that EOD Observation Period and every timestamp which is exactly a multiple of 30 seconds after such starting timestamp to (and including) the final timestamp in that EOD Observation Period			

EOD Observation Time-Stamp Count	11

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