Annex 4 to the Algorithm methodology:

~~Methodology for~~

Algorithm monitoring ~~the performance and usage~~methodology for single intraday coupling

30 January 2020

Table of ~~the continuous trading matching algorithm~~Contents

~~in accordance with Article 8 of the Algorithm Methodology~~

~~31st May 2019~~

Summary

TITLE 1 - General provisions

~~Article 1~~

~~Subject matter and scope~~

Article 1

General specifications

~~1.~~ This Annex elaborates the principles ~~and sets forth~~for the required indicators ~~for:~~

1. monitoring the SIDC algorithm. More specifically, it is referred to by the following Articles in the Algorithm methodology:

   a) Article 7: Calculation of effective usage, anticipated usage and usage range, using the defined data sets and the scalability indicator for calculating the usage range;
   b) Article 8: Monitoring algorithm performance ~~of~~ ;
   c) Article 9: Scalability report;
   d) Article 11: Research and development activities;
   e) Article 12: Corrective measures; and
   ~~a)~~f) Article 19: Impact assessment methodology for the continuous trading ~~matching~~ algorithm, ~~as set out in Article 7~~for the assessment of ~~the Algorithm Methodology;~~requests for change.

   ~~a)~~ The indicators monitoring the ~~usage~~performance of the ~~continuous trading matching algorithm, as set out~~intraday auctions shall be those used in ~~Article 7 of~~ the ~~Algorithm Methodology;~~

2. ~~monitoring~~DA timeframe, mutatis mutandis, in accordance with Annex 3 to the ~~output produced by~~algorithm methodology. For the ~~continuous trading matching algorithm, as set out in Article 7 of~~avoidance of doubt, the ~~Algorithm Methodology;~~'SDAC algorithm' shall be read as the 'IDA algorithm'.

3. The principles and processes described in this methodology shall be further developed and detailed within the algorithm monitoring procedures ~~defined in the relevant operational agreements among all NEMOs, between all NEMOs and all TSOs, and among TSOs,~~ in the intraday continuous trading framework.

4. Unless specified otherwise, all the values that are defined as parameters in this methodology shall be defined in the operational procedures defined in the relevant operational agreements and their value will be shared in the public reports

~~4. All NEMOs and all TSOs shall ensure the update of the present Annex.~~

5.

   ~~Type, Purposes~~At the entry into force of this methodology all listed indicators shall be provided with the exemption of the following indicators which shall be available by the end of 2021:

   i. total number of daily submitted orders per product and ~~Use Cases~~per bidding zone in accordance with Article 8(1)(b);
   ii. total daily submitted order volume per bidding zone in accordance with Article 8(1)(c);
   iii. total number of trades per contracts in accordance with Article 11(1)(c); and
   iv. total number of trades per contract – hours to delivery in accordance with Article 11(1)(d);

Article 2

Data sets for indicators ~~calculation~~

~~1.~~ The indicators ~~addressed in this Annex shall belong to different categories:~~

~~a) usage indicators envisaged in TITLE 4 shall quantify the average daily usage of a functionality and shall constitute the input of the continuous trading matching algorithm. They shall be the basis for the quantification of effective usage, anticipated usage and usage range and the definition of datasets;~~

~~b) output indicators envisaged in TITLE 5 shall qualify the outcomes of the continuous trading matching algorithm;~~

~~c) performance indicators envisaged in TITLE 3 shall measure the properties of the continuous trading matching algorithm in terms of compliance with the CACM requirements of scalability (Article 9). The continuous trading matching algorithm is by default optimal and repeatable. For this reason, the monitoring of the continuous trading matching algorithm's optimality and repeatability is not necessary.~~

~~2. The indicators referred to in paragraph 1 above are intended to fulfil different purposes:~~

~~d) Monitoring of operations: monitoring the evolution of the actual performance of the continuous trading matching algorithm (Article 3);~~

~~e) Request for change impact assessment: assessing the impact of requests for change or of corrective measures, as described in the Algorithm Methodology (Article 4);~~

~~f) Scalability assessment: assessing the impact of the long-term anticipated market growth on the continuous trading matching algorithm scalability (Article 5);~~

~~g) Research and development assessment: ensure the capability of the continuous trading matching algorithm to support in the medium- and long-term anticipated market growth and extension of requirements (Article 6).~~

~~The indicators under paragraph 1 above~~ shall be calculated on the basis of different temporal sets ~~in order to build the scenarios to address the purposes described in paragraph 2 above~~. Each data set comprises the data for either a single MTU's or a single day's run of the continuous market depending on the type of assessment. Specifically:

~~h)~~a) ~~The~~the recent historical set shall comprise either a representative MTU or of all days of the previous K months, starting from the Kth month (‘M’) before the assessment (M-K) up to the previous month (M-1). The K value should be below 13 and shall be defined in the operational procedures ~~attached to the relevant operational agreement~~;

~~i)~~b) ~~The~~the rolling historical set shall comprise either a representative MTU of the previous year or of all days starting from the 13th month before the assessment (M-13) up to the previous month (M-1);

~~j)~~c) ~~The~~the near future set for the indicator calculation shall be defined starting from the projected growth of the rolling historical set for an MTU for the following year (Y+1) and considering all the forward-looking system information expected at the time of evaluation; and

~~k)~~d) ~~The~~the distant future set for the indicator calculation shall be defined starting from the projected growth for of the historical set for an MTU for the following three years (Y+3) and considering all the forward-looking system information expected at the time of evaluation.

~~3.~~1. ~~Unless specified otherwise, all the values that are defined as parameters in this methodology shall be defined in the operational procedures defined in the relevant operational agreements and their value will be shared in the public reports~~

~~4. The implementation timeline for the indicators listed in this paragraph shall be the following:~~

~~l)~~ - Application of Indicators ~~available from the end of 2019:~~

~~i. Volume-Weighted Average Intraday Prices in accordance with Article 12.3.a);~~
~~ii. Volume-Weighted Average Intraday Prices last trading hour in accordance with Article 12.3.a);~~
~~iii. Bid-Ask Spread in accordance with Article 12.3.a);~~
~~iv. Total matched volume in accordance with Article 12.1.a);~~
~~v. Total matched volumes – hours to delivery in accordance with Article 12.1.a);~~

~~m) Indicators available from the end of 2021:~~

~~i. Total number of daily submitted orders per product and per bidding zone in accordance with Article 12.1.b);~~
~~ii. Total daily submitted order volume per bidding zone in accordance with Article 12.1.c)a);~~
~~iii. Total number of trades per contracts in accordance with Article 12.1.a);~~
~~iv. Total number of trades per contract – hours to delivery in accordance with Article 12.1.a);~~

~~n) All the other indicators are provided from the entry into force of this Annex 4.~~

TITLE 2 ~~– Indicators calculation and thresholds~~ for continuous trading matching algorithm ~~usage~~

Article 3

Monitoring of operations ~~and reporting~~

1. For ~~Monitoring purposes under Article 2(2)(a)~~monitoring and reporting the ~~following~~ evolution the continuous trading matching algorithm the indicators described under Title 3, Title 4 and 5 shall be used~~:~~.

   ~~o) the usage indicators more particularly described under TITLE 4 (and as referenced under Article 2(1)(a)),~~
   ~~p) the output indicators more particularly described under TITLE 5 (and as referenced under Article 2(1)(b)),~~
   ~~q) the performance indicators more particularly described under TITLE 3 (and as referenced under Article 2(1)(c)).~~

~~2. The indicators referred to under paragraph 1 above shall be calculated as their actual values as recorded in the recent historical set under Article 2(3)(b).~~

2. ~~The usage indicators under paragraphs 1(a) shall be assessed against the following threshold~~The usage indicators under Title 4 shall be monitored by comparing the effective usage of ~~the~~their functionality ~~calculated over~~in the recent historical set pursuant to Article 2(a) for all days against the usage range of the same functionality, which was calculated pursuant to Article 5(3).

~~3.~~ For monitoring the scalability pursuant to Article 7 the recent historical set for ~~all days under Article 2(3)(a)~~a MTU pursuant to Article 2(a) shall be assess against the ~~corresponding usage range, as calculated under following Article 5(4):~~

~~4. The performance indicators under paragraph 1(c) calculated as their actual values as recorded in the recent historical set for an MTU under Article 2(3)(a), shall be assessed over the following thresholds:~~

~~5.~~3. ~~Scalability indicators under Article 8:~~ thresholds defined in the service agreement with the continuous trading matching algorithm service provider.

4. For reporting purposes, the indicators referred to under Title 3, 4 and 5 shall use the rolling historical set pursuant to Article 2(b).

5. For reporting purposes an average of values may be applied.

Article 4

Request for Change impact assessment

~~6. For request for change impact assessment purposes under Article 2(2)(b), the performance indicators more particularly described under TITLE 3 Article 8 and recalled under Article 2(1)(c) shall be used.~~

1. ~~The performance indicators referred to under paragraph 1~~The request for change impact assessment should assess the impact on scalability by a request for change.

~~7.~~2. The scalability indicators pursuant to Article 7 shall be calculated simulating the run of the continuous trading matching algorithm over two different ~~scenarios~~sets:

a) The historical ~~scenario~~set: using as inputs

v. the effective usage of all the existing functionalities observed over the rolling historical set for an MTU ~~under Article 2 (3)(b)~~pursuant to Article 2(b) without the change; and

vi. the effective usage of all the existing functionalities observed over the rolling historical set for an MTU ~~under Article 2 (3)(b) with the change;~~pursuant to Article 2(b) with the change.

b) The near future ~~scenario~~set: using as inputs

i. the anticipated usage of all existing products and functionalities calculated on the near future set for an MTU ~~under Article 2 (3)(c)~~pursuant to Article 2(c) without the change; and

ii. the anticipated usage of all existing products and functionalities calculated on the near future set for an MTU ~~under Article 2 (3)(c)~~pursuant to Article 2(c) with the change~~;~~.

c) If the change under investigation involves an adaptation of the algorithm with anticipated significant performance impact, then the near future ~~scenario~~set may be run additionally on a prototype of the algorithm that implements this adaptation.

~~8.~~ The ~~performance indicators under paragraph 1 above~~request for change impact assessment shall ~~be assessed over~~use the ~~following~~ thresholds~~:~~

3. ~~Scalability indicators under Article 8: all cases calculated over~~ defined in the service agreement with the continuous trading matching algorithm service provider and assess them against the scalability indicators pursuant to Article 7 applied on the near future ~~scenario~~ set for an MTU under Article 2(c).

Article 5

Scalability assessment

1. ~~Article 2(3)(c) shall be within~~The scalability assessment should assess the impact of the long-term anticipated growth on the SIDC algorithm scalability, considering the expected increase of usage of functionalities.

~~9.~~2. The assessment shall apply the thresholds defined in the service agreement with the continuous trading matching algorithm service provider~~.~~ on values resulting from simulation of the SIDC algorithm including the anticipated usage of all functionalities on:

a) the near future set for an MTU under Article 2(c) and
b) the distant future set for an MTU under Article 2(d).

3. The usage range shall be calculated as the maximum usage of the functionalities supported by the SIDC algorithm resulting from paragraph 2(b).

Article 6

Research and Development assessment

~~Article 5~~Article 1

~~Scalability assessment~~

~~10. For scalability assessment purposes under Article 2(2)(c) the performance indicators more particularly described under Article 8 shall be used.~~

1. ~~The performance~~The research and development assessment should ensure the capability of the SIDC algorithm to support in the medium and long term the anticipated market growth and the extension of requirements and shall use all scalability indicators pursuant to Article 7.

~~11.~~ The scalability indicators ~~referred to under paragraph 1 above~~ shall be calculated with the usage range of all the functionalities when simulating the run of the continuous ~~trading matching~~SIDC algorithm ~~over two different scenarios:~~

~~d) a near future scenario: using as inputs the anticipated usage of all the functionalities calculated over the near future set for an MTU under Article 2(3)(c).~~

~~e) a distant future scenario, using as inputs the increasing values of the anticipated usage of all the functionalities calculated~~ on the distant future set for an MTU ~~under Article 2(3)(d) .~~

~~12. The performance indicators under paragraph 1 above shall be assessed over the following thresholds:~~

~~13.~~2. ~~Scalability indicators under Article 8: all cases calculated over the distant future scenario for an MTU set under Article 2(3)(d)~~pursuant to Article 2(d). At least X% of the resulting values shall be within the thresholds defined in the service agreement with the continuous trading matching algorithm service provider.

~~14. The basis for the calculation of the usage range is the maximum usage of the functionalities supported by the continuous trading matching algorithm estimated adopted in paragraph 2 above and complying with the threshold under paragraph 3 (a).~~

~~Article 6~~Article 1

~~Research and Development assessment~~

~~15. For research and development purposes under Article 2(2) (d), all performance indicators defined under TITLE 3 shall be used.~~

~~16. The performance indicators shall be calculated simulating the run of the continuous SIDC algorithm using as inputs the usage range of all the functionalities calculated on the distant future set for an MTU defined in Article 2(3)(d).~~

~~17. The performance indicators under paragraph 1 above shall be assessed over the following thresholds:~~

~~f) Scalability indicators under Article 8: at least X% of cases calculated over the distant future scenario set for an MTU under Article 2(3)(d) shall be within the thresholds defined in the service agreement with the continuous trading matching algorithm service provider.~~

- Indicators on the continuous trading matching algorithm performance

~~**Article 7**~~

~~**Indicators on the continuous trading matching algorithm's ability to maximize economic surplus**~~

~~18. These indicators are not relevant for the continuous trading matching algorithm.~~

~~**Article 8**~~**Article 7**

Indicators on the algorithm scalability

1. Indicators of the time needed to process an order execution, meaning the processing of an order
    a) **Time for the execution of an order** – This indicator measures the time between the moment when an order receives a timestamp from the system and the moment it is reported by the system as having been executed
    b) **Rate of executed orders** – this indicator measures the number of executed orders divided by a certain amount of time (to be defined)

2. Indicators of the time needed to process a trade execution, meaning the matching of orders
    a) **Time for the execution of a trade** – This indicator measures the time between the moment when an aggressor order receives a timestamp from the system and the moment it is reported by the system as having concluded a trade
    b) **Rate of executed trade** – this indicator measures the number of executed trades divided by a certain amount of time (to be defined)

3. ~~Indicators~~Indicator of the time needed to produce post-coupling output

    Time for the generation of post coupling files – This indicator measures the time between the moment the system is triggered to produce its post-coupling output (after gate closure time) and the moment it sends this post-coupling output.

4. ~~Indicators~~Indicator of the time needed to process order book update

   Time for processing an order book update - For each order book update, this indicator measures the longest time lapse between the moment that an order receives a timestamp from the system and the moment that the system sends the order book update comprising that order.

TITLE 3 - Indicators on the continuous trading matching algorithm usage

~~Article 9~~Article 8

Indicators to describe the usage of continuous SIDC products

1. Indicators to describe the usage of continuous SIDC algorithm products:
   a) **Total number of products** – This indicator counts the number of available products in the continuous trading matching algorithm, as defined in ~~SOB~~ shared order book
   b) **Total number of daily submitted orders per product and per bidding zone** – This indicator counts the total number of submitted orders on a daily basis
   c) **Total daily submitted order volume per bidding zone** – This indicator measures total submitted order volume per bidding zone

2. ~~Indicators~~Indicator to describe the usage of explicit capacity allocation

   Total number of explicit capacity allocation request - this indicator counts on a daily basis the total number changes of ~~explicit~~cross-zonal capacity ~~allocation requests on a daily basis~~, which do not derive from a trade in the shared order book.

~~Article 10~~Article 9

Indicators to describe the geographical extension of continuous SIDC

1. Indicators to describe the geographical extension of continuous SIDC
   a) **Total number of NEMOs –** This indicator counts the number of member entities as defined in ~~SOB~~shared order book
   b) **Total number of delivery areas** – This indicator counts the number of delivery areas as defined in ~~CMM~~capacity management module
   c) **Total number of market areas –** This indicator counts the number of market areas as defined in ~~CMM~~capacity management module
   d) **Total number of interconnectors** – This indicator counts the number of interconnectors as defined in ~~CMM~~capacity management module
   e) **Total number of borders** – This indicator counts the number of borders as defined in ~~CMM~~capacity management module

~~Article 11~~Article 10

Indicators to describe the network constraints

a) **Total number of occurrences of ramping constraints on interconnector level** - This indicator counts the occurrences (per DC interconnector, per year, per MTU) of the constraint being a limiting one for the available transmission capacities
b) **Total number of occurrences of Biding Zone net position ramping constraints** - This indicator counts the occurrences (per year, per Bidding Zone) of the net position ramping constraint being a limiting one for the available transmission capacities
c) **Total number of occurrences of Biding Zone net position volume constraints -** This indicator counts the occurrences (per year, per Bidding Zone) of the net position volume constraint being a limiting one for the available transmission capacities

TITLE 4 - Monitoring of the continuous trading matching algorithm output

~~Article 12~~Article 11

Indicators to describe the output of ~~maximization of economic surplus~~the continuous trading algorithm

1. Indicators on the evolution of the number of matched orders of each contract, and the corresponding total volume;
    a) **Total matched volume -** aggregated volume of all trades within the intraday timeframe, made per contract per combination of Bidding Zones
    b) **Total matched volumes – hours to delivery** – this indicator counts the traded volumes, grouped per contract with same "delivery time start-end", per combination of Bidding Zones and grouped according to the hours left to delivery and aggregated per month
    c) **Total number of trades per contracts** – This indicator counts the total number of trades and per Bidding Zone,
    d) **Total number of trades per contract – hours to delivery** – This indicator counts the total number of trades, grouped per contract with same "delivery time start-end", per Bidding Zone and grouped according to the hours left to delivery.

2. Indicators on the evolution of the number of explicit capacity allocations
    a) **Total number of explicit capacity allocations -** this indicator counts the total number of explicit allocations on a daily basis

3. Indicators on the prices
    a) **Volume-Weighted Average Intraday Prices -** volume-weighted average price of all trades per contract per Bidding Zone
    b) **Volume-Weighted Average Intraday Prices-last trading hour -** volume-weighted average price of all trades per contract per Bidding Zone corresponding to the last trading hour
    c) **Bid-Ask Spread -** Average bid-ask spread of the active orders per contract per Bidding Zone, calculated as defined in the algorithm monitoring procedures.

4. Indicators on the capacities

a) **ATC utilization rate -** ratio for each MTU calculated from the allocated netted intra-day capacity / offered intra-day capacity for each border in both directions

5. Indicators on net positions

a) **Net positions –** This indicator counts the net positions for each Bidding Zone per MTU level.