All NEMOs' proposal for the price coupling algorithm and for the continuous trading matching algorithm, also incorporating TSO and NEMO proposals for a common set of requirements, in accordance with Article 37(5) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

03 November 2016

All NEMOs, taking into account the following:

Whereas

Background

(1) This document is a common proposal developed by all Nominated Electricity Market Operators (hereafter referred to as "NEMOs") for the price coupling algorithm and for the continuous trading matching algorithm (hereafter referred to as the "Algorithm Proposal") in accordance with Article 37(5) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereafter referred to as the "CACM Regulation"). It incorporates as an annex a common set of requirements proposed by NEMOs and TSOs for the price coupling algorithm and the continuous trading matching algorithm (hereinafter referred to as "DA Algorithm Requirements" and "ID Algorithm Requirements" respectively) in accordance with Article 37 of the CACM Regulation.

(2) According to Article 37: *"1. By eight months after the entry into force of this Regulation: (a) all TSOs shall jointly provide all NEMOs with a proposal for a common set of requirements for efficient capacity allocation to enable the development of the price coupling algorithm and of the continuous trading matching algorithm. These requirements shall specify functionalities and performance, including deadlines for the delivery of single day-ahead and intraday coupling results and details of the cross-zonal capacity and allocation constraints to be respected; (b) all NEMOs shall jointly propose a common set of requirements for efficient matching to enable the development of the price coupling algorithm and of the continuous trading matching algorithm."*

(3) When both proposals are prepared, all NEMOs and all TSOs will cooperate to finalise the sets of the TSOs' and NEMOs' DA and ID Algorithm Requirements. Subsequently, "*all NEMOs shall develop a proposal for the algorithm in accordance with these requirements. This proposal shall indicate the time limit for the submission of received orders by NEMOs required to perform the MCO functions in accordance with Article 7(1)(b).*"

(4) In accordance with Article 37(3) of the CACM Regulation the NEMOs' proposal for the algorithm "*shall be submitted to all TSOs. If additional time is required to prepare this proposal, all NEMOs shall work together supported by all TSOs for a period of not more than two months to ensure that the proposal complies with paragraphs 1 and 2.*"

(5) In accordance with Article 37(4) "*The proposals referred to in paragraphs 1 and 2 shall be subject to consultation in accordance with Article 12*". The consultation on all proposals - i.e., the TSOs' and NEMOs' DA and ID Algorithm Requirements and the NEMOs' proposal for the Algorithm Proposal - will be prepared in cooperation between all TSOs and all NEMOs and be consulted upon together to ensure efficient assessment of their content by market participants.

(6) The all NEMOs' proposal for the Algorithm Proposal incorporating the TSOs' and NEMOs' DA and ID Algorithm Requirements and taking into account the comments from the consultation will be submitted to the regulatory authorities for approval no later than 18 months after the entry into force of the CACM Regulation - i.e., 14 February 2017.

(7) In accordance with the Whereas (14) of the CACM Regulation, the DA and ID Algorithm Requirements are based on the current coupling solutions, either implemented or under development and updated or amended where seen appropriate.

(8) Future evolution of capacity calculation methodologies in accordance with the CACM regulation may require additional input parameters. In this case, all TSOs will send a request for amendments of the algorithm to the NEMOs and later on for all NRAs' approval. An assessment of the additional algorithm functionalities shall take place at the latest when the proposal for the capacity calculation methodology in every capacity calculation region (CCR) in accordance with the CACM Regulation is being developed by the TSOs. All TSOs and all NEMOs shall cooperate to propose any amendments if

deemed necessary when the above proposals for the capacity calculation methodology is submitted for approval to the national regulatory authorities (ten months after the approval of the all TSOs CCR Proposal).

(9) NEMOs will establish, consistent with the MCO plan, through a NEMO Cooperation Agreement entered into by all NEMOs, a NEMO Committee and associated governance arrangements compliant with the CACM Regulation. Joint NEMO decisions and responsibilities regarding this Algorithm Proposal will be undertaken via the NEMO Committee and associated governance arrangements.

Impact on the objectives of CACM Regulation

(10) The proposed Algorithm Proposal takes into account the general objectives of capacity allocation and congestion management cooperation described in Article 3 of the CACM Regulation. The DA and ID Algorithm Requirements aim in particular at ensuring optimal use of the transmission infrastructure (optimizing the calculation and allocation of cross - zonal capacity) while respecting the need for a fair and orderly market and fair and orderly price formation (encouraging the development of market liquidity).

(11) The procedures for maintaining the algorithms aim at ensuring fair and non-discriminatory treatment of TSOs, NEMOs and market participants. The DA and ID Algorithm Requirements support trading with multiple NEMOs while facilitating a level playing field for NEMOs. The algorithms also allow participation by more than one TSO on one or both sides of a bidding zone border.

(12) Further, the Algorithm Proposal ensures and enhances transparency and reliability of information through the provision of suitable algorithm documentation, performance reporting to all involved stakeholders and a transparent process (including consultation where relevant) to manage changes to the algorithms.

(13) The Proposal establishes that the DA and ID Algorithm's operational performance and compliance will be managed in accordance with principles that:
   a) Provide an objective basis to monitor and communicate operational performance;
   b) Provide assurance that the Algorithm Performance (DA and ID) is at an acceptable level. In particular, that the DA Algorithm is for all days able to find a compliant solution to the market coupling problem in the permitted time;
   c) Support stakeholders' understanding of the DA and ID Algorithm.

(14) The Proposal establishes that changes to the DA and ID Algorithm will be managed in accordance with principles that:
   a) Provide an open, transparent, non-discriminatory way to manage change requests, including stakeholder input where relevant;
   b) Provide assurance that the Algorithm Performance shall be maintained at acceptable levels now and over a reasonable period of time in the future, assuming plausible market growth and development;
   c) Enable individual NEMO or TSO requests to be supported where this does not harm others or includes measures to mitigate any harm;
   d) Establish a fair and efficient process that supports timely market development.

Implementation timeline

(15) TSOs and NEMOs aim at the earliest possible implementation of the DA and ID Algorithms keeping in mind the differences between the various Member States and regions/CCRs. The NEMOs' proposal for the Algorithm Proposal allows for an early but stepwise alignment of existing solutions and the application of the single day-ahead and intraday coupling at a regional level and later at EU level.

(16) Some Algorithm Requirements have been identified for implementation at a later date, following clarification of the requirements and technical assessment of the impact on algorithm performance.

SUBMIT THE FOLLOWING ALGORITHM PROPOSAL TO ALL REGULATORY AUTHORITIES:

TITLE 1

GENERAL PROVISIONS

Article 1

Subject matter and scope

1. The Algorithm Proposal in this Proposal shall be considered as the common proposal of all NEMOs in accordance with Article 37 of the CACM Regulation.
2. The annexed DA and ID Algorithm Requirements shall be considered as the common proposal of all NEMOs and all TSOs, in accordance with Article 37 of the CACM Regulation.

Article 2

Definitions

For the purpose of this proposal, terms used in this document have the meaning of the definitions included in Article 2 of the CACM Regulation and Regulation 543/2013.

In addition, the following definitions shall apply:

1. Party: means any NEMO or TSO unless specified otherwise.
2. DA Algorithm: means the price coupling algorithm in the single day-ahead coupling MCO function computing prices and net positions and providing necessary input to shipping and clearing processes.
3. ID Algorithm: means the continuous trading matching algorithm in the single intraday coupling MCO function computing order display, matching orders and providing necessary input to shipping and clearing processes.
4. Algorithm Performance: means the ability of the DA or ID Algorithm to provide in the timeframe allowed in production reliable and valid quality results plus any other performance indicators established by the NEMO Committee.
5. Functionality: means any market or network feature or design element embodied in the systems, communications and procedures that support the DA or ID Algorithm in accordance with the Algorithm Requirements.
6. Prototype: means a variant of the current DA or ID Algorithm built to assess the impact on Algorithm Performance of the introduction of changes such a new Functionality.
7. Implementation: means the inclusion in the DA or ID Algorithm of a new Functionality. In this document, the use of a Functionality in production requires the Activation of the Functionality after it has been implemented.
8. Activation: means making an existing Functionality available for daily use in production (either where not used yet by any Party or in a location or by a Party not using it yet).

9. Change Request: means a formal request by one or more Parties for any modification to be made to the DA or ID Algorithm or to its usage in production.
10. Change Request on existing Usage: means a Change Request in for the modification of the Usage Limit of an existing, already activated, Functionality in.
11. Change Request for Prototyping: means a Change Request for the development of a Prototype or a request for analyses of potential changes.
12. Change Request for Implementation: means a Change Request for the implementation of a new or modified Functionality in the DA or ID Algorithm.
13. Change Request for Activation: means a Change Request for the Activation (i.e., use) in production of an existing Functionality either (i) not yet used by anybody, or (ii) in a bidding areas or by a NEMO not using it yet.
14. Usage Limit: means a restriction applicable in production to the usage by each individual Party of any Functionality which can significantly impact Algorithm Performance.
15. Effective Usage: means the observed relevant historic usage of a Functionality in production by each individual Party after its Activation.
16. Anticipated Effective Usage: means a reasonable expected Effective Usage of a Functionality by each individual Party - for example, based on projecting historic Effective Usage adjusted for particular circumstances by exception as approved by the NEMO Committee - for the purpose of testing the impact of Change Requests at a time horizon set by the NEMO Committee (typically 1 year).
17. Initial Requirements: means DA or ID Algorithm Requirements proposed according to Article 37 which the DA or ID Algorithm will comply with from the start of operation of the single day-ahead or intraday coupling (as further defined in the MCO Plan).
18. Future Requirements: means DA or ID Algorithm requirements proposed according to Article 37 which the DA or ID Algorithm will comply with after the initial start of the single day-ahead or intraday coupling, where necessary subject to clarification of the requirements and technical assessment of the impact on Algorithm Performance. In accordance to the implementation timeline.
19. Owners: means the Parties (all TSOs and/or all NEMOs) proposing an Algorithm Requirement according to CACM Article 37. The Owners are responsible for defining the Algorithm Requirement, agreeing to any modification to such Algorithm Requirement and for verifying that the DA or ID Algorithm Functionalities meet the Algorithm Requirement.

Article 3

Algorithm Requirements

1. The DA Algorithm Requirements are set out in annex 1 and the ID Algorithm Requirements in annex 2.
2. The Algorithm Requirements comprise a common set of Requirements proposed by TSOs, a common set of Requirements proposed by NEMOs and a common set of Requirements jointly proposed by both TSOs and NEMOs.
3. Any modification to Functionality, including modifications needed to meet Future Requirements, shall be implemented according to a Change Request, including assessment of feasibility and algorithm performance impact.
4. The NEMO Committee shall maintain the DA and ID Algorithm Functionalities to be compliant with the Initial Requirements plus Future Requirements (following their implementation).
5. The NEMO Committee is entitled to set Usage Limits which limit the level of usage of a particular Functionality where necessary to ensure that Algorithm Performance shall be maintained at a satisfactory level.

Article 4

DA Algorithm

1. The price coupling algorithm shall be based on the PCR Euphemia algorithm initially developed and operational in the MRC and 4MMC regions.
2. The price coupling algorithm shall utilise a quadratic linear programme in combination with heuristic rules that seek to maximise overall economic welfare based on the input orders and transmission network data together with the network and market matching constraints.
3. The price coupling algorithm shall first aim to find a solution that complies with the inputs and solution constraints. It shall then seek to find solutions with higher economic welfare within the operational time allowed.
4. Orders shall be anonymous – i.e., there shall be no identification of the originating market participant.
5. A single instance of the price coupling algorithm operated by the coordinator shall calculate the results for all coupled NEMO Trading hubs, where a NEMO Trading hub represents the orders submitted on one particular NEMO in one bidding zone.
6. The input data shall be available to any authorised operator, who is entitled to perform the price coupling calculation in parallel.
7. The results from the price coupling algorithm shall comprise the following:
    a) per bidding zone and PUN region: hourly prices,
    b) per NEMO Trading hub: net volumes, aggregate matched hourly orders, matched complex, block, merit and PUN orders
8. The NEMO Committee shall establish the operational procedures and timings, including both normal procedures and fallback procedures, consistent with operational requirements under CACM. NEMOs shall be required to comply with these procedures.
9. Under normal operations, NEMOs shall submit orders to the MCO Function by 12.10 or else backup procedures shall apply.

Article 5

ID Algorithm

1. The continuous trading matching algorithm shall be based on the XBID solution initially developed in the NWE+ group of countries.
2. The continuous trading matching algorithm shall comprise a shared order book (SOB) module and a capacity management module (CMM). The SOB module shall manage order entry, order management and order matching, while the capacity management module shall manage transmission capacity management and allocation.
3. The continuous trading matching algorithm enables multiple NEMOs to connect to the central SOB module. Orders are entered in the local trading solutions; market participants are not entitled to access the shared order book directly.
4. Matching of contracts shall be performed in the SOB module, irrespectively of the delivery areas the orders were entered (including from the same area). NEMOs are entitled to match other local contracts themselves. The SOB module maintains a consolidated order book for all contracts (not local contracts) based on available transmission capacity and allocation constraints between market areas.

5. The CMM shall provide the current capacity availability information. When cross border trades are performed, the required cross border capacity shall be implicitly allocated in the CMM.
6. Explicit participants shall directly access the CMM to perform explicit capacity reservations.
7. The SOB module shall determine the local view of all orders that can be executed in the selected delivery area – i.e., local orders plus orders from connected delivery areas where there is available transmission capacity.
8. The SOB shall apply deterministic matching procedures. Contracts shall be executed in the SOB on the price-time-priority principle:
   a) Price: orders shall be executed at the best price. The best buy order shall be executed against the best sell order first (the best price for buy orders is the highest price, for sell orders it is the lowest price).
   b) Time: when an order is entered into the SOB, it shall be assigned a timestamp. This timestamp is used to prioritize orders with the same price limit. Orders with earlier timestamps shall be executed with a higher priority than orders with a later timestamp.
9. The clearing price for a matched order shall be the order price of the best order which is already in the SOB:
   a) If a newly entered buy order is matched against an existing sell order, the limit price of the sell order becomes the trade execution price.
   b) If a newly entered sell order is matched against an existing buy order, the limit price of the buy order becomes the trade execution price.
10. Where a cross-zonal trade is identified in the SOB, a request to reserve the associated cross-zonal capacity shall be made to the CMM. Requests to reserve capacity shall be queued along with explicit capacity requests and treated in time sequence. If the necessary cross-zonal capacity is not available, the cross-zonal trade is not matched.

Article 6

Algorithm Management Principles

The DA and ID Algorithm's operational performance and compliance shall be managed in accordance with the Algorithm Management Principles set out below.

1. Performance shall be controlled and measured by the NEMO Committee against criteria to be set in consultation with the Market Electricity Stakeholder Committee (MESC).
2. The NEMO Committee shall investigate and to the fullest extent possible share its findings with the MESC on any significant performance deterioration or non-compliance with an implemented Algorithm Requirement.
3. The NEMO Committee shall promptly inform all TSOs of any non-compliance with a TSO-owned or joint TSO/NEMO-owned Algorithm Requirement and shall cooperate with TSOs to resolve any such non-compliance.
4. The NEMO Committee shall maintain a public description of the DA and ID Algorithm.
5. The NEMO Committee shall, in consultation with the Market European Stakeholder Committee established pursuant to Article 11 of CACM, provide additional reasonable support for stakeholders to assist them in their understanding of the DA and ID Algorithm and issues related to it.

Article 7

Change Management Principles

The NEMO Committee shall manage changes to the DA and ID Algorithm Functionality and usage according to the principles in this Article 7. The principles shall be incorporated by the NEMO Committee into more detailed change management procedures.

Moderation and control

1. Any Change Request for Implementation (of a new or modified Functionality), a Change Request on existing Usage or a Change Request for Activation shall induce only a proportionate, controlled impact on the Algorithm Performance - and no significant harm to any other Functionality already included in the DA or ID Algorithm and shall be compatible with the Initial Requirements plus Future Requirements (following their implementation).
2. Algorithm Performance shall be measured against criteria as specified in Article 6.1.
3. Any impact on the performance of related MCO function systems and processes shall also be taken into account.

Fair and Non-Discriminatory Treatment of Change Requests

4. All Parties have the right in principle to use any Functionality subject to approval of a Change Request for Activation.
5. Any new Functionality is available to be used by all Parties that initially contributed to its development plus any other Party that is willing to share the historical cost of this new Functionality. Activation by a party of the Functionality shall be subject to a corresponding Change Request. The associated costs shall be shared according to sharing rules in compliance with CACM.
6. Change Requests to the DA or ID Algorithm requested by any Party(ies) shall be handled in an objective and non-discriminatory manner.
7. Change Requests that aim to improve Algorithm Performance are deemed to be of benefit to all NEMOs, and shall be decided upon by the NEMO Committee and the costs proposed to be treated as Common Costs according to CACM. Similarly, the NEMO Committee is entitled to decide that any Change Request for Implementation is considered a common proposal of all NEMOs.
8. Change Requests for Prototyping are de-facto accepted provided the requesting Party(ies) bears the associated costs (where any cost sharing shall be in accordance with CACM).
9. Change Requests for Implementation shall be accepted by the NEMO Committee provided the requesting Party(ies) bears the associated costs in accordance with CACM and such Implementation in particular complies with 7(1).
10. Any Party is entitled to join another Parties' Change Request for Prototyping or Implementation provided that (i) the additional Party(ies) is entitled to request modifications to the Change Request and which the original requesting Party(ies) shall consider in good faith and not unreasonably reject, and that (ii) the original requesting Party(ies) and any additional Parties shall, as long as 7(7) is not deemed by the NEMO Committee to apply, bear the associated costs (where any cost sharing shall be in accordance with CACM).
11. A Change Request for Implementation into the DA or ID Algorithm of new Functionality may be rejected based only on reasonable, objective, and non-discriminatory criteria.
12. Approval of Change Requests for Activation is made based on objective acceptance criteria defined to secure the Algorithm Performance according to 7(1), (2) and (3).

Usage Limits

13. The use in production by any Party of any Functionality potentially impacting the Algorithm Performance may be subject to controlled Usage Limits agreed by the NEMO Committee at the time the Change Request for Activation is approved.

14. Usage Limits for each individual Party for the Functionalities in Production that – together with other Functionalities - significantly impact the Algorithm Performance shall be set by the NEMO Committee according to objective, non-discriminatory criteria established by the NEMO Committee where an objective risk exists that the Algorithm Performance cannot be maintained at a satisfactory level. If it is anticipated that the Usage Limit may be exceeded in the future, a revised Usage Limit should be subject of a new Change Request.

15. The Usage Limits of a Functionality shall be set by the NEMO Committee taking into account at least, but not be limited to, the following principles:
    a) Usage Limits shall respect the Effective Usage;
    b) Usage Limits shall support the geographic completion of the Single Day-ahead Coupling;
    c) Usage Limits shall support fair competition among the NEMOs;
    d) Usage Limits shall support the development of efficient, liquid markets able to support fair competition between market participants in all member states.

16. To meet the principles in 7(15), and to address any performance issues of Change Request for Activation or Usage, the NEMO Committee is entitled to reduce the Usage Limits of a Functionality for any individual Party, provided that this is done in a reasonable way and based on objective and non-discriminatory criteria, and it shall not (except in exceptional circumstances in 7(17)) result in Usage Limits set below the Effective Usage.

17. In exceptional circumstances, where the NEMO Committee is unable to set Usage Limits that meet all the above-mentioned principles, the further actions to be taken shall be decided by the NEMO Committee in consultation with the MESC. In addition, all NEMOs shall take all reasonable actions to improve the Algorithm Performance.

18. After the Activation of a Functionality in production, the Effective Usage and the Anticipated Effective Usage of the Functionality shall serve as the basis for future assumptions related to the impact on Algorithm Performance of this Functionality (including the testing of other Change Requests for Activation).

19. The agreed Usage Limit does not grant a reserved allowance to a Party for DA or ID Algorithm Performance degradation to be redeployed for future use or any other purpose.

20. Parties shall ensure that the conditions expressed in the approved Change Request are respected in production. In particular, the Effective Usage of a Functionality shall not exceed the agreed Usage Limit for this Functionality.

21. Where possible, the Change Request implementation shall include measures to prevent violation of the previously agreed Usage Limit. Parties may apply appropriate measures under their relevant agreements on any Party breaching their Usage Limits and failing to take timely actions to rectify.

22. The NEMO Committee shall maintain a public record of all Usage Limits.

Change Request Process

23. The Party(ies) proposing a Change Request for new Functionality or Activation is responsible for fully specifying their requirement, including projected Usage Limits and any subsequent effect on processes or other systems.

24. A Party(ies) is entitled to submit Change Request for Prototyping in order to evaluate and further develop their requirements.

25. The impact on Algorithm Performance, existing Functionality, adjacent systems and processes shall be assessed based on Anticipated Usage of the new Functionality together with Anticipated Usage of existing Functionality.

26. The assessment of Change Requests related to the same implementation timeframe shall first be considered in combination. Where such combination breaches the acceptance criteria, a second assessment based on individual impact can be done.

27. Change Requests shall be categorised as follows:
    a) Non-Notifiable Change: Stakeholders not informed of change – where no impact on market parties;
    b) Notifiable Change: Stakeholders informed of change (ahead of implementation) – where the change is non-discretionary but there is potential impact for market parties;
    c) Consulted Change: Requirement on The NEMO Committee to consult Stakeholders and to take response into consideration; the form of the consultation shall be agreed with the MESC – where there is material potential adverse market impact and discretionary choices exist.

28. Where a change is required to the Algorithm Proposal or the Algorithm Requirements, the Parties shall follow the formal CACM amendment process, including Article 12 consultation.

29. The NEMO Committee shall determine on a case-by-case basis which approach is most suitable.

30. The current list of Change Requests under consideration shall be available to the MESC, who can request the NEMO Committee to reconsider the approach it has adopted on a particular Change Request.

Decision-making

31. Change Requests must be approved by the NEMO Committee based on an objective evaluation report.

32. All impacted Parties are entitled to receive all relevant information regarding the status of a Change Request.

33. Where a decision in accordance with this Algorithm Proposal impacts the Algorithm Requirements proposed by all TSOs (or by all TSOs and all NEMOs jointly), the NEMO Committee shall coordinate with TSOs.

34. Any decisions required by the NEMO Committee in accordance with this Algorithm Proposal shall be motivated by reference to the objectives set out in Articles 3 and 37 of CACM.

35. The NEMO Committee is entitled to decide to refer a decision in accordance with this Algorithm Proposal to an arbitral tribunal to be established by NEMOs for a binding decision.

36. Any Party is entitled to challenge a decision taken by the NEMO Committee in accordance with this Algorithm Proposal by requesting a referral to the arbitral tribunal.

37. Referrals under 7(35) and 7(36) shall be according to procedures established by the NEMO Committee, in coordination with TSOs consistent with 7(33).

Article 8

Timeline

1. The timelines, including intermediate implementation steps and planning assumptions, for both the DA and ID Algorithms are established in the MCO Plan.

ANNEX 1 – DA Algorithm Requirements

ANNEX 2 – ID Algorithm Requirements