

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

13 November 2017

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) of the CACM Regulation: *“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) After both proposals for common set of requirements were prepared, all NEMOs and all TSOs have cooperated 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) of the CACM Regulation *“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 - was prepared in cooperation between all TSOs and all NEMOs and was consulted upon together to ensure efficient assessment of their content by market participants.
- (6) In accordance with Article 37(5) of the CACM Regulation 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, has been 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 Article 9(12) of the CACM Regulation all NRAs sent to all NEMOs a “Request for amendment by all Regulatory Authorities agreed at the Energy Regulators’ Forum”, providing a detailed request commonly agreed among NRAs of improving the Algorithm Proposal, as well as the DA Algorithm Requirements and the ID Algorithm Requirements.

- (8) In accordance with the Whereas (1) of the CACM Regulation, *“The urgent completion of a fully functioning and interconnected internal energy market is crucial to the objectives of maintaining security of energy supply, increasing competitiveness and ensuring that all consumers can purchase energy at affordable prices.”*
- (9) Future evolution of capacity calculation methodologies in accordance with the CACM regulation may require additional input parameters. In this case, all TSOs shall send a request for amendments of the DA Algorithm Requirements to all NEMOs and later on for all NRAs’ approval. An assessment of the additional functionalities shall take place at the latest when the proposal for the capacity calculation methodology in every capacity calculation region 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 NRAs.
- (10) All NEMOs shall establish, consistent with the MCO plan, through the All NEMO Cooperation Agreement entered into by all NEMOs, the All NEMO Committee and associated governance arrangements compliant with the CACM Regulation. Joint NEMOs decisions and responsibilities regarding this Algorithm Proposal shall be coordinated via the All NEMO Committee and associated governance arrangements.

Impact on the objectives of CACM Regulation

- (11) The 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) and promoting effective competition in the generation, trading and supply of electricity while respecting the need for a fair and orderly market and fair and orderly price formation (encouraging the development of market liquidity).
- (12) The procedures for maintaining the algorithms aim at ensuring fair and non-discriminatory treatment of TSOs, NEMOs, market participants, NRAs and ACER. 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.
- (13) 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.
- (14) The Algorithm Proposal establishes that the operational performance, security and compliance shall 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 (for DA and ID) is at an acceptable level. In particular, that the price coupling 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 algorithms.
- (15) The Algorithm Proposal establishes that changes to the price coupling algorithm and continuous matching algorithm shall be managed in accordance with principles that:
 - a) Provide an open, transparent, non-discriminatory way to manage Request for Changes, 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 any party or includes measures to mitigate any harm in a way that ensures non-discrimination;

- d) Establish a fair and efficient process that supports timely market development.

Interim and Enduring solutions

- (16) In order to deliver a solution fully compliant with the CACM Regulation for the price coupling algorithm and continuous matching algorithm, starting from the existing solutions, an implementation timeline is proposed. Such timeline includes an interim solution based on which all NEMOs shall carry out research and development activity (hereafter referred to as the “prototyping phase”) in order to achieve the enduring solution. Legal basis, motivation and proposals for such interim and enduring solution and for the relative implementation timeline are provided in the following paragraphs.
- (17) While the existing solutions guarantee support for all individual products referred to in the proposals for products that can be taken into account by NEMOs in the single day-ahead and intraday coupling process in accordance with Articles 40 and 53 of the CACM Regulation (hereafter referred to as the “Product Proposals”), support of some combinations of products in one single bidding zone might be not guaranteed. The same might apply to combinations of specific requirements. During the prototyping phase such combination might be adopted according to outcomes of Change Control Procedure depending on the impact on Algorithm Performance and with possible adoption of limits on the usage of such combinations.
- (18) In case the research and development activity carried out in the prototyping phase will not remove limitations on adoption of specific combinations of product as reported in Whereas 17, in the enduring solution the adoption of such combinations shall be forbidden.

Enduring solution – adequately maximized economic surplus

- (19) According to Article 38(1)(a) of the CACM Regulation, the price coupling algorithm “*aims at maximising economic surplus for single day-ahead coupling for the price-coupled region for the next trading day*”.
- (20) According to Article 51(1)(a) of the CACM Regulation, the continuous trading matching algorithm “*aims at maximising economic surplus for single intraday coupling per trade for the intraday market time-frame by allocating capacity to orders for which it is feasible to match in accordance with the price and time of submission*”.
- (21) According to Article 2(46) of the CACM Regulation, “*economic surplus for the single day-ahead or intraday coupling’ means the sum of (i) the supplier surplus for the single day-ahead or intraday coupling for the relevant time period, (ii) the consumer surplus for the single day- ahead or intraday coupling, (iii) the congestion income and (iv) other related costs and benefits where these increase economic efficiency for the relevant time period, supplier and consumer surplus being the difference between the accepted orders and the clearing price per energy unit multiplied by the volume of energy of the orders*”.
- (22) According to Article 48(1) of the CACM Regulation, “*No later than by the time specified by all TSOs in the requirements set out in Article 37(1)(a), all NEMOs performing MCO functions shall deliver the single day-ahead coupling results*”.
- (23) According to Article 59(4) of the CACM Regulation, “*The intraday energy trading for a given market time unit for a bidding zone border shall start at the latest at the intraday cross-zonal gate opening time of the relevant bidding zone borders and shall be allowed until the intraday cross-zonal gate closure time*”.
- (24) Considering that the presence of products (and TSO requirements) ranging across more than one market time unit (MTU) with all-or-nothing acceptance criterion requires combinatorial calculations to search for alternative compliant solutions, and considering the complexity of the requirements to be respected and the number of solutions to be assessed, in order to allow the algorithm to provide the results within the time limit specified by all TSOs in accordance with Article 48(1) and 59(4) of the

CACM Regulation, some stopping criterion need to be applied to the procedure for searching the optimal solution. This entails that the algorithm may not have enough time to search for all feasible solutions in order to find the global optimal solution.

- (25) An algorithm producing an adequate maximized surplus is an algorithm that delivers the solution with the highest possible economic surplus among all the feasible solutions found by the algorithm within the time limit specified in accordance with Article 48(1) and 59(4) of the CACM Regulation.

Enduring solution – adequately repeatable

- (26) According to Article 38(1)(e) and 51(1)(e) of the CACM Regulation, the algorithm must be repeatable.
- (27) The need of a stopping criterion referred to under Whereas 24 implies that any solution found by the algorithm is time dependent. As consequence repeatability can only be ensured on the same machine and at the same number of iterations, which allows for assessing exactly the same set of potential market solutions.
- (28) An adequately repeatable algorithm is an algorithm that delivers the exact same result for two different runs of the algorithm performed on the same machine and with the same number of iterations.

Enduring solution – adequately scalable

- (29) According to Article 38(1)(e) and 51(1)(e) of the CACM Regulation, the algorithm must be scalable.
- (30) According to Article 38(2) of the CACM Regulation, *“The price coupling algorithm shall be developed in such a way that it would be possible to apply it to a larger or smaller number of bidding zones”*.
- (31) The urgent completion of a fully functioning and interconnected internal energy market makes the extension of market coupling to all EU Member states the highest priority objective.
- (32) Unlimited scalability is not feasible, since any machine is subject to technical constraints that can be triggered under extreme conditions, neither efficient, since it entails costs which are not proportionate to the results that can be achieved, nor needed, since the dimensions of the market coupling are not infinite in terms of geographical scope, number of NEMOs and product usage. Hence adequate scalability is needed.
- (33) An adequately scalable algorithm is an algorithm able to accommodate the enlargement of the market coupling to new bidding zones and new NEMOs on a European scale as well as the reasonable use of products as defined in the Product Proposals.

Interim solution

- (34) According to Whereas 14 of the CACM Regulation, *“For efficiency reasons and in order to implement single day-ahead and intraday coupling as soon as possible, single day-ahead and intraday coupling should make use of existing market operators and already implemented solutions where appropriate, without precluding competition from new operators”*.
- (35) According to Article 36(4) of the CACM regulation, *“Where possible, NEMOs shall use already agreed solutions to efficiently implement the objectives of this Regulation”*.
- (36) The existing solutions for DA and ID markets were designed before the entry into force of the CACM Regulation and therefore they were not designed to necessarily meet all requirements of the CACM Regulation.
- (37) In order to make the DA and ID existing solutions fully compliant with all requirements of the CACM Regulation, further development is needed, including research and development activity on the IT solution supporting the algorithm operation and the algorithm design, aiming to increase the performance of the algorithm; prototyping activity aiming to test the performance of the newly proposed solutions; industrialization activity aiming to deliver a full functioning algorithm deployed in its expected production environment; timely communication to NRAs and other stakeholders of the

expected outcome of the process, in order to allow them adapting their own operational processes to the newly delivered solutions.

- (38) Since the final outcome of the research and development activity is still unknown, an amended detailed description of the enduring solution if needed shall be communicated to all NRAs and other stakeholders by the end of the prototyping phase.
- (39) In order to implement the SDAC and SIDC as soon as possible (e.g. market coupling in all EU plus Norway), an interim solution, based on the existing solutions, shall be adopted until solution fully compliant with the CACM Regulation, the enduring solution, is delivered.
- (40) In order to minimize the risk of decoupling, some limits to the usage of the existing Functionalities might be imposed as a last resort measure.

Day to day management

- (41) According to Article 10 of the CACM Regulation, *“TSOs and NEMOs shall jointly organise the day-to-day management of the single day-ahead and intraday coupling. They shall meet regularly to discuss and decide on day-to-day operational issues. TSOs and NEMOs shall invite the Agency and the Commission as observers to these meetings and shall publish summary minutes of the meetings”*.
- (42) The implementation of the proposed algorithms requires close cooperation between NEMOs and TSOs, especially with regard to the algorithm management and change management. The modalities of such cooperation shall be jointly agreed by TSOs and NEMOs in the organization of the day-to-day management of the single day-ahead and intraday coupling in accordance with Article 10 of the CACM Regulation.
- (43) The day to day management shall include, among others, the management of operational incidents, aiming to secure reliability of market coupling, plus the monitoring of algorithm performance and the management of Request for Changes to the algorithm from the NEMOs or TSOs, aiming to preserve adequate scalability.
- (44) According to Article 51(1)(e) of the CACM Regulation, continuous trading matching algorithm should be repeatable. Since continuous trading matching algorithm is based on price order principle and input time order principle and since it doesn't contain any element of randomness, current version of algorithm on the initial products is already repeatable from a theoretical point of view. This is the reason why there are no indicators about repeatability included in this Algorithm Proposal.

Implementation timeline

- (45) The implementation timeline for both single day-ahead coupling (SDAC) and single intraday coupling (SIDC) relies on the approval by All NRAs of All NEMOs Methodologies and proposals, on the approved MCO Plan implementation timeline and content until June 2018.
- (46) The implementation timeline shall include a proper phase dedicated to research and development activity to be carried out on existing solutions for DA and ID aimed at reaching a solution complying with the properties of the enduring solution, e.g. based on stipulations described in Whereas 16-40 above (prototyping phase).

SUBMIT THE FOLLOWING ALGORITHM PROPOSAL TO ALL REGULATORY AUTHORITIES:

Article 1

Subject matter and scope

1. The present Algorithm 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.
3. The following provisions and related decisions of all NEMOs shall apply subject to applicable laws and regulations.

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, the other items of legislation referenced therein and MCO Plan. In addition, the following definitions shall apply:

1. **Algorithm Monitoring Procedure:** means a procedure designed by all NEMOs in coordination with all TSOs in order to control the performance of the price coupling algorithm respectively continuous trading matching algorithm.
2. **Algorithm Performance:** means the ability of the price coupling algorithm and continuous matching algorithm to ensure reliability of the elaborated solution, to aim to maximize economic surplus and to ensure an adequate level of repeatability and scalability, as described in Article 3. Algorithm Performance is measured and monitored according to dedicated metrics (indicators) described in DA and ID Algorithm Requirements and established by all NEMOs in coordination with all TSOs.
3. **Anticipated Usage:** means a reasonable expected Effective Usage of a Functionality by each individual NEMO or TSO. The Anticipated Usage for a new Functionality is indicated by the same NEMO or TSO in the submitted Request for Change. For existing Functionalities, the Anticipated Usage shall be derived from the Effective Usage according to a formula commonly defined amongst all NEMOs and stated in the Change Control Procedure. Anticipated Usage is used for the purpose of testing the impact of Request for Changes at a time horizon set by all NEMOs (typically 1 year).
4. **Change Control Procedure:** means a procedure designed by all NEMOs in coordination with all TSOs in order to manage Requests for Change to the price coupling algorithm respectively continuous trading matching algorithm.
5. **Corrective measures:** means a last resort measure to be taken based on all NEMOs decision with the aim to allow restoring adequate scalability.
6. **Effective Usage:** means the observed relevant historic usage of a Functionality in production by each individual NEMO or TSO.
7. **Existing DA Algorithm Solution:** means the algorithm which has been developed and implemented for the day-ahead market coupling within the DA coupling project pre-existing the CACM Regulation among some NEMOs, as recognized under Article 5(1) of the approved MCO Plan.
8. **Existing ID Algorithm Solution:** means the algorithm which has been developed for the intraday market coupling within the ID coupling project pre-existing the CACM Regulation among some NEMOs, as recognized under Article 5(2) of the approved MCO Plan.
9. **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.
10. **Future Requirements:** means requirements proposed according to Article 37 of the CACM Regulation which the price coupling algorithm and continuous matching algorithm shall 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.

11. **Initial Requirements:** means requirements proposed according to Article 37 of the CACM Regulation which the price coupling algorithm and continuous matching algorithm shall comply with from the start of operation of the single day-ahead or intraday coupling (as further defined in the MCO Plan).
12. **MCO Plan:** means the document developed by all NEMOs in order to describe the plan that sets out how they jointly set up and perform the MCO functions, elaborated according to requirements of Article 7(3) of the CACM Regulation and approved by all NRAs in June 2017.
13. **MTU:** means market time unit.
14. **NEMO trading hub:** means the set of orders submitted by the market participants to a specific NEMO within a bidding zone.
15. **Request for Change:** means a formal request by one or more NEMO(s) or TSO(s) for any modification to be made to the price coupling algorithm and continuous matching algorithm or to its usage in production.
16. **Scheduled Flow:** means allocated flow between two bidding zones, two scheduling areas or two NEMO trading hubs that is obtained as a result of the MCO function.
17. **Usage Range:** means an assessment of the maximum level of usage of a specific requirement supported by the algorithm in conditions of adequate scalability related to the Anticipated Usage through a function defined by all NEMOs in coordination with all TSOs.

Article 3

Algorithm Requirements

1. 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, in line with Article 37 (1) of the CACM Regulation.
2. The DA Algorithm Requirements are those set out in Annex 1 of this Algorithm Proposal, the ID Algorithm Requirements are those set out in Annex 2 of this Algorithm Proposal.
3. All NEMOs shall maintain the Functionalities to be compliant with the list of Initial Requirements plus Future Requirements (following their implementation) that are set out in Annex 1 and Annex 2.
4. Any modification to the Functionality, including the modifications needed to meet Future Requirements, shall be implemented according to a Request for Change, including assessment of feasibility and algorithm performance impact.
5. The price coupling algorithm and the continuous trading matching algorithm shall support scheduled exchange calculation function requirements, which relate to the joint responsibility of TSOs to calculate and publish Scheduled Exchanges on borders between bidding zones in accordance with Article 8(2)(g) of the CACM Regulation.
6. While the price coupling algorithm respectively the continuous trading matching algorithm shall guarantee support for all individual products referred to in the DA (respectively ID) Product Proposal and for all requirements under Annex 1 and Annex 2, support of specific combination of products in one single bidding zone or specific combination of requirements could not be guaranteed (i.e. feasible only under limited scalability) or even not allowed. Such combinations shall be indicated in the Algorithm Monitoring Procedure as further specified under Article 9(3).
7. All NEMOs shall ensure that the price coupling algorithm fulfils the requirements described in Annex 1 of the Algorithm Proposal and the set of requirements referred to in Article 38(1) and Article 40(2) of the CACM Regulation, aimed at ensuring an adequate level of performance:
 - a) The price coupling algorithm shall aim at maximizing the economic surplus for SDAC for the next trading day while respecting cross-zonal capacity and allocation constraints and being consistent with time limitations. The price coupling algorithm shall facilitate efficient price formation by using the marginal price principle, in order to ensure that all accepted bids have the same price per bidding zone and per market unit. The results of the price coupling algorithm shall fulfil the maximization thresholds defined according to Article 9(3);

- b) The price coupling algorithm shall be repeatable, thus ensuring the delivery of the same result for two different runs of the algorithm on the same machine and after the same number of iterations;
 - c) The price coupling algorithm shall be scalable, ensuring the possibility to apply the algorithm to a larger number of i) bidding zones, ii) NEMOs, iii) volumes of bids and offers, with reference to the whole European extension. At the end of the prototyping phase, the enduring solution of the price coupling algorithm shall at least:
 - i. support the coupling of all bidding zones in the EU plus Norway;
 - ii. respect allocation constraints applying both ATC methodology and flow-based approach;
 - iii. support the operation of multiple NEMOs in a same bidding zone;
 - iv. accommodate orders resulting from products covering one MTU and at least one kind of product covering multiple MTUs, in line with Article 40(2) of the CACM Regulation;
 - v. Support a reasonable usage of the products reported under previous letter iv), to be assessed against the anticipated/effective usage;
 - d) The price coupling algorithm shall be reliable. By reliability, it is meant the ability of the algorithm to ensure finding at least one solution within the given timeframe.
8. All NEMOs shall ensure that the continuous trading matching algorithm fulfils the requirements described in Annex 2 of the Algorithm Proposal and the set of requirements referred to in Article 51(1), Article 53(2) and Article 53(3) of the CACM Regulation, aimed at ensuring an adequate level of performance:
- a) The continuous trading matching algorithm shall aim at maximizing the economic surplus for SIDC for the intraday market time-frame by allocating capacity to orders for which it is feasible to match in accordance with the price and time of submission while respecting cross-zonal capacity and allocation constraints. The results of the continuous trading matching algorithm shall fulfil the optimality thresholds defined according to Article 9(4);
 - b) The continuous trading matching algorithm shall respect the delivery of results according to Article 60 of the CACM Regulation;
 - c) The continuous trading matching algorithm shall be repeatable, which means that, given a set of order books, their associated time stamp and existing grid constraints for a specified delivery date, provided an adequate and suitable capacity in terms of storage and calculation, the same results originally obtained for the indicated delivery date can be reproduced;
 - d) The continuous trading matching algorithm shall be scalable, thus ensuring the possibility to apply the algorithm to a larger number of i) bidding zones, ii) NEMOs, iii) volumes of bids and offers and at least one kind of product covering multiple MTU, in line with Article 53(3) of the CACM Regulation, with reference to the whole European extension.

Article 4

Price coupling algorithm

1. The price coupling algorithm shall be based on the Existing DA Algorithm Solution, as improved at the end of the prototyping phase dedicated to research and development processes.
2. The price coupling algorithm shall provide as outcome a solution, composed by a set of values for the following variables, which respect the market and network constraints:
 - a) the market clearing prices of each bidding zone for each relevant MTU,
 - b) the matched volumes of each bidding zone for each relevant MTU,
 - c) the net position of each bidding zone, scheduling area and NEMO hub for each relevant MTU,
 - d) the Scheduled Flow between bidding zones, NEMO Hubs and scheduling areas for each relevant MTU,
 - e) the selection of executed block, complex, merit, and PUN orders,
 - f) the accepted percentage for each curtailable block.
3. Between two solutions with the same value of economic surplus, the price coupling algorithm shall select the one that maximizes the traded volume.

4. The price coupling algorithm shall calculate the Scheduled Flows between bidding zones, scheduling areas and NEMO trading hubs, ensuring consistency among the three different kind of flows.
 - a) For the bidding zones containing several NEMOs, the net position for each MTU will be calculated for each NEMO trading hub.
 - b) For the bidding zones containing several TSOs separating their scope in different scheduling areas, the net position for each MTU and where relevant for each NEMO Hub will be calculated for each scheduling area.
5. The inter bidding zone flow calculation functionality shall ensure that, when several routes might be possible for a given set of net positions, the price coupling algorithm shall provide the Scheduled Flows of the solution by minimizing a cost function on Scheduled Flows, using for this calculation a deterministic rule.
6. To find solutions, the price coupling algorithm shall evaluate different combinations of selected/non-selected blocks and complex orders, trying to find values for the resting variables that fulfil the market and network constraints. Every new evaluated combination is a node.
7. In order to ensure reliability of operation, the price coupling algorithm shall first aim to find a first solution compliant with the input constraints. In order to maximize the economic surplus, it shall then seek to find new solutions with higher economic welfare by exploring new nodes until the stopping criterion is reached.
8. The price coupling algorithm shall stop when one of following stopping criteria is met:
 - a) The optimal solution is found;
 - b) Time limit: the elapsed time has reached the set permitted time to run;
 - c) Iteration limit: the algorithm stops after it has completely processed a number of nodes;
 - d) Solution limit: the algorithm stops after having found a number of solutions.
9. Under normal operations, NEMOs shall run the price coupling algorithm using the time limit stopping criterion, set to the maximum calculation time allowed. This maximum allowed time shall be established in the operational procedure referred to under Article 4(15).
10. The price coupling algorithm shall perform checks on every solution found to validate that all the market and network constraints are respected within a given tolerance.
11. The last solution found that is fulfilling the checks under Article 4(10) contains the values that are considered the result of the execution of the price coupling algorithm.
12. Orders shall be anonymous – i.e., there shall be no identification of the originating market participant.
13. A single instance of the price coupling algorithm operated by the Coordinator shall calculate the results for all coupled NEMO trading hubs.
14. The input data shall be available to any authorised Operator, who is entitled to perform the price coupling calculation in parallel.
15. All NEMOs, in cooperation with TSOs where relevant, shall establish the operational procedure and timings, including both normal procedures and back-up procedures, consistent with operational requirements under the CACM Regulation. NEMOs shall be required to comply with these procedures.
16. Under normal operations, NEMOs shall submit orders to the MCO Function by the time stated in the operational procedure or else backup procedures shall apply.
17. Under normal operations, NEMOs shall provide all TSOs with the relevant outcome referred to under Article 4(2) (a), (b) and (c) of the SDAC by 13:00 market time day-ahead and anyway not later than 15:30 market time day-ahead.
18. NEMOs shall provide TSOs with the relevant outcome referred to under Article 4(4) in case such TSOs decide to use the price coupling algorithm to provide the single scheduled exchange calculator functionality recalled to in the methodology for the calculation of Scheduled Exchanges, according to Article 43 of the CACM Regulation.
19. All NEMOs shall create and maintain a document with the detailed description of the price coupling algorithm, including the rules to calculate Scheduled Flows between NEMO trading hubs. This document shall be kept updated with every new version of the price coupling algorithm. The document is made publicly available by all NEMOs on public internet webpage.

20. All NEMOs shall activate continuous research and development activities to allow for incremental improvement of the performance of the price coupling algorithm in order to ensure adequate scalability, according to principles laid out in Article 3(7)(c).

Article 5

Price coupling algorithm Implementation timeline

1. The price coupling algorithm implementation timeline begins with the approval of the Algorithm Proposal by all NRAs.
2. In order to reach to an enduring solution compliant with requirements reported in Article 3 by starting from the adoption of Existing DA Algorithm Solution, the implementation timeline is structured in three phases:
 - I. Prototyping phase: up to three years dedicated to developing the activity of research and development on the Existing DA Algorithm Solution aimed at reaching a solution complying with the properties of the enduring solution described under Article 3. During the prototyping phase all NEMOs adopt the DA interim solution as further described in Article 5(4)(i);
 - II. Extended prototyping phase: up to one further year at the end of the prototyping phase, if necessary to finalize the research and development activity;
 - III. Industrialization phase: up to one year, dedicated to the industrialization of the prototype delivered by the research and development activity, if such prototype has been proven suitable, announcing to stakeholders the specific features of the enduring solution and to draft if needed an amended version of the Algorithm Proposal.
3. All NEMOs shall have the chance, at any phase, to introduce modifications in the approach adopted for the research and development activity in case the latter does not provides outcomes compatible with the target of the enduring solution within the proposed timeline. Such change shall be properly reported to all NRAs according to Article 5(7).
4. All NEMOs shall ensure at least the achievement of the following mid-term milestones:
 - i. By the end of June 2018 the DA interim solution shall be able to support all Initial Requirements reported in Annex 1, the requirement of adequate maximization described under Article 3(7)(a), the Multi-Nemo operation, the schedule exchange calculation functionalities according to methodology for the calculation of Scheduled Exchanges and the coupling of all bidding zones in the EU plus Norway, as described in Article 3(7)(c)(i).
 - ii. By June 2020 the DA interim solution shall be able to support the requirement of adequate repeatability described in Article 3(7)(b).
 - iii. By the end of the first year of the prototyping phase, all NEMOs shall communicate to all NRAs and make publicly available to all stakeholders the Change Control Procedure and the Algorithm Monitoring Procedure referred to the existing solutions.
 - iv. By the end of the extended Prototyping Phase, all NEMOs shall consult with the relevant stakeholder forums organised in accordance with Article 11 of the CACM Regulation and send to all NRAs the report on outcomes of the research and development activities carried out;
 - v. By the end of the industrialization phase the DA interim solution shall be able to support all Future Requirements reported in Annex 1 and the requirement of adequate scalability, described under Article 3(7)(c).
 - vi. By the end of the industrialization phase, all NEMOs shall also communicate to all NRAs and make publicly available to all stakeholders the detailed description of the enduring solution, the Change Control Procedure and the Algorithm Monitoring Procedure referred to the enduring solution.
 - vii. By the end of the industrialization phase, all NEMOs shall start the prototyping phase of the other functionalities as described in Annex 1, following the Change Control Procedure.

5. The consultation indicated in Article 5(4)(iv) shall be carried out latest at the end of the extended prototyping phase activity and shall be considered for the activation of the one-year extension to perform the industrialization.
6. At the end of consultation indicated in Article 5(4) (iv) all NEMOs shall, if the prototyping phase(s) and the following consultation has led to a need to amend the Algorithm Proposal, send to all NRAs for approval an amended version of Algorithm Proposal.
7. On a periodic basis, at least on a yearly basis, during the prototyping phase all NEMOs shall send to all NRAs a report on research and development activities providing:
 - a) Status of the research and development (prototyping) activity in relation to beforehand among All NEMOs agreed approach(es) and targets;
 - b) Planning of the research and development activity for the coming period, including estimation on identified workload.
8. In case the prototyping phase does not conclude in the given timeframe, the activation of the extended prototyping phase may take place. In such a case, all NEMOs shall inform all NRAs about such activation three months prior to the deadline of the prototyping phase.
9. The timely delivery of the specific schedule exchange calculator functionalities, requested by all TSOs in the methodology for the calculation of Scheduled Exchanges shall be dependent on the final approval by all NRAs of such methodology and on the confirmation of the formulas for Scheduled Flows between bidding zones and scheduling areas already implemented in the existing solution or in course of implementation.

Article 6

Continuous trading matching algorithm

1. The continuous trading matching algorithm shall be based on Existing ID Algorithm Solution.
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 SOB module. Orders are entered in the local trading solutions; all valid orders entered in time in the local trading solution are automatically entered into the SOB; market participants are not entitled to access the SOB module directly.
4. The continuous trading matching algorithm shall calculate the Scheduled Flows between bidding zones, scheduling areas and NEMO trading hubs, ensuring consistency among the three different kind of flows.
5. Matching of contracts shall be performed in the SOB module, irrespectively of the scheduling areas the orders were entered (including from the same area). The SOB module maintains a consolidated order book for all contracts based on available transmission capacity and allocation constraints between bidding zones.
6. 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.
7. Explicit participants shall directly access the CMM to perform explicit capacity reservations.
8. The SOB module shall determine the local view of all orders that can be executed in the selected scheduling area.
9. The SOB module shall apply deterministic matching procedures. Contracts shall be executed in the SOB module 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. At the same time orders with earlier timestamps shall be executed with a higher priority than orders with a later timestamp.

10. The clearing price for a newly entered order that is matched 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.
11. Where a cross-zonal trade is identified in the SOB module, a request for the associated cross-zonal capacity shall be made to the CMM. Requests for implicit 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.
12. There shall be no discrimination between the matching of single-time-unit orders, the matching of multiple-time-unit (i.e. block) orders and granting explicit capacity requests. These requests from both implicit continuous matching and explicit allocation shall all be treated in the CMM on a first-come-first served basis.
13. NEMOs shall provide TSOs with the relevant outcome referred to under Article 6(4) in case such TSOs decide to use the continuous trading matching algorithm to provide the single scheduled exchange calculator functionality recalled to in the methodology for the calculation of Scheduled Exchanges, according to Article 43 of the CACM Regulation. For such purpose and in such cases NEMOs shall, together with TSOs, implement the Shipping Module (SM). The SM shall be able to provide the necessary information for calculating Scheduled Exchanges between bidding zones and scheduling areas and Scheduled Flows between NEMO trading hubs.
14. NEMOs shall create and maintain a document with the detailed description of the continuous trading matching algorithm. This document shall be kept updated with every new version of the continuous trading matching algorithm. The document is made publicly available by NEMOs on public internet webpage.
15. All NEMOs shall activate continuous research and development activities to allow for incremental improvement of the performance of the continuous trading algorithm in order to ensure adequate scalability, according to principles laid out in Article 3(8)(d).

Article 7

Continuous trading matching algorithm implementation timeline

1. The continuous trading matching algorithm implementation timeline begins with the approval of the algorithm proposal by all NRAs.
2. In order to reach to an ID enduring solution compliant with requirements listed in Article 3, the implementation timeline is structured in four phases:
 - I. First implementation phase: up to one year dedicated for go-live of the Existing ID Algorithm Solution, to be considered as SIDC interim solution;
 - II. Prototyping phase: up to three years after the first implementation phase is completed: dedicated to the activity of research and development aimed to reach a solution complying with the properties of the enduring one described under Article 3;
 - III. Extended prototyping phase: up to one further year, to be granted to all NEMOs by all NRAs at the end of the prototyping phase, based on a request provided by all NEMOs in order to finalize the research and development activity;
 - IV. Industrialization phase: up to one further year, dedicated to the industrialization of the prototype delivered by the research and development activity, if such prototype has been proven suitable, announcing to stakeholders the specific features of the enduring solution and to draft if needed an amended version of the Algorithm Proposal.

3. All NEMOs shall have the chance, at any phase, to introduce modifications in the approach adopted for the research and development activity in case the latter does not provides outcomes compatible with the target of the enduring solution within the proposed timeline. Such change shall be properly reported to all NRAs according to Article 7(6).
4. All NEMOs shall ensure at least the achievement of the following mid-term milestones:
 - i. By the end of 2018 the SIDC interim solution shall be able to support all Initial Requirements reported in Annex 2, the Multi-Nemo support and the requirement on delivery of results described under Article 3(8)(b) and maximization the economic surplus described under Article 3(8)(a);
 - ii. To ensure the second go-live, the SIDC interim solution shall be updated with the rest of the functionality of enhanced preferred shipper by 2019;
 - iii. By the end of the first year of the prototyping phase, all NEMOs shall communicate to NRAs and make publicly available to all stakeholders the Change Control Procedure and the Algorithm Monitoring Procedure;
 - iv. By the end of the industrialization phase, all NEMOs shall communicate to NRAs and make publicly available to all stakeholders the detailed description of the SIDC enduring solution;
 - v. By the end of the industrialisation phase, all Future Requirements reported in Annex 2 and adequate scalability described under Article 3(8)(d), shall be supported.
 - vi. By the end of the industrialization phase, all NEMOs shall communicate to NRAs and make publicly available to all stakeholders the Change Control Procedure and the Algorithm Monitoring Procedure referred to the SIDC enduring solution.
5. At the end of consultation indicated in Article 7(4) (iv) all NEMOs shall, if the prototyping phase(s) and the following consultation has led to a need to amend the Algorithm Proposal, send to all NRAs for approval an amended version of Algorithm Proposal.
6. On a periodic basis, at least on a yearly basis, during the prototyping phase all NEMOs shall send to all NRAs a report on research and development activities providing:
 - a) Status of the research and development (prototyping) activity in relation to beforehand among All NEMOs agreed approach(es) and targets;
 - b) Planning of the research and development activity for the coming period, including estimation on identified workload.
7. In case the prototyping phase does not conclude in the given timeframe, the activation of the extended prototyping phase may take place. In such a case, all NEMOs shall inform NRAs about such activation three months prior to the deadline of the prototyping phase.
8. The timely delivery of the specific schedule exchange calculator functionalities, during properly planned phase, as described in Article 3(5), requested by all TSOs in the methodology for the calculation of Scheduled Exchanges, shall be dependent on the final approval by all NRAs of such methodology and on the confirmation of the formulas for Scheduled Flows between bidding zones and scheduling areas already implemented.

Day to day management

1. All NEMOs and all TSOs shall jointly organize the day to day management of the single day-ahead and intraday coupling, pursuant to Article 10 of the CACM Regulation. The scope of such activity and of the provisions pursuant the following Articles 8(2), 8(3) and 8(4) shall be limited to the management of the joint responsibilities of NEMOs and TSOs, without prejudice for the specific responsibilities of separately all NEMOs and of all TSOs. The modalities and scope of such joint organization and cooperation shall be elaborated jointly by the TSOs and NEMOs in accordance with Article 10 of the CACM Regulation.
2. The day to day management of both single day-ahead and intraday coupling shall include, among others and without prejudice for other agreements of TSOs and NEMOs pursuant to Article 10 of the CACM Regulation, the joint drafting with TSOs and the application in cooperation with TSOs of:
 - a) the operational procedure, referred to under Article 4(15);
 - b) the procedures for the management of operational incidents;
 - c) the procedures for monitoring of the price coupling algorithm and continuous matching algorithm usage and performance, according to principles laid out in Article 9;
 - d) the procedures for the management of Request for Changes to the price coupling algorithm and continuous matching algorithm, according to principles laid out in Article 10.
3. All NEMOs shall also cooperate with all TSOs in the definition of the principles, scope and workload for the development of the algorithm, according to principles laid out in Article 4 (20) and Article 6(15).
4. All NEMOs and all TSOs shall jointly:
 - a) define the needed joint governance arrangements to support day to day management of the of the single day-ahead and intraday coupling;
 - b) meet regularly to discuss and decide on day-to-day operational issues;
 - c) invite the Agency and the Commission as observers to these meetings;
 - d) publish summary minutes of these meetings on public internet webpage.

Article 9

Algorithm Management Principles

1. All NEMOs shall manage operational performance and compliance of the price coupling algorithm and the continuous trading matching algorithm according to the principles in this Article 9. The principles shall be incorporated into the Algorithm Monitoring Procedure as provided under Article 8(2) (c), which will be published and maintained updated according to Article 11(2) provisions.

Algorithm Monitoring

2. Performance shall be controlled and measured by all NEMOs, in coordination with all TSOs, according to the provisions of the Algorithm Monitoring Procedure.
3. Such Algorithm Monitoring Procedure shall include at least, for the price coupling algorithm:
 - a) the relevant indicators to monitor algorithm optimality which shall include at least:
 - i. indicators of the level of welfare;
 - ii. indicators to evaluate the loss of welfare due to time limitation;
 - iii. indicators of the time spent by the algorithm to reach a first solution;
 - iv. indicators on paradoxically rejected block orders and paradoxically rejected minimum income condition orders;
 - v. indicators on the fulfilment of the network constraints.
 - b) the relevant indicators to monitor algorithm repeatability which shall include at least:
 - i. indicators on repeatability of results in the same machine.
 - c) the relevant indicators to monitor algorithm scalability which shall include at least:

- i. indicators on the evolution of the topology over time, in terms of number of bidding zones and network constraints;
 - ii. indicators on the evolution of the number of submitted orders of each product type per bidding zone over time, and the corresponding total volume;
 - iii. Indicators on the evolution of number of matched orders and paradoxically rejected orders of each product type per bidding zone over time, and the corresponding total volume;
 - iv. indicators on the evolution of the use of network constraints along the time;
 - v. indicators on time spent in every phase of the algorithm calculation along the time.
 - d) the relevant thresholds (including critical thresholds) to identify performance deteriorations;
 - e) the frequency, level of detail, confidentiality and process for the different reporting of the outcome of the monitoring activity towards all NEMOs, all TSOs, all NRAs and the relevant stakeholder forums organised in accordance with Article 11 of the CACM Regulation;
 - f) the process to be followed to address performance deterioration in case needed, in coordination with all TSOs and informing all NRAs;
 - g) the introduction and detailed elaboration of rules for performance improvement;
 - h) the relevant information to be disclosed to third parties and the relative channels.
4. The Algorithm Monitoring Procedure shall include at least, for continuous trading matching algorithm:
- a) the relevant indicators to monitor algorithm optimality which shall include at least:
 - i. Indicators of the time needed to process an order;
 - ii. Indicators of the time needed to process a trade;
 - iii. Indicators of the time needed to produce post-coupling output.
 - b) the relevant indicators to monitor algorithm scalability which shall include at least:
 - i. indicators on the evolution of the topology over time, in terms of number of bidding zones and network constraints;
 - ii. indicators on the evolution of the number of submitted orders of each product type per bidding zone over time, and the corresponding total volume.
 - c) Indicators on the evolution of number of matched orders of each product type per bidding zone over time, and the corresponding total volume;
 - d) the relevant thresholds (including critical thresholds) to identify performance deteriorations;
 - e) the frequency, level of detail, confidentiality and process for the different reporting of the outcome of the monitoring activity towards all NEMOs, all TSOs, all NRAs and the relevant stakeholder forums organised in accordance with Article 11 of the CACM Regulation;
 - f) the process to be followed to restore performance and compliance in case needed, in coordination with all TSOs and informing all NRAs;
 - g) the relevant information to be disclosed to third parties and the relative channels.
5. Algorithm Performance shall be measured against criteria as specified in this Article 9. Whenever performance deterioration or non-compliance with an implemented Algorithm Requirement is detected according to the procedures under previous Article 9(1), all NEMOs shall:
- a) promptly inform all TSOs and all NRAs;
 - b) investigate and to the fullest extent possible share its findings with relevant stakeholder forums organised in accordance with Article 11 of the CACM Regulation;
 - c) evaluate any potential improvement of the algorithm, to be introduced following a Request for Change;
 - d) communicate to all TSOs and all NRAs the solution identified, supported by relevant documentation;
 - e) eventually initiate the Request for Change process described under Article 10.

Scalability management

6. The usage in production by any NEMO or TSO of any Functionality impacting the Algorithm Performance, with related adequacy of scalability and impact on the Algorithm Performance, shall be guaranteed only up to an upper bound defined by the Usage Range.
7. The Effective Usage in production by any NEMO or TSO of any Functionality impacting the Algorithm Performance shall be subject to monitoring following the Algorithm Monitoring Procedure.
8. After a Functionality is available in production, the Effective Usage and the Anticipated 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 Requests for Change).
9. The Usage Range of any Functionality impacting the Algorithm Performance shall be reviewed yearly, on the basis of the estimated level of adequate scalability.
10. The level of adequate scalability is estimated each year for the following years on the basis of, among others, the information included in the Request for Change referred to:
 - a) The extension of the SDAC and SIDC;
 - b) The implementation of local multi NEMO operation;
 - c) The extension of usage of products and requirements in further bidding zones or NEMO trading hubs;
 - d) The anticipated results from the activity of research and development.
11. All NEMO shall send to all NRAs and publish a yearly report including:
 - a) The methodology and the outcome of the assessment of the estimated level of adequate scalability for the following years;
 - b) The perspective projects scoped for the research and development activity with related estimated workload.

Corrective measures

12. In case Algorithm Performance degradation below critical thresholds indicated in Article 9(3)(d) and 9(4)(d) is detected according to the Algorithm Monitoring Procedure, due to an overall Effective Usage higher than the Usage Range, all NEMOs shall decide which specific Corrective measures are to be applied, if any, as a last resort measure with the aim to allow restoring adequate scalability.
13. Where a decision in accordance with previous Article 9(12) impacts the algorithm requirements proposed by all TSOs (or by all TSOs and all NEMOs jointly), all TSOs shall have the right to approve or reject the decision from all NEMOs. For this purpose, all NEMOs shall provide all TSOs all relevant information and deemed approval of all NEMOs decisions will apply in case no different decision is communicated by TSOs before an agreed timeline.
14. Corrective measures may include, among others, application of limitations to combination of products or requirements, or of the usage, based on the Usage Range.
15. Any Corrective measure shall guarantee non-discriminatory principles among Market Participants and NEMOs.
16. In case limitations to the usage are applied, all NEMOs shall issue a public report indicating the Corrective measures applied and the reasons for applying the Remedial Action(s).
17. All NEMOs or TSOs shall in such case implement measures to prevent violation of the agreed limitations to the usage. In case any NEMO or TSO breaches the limitations to the usage and fails to take timely measures, the other NEMOs are entitled to report it to all NRAs.
18. At the end of industrialization phase, all NEMOs are entitled to apply Corrective measures only on a temporary basis, and anyway not beyond 6 months, to solve unanticipated impacts on Algorithm Performance. In the prototyping phase, all NEMOs are entitled to apply Corrective measures to manage the consequences of limited scalability.

Article 10

Change Management Principles

1. All NEMOs shall manage changes to the price coupling algorithm or continuous trading matching algorithm Functionalities and usage according to the principles in this Article 10. The principles shall be incorporated into the Change Control Procedure as provided under Article 8(2)(d), which will be published and maintained updated according to Article 11(2) provisions.

Moderation and control

2. Any Request for Change shall induce only a proportionate, controlled impact on the Algorithm Performance and no significant harm to any other Functionality already included in the price coupling algorithm or continuous trading matching algorithm.
3. Any Request for Change shall be compatible with the Initial Requirements and Future Requirements following their implementation.
4. Any impact on the performance of related MCO function systems and processes shall also be taken into account.

Fair and Non-Discriminatory Treatment of Requests for Change

5. All NEMOs and TSOs are entitled to use any Functionality subject to approval of a Request for Change.
6. NEMOs shall handle any Request for Change in an objective and non-discriminatory manner, according to the criteria set out in the Change Control Procedure.
7. Requests for Change that aim to improve Algorithm Performance are deemed to be of benefit to all NEMOs, and shall be decided upon by all NEMOs. Similarly, all NEMOs are entitled to decide that any Request for Change is considered a common proposal of all NEMOs.
8. Any NEMO respectively TSO is entitled to join another NEMOs' respectively TSOs' Request for Change provided that (i) the additional NEMO(s) respectively TSO(s) is entitled to request modifications to the Request for Change and which the original requesting NEMO(s) respectively TSO(s) shall consider in good faith and not unreasonably reject, and that (ii) the original requesting NEMO(s) respectively TSO(s) and any additional NEMO respectively TSO shall, as long as Article 10(7) is not deemed by all NEMOs to apply, bear the associated costs (where any cost sharing shall be in accordance with the CACM Regulation).
9. All NEMOs respectively TSOs are entitled to request for the implementation of a new Functionality subject to approval of a Request for Change. Such new Functionality is available to be used by all NEMOs respectively TSOs that initially contributed to its development plus any other NEMO respectively TSO that is willing to contribute to the development cost of this new Functionality in compliance with the CACM Regulation sharing rules.

Request for Change process

10. The NEMO(s) respectively TSO(s) proposing a change shall issue a Request for Change to all NEMOs according to a template and process described in the Change Control Procedure referred to under Article 10(1).
11. The NEMO(s) respectively TSO(s) proposing a Request for Change is responsible for fully specifying their requirement, including the requested Anticipated Usage and any subsequent effect on processes or other systems.
12. The impact of a Request for Change on Algorithm Performance, existing Functionalities, adjacent systems and processes shall be assessed based on Anticipated Usage of the new Functionality together with Anticipated Usage of existing Functionalities, in order to ensure technical feasibility and consistency with performance criteria approved in the Algorithm Monitoring Procedure.

13. Depending on the Impact assessment reported in the Request for Change submission, Requests for Change are classified as
 - a) Non-Notifiable change (type I): where no impact on market parties nor potential adverse impact on the Algorithm Performance in such a case stakeholders are not informed of change;
 - b) Notifiable change (type II): where the change has no potential adverse impact on the Algorithm Performance but impact on market parties. In such a case stakeholders are informed of change ahead of implementation;
 - c) Consulted change (type III): where there is potential adverse impact on the Algorithm Performance. In such a case NEMOs shall consult stakeholders, according to the format agreed upon in the relevant Stakeholders Committee and will take response into consideration;
 - d) Methodology amendment (type IV): where change is required to the Algorithm Proposal or its annexes. In such a case the NEMOs shall follow formal CACM Regulation amendment process, including consultation process as described in Article 12 of the CACM Regulation.
14. Requests for Change can be submitted on a continuous basis, provided that evaluation is carried out periodically in different assessment timeframes on the basis of issuing date and/or anticipated go live date of the Request for Change, according to criteria described in following articles, with such periodicity being defined in the Change Control Procedure.
15. The assessment of Request for Change 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 shall be done.
16. In case multiple Requests for Change are supported individually but not together, the following prioritization shall apply:
 - a) Extending the SDAC or SIDC to the scope anticipated under the CACM Regulation;
 - b) Supporting multiple NEMO operation per bidding zone;
 - c) Supporting extension of the set of products or requirements used in one or more bidding zones, in order to allow for fair and non-discriminatory treatment of different parties.
17. In case the Requests for Change involves simultaneously more than one of the principles under Article 10(16), the Requests for Change shall be evaluated case by case depending on the specific nature of the request and a public report shall be issued, indicating the decision, the reason for the decision, the principles behind the decision and the specific assessments incurred, according to Article 11(3).
18. In case the Requests for Change implies a change in the methodologies as envisioned in Article 10(13)(d), after the technical assessment by all NEMOs, and before taking any decision, the Requests for Change shall be submitted by all NEMOs to all NRAs for approval as provided by the CACM Regulation.
19. At the end of the industrialization phase, all Requests for Change respecting previous criteria, shall be implemented within a reasonable timeframe, following if needed the prioritization principles recalled under previous Articles 10(16) and 10(17). In the prototyping phase, the same principles could be applied to identify which Requests for Change shall not be supported.

Decision-making

20. Requests for Change must be approved by all NEMOs based on an objective evaluation report.
21. Approved and rejected Requests for Change are made publicly available, with the relevant motivation, in order to ensure the objective and non-discriminatory treatment of Requests for Change, unless such Request for Change includes commercial sensitive information.
22. All impacted parties are entitled to receive all relevant information regarding the status of a Request for Change.
23. 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), all TSOs shall have the right to approve or reject the decision from all NEMOs, such right being subject to complying with the provisions of this methodology and

in particular with the prioritization rules set out in Article 10(16). For this purpose, all NEMOs shall provide all TSOs all relevant information and deemed approval of all NEMOs decisions will apply in case no different decision is communicated by TSOs before an agreed timeline.

24. Any decisions required by all NEMOs in accordance with this Algorithm Proposal shall be motivated by reference to the objectives set out in Articles 3 and 37 of the CACM Regulation.
25. Before rejecting the Request for Change, all NEMOs are entitled to decide to refer a decision in accordance with this Algorithm Proposal to an independent arbitral tribunal for a binding decision.
26. Any NEMO or TSO is entitled to challenge a Request for Change approved or rejected in accordance with this Algorithm Proposal by requesting a referral to an independent arbitral tribunal for a binding decision.
27. Referrals under Articles 10(25) and 10(26) shall:
 - a) follow procedures jointly established by all NEMOs, in coordination with all TSOs;
 - b) be submitted to an independent arbitral tribunal whose members shall be jointly appointed by all NEMOs and all TSOs.

Article 11

Stakeholders involvement

1. In order to promote market transparency and proper level of stakeholder involvement, and to ensure that the price coupling algorithm and the continuous trading matching algorithm is managed and developed in an objective and non-discriminatory manner, the following provisions apply.
2. All NEMOs shall maintain a public description, to be formally updated on a periodic basis and consulted with the relevant stakeholder forums organised in accordance with Article 11 of the CACM Regulation, of the following documents:
 - a) the public description of the price coupling algorithm and the continuous trading matching algorithm as referred to under Articles 4 and 6;
 - b) the Algorithm Monitoring Procedure as referred to under Article 9;
 - c) the Change Control Procedure, referred to under Article 10;
 - d) the appointment of the independent arbitral tribunal, referred to under Articles 10(27).
3. All NEMOs shall maintain an updated public record of:
 - a) approved and rejected Requests for Change referred to under Article 10(21), with the relevant motivation;
 - b) applied Corrective measures, referred to under Article 9(16);
 - c) the performance results of the algorithm, measured accordingly to the criteria referred to in the Algorithm Monitoring Procedure;
 - d) any incident visible to market parties, and the application of back up and fall-back procedures.
4. All NEMOs shall also involve stakeholders in the price coupling algorithm implementation timeline activities as further detailed in Article 5 and in the continuous trading matching algorithm implementation timeline activities as further detailed in Article 7.

Article 12

Language

1. The reference language for this proposal shall be English. For the avoidance of doubt, where NEMOs need to translate this proposal into their national language(s), in the event of inconsistencies between the English version published by the NEMOs in accordance with Article 9(14) of the CACM Regulation and any version in another language, the relevant NEMOs shall be obliged to dispel any inconsistencies by providing a revised translation of this proposal to their relevant national regulatory authorities.

ANNEX 1 – Price coupling algorithm requirements
ANNEX 2 – continuous trading matching algorithm requirements