ACER
Agency for the Cooperation of Energy Regulators

PUBLIC

DECISION No 04/2020
OF THE EUROPEAN UNION AGENCY
FOR THE COOPERATION OF ENERGY REGULATORS

of 30 January 2020

on the nominated electricity market operators' proposal for the price coupling algorithm and for the continuous trading matching algorithm, also incorporating TSOs' and NEMOs' proposals for a common set of requirements

THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators[1], and, in particular, Articles 5(2)(b) thereof,

Having regard to Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management[2], and, in particular, Article 53(1) thereof,

Having regard to the outcome of the consultation with regulatory authorities, nominated electricity market operators, transmission system operators and market participants,

Having regard to the favourable opinion of the Board of Regulators of 22 January 2020, delivered pursuant to Article 22(5) of Regulation (EU) 2019/942,

Whereas:

1. INTRODUCTION

(1) Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (the 'CACM Regulation') laid down

[1] OJ L158, 14.6.2019, p. 22.
[2] OJ L 197, 25.7.2015, p. 24.

a range of requirements for cross-zonal capacity allocation and congestion management in the day-ahead and intraday markets in electricity. These requirements also include specific provisions for the development and maintenance of a price coupling algorithm and of a continuous trading matching algorithm for the single day-ahead coupling ('SDAC') and for the single intraday coupling ('SIDC'), in accordance with Chapters 4 to 6 of the CACM Regulation.

(2) On 26 July 2018, ACER issued its Decision No 08/2018 on the nominated electricity operators' ('NEMOs') proposal for the price coupling algorithm and for the continuous trading matching algorithm, also incorporating TSOs' and NEMOs' proposals for a common set of requirements ('Algorithm methodology'), in accordance with Article 37 of the CACM Regulation.

(3) Pursuant to Article 5(2) of the Regulation (EU) 2019/942, where proposals for common terms and conditions or methodologies or their amendments, as the case might be, require the approval of all regulatory authorities, those proposals shall be submitted to ACER for revision and approval.

(4) Accordingly, on 31 July 2019, all NEMOs submitted to ACER a proposal for amendment to the Algorithm methodology ('proposal for amendment'). This Decision is hereby made to revise and approve the proposal for amendment. Annex I to this Decision sets out the amended Algorithm methodology, pursuant to Article 37(5) of the CACM Regulation.

2. PROCEDURE

2.1. Proceedings before ACER

(5) On 3 June 2019, the NEMO Committee, on behalf of all NEMOs, published the proposed amendments to the Algorithm methodology for public consultation, in accordance with Article 9(13) and Article 12 of the CACM Regulation and the consultation finished on 2 July 2019.

(6) By email of 31 July 2019, the NEMO Committee, on behalf of all NEMOs, submitted a proposal for amendment to the Algorithm methodology to ACER for decision.

(7) On 21 October 2019, ACER launched a public consultation on the proposal for amendment, inviting all market participants to submit their comments by 17 November 2019. In particular, ACER asked stakeholders to provide comments on (i) the timing of suspension of the cross-zonal capacity allocation within continuous trading during intraday auctions ('IDAs'), (ii) possible simplification of the choice of products in case the algorithms would face performance problems and iii) on the choice of monitoring and reporting indicators.

(8) During the decision-making process, ACER closely cooperated with all NEMOs, all regulatory authorities and all transmission system operators ('TSOs') and consulted them on the proposed amendments during numerous teleconferences and meetings

and through exchanges of textual amendments via emails. In particular, the following procedural steps were taken in 2019:

(a) 30 September: teleconference with NEMOs, TSOs and regulatory authorities;

(b) 3 October: teleconference with NEMOs, TSOs and regulatory authorities;

(c) 7 November: discussion with the regulatory authorities during the CACM Task Force meeting[3];

(d) 14 November: teleconference with NEMOs, TSOs and regulatory authorities;

(e) 19 November: discussion during the ACER Electricity Working Group[4] meeting with regulatory authorities;

(f) 25 November: teleconference with NEMOs, TSOs and regulatory authorities;

(g) 5 December: teleconference with NEMOs, TSOs and regulatory authorities;

(h) 9 December: teleconference with the regulatory authorities;

(i) 10 December: discussion during the Trilateral Coordination Group meeting with the NEMOs, TSOs, regulatory authorities and the representatives of the European Commission;

(j) 11 December: teleconference with NEMOs and discussion with the regulatory authorities during the Board of Regulators[5] meeting;

(k) 13 December: teleconference with NEMOs;

(l) 17 December: discussion with the regulatory authorities during the CACM Task Force meeting; and

(m) 9 January 2020: discussion with the regulatory authorities during the ACER Electricity Working Group meeting.

3. ACER'S COMPETENCE TO DECIDE ON THE PROPOSAL FOR AMENDMENT

(9) According to Article 9(13) of the CACM Regulation, the NEMOs responsible for developing a proposal for terms and conditions or methodologies may request amendments of these terms and conditions or methodologies, which shall be approved in accordance with the procedure set out in that Article.

[3] ACER's platform for discussing all issues connected to the CACM Regulation with the regulatory authorities.
[4] According to Article 30 of Regulation No 2019/942 of the European parliament and of the Council of 5 June 2019, establishing a European Union Agency for the Cooperation of Energy Regulators, the ACER Electricity working group supports the work of the Director and of the Board of Regulators on regulatory issues and for the purpose of preparing the opinions, recommendations and decisions.
[5] The Board of Regulators is a decision-making body defined in Articles 21 and 22 of Regulation No 2019/942 of the European parliament and of the Council of 5 June 2019, establishing a European Union Agency for the Cooperation of Energy Regulators.

(10) According to Article 9(6)(g) of the CACM Regulation, proposals related to the algorithm developed in accordance with Article 37 of the CACM Regulation shall be subject to approval by all regulatory authorities.

(11) According to Article 5(2)(a) of Regulation (EU) 2019/942, proposals for terms and conditions or methodologies, based on network codes and guidelines adopted before 4 July 2019 (i.e. the CACM Regulation), which require the approval of all regulatory authorities, shall be submitted to ACER for revision and approval.

(12) Accordingly, on 31 July 2019, all NEMOs submitted the proposal for amendment on the Algorithm methodology to ACER for revision and approval, thereby making ACER competent to adopt a decision in that respect.

4. SUMMARY OF THE PROPOSAL FOR AMENDMENT

(13) The proposal for amendment includes the following elements:

(14) The Recitals and Articles 1 and 2, which include general provisions, the scope of application and the definitions;

(15) Articles 3 to 6, which include the summary of the algorithm requirements, the provisions on the price coupling algorithm, the continuous trading matching algorithm and the intraday auction algorithm including the timelines for the implementation of specific requirements;

(16) Articles 7 to 9, which include provisions on the concept of usage of products and functionalities of the algorithms, on the monitoring of the algorithm performance and on the reporting of scalability;

(17) Articles 10 and 11, which include provisions on the planning of changes and research and development activities;

(18) Article 12, which determines corrective measures to be used in the case of an algorithm's performance degradation;

(19) Articles 13 to 19, which include provisions describing the management of change process of the algorithms;

(20) Articles 20 to 23, which include provision on the decision making process of all NEMOs and TSOs, including the functioning and establishment of an arbitral tribunal;

(21) Articles 24 to 26, which include provisions on publishing, reporting, transparency and applicable language;

(22) Annexes 1 and 2, which include the common set of requirements for the DA and ID timeframes; and

(23) Annexes 3 and 4, which include the algorithm monitoring methodologies for the DA and ID timeframes.

5. ASSESSMENT OF THE PROPOSAL FOR AMENDMENT

5.1. Legal framework

(24) According to Article 7(1)(b) of the CACM Regulation, NEMOs are responsible for establishing collectively the requirements for the single day-ahead and intraday coupling, the requirements for the market coupling operator ('MCO') functions and the price coupling algorithm with respect to all matters related to electricity market functioning in accordance with Article 7(2) and Articles 36 and 37 of the CACM Regulation.

(25) According to Article 7(2) of the CACM Regulation, NEMOs have to carry out the MCO functions jointly with other NEMOs and those functions need to include the following: (i) developing and maintaining the algorithms, systems and procedures for single day-ahead and intraday coupling in accordance with Articles 36 and 51 of the CACM Regulation; (ii) processing input data on cross-zonal capacity and allocation constraints provided by coordinated capacity calculators in accordance with Articles 46 and 58 of the CACM Regulation; (iii) operating the price coupling and continuous trading matching algorithms in accordance with Articles 48 and 60 of the CACM Regulation; and (iv) validating and sending single day-ahead and intraday coupling results to the NEMOs in accordance with Articles 48 and 60 of the CACM Regulation.

(26) According to Article 8(1) and 8(2)(a) and (b) of the CACM Regulation, all TSOs in Member States electrically connected to another Member State must participate in the single day-ahead and intraday coupling and jointly establish the TSOs requirements for the price coupling and continuous trading matching algorithms for all aspects related to capacity allocation in accordance with Article 37(1)(a) of the CACM Regulation, and jointly validate the matching algorithms against the above mentioned requirements in accordance with Article 37(4) of the CACM Regulation.

(27) According to Article 36(1) and (2) of the CACM Regulation, all NEMOs must develop, maintain and operate a price coupling algorithm and a continuous trading matching algorithm. They must ensure that the price coupling algorithm and the continuous trading matching algorithm meet the requirements provided for, respectively, in Articles 39 and 52 of the CACM Regulation.

(28) According to Article 36(4) of the CACM Regulation, where possible, NEMOs must use already agreed solutions efficiently to implement the objectives of the CACM Regulation.

(29) According to Article 37(1) of the CACM Regulation (i) all TSOs need jointly to 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, where these requirements shall specify the functionalities and the performance, including the deadlines for the delivery of single day-ahead and intraday coupling results and the details of the cross-zonal capacity and allocation constraints to be respected; and (ii) all NEMOs need jointly to 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.

(30) According to Article 37(2) of the CACM Regulation, no later than three months after the submission of the TSOs' and NEMOs' proposals for a common set of requirements mentioned above, all NEMOs must develop a proposal for the algorithms in accordance with these requirements. This proposal shall indicate the time limit for the submission of the received orders by NEMOs required to perform the MCO functions in accordance with Article 7(1)(b) of the CACM Regulation.

(31) According to Article 37(3) of the CACM Regulation, the all NEMOs' proposal mentioned above has to be submitted to all TSOs. If additional time is required to prepare this proposal, all NEMOs must work together supported by all TSOs for a period of not more than two months to ensure that the proposal complies with Article 37(1) and (2) of the CACM Regulation.

(32) According to Article 37(4) of the CACM Regulation, the proposals referred to in Article 37(1) and (2) of the CACM Regulation shall be subject to consultation in accordance with Article 12 of the CACM Regulation.

(33) According to Article 37(5) of the CACM Regulation, all NEMOs must submit the proposal developed in accordance with Article 37(2) and (3) of the CACM Regulation to all regulatory authorities for approval by no later than 18 months after the entry into force of this Regulation.

(34) According to Article 38 of the CACM Regulation, the price coupling algorithm should produce the results set out in Article 39(2) of the CACM Regulation in a manner which: (i) aims at maximising the economic surplus for single day-ahead coupling for the price-coupled region for the next trading day; (ii) uses the marginal pricing principle according to which all accepted bids will have the same price per bidding zone and per market time unit; (iii) facilitates efficient price formation; (iv) respects cross-zonal capacity and allocation constraints; and (v) is repeatable and scalable. Moreover, 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.

(35) According to Article 39(1) of the CACM Regulation, in order to produce results, the price coupling algorithm shall use: (i) allocation constraints established in accordance with Article 23(3) of the CACM Regulation; (ii) cross-zonal capacity results validated in accordance with Article 30 of the CACM Regulation; and (iii) orders submitted in accordance with Article 40 of the CACM Regulation.

(36) According to Article 39(2) of the CACM Regulation, the price coupling algorithm should produce at least the following results simultaneously for each market time unit: (i) a single clearing price for each bidding zone in EUR/MWh; (ii) a single net position for each bidding zone; (iii) the information which enables the execution status of orders to be determined.

(37) According to Article 39(3) of the CACM Regulation, all NEMOs must ensure the accuracy and efficiency of results produced by the price coupling algorithm.

(38) According to Article 40 and Article 53 of the CACM Regulation the algorithms must be is able to accommodate the orders resulting from the products covering one market time unit and multiple market time units.

(39) According to Article 51(1) of the CACM Regulation, from the intraday cross-zonal gate opening time until the intraday cross-zonal gate closure time, the continuous trading matching algorithm shall determine which orders to select for matching such that matching: (i) aims at maximising economic surplus for single intraday coupling per trade for the intraday market timeframe by allocating capacity to orders for which it is feasible to match in accordance with the price and time of submission; (ii) respects the allocation constraints provided in accordance with Article 58(1) of the CACM Regulation; (iii) respects the cross-zonal capacity provided in accordance with Article 58(1) of the CACM Regulation; (iv) respects the requirements for the delivery of results set out in Article 60 of the CACM Regulation; and (v) is repeatable and scalable.

(40) According to Article 51(2) of the CACM Regulation, the continuous trading matching algorithm should produce the results provided for in Article 52 of the CACM Regulation and correspond to the product capabilities and functionalities set out in Article 53 of the CACM Regulation.

(41) According to Article 52(1) of the CACM Regulation, all NEMOs, as part of their MCO function, need to ensure that the continuous trading matching algorithm produces at least the following results: (i) the execution status of orders and prices per trade; and (ii) a single net position for each bidding zone and market time unit within the intraday market.

(42) According to Article 52(2) of the CACM Regulation, all NEMOs must ensure the accuracy and efficiency of results produced by the single continuous trading matching algorithm.

(43) According to Article 62 of the CACM Regulation, as soon as the orders are matched, each NEMO must publish for relevant market participants at least the status of execution of orders and prices per trade produced by the continuous trading matching algorithm in accordance with Article 52(1)(a) of the CACM Regulation and each NEMO must ensure that information on aggregated executed volumes and prices is made publicly available in an easily accessible format for at least 5 years. The information to be published should be proposed by all NEMOs within the proposal for continuous trading matching algorithm pursuant to Article 37(5) of the CACM Regulation.

(44) As a general requirement, Article 9(9) of the CACM Regulation demands that every proposal for terms and conditions or methodologies includes a proposed timescale for their implementation and a description of their expected impact on the objectives set out in Article 3 of the CACM Regulation.

(45) According to Recital 22 and Article 55 of the CACM Regulation, all TSOs shall develop a proposal for single methodology for pricing intraday cross-zonal capacity to establish reliable pricing of transmission capacity, which reflects congestion, if capacity is scarce. This requirement is understood as complementing the other legal requirements for single intraday coupling.

(46) In addition, the ACER Decision No. 01/2019 of 24 January 2019, determines the Methodology for pricing intraday cross-zonal capacity, in accordance with Article 55 of the CACM Regulation. Articles 5 and 6 of Annex I to that ACER Decision set out the frequency of IDAs and require all TSOs to update and complement the common set of requirements for efficient capacity allocation to enable the development of the algorithm for IDAs, in accordance with Article 37(1)(a) of the CACM Regulation. While this methodology is not directly legally binding for the Algorithm methodology, the latter should nonetheless be consistent with the former.

5.2. Assessment of the legal requirements of the CACM Regulation

5.2.1. Requirements of Article 7 of the CACM Regulation

(47) The proposal for amendment fulfils the requirements of Article 7(1)(b) of the CACM Regulation, as all NEMOs and, where required in cooperation with all TSOs, collectively established the requirements for the single day-ahead and intraday coupling, as set out in Annex 1 and Annex 2 to the proposal for amendment.

(48) The proposal for amendment fulfils the requirements of Article 7(2)(a) and (b) of the CACM Regulation by: (i) providing rules and procedures for developing and maintaining the algorithms, systems and procedures as described in Articles 4 to 7 and in Article 10 of the proposal for amendment; and (ii) taking into account the cross-zonal capacity and allocation constraints, as set out in Articles 3(6), 3(7) and 3(8) of the proposal for amendment.

(49) The proposal for amendment fulfils the requirements of Article 7(2)(c) and (d) of the CACM Regulation and the requirements of Article 48(1)(a) and (b) and Article 48(3) of the CACM Regulation because it specifies, in Article 4(12) of the proposal for amendment, the necessity to deliver single day-ahead coupling results: (i) to all NEMOs and all coordinated capacity calculators for the results set out in Article 39(2)(a) and (b) of the CACM Regulation; and (ii) to all NEMOs for the results set out in Article 39(2)(c) of the CACM Regulation.

5.2.2. Requirements of Articles 8, 36 and 37 of the CACM Regulation

(50) The proposal for amendment fulfils the requirements of Article 8(2)(a) and (b) of the CACM Regulation by establishing the requirements for the price coupling and continuous trading matching algorithms in Annex 1 and Annex 2 of the proposal for amendment and providing them to all NEMOs in accordance with Article 37(1)(a) of the same Regulation.

(51) The proposal for amendment fulfils the requirements set out in Article 36(1) and (2) of the CACM Regulation, because all NEMOs have developed and submitted both the price coupling algorithm and the continuous trading matching algorithm for approval to ACER, while meeting the requirements provided for in Articles 39 and 52 of the CACM Regulation, as assessed in Paragraphs 5.2.4 to (65), (69) and (71) below.

(52) The proposal for amendment fulfils the requirements of Article 36(4) of the CACM Regulation by using the existing day-ahead and intraday algorithm solution in Article 2(2) of the proposal for amendment.

(53) The proposal for amendment generally fulfils the requirements of Article 37(1) to (5) of the CACM Regulation (except for the requirements outlined in paragraph 56 below), because all NEMOs developed the proposal for amendment in accordance with Article 37(1) to (3) of the CACM Regulation, consulted on it and submitted it to ACER.

(54) The time limit for the submission of received orders by NEMOs required to perform the MCO functions in accordance with Article 7(1)(b) of the CACM Regulation is set out in Article 4(12) of the proposal for amendment. The obligation under Article 37(2) of the CACM Regulation demands the time to be mentioned in the common set of requirements for the algorithms. Even though the time is determined in the body text of the proposal for amendment and not in the common set of requirements, these requirements form part of the proposal for amendment. Therefore, the proposal for amendment fulfils the criteria of Article 37(2) of the CACM Regulation to include the time limit for the submission of received orders by NEMOs.

(55) The common sets of requirements, as annexed to the Algorithm methodology fulfil the requirements of Article 37(1) and (2) and once approved and implemented fulfil the objectives of Article 38 of the CACM Regulation.

(56) In accordance with Article 37(1) and (2) of the CACM Regulation the algorithms must fulfil requirements of TSOs and NEMOs. The algorithm methodology generally fulfils all these DA and ID requirements, except in cases the algorithm performance deteriorates and the algorithm cannot accommodate all DA and ID requirements. In such a fallback scenario, all NEMOs propose, among others, the application of corrective measures **(**Article 12 of the proposal for amendment) for DA and ID requirements which have already been accommodated and implemented; or postponement or rejections of change requests (Title IV of the proposal for amendment) for DA and ID requirements, which still need to be implemented.

(57) ACER deemed it necessary to amend Articles 12, 14 and 19 of the proposal for amendment in order to ensure that in case of a fallback scenario of algorithm performance deterioration, the DA and ID requirements have a higher priority than other requirements. For this purpose, a new paragraph has been added to Article 14 of the proposal for amendment to determine all that all DA and ID requirements have direct legal requirements stemming from the CACM Regulation. These requirements should therefore be implemented regardless of the algorithm performance problems and ACER reflected this fact in its amendments to the Algorithm methodology. To

this end, ACER specified in Article 19 that the change requests related to these direct legal requirements should not be rejected or postponed and instead corrective measures should be applied in case these change requests would deteriorate algorithm performance. Similarly, in Article 12, ACER specified that corrective measures on direct legal requirements may only be applied if corrective measures on other requirements are infeasible or insufficient to restore an algorithm's performance. This latter requirement must take into account also the impact of these requirements on the algorithm's performance.

(58) ACER added one paragraph to Article 12(1) of the proposal for amendment to complement the application of the six-month deadline for the use of any corrective measure and to oblige all NEMOs to submit a proposal for amendment to the Algorithm methodology or the products that can be used in SDAC or SIDC, if the application of the corrective measure did not succeed in restoring the algorithm's performance and/or confirming the timely implementation of a legal requirement.

(59) ACER amended the six-month deadline referenced in the previous paragraph and changed it into an eight-month deadline to reflect the fact that the corrective measures shall be applied for the maximum of six months, after which all NEMOs need to propose changes to the Algorithm methodology or the SIDC and/or SDAC products, in accordance with Articles 40 and 53 of the CACM Regulation. In analogy to the procedures set out in Article 9 of the CACM Regulation, all NEMOs shall submit the proposal(s) within two months after the need for an amendment has been triggered.

5.2.3. Requirements of Articles 38 of the CACM Regulation

(60) The proposal for amendment partly fulfils the objectives of Article 38 of the CACM Regulation, as Article 3(6) of the proposal for amendment generally addresses all the algorithm's objectives. However, the requirement for algorithm scalability is being questioned by the proposal for amendment in case of deterioration of an algorithm's performance. In such fallback scenarios, all NEMOs propose, among others, the application of corrective measures **(**Article 12 of the proposal for amendment) for scalability requirements which have already been accommodated and implemented ; or postponement or rejections of change requests (Title IV of the proposal for amendment) for scalability requirements which still need to be implemented.

(61) ACER deemed it necessary to amend Articles 12, 14 and 19 of the proposal for amendment in order to ensure that in case of a fallback scenario of algorithm performance deterioration, the scalability requirements have a higher priority than other requirements. For this purpose, a new paragraph has been added to Article 14 of the proposal for amendment to determine all that all scalability requirements have direct legal requirements stemming from the CACM Regulation. These requirements should therefore be implemented regardless of the algorithm performance problems and ACER reflected this fact in its amendments to the Algorithm methodology. To this end, ACER specified in Article 19 that the change requests related to these scalability requirements should not be rejected or postponed and instead corrective measures should be applied in case these change requests would deteriorate algorithm performance. Similarly, in Article 12 ACER specified that corrective measures on

scalability requirements may only be applied if corrective measures on other requirements are infeasible or insufficient to restore algorithm performance. This latter requirement must take into account also the impact of these requirements on algorithm performance based on the evidence provided about such impact. In this way, ACER ensured a non-discriminatory approach to all market participants and NEMOs, which could be affected by these corrective measures.

(62) In Article 17(7) of the proposal for amendment, ACER amended the prioritisation that shall apply on requests for change to reflect the new principles securing high priority for the implementation of the direct legal requirements as introduced above.

5.2.4. Requirements of Article 39 of the CACM Regulation

(63) The proposal for amendment fulfils the requirements of Article 39(1) of the CACM Regulation, as Article 3(6) of the proposal for amendment specifies that the price coupling algorithm shall use the orders submitted in accordance with Article 40 of the CACM Regulation, as well as the allocation constraints in accordance with Article 23(3) of the CACM Regulation and the cross-zonal capacity results validated in accordance with Article 30 of the CACM Regulation.

(64) The proposal for amendment fulfils the requirements of Article 39(2) of the CACM Regulation, as Article 4(1) of the proposal for amendment presents a list of necessary results that the price coupling algorithm should produce.

(65) The proposal for amendment fulfils the requirements of Article 39(3) of the CACM Regulation, as Article 4(7) of the proposal for amendment indicates that the price coupling algorithm performs checks on every solution found to validate that all the market and network constraints are respected within a given tolerance.

5.2.5. Requirements of Articles 40 and 53 of the CACM Regulation

(66) The proposal for amendment generally fulfils the requirement of Article 40 and 53 of the CACM Regulation, as it accommodates all the orders resulting from the products covering one market time unit and multiple market time units. However, the requirement for accommodating these products is being questioned by the proposal for amendment in case of deterioration of algorithm performance. In such fallback scenarios, all NEMOs propose, among others, the application of corrective measures **(**Article 12 of the proposal for amendment) for products which have already been accommodated and implemented; or postponement or rejections of change requests (Title IV of the proposal for amendment) for products which still need to be implemented.

(67) ACER deemed it necessary to amend Articles 12, 14 and 19 of the proposal for amendment in order to ensure that in case of a fallback scenario of algorithm performance deterioration, the product requirements which have a direct legal basis in Article 40 and 53 of the CACM Regulation have a higher priority than other product requirements. For this purpose, a new paragraph has been added to Article 14 of the proposal for amendment to determine that products covering one market time unit and

multiple market time units have a direct legal basis in the CACM Regulation. These products should therefore be implemented regardless of the algorithm performance problems and ACER reflected this fact in its amendments to the Algorithm methodology. To this end, ACER specified in Article 19 that the change requests related to these products should not be rejected or postponed and instead corrective measures should be applied in case these change requests would deteriorate algorithm performance. Similarly, in Article 12 ACER specified that corrective measures on these products may only be applied if corrective measures on other requirements are infeasible or insufficient to restore algorithm performance. This latter requirement must take into account also the impact of these products or requirements on algorithm performance based on the evidence provided about such impact. In this way, ACER ensured a non-discriminatory approach to all market participants and NEMOs, which could be affected by these corrective measures.

5.2.6. Requirements of Articles 51, 52 and 62 of the CACM Regulation

(68) The proposal for amendment fulfils the requirements of Article 51(1) of the CACM Regulation as Article 3(7) of the proposal for amendment addresses all the objectives and describes the way the continuous trading matching algorithm should reach a result.

(69) The proposal for amendment fulfils the criteria of Article 52(1) of the CACM Regulation because it contains the information about execution status, prices per trade and single net positions in its Article 5(1).

(70) The proposal for amendment fulfils the requirements of Article 62(2) of the CACM Regulation because the proposal for amendment obliges all NEMOs to publish aggregated executed volumes and prices in its Article 23(6).

(71) The proposal for amendment fulfils the criteria of Article 52(2) of the CACM Regulation, as the general approach and steps used by the continuous trading matching algorithm described in Article 5 of the proposal for amendment ensures that any matching done by the continuous trading matching algorithm is accurate and efficient.

5.2.7. Requirements of Article 55 of the CACM Regulation

(72) The proposal for amendment generally contains provisions that aim to fulfil the requirements of Article 55 of the CACM Regulation, because it includes provisions on pricing intraday cross-zonal capacity. The requirements of Article 55 of the CACM Regulation were already fulfilled through the adoption of the Methodology for pricing intraday cross-zonal capacity, which sets out that the pricing mechanism for cross-zonal capacity in the intraday timeframe shall be based on IDAs.

(73) This methodology sets out the timing and the implementation of IDAs and requires the TSOs to update and complement the common set of requirements for efficient capacity allocation to enable the development of the algorithm for the IDAs in accordance with Article 37(1)(a) of the CACM Regulation and provide it to all NEMOs.

(74) All NEMOs complied with the amended TSOs' requirements and provided, in Article 6 of the proposal for amendment, the main features of the algorithm for the implementation of IDAs.

(75) ACER changed the structure of the whole Article 6 of the proposal for amendment in order to prevent potential ambiguities. Article 6(1) determines the main features of the IDAs and makes reference to the day-ahead timeframe of Article 4 and indicates that the same provisions of Article 4 shall apply for IDAs, with exceptions listed below that paragraph.

(76) Therefore, ACER copied all necessary provisions from Article 4 to Article 6 and amended them in a way to ensure they are ready to be applied in the IDA algorithm. Apart from the change of structure, the content and goal of Article 6 remain the same.

(77) ACER amended Articles 5(19) and 5(20) to minimise the impact of the IDAs on continuous trading, because the public consultation revealed that the market participants value shortening the time for the suspension of cross-zonal capacities in the continuous SIDC. Nevertheless, at the same time, ACER should secure that the results of the IDA algorithm are consistent and robust. Therefore, ACER determined an overall suspension time of 40 minutes, including 20 minutes before the deadline for bid submission, which are reserved for TSOs to merge the recalculated capacities with the capacities from the continuous SIDC (5 minutes) and for placing bids to the IDA (15 minutes) and 20 minutes after the deadline for bid submission, which are reserved for the calculation of the auction results, verification, transfer of data and publication of results.

(78) After consulting all NEMOs on the shortened time period for delivering results from the IDAs, ACER introduced a temporary measure, which allows the NEMOs and TSOs to extend the suspension time to the originally proposed length of 30 minutes before the deadline for bid submission and 30 minutes after, if they identify the need in the testing phase of the preparation of IDAs.

5.2.8. Requirements of Article 9(9) of the CACM Regulation

(79) The proposal for amendment fulfils the criteria of Article 9(9) of the CACM Regulation, because it describes the proposed implementation timescale in Articles 4 to 6 and in Annexes 1 and 2, and because it describes the expected impact on the objectives of the CACM Regulation in its Recitals (5) to (14).

5.2.9. Public consultation

(80) The NEMO Committee, representing all NEMOs, consulted the stakeholders on the draft proposal for amendment Union-wide, from 3 June to 2 July 2019. Moreover, on 4 March 2019, all NEMOs organised a stakeholder workshop to discuss ongoing problems related to the algorithm, including the proposal for amendment for the price coupling algorithm and the continuous trading matching algorithm.

(81) Therefore, the proposal for amendment has been subject to a public consultation in accordance with Article 12 of the CACM Regulation and complies with Article 37(4) of the CACM Regulation.

5.2.10. Recitals

(82) ACER did not change the content of the Recitals, nevertheless, it amended the text in order to precise the expressions, put in place the appropriate abbreviations and to generally clarify the intent and purpose of the Algorithm methodology.

5.2.11. Proposed timescale for implementation

(83) Articles 4 and 5 of the proposal for amendment define the implementation timelines of the Algorithm methodology as regards the implementation of the price coupling algorithm and the continuous trading matching algorithm.

(84) In Article 4(14) of the proposal for amendment, ACER amended the already past deadlines for implementation for the already existing requirements of 1 August 2018 and 1 May 2019 and referred to them as to 'existing'. Moreover, ACER added one new deadline for implementation of half-hourly and quarter-hourly granularity of DA products. This change stems from the requirement of Article 8(4) of Regulation (EU) 2019/943 of the European parliament and of the Council of 5 June 2019 on the internal market for electricity.

(85) In Article 5(14) of the proposal for amendment, ACER amended, in analogy to the previous paragraph (84), the already past deadlines for implementation and referred to them as to 'existing'. Moreover, after consulting all NEMOs, TSOs and regulatory authorities, ACER amended the timeline for implementation of the IDAs and postponed it by one year to 1 January 2023, which means that all functionalities and requirements (e.g. switchover and switchback) with their respective deadlines shall be implemented together with the implementation of IDAs.

(86) In Article 6(6) of the proposal for amendment, ACER amended, in analogy to the previous paragraph (84), the already past deadlines for implementation and referred to them as to 'existing'. Moreover, after consulting all NEMOs, TSOs and regulatory authorities, ACER amended the timeline for implementation of the IDAs and postponed it by one year to 1 January 2023 in order to relieve the envisaged algorithm performance issues.

(87) ACER defined the above mentioned deadlines after consultation with all NEMOs, TSOs, regulatory authorities and market participants. ACER understands that the NEMOs face the risk of not meeting the adequate algorithm performance criteria once all the future algorithm requirements are implemented. Nevertheless, ACER considers that the NEMOs should manage this risk via a revision of the need and use of products, as well as reasonable specification of requirements, particularly those having a significant impact on the algorithm performance and not being explicitly required by the CACM Regulation or the European law. Therefore, ACER considers that all

NEMOs should be able to maintain an adequate performance of the algorithms without jeopardising the implementation of all the future algorithm requirements.

5.3. Specific issues of the Algorithm methodology

5.3.1. Definitions

(88) Article 2 of the proposal for amendment sets out the definitions used throughout the document.

(89) In Article 2(1), ACER amended and updated the already repealed Regulation (EU) 714/2009 with the new Regulation (EU) 2019/943 and in Article 2(2) added the definitions set out in the Methodology for pricing intraday cross-zonal capacity, because it is also implementing Article 55 of the CACM Regulation for implementing IDAs, therefore relevant for the establishment of the IDA algorithm.

(90) In Article 2(3), ACER:

(a) amended the definitions of the Algorithm monitoring methodology, Algorithm performance, Change control procedure, Corrective measure, First "OK" solution, Functionality, Paradoxically rejected order, DA/ID/IDA products and Request for change in order to reflect the new structure of the document and new abbreviations;

(b) amended the definitions of the Go-live window and Originator in order to simplify it and to provide legal clarity;

(c) added the definitions of the Algorithm monitoring procedure, Back-up procedure, Fallback procedure, Methodology for pricing intraday cross-zonal capacity, Operational contract, Operational procedure, Switchover and Switchback to enable better understanding of the Algorithm methodology and to identify the concrete documents, where additional information can be found (for all contracts and procedures);

(d) deleted the definition of the Algorithm service provider, because it does not constitute a party under the CACM Regulation and could cause ambiguities about legal responsibilities;

(e) deleted the definition of the Assessment body and the Decision body, because the whole concept of decision-making was deleted from the proposal for amendment as discussed in paragraph (112);

(f) deleted the definition of the Future requirements and Initial requirements, because the concept was replaced by the introduction of explicit implementation deadlines in order to make the deadlines easy to find in the common sets of requirements and to unify the style for both the DA and ID timeframes;

(g) deleted the definition of the IDA, because it has been already defined in the Methodology for pricing intraday cross-zonal capacity as introduced by ACER above in paragraph (89);

(h) deleted the definition of Party, which is not necessary to abbreviate, as it stands for 'any NEMO and TSO'. Therefore, ACER replaced all occurrences of the Party by its former definition, i.e. by 'any NEMO or TSO'; and

(i) deleted the definition of Usage, because it attempts to define several concepts at once and it was moved to the beginning of Article 7 of the proposal for amendment dealing with usage.

5.3.2. Algorithm requirements

(91) Article 3 of the proposal for amendment sets out the main requirements for the price coupling algorithm, the continuous trading matching algorithm and the IDA algorithm, the details of which are defined in Annex 1 and Annex 2 to the proposal for amendment.

(92) ACER deleted paragraph 2, as it repeats the scope of the Algorithm methodology and became redundant.

(93) Repeatability is a crucial feature of the algorithm, because it secures that any run of the algorithm provides output, which can be back-tracked and potentially used in infringement procedures to prove market manipulation.

(94) Therefore, ACER amended paragraph 5 to ensure that the repeatability of the algorithm is ensured and reinstalled the wording of the last ACER Decision 08/2018 on the same subject, which sets out that the algorithm should consistently deliver the same results.

5.3.3. Price coupling algorithm

(95) Article 4 of the proposal for amendment determines the main features of the price coupling algorithm. It provides details on the algorithm outputs, on the calculation of scheduled exchanges and on the way to find solutions. It also provides some details on the operational procedures and timings and puts obligations on NEMOs regarding the provision of data and information to TSOs and market participants, including the public description of the algorithm.

(96) ACER amended paragraph 4 in order to better describe the combinations of products, which the algorithm shall evaluate. As it became difficult to list all products, which should be evaluated, ACER instead listed the products which should not be.

5.3.4. Calculation of effective usage, anticipated usage and usage range

(97) Article 7 of the proposal for amendment determines the main features of the concept of the algorithm usage. The algorithm usage gives a quantitative indication on the average use of products or functionalities.

(98) ACER amended paragraph 1 to reflect the general idea of usage and used for that purpose the deleted definition of 'Usage' from Article 2 of the proposal for amendment.

(99) ACER corrected and unified the terminology in Article 7 to use the same terms (where confirmed by NEMOs that the underlying meaning is the same) in the Algorithm methodology with those used in the annexes. These amendments did not change the substance of the Algorithm methodology and its annexes.

5.3.5. Monitoring algorithm performance

(100) Article 8 of the proposal for amendment determines the minimal requirements for monitoring the algorithms' performance.

(101) ACER deleted paragraph 3. In the last ACER Decision 08/2018, it served as a legal basis for the current proposal for amendment. Its purpose was to set out the minimum requirements on the monitoring and it became redundant in the current proposal for amendment, because the implementation of those provisions shifted all the content to Annexes 3 and 4 of the Algorithm methodology.

(102) ACER amended Article 8(5), in order to set the deadline until when the NEMOs should send the yearly report and added a provision, by which the NEMOs should share the data used for the production of the report with ACER. Moreover, ACER added a new provision, which requests the NEMOs to provide an analysis of each product and its impact on the algorithm performance. Such analysis should be used by NEMOs in case of the need of simplification of the products used in SDAC or IDAs.

5.3.6. Roadmap for planning of changes

(103) Article 10 of the proposal for amendment describes the process of early submission of requests for change, which can enter the roadmap and be treated with certain priority compared to requests for change, which are not in the roadmap.

(104) ACER, without changing the meaning of Article 10, slightly changed the structure and moved Article 16(8) in a paragraph of Article 10, because it is closely related to the roadmap.

(105) ACER deleted paragraph 5, because it became redundant. It describes the conditions under which a request for change cannot be considered as a part of the roadmap, while the rest of the content of Article 10 makes it clear under what conditions a request for change can become part of the roadmap.

5.3.7. Research and development activities

(106) Article 11 of the proposal for amendment describes the activities of NEMOs in the field of research and development.

(107) Except for clarifying the text of the whole Article 11, ACER deleted paragraph 7, which mentioned the potential tasks of the algorithm provider. The deletion of the paragraph is in accordance with the reasoning of paragraph (90)(d).

5.3.8. Algorithm change management

(108) Title 4 of the proposal for amendment describes in its Articles 13 to 23 the governance of all NEMOs and management of requests for change. It contains principles on submission, assessment, timing, prioritisation and decision-making connected to the requests for change.

(109) All NEMOs enhanced over time their cooperation with all TSOs, which goes even beyond the minimum requirements of the CACM Regulation, and which is positively acknowledged by ACER. For that reason, all NEMOs introduced for their governance purposes a phrase stating that 'all NEMOs and all TSOs shall/may/ …' to stress that the algorithm connected decisions are made together with all TSOs. Even though ACER supports such cooperation, there is no legal mandate for ACER to lay any obligations on TSOs in a proposal submitted by all NEMOs. In support of the statement in the previous sentence, the Decision is addressed to all NEMOs, which submitted the proposal for amendment to ACER; therefore, the TSOs are not recipients of the Decision and the Decision cannot have any legal effect on them.

(110) Therefore, after consultation with all NEMOs and all TSOs, ACER amended the phrase in the whole proposal for amendment and changed it into 'all NEMOs in cooperation with all TSOs', which keeps the original concept of enhanced cooperation, but does not imply any direct legal obligation on TSOs.

(111) All NEMOs proposed in Title 4 a concept, which envisaged the existence of several decision-making bodies, which would in different steps manage the decision-making process. In particular, they are the assessment body, the decision body and the independent arbitral tribunal. The assessment body and the decision body are defined in Article 2 of the proposal for amendment.

(112) After consultation with all NEMOs and TSOs, ACER requested the NEMOs to change the concept of decision-making bodies, because the process of assessing requests for change resulted in a decision of the arbitral tribunal, which was binding for all NEMOs and TSOs and ACER could not have agreed on any binding decisions imposed on TSOs as argued earlier in the text. Therefore, ACER deleted not only the definitions, but also deleted and amended Articles 21 to 23 and replaced the decision-making bodies with a phrase 'all NEMOs in cooperation with all TSOs assess/decide/ …' in all the relevant places of the proposal for amendment.

(113) For enhancing clarity, ACER moved paragraph 6 of Article 15 describing the timing of submission to the beginning of Article 16, as it better reflects the purpose of Article 16, which directly covers the timing of requests for change.

(114) ACER deleted Article 16(8) because it introduces rules and concepts that have been already described in Articles 10, 13 and 17.

(115) ACER merged Articles 18 and 19 because the content was close to identical, only distinguishing the DA and ID timeframes.

(116) ACER deleted Article 20(9) because the timing has been sufficiently described in the relevant Article 16.

(117) ACER deleted Article 20(14) because the concept of the decision body was deleted and replaced by the common decision of all NEMOs in cooperation with all TSOs.

5.3.9. Publications and reporting

(118) Article 24 of the proposal for amendment sets out the list of publications and their timings that all NEMOs shall produce.

(119) ACER added one paragraph obliging the NEMOs to publish and continuously update all procedures and contracts, which are mentioned in the document and defined (as amended by ACER) in Article 2. The procedures and contracts provide in more details the specific parts of the Algorithm methodology and especially details on monitoring of the algorithms' performance and reporting.

5.3.10. Annex 1 to the Algorithm methodology: Common set of requirements or the price coupling algorithm

(120) ACER amended and updated the table referring to the 'State' of the requirements with the new denotations from the Algorithm methodology.

(121) In paragraph 1.1(a)(i), ACER changed the deadline for implementation of the 15 minute and 30 minute market time units, in accordance with Regulation (EU) 2019/943.

(122) ACER deleted paragraph 1.1(j) because it is identical to paragraph 1.1(i)therefore redundant.

(123) During the consultation with NEMOs, TSOs and regulatory authorities, ACER received inputs that the requirement for intuitive flow-based approach does not have a legal basis in the CACM Regulation and has a significant impact on the SDAC algorithm. The Agency evaluated this claim and indeed concluded that the intuitive flow-based approach cannot be supported by the SDAC algorithm because:

(a) The constraints required to enforce intuitive solution for the flow-based approach cannot be accommodated by Article 39(1) of the CACM Regulation, which defines inputs to the SDAC algorithm, because these constraints are neither supported by the cross-zonal capacities nor by allocation constraints. In case of flow-based approach, the cross-zonal capacities are flow-based parameters (i.e. available margins on critical network elements and power transfer distribution factors) and in case of allocation constraints these are, according to Article 23(3) of the CACM Regulation, the constraints that are needed to maintain the transmission system within operational security limits and that cannot be transformed efficiently into maximum flows on critical network elements; or the constraints intended to increase the economic surplus for single day-ahead or intraday coupling. The constraints required to enforce intuitive solution for the flow-based approach do not fit into either of these categories.

(b) The constraints required to enforce intuitive solution for the flow-based approach are directly contradicting Article 38(1) of the CACM Regulation, which requires that the SDAC algorithm aims at maximising the economic surplus, while respecting cross-zonal capacities and allocation constraints. This is because the constraints required to enforce intuitive solution for the flow-based approach are limiting the maximisation of the economic surplus in order to achieve intuitive solution. Such limitation of economic surplus has no legal basis in the CACM Regulation.

Therefore, ACER deleted paragraph 2.2 and 3.4 form the Common set of requirements for the price coupling algorithm.

5.3.11. Annex 2 to the Algorithm methodology: Common set of requirements for the continuous trading matching and the intraday auction algorithms

(124) ACER deleted the introductory sections 'Background' and 'Impact on the objectives of the CACM Regulation and implementation timeline' because all the content of these sections is covered by the Algorithm methodology and makes them redundant.

(125) ACER amended and updated the table referring to the 'State' of the requirements with the new denotations from the Algorithm methodology.

(126) ACER deleted paragraph 1.3(g)(vi) and merged its content with paragraph 1.3(g)(i).

(127) ACER deleted paragraph 1.3(g)(vii) and merged its content with paragraph 1.3(g)(ii).

(128) ACER deleted paragraph 1.3(m) and merged its content with paragraph 1.3(g)(ix).

(129) ACER deleted paragraphs 1.3(h) to 1.3(l) because identical provisions are mentioned under paragraphs 1.3(g)(iii) to 1.3(g)(vii) and are, therefore, redundant.

(130) ACER deleted paragraph 2.2 on the intuitive flow-based approach for the reasons described in paragraph (123).

(131) ACER amended paragraph 6.2(c), in order to provide more precise explanations of the reasons under which partial coupling can occur.

(132) ACER deleted paragraph 7.2 and 8.4 on the intuitive flow-based approach for the reasons described in paragraph (123).

5.3.12. Annex 3 to the Algorithm methodology: Methodology for monitoring the performance and usage of the price coupling algorithm

(133) In Article 10 of the proposal for amendment, after consultation with NEMOs, ACER deleted paragraph 1(a), which determines the number of curve points as a monitoring indicator, because it is not necessary in combination with Article 10(1)(b), which determines the number of curve steps and does not bring any added value for the monitoring purposes.

(134) To enhance readability, ACER generally restructured the whole Annex. ACER unified the terminology and abbreviations used in the Algorithm methodology and in the Annex and rearranged and reworded the content of most Articles in order to provide clarity. Nevertheless, the content (i.e. the choice of indicators and the method by which they should be calculated, used and reported) and the purpose of the Annex remains unchanged.

5.3.13. Annex 4 to the Algorithm methodology: Methodology for monitoring the performance and usage of the continuous trading matching algorithm.

(135) To enhance readability, ACER generally restructured the whole Annex. ACER unified the terminology and abbreviations used in the Algorithm methodology and in the Annex and rearranged and reworded the content of most Articles in order to provide clarity. Nevertheless, the content (i.e. the choice of indicators and the method by which they should be calculated, used and reported) and the purpose of the Annex remains unchanged.

5.3.14. Assessment of other points of the proposal for amendment

(136) ACER deleted Article 7 because it did not have any content.

(137) ACER introduced several editorial amendments. The most significant one relates to the transformation of the document into a format which enables enforceability. Further, the wording, use of the appropriate abbreviations and ordering of some chapters were changed in order to improve readability and clarity.

6. CONCLUSION

(138) For all the above reasons, ACER considers the proposal for amendment compliant with the requirements of the CACM Regulation, provided that the amendments described in this Decision are integrated in the proposal for amendment, as presented in Annexes I, II, III, IV and V to this Decision.

(139) Therefore, ACER approves the proposal for amendment subject to the necessary amendments and to the necessary editorial amendments. To provide clarity, Annexes I, II, III, IV and V to this Decision set out the proposal for amendment as amended and as approved by ACER,

HAS ADOPTED THIS DECISION:

Article 1

The Algorithm methodology, the common set of requirements for the price coupling algorithm, the continuous trading matching algorithm and intraday auction algorithm, and the day-ahead and intraday algorithm monitoring methodologies,

developed pursuant to Article 37 of Regulation (EU) 2015/1222, are adopted as set out in Annexes I, II, III, IV and V to this Decision.

Article 2

This Decision is addressed to

- BSP Regionalna Energetska Borza d.o.o.
- CROPEX Ltd
- EirGrid plc
- EMCO AS
- EPEX Spot SE
- EXAA AG
- GME Spa
- HEnEx SA
- HUPX Zrt.
- Independent Bulgarian Power Exchange (IBEX)
- Nasdaq Oslo ASA
- Nord Pool AS
- OKTE a.s.
- OMIE S.A.
- OPCOM S.A.
- OTE a.s.
- SONI Ltd
- Towarowa Gielda Energii S.A.

Done at Ljubljana, on 30 January 2020.

- SIGNED –

For the Agency
The Director

C. ZINGLERSEN

Annexes:

Annex I – Methodology for the price coupling algorithm, the continuous trading matching algorithm and the intraday auction algorithm also incorporating 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

Annex II – Common set of requirements for the price coupling algorithm

Annex III – Common set of requirements for the continuous trading matching algorithm and the intraday auction algorithm

Annex IV – Algorithm monitoring methodology for single day-ahead coupling

Annex V – Algorithm monitoring methodology for single intraday coupling

Annex VI (for information only) – Evaluation of responses to the public consultation on the compliance of the all NEMOs' proposal for Methodology for the price-coupling algorithm and the continuous trading matching algorithm

Annex Ia – Methodology for the price coupling algorithm, the continuous trading matching algorithm and the intraday auction algorithm also incorporating 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 (track-change version, for information only)

Annex IIa – Common set of requirements for the price coupling algorithm (track-change version, for information only)

Annex IIIa – Common set of requirements for the continuous trading matching and the intraday auction algorithms (track-change version, for information only)

Annex IVa – Algorithm monitoring methodology for single day-ahead coupling in accordance with Article 8 of the Algorithm methodology (track-change version, for information only)

Annex Va – Algorithm monitoring methodology for single intraday coupling in accordance with Article 8 of the Algorithm methodology (track-change version, for information only)

In accordance with Article 28 of Regulation (EU) 2019/942, the addressees may appeal against this Decision by filing an appeal, together with the statement of grounds, in writing at the Board of Appeal of ACER within two months of the day of notification of this Decision.

Methodology for the price coupling algorithm, the continuous trading matching algorithm and the intraday auction algorithm

also incorporating 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

30 January 2020

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Whereas

(1) This document ('Algorithm methodology') establishes the methodology for the price coupling algorithm, the continuous trading matching algorithm and intraday auction algorithm in accordance with Article 37(5) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management ('CACM Regulation'). It incorporates, as annexes, a common set of requirements for the day-ahead price coupling algorithm ('DA algorithm requirements') and for the intraday continuous trading matching algorithm and the intraday auction algorithm ('ID algorithm requirements') in accordance with Articles 37 and 55 of the CACM Regulation, and principles and indicators for their respective monitoring.

(2) This Algorithm methodology incorporates the intraday auctions (IDAs) to comply with the requirement for pricing cross-zonal capacity in single intraday coupling (SIDC) set forth in Article 55 of the CACM Regulation and to comply with the provisions of the Methodology for pricing intraday cross-zonal capacity. Consequently, the ID algorithm requirements include the requirements for the continuous trading matching algorithm and the IDA algorithm. For the avoidance of doubt, while the single day-ahead coupling (SDAC) means the day-ahead session of market coupling, the SIDC means both the continuous trading session and the IDA session as set out in the aforementioned Methodology for pricing intraday cross-zonal capacity.

(3) In order to be able to support the same set of products and functionalities while assuring at the same time an efficient use of resources in terms of implementation costs and time to delivery of new functionalities, as well as benefit from the SDAC algorithm's development evolution, the same algorithm used for SDAC should be used also for IDAs.

(4) In this Algorithm methodology, any reference to the IDA algorithm directs to the same algorithm solution used in SDAC. The proposed timeline for the implementation of the IDAs is based on this assumption.

(5) This Algorithm methodology takes into account the general objectives of capacity allocation and congestion management described in Article 3 of the CACM Regulation as set out below in paragraphs (6) to (15).

(6) This Algorithm methodology promotes effective competition in the generation, trading and supply of electricity (Article 3(a) of the CACM Regulation) as it establishes a level playing field for competition among all market participants through an objective function, which aims to maximise the economic surplus and sets transparent conditions to participate in the SDAC and SIDC.

(7) This Algorithm methodology ensures that the cross-zonal capacity is allocated in a way that aims to maximise the economic surplus and thus contributes to ensuring optimal use of the transmission infrastructure (Article 3(b) of the CACM Regulation).

(8) This Algorithm methodology ensures that cross-zonal trading within the SDAC and SIDC respects the cross-zonal capacities and allocation constraints provided by coordinated capacity calculators and thereby ensures that operational security is not endangered by the operation of SDAC and SIDC (Article 3(c) of the CACM Regulation).

(9) This Algorithm methodology facilitates both the coordinated net transmission capacity approach as well as flow-based approach and thereby supports the optimisation of the calculation of cross-zonal capacity (Article 3(d) of the CACM Regulation). As regards the allocation of cross-zonal capacity, the Algorithm methodology promotes implicit allocation of cross-zonal capacity, which is considered as more efficient than explicit allocation of cross-zonal capacity and allows for the usage of explicit cross-zonal capacity allocation.

(10) This Algorithm methodology ensures fair and non-discriminatory treatment of TSOs, NEMOs and market participants (Article 3(e) of the CACM Regulation). The non-discriminatory treatment of TSOs and NEMOs is achieved by allowing an open access to participation in SDAC and SIDC to all NEMOs and TSOs and by allowing both to define their requirements in relation to the development and operation of SDAC and SIDC. Non-discriminatory treatment of market participants is achieved through their equal access to the SDAC and SIDC regardless of their origin or chosen NEMO in Member States with multiple NEMOs. Moreover, the matching of their orders is based on an objective function, which maximises the

economic surplus. This Algorithm methodology has no impact on the non-discriminatory treatment of ACER and regulatory authorities.

(11) This Algorithm methodology ensures and enhances transparency and reliability of information (Article 3(f) of the CACM Regulation) through transparent management of the algorithms' development and operation. This is achieved via transparent rules for monitoring and managing the algorithm performance, the corrective measures and the requests for changes to the algorithms. Transparency and reliability is also achieved through the requirements on regular reporting, the publication of documents related to these processes and the disclosure to the interested public of information needed to monitor the functioning of the algorithms.

(12) This Algorithm methodology contributes to an efficient long-term operation and development of the electricity transmission system and electricity sector in the Union (Article 3(g) of the CACM Regulation) as it ensures that all electricity markets and networks in the EU and other eligible third countries can participate in the SDAC and SIDC. This provides for an environment in which these markets can operate efficiently, where the cheapest generation can meet the highest demand and where efficient signals for the operation and development of the electricity sector are provided for.

(13) The algorithms apply clear rules for the price formation, which do not allow for discrimination among market participants. Therefore, this Algorithm methodology respects the need for a fair and orderly market and a fair and orderly price formation (Article 3(h) of the CACM Regulation) by ensuring that the algorithms always maximise the economic surplus and that their outcome is repeatable and scalable to the extent needed to support the extension of SDAC and SIDC to the whole EU and other eligible third countries.

(14) This Algorithm methodology supports the creation of a level playing field for NEMOs (Article 3(i) of the CACM Regulation) as it allows the participation by more than one NEMO in one bidding zone and provides equal opportunities for all NEMOs to compete with their services, with the exception of the national legal monopoly, in accordance with Article 5 of the CACM Regulation. This Algorithm methodology also ensures that the NEMOs' needs for product customisation for their customers are treated in a non-discriminatory way, while taking into account the impact of those needs on the algorithm performance.

(15) This Algorithm methodology ensures non-discriminatory access to cross-zonal capacity (Article 3(j) of the CACM Regulation) as it ensures the application of implicit capacity allocation, which allocates cross-zonal capacities to market participants' orders in a way that maximises the economic surplus at a specific point of time.

(16) This Algorithm methodology should provide assurance that the SDAC and SIDC algorithms are able to find for all days a solution that is compliant with the concept of market coupling and implicit capacity allocation within the permitted time. This Algorithm methodology should provide an objective framework to monitor and communicate on the operational performance, as well as to ensure stakeholders' understanding of the functioning of the algorithms.

(17) Changes to the SDAC and SIDC algorithms should be managed in an open, transparent and non-discriminatory way by seeking stakeholder's input, where relevant. These changes should provide assurance that the algorithms' performance is maintained at adequate levels and over a reasonable period of time in the future, assuming plausible market growth and development. To achieve this, individual NEMO's or TSO's requests should be supported to the extent that they do not harm any NEMO or TSO or include measures to mitigate any harm in a way that ensures non-discrimination.

(18) While the existing SDAC and SIDC algorithm solutions support all existing requirements and all individual products established in the respective terms and conditions, which set the products that can be taken into account by NEMOs in the single day-ahead coupling and single intraday coupling ('Terms and conditions on SDAC products' and 'Terms and conditions on SIDC products'), such support may not be achievable in a situation where the SDAC and SIDC are extended to many additional bidding zones and where the usage of products is greatly increased. In such a situation, the algorithm should support at least a combination of products that does not significantly restrict the needs of market participants and requirements specified in a way that enables the TSOs to perform their duties pursuant to CACM Regulation. A specific set of articles for deciding on requests for changes and corrective measures is

included in this Algorithm methodology to provide clarity regarding potential limitations to products or requirements.

(19) In order to address all the requirements of the CACM Regulation, the existing SDAC and SIDC algorithm solutions require further research and development on the IT solution supporting the algorithm operation and the algorithm design, aiming to maintain adequate performance of the algorithm. All NEMOs should regularly inform the regulatory authorities and other stakeholders about the expected outcome of the research and development process, in order to allow for adapting their own operational processes to the newly developed solutions.

(20) The SDAC algorithm and the IDA algorithm need to support the products (and requirements) ranging across more than one market time unit ('MTU') and often have an all-or-nothing acceptance criterion. This requires a complex combinatorial calculations to compute a number of alternative (compliant with the CACM Regulation) solutions. In order to allow the algorithm to provide the results within the time limit specified by all TSOs in accordance with Articles 48(1) and 59(4) of the CACM Regulation, the algorithm may not have enough time to search for all feasible solutions in order to find an optimal solution, which maximises the economic surplus. In that respect, the requirement to maximise the economic surplus for SDAC or SIDC should be understood as the requirement to find the highest possible economic surplus among all the feasible solutions found by the algorithm within the time constraints. In specific cases, this may have an impact on the requirement to respect the need for a fair and orderly price formation in accordance with Article 3(h) of the CACM Regulation. Since the maximisation of the economic surplus (i.e. optimal solution) is considered as the best guarantee to fulfil this requirement, all NEMOs should minimise the degree to which the solution found within the time constraints deviates from the optimal solution.

(21) According to Article 38(1)(e) of the CACM Regulation, the SDAC algorithm must be repeatable, which means that it must consistently produce the same results during a repeated execution with identical inputs. However, since the solution found by the SDAC algorithm and IDA algorithm is time dependent, the repeatability can only be ensured under the same conditions, i.e. on the same specific configuration of hardware and software and the same number of algorithm iterations. Furthermore, the application of a concept of full repeatability in a 'multi-threading' approach, as the one implemented in the SDAC algorithm and IDA algorithm in order to maximise its scalability and its ability to find more and better solutions given the constraints recalled in whereas (20), would drastically reduce such benefits. For this reason, the repeatability of the SDAC algorithm and IDA algorithm in operations should be adequate to accommodate the objectives of the CACM Regulation. It means that the differences between alternate runs of the algorithm with the same input data (given the same specific configuration of hardware and software and the same number of algorithm iterations) respect the conditions defined in this Algorithm methodology. At the same time, the NEMOs should be able to fully replicate the outcome of specific algorithm runs upon the request of ACER or of one or more regulatory authorities.

(22) According to Article 51(1)(a) and (e) of the CACM Regulation, the continuous trading matching algorithm must aim at maximising the economic surplus and be repeatable and scalable. Since the matching of orders in the continuous trading matching algorithm is based on their price and submission time, the continuous trading matching algorithm does not contain any welfare optimization feature or any element of randomness. Therefore, the continuous trading matching algorithm is by default maximizing welfare and repeatable. For this reason, the monitoring of continuous trading matching algorithm's optimality and repeatability is not necessary.

(23) According to Articles 38(1)(e) and 51(1)(e) of the CACM Regulation, the algorithms must be scalable. This means that they must be able to accommodate an enlargement of the SDAC and SIDC to new bidding zones (and new NEMOs), as well as the increased usage of the products and the implementation of the algorithm requirements. However, an unlimited scalability is (i) not feasible, since any configuration of hardware and software is subject to technical constraints that can become limiting under extreme conditions, (ii) not efficient, since it entails costs, which are not proportionate to the results that can be achieved and (iii) not needed, since the dimensions of the market coupling are not infinite in terms of geographical scope, number of NEMOs, products and requirements. Hence, the scalability should be adequate to accommodate the objectives of the CACM Regulation.

(24) With regard to additional bidding zones, the completion of a fully functioning and interconnected internal energy market makes the extension of market coupling to all eligible bidding zones and NEMOs the highest priority objective. Thus, at the time of the adoption of this Algorithm methodology, the algorithm should support all eligible bidding zones and NEMOs as well as the existing requirements of TSOs and existing. However, as the number of eligible bidding zones and NEMOs will increase in the future (e.g. due to extension to third countries), the algorithms should be continuously upgraded to accommodate all additional bidding zones (and NEMOs) eligible to participate in the SDAC and SIDC, as well as the additional requirements from TSOs that may arise from the development of capacity calculation methodologies in capacity calculation regions.

(25) The implementation and management of the SDAC and/or SIDC algorithms (according to the CACM Regulation's requirements) in terms of security of operation as well as of adequate performance, trigger different activities in the responsibility of all NEMOs and/or all TSOs. Such activities are the monitoring on a structured basis of the algorithm performance and of the usage of the functionalities therein supported, an efficient planning of the modifications to be implemented to the algorithms in the mid-long term, together with the establishment of a research and development process aimed at improving the SDAC and/or SIDC algorithm performance.

(26) If due to an unexpected evolution in the framework of the monitoring of the algorithm performance, the performance of the algorithm deteriorates, all NEMOs in cooperation with all TSOs should apply corrective measures to restore the performance. These measures should be timely communicated to stakeholders. An efficient and transparent governance is crucial for this process.

(27) The future evolution of the algorithms in terms of their scalability requires changes to the algorithms' functionalities or to the usage of already existing functionalities. To accommodate these changes, all NEMOs should cooperate with all TSOs where these changes affect TSOs' algorithms' requirements or algorithms' performance and communicate these changes to stakeholders in a timely manner. An efficient and transparent governance is crucial for this process.

(28) In order to assess the impact on performance of the SDAC and/or SIDC algorithm by any change in the usage of its functionalities, all NEMOs in cooperation with all TSOs should define usage scenarios for each functionality, usage of which could vary on a daily basis.

(29) The concept of effective usage refers to the actual value of usage of these functionalities over a past period. This should be the basis for the monitoring of usage of requirements and the performance of the SDAC and SIDC algorithms.

(30) The concept of anticipated usage refers to the future value of the usage of the SDAC and SIDC algorithm's functionalities, when assessing an expected variation of the performance of the algorithms due to the implementation of requests for change or due to the expected growth of their usage. This should be the basis for assessing the impact on the algorithms' performance induced by requests for change as well as for the periodic assessment of adequate scalability against anticipated growth of the usage of functionalities.

(31) The concept of usage range refers for each functionality to the maximum estimated usage of such functionality supported by the algorithm, consistent with adequate levels of scalability. The individual usage ranges of the functionalities should be jointly estimated on the basis of their anticipated usage. Considering that the joint usage of many functionalities affects performance, the usage range should not represent any maximum allowed or reserved level of usage of the functionalities. The usage range should rather indicate a prudent measure of an individual usage consistent with overall adequate performance and indicate potential area of application of corrective measures in case the overall performance is reducing the predefined thresholds.

(32) The development and operation of the SDAC and SIDC algorithms require close cooperation between all NEMOs and all TSOs as part of the day-to-day management of the single day-ahead and intraday coupling pursuant to Article 10 of the CACM Regulation, because the algorithms must satisfy the requirements from NEMOs and TSOs. For this purpose, NEMOs and TSOs should collaborate in the processes for managing the algorithm performance, in the processes leading to a change in the algorithms, as well as in the development of the underlying rules governing these processes.

(33) The development and operation of the algorithms require highly transparent processes. For this reason, all NEMOs should publish in a timely manner all relevant information, procedures, contracts, descriptions and reports having an impact on the algorithm operation, management, performance and future evolution. Moreover, all NEMOs should ensure that the interested public is able to understand the functioning of the SDAC and SIDC algorithms.

(34) The future evolution of various terms and conditions or methodologies developed by TSOs or NEMOs in accordance with the CACM Regulation may require some additional changes to the SDAC and SIDC algorithms. In such a case, all TSOs and all NEMOs should update the DA and ID algorithm requirements and subsequently all NEMOs should update this Algorithm methodology and submit it to ACER for decision, in accordance with Article 37(5) of the CACM Regulation.

(35) The SDAC and SIDC algorithm indicators are meant to provide an objective basis for the management of all the activities related to the management of the SDAC and/or SIDC coupling and to inform stakeholders and interested public, as far as both operations and development are involved.

(36) The usage indicators are meant to support the day-to-day management of the SDAC and SIDC referred to in Article 10 of the CACM Regulation. They provide the information on the evolution of the effective usage of the SDAC and SIDC algorithms over a historical set and serve as the basis for application of corrective measures.

(37) The performance indicators are meant to measure the properties of the algorithms in terms of compliance with the CACM Regulation's requirements of maximising the economic surplus, repeatability and scalability. They provide the information on evolution of the actual performance of the SDAC and/or SIDC algorithms over the same historical scenario of the usage indicators, as a consequence of the growth of the usage.

(38) The performance indicators are also meant to measure the capability of the algorithm to support the anticipated market growth and extension of requirements in the medium and long term, thus providing the basis for the decisions on the long-term development of the SDAC and SIDC algorithms. Moreover, they measure the impact on performance of any requests for change.

(39) In particular, the performance indicators on scalability should provide the basis for an impact assessment of requests for change including, but not limited to, those for corrective measures, which secure the reliability of the algorithm's operation. They measure the impact of such changes on calculation time based on the anticipated usage of SDCA and/or SIDC requirements, in order to assess the risk that the requests for change are expected to have on: (i) the reliability of operation of the existing version of the algorithms in the short term; (ii) the necessity of triggering or revising the research and development activity in order to be able to support the request for change in the medium or long term, or (iii) the likelihood that the proposed corrective measures are sufficient to restore adequate reliability of operation.

(40) In order to ensure transparency on the process of development of the SDAC and SIDC algorithms, all indicators should be published in the yearly reports and constitute the basis for periodic reporting from NEMOs and TSOs.

TITLE 1
General provisions

Article 1

Subject matter and scope

1. This Algorithm methodology determines the SDAC algorithm, the single intraday continuous trading matching algorithm and the IDA algorithm in accordance with Article 37 and 55 of the CACM Regulation.

The Algorithm methodology incorporates the DA and ID algorithm requirements (as per Annex 1 and Annex 2) and the DA and ID algorithm monitoring methodologies (as per Annex 3 and Annex 4).

2. This Algorithm methodology sets forth the principles for the submission, evaluation, decision and implementation of requests for change related to the SDAC and/or SIDC algorithms.

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

Article 2

Definitions and interpretation

1. The terms used in this Algorithm methodology shall have the meaning given to them in Article 2 of Regulation (EU) 2019/943, in Article 2 of Regulation (EU) 543/2013, in Article 2 of the CACM Regulation, in Article 2 of Directive 2009/72/EC, in Article 3 of Regulation (EU) 2017/1485, with the exception of the definition of 'scheduling area', and in the Market Coupling Operator ('MCO') Plan.

2. In addition, the terms used in this Algorithm methodology shall have the meaning given to them in the Methodology for pricing intraday cross-zonal capacity.

3. In addition, the following definitions shall apply:

   a) **Algorithm monitoring methodology**: means a methodology developed in accordance with Article 8 of this Algorithm methodology, which is necessary to assess the performance of the SDAC and SIDC algorithms, as set out by Annex 3 and Annex 4 to this Algorithm methodology, for the DA and ID timeframes respectively.
   b) **Algorithm monitoring procedure**: means a procedure, which provides in more detail the assessment of the performance of the respective SDAC and/or SIDC algorithms and the process of determining and calculating the algorithm monitoring indicators, and is developed in accordance to the principles set out in this Algorithm methodology as set out in Annex 3 and Annex 4 to this Algorithm methodology. It shall be published in accordance with Article 20(7).
   c) **Algorithm performance**: means the ability of the SDAC and SIDC algorithms to ensure reliability of the process to find solutions, maximise economic surplus, and ensure an adequate level of repeatability and scalability.
   d) **Back-up methodology**: means the methodology developed in accordance with Article 36(3) of the CACM Regulation and approved in accordance with Article 9 of the CACM Regulation, including any amendments, which have been approved in accordance with that Article 9.
   e) **Back-up procedure**: means a procedure, which provides in more detail the processes set out in the Back-up methodology. It shall be published in accordance with Article 20(7).
   f) **Change control procedure:** means a procedure, which provides in more detail the process of managing requests for change in the respective DA and/or ID timeframe and is developed in accordance to the principles set out in this Algorithm methodology. It shall be published in accordance with Article 20(7).
   g) **Corrective measure**: means a last resort measure taken by all NEMOs in cooperation with all TSOs in case of performance degradation of the SDAC and/or SIDC algorithms with the aim to restore their adequate performance.
   h) **Existing DA algorithm solution**: means the algorithm, which has been developed and implemented by some NEMOs for the day-ahead market coupling within the day-ahead coupling project pre-existing the CACM Regulation in accordance with the MCO Plan.
   i) **Existing ID algorithm solution**: means the continuous trading algorithm, which has been developed and implemented by some NEMOs for the intraday market coupling within the intraday coupling project pre-existing the CACM Regulation in accordance with the MCO Plan.
   j) **Fallback methodology**: means the methodology developed for robust and timely fallback procedures to ensure efficient, transparent and non-discriminatory capacity allocation in the event

that the single day-ahead coupling process is unable to produce results, in accordance with Article 44 of the CACM Regulation and approved in accordance with Article 9 of the CACM Regulation, including any amendments, which have been approved in accordance with that Article 9.

k) **Fallback procedure**: means a procedure, which provides in more detail the processes set out in the Fallback methodology. It shall be published in accordance with Article 20(7).

l) **First solution:** when referring to the SDAC algorithm or the IDA algorithm, it means the first solution found that satisfies all input constraints up to a pre-defined numerical tolerance level published in the public description of the algorithms. A solution is considered satisfactory when there exists an acceptance tolerance problem in all the constraints up to a maximum value known as the technical limit. SDAC algorithm provides the utility of each one of the solutions that improve the previously solutions found.

m) **Functionality**: means any market or network feature or design element embodied in the systems, communications and procedures that support the SDAC and SIDC algorithms in accordance with the DA and ID algorithm requirements.

n) **Go-live date**: means, with respect to each request for change, the date within a specific go-live window on which such request for change is to be implemented in operation

o) **Go-live window**: means a period in a calendar year, during which the: (i) requests for change may be submitted; (ii) the assessment process of requests for change will take place; or (iii) the request for change will go-live. It shall be managed in accordance with Article 16.

p) **MCO Plan**: means the plan on joint performance of market coupling operator functions developed in accordance with Article 7(3) of the CACM Regulation and approved in accordance with Article 9 of the CACM Regulation, including any amendments, which have been approved in accordance with that Article 9.

q) **Methodology for calculating scheduled exchanges**: means the methodology developed in accordance with Articles 43(1) and 56(1) of the CACM Regulation and approved in accordance with Article 9 of the CACM Regulation, including any amendments, which have been approved in accordance with that Article 9.

r) **Methodology for pricing intraday cross-zonal capacity**: means the methodology developed in accordance with Article 55 of the CACM Regulation and approved in accordance with Article 9 of the CACM Regulation, including any amendments, which have been approved in accordance with that Article 9.

s) **NEMO trading hub**: means a virtual trading point collecting all orders received by a NEMO with delivery in a specific scheduling area.

t) **Operational contract:** means the contract between NEMOs only or TSOs only or between NEMOs and TSOs governing the SDAC or SIDC market coupling operations. It shall be published in accordance with Article 20(7).

u) **Operational procedure:** means a procedure, which provides in more detail the processes set out in this Algorithm methodology and is concluded between NEMOs only or TSOs only or between NEMOs and TSOs. It shall be published in accordance with Article 20(7).

v) **Originator**: means one or more NEMO(s) or TSO(s) submitting a request for change.

w) **Paradoxically rejected order**: means any sell/buy order covering multiple MTUs, which, although its order price is lower/higher than the average market clearing price for all the MTUs included in the order, are nonetheless rejected by the SDAC algorithm on the grounds that, if they had been accepted, the average market clearing price in the respective MTUs would have either decreased/increased below/above their order price or the economic surplus calculated by the SDAC algorithm would have decreased.

x) **DA products, ID products and IDA products**: means the products that can be taken into account in the SDAC, intraday continuous trading or IDAs, respectively, developed in accordance with Articles 40(1) and 53(1) of the CACM Regulation and approved in accordance with Article 9 of the CACM Regulation, including any amendments, which have been approved in accordance with that Article 9.

y) **Request for change**: means a formal request by an originator for any modification to the SDAC and/or SIDC algorithm or to its usage.

z) **Scheduling area**: means a scheduling area according to Article 3(2)(91) of the Regulation (EU) 2017/1485 with at least one NEMO trading hub.

aa) **Scheduled exchange between NEMO trading hubs**: means an electricity transfer scheduled between NEMO trading hubs within or between scheduling areas or bidding zones.
bb) **Switchover**: means all the technical processes to be taken in advance or at the IDAs' deadline for bid submissions in order to switch from the intraday continuous capacity allocation mechanism to the intraday auction based capacity allocation mechanism, avoiding the double allocation of cross-zonal capacity.
cc) **Switchback**: means all the technical processes to be taken in order to continue with the intraday continuous capacity allocation once the allocation of capacity through an IDA has finished, avoiding the double allocation of cross-zonal capacity.

4. Unless the context requires otherwise or unless specified otherwise:

a) the singular indicates the plural and vice versa;
b) the table of contents and headings are inserted for convenience only and do not affect the interpretation of this Algorithm methodology; and
c) any reference to legislation, regulations, directives, decisions, orders, instruments, codes or any other enactment shall include any modification, extension or re-enactment thereof when in force.

TITLE 2
Algorithms

Article 3

Algorithm requirements

1. The DA and ID algorithm requirements comprise a common set of requirements proposed by all TSOs, a common set of requirements proposed by all NEMOs and a common set of requirements jointly proposed by both all TSOs and all NEMOs, in line with Article 37(1) of the CACM Regulation and are set out in Annex 1 and Annex 2 of this Algorithm methodology.
2. All NEMOs shall maintain the functionalities (following their implementation) to be compliant with the DA and ID algorithm requirements.
3. The SDAC and SIDC algorithms shall support the requirements for the calculation of scheduled exchanges between bidding zones and between scheduling areas as well as scheduled exchanges between NEMO trading hubs in accordance with the methodology for calculating scheduled exchanges for the day-ahead and intraday timeframes.
4. The SDAC and SIDC algorithms shall support products listed in the Terms and conditions on SDAC and SIDC products and all DA and ID algorithm requirements. However, if such support leads to a deterioration of the algorithm performance, all NEMOs may apply, through the procedures for corrective measure and/or change requests:

a) limitations to specific products or their usage in specific bidding zones; and/or
b) limitations to specific algorithm requirements or their usage, if these requirements are specified in a way that excessively impacts the algorithm performance.

When applying those limitations, all NEMOs shall respect the rules referred to in Article 12 of this Algorithm methodology.

5. All NEMOs shall ensure that the SDAC algorithm produces the results set out in Article 39(2) of the CACM Regulation while fulfilling the requirements referred to in Article 38(1) and Article 40(2) of the CACM Regulation:

a) the SDAC algorithm shall aim at maximising the economic surplus for all biding zones participating in the SDAC for the next trading day while respecting cross-zonal capacity and allocation constraints within the maximum calculation time. The SDAC algorithm shall facilitate efficient price formation by using the marginal price principle according to which all accepted orders have the same price per bidding zone and per MTU;
b) the SDAC algorithm shall be repeatable, which means that the outcome of alternate executions of the algorithm on the same hardware and software and their configuration after the same number of iterations consistently delivers the same result and shall respect the thresholds set forth in Article 3(3) of Annex 3. All NEMOs shall be able to fully replicate the results of the SDAC algorithm for a specific historic delivery day if requested by any regulatory authority or ACER pursuant to their monitoring duties in accordance with Article 82(1) of CACM Regulation;
c) the SDAC algorithm shall be scalable, thus ensuring that it can support in a non-discriminatory way all bidding zones and all NEMOs eligible to participate in the SDAC at any time, all DA algorithm requirements and DA products, as well as their reasonable usage based on anticipated and effective usage;
d) the SDAC algorithm shall be able to accommodate orders resulting from products covering one MTU and multiple MTUs;
e) the SDAC algorithm shall be reliable, which means that it shall be able to find at least one solution within the time limit as set out in the operational procedure and timings; and
f) the SDAC algorithm shall provide for a fair and orderly price formation as required by Article 3(h) of the CACM Regulation.

6. All NEMOs shall ensure that the continuous trading matching algorithm produces the results set out in Article 52(1) of the CACM Regulation while fulfilling the requirements of Article 51(1) and Article 53(3) of the CACM Regulation:

a) the continuous trading matching algorithm shall aim at maximising economic surplus for the SIDC per trade for the intraday market time-frame by allocating cross-zonal capacity to orders, which can be matched in accordance with their price and submission time, while respecting the cross-zonal capacity and allocation constraints;
b) the continuous trading matching algorithm shall be repeatable, which means that for a given (i) set of orders, their associated submission time and cross-zonal capacities and allocation constraints for a specified delivery date and (ii) an adequate and suitable storage and computational capacity of the algorithm and related IT assets, the same results originally obtained for the indicated delivery date can be reproduced;
c) the continuous trading matching algorithm shall be scalable, thus ensuring that it can support in a non-discriminatory way all bidding zones and all NEMOs eligible to participate in the SIDC at any time, all ID algorithm requirements and all products listed in the Terms and conditions on SDAC products, as well as their reasonable usage based on anticipated and effective usage; and
d) the continuous trading matching algorithm shall be able to accommodate orders covering one MTU and multiple MTUs.

7. All NEMOs shall ensure that the IDA algorithm produces the results and fulfils the requirements defined for SDAC algorithm in the previous paragraph 5, mutatis mutandis, and in Title 2 of the ID algorithm requirements as set out in Annex 2 of this Algorithm methodology.

Article 4

Price coupling algorithm

1. The SDAC algorithm shall produce at least the following results simultaneously for each MTU:

a) a single clearing price for each bidding zone and MTU in EUR/MWh;
b) a single net position for each bidding zone and each MTU;

c) the matched volumes of each bidding zone for each relevant MTU;
d) the scheduled exchanges between bidding zones (in case of DC interconnectors separately for each of them) and between scheduling areas as well as scheduled exchanges between NEMO trading hubs for each relevant MTU;
e) the information which enables the execution status of orders to be determined; and
f) the acceptance ratio for each block as defined in the Terms and conditions on SDAC products.

2. The SDAC algorithm shall calculate scheduled exchanges between bidding zones and between scheduling areas as well as scheduled exchanges between NEMO trading hubs in accordance with the methodology for calculating scheduled exchanges for the day-ahead timeframe.

3. For the purpose of calculating scheduled exchanges, the SDAC algorithm shall calculate the net positions as follows:

   a) for the bidding zones consisting of more than one scheduling area, the net position for each MTU will be calculated for each scheduling area; and
   b) for the scheduling areas where more than one NEMO operates, the net position for each MTU will be calculated for each NEMO trading hub.

4. Where applicable, to find a solution, the SDAC algorithm shall evaluate the acceptance criteria combinations of all DA products, which are not simple or aggregated hourly, half-hourly or quarter-hourly products that fulfil the market and network DA algorithm requirements expressed as constraints in the optimisation problem. Every evaluated combination is a node.

5. In order to ensure reliability of operation, the SDAC algorithm shall first aim to find a first solution compliant with the input constraints. In order to maximise the economic surplus, it shall then seek to find new solutions with higher economic surplus by exploring new nodes until the overall optimal solution is found and verified in the process of maximising the economic surplus or until the time limit referred to in paragraph 6 has been reached. In case the SDAC algorithm finds two or more solutions with the same value of economic surplus, it shall select the one that maximises the traded volume.

6. Under normal operations, all NEMOs shall execute the SDAC algorithm using the time limit stopping criterion, which shall be equal to the maximum calculation time established in the operational procedure and timings referred to in paragraph 16.

7. The SDAC algorithm shall perform checks on every solution found to validate that all the market and network requirements, expressed as constraints in the optimisation problem, are respected within a tolerance, which shall be defined in operational procedures. The last solution found that is fulfilling this condition shall be the result of the execution of the SDAC algorithm.

8. Orders used in the SDAC algorithm shall be anonymous and processed in a non-discriminatory way. There shall be no identification of the originating market participant or NEMOs.

9. A single execution of the SDAC algorithm operated by the coordinator shall calculate the results for all NEMO trading hubs participating in the SDAC.

10. The input data to the SDAC algorithm referred to in Article 39(1) of the CACM Regulation shall be available to any authorised operator, who is entitled to perform the SDAC calculation in parallel.

11. Under normal operations, all NEMOs shall submit orders to the MCO function systems by the time defined in the operational procedures. If applicable, back-up procedures shall be applied in accordance with the Back-up methodology.

12. Under normal operations, all NEMOs performing the MCO functions shall provide (i) all TSOs, all coordinated capacity calculators and all NEMOs with the results of the SDAC referred to in paragraph 1(a),(b),(c) and (d) above; and (ii) all NEMOs with the results specified in paragraph 1 above, by 13:00 market time day-ahead and anyway not later than 15:30 market time day-ahead.

13. All NEMOs shall provide TSOs with the scheduled exchanges between bidding zones and between scheduling areas as referred to in paragraph (2) above, calculated in accordance with the methodology for calculating scheduled exchanges for the day-ahead timeframe.

14. All NEMOs shall ensure that the SDAC algorithm meets the algorithm requirements as follows:

    a) the SDAC algorithm shall be able to support all existing requirements and functionalities:

        (i) set out in Annex 1 to this Algorithm methodology and denoted as 'existing';
        (ii) the requirement of maximisation of the economic surplus as referred to in Article 3(5)(a);
        (iii) the requirement on delivery of results as referred to in paragraph 1;
        (iv) the requirement for the operation of multiple NEMOs in a bidding zone;
        (v) the requirement of scalability as referred to in Article 3(5)(c); and
        (vi) the requirement for the calculation of scheduled exchanges as referred to in paragraph 2.

    b) by 1 February 2020, the SDAC algorithm shall be able to support the requirement of adequate repeatability referred to in Article 3(5)(b);
    c) by 1 January 2021, the SDAC algorithm shall be able to support half-hourly and quarter-hourly granularity of DA products as set out in paragraph 1.1(a)(i) in Annex 1 to this Algorithm methodology; and
    d) by 1 August 2022, the SDAC algorithm shall be able to support all requirements denoted as 'AUG 2022' as set out in Annex 1 to this Algorithm methodology.

15. In the case of amendments of the Methodology for the calculation of scheduled exchanges for day-ahead timeframe, the delivery of the amended functionality for the calculation of scheduled exchanges shall be postponed until 12 months after the approval of the methodology for the calculation of scheduled exchanges for the day-ahead timeframe.

16. All NEMOs in cooperation with all TSOs shall jointly establish the operational procedures and timings for the SDAC algorithm to comply with Article 48 of the CACM Regulation. These operational procedures and timings shall define the modalities for coordinating the operation of the SDAC market between NEMOs and TSOs both in ordinary and non-ordinary conditions and shall detail all relevant actions to be taken together with relevant subjects, timings and processes. These operational procedures and timings shall make reference to the Back-up methodology developed in accordance with Article 36(3) of the CACM Regulation.

17. Every year, all NEMOs shall provide all regulatory authorities with a report on incidents in the operation of the SDAC algorithm and the application of back-up and fallback procedures in accordance with the Back-up methodology and Fallback methodology. The report shall provide at least a list of incidents in the operation of the SDAC algorithm and the application of back-up and fallback procedures, including the reasoning of their occurrence and applied or anticipated remedies to prevent their recurrence in the future.

18. All NEMOs shall create and maintain a document with the detailed description of the SDAC algorithm, including the description of the calculation of scheduled exchanges in accordance with the methodology for calculating scheduled exchanges for the day-ahead timeframe. This document shall be published and kept updated with every new version of the SDAC algorithm. The document shall be publicly available by all NEMOs on a public webpage.

Article 5

Continuous trading matching algorithm

1. All NEMOs, as part of their MCO function, shall ensure that the continuous trading matching algorithm produces at least the following results:

    a) the execution status of orders and prices per trade;
    b) a single net position for each bidding zone participating in the SIDC and each MTU; and
    c) the scheduled exchanges between bidding zones (in case of DC interconnectors separately for each of them) and between scheduling areas as well as scheduled exchanges between NEMO trading hubs for each relevant MTU.

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 and allocate cross-zonal capacities and allocation constraints.

3. The continuous trading matching algorithm shall enable all NEMOs to connect to the SOB module. All NEMOs shall enter orders into the SOB module through local trading solutions. All valid orders entered in time in the local trading solution shall automatically enter the SOB module. Market participants are not entitled to access the SOB module directly.

4. The continuous trading matching algorithm shall calculate the scheduled exchanges between bidding zones and between scheduling areas as well as scheduled exchanges between NEMO trading hubs in accordance with the methodology for calculating scheduled exchanges for the intraday timeframe. This functionality shall be implemented by all NEMOs, together with all TSOs, through the shipping module.

5. Matching of orders shall be performed within the SOB module, irrespectively of the scheduling areas through which the orders were entered, including from the same area. The SOB module shall maintain a consolidated order book for all contracts based on the available cross-zonal capacities and allocation constraints.

6. The CMM shall provide information on the currently available cross-zonal capacities and allocation constraints. When cross-zonal matching is performed, the required cross-zonal capacities shall be implicitly allocated in the CMM.

7. Market participants requesting explicit access to cross-zonal capacity in accordance with Article 64 of the CACM Regulation and subject to regulatory approval shall directly access the CMM for explicit cross-zonal capacity allocation.

8. The SOB module shall determine the local view of all orders that can be matched in a selected scheduling area.

9. The SOB module shall apply deterministic matching. Orders shall be matched in the SOB module on the price-time-priority principle:

    a) price: orders shall be executed at the best price. This means that the best buy order, i.e. the order with the highest price, shall be executed against the best sell order, i.e. the order with the lowest price, first.
    b) Time: when an order is entered into the SOB, it shall be assigned a timestamp. This timestamp is used to prioritise orders with the same price. At the same price, orders with earlier timestamps shall be executed with a higher priority than orders with a later timestamp.

10. The trade execution 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 price of the sell order shall become the trade execution price.
    b) if a newly entered sell order is matched against an existing buy order, the price of the buy order shall become the trade execution price.

11. Where a possible cross-zonal trade is identified in the SOB module, a request for implicit allocation of cross-zonal capacity shall be submitted to the CMM. Requests for implicit capacity allocation shall be queued along with requests for explicit capacity allocation, and cross-zonal capacity shall be allocated on a first-come-first serve basis respecting also allocation constraints. If the necessary cross-zonal capacity is not available, the cross-zonal trade shall not be matched.

12. CMM shall not discriminate between implicit capacity allocation for matching of single-time-unit products (e.g. hourly, half-hourly and quarter-hourly), implicit capacity allocation for matching of user-defined blocks and explicit capacity allocation to explicit capacity allocation 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 scheduled exchanges between bidding zones and between scheduling areas as referred to in paragraph 4 above and in accordance with the methodology for calculating of scheduled exchanges for the intraday timeframe.

14. All NEMOs shall ensure that the continuous trading matching algorithm meets the algorithm requirements as follows:

    a) the continuous trading matching algorithm shall be able to support all existing requirements and functionalities:

    (i) all requirements defined in Annex 2 to this Algorithm methodology, denoted as 'existing';
    (ii) the requirement of maximisation of economic surplus as referred to in Article 3(6)(a);
    (iii) the requirement for the operation of multiple NEMOs in a bidding zone;
    (iv) the requirement of scalability as referred to in Article 3(6)(c);
    (v) the requirement of adequate repeatability as referred to in Article 3(6)(b);
    (vi) the requirement on delivery of results as referred to in paragraph 1;
    (vii) the requirements for the calculation of schedule exchanges as referred to in paragraph 4; and
    (viii) the complete functionality of the enhanced preferred shipper;

    b) by 1 January 2023, the continuous trading matching algorithm shall be able to support all requirements denoted as 'JAN 2023' set out in TITLE 1 of Annex 2 to this Algorithm methodology; and
    c) by 1 August 2023, the continuous trading matching algorithm shall be able to support all requirements denoted as 'AUG 2023' set out in Annex 2 to this Algorithm methodology.

15. In the case of amendments of the Methodology for the calculation of scheduled exchanges for intraday timeframe, the delivery of the amended functionality for the calculation of scheduled exchanges shall be postponed until 12 months after the approval of the methodology for calculating scheduled exchanges for the intraday timeframe.

16. All NEMOs in cooperation with all TSOs shall jointly establish the operational procedures and timings for the continuous trading matching algorithm to comply with Article 60 of the CACM Regulation. These operational procedures and timings shall define the modalities for coordinating the operation of the SIDC market between NEMOs and TSOs both in ordinary and non-ordinary conditions and shall detail all relevant actions to be taken together with relevant subjects, timings and processes. These operational procedures and timings shall make reference to the Back-up methodology developed in accordance with Article 36(3) of the CACM Regulation.

17. Every year, all NEMOs shall provide all regulatory authorities with a report on incidents in the operation of the continuous trading matching algorithm and the application of back-up and fallback procedures in accordance with the Back-up methodology and Fallback methodology. The report shall provide at least a list of incidents in the operation of the continuous trading matching algorithm and the application of back-up procedures, including the reasoning of their occurrence and applied or anticipated remedies to prevent them in the future.

18. All NEMOs shall create and maintain a document with the detailed description of the continuous trading matching algorithm, including the description of calculation of scheduled exchanges in accordance with the methodology for calculating scheduled exchanges for the intraday timeframe. This document shall be published and kept updated with every new version of the continuous trading matching algorithm. The document shall be publicly available on all NEMOs' public webpage.

19. In order to accommodate IDAs, the cross-zonal capacity allocation within the continuous SIDC shall be suspended for a limited period during which the cross-zonal capacities shall not be allocated through the continuous SIDC. This period for suspension shall not be longer than 40 minutes and shall consist of:

    (a) the suspension before the deadline for bid submissions of each IDA. This suspension shall not be longer than 20 minutes and allow maximum of 5 minutes for recalculating and/or updating of cross-zonal capacities, which shall be published no later than 15 minutes before the deadline for bid submissions for each IDA as specified in the single methodology for pricing intraday cross-zonal capacity adopted in accordance with Article 55 of the CACM Regulation; and

(b) the suspension after the deadline for bid submissions of each IDA, which shall not be longer than 20 minutes and allow for the calculation of auction results, verification of results and the recalculation and/or update of cross-zonal capacities for the continuous SIDC.

20. If all NEMOs and/or all TSOs identify during the testing of IDAs, that they are not able to implement IDAs within the time constraints provided in paragraph 19, they may start the implementation of IDAs with extended time constraints which are 30 minutes for suspension before the deadline for bid submissions of each IDA and 30 minutes for the suspension after the deadline for bid submissions of each IDA. These extended time constraints may be applied for up to maximum 12 months starting from the implementation date of IDAs and shall not affect the deadline for publication of cross-zonal capacities as referred to in paragraph 19(a). All NEMOs shall announce and publish the start and end of the application of extended deadlines at least two months before their application.

Article 6

Intraday auction algorithm

1. The IDA algorithm shall produce at least the following results simultaneously for each MTU:
   a) a single clearing price for each bidding zone and MTU in EUR/MWh;
   b) a single net position for each bidding zone and each MTU;
   c) the matched volumes of each bidding zone for each relevant MTU;
   d) the scheduled exchanges between bidding zones (in case of DC interconnectors separately for each of them) and between scheduling areas as well as scheduled exchanges between NEMO trading hubs for each relevant MTU;
   e) the information which enables the execution status of orders to be determined; and
   f) the acceptance ratio for each block as defined in the Terms and conditions on SIDC products.

2. The IDA algorithm shall calculate scheduled exchanges between bidding zones and between scheduling areas as well as scheduled exchanges between NEMO trading hubs in accordance with the methodology for calculating scheduled exchanges for the day-ahead timeframe, applied for the needs of IDAs mutatis mutandis.

3. For the purpose of calculating scheduled exchanges, the IDA algorithm shall calculate the net positions as follows:
   a) for the bidding zones consisting of more than one scheduling area, the net position for each MTU will be calculated for each scheduling area; and
   b) for the scheduling areas where more than one NEMO operates, the net position for each MTU will be calculated for each NEMO trading hub.

4. Where applicable, to find a solution, the IDA algorithm shall evaluate the acceptance criteria combinations of all IDA products, which are not simple or aggregated hourly, half-hourly or quarter-hourly products that fulfil the market and network ID algorithm requirements expressed as constraints in the optimisation problem. Every evaluated combination is a node.

5. In order to ensure reliability of operation, the IDA algorithm shall first aim to find a first solution compliant with the input constraints. In order to maximise the economic surplus, it shall then seek to find new solutions with higher economic surplus by exploring new nodes until the overall optimal solution is found and verified in the process of maximising the economic surplus or until the time limit referred to in paragraph 6 has been reached. In case the IDA algorithm finds two or more solutions with the same value of economic surplus, it shall select the one that maximises the traded volume.

6. Under normal operations, all NEMOs shall execute the IDA algorithm using the time limit stopping criterion, which shall be equal to the maximum calculation time established in the operational procedure and timings referred to in Article 5(16).

7. The IDA algorithm shall perform checks on every solution found to validate that all the market and network requirements, expressed as constraints in the optimisation problem, are respected within a tolerance, which shall be defined in the operational procedures. The last solution found that is fulfilling this condition shall be the result of the execution of the IDA algorithm.

8. Orders used in the IDA algorithm shall be anonymous and processed in a non-discriminatory way. There shall be no identification of the originating market participants or NEMOs.

9. A single execution of the IDA algorithm operated by the coordinator shall calculate the results for all NEMO trading hubs participating in the IDA.

10. The input data to the IDA algorithm referred to in Article 39(1) of the CACM Regulation shall be available to any authorised operator, who is entitled to perform the IDA calculation in parallel.

11. Under normal operations, all NEMOs shall submit orders to the MCO function systems by the time defined in the operational procedures or otherwise back-up procedures shall be applied as set out in the Back-up methodology.

12. Under normal operations, all NEMOs performing the MCO functions shall provide (i) all TSOs, all coordinated capacity calculators and all NEMOs with the results of the IDA referred to in paragraph 1(a),(b),(c) and (d) above; and (ii) all NEMOs with the results specified in paragraph 1 above, in due time to allow at least 30 minutes of cross-zonal continuous trading for any given MTU after the publication of the auction results as set out in the Methodology for pricing intraday cross-zonal capacity.

13. All NEMOs shall provide TSOs with the scheduled exchanges between bidding zones and between scheduling areas as referred to in paragraph (2) above, calculated in accordance with the methodology for calculating scheduled exchanges for the day-ahead timeframe.

14. Under normal operations, the IDA shall be completed and publish results no longer than 20 minutes after the deadline for bid submission.

15. All NEMOs shall ensure that the ID auction algorithm meets the algorithm requirements as follows:

    a) by 1 January 2023, all NEMOs shall organize and operate the IDAs and the IDA auction algorithm shall be able to support:

        (i) all requirements denoted as 'JAN 2023', set out in TITLE 2 of Annex 2 to this Algorithm methodology;
        (ii) the requirement of maximisation of the economic surplus as referred to in Article 3(5)(a);
        (iii) the requirement of adequate repeatability referred to in Article 3(5)(b)
        (iv) the requirement of scalability as referred to in Article 3(5)(c);
        (v) the requirement on delivery of results as referred to in paragraph 1;
        (vi) the requirement for the calculation of scheduled exchanges as referred to in paragraph 2 ; and
        (vii) the requirement for the operation of multiple NEMOs in a bidding zone.

    b) by 1 August 2023, the ID auction algorithm shall be able to support all requirements denoted as 'AUG 2023' set out in TITLE 2 of Annex 2 to this Algorithm methodology.

    c) by 1 January 2023, only the net transfer capacity approach shall be implemented in operation. The flow-based approach shall be implemented in operation for those regions where cross-zonal capacity is calculated following the flow-based methodology no later than when continuous trading matching algorithm is adapted to support flow-based allocation. The evolution of the flow-based approach for auctions prior to the implementation of the full flow-based solution is subject to further technical evaluation.

16. All NEMOs shall create and maintain a document with the detailed description of the IDA algorithm, including the description of the calculation of scheduled exchanges in accordance with the methodology for calculating scheduled exchanges for the day-ahead timeframe, applied for the needs of IDAs mutatis mutandis. This document shall be published and kept updated with every new version of the IDA algorithm. The document shall be publicly available by all NEMOs on a public webpage from the date set out in paragraph 15(a).

TITLE 3
Algorithm performance management

Article 7

Calculation of effective usage, anticipated usage and usage range

1. Usage is a quantitative indication of the average usage of a functionality over a predefined time range. Such information is needed whenever the usage of such functionality is dependent on decisions of market participants, thus can vary on daily basis (e.g. number of orders of a specific product) or TSOs (e.g. hourly value of ATC or the number and value of PTDFs).
2. All NEMOs in cooperation with all TSOs shall ensure that each functionality of the SDAC and SIDC algorithms is associated with a quantification of the effective usage and the anticipated usage. These usages provide the basis for the quantification of the usage range and the assessment of the performance impact on any request for change, according to the principles described in Article 13. Moreover, they provide for the monitoring of the evolution of the performance of the SDAC and SIDC algorithms, according to the provisions of Article 8.
3. The effective usage of a functionality is equal to the mean of its actual usage observed over the recent historical set defined in Article 2(a) of Annex 3 and Article 2(a) of Annex 4 for the DA and ID timeframes respectively, based on the following principles:
    a) the recent historical set shall be the same for all functionalities; and
    b) the computation of the effective usage shall reflect the observed historical growth trend in the assessment process and the application of corrective measures.
4. The anticipated usage of a functionality is the expected effective usage observed over the near future set defined in Article 2(d) of Annex 3 and Article 2(c) of Annex 4 for the DA and ID timeframes respectively, based on the following principles:
    a) the near future set shall be the same for all the functionalities and wide enough to avoid the influence of seasonal effects;
    b) in case of existing functionalities already used in bidding zones or on the borders subject to assessment, the anticipated usage shall be derived from the effective usage, where relevant, according to a growth rate associated to the functionality; and
    c) in case of new functionalities or functionalities not already being used in bidding zones, scheduling areas, NEMO trading hubs or on the borders between them that are subject to assessment, the anticipated usage shall be communicated by the originator in its request for change.
5. The usage range of a functionality is the maximum estimated usage of that functionality supported by the algorithm consistent with an adequate level of performance, according to the indicators defined in the Article 9 of Annex 3 and Article 7 of Annex 4, for the DA and ID timeframes respectively. The usage range of each functionality shall be jointly estimated in a single simulation set with the purpose of calculating in a single step the individual usage range of all the functionalities, each based on its anticipated usage. All NEMOs and all TSOs shall review, when relevant and at least annually, the usage range of any functionality impacting the algorithm performance on the basis of the estimated level of scalability indicated in the scalability report described in Article 9.

Article 8

Monitoring algorithm performance

1. All NEMOs in coordination with all TSOs, shall monitor the performance of the SDAC and SIDC algorithms and their compliance with the CACM Regulation and this Algorithm methodology. This monitoring shall be based on the principles set out in this Article and on the principles and the indicators described in the Algorithm monitoring methodology in Annex 3 and Annex 4 and shall be further detailed in the monitoring procedures.
2. The algorithm performance shall be measured against the thresholds specified in the Article 3(3) and (4) of Annex 3 and Article 3(3) of Annex 4. In case all NEMOs detect an unanticipated degradation of the algorithms' performance below the thresholds referred to in Article 3(4) of Annex 3 and Article 3(3) of Annex 4 or a non-compliance with an implemented functionality is detected according to Article 3(4) of Annex 3 and Article 3(3) of Annex 4, all NEMOs in cooperation with all TSOs shall:
    a) promptly inform all regulatory authorities and ACER;
    b) investigate to the fullest extent possible and share its findings with relevant stakeholder fora organised in accordance with Article 11 of the CACM Regulation;
    c) evaluate any potential improvement of the algorithm performance, to be introduced following a request for change or following research and development activity as described in Article 11;
    d) communicate to all regulatory authorities the solution identified, supported by relevant documentation; and
    e) whenever the conditions described in Article 12(1) apply, initiate the request for change process described in that Article 12.
3. By 1 July of every year, all NEMOs in coordination with all TSOs shall jointly develop and publish a report on the outcome of the monitoring of the algorithm performance for the past calendar year and upon request provide ACER with the data (in electronic form, which allows for data processing) used for the production of the report. The report shall contain at least:
    a) all items listed in Annex 3 and Annex 4 of this Algorithm methodology;
    b) all cases of performance deterioration or non-compliance with an implemented functionality;
    c) for the SDAC: analysis on the usage of each product and its impact on algorithm performance. The analysis on the usage shall include at least the total annual volume and number of orders submitted and cleared, number of bidding zones using each product and the number of NEMOs using each product. The impact of each individual product on algorithm performance shall contain a comparison of algorithm performance with and without the product on a historical sample of days from a at least previous calendar year;
    d) a description of the reasons of these occurrences and the used or suggested remedies or future improvements, according to Article 5 of Annex 3 for SDAC and Article 5 of Annex 4 for SIDC; and
    e) a presentation of the conclusions made in cooperation with the relevant stakeholder fora organised in accordance with Article 11 of the CACM Regulation.

Article 9

Scalability report

1. All NEMOs in cooperation with all TSOs shall identify the limit and monitor the usage of any functionality by any NEMO or TSO that affects the algorithm performance up to an upper bound defined by the usage range, taking into account the requirement of adequate scalability. The usage range shall take as basis the anticipated usage and shall assess the usage beyond it.

2. When the algorithm supports a specific functionality, the effective usage and the anticipated usage of the functionality shall serve as the basis for future assumptions related to the impact on the algorithm performance of this functionality (including the testing of other requests for change).

3. All NEMOs in coordination with all TSOs shall estimate each year for the following years the level of scalability, according to Article 5 of Annex 3 and Article 5 of Annex 4, on the basis of at least the following information related to the received requests for change and research and development activities:

   a) the extension of the SDAC and SIDC to additional bidding zones and/or NEMOs;
   b) the implementation of operation of multiple NEMOs within a bidding zone or a scheduling area;
   c) the extension of the usage of products and requirements to additional bidding zones and/or NEMO trading hubs; and
   d) the anticipated results from the activity of research and development.

4. All NEMOs in cooperation with all TSOs shall develop, publish and send to all regulatory authorities a yearly scalability report including at least:

   a) the outcome of the assessment of the estimated level of scalability for the following years and whether this level meets the adequate scalability, including the assessment of the effective usage, anticipated usage and usage range; and
   b) the perspective projects scoped for the research and development activity with the related estimated workload.

Article 10

Roadmap for planning of changes

1. In order to support a timely and consistent development of the SDAC and SIDC algorithms, every year all NEMOs in cooperation with all TSOs shall agree on a multi-year roadmap incorporating all requests for change related to:

   a) new releases of the SDAC and SIDC algorithms;
   b) amendments of requirements of the SDAC and SIDC algorithms;
   c) outcomes of the research and development activity, according to Article 11;
   d) major amendments in the usage of the existing functionalities; and
   e) future requirements as defined in the Annex 1 and 2 of this Algorithm methodology.

   This roadmap shall be updated at the end of each year and shall include requests for change with the expected go-live dates for at least next 24 months.

2. According to the roadmap, all NEMOs in cooperation with all TSOs shall elaborate a feasible calendar for the implementation of each request for change;

3. In order to include a request for change in the roadmap, the originator shall prepare and submit to all NEMOs the related requests for change, which shall include at least information under Article 15(2), letters a), b), c), d), e), i), j), k) and l).

4. Requests for change included in the roadmap process shall be preliminary assessed by all NEMOs in cooperation with all TSOs by the end of the next go-live window, in accordance with Article 17(3).

5. The requests for change in the roadmap shall have a specific priority according to Article 17(7), under the condition that the complete set of information requested under Article 15(2) is received before the time requested under Article 16(5). Once the information is completely received, the request for change shall be assessed according to Article 17.

Article 11

Research and development activities

1. All NEMOs in cooperation with all TSOs shall perform continuous research and development activities to allow for incremental improvement of the performance of the DA and ID algorithms. This shall ensure an adequate scalability as referred to in Article 3(5)(c) in order to monitor and preserve the fairness of the price formation, according to the principles laid out in Article 3(h) of the CACM Regulation and to develop new functionalities.
2. At the end of every year, all NEMOs in cooperation with all TSOs shall elaborate a research and development program for the next year. The program shall indicate at least the technical solutions subject to research and development, their qualitative expected impact on the CACM Regulation compliance, the timeline for prototyping and the estimated prototyping costs. All NEMOs in cooperation with all TSOs shall agree on the program.
3. The research and development program shall have up to two yearly assessments, depending on the needs of the originator and development activities. At the beginning of each assessment, new requests for change can be added.
4. According to the research and development program, all NEMOs in cooperation with all TSOs shall elaborate a feasible calendar for the implementation of type IV changes as set out in Article 14(3)(d), including an estimation of the identified workload;
5. All NEMOs might be required to create algorithm prototypes in order to implement the list of type IV changes elaborated by all NEMOs in cooperation with all TSOs, if the decision body considers it necessary.
6. Assessment of type IV changes shall be carried out according to Article 6 of Annex 3 and Article 6 of Annex 4.
7. If the outcome of the research and development is positive and improves beyond the thresholds defined in Article 6(2) of Annex 3 and Article 6(2) of Annex 4 for accepting the algorithm prototype, then a type I, II or III change might be issued for implementing the prototyped changes.
8. Every year, all NEMOs in cooperation with all TSOs shall provide all regulatory authorities with a report on research and development activities on the SDAC and SIDC algorithms. All NEMOs shall consult the draft report with the relevant stakeholder fora organised in accordance with Article 11 of the CACM Regulation, before submitting it to all regulatory authorities. The report shall provide at least:
    a) the status of the research and development activity in relation to the earlier agreed all NEMOs' approaches and targets; and
    b) the planning of the future research and development activity, including an estimation of the identified workload and the associated budget.

Article 12

Corrective measures

1. In case all NEMOs detect an unanticipated degradation of the algorithms' performance below the thresholds referred to in Article 3(4) of Annex 3 and/or Article 3(3) of Annex 4, due to an overall effective usage higher than the usage range, in accordance with Article 3(2) of Annex 3 and Article 3(2) of Annex 4, all NEMOs in cooperation with all TSOs may decide to apply specific corrective measures with the aim to maintain an adequate performance of the SDAC and/or SIDC algorithms. Corrective measures shall be applied also in cases when the algorithms' performance is expected to be degraded by a request for change, which cannot be rejected or postponed, in accordance with Article 19(2).

2. Any NEMO(s) and/or TSO(s) may initiate a proposal for the application of a corrective measure. The proposal shall be submitted to all NEMOs by a request for change in accordance with Article 13.

3. All NEMOs in cooperation with all TSOs shall evaluate and decide on any requests for change proposing the application of corrective measures in an objective and non-discriminatory manner in accordance with the principles defined in Article 17 and Article 19 and based on the evidence of the impact a corrective measure would have on an algorithm's performance.

4. The corrective measures referred to in paragraph 1 may be applied only for a limited time period to solve unanticipated impacts on the algorithm performance. After the deadlines referred to in Article 4(14)(d) and Article 5(14)(c), the application of a corrective measure shall be limited to eight months and an extension of it shall be possible only in accordance with paragraph 5.

5. If the algorithm performance cannot be restored within this deadline as referred to in paragraph (4), all NEMOs shall address problems related to algorithm performance by developing a proposal for amendment of this Algorithm methodology or the Terms and conditions on SDAC or SIDC products. This proposal for amendment shall be submitted for approval by the expiry of the deadline as referred to in paragraph (4). The application of corrective measures shall, in such case, be extended until the algorithm performance can be restored pursuant to amended Algorithm methodology.

6. The corrective measures referred to in paragraph 1 shall be limited to:

   a) limitations to the selection of products that NEMOs are allowed to offer;
   b) limitations to the availability of the technical features or parameters of a product or an algorithm requirement;
   c) limitations on the overall usage of products or requirements based on usage range; and
   d) changes in parameters related to the operation of the SDAC and/or SIDC algorithms, or to the thresholds described in Article 1(3) of Annex 3 and Article 1(3) of Annex 4 and in the relevant DA and/or ID change control procedures.

7. Corrective measures referred to in paragraph 6 should only be applied based on evidence of the proportional impact of different product types on the algorithm performance. Such measures may be applied on requirements pursuant to Article 14(2) only if other corrective measures prove to be infeasible or insufficient for restoring the algorithm performance.

8. In case all NEMOs in cooperation with all TSOs apply a corrective measure to limit the usage of products or requirements whose effective usage is higher than the usage range pursuant to paragraph 6(c), they shall limit the usage of these functionalities according to the sharing rules that shall be defined in the relevant change control procedure.

9. Without prejudice to what is set out in previous paragraph 8, sharing rules shall ensure a reasonable limitation on the usage of involved products or requirements to all bidding zones and/or scheduling areas and/or NEMO trading hubs. The adoption of sharing rules shall restore a value of the overall effective usage compatible with the usage range and thus an adequate level of SDAC and/or SIDC algorithm performance. In particular, the sharing rules reported in the relevant change control procedures shall introduce a limitation on the overall usage of the involved product or requirement equal to the excess of overall effective usage compared to the overall usage range, increased by a safeguard parameter. Such reduction shall be applied on a proportional basis to the NEMOs and/or TSOs using that product or requirement.

10. In case of application of corrective measures, all NEMOs in cooperation with all TSOs shall implement measures to ensure their compliance with these agreed limitations. In case any NEMO or TSO breaches such limitations and fails to take timely measures, each NEMO shall report such events to the competent regulatory authority.

11. Any corrective measure shall guarantee non-discriminatory principles among market participants and NEMOs.

12. All NEMOs shall announce publicly any introduction or discontinuation of a corrective measure at least seven calendar days before its introduction or discontinuation and maintain an up-to-date publicly accessible list of currently applied corrective measures.

13. No later than four weeks after the introduction of a corrective measure, all NEMOs shall publish a report indicating the corrective measure applied and the reasons for applying it. After the discontinuation of a corrective measure, the report shall be updated with additional information on the future measures planned by all NEMOs to address the problems that have caused the application of a corrective measure.

TITLE 4
Algorithm change management

Article 13

Principles and criteria for requests for change management

1. All NEMOs in cooperation with all TSOs shall manage all requests for change to the SDAC and SIDC algorithms' functionalities and their usage, according to the principles set out in this Article.
2. Any approved change to the SDAC or SIDC algorithm and any changes to the MCO function systems, including any modifications needed to meet future requirements, shall be implemented based on a request for change, which shall require an assessment of its feasibility and of its impact on the relevant algorithm's performance.
3. As a basic principle, a decision on requests for change shall be made by all NEMOs in cooperation with all TSOs. The related provisions concerning the decision-making shall be provided in the operational contracts among the NEMOs and/or TSOs. All NEMOs in coordination with all TSOs shall ensure that the assessment of all requests for change is done according to the provisions established in the DA or ID change control procedures among the NEMOs and/or TSOs.
4. The originator submitting a request for change shall include a preliminary assessment of feasibility and the expected impact on the relevant algorithm's performance, with the aim of demonstrating that the request for change will induce only a proportionate and controlled impact on the relevant algorithm's performance, will avoid significant harm to any other functionality already included in the relevant algorithm and is in line with the objectives of the CACM Regulation.
5. All NEMOs in cooperation with all TSOs shall conduct assessments of all requests for change in an objective and non-discriminatory manner. In order to ensure the objectivity of the assessment process, all requests for change must be submitted according to a standard format and shall be assessed according to a standard procedure, as described in this methodology and as further detailed in the relevant change control procedures.
6. When evaluating a request for change, all NEMOs in cooperation with all TSOs shall take into account any impact of a request for change on the performance of the MCO functions, systems and processes. The impact of a request for change on the relevant algorithm's performance, existing functionalities, adjacent systems and processes shall be evaluated based on the anticipated usage of the new functionality, together with the effective usage of existing functionalities, in order to ensure its technical feasibility and consistency with the performance criteria set forth in Annex 3 and Annex 4.
7. All NEMOs in cooperation with all TSOs may reject any request for change, which induces an unproportionate and/or uncontrolled impact on the relevant algorithm's performance, or where all NEMOs in cooperation with all TSOs reasonably consider that the request for change could cause significant harm to another functionality of the relevant algorithm, nevertheless in accordance with Article 19(2).
8. Requests for change shall be compatible with the algorithm requirements after they have been implemented in accordance with the deadlines specified in Article 4(14) and Article 5(14).
9. All NEMOs, in coordination with all TSOs, shall jointly ensure the transparency of the request for change process by publishing in due time all information relevant to the evaluation of the request for change, in accordance with Article 20.

Article 14

Request for change – purpose and types

1. The purpose of a request for change is (one or more or any combination):
   a) compliance with any legal and/or regulatory requirement, including the DA and ID algorithm requirements;
   b) bug fixes and incomplete algorithm requirements;
   c) application of corrective measures pursuant to Article 12;
   d) implementation of modifications that affect the performance of the SDAC algorithm and/or SIDC algorithm, including those modifications arising from the research and development activity as described in Article 11;
   e) introduction/removal/modification of an algorithm requirement requested by NEMOs and/or TSOs, including products and network elements;
   f) implementation of a new release of the SDAC algorithm and/or SIDC algorithm, including those arising from research and development activity carried out pursuant to Article 11;
   g) modification of the topology not requiring changes in the algorithm requirements, but limited to the addition or removal of network elements (e.g. the addition or removal of bidding zone borders, scheduling areas, interconnectors between bidding zones or scheduling areas or PTDFs) or NEMO trading hubs;
   h) change in configuration of the parameters of the SDAC algorithm and/or SIDC algorithm used to set the internal numerical tolerances or heuristics applied; and
   i) hardware update, including but not limited to machine upgrades and firmware updates.
2. The following requests for change shall be deemed to be a direct legal requirement pursuant to the CACM Regulation:
   a) all requirements included in the DA and ID algorithm requirements;
   b) all requirements for scalability to all bidding zones eligible to participate in SDAC and SIDC;
   c) the following requirements in accordance with the Terms and conditions on SDAC products: orders covering single MTU and the simple block orders, which are block orders, excluding linked block orders, exclusive block orders and flexible MTU orders; and
   d) the following requirements in accordance with the Terms and conditions on SIDC products: continuous single intraday coupling products and mandatory products for intraday auctions.
3. Requests for change shall be classified, depending on the expected impact of the requested change on the SDAC and/or SIDC algorithm performance and on the market participants, into one of the following categories:
   a) Non-notifiable change (‘type I change’): is a change that does not directly affect the MCO function assets, does not cause any detriment to the performance of the relevant algorithm and is not relevant to market participants. Such changes are not included in the public list of all requests for change required by Article 13(9) and Article 20.
   b) Fast-track change (‘type II change’): is a change that needs to be implemented with urgency. This type includes bug fixes and the application of corrective measures.
   c) Standard change (‘type III change’): is a change that has a potential detrimental impact on the performance of the relevant algorithm and/or market participants. Any request for change not being of type I, type II or type IV shall be considered as type III.
   d) Research and Development change (‘type IV change’): is a change aimed at activating the research and development analysis on the specific functionality involved. The assessment is carried out in the test framework according to the relevant research and development; hence, the management of such request for change is carried out according to a dedicated process as more particularly described in Article 11.
4. In derogation from general provisions under Article 16 and Article 19, all NEMOs in cooperation with all TSOs shall assess type I changes and type II changes on a continuous basis (i.e. without the periodic assessment in a given go-live window). Decisions on type I changes shall be completed within one month from the issuing date.

5. In derogation from general provisions under Article 15, Article 16, Article 17 and Article 19, a bug fix (as a subset of the type II change) may be treated in a separate process for assessment and approval as determined in the relevant change control procedure.

Article 15

Request for change – submission content

1. Any originator is entitled to submit to all NEMOs at any time a request for change with respect to the SDAC and/or SIDC algorithms and/or to the MCO function systems in a format corresponding to the template annexed to the relevant DA and ID change control procedures.
2. The request for change shall include the following information to be considered as complete:
   a) the purpose of the request for change, according to Article 14(1) and the general description of the request for change.
   b) indication of the type of request for change according to Article 14(3);
   c) originator;
   d) issuing date;
   e) expected go-live date;
   f) fully specified technical requirement;
   g) anticipated usage of the functionality;
   h) estimated impact on algorithm performance, following principles set in Article 13(4);
   i) estimated effect on other processes or systems;
   j) risk assessment;
   k) bidding zones, scheduling areas or NEMO trading hubs affected by the implementation of the request for change; and
   l) specification of the cost categorization in accordance with Article 80(2) of the CACM Regulation.
3. Where an assessment of a request for change, pursuant to Article 13(4), induced by one or more regulatory authorities indicates an adverse impact on the algorithm's performance, the originator shall inform the requesting regulatory authority(ies) and ACER about the impact. Consecutively, the originator shall enclose written evidence of the original or amended instructions from the relevant regulatory authority(ies).
4. All NEMOs in cooperation with all TSOs can decide at any moment to contact the originator with the purpose of requesting an additional information on the request for change. The originator is always entitled to receive all relevant information regarding the status of its request for change.
5. Any NEMO(s) or TSO(s) may join a request for change submitted by the originator. The originator and the NEMO(s) or TSO(s) joining the request for change may decide jointly to modify the submitted request for change.
6. Requests for change that aim to improve the algorithm performance shall be deemed beneficial to all NEMOs and all TSOs and those NEMOs and/or TSOs shall be entitled to define such requests for change as a common proposal of all NEMOs and/or all TSOs.
7. The associated costs of any request for change shall be treated in accordance with Article 80 of the CACM Regulation.

Article 16

Request for changes – timing for submission and assessment

1. A request for change may be submitted at any time, provided that the timing requirements according to this Article and the criteria described according to Article 13 are fulfilled, also taking into account provisions under Article 10.
2. The assessment of requests for change shall be carried out periodically by all NEMOs in cooperation with all TSOs in go-live windows, based on the expected go-live date of the request for change.
3. The periodic assessment of a request for change with an expected go-live date within a specific go-live window shall include all requests for change with an expected go-live date within the same go-live window in such a manner as to allow a cumulative impact assessment tests.
4. Each DA and/or ID change control procedure shall define the number of go-live windows in each calendar year. Additional go-live windows can be introduced by all NEMOs in cooperation with all TSOs as a new ad-hoc go-live window or by increasing the frequency of regular go-live windows. There shall be at least two go-live windows in a calendar year.
5. The originator shall send each request for change to the all NEMOs in cooperation with all TSOs by no later than at the end of the second go-live window prior to the go-live window during which the go-live date of such request for change is expected to occur.
6. In derogation from the previous paragraph, all NEMOs in cooperation with all TSOs shall carry out the assessment of type II change, due to their exceptional urgency, within the same go-live window of their submission or in a separate additional go-live window for quicker implementation. In the first case, the requests for change can be collectively tested and shall be prioritized according to a principle of urgency by applying prioritization rules set out in Article 17(7), to be justified by the all NEMOs in cooperation with all TSOs, while in case of a dedicated go-live window all NEMOs in cooperation with all TSOs shall implement an individual assessment of the request for change.
7. The assessment process of requests for change and the decisions shall be concluded within the go-live window antecedent the one in which the go-live date will occur. In case of a preliminary consultation under Article 19(7) or escalation process described in the relevant operational contract the time for the decision process can be extended, even beyond the duration of the go-live window.
8. If the originator submits the requests for change to all NEMOs before the time set out in paragraph 5, the requests for change can be considered validly received even if they are not reporting all information under Article 15(2), provided that:
    a) the originator provides the list of considered options and the magnitude of new products or network elements (or constraints) to be added to the algorithm; and
    b) the missing information is provided to all NEMOs in cooperation with all TSOs by the time set out in paragraph 5.

Article 17

Request for change - assessment

1. All NEMOs in cooperation with all TSOs shall evaluate any request for change in an objective and non-discriminatory manner and shall issue an assessment report for each submitted request for change.
2. In case of a request for change related to a development of the SDAC and/or SIDC algorithm, it is possible to reject the requests for change in case of unfeasibility or to request amendments in order to include additional amendments for solving interferences with other existing legal and/or regulatory requirements.

3. All NEMOs in cooperation with all TSOs shall, directly or in coordination with other bodies under the relevant operational contracts, assess for each request for change:

   a) correct indication of the purpose and type of the request for change, according Article 14(1) and (2);
   b) the originator of the request for change and impacted parties;
   c) potential prioritization criteria to be applied according to this Article below;
   d) impact assessment on the SDAC and/or SIDC algorithm performance as set out in Article 18.
   e) whether or not any development is required in the algorithm for the request for change, in accordance with paragraph 13;
   f) assignment of the go-live window according to timings set out in Article 16 and of the timeline to be followed during the assessment; and
   g) whether it fulfils the objectives of Article 3 of the CACM Regulation.

4. In case the assessment in paragraph 3(a) proves that categorization of the request for change is not correct, the all NEMOs in cooperation with all TSOs shall:

   a) assign the correct categorization of the request for change according to Article 14(2);
   b) apply the relevant assessment process in terms of timing and actions according to the relevant DA or ID change control procedure; and
   c) timely inform the originator of the modification.

5. The impact assessment of the requests for change with expected go-live dates within the same go-live window shall first be considered in combination.

6. In case the outcome of the combined impact assessment breaches the acceptance criteria described in Article 18, the assessment body shall carry out a second assessment based on individual impact assessments enclosed to the original request for change.

7. In case multiple requests for change have been received with the expected go-live dates within the same go-live window, the following prioritization shall apply:

   i. type II change;
   ii. requests for change in accordance with Article 14(2)
   iii. requests for change from the roadmap, received in accordance with Article 10; and
   iv. other requests for change.

8. In case several requests for change have the same priority according to the previous paragraph 7, the following sub-prioritization shall apply:

   i. requests for change extending the SDAC and SIDC to all bidding zones, improving the SDAC and SIDC between existing bidding zones also through the implementation of flow-based capacity calculation, the modification of interconnections, amending TSOs configurations and extending the SDAC and SIDC to all NEMOs eligible to participate in the SDAC and SIDC;
   ii. requests for change modifying the parameters for the usage of products or requirements used in the algorithm, including among others the modification of the usage range, the modification of the topology of bidding zones, scheduling areas or NEMO trading hubs different from those reported in point iii, the modification of the number of PTDFs;
   iii. requests for change extending the set of products or requirements used in one or more bidding zones, scheduling areas or NEMO trading hubs;
   iv. requests for change modifying the requirements included in this Algorithm methodology and/or the products included in the Terms and conditions on SDAC and/or SIDC products; and
   v. requests for change from previous go-live windows postponed by the originator not received according to Article 10.

9. In case several requests for change have the same priority according to previous paragraph (8), the following sub-prioritization shall apply:

   a) requests for change from previous go-live windows, which were postponed;
   b) requests for change assessed in a preliminary impact assessment with a positive outcome according to Article 16(7); and

c) other requests for change.

10. The costs for assessment of requests for change shall be borne in shares, according to CACM Regulation's sharing keys.

11. In case the request for change involves simultaneously more than one of the principles referred to in paragraphs 7, 8 or 9 above, the requests for change shall be assessed on a case-by-case basis depending on the specific nature of the request. Once the assessment process is concluded, all NEMOs in cooperation with all TSOs shall take the final decision on the request for change according to the outcome of consultation and, if needed, to a new technical assessment.

12. The outcomes of the assessment of requests for change shall be included in an assessment report, containing all the relevant information on the process followed, including at least the following information:

    a) description of the requests for change, including all information from Article 15(2);
    b) proposal of prioritization of the requests for change with arguments when requests for change submitted for combined impact assessment breach the performance criteria referred to in paragraph 6; and
    c) results of the individual impact assessment, in case of the situation of paragraph b) occurs.

13. In case the request for change requires developments to be done under previous paragraph 3(e), all NEMOs in cooperation with all TSOs shall in derogation to Article 16:

    a) evaluate the go-live date of the request for change, taking into account the time necessary for the estimated development required for the request for change;
    b) amend, postpone or reject the start of the development upon consideration of resource constraints;
    c) coordinate the follow-up of the developments required for the request for change with all NEMOs to ensure a correct and timely implementation by the foreseen go-live window; and
    d) perform an impact assessment of the request for change within the respective go-live window (combined with the impact assessments of other requests for change for such go-live window) once the developments have been completed, after which the request for change will follow the normal process of this Algorithm methodology.

14. For the decision to allow the go-live of requests for change, all assessments for requests for change and the version of the respective algorithm that shall be used in the assessment process shall be the same like the one that is expected to be used in the implementation of the request for change.

Article 18

Request for change – impact assessment

1. The impact of a request for change on the performance of the SDAC and IDA algorithms, (respectively, continuous trading matching algorithm) in isolation or in combination, shall be assessed by monitoring the scalability indicator under Article 9 of Annex 3 (respectively, Article 7 of Annex 4) before and after the change.

2. To be accepted, a request for change shall fulfil the thresholds defined in Article 4(2) of Annex 3 (respectively, Article 4(2) of Annex 4).

3. The impact on the algorithms' performance shall comprise at least two scenarios: the historical scenario, according to Article 4(2)(a) of Annex 3 (respectively, Article 4(2)(a) of Annex 4), and the near future scenario, described under Article 4(2)(b) of Annex 3 (respectively, Article 4(2)(b) of Annex 4).

4. To reflect accurately the operational conditions of the algorithms, tests shall be performed using the algorithm version that will be in production at the date the request for change is expected to go live. Shall

the go-live date of the change be delayed, a new performance assessment may be required if the new expected go-live date occurs in a different go-live window.

Article 19

Decision-making and implementation of requests for change

1. The decisions by all NEMOs in cooperation with all TSOs shall be justified in the assessment report referred to in Article 17(12) and the objectives set out in Articles 3 and 37 of the CACM Regulation.
2. All NEMOs in cooperation with all TSOs shall decide on the request for change and shall issue for each assessed request for change one of the following possible decisions:
   a) Accepted: the request for change is ready to be used in production and the request for change shall be implemented within six months;
   b) Rejected: the implementation of the request for change is not compatible with the security of operation, adequate performance criteria, resource constraints or does not fulfil the objectives of the CACM Regulation;
   c) Postponed: the implementation of the request for change could be compatible to security of operation and adequate performance criteria, but it is necessary to postpone the go-live date or due to resources constraints; or
   d) Amended: the request for change as submitted is not fully compliant with security of operation and/or adequate performance criteria or demands disproportionate resources compared to its benefits, but could be compliant and accepted if appropriate amendments of it are carried out.

   Requests for change in accordance with Article 14(2) shall not be rejected or postponed beyond the legally binding deadlines. If necessary, to allow the acceptance of such request for change, the NEMOs in cooperation with TSOs shall apply corrective measures in accordance with Article 12.
3. All NEMOs in cooperation with all TSOs shall approve and implement type I changes within 30 days.
4. In case of a type III change, and provided that the combined impact assessment in accordance with Article 17(3) of all the requests for change within a particular go-live window has a positive outcome, all requests for change in such go-live window shall be approved. All NEMOs in cooperation with all TSOs might, nevertheless, decide to carry out a case-by case qualitative assessment on individual requests for change considered in the combined impact assessment in case they collectively induce an excessive variation on the algorithm performance, even though it is below the combined acceptance criteria.
5. In case of a type III change, if the combined impact assessment of all the requests for change in accordance with Article 17(5) has a negative outcome, depending on the assessment of algorithm performance with respect to the individual request for change, all NEMOs in cooperation with all TSOs can:
   i. request the originator to amend the request for change;
   ii. postpone its anticipated go-live under the conditions set out in paragraph 2(c) above and 2(d) above;
   iii. propose an update of the criteria to assess the market performance under Article 18, in case they are deemed no longer suited to properly assess algorithm performance. In such a case all NEMOs in cooperation with all TSOs shall issue a revised proposal in accordance with Article 9(13) of the CACM Regulation within 30 days; or
   iv. trigger an escalation according to the relevant operational contract.
6. In case the actions taken by all NEMOs in cooperation with all TSOs pursuant to paragraph (5) are not sufficient to change the combined impact assessment of all the requests for change under Article 17(5), all NEMOs in cooperation with all TSOs shall approve only those requests for change with individual positive impact assessment outcomes, in order of priority according to Article 17(7). If such an approval cannot not be achieved, an escalation according to the relevant operational contract shall be triggered.

7. All NEMOs in cooperation with all TSOs may decide to consult a preliminary decision on a type III change prior to taking a final decision. Such consultation shall be carried out only in exceptional cases, such as, but not limited to, significant changes on the market design, or if the request for change triggers an amendment of a methodology under Article 5(2) of Regulation (EU) 2019/942. Once the consultation process is concluded, all NEMOs in cooperation with all TSOs shall consider the outcome of such process in order to express the final decision on the requests for change.
8. In case all NEMOs in cooperation with all TSOs activate the consultation process according to previous paragraph 7, timing on final decision indicated in Article 16 shall be considered only once the consultation is concluded.
9. The voting rules that apply for decisions on requests for change is defined in the relevant DA and ID operational contracts.
10. Any decision will be timely communicated by all NEMOs in cooperation with all TSOs to the originator.
11. After the decision on the request for change, all NEMOs in coordination with all TSOs shall issue a public report indicating the decision, the reason for the decision, the principles behind the decision and the assessment report as referred to in Article 17(12), in order to ensure transparency on the change request process.
12. In case of failure of the decision making process in this article, the escalation process shall be triggered according to the relevant provisions set forth in the operational contracts.

TITLE 5
Transparency and reporting

Article 20

Publications and reporting

1. All NEMOs shall publish and maintain a set of documents to be formally updated and consulted with the relevant stakeholder fora, organised in accordance with Article 11 of the CACM Regulation.
2. All NEMOs shall publish, continuously update and consult in the relevant stakeholder fora the following draft documents:
    a) the public description of the SDAC algorithm as referred to under Article 4(18);
    b) the public description of the continuous trading matching algorithm as referred to under Article 5(18); and
    c) the public description of the IDA algorithm as referred to under Article 6(16).
3. All NEMOs shall develop and publish with the relevant periodicity the following reports:
    a) the report on incidents in the operation of the SDAC and SIDC algorithms and on the application of back-up and fallback procedures in accordance with the Back-up methodology and Fallback methodology and in accordance with Article 4(17) and Article 5(17);
    b) the report on research and development activities in accordance with Article 11(8);
    c) the reports on the outcome of the monitoring of the algorithm performance in accordance with Article 8;
    d) the report on scalability in accordance with Article 9(4);
    e) the report on the application of corrective measures in accordance with Article 12(13); and
    f) the reports on the decisions on requests for change in accordance with Article 19(11).
4. All NEMOs shall publish and maintain a continuously updated record of the currently and historically applied corrective measures.
5. All NEMOs in coordination with all TSOs shall publish at least one month in advance the date of the yearly workshop with stakeholders and institutions on the requests for change Roadmap under Article 10.
6. All NEMOs shall publish, pursuant to Article 62(2) of the CACM Regulation:
    a) the aggregated volumes of all trades made per contract per bidding zone – two values are requested, sell volumes and buy volumes;
    b) the volume-weighted average intraday prices per contract and bidding zone[1]; and
    c) the volume-weighted average intraday prices per contract and bidding zone that took place during the last trading hour[2].

    The information shall be published no later than 12:00 on the day following the trading day.
7. By 1 September 2020, all NEMOs in coordination with TSOs shall publish and then continuously update the relevant parts of the following documents:
    a) operational contracts;
    b) operational procedures;
    c) change control procedures;
    d) monitoring procedures;

[1] For the calculation of this indicator, all trades where either the seller, the buyer or both are located in the relevant bidding zone are to be considered and weighed equally.
[2] See footnote 1

e) fallback procedures; and
f) back-up procedures.

Whenever this Algorithm methodology refers to the 'relevant' procedures or contracts, it means the respective documents setting up any relationship among only NEMOs or among only TSOs or between NEMOs and TSOs, and shall cover either the DA or the ID timeframe.

Article 21

Access to data by regulatory authorities

1. The regulatory authorities or relevant authorities primarily responsible for monitoring NEMOs in accordance with Article 82(1) of the CACM Regulation shall have the power to request from the respective NEMOs all information and data used in the monitoring of the algorithm performance, historical input data used by the algorithms in calculating SDAC and SIDC results. They shall provide access to this information and data to other regulatory authorities and ACER.
2. NEMOs shall also make the source code of the algorithms auditable by third parties mandated by the regulatory authorities and/or ACER, subject to non-disclosure agreement and in coherence with contractual agreements with the relevant third parties.
3. The regulatory authorities responsible for monitoring NEMOs in accordance with Article 82(1) of the CACM Regulation can request from the respective NEMOs the simulation of the algorithm results, respecting adequate repeatability pursuant to Article 3(5)(b) and Article 3(6)(b)) of this methodology. They shall provide access to this possibility to other regulatory authorities and ACER.

TITLE 6
Final provisions

Article 22

Language

The reference language for this Algorithm methodology shall be English. For the avoidance of doubt, where NEMOs need to translate this Algorithm methodology into the national language(s) of a relevant national regulatory authority, 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 Algorithm methodology to the relevant national regulatory authorities.

Annex 1 to the Algorithm methodology:

Common set of requirements for the price coupling algorithm

30 January 2020

1. Requirements on functionalities and performance

	State	Owner	
	Requirement deadlines	TSOs	NEMOs
1.1 General requirements.			
a) For each bidding zone, the price coupling algorithm shall be able to:			
(i) facilitate orders for several Market Time Units ('MTU'), such as 15 minutes, 30 minutes and hourly;	JAN 2021[1]	X	X
(ii) support the products as defined in the DA Products;	EXISTING		X
(iii) facilitate configurations with more than one NEMO for a given bidding zone or a scheduling area in accordance to the multiple NEMO arrangement as referred to in Article 45 of the CACM regulation;	EXISTING	X	X
(iv) support multiple scheduling areas within a bidding zone as requested by TSOs;	EXISTING	X	
(v) allocate cross-zonal capacities on a bidding zone border with one or multiple TSOs on one or both sides of the concerned bidding zone border.	EXISTING	X	
b) The price coupling algorithm shall aim at maximising the economic surplus for SDAC for the next trading day, consistent with time limitations, conditions and requirements established by NEMOs and TSOs.	EXISTING	X	X
c) The price coupling algorithm shall provide for a fair and orderly price formation in accordance with Article 3(h) of the CACM Regulation.	EXISTING		X
d) The price coupling algorithm shall support multiple bidding zones within a country and shall be scalable to cover all bidding zones eligible for participating in SDAC.	EXISTING	X	X
e) In case the price coupling algorithm finds solutions with equal social welfare, it shall apply deterministic rules in order to define prices and net positions for each bidding zone.	EXISTING	X	X
f) The price coupling algorithm shall be reliable, thus able to find a solution within the allowed time limit, including the potential to extend the calculation time in case the allowed calculation time is exceeded.	EXISTING	X	X

[1] Hourly orders are already an existing functionality.

g) The price coupling algorithm shall be able for each MTU to provide the net position per NEMO trading hub and the input for the calculation of the scheduled exchanges between bidding zones or scheduling areas.	EXISTING	X	X
h) The price coupling algorithm shall be able to calculate the scheduled exchanges between bidding zones or scheduling areas.	EXISTING	X	
i) For each bidding zone, the result from the application of the price coupling algorithm shall be one price and one net position for each MTU. For the bidding zones containing several TSOs separating their scope in different scheduling areas, the net position for each MTU shall be calculated for each scheduling area. For scheduling areas where more than one NEMO operates, the net position for each MTU shall be calculated for each NEMO trading hub.	EXISTING	X	X
j) The integrity of the price coupling algorithm and the data it processes shall be properly secured from unauthorized access;	EXISTING	X	X
1.2 Qualitative requirements with precision and price ranges			
a) The price coupling algorithm shall ensure: (i) equal treatment of orders coming from all NEMOs in accordance with Article 3(e) of the CACM Regulaiton; and (ii) provide all orders of market participants non-discriminatory access to cross-zonal capacity in accordance with Article 3(j) of the CACM Regulation.	EXISTING	X	X
b) In case of tie rules (between two or more orders) and for branching decisions (if any), deterministic rules shall be implemented. Such choices shall be logged.	EXISTING	X	X
c) The price coupling algorithm shall allow for partial decoupling.	EXISTING	X	X
d) The price coupling algorithm shall automatically support leap years, i.e. 366 days in a year.	EXISTING	X	X
e) The price coupling algorithm shall support 23, 24 or 25 hours for a trading day.	EXISTING	X	X
f) The calculation process of the price coupling algorithm, including prices and scheduled exchanges resulting from this calculation process, shall be transparent, auditable, and explainable. This requirement applies also to all deterministic rules and applied algorithm heuristics and occurrence rate of these rules and heuristics.	EXISTING	X	X
g) The price coupling algorithm source code shall be well structured and well documented.	EXISTING		X
h) The price coupling algorithm shall support negative prices for each bidding zone.	EXISTING		X
i) The price coupling algorithm shall be able to round calculated prices and volumes according to bidding zone specific ticks and rounding rules.	EXISTING	X	X

1.3 Performance		
a) The price coupling algorithm shall be robust and reliable and it shall be resilient to pretested data configurations such as, but not limited to, non-crossing of bids and offer curves, orders' curtailment, maximum and minimum prices, price and volume indeterminacy.	EXISTING	X	X
b) The price coupling algorithm shall always produce a unique result, i.e. price and volume indeterminacy shall be resolved.	EXISTING	X	X
c) The price coupling algorithm shall use reliable IT technology, e.g. reliable third party software.	EXISTING	X	X
d) The price coupling algorithm shall be available at all times when required.	EXISTING	X	X
e) The price coupling algorithm shall be adequatly scalable when the number of bidding zones increases. The price coupling algorithm shall cope with new markets that need to be incorporated in the price coupling, either corresponding to geographical extensions, or with additional NEMOs in existing bidding zones.	EXISTING	X	X
f) Price taking orders are buy (respectively sell) limit orders submitted at the maximum (respectively minimum) prices. The failure to accept these price taking orders corresponds to a curtailment situation: (i) In case of over-supply, not all price taking supply orders can be accepted (ii) In case of under-supply, not all price taking demand orders can be accepted Curtailment can be partially mitigated by exporting excess energy or importing deficit energy. In case more than one bidding zones faces a curtailment situation, when the curtailment of one increase, the curtailment of the other will decrease. Per bidding zone, it should be possible to either: (i) Prevent sharing of curtailment: the local curtailments remain local; no support is received or provided to the adjacent bidding zone (ii) Share curtailment: the difference in relative (percentage) curtailment between the different bidding zones is minimized The option of sharing curtailment in point (ii) above also applies in case of an application of flow-based approach, where sharing curtailments may be at the cost of the economic surplus. The price coupling algorithm shall provide a mechanism that allows for a sharing of curtailment between bidding zones in a flow-based capacity allocation.	EXISTING	X	X

2. Requirements related to cross-zonal capacities

2.1 The price coupling algorithm shall be able for each MTU to:

a)	allow setting cross-zonal capacity value for each bidding zone border in accordance with the CACM Regulation in case coordinated net transmission capacity is applied;	EXISTING	X
b)	constrain scheduled exchanges to the respective cross-zonal capacity value for each bidding zone border for each direction, in case the coordinated net transmission capacity approach is applied;	EXISTING	X
c)	where applicable, allow TSOs setting a default value for cross-zonal capacity for each bidding zone border and for each direction in case coordinated net transmission capacity approach is applied;	EXISTING	X
d)	constrain, where appropriate, an aggregated set of cross-zonal interconnectors with one global cross-zonal transmission capacity limit (cumulative ATC), i.e. a general boundary constraint. This constraint shall be applicable also to a predefined set of bidding zone borders in order to limit, for example, the net position of a bidding zone(s);	EXISTING	X
e)	allow to define a positive and a negative limit to the net position for each bidding zone;	AUG 2022	X
f)	process flow-based parameters, if provided at the defined MTU, when allocating cross-zonal capacities for each bidding zone border;	EXISTING	X
g)	allow definition and application of the following flow-based parameters for each network element of a given bidding zone for the flow-based approach:		
	(i) power transfer distribution factor (PTDF) as defined in Regulation (EU) 543/2013; and	EXISTING	X
	(ii) available margin on critical network element as refered to in Regulation (EU) 543/2013	EXISTING	X
h)	ensure that the PTDF matrix multiplied by the net position is less than or equal to the available margins for each critical network element;	EXISTING	X
i)	receive the flow-based parameters as:		
	(i) "zero balanced" meaning that the available margin on critical network elements applies from zero exchanges and that pre-existing exchanges are transmitted aside; or	AUG 2022	X
	(ii) "not zero balanced" meaning that the available margin on critical network elements applies from pre-existing exchanges;	EXISTING	X

j) allow the coexistence of both flow-based and coordinated net transmission capacity approaches within the coupled regions, i.e. hybrid coupling;	EXISTING	X	
k) allow the use of virtual bidding zones to model how the critical network elements of a CCR applying the flow-based approach are impacted by cross-zonal exchanges on HVDC interconnectors within a CCR or by cross-zonal exchanges on bidding zone borders outside the CRR that are applying the coordinated net transmission capacity approach	EXISTING	X	

3. Requirements related to allocation constraints

3.1 The price coupling algorithm shall be able to:

a) constrain the increase/decrease of scheduled exchanges over one direct current (DC) interconnector and/or a combination of DC interconnectors from a MTU to the following MTU or between the last MTU from the day before and the first MTU of the following day;	EXISTING	X	
b) constrain the increase/decrease of scheduled exchanges over one DC interconnector and/or a combination of DC interconnectors from a MTU to the following MTU or between the last MTU from the day before and the first MTU of the following day taking into account the nominations of long term capacity allocations, i.e. physical transmission rights, where applicable. The constraint shall be handled on a single DC interconnector and multiple DC interconnectors in combination;	AUG 2022	X	
c) constrain the increase/decrease of net positions of a single bidding zone from a MTU to the following MTU within a day or between the last MTU from the day before and the first MTU of the following day; and	EXISTING	X	
d) incorporate losses functionality on interconnector(s) between bidding zones during capacity allocation, and activate this functionality during allocation, if requested by the owner(s) of the relevant interconnector after the approval by the relevant NRAs.	EXISTING	X	
3.2 The price coupling algorithm shall allow to set a minimum price difference between adjacent bidding zones when a DC interconnector is used for electricity exchange. For this requirement, the price coupling algorithm shall model the costs incurred for each MWh passing through a DC interconnector as a "flow tariff". The "flow tariff" shall be treated as a threshold for the price between the bidding zones connected by the DC interconnector. If the price difference between the relevant bidding zones is less than the "flow tariff", the scheduled exchange shall be set to zero. If there is a scheduled exchange, the price difference shall equal the "flow tariff", unless there is a congestion. Once the price difference exceeds the "flow tariff", the congestion income becomes positive. This functionality	EXISTING	X	

shall be incorporated in the price coupling algorithm and activated during allocation if requested by the owner(s) of the interconnector after approval by the relevant NRAs.			
3.3 The price coupling algorithm shall allow for adverse scheduled exchanges, i.e. scheduled exchanges from higher price bidding zone to lower price bidding zone, if this leads to an increase in overall economic surplus.	EXISTING	X	

4. Requirements related to balance constraints

4.1 For overall balance of all bidding zones, the price coupling algorithm shall ensure that the sum of unrounded net positions and transmission losses, where applicable, of all bidding zones shall be zero.	EXISTING	X	
4.2 For overall balance of a bidding zone, the price coupling algorithm shall ensure for each bidding zone the sum of unrounded net position and transmission losses, where applicable, shall be equal to the sum of import and export of this bidding zone resulting from the day ahead capacity allocation.	EXISTING	X	

5. Requirements on algorithm output and deadlines for the delivery of SDAC results

5.1 Regarding the prices for each MTU the output of the price coupling algorithm shall be:			
a) rounded and unrounded price in Euros for each bidding zone;	EXISTING	X	X
b) shadow prices of critical network elements as needed for flow-based capacity allocation; and	EXISTING	X	
c) regional reference prices, in a network in which the cross-zonal capacity constraints are relaxed, e.g. Nordic region.	EXISTING	X	X
5.2 Regarding the quantities for each relevant MTU, the output of the price coupling algorithm shall be:			
a) rounded and unrounded net position for each bidding zone, which is defined as the difference between accepted supply and demand orders within a bidding zone, where rounding shall follow the rounding rules defined for each bidding zone;	EXISTING	X	X
b) where there are multiple NEMOs within a bidding zone and scheduling area, the rounded and unrounded net position for each NEMO trading hub in a bidding zone;	EXISTING	X	X
c) the information which enables the execution status of orders to be determined;	EXISTING		X

d) number and volume of accepted block orders for each bidding zone and paradoxically rejected orders, if any;	EXISTING		X
e) scheduled exchanges into and out of individual relevant DC network elements (difference in scheduled exchanges in/out reflecting losses where applicable);	EXISTING	X	
f) scheduled exchanges on relevant bidding zone borders (scheduled exchanges in/out reflecting losses where applicable);	EXISTING	X	
g) scheduled exchanges on relevant scheduling area borders (scheduled exchanges in/out reflecting losses where applicable);	EXISTING	X	
h) available margin on critical network elements or the remaining allowable scheduled exchange on the network element in case of flow-based approach.	AUG 2022	X	
5.3 For each relevant MTU the price coupling algorithm shall provide scheduled exchanges resulting from day ahead market coupling in the form of:			
a) bilateral and multilateral scheduled exchanges between scheduling areas;	EXISTING	X	
b) bilateral and multilateral scheduled exchanges between bidding zones; and	EXISTING	X	
c) bilateral and multilateral scheduled exchanges between NEMO trading hubs;	EXISTING	X	X
and pursuant to the methodology for calculating scheduled exchanges. This is to support the scheduled exchanges calculation and/or multi-NEMO arrangements function.			
5.4 Regarding the calculation results, the output of the price coupling algorithm shall be:			
a) the overall economic surplus and economic surplus for each bidding zone; and	EXISTING	X	X
b) the output necessary for monitoring in accordance with Article 82(2) and (4) of the CACM Regulation.	EXISTING	X	X
5.5 The price coupling algorithm shall provide NEMOs and TSOs with information necessary to comply with the monitoring pursuant to Regulation (EU) 1227/2011, where such information can be obtained only from the price coupling algorithm.	EXISTING	X	X
5.6 The price coupling algorithm shall be able to implement a change of bidding zone configurations following the change control procedure referred to in Article 9 of the Algorithm methodology.	EXISTING	X	
5.7 The price coupling algorithm shall be capable of finding results normally within the time limit that is established in the operational procedure referred to in Article 4(15) of the Algorithm methodology.	EXISTING	X	X

5.8	The price coupling algorithm shall be able to deliver the volume of matched orders and not-matched orders of each NEMO for bidding zones or scheduling areas if requested by the relevant TSOs.	EXISTING	X	

6. Currency

6.1	The price coupling algorithm shall for SDAC only accept matching in Euro, i.e. all input and output currency data shall be in Euros. This should not prevent local currency orders and settlements.	EXISTING	X	X

Annex 2 to the Algorithm methodology:

Common set of requirements for the continuous trading matching algorithm and the intraday auction algorithm

30 January 2020

TITLE 1

Requirements for continuous single intraday coupling algorithm

	Owner		State
	TSO	NEMO	Requirement deadline
1 Requirements on functionalities and performance			
1.1 General requirements			
a) The continuous trading matching algorithm shall support the continuous matching of orders as well as the continuous allocation of intraday cross-zonal capacity.	X	X	EXISTING
b) The continuous trading matching algorithm shall ensure equal treatment of orders coming from all NEMOs and from requests for explicit capacity allocation.		X	EXISTING
c) For each bidding zone, the continuous trading matching algorithm shall be able to:			
(i) support at least the order types included in the ID products;		X	EXISTING
(ii) support non-standard products (all products besides quarter hourly, half hourly and hourly) to the extent this is technically feasible and approved by the competent regulatory authorities;	X	X	AUG 2023
(iii) facilitate different market time units (MTUs) which shall be configurable in each bidding zone;	X	X	EXISTING
(iv) facilitate configurations with more than one NEMO for a given bidding zone or a scheduling area in accordance to the multiple NEMO arrangement as referred to in Article 57 of the CACM regulation;	X	X	EXISTING
(v) support multiple scheduling areas within a bidding zone as requested by TSOs;	X		EXISTING
(vi) allocate cross-zonal capacities on a bidding zone border with multiple TSOs on one or both sides of the concerned bidding zone border.	X	X	EXISTING
d) Intraday cross-zonal gate opening and intraday cross-zonal gate closure times (IDCZGT) shall be configurable for each bidding zone border.	X	X	EXISTING
e) The continuous trading matching algorithm shall aim to ensure that economic surplus is maximised, where applicable.	X	X	EXISTING
f) The continuous trading matching algorithm shall support one or multiple bidding zones within a country and shall be scalable to cover all bidding zones eligible for participating in SIDC.	X	X	EXISTING
g) The continuous trading matching algorithm shall be able to provide the net positions considering bidding zone borders included in SIDC and scheduled exchanges between bidding zones.	X		EXISTING

h) For each bidding zone the result from application of the continuous trading matching algorithm shall be for each MTU calculate one net position and, where applicable, net positions for each scheduling area and each NEMO trading hub.	X		EXISTING
i) The continuous trading matching algorithm must ensure the respect of the proprietary rights and the anonymity of the data (orders, etc.) and information submitted and accessed by the parties in their use of the system.	X	X	EXISTING
j) The integrity of the continuous trading matching algorithm and the data it processes shall be properly secured from unauthorized access.	X	X	EXISTING
k) The continuous trading matching algorithm needs to provide all necessary information for the cross-NEMOs settlement and shipping.		X	EXISTING
l) Problems in one area, on one border or for one NEMO shall not, as far as possible, prevent trading in the other areas, on the other borders or for the other NEMOs.	X	X	EXISTING
m) The continuous trading matching algorithm must support, but not be limited to: (i) receive the available cross-zonal capacity information in real time; (ii) request cross-zonal capacity when pairs of matchable orders are identified.	X	X	EXISTING
n) The continuous trading matching algorithm must support transaction cancellation functionalities. The system must be able to initiate the required actions on the capacity allocation side and interaction with the NEMOs: (i) In case a cross-border trade is involved in the transaction cancellation, the continuous trading matching algorithm shall request cross-zonal capacity in the opposite direction; (ii) The system must support to define a deadline for transaction cancellation.		X	EXISTING
o) The continuous trading matching algorithm shall match orders according to price, time priority and, for cross-border trades, available cross-zonal capacity and allocation constraints. The configuration of the matching rules must support, but not be limited to the following matching rules: (i) Automatic matching process meaning buy and sell orders with crossed prices. The matcher will match the orders at the price of the passive order, i.e. the one already in the order book; (ii) When an order is updated or entered, the continuous trading matching algorithm checks if it can be matched; (iii) A buy (sell) order can be matched if: • there is an order by a trading counterpart with an inferior sell (superior buy) price or equal price; • there are several orders on the sell (buy) side fulfilling the first criterion the order with best price is matched first and if the aggressor order is not fully matched, then the second best price order is matched etc.; • there are several orders with the same price on the sell (buy) side fulfilling the first criterion, the order with the oldest timestamp is matched first and if the aggressor order is not fully matched, then the second oldest is matched etc.; • the matching respects the cross-zonal capacity and allocation constraints; • the matching price is within the harmonised maximum and minimum clearing prices for SIDC.		X	EXISTING

	In case of partial matching of an order, the non-matched part remains in the book (except otherwise specified by the order type) as an order with the quantity equal to the non-matched quantity - the price of the remaining part of order is the one entered initially by the trader except otherwise specified by the order type.			
p)	The orders are all centralised in a consolidated order book that is used to generate the local views, considering the relevant cross-zonal capacity and allocation constraints.		X	EXISTING
q)	All incoming orders and explicit capacity requests are queued in the same queue and treated in non-discriminatory way. The continuous trading matching algorithm shall guarantee a first come first serve principle. Only one matching and/or cross-zonal capacity allocation event can occur at the same time.	X	X	EXISTING
r)	The continuous trading matching algorithm supports increase and decrease of capacity. When the capacity available increases due to netting, capacity publication or update, it may lead to a crossed order book. The continuous trading matching algorithm must include a mechanism to solve this situation (pair matching or auction).	X	X	EXISTING
s)	The continuous trading matching algorithm must calculate local views of order books based on available orders and capacities. The configuration of the local views must support, but not be limited to the following rules:			
	(i) The local view of a bidding zone corresponds to the orders that the market participants of the bidding zone can trade;			
	(ii) The available capacity corresponds to the maximum flow between two bidding zones (unless flow-based cross-border capacity mechanisms are defined and implemented) taking all allocation constraints into consideration;		X	EXISTING
	(iii) For building the same local view, the same capacity can only be considered once;			
	(iv) Construction of the local view must take into account the harmonised maximum and minimum clearing prices for SIDC;			
t)	The continuous trading matching algorithm must prevent that NEMOs have the information to calculate the local view based on the order books from other NEMOs and capacities.		X	EXISTING
u)	Capacity and order book updates are used to create updated local views. Local view updates are continuously broadcasted to the connected NEMOs in a non-discriminatory manner.	X	X	EXISTING
v)	The continuous trading matching algorithm must allow, as part of SIDC, to cross-match the different order types of the ID products within one and between multiple bidding zones, respecting the capacity and order restrictions.		X	EXISTING
1.2	Qualitative requirements with precision and price ranges			
a)	The continuous trading matching algorithm shall provide all market participants non-discriminatory access to cross-zonal capacity in accordance with Article 3(j) of the CACM Regulation.	X	X	EXISTING
b)	The continuous trading matching algorithm shall aim to ensure that in case there are matching opportunities the matching shall always take place taking into account the IDCZGT.		X	EXISTING

c)	The continuous trading matching algorithm shall be able to reproduce the same results with the same input data coming in exactly identical sequence and timing.	X	X	EXISTING
d)	The continuous trading matching algorithm shall support 23, 24 or 25 hours for a trading day.	X	X	EXISTING
e)	The continuous trading matching algorithm shall support automatically the leap years, i.e. 366 days in a year.	X	X	EXISTING
f)	The matching process of the continuous trading matching algorithm, including prices and allocated capacities resulting from this calculation process, has to be transparent, auditable, and explainable. This requirement applies also to all the deterministic rules and applied continuous trading matching algorithm heuristics, if any, and occurrence rate of these rules and heuristics.	X	X	EXISTING
g)	The continuous trading matching algorithm shall be well structured and well documented. A description of the continuous trading matching algorithm should be made publicly available, and should be kept up to date. The documentation shall be written in English.	X	X	EXISTING
h)	The continuous trading matching algorithm shall support negative prices as well as prices with different price boundaries.		X	EXISTING
i)	The continuous trading matching algorithm shall be able to deliver prices and volumes according to globally configurable ticks and, in case rounding is required, specific rounding rules.	X	X	EXISTING
1.3	Other functionalities related to cross-zonal capacity allocation			
a)	The continuous trading matching algorithm shall be able to match both implicit (NEMOs) and explicit capacity allocation requests.	X	X	EXISTING
b)	The continuous trading matching algorithm shall be able to calculate for each MTU the scheduled exchanges between bidding zones.	X	X	EXISTING
c)	The continuous trading matching algorithm shall be able to calculate for each MTU the scheduled exchanges between scheduling areas.	X		EXISTING
d)	Once allocated by the continuous trading matching algorithm, the capacity is firm (cannot be changed by TSOs).		X	EXISTING
e)	Cross-zonal capacity shall be allocated to either energy transactions or explicit requests where approved, at zero price for market participants, in accordance with Article 64 of the CACM Regulation.	X	X	EXISTING
		X	X	EXISTING
f)	The continuous trading algorithm shall:			
	(i) support switchover to auction mode where the IDA requirements apply to allocation of cross zonal capacity and enable its automatization;			
	(ii) support switchback from auction mode to continuous trading mode where continuous trading requirements apply to allocation of cross zonal capacity and enable its automatization;			
	(iii) make the allocation results available for the TSOs on the relevant borders when the suspension of the continuous trade occurs;	X	X	JAN 2023
	(iv) allow setting the priority level of the already allocated capacity files in the same way as for net transfer capacity files, depending on the sender of the already allocated capacity file;			
	(v) allow automatization of halting and unhalting of allocation of cross-zonal capacities in continuous trading;			

(vi) ensure no double allocation of capacity, especially in connection to IDAs; and (vii) allow for the timeout time and timings of all process steps to be configurable.			
g) The continuous trading matching algorithm shall support the possibility of continuous matching of orders during the IDA without continuous allocation of intraday cross-zonal capacity.	X	X	JAN 2023
h) The continuous trading algorithm and the IDA shall align the approach toward the losses functionality.	X	X	JAN 2023
i) The continuous trading algorithm and the IDA algorithm shall support updating relevant data: (i) Upon switchover into IDAs – the continuous trading algorithm shall allow processes for sending of capacity data and other relevant input data to the IDA. (ii) Upon switchback from IDAs the continuous trading algorithm shall allow processes for updating the cross-zonal capacities and other results accordingly.	X	X	JAN 2023
j) For the execution of complementary regional auctions, it shall be possible to stop continuous trading within and between relevant bidding zones for a limited period of time before the intraday cross-zonal gate closure time, which shall not exceed the minimum time required to hold the auction and in any case 10 minutes.	X	X	EXISTING
k) Once IDAs are combined with continuous trading, the continuous trading matching algorithm shall include the necessary mechanisms for: (i) allowing the operational integration with the auctions taking into account the intraday cross-zonal gate opening and closure times; and (ii) allowing the incorporation of the auctions' results to the continuous trading, in terms of cross-zonal capacity.	X	X	JAN 2023
1.4 Performance			
a) The continuous trading matching algorithm shall produce and log performance indicators with minimum level of those indicators in order to monitor its performance. This shall include, among others, the statistics related to the usage of different products with regard to their impact on continuous trading matching algorithm performance and in relation to particular products. These measurements should include for every bidding zone the number and volume of bids per product and the number and volume of accepted bids per product.		X	EXISTING
b) All TSOs and NEMOs shall develop performance indicators in order to monitor the performance of the continuous trading matching algorithm.	X	X	EXISTING

2 Requirements related to cross-zonal capacities

2.1 The continuous trading matching algorithm shall be able for each MTU to:

a) allow TSOs to set constant cross-zonal capacity and allocation constraints for each bidding zone border in case coordinated net transmission capacity is applied. This cross-zonal capacity value may also be a very high value;	X		AUG 2023

b) constrain scheduled exchanges to the respective cross-zonal capacity value for each bidding zone border for each cross-zonal flow directions, in case the coordinated net transmission capacity approach is applied;	X		EXISTING
c) where applicable, allow setting a default value for cross-zonal capacity for each bidding zone border and for each direction in case coordinated net transmission capacity approach is applied;	X		AUG 2023
d) constrain, where appropriate, an aggregated set of cross-zonal interconnectors with one global cross-zonal transmission capacity limit (cumulative net transmission capacity), i.e. a general boundary constraint. This constraint shall be applicable also to a predefined set of bidding zone borders in order to limit for example the net position of a bidding zone(s);	X		AUG 2023
e) allow the processing of flow-based parameters, if provided at the defined MTU, when allocating cross-zonal capacities for each bidding zone border;	X		AUG 2023
f) allow definition and application of the following flow-based parameters for each network element of a given bidding zone for flow-based approach:	X		AUG 2023
(i) power transfer distribution factor (PTDF) as defined in Regulation (EU) 543/2013; and	X		AUG 2023
(ii) available margin on critical network element as refered to in Regulation (EU) 543/2013;	X		AUG 2023
g) ensure that the PTDF matrix multiplied by the net position is less than or equal to the available margin for each critical network element;	X		AUG 2023
h) allow the reception of the flow-based parameters as:	X		AUG 2023
(i) 'zero balanced' meaning that the available margin on critical network elements applies from zero exchanges and that pre-existing exchanges are transmitted aside; or			
(ii) 'not zero balanced' meaning that the available margin on critical network elements applies from pre-existing exchanges;			
i) allow the coexistence of both flow-based and coordinated net transmission capacity approaches within the coupled regions, i.e. hybrid coupling;	X		AUG 2023
j) allow the use of virtual bidding zones to model how the critical network elements of a CCR applying the flow-based approach are impacted by cross-zonal exchanges on HVDC interconnectors within a CCR or by cross-zonal exchanges on bidding zone borders outside the CRR that are applying the coordinated net transmission capacity approach;	X		AUG 2023
k) facilitate change of cross-zonal capacity values or flow-based parameters, which among other things might be a consequence of netting, capacity publication or update of capacity value or flow-based parameter. In such a case, if a crossed order book is produced, the continuous trading matching algorithm shall match the relevant orders with the aim of maximizing economic surplus;	X	X	AUG 2023
l) allow configuring the moment when the cross-zonal capacity update is applied or becomes effective;	X		EXISTING
m) enable to halt/unhalt one bidding zone, one border, one instrument, and one NEMO. In case of halting of one bidding zone, one instrument and one NEMO, all the relevant orders will be halted or inactivated.	X	X	EXISTING
n) handle situations for relevant bidding zone borders where the calculated cross-zonal capacity value applying coordinated net transmission capacity approach is less than the current level of exchange so that no more capacity is allocated	X		EXISTING

in the direction of this exchange until level of exchange is below the calculated cross zonal capacity value; and			
o) handle situations for relevant bidding zone borders where for continuous intraday trading applying flow-based approach an initial market clearing point is outside flow-based domain by allowing only trades moving the clearing point towards the flow-based domain.	X		AUG 2023

3 Requirements related to allocation constraints

3.1	The continuous trading matching algorithm shall allow to: a) constrain the increase/decrease of scheduled exchanges over one direct current (DC) interconnector and/or a combination of DC interconnectors from a MTU to the following MTU or between the last MTU from the day before and the first MTU of the following day. The constraint shall take into account the nominations of capacity allocations, i.e. physical transmission rights, day-ahead scheduled exchanges, and auction SIDC scheduled exchanges, where applicable. The constraint shall be handled on a single DC interconnector and multiple DC interconnectors in combination (i.e. ramping); b) constrain the increase/decrease of net positions of a single bidding zone from a MTU to the following MTU within a day or between the last MTU from the day before and the first MTU of the following day; and c) incorporate losses on interconnector(s) between bidding zones during capacity allocation, if requested by the owner(s) of the relevant interconnector after approval by the relevant NRAs.	X		AUG 2023
3.2	For the DC interconnectors, the scheduled exchanges shall not be below the minimum stable flow (MSF), other than at zero. The MSF will be given for the DC interconnector, if requested by the owner(s) of the interconnectors after approval by relevant NRAs. The capacity allocation shall take into account the nominations of long term cross- zonal capacity and day ahead cross-zonal capacity, where applicable. The constraints shall be handled on a DC interconnector-by-DC interconnector, multiple DC interconnectors and on a net position (regional) basis.	X		AUG 2023
3.3	The continuous trading matching algorithm shall allow to set a minimum price difference between adjacent bidding zones when a DC interconnector is used for power exchange. For this requirement, the continuous trading matching algorithm shall model the costs incurred for each MWh passing through a DC interconnector as a 'flow tariff'. This 'flow tariff' shall be treated as a threshold for the price between the bidding zones connected by the DC interconnector. If the price difference between the relevant bidding zones is less than the 'flow tariff', the scheduled exchanges will be set to zero. If there is a scheduled exchange, the price difference will equal the 'flow tariff', unless there is a congestion. Once the price difference exceeds the 'flow tariff', the congestion income becomes positive. This functionality shall be incorporated in the continuous trading matching algorithm if requested by the owner(s) of the interconnector after approval by relevant NRAs.	X		AUG 2023
3.4	The continuous trading matching algorithm shall allow for adverse scheduled exchanges, i.e. scheduled exchanges from higher price bidding zone to lower price bidding zone, if this leads to an increase in overall economic surplus.	X		AUG 2023
3.5	The continuous trading matching algorithm shall aim to minimize the number of bidding zone borders on the path between the matched orders and allow for route prioritisation by the use of interconnector specific cost coefficients.	X		AUG 2023

4 Requirements on continuous trading matching algorithm output for the delivery of single intraday coupling results

4.1	Regarding the quantities for each MTU the output of the continuous trading matching algorithm shall be:			
	a) rounded and unrounded net position for each bidding zone, which is defined as the difference between matched supply and demand orders within a bidding zone, where rounding shall follow the rounding rules defined for each bidding zone;	X	X	EXISTING
	b) where applicable, the rounded and unrounded net position for each NEMO trading hub in bidding zones with several NEMOs shall be provided;		X	EXISTING
	c) the execution status of orders and prices per trade;		X	EXISTING
	d) number and volume of matched block orders for each bidding zone;		X	AUG 2023
4.2	For each relevant MTU, the continuous trading matching algorithm shall provide scheduled exchanges resulting from intraday market coupling in the form of:			
	a) scheduled exchanges between scheduling areas;	X		EXISTING
	b) scheduled exchanges between bidding zones;	X		EXISTING
	c) scheduled exchanges between NEMO trading hubs;		X	EXISTING
	and pursuant to the Methodology for calculation of scheduled exchanges resulting from market coupling. This is to support the scheduled exchanges calculation and/or multi-NEMO arrangements function.			
4.3	Regarding the calculation results, the output of the continuous trading matching algorithm shall be the output necessary for monitoring in accordance with Article 82(2) and (4) of the CACM Regulation.	X	X	AUG 2023
4.4	The continuous trading matching algorithm shall provide NEMOs and TSOs with information necessary to comply with the monitoring pursuant to Regulation (EU) 1227/2011 where such information can be obtained only from the continuous trading matching algorithm.	X	X	AUG 2023
4.5	The continuous trading matching algorithm shall be able to implement a change of bidding zone configurations no later than 4 weeks after a TSO notifies a change subject to the change request procedure.	X	X	EXISTING
4.6	The continuous trading matching algorithm shall be capable of providing results in order for all post coupling processes to be initiated in 5 minutes after gate closure time of a particular MTU.	X	X	EXISTING

5 Currency

5.1	The continuous trading matching algorithm shall only accept matching in Euro, i.e. all input and output currency data shall be in Euros. This should not prevent local currency orders and settlements.	X	X	EXISTING

TITLE 2

Requirements for intraday auctions

6. Requirements on functionalities and performance

6.1. General requirements

	Owner		State
	TSOs	NEMOs	Requirement deadline
a) For each bidding zone, the IDA algorithm shall be able to:			
(i) Facilitate orders for several Market Time Units ('MTUs'), such as quarter-hourly, half-hourly and hourly;	X	X	JAN 2023
(ii) support the products as defined in the IDA products;		X	JAN 2023
(iii) facilitate configurations with more than one NEMO for a given bidding zone or a scheduling area in accordance to the multiple NEMO arrangement as referred to in Article 45 of the CACM regulation;	X	X	JAN 2023
(iv) support multiple scheduling areas within a bidding zone as requested by TSOs; and	X		JAN 2023
(v) allocate cross-zonal capacities on a bidding zone border with one or multiple TSOs on one or both sides of the concerned bidding zone border.	X		JAN 2023
b) The IDA algorithm shall aim at maximising the economic surplus of the SIDC auction for all market time units that are part of the delivery period of the IDA, consistent with time limitations, conditions and requirements established by NEMOs and TSOs.	X	X	JAN 2023
c) The IDA algorithm shall provide for a fair and orderly price formation in accordance with Article 3(h) of the CACM Regulation.		X	JAN 2023
d) The IDA algorithm shall support multiple bidding zones within a country and shall be scalable to cover all bidding zones eligible for participating in SIDC.	X	X	JAN 2023
e) In case the IDA algorithm finds solutions with equal social welfare, it shall apply deterministic rules in order to define prices and net positions for each bidding zone.	X	X	JAN 2023
f) The IDA algorithm shall be reliable, thus able to find a solution within the allowed time limit, including the potential to extend the calculation time in case the allowed calculation time is exceeded.	X	X	JAN 2023

g) The IDA algorithm shall be able for each MTU to provide the net position per NEMO trading hub and the input for the calculation of the scheduled exchanges between bidding zones or scheduling areas.	X	X	JAN 2023
h) The IDA algorithm shall be able to calculate the scheduled exchanges between bidding zones or scheduling areas.	X		JAN 2023
i) For each bidding zone, the result from the application of the IDA algorithm shall be one price and one net position for each MTU. For the bidding zones containing several TSOs separating their scope in different scheduling areas, the net position for each MTU shall be calculated for each scheduling area. For scheduling areas where more than one NEMO operates, the net position for each MTU shall be calculated for each NEMO trading hub.	X	X	JAN 2023
j) The integrity of the IDA algorithm and the data it processes shall be properly secured from unauthorized access.	X	X	JAN 2023
k) Intraday auction cross-zonal gate opening and intraday cross-zonal gate closure times (IDCZGT) shall be configurable.	X	X	JAN 2023
6.2. Qualitative requirements with precision and price ranges			
a) The IDA algorithm shall ensure: (i) equal treatment of orders coming from all NEMOs in accordance with Article 3(e) of the CACM Regulaiton; and (ii) provide all orders of market participants non-discriminatory access to cross zonal capacity in accordance with Article 3(j) of the CACM Regulation.	X	X	JAN 2023
b) In case of tie rules (between two or more orders) and for branching decisions (if any), deterministic rules shall be implemented. Such choices shall be logged.	X	X	JAN 2023
c) The IDA algorithm shall allow for partial coupling, in order to deliver the auctions results, even if some inputs from a market or a delivery area are missing.	X	X	JAN 2023
d) The IDA algorithm shall automatically support leap years, i.e. 366 days in a year.	X	X	JAN 2023
e) The IDA algorithm shall automatically support daylight saving clock changes.	X	X	JAN 2023
f) The IDA algorithm shall support MTUs from first auction MTU till end of the delivery day for each IDA.	X	X	JAN 2023
g) The calculation process of the IDA algorithm, including prices and scheduled exchanges resulting from this calculation process, shall be transparent, auditable, and explainable. This requirement applies also to all deterministic rules and applied algorithm heuristics and occurrence rate of these rules and heuristics.	X	X	JAN 2023
h) The IDA algorithm source code shall be well structured and well documented.		X	JAN 2023
i) The IDA algorithm shall support negative prices for each bidding zone.		X	JAN 2023

j) The IDA algorithm shall be able to round calculated prices and volumes according to bidding zone specific ticks and rounding rules.	X	X	JAN 2023
6.3. Performance			
a) The IDA algorithm shall be robust and reliable and it shall be resilient to pretested data configurations such as, but not limited to, non-crossing of bids and offer curves, orders' curtailment, maximum and minimum prices, price and volume indeterminacy.	X	X	JAN 2023
b) The IDA algorithm shall always produce a unique result, i.e. price and volume indeterminacy shall be resolved.	X	X	JAN 2023
c) The IDA algorithm shall use reliable IT technology, e.g. reliable third party software.	X	X	JAN 2023
d) The IDA algorithm shall be available at all times when required.	X	X	JAN 2023
e) The IDA algorithm shall be adequately scalable when the number of bidding zones increases. The IDA algorithm shall cope with new markets that need to be incorporated in the price coupling, either corresponding to geographical extensions, or with additional NEMOs in existing bidding zones.	X	X	JAN 2023
7. Requirements related to cross-zonal capacities			
The IDA algorithm shall be able for each MTU to:			
a) Allow setting cross-zonal capacity value for each bidding zone border in accordance with the CACM Regulation in case coordinated net transmission capacity is applied;	X		JAN 2023
b) constrain scheduled exchanges to the respective cross-zonal capacity value for each bidding zone border for each direction, including capacity allocated under previous timeframes , in case the coordinated net transmission capacity approach is applied;	X		JAN 2023
c) where applicable, allow TSOs setting a default value for cross-zonal capacity for each bidding zone border and for each direction in case coordinated net transmission capacity approach is applied;	X		JAN 2023
d) constrain, where appropriate, an aggregated set of cross-zonal interconnectors with one global cross-zonal transmission capacity limit (cumulative ATC), i.e. a general boundary constraint. This constraint shall be applicable also to a predefined set of bidding zone borders in order to limit, for example, the net position of a bidding zone(s);	X		JAN 2023
e) allow to define a positive and a negative limit to the net position for each bidding zone;	X		AUG 2023
f) process flow-based parameters, if provided at the defined MTU, when allocating cross-zonal capacities for each bidding zone border;	X		AUG 2023
g) allow definition and application of the following flow-based parameters for each network element of a given bidding zone for the flow-based approach:			

(i) power transfer distribution factor (PTDF) as defined in Regulation (EU) 543/2013; and	X		AUG 2023
(ii) available margin on critical network element as refered to in Regulation (EU) 543/2013;	X		AUG 2023
h) ensure that the PTDF matrix multiplied by the net position from the current IDA is less than or equal to the available margins for each critical network element adjusted for already existing exchanges;	X		AUG 2023
i) receive the flow-based parameters as:			
(i) 'zero balanced' meaning that the available margin on critical network elements applies from zero exchanges and that pre-existing exchanges are transmitted aside; or	X		AUG 2023
(ii) 'not zero balanced' meaning that the available margin on critical network elements applies from pre-existing exchanges;	X		AUG 2023
j) allow the coexistence of both flow-based and coordinated net transmission capacity approaches within the coupled regions, i.e. hybrid coupling;	X		AUG 2023
k) allow the use of virtual bidding zones to model how the critical network elements of a CCR applying the flow-based approach are impacted by cross-zonal exchanges on HVDC interconnectors within a CCR or by cross-zonal exchanges on bidding zone borders outside the CRR that are applying the coordinated net transmission capacity approach.	X		AUG 2023
8. Requirements related to allocation constraints			
8.1. The IDA algorithm shall be able to:			
a) constrain the increase/decrease of scheduled exchanges over one direct current (DC) interconnector and/or a combination of DC interconnectors from a MTU to the following MTU or between the last MTU before first auction MTU and the first auction MTU;	X		JAN 2023
b) constrain the increase/decrease of scheduled exchanges over one DC interconnector and/or a combination of DC interconnectors from a MTU to the following MTU or between the last MTU before first auction MTU and the first auction MTU taking into account the results of previous allocation including nominations of long term capacity allocations, i.e. physical transmission rights, where applicable. The constraint shall be handled on a single DC interconnector and multiple DC interconnectors in combination;	X		AUG 2023
c) constrain the increase/decrease of net positions of a single bidding zone between MTUs;	X		JAN 2023
d) calculate losses on interconnector(s) between bidding zones during capacity allocation, and activate this functionality during allocation, if requested by the owner(s) of the relevant interconnector after the approval by the relevant NRAs.	X		JAN 2023
8.2. The IDA algorithm shall allow to set a minimum price difference between adjacent bidding zones when a DC interconnector is used for electricity exchange. For this	X		JAN 2023

requirement, the IDA algorithm shall model the costs incurred for each MWh passing through a DC interconnector as a 'flow tariff'. The 'flow tariff' shall be treated as a threshold for the price between the bidding zones connected by the DC interconnector. If the price difference between the relevant bidding zones is less than the 'flow tariff', the scheduled exchange shall be set to zero. If there is a scheduled exchange, the price difference shall equal the 'flow tariff', unless there is a congestion. Once the price difference exceeds the 'flow tariff', the congestion income becomes positive. This functionality shall be incorporated in the IDA algorithm and activated during allocation if requested by the owner(s) of the interconnector after approval by the relevant NRAs.			
8.3. The IDA algorithm shall allow for adverse scheduled exchanges, i.e. scheduled exchanges from higher price bidding zone to lower price bidding zone, if this leads to an increase in overall economic surplus.	X		JAN 2023

9. Requirements related to balance constraints

9.1. For overall balance of all bidding zones, the IDA algorithm shall ensure that the sum of unrounded net positions and transmission losses, where applicable, of all bidding zones shall be zero.	X		JAN 2023
9.2. For overall balance of a bidding zone, the IDA algorithm shall ensure for each bidding zone the sum of unrounded net position and transmission losses, where applicable, shall be equal to the sum of import and export of this bidding zone resulting from the intraday capacity allocation.	X		JAN 2023

10. Requirements on algorithm output and deadlines for the delivery of auction SIDC results

10.1. Regarding the prices for each MTU the output of the IDA algorithm shall be:

a)	rounded and unrounded price in Euros for each bidding zone;	X	X	JAN 2023
b)	shadow prices of critical network elements as needed for flow-based capacity allocation; and	X		AUG 2023
c)	regional reference prices, in a network in which the cross-zonal capacity constraints are relaxed, e.g. the Nordic region.	X	X	JAN 2023

10.2. Regarding the quantities for each relevant MTU, the output of the IDA algorithm shall be:

a)	rounded and unrounded net position for each bidding zone, which is defined as the difference between accepted supply and demand orders within a bidding zone, where rounding shall follow the rounding rules defined for each bidding zone;	X	X	JAN 2023
b)	where there are multiple NEMOs within a bidding zone and scheduling area, the rounded and unrounded net position for each NEMO trading hub in a bidding zone;	X	X	JAN 2023

c) the information which enables the execution status of orders to be determined;		X	JAN 2023
d) number and volume of accepted block orders for each bidding zone and paradoxically rejected orders, if any;		X	JAN 2023
e) scheduled exchanges into and out of individual relevant DC network elements (difference in scheduled exchanges in/out reflecting losses where applicable);	X		JAN 2023
f) scheduled exchanges on relevant bidding zone borders (scheduled exchanges in/out reflecting losses where applicable);	X		JAN 2023
g) scheduled exchanges on relevant scheduling area borders (scheduled exchanges in/out reflecting losses where applicable);	X		JAN 2023
h) available margin on critical network elements or the remaining allowable scheduled exchange on the network element in case of flow-based approach.	X		AUG 2023
10.3. For each relevant MTU the IDA algorithm shall provide scheduled exchanges resulting from the IDAs in the form of:			
a) bilateral and multilateral scheduled exchanges between scheduling areas;	X		JAN 2023
b) bilateral and multilateral scheduled exchanges between bidding zones; and	X		JAN 2023
c) bilateral and multilateral scheduled exchanges between NEMO trading hubs;	X	X	JAN 2023
and pursuant to the methodology for calculating scheduled exchanges resulting from SDAC. This is to support the scheduled exchanges calculation and/or multi-NEMO arrangements function[1].			
10.4. Regarding the calculation results, the output of the IDA algorithm shall be:			
a) the overall economic surplus and economic surplus for each bidding zone; and	X	X	JAN 2023
b) the output necessary for monitoring in accordance with Article 82(2) and (4) of the CACM Regulation.	X	X	JAN 2023
10.5. The IDA algorithm shall provide NEMOs and TSOs with information necessary to comply with the monitoring pursuant to Regulation (EU) 1227/2011, where such information can be obtained only from the IDA algorithm.	X	X	JAN 2023
10.6. The IDA algorithm shall be able to implement a change of bidding zone configurations.	X		JAN 2023
10.7. The IDA algorithm shall be capable of finding results within the agreed time limit that is established in the operational procedure of the Algorithm methodology.	X	X	JAN 2023

[1] *The IDA algorithm shall be capable of providing results in order for all post coupling processes to be initiated in 5 minutes after gate closure time of a particular MTU.*

10.8. The IDA algorithm shall be able to deliver the volume of matched orders and not-matched orders of each NEMO for bidding zones or scheduling areas if requested by the relevant TSOs.	X		JAN 2023

11. Currency

11.1. The IDA algorithm shall for auctions under the SIDC arrangements only accept matching in Euro, i.e. all input and output currency data shall be in Euros. This should not prevent local currency orders and settlements.	X	X	JAN 2023

Annex 3 to the Algorithm methodology:

Algorithm monitoring methodology for single day-ahead coupling

30 January 2020

Table of Contents

TITLE 1

General provisions

Article 1

General specifications

1. This Annex elaborates the principles for the required indicators monitoring the SDAC algorithm. More specifically, it is referred to by the following Articles in the Algorithm methodology:
   a) Article 7: Calculation of effective usage, anticipated usage and usage range, using the defined data sets and the scalability indicator for calculating the usage range;
   b) Article 8: Monitoring algorithm performance;
   c) Article 9: Scalability report;
   d) Article 11: Research and development activities;
   e) Article 12: Corrective measures; and
   f) Article 18: Impact assessment methodology for SDAC and IDA algorithms, for the assessment of requests for change.

2. The principles and processes described in this methodology shall be further developed and detailed within the algorithm monitoring procedures in the DA framework.

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

Article 2

Data sets for indicators

The indicators shall be calculated with a daily granularity over different temporal sets of delivery days. Specifically:

a) the recent historical set shall comprise the delivery days of the previous K (K<13) months, starting from the Kth month ('M') before the assessment (M-K) up to the previous month (M-1) and may exclude for practical reasons the days on which a daylight saving time change occurs and/or any days on which a partial/total decoupling occurs. The K value shall be defined in the operational procedures;
b) the rolling historical set shall comprise the previous year's delivery days, starting from the 13th month before the assessment (M-13) up to the previous month (M-1) and may exclude for practical reasons the days on which a Daylight Saving Time change occurs and/or any days on which a partial/total decoupling occurs;
c) the whole year historical set will comprise the previous full years' delivery days, counting only complete years, and may exclude for practical reasons the days on which a Daylight Saving Time change occurs and/or any day on which a partial/total decoupling occurs;
d) the near future set for the indicator calculation shall be defined by reference to the projected growth of the whole year historical set for the following year (Y+1) and taking into account all the forward-looking system information expected at the time of evaluation; and
e) the distant future set for the indicator calculation shall be defined by reference to the projected growth for of the whole year historical set for the following three years (Y+3) and taking into account all the forward-looking system information expected at the time of evaluation.

TITLE 2

Application of Indicators for the SDAC algorithm

Article 3

Monitoring of operations and reporting

1. For monitoring and reporting the evolution of the SDAC algorithm the performance indicators described under Title 3, 4 and 5 shall be used.
2. The usage indicators under Title 4 shall be monitored by comparing the effective usage of their functionality in the recent historical set pursuant to Article 2(a) for all days against the usage range of the same functionality, which was calculated pursuant to Article 5(3).
3. The economic surplus indicator pursuant to Article 7 and the repeatability indicator pursuant to Article 8 shall be monitored by assessing the values of the recent historical set pursuant to **Error! Reference source not found.**2(a) against the values of the rolling historical set pursuant to **Error! Reference source not found.**2(b).
4. For monitoring the scalability, the values of the recent historical set pursuant to Article 2(a) shall be assessed against the thresholds of the scalability indicator pursuant to Article 9(2).
5. For reporting purposes, the indicators referred to under Title 3, 4 and 5 shall use the rolling historical set pursuant to Article 2(b).
6. For reporting purposes an average of values may be applied.

Article 4

Request for Change impact assessment

1. The request for change impact assessment should assess the impact on scalability by a request for change.
2. The assessment of the scalability indicator shall be performed for:
   a) the historical scenario: using as inputs the actual usage of all the existing functionalities as recorded over the whole year historical set under Article 2(c) and the anticipated usage of the functionality under assessment calculated over the near future set under Article 2(d) and applying the relevant thresholds in accordance with Article 9(2);
   b) the near future scenario: using as inputs the anticipated usage of all the functionalities calculated on the near future set under Article 2(d) and using the relevant thresholds in accordance with Article 9(2).

Article 5

Scalability assessment

1. The scalability assessment should assess the impact of the long-term anticipated growth on the SDAC algorithm scalability, considering the expected increase of usage of functionalities.

2. The relevant thresholds pursuant to Article 9(2) shall be applied on the values resulting from simulation of the SDAC algorithm including the anticipated usage of all functionalities on:

   a) the near future set pursuant to Article 2(d) and
   b) the distant future set pursuant to Article 2(e).

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

Article 6

Research and Development assessment

1. The research and development assessment should ensure the capability of the SDAC algorithm to support in the medium and long term the anticipated market growth and the extension of requirements and shall use all performance indicators defined under TITLE 3.
2. The performance indicators shall be calculated with the usage range of all the functionalities when simulating the run of the SDAC algorithm on the distant future set pursuant to Article 2(e) and shall be assessed as follows:

   a) for the scalability indicator the relevant thresholds in accordance with Article 9(2) shall be used;
   b) for the economic surplus indicator pursuant to Article 7 and the repeatability indicator pursuant to Article 8 the obtained values shall be assessed against the rolling historical set pursuant to Article 2(b).

TITLE 3

Indicators on SDAC algorithm performance

Article 7

Indicators on algorithm's ability to maximize economic surplus

The indicators to monitor the ability of the SDAC algorithm to maximize the economic surplus are:

1. **Economic surplus gain with respect to the first solution** – This indicator is the difference between the economic surplus of the accepted solution and the economic surplus of the first solution found. This indicator is not valid for comparing two different versions of the SDAC algorithm. It should be used only as an indicative of the improvements of the solutions after first one is found.
2. **Economic surplus gain after increasing the calculation time by T minutes** – This indicator measures the gain in the economic surplus if the same delivery day is run again on a hardware with the same min requirements as the one used for delivering results, giving the SDAC algorithm T minutes more. This indicator needs to be calculated ex post SDAC algorithm calculation, in a different process.

Article 8

Indicators on SDAC algorithm repeatability

The indicators to monitor algorithm repeatability reflect the differences of clearing prices and accepted quantities for different orders over the relevant MTUs and bidding zones between two runs of the SDAC algorithm. Potential differences shall be calculated while using the same inputs, configuration of hardware and software and at the same number of iterations and comparing the last common solutions in both runs.

Article 9

Indicators on Algorithm scalability

1. The indicator to monitor the algorithm scalability is the **Time to first solution**. This indicator measures the time spent since the algorithm starts until the first solution is found. It considers the time required for reading input data from database, the creation of the model for the optimization problems and the resolution until the first solution has been found.
2. The scalability indicator pursuant to paragraph 1 shall be based on data sets in accordance with Article 2 and be assessed against the following thresholds (the 'x' and 'y' values shall be set in the algorithm monitoring procedure):
   a) in x% of the cases the indicator shall be lower than y minutes, and
   b) its average value shall be smaller than z minutes;

TITLE 4

Indicators on the SDAC algorithm usage

Article 10

Indicators to describe the usage of SDAC products

Indicators on the evolution of the number of submitted orders of each product type per bidding zone over time, and the corresponding total volume:

a) **Total number of steps at bidding zone level** – This indicator counts the total number of steps in the aggregated price-per-volume-curves for each bidding zone and MTU from all orders of all NEMO Trading Hubs. A step is a segment made of two consecutive curve points of the price-per-volume-curve with different quantities. One single value is provided per delivery day.
b) **Total number of block orders** – This indicator counts the total number of block orders per delivery day and bidding zone.
c) **Total number of block order exclusive groups** – This indicator counts the total number of exclusive groups existing for the block orders per delivery day.
d) **Total number of linked families** – This indicator counts the total number of families of linked block orders per delivery day.
e) **Total number of complex orders** – This indicator counts the total number of complex orders per delivery day and bidding zone.

f) **Total number of demand merit orders** – This indicator counts the total number of demand merit orders per delivery day and bidding zone. These merit orders are not the PUN orders.
g) **Total number of supply merit orders** – This indicator counts the total number of supply merit orders per delivery day and bidding zone.
h) **Total number of PUN orders** – This indicator counts the total number of PUN orders per delivery day and bidding zone. That means the number of unique PUN prices regarding the input data.

Article 11

Indicators to describe the geographical extension of the SDAC

Indicators on the evolution of the number of bidding zones:

a) **Number of bidding zones** – Total number of bidding zones. This indicator is obtained by counting all the bidding zones existing per delivery day.
b) **Total number of flow-based bidding zones** – This indicator counts the total number of bidding zones in which there is flow based topology. This indicator is calculated by counting the number of PTDF matrixes that exist per delivery day.
c) **Number of scheduling areas** – Total number of scheduling areas. This indicator is obtained by counting all the scheduling areas existing per delivery day.
d) **Number of NEMO Trading Hubs** – Total number of NEMO Trading Hubs per delivery day.
e) **Number of NEMOs** – Total number of different NEMOs in the delivery day. One NEMO may be operating several NEMO Trading Hubs, each one in a different bidding zone and scheduling area.

Article 12

Indicators to describe the network constraints

Indicators on the evolution of the use of network constraints are:

a) **Total number of bidding zone lines** – This indicator counts the total number of lines between bidding zones.
b) **Total number of flow-based PTDF constraints** – This indicator counts the total number of PTDF constraints existing for all the flow-based bidding zones per delivery day. It is the same as the number of rows in the PTDF matrixes.
c) **Total number of scheduling area lines** – This indicator counts the total number of lines between scheduling areas.
d) **Total number of NEMO Trading Hub lines** – This indicator counts the total number of lines between NEMO Trading Hubs.

TITLE 5

Indicators on the SDAC algorithm output

Article 13

Indicators to describe the output of maximization of economic surplus

Indicators on the maximization of economic surplus:

a) **Economic surplus of the first solution found -** is the market surplus, calculated Due to SDAC algorithm works floating-point format numbers, the precision of the calculations is limited. Quality of the solution is the quality in term of tolerances, using as value the worst level of tolerance achieved among all the checks applied to the constraints.
b) **Economic surplus of the final solution** - This indicator is obtained as provided by the SDAC algorithm, querying the utility of the solution that the SDAC algorithm classifies as the accepted solution per delivery day.

Article 14

Indicators to describe the status of orders

1. Indicators on the evolution of number of matched orders and paradoxically rejected orders of each product type over time, and the corresponding total volume;

a) **Total number of matched blocks** – This indicator counts the total number of matched blocks per delivery day and bidding zone.
b) **Total number of matched complex orders** – This indicator counts the total number of matched complex orders per delivery day and bidding zone.
c) **Total number of matched non-PUN merit orders** – This indicator counts the total number of matched merit orders (non-PUN merit orders) per delivery day and bidding zone. It will be calculated as the count of non-PUN merit orders whose matching quantity is greater than 0.
d) **Total number of matched PUN orders** – This indicator counts the total number of matched PUN orders per delivery day and bidding zone. That means the number of unique PUN prices regarding the input data. It will be calculated as the count of PUN orders whose matching quantity is greater than 0.
e) **Total matched volume from curves** – This indicator aggregates the total matched volume from supply and demand curves. It will be calculated as the sum of all “market time unit”-weighted unrounded volume matched at each relevant MTU and bidding zones for supply and demand curves.
f) **Total matched volume from blocks** – This indicator aggregates the total matched volume from blocks. It will be calculated as sum of all “market time unit”-weighted unrounded volume matched at each relevant MTU and bidding zones from blocks.
g) **Total matched volume from complex orders** – This indicator aggregated the total matched volume from complex orders. It will be calculated as sum of all unrounded volume matched at each relevant MTU and bidding zones from complex orders.
h) **Total matched volume from (non-PUN) merit orders** – This indicator aggregates the total matched volume from (non-PUN) merit orders. It will be calculated as sum of all unrounded volume matched at each relevant MTU and bidding zones from (non-PUN) merit orders.
i) **Total matched volume from PUN orders** – This indicator aggregated the total matched volume from PUN orders. It will be calculated as sum of all unrounded volume matched at each relevant MTU and bidding zones from PUN orders

2. Indicators on paradoxically rejected orders

   a) **Number of PRBs in the final solution** – This indicator counts the total number of Paradoxically Rejected Blocks (PRBs) in the accepted solution per delivery day and bidding zone.
   b) **Number of PRMICs in the final solution** – This indicator counts the total number of Paradoxically Rejected MICs (PRMICs) in the accepted solution per delivery day and bidding zone.
   c) **Maximum Delta P in the final solution** – This indicator reports the maximum delta P of the blocks for the accepted solution per delivery day.
   d) **Maximum Delta MIC in the final solution** – This indicator reports the maximum Delta MIC of the blocks for the accepted solution per delivery day.
   e) **PRB utility loss in the final solution** – This indicator reports the utility (economic surplus) loss due to paradoxically rejected blocks per delivery day.
   f) **PRMIC utility loss in the final solution** – This indicator reports the utility (economic surplus) loss due to paradoxically rejected MICs and MPCs per delivery day.
   g) **Volume of PRBs in the final solution** – This indicator sums the volume of all the Paradoxically Rejected Blocks (PRBs) in the accepted solution per delivery day and bidding zone.
   h) **Volume of PRMICs in the final solution** – This indicator sums the volume of all the Paradoxically Rejected MICs (PRMICs) in the accepted solution per delivery day and bidding zone.

3. Indicators on the evolution of the use of network constraints along the time;

   a) **Number of periods for ATC/DC lines with flows at full capacity** – Total number of periods for which ATC/DC lines are utilized at full capacity in one of their directions. We consider a line fully utilized when the energy flow is equal to capacity.

Article 15

Indicators to describe the IT calculation process

Indicators on the time spent in every phase of the algorithm calculation process are:

a) **Input data reading time** – This indicator measures the time the SDAC algorithm requires in order to read all the data needed for a delivery day from the SQL database. Different methods exist for the calculation of this indicator:
b) **Input data delivery day creation** – This indicator measures the amount of time the SDAC algorithm requires in order to create a delivery day from the data read from the database.
c) **Time to solve the root node for the master computer** – This indicator measures the amount of time to solve the root node for the master tree.
d) **Time to solve the root node for the job that found first solution** – This indicator measures the amount of time to solve the first node of the job that lead to the first OK solution found. This time will not include the time to read the input data and create the solver models. It will neither include the time spent in the master computers root node.
e) **Number of successive improvements of the solution in the given timeframe** – This indicator measures the number of OK solutions that improve a previously found solution during the optimization process limited by the amount of time available for running the SDAC algorithm.
f) **Total number of nodes in the master branch and bound tree** – This indicator measures the number of nodes processed in the master branch and bound tree.

Annex 4 to the Algorithm methodology:

Algorithm monitoring methodology for single intraday coupling

30 January 2020

Table of Contents

TITLE 1

General provisions

Article 1

General specifications

1. This Annex elaborates the principles for the required indicators monitoring the SIDC algorithm. More specifically, it is referred to by the following Articles in the Algorithm methodology:
   a) Article 7: Calculation of effective usage, anticipated usage and usage range, using the defined data sets and the scalability indicator for calculating the usage range;
   b) Article 8: Monitoring algorithm performance;
   c) Article 9: Scalability report;
   d) Article 11: Research and development activities;
   e) Article 12: Corrective measures; and
   f) Article 19: Impact assessment methodology for the continuous trading algorithm, for the assessment of requests for change.

2. The indicators monitoring the performance of the intraday auctions shall be those used in the DA timeframe, mutatis mutandis, in accordance with Annex 3 to the algorithm methodology. For the avoidance of doubt, the 'SDAC algorithm' shall be read as the 'IDA algorithm'.

3. The principles and processes described in this methodology shall be further developed and detailed within the algorithm monitoring procedures in the intraday continuous trading framework.

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

5. At the entry into force of this methodology all listed indicators shall be provided with the exemption of the following indicators which shall be available by the end of 2021:
   i. total number of daily submitted orders per product and per bidding zone in accordance with Article 8(1)(b);
   ii. total daily submitted order volume per bidding zone in accordance with Article 8(1)(c);
   iii. total number of trades per contracts in accordance with Article 11(1)(c); and
   iv. total number of trades per contract – hours to delivery in accordance with Article 11(1)(d);

Article 2

Data sets for indicators

The indicators shall be calculated on the basis of different temporal sets. Each data set comprises the data for either a single MTU's or a single day's run of the continuous market depending on the type of assessment. Specifically:

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

b) the rolling historical set shall comprise either a representative MTU of the previous year or of all days starting from the 13th month before the assessment (M-13) up to the previous month (M-1);
c) the near future set for the indicator calculation shall be defined starting from the projected growth of the rolling historical set for an MTU for the following year (Y+1) and considering all the forward-looking system information expected at the time of evaluation; and
d) the distant future set for the indicator calculation shall be defined starting from the projected growth for of the historical set for an MTU for the following three years (Y+3) and considering all the forward-looking system information expected at the time of evaluation.

TITLE 2

Application of Indicators for continuous trading matching algorithm

Article 3

Monitoring of operations and reporting

1. For monitoring and reporting the evolution the continuous trading matching algorithm the indicators described under Title 3, Title 4 and 5 shall be used.
2. The usage indicators under Title 4 shall be monitored by comparing the effective usage of their functionality in the recent historical set pursuant to Article 2(a) for all days against the usage range of the same functionality, which was calculated pursuant to Article 5(3).
3. For monitoring the scalability pursuant to Article 7 the recent historical set for a MTU pursuant to Article 2(a) shall be assess against the thresholds defined in the service agreement with the continuous trading matching algorithm service provider.
4. For reporting purposes, the indicators referred to under Title 3, 4 and 5 shall use the rolling historical set pursuant to Article 2(b).
5. For reporting purposes an average of values may be applied.

Article 4

Request for Change impact assessment

1. The request for change impact assessment should assess the impact on scalability by a request for change.
2. The scalability indicators pursuant to Article 7 shall be calculated simulating the run of the continuous trading matching algorithm over two different sets:
    a) The historical set: using as inputs
        i. the effective usage of all the existing functionalities observed over the rolling historical set for an MTU pursuant to Article 2(b) without the change; and
        ii. the effective usage of all the existing functionalities observed over the rolling historical set for an MTU pursuant to Article 2(b) with the change.
    b) The near future set: using as inputs

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

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

3. The request for change impact assessment shall use the thresholds defined in the service agreement with the continuous trading matching algorithm service provider and assess them against the scalability indicators pursuant to Article 7 applied on the near future set for an MTU under Article 2(c).

Article 5

Scalability assessment

1. The scalability assessment should assess the impact of the long-term anticipated growth on the SIDC algorithm scalability, considering the expected increase of usage of functionalities.
2. The assessment shall apply the thresholds defined in the service agreement with the continuous trading matching algorithm service provider on values resulting from simulation of the SIDC algorithm including the anticipated usage of all functionalities on:

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

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

Article 6

Research and Development assessment

1. The research and development assessment should ensure the capability of the SIDC algorithm to support in the medium and long term the anticipated market growth and the extension of requirements and shall use all scalability indicators pursuant to Article 7.
2. The scalability indicators shall be calculated with the usage range of all the functionalities when simulating the run of the continuous SIDC algorithm on the distant future set for an MTU pursuant to Article 2(d). At least X% of the resulting values shall be within the thresholds defined in the service agreement with the continuous trading matching algorithm service provider.

TITLE 3

Indicators on the continuous trading matching algorithm performance

Article 7

Indicators on the algorithm scalability

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

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

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

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

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

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

TITLE 4

Indicators on the continuous trading matching algorithm usage

Article 8

Indicators to describe the usage of continuous SIDC products

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

c) **Total daily submitted order volume per bidding zone** – This indicator measures total submitted order volume per bidding zone

2. Indicator to describe the usage of explicit capacity allocation

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

Article 9

Indicators to describe the geographical extension of continuous SIDC

1. Indicators to describe the geographical extension of continuous SIDC

a) **Total number of NEMOs –** This indicator counts the number of member entities as defined in shared order book
b) **Total number of delivery areas** – This indicator counts the number of delivery areas as defined in capacity management module
c) **Total number of market areas –** This indicator counts the number of market areas as defined in capacity management module
d) **Total number of interconnectors** – This indicator counts the number of interconnectors as defined in capacity management module
e) **Total number of borders** – This indicator counts the number of borders as defined in capacity management module

Article 10

Indicators to describe the network constraints

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

TITLE 5

Monitoring of the continuous trading matching algorithm output

Article 11

Indicators to describe the output of the continuous trading algorithm

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

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

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

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

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