All TSOs' proposal for a Methodology for Calculating Scheduled Exchanges resulting from single day-ahead coupling in accordance with Article 43 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

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All Transmission System Operators taking into account the following:

Whereas

1. This document is a common proposal developed by all Transmission System Operators (hereafter referred to as "**TSOs**"), which intend to calculate Scheduled Exchanges resulting from single day-ahead coupling (hereafter referred to as "**SDAC**") or which will use directly the result from SDAC. The document provides a methodology for calculating Scheduled Exchanges resulting from the SDAC ("hereafter referred to as "**DA SEC Methodology**") in accordance with Article 43 of Commission Regulation (EU) 2015/1222 establishing a guideline on Capacity Allocation and Congestion Management (hereafter referred to as "**CACM Regulation**"). This proposal is hereafter referred to as "**DA SEC Proposal**".

2. The DA SEC Proposal takes into account the general principles, goals and other methodologies reflected in CACM Regulation. The goal of CACM Regulation is the coordination and harmonisation of capacity calculation and allocation in the day-ahead and intraday cross-border markets.

3. The DA SEC Proposal, in line with Article 45 of CACM Regulation, accommodates situations where there are more than one Nominated Electricity Market Operator (hereafter referred to as "**NEMO**") designated and/or offering day-ahead trading services in a particular geographic area. In addition, according to Article 4(1) of CACM Regulation, multiple NEMOs can be designated to perform SDAC in a Member State. For each NEMO, a NEMO Trading Hub shall be assigned. Where multiple NEMOs operate within a geographic area, some multi-NEMO arrangements require multiple NEMO Trading Hubs within that geographic area.

4. The DA SEC Proposal shall consider situations where the bidding zone is equal to the scheduling area, as well as where there are multiple scheduling areas within a bidding zone.

5. The DA SEC Proposal does not provide for the calculation of exchanges per NEMO Trading Hub. It is acknowledged that the NEMO Trading Hub is not equal to a geographic area, therefore, Scheduled Exchange do not concern NEMO Trading Hub.

6. The exchanges between NEMO Trading Hubs shall be compliant to the Scheduled Exchanges calculated by the Scheduled Exchange Calculator. Furthermore, the calculation of exchanges between Nemo Trading Hubs shall be compliant with the local Multi Nemo Arrangements in accordance with Article 45 of CACM Regulation.

7. The DA SEC Methodology shall be applied by the Scheduled Exchange Calculator who is responsible for the calculation of Scheduled Exchanges resulting from SDAC as per Article 49 of CACM Regulation. By All TSOs' decision, this role can be delegated to a service provider.

8. Net positions and prices are fixed by the results from the SDAC. Furthermore, cross zonal capacities and allocation constraints have already been taken into account by the market coupling algorithm. Cross zonal capacities and allocation constraints shall therefore not be impacted by the calculated Scheduled Exchanges.

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9. According to Article 9(9) of CACM Regulation, the proposed timescale for the implementation of the proposed DA SEC Methodology shall be included DA SEC Proposal.

10. The implementation of DA SEC Methodology could use the solutions developed for algorithm proposal in accordance with Article 37 of CACM Regulation, arrangements developed in accordance with Article 45 of CACM Regulation for more than one NEMO within a bidding zone and arrangements developed for clearing and settlement between central counter parties and shipping agents in accordance with Article 77 of CACM Regulation. Thus the implementation should happen in co-operation with NEMOs applying common solutions to ensure consistency and alignment in flow calculations.

11. According to Article 9(9) of CACM Regulation, the expected impact of the proposed DA SEC Methodology, on the objectives of CACM Regulation, shall be described.

- Article 3(a) of CACM Regulation aims at promoting effective competition in the generation, trading and supply of electricity.
    o The DA SEC Methodology, as it is derived from the results of SDAC, does not impact competition in generation, trading and supply of electricity.

- Article 3(b) of CACM Regulation aims at ensuring optimal use of the transmission infrastructure.
    o The Scheduled Exchanges resulting from the DA SEC Methodology are derived from the results of the single day-ahead market coupling i.e. they are based upon:
        ▪ Net positions of bidding zones and scheduling areas;
        ▪ Allocated capacities in the form of Scheduled Flows between bidding zone borders

- Article 3(c) of CACM Regulation aims at ensuring operational security.
    o The DA SEC Methodology is carried out by the Scheduled Exchange Calculator or application directly the result from SDAC, following receipt of the outputs itemised within the list of information required from all NEMOs as outlined in Article 3 of this DA SEC Methodology and allocated capacities in form of Scheduled Flows. This list of information provided by all NEMOs to the Scheduled Exchange Calculator and all TSOs shall result from completion of the single day-ahead market coupling session where all constraints defined by TSOs in order to maintain operational security shall be duly respected. The DA SEC Methodology shall be initiated post SDAC and shall have no influence on operational security under CACM Regulation.

- Article 3(d) of CACM Regulation aims at optimising the calculation and allocation of cross zonal capacity.
    o Scheduled Exchanges resulting from SDAC shall not modify, but only duly reflect the results of the single day-ahead market coupling session.

- Article 3(e) of CACM Regulation aims at ensuring fair and non-discriminatory treatment of TSOs, NEMOs, the Agency, regulatory authorities and market participants.
    o The DA SEC Methodology shall be fair, transparent and based on the results of SDAC.

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- Article 3(f) of CACM Regulation aims at ensuring and enhancing the transparency and reliability of information.
  - The DA SEC Methodology comprises a step-wise, top-down approach (from bidding zone, to scheduling area) for the calculation of Scheduled Exchanges which ensures and enhances the transparency and reliability of the DA SEC Methodology.

- Article 3(g) of CACM Regulation aims at contributing to the efficient long-term operation and development of the electricity transmission system and electricity sector in the Union.
  - The DA SEC Methodology shows clear cross-Network Code thinking in order to contribute to the efficient development of a single day-ahead electricity market in Europe. The DA SEC Methodology, through its construction facilitates the efficient long-term operation and development of the European transmission system.

- Article 3(h) of CACM Regulation aims at respecting the need for a fair and orderly market and fair and orderly price formation.
  - The DA SEC Methodology does not interfere with or compromise the anonymity of the market participants as it has no influence on the results of SDAC.

- Article 3(i) of CACM Regulation aims at creating a level playing field for NEMOs.
  - The DA SEC Methodology creates a level playing field for NEMOs as it has no influence on the results of SDAC. Additionally, the DA SEC Methodology supports scenarios where there are multiple NEMOs within a bidding zone or scheduling area.

- Article 3(j) of CACM Regulation aims at providing non-discriminatory access to cross-zonal capacity.
  - The DA SEC Methodology does not interfere with the provision nor allocation of cross-zonal capacity.

SUBMIT THE FOLLOWING DA SEC METHODOLOGY TO ALL REGULATORY AUTHORITIES:

Article 1 - Subject matter and scope

1. All TSOs lay down in this DA SEC Proposal the requirements to calculate Scheduled Exchanges resulting from SDAC, the information required from all NEMOs for the calculation, the setup of the Scheduled Exchange Calculator, the calculation process, methodology and description of the required equations.

2. The outputs of the applied DA SEC Methodology shall be:
   a) Scheduled Exchanges between bidding zones
   b) Scheduled Exchanges between scheduling areas

3. The scope of the DA SEC Methodology does not extend to the assignment of roles and responsibilities of the specific parties. Also the governance framework for specific roles or responsibilities is out of

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scope of the DA SEC Proposal. These aspects shall be defined by the TSOs, where required in accordance with Article 8(2g) of CACM Regulation.

4. This DA SEC Methodology shall apply to TSOs which intend to calculate Scheduled Exchanges resulting from SDAC using the Scheduled Exchanges Calculator to calculate Scheduled Exchanges, or using the Scheduled Flows calculated by the day-ahead coupling algorithm as Scheduled Exchanges.

Article 2 - Definitions and interpretation

1. For the purposes of this DA SEC Proposal, terms used shall have the meaning of the definitions included in Article 2 of CACM Regulation, Commission Regulations (EU) 543/2013 and (EU) 1227/2011 as well as Article 3 of Commission Regulation (EU) 2017/1485. In addition, the following definitions shall apply:

   a) 'NEMO Trading Hub' shall have the meaning as defined in the terms and conditions or methodologies pursuant to Article 37 and Article 45 of CACM Regulation; and
   b) 'Scheduled Flow' shall have the meaning as defined in the terms and conditions or methodologies pursuant to Article 37 of CACM Regulation developed by all NEMOs.

2. The term 'Scheduled Exchange' is defined within Article 2 of CACM Regulation. For the purposes of the DA SEC Proposal, the term 'geographic area' means both scheduling area and bidding zone. The notion of 'NEMO Trading Hub' is required in order to ensure proper functioning of post market coupling processes under market settlement regimes where multiple NEMOs are active in a bidding zone or scheduling area in accordance with the requirements contained within Article 45 of CACM Regulation.

3. In this DA SEC Proposal, unless the context requires otherwise:

   a) the terms used apply in the context of the SDAC
   b) the table of contents and headings are inserted for convenience only and do not affect the interpretation of this methodology; and
   c) any reference to legislation, regulations, directive, order, instrument, code or any other enactment shall include any modification, extension or re-enactment of it then in force.

Article 3 - List of Information Required from all NEMOs

1. All NEMOs shall provide the following information, resulting from the single day-ahead market coupling algorithm to the Scheduled Exchange Calculator and all TSOs, for each market time unit, in order to perform the DA Scheduled Exchanges Calculation:
   a) Unrounded net position per bidding zone;
   b) Unrounded net position per scheduling area;
   c) A single clearing price for each bidding zone in EUR/MWh; and
   d) Allocated capacities in form of Scheduled Flows for each bidding zone border

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Article 4 - Scheduled Exchange Calculator

1. The Scheduled Exchange Calculator shall calculate Scheduled exchanges as defined in this methodology.

2. The TSOs shall develop governance functionalities for the Scheduled Exchange Calculator in coordination with all NEMOs that are in line with the SDAC.

3. The results of the Scheduled Exchange Calculation shall be (for each market time unit):
   a) Scheduled Exchanges between bidding zones, and
   b) Scheduled Exchanges between scheduling areas.

4. All NEMOs, as an output of the market coupling algorithm, shall provide the information listed in Article 3 of this DA SEC Methodology to the Scheduled Exchange Calculator and all TSOs not later than 15.30 market time day-ahead.

5. All NEMOs shall ensure consistency of the exchanges between NEMO Trading Hubs and the exchanges calculated by the Scheduled Exchange Calculation. Furthermore, All NEMOs shall ensure compability with all local MNA proposals.

6. All TSOs, through the Scheduled Exchange Calculator, shall initiate the DA Scheduled Exchanges Calculation upon receipt of the items included within the list of requirements from all NEMOs, pursuant to Article 3 of this DA SEC Proposal.

7. The Scheduled Exchange Calculator shall notify the results of the DA Scheduled Exchanges Calculation to all NEMOs, central counter parties, shipping agents and TSOs so that the day-ahead post-coupling processes can be completed in a timely manner.

Article 5 - General Principles for Calculation of Scheduled Exchanges

1. The Scheduled Exchange Calculator shall calculate the Scheduled Exchanges between bidding zones and scheduling areas according to the following principles:

   i. Only the Scheduled Exchange Calculator shall calculate the Scheduled Exchanges.

   ii. The calculation of Scheduled Exchanges shall be carried out by the Scheduled Exchange Calculator in such a way that the constraints described in Article 6 of this DA SEC Proposal are respected.

   iii. The DA Scheduled Exchanges Calculation as described in Articles 6, 7 and 8 of this DA SEC Proposal shall respect the net position of the scheduling area and bidding zone and allocated capacities, in the form of Scheduled Flows resulting from the SDAC.

   iv. For cross border DC interconnectors within an area applying flow based and where the impact of an exchange over the DC Interconnector is considered during flow based allocation, the Scheduled Exchanges over the respective bidding zone border may differ from the Scheduled Flow over the interconnector to ensure optimal solution in accordance with this DA SEC Proposal. This allows, if configured as such, a calculation based only on net positions of the

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scheduling area and bidding zone, a set of constraints and allocated capacities in the form of Scheduled Flows on relevant bidding zone borders (as for other AC interconnectors).

    v.   Scheduled Exchanges between bidding zones, where one bidding zone has multiple scheduling areas, shall be consistent i.e. the Scheduled Exchanges shall be calculated by the Scheduled Exchange Calculator and the sum of the Scheduled Exchanges on the scheduling area borders corresponding to this bidding zone border shall equal the Scheduled Exchange on this bidding zone border.

2. The allocated capacities in the form of Scheduled Flows between bidding zone borders shall be calculated as an output of the day-ahead coupling algorithm:

    i.   TSOs not using the Scheduled Exchanges Calculator to calculate Scheduled Exchanges shall use the allocated capacities in the form of Scheduled Flows received from the NEMOs as stipulated under Article 3 of this DA SEC Methodology and calculated in accordance with Article 37 of CACM Regulation

    ii.   These flows are validated by TSOs not using the Scheduled Exchanges Calculator to calculate Scheduled Exchanges and used as the scheduled exchanges resulting from the SDAC for that market time unit.

Article 6 - Methodology for calculating Scheduled Exchanges between scheduling areas and bidding zones resulting from SDAC using the Scheduled Exchange Calculator

1. The DA SEC Methodology shall be based on a step-wise DA Scheduled Exchanges Calculation. The Scheduled Exchange Calculator shall respect the principles defined in Article 5 of this DA SEC Proposal.

2. The calculation shall be performed per market time unit:

    i.   The Scheduled Exchange Calculator shall calculate respective Scheduled Exchanges stepwise for the two different levels (bidding zones, scheduling areas) from the available input as defined by Article 3 of this DA SEC Proposal;

    ii.   Each subsequent step shall take as a constraint the output from the previous step;

    iii.   The calculation of Scheduled Exchanges between bidding zones shall follow the principles described in Article 7 of this DA SEC Proposal;

    iv.   The calculation of the Scheduled Exchanges between scheduling areas shall follow the principles described in Article 8 of this DA SEC Proposal; and

    v.   Scheduled Exchanges shall always be calculated for a specific direction i.e. scheduled exchange from / to.

Article 7 - Calculation of Scheduled Exchanges between bidding zones

1. The Scheduled Exchange Calculator shall calculate the Scheduled Exchanges between the bidding zones based on bidding zone net positions provided by all NEMOs according to Article 3 of this DA SEC Proposal.

2. When considering the Coordinated Net Transmission Capacity (hereafter referred to as "**CNTC**") Approach, where a price difference exists between two bidding zones either the available capacity has been fully used or another allocation constraint (e.g. ramping constraint) was active. Hence, if there is a price difference between two bidding zones, within a CCR applying CNTC, the Scheduled Exchange shall be equal to the Scheduled Flows on respective bidding zone border.

3. When the allocation of cross border capacities is based on bidding zone net positions (e.g. flow based allocation), or in case of indeterminacies[1], several routes could be possible. The optimisation of the Scheduled Exchanges shall therefore aim to minimise the Scheduled Exchanges between the involved bidding zones taking into account the principles in Article 5.1 of this DA SEC Proposal. For this minimisation, the Scheduled Exchanges between involved bidding zones shall be used as a set of variables to minimise the target function following:

$$\min \left(\sum lc_{i,h}\varphi_{i,h} + \sum qc_{i,h}\varphi_{i,h}^2 \right)$$

With:
- $lc_{i,h}$ = linear cost coefficient associated to interconnector i for market time unit h
- $qc_{i,h}$ = quadratic cost coefficient associated to interconnector i for market time unit h
- $\varphi_{i,h}$ = flow on interconnector i for market time unit h
- i = interconnector representing a given bidding zone border

4. The costs coefficients (both linear and quadratic) associated to each bidding zone border are provided as an input by TSOs. The cost coefficients are fixed for a given market topology (set of bidding zone borders) and do not change per market time unit. The cost coefficients are determined in such a way that following objectives are met:

   i. Uniqueness by introducing a quadratic cost coefficient

   ii. Shortest path rule to avoid loops and to ensure a minimization of transits between regions by setting of the linear cost coefficient

   iii. Priorisation rule to prioritise the use of certain interconnectors to ensure the minimisation of Scheduled Exchanges between the involved bidding zones

5. The cost coefficients are determined in such a way that the general behaviour of the optimisation is balanced and respect the objectives. Hence, the ratio between the different cost coefficients on each bidding zone border is more important than the exact value of the cost coefficient.

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[1] In case there is no congestion between two or more bidding zones applying a CNTC approach (i.e. no allocation constraint was active and the bidding zone prices are equal), then multiple routes are available.

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6. Furthermore, where relevant, it needs to be ensured that Scheduled Exchanges are defined from low price to high price areas. Therefore, an intuitiveness scheduling restriction between bidding zones is applied. The intuitiveness scheduling restriction between bidding zone A and bidding zone B is described as follows:

$$(Price_{BZ\ B} - Price_{BZ\ A}) * Scheduled\ Exchanges_{A \to B} \geq 0$$

7. The calculated Scheduled Exchanges between bidding zones shall be consistent with the bidding zone Net Positions provided by NEMOs according to Article 3 of this DA SEC Proposal.

Article 8 - Calculation of Scheduled Exchanges between scheduling areas

1. After the calculation of the Scheduled Exchanges between bidding zones, the Scheduled Exchange Calculator can calculate the Scheduled Exchanges between scheduling areas, where appropriate. In case scheduling areas are equal to bidding zones, Scheduled Exchanges between two bidding zones are equal to the Scheduled Exchanges between two scheduling areas.

2. If there is more than one scheduling area within a bidding zone then:
   a) The Scheduled Exchange Calculator shall calculate the Scheduled Exchanges between the scheduling areas using the scheduling area Net Positions provided according to Article 3 of this DA SEC Proposal.
   b) For the calculation of Scheduled Exchanges between scheduling areas the same optimisation approach shall be applied as for the Scheduled Exchanges between bidding zones following:

$$\min \sum_{(sa_1,sa_2) \in TOP_{SA}} \left(c_{sa_1,sa_2} \cdot flow_{sa_1,sa_2} + q_{sa_1,sa_2} \cdot \left(flow_{sa_1,sa_2} \right)^2 \right)$$

   Where

   $flow_{sa1,sa2}$ is the Scheduled Exchange between scheduling areas sa1 and sa2,

   $c_{sa1,sa2}$ is the linear cost coefficient between scheduling areas sa1 and sa2,

   $q_{sa1,sa2}$ is the quadratic cost coefficient between scheduling areas sa1 and sa2,

   c) If there are multiple scheduling areas on one (or both) side(s) of the bidding zone border, then the Scheduled Exchanges between the scheduling areas, over the bidding zone border, shall be attributed to each scheduling area border proportionally to the installed thermal capacity of the interconnections, following:

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$$flow_{sa_1,sa_2} = \frac{TC_{sa1,sa2}}{\sum_{\substack{(i,j)\in \\ TOP_{SA}|i.z=z_1 \& j.z=z_2}} TC_{sa_1,sa_2}} \cdot \overline{flow}_{z1,z2}$$

Where

$TC_{sa1,sa2}$ is the thermal capacity installed on the border between sa1 and sa2,

$\overline{flow}_{z1,z2}$ is the Scheduled Exchange between bidding zones z1 and z2,

d) The calculated Scheduled Exchanges between scheduling areas shall be consistent with the scheduling area net positions provided by NEMOs according to Article 3 of this DA SEC Proposal:

$$NP_{sa} = \sum_{(sa_1,sa_2)\in TOP_{SA}|sa_1=sa} \left(flow_{sa_1,sa_2} \right) - \sum_{(sa_1,sa_2)\in TOP_{SA}|sa_s=sa} \left(flow_{sa_1,sa_2} \right)$$

Where:

$\overline{NP}_{sa}$ is the net position of scheduling area sa

Article 9 - Implementation of the DA SEC Methodology

1. The TSOs shall implement the DA SEC Proposal when the day-ahead market coupling operator function developed in accordance with Article 7(3) of CACM Regulation, the Price Coupling Algorithm in accordance with Article 37 (5) of CACM Regulation and, where relevant, arrangements concerning more than one NEMO in accordance with Article 45 of CACM Regulation are implemented on each bidding zone and its borders.

Article 10 - Language

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