

**ACER Decision on the Methodology for Calculating Scheduled Exchanges
resulting from single day-ahead coupling: Annex Ia**

**ACER's preliminary position on the TSOs' proposal
for amendment to:**

**Methodology for Calculating Scheduled
Exchanges resulting from single day-
ahead coupling**

**in accordance with Article 43 of Commission Regulation (EU)
2015/1222 of 24 July 2015 establishing a guideline on capacity
allocation and congestion management**

30XX May 2023

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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”). The document provides thea methodology for calculating Scheduled Exchanges resulting from the single day ahead coupling (hereafter referred to as “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 methodology~~ is hereafter referred to as “DA SEC Proposal Methodology”. The document is based on all Transmission System Operators (hereafter referred to as “TSOs”) proposal of 20 December 2022, as amended and approved by ACER.
2. The DA SEC Proposal Methodology takes into account the objectives and general principles set out in the CACM Regulation, and is consistent with, goals and other methodologies ~~reflected in~~ based on the CACM Regulation. The goal of the 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 Methodology, 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 the SDAC in a Member State. For each NEMO, a NEMO trading hub ~~shall be~~ is 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 Methodology shall considers 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 Methodology provides for the calculation of Scheduled Exchanges between bidding zones, scheduling areas and NEMO trading hubs.
- ~~6. 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.~~
6. The DA Scheduled Exchanges calculation is integrated in the SDAC calculation in accordance with the methodology for the price coupling algorithm and the continuous trading matching algorithm in accordance with Article 37(5) of the CACM Regulation (hereafter referred to as “algorithm methodology”), and consequently performed by the Market Coupling Operator function (hereafter referred to as “MCO function”). NEMOs are responsible for operating the MCO function, and therefore acts as the entities with the task of calculating Scheduled Exchanges (the Scheduled Exchange Calculator). The DA SEC Methodology provides the necessary framework for the Scheduled Exchanges

Calculator to calculate the Scheduled Exchanges resulting from SDAC pursuant to Article 49 of CACM Regulation.

7. The requirements on information exchange between the NEMOs, TSOs and the Scheduled Exchange Calculator stem from the algorithm methodology.

~~7.8.~~ Net positions and clearing prices are fixed by the results from the SDAC. Furthermore, cross-zonal capacities and allocation constraints have already been taken into account by the price coupling algorithm. Cross-zonal capacities and allocation constraints ~~shall~~are therefore not ~~be~~ impacted by the calculated Scheduled Exchanges.

~~8.9.~~ In line with ~~According to~~ Article 9(9) of CACM Regulation, the DA SEC Methodology includes the proposed a timescale for the implementation of the the proposed DA SEC Methodology, ~~shall be included in the DA SEC Proposal.~~

~~9.~~ The implementation of the DA SEC Methodology is aligned with the price coupling algorithm proposal in accordance with Article 37 of CACM Regulation (here after referred to as 'algorithm methodology'), 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 of exchange calculations.

~~10.~~ The Scheduled Exchanges calculation will form an integral part of the price coupling algorithm pursuant to the ACER Decision No 08/2018 on the all NEMOs' proposal for the price coupling algorithm and the continuous trading matching algorithm.

~~11.10.~~ This According to Article 9(9) of CACM Regulation, the expected impact of the proposed DA SEC Methodology fulfils the objectives stated in Article 3, on the objectives of the CACM Regulation as follows; ~~shall be described.~~

- Article 3(a) of CACM Regulation aims at promoting effective competition in the generation, trading and supply of electricity.
 - 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.
 - The Scheduled Exchanges resulting from the DA SEC Methodology are derived from the results of SDAC i.e. they are based upon:
 - Net positions of bidding zones, scheduling areas and NEMO trading hubs;
 - Scheduled Exchanges into and out of individual HVDC interconnectors (difference in Scheduled Exchanges in/out reflecting losses where applicable).
- Article 3(c) of CACM Regulation aims at ensuring operational security.

- The information provided by ~~all NEMOs~~ [the Scheduled Exchange Calculator](#) to all TSOs resulting from the SDAC will duly respect all constraints defined by TSOs in order to maintain operational security. Cross-zonal capacities and allocation constraints ~~shall are~~ not ~~be~~ impacted by the calculation of Scheduled Exchanges and ~~shall~~ have no influence on operational security.
- Article 3(d) of CACM Regulation aims at optimising the calculation and allocation of cross-zonal capacity.
 - Scheduled Exchanges resulting from SDAC ~~shall does~~ not modify, but only duly reflect the results of the SDAC 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.
 - The DA SEC Methodology ~~shall be is~~ fair, transparent and based on the results of SDAC.
- 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 and to NEMO trading hub) 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 the common European day-ahead market. 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 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.

~~12. The requirements on information exchange between the NEMOs, TSOs and the SEC stem from the algorithm methodology.~~

~~SUBMIT THE FOLLOWING DA SEC METHODOLOGY TO ALL REGULATORY AUTHORITIES:~~

Article 1 – Subject matter and scope

- ~~1. All TSOs lay down in this~~The DA SEC ~~Proposal Methodology lays down~~ the requirements to calculate Scheduled Exchanges resulting from SDAC, the input information required from all NEMOs for the calculation, the calculation process, ~~the methodology and~~ description of the required equations and the information that shall be notified to relevant NEMOs, central counter parties, shipping agents and TSOs.
- ~~2. This DA SEC Methodology shall apply to the TSOs listed in Annex 1.~~
- ~~2. The outputs of the applied DA SEC Methodology shall be, for each market time unit:~~
 - ~~a) Scheduled Exchanges between bidding zones~~
 - ~~b) Scheduled Exchanges between scheduling areas~~
 - ~~e) Scheduled Exchanges between NEMO trading hubs~~
- ~~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 scope of the DA SEC Proposal Methodology. These aspects shall be defined by the TSOs, where required, in accordance with Article 8(2)(g) of CACM Regulation.~~
- 3.

Article 2 – Definitions and interpretation

1. For the purposes of this DA SEC ~~Proposal Methodology~~, terms used shall have the meaning of the definitions included in Article 2 of CACM Regulation, Article 2 of Regulation (EU) 2019/943, Commission Regulations (EU) 543/2013 and (EU) 1227/2011 as well as Article 3 of Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as “SO Regulation”), with the exception of the definition of ‘scheduling area’.
- ~~1.2.~~ In addition, in the DA SEC Methodology, the following definitions shall apply:
 - a) ‘NEMO trading hub’ means ‘a virtual trading point collecting all orders received by a NEMO with delivery in a specific scheduling area’, as defined in the algorithm methodology; shall have the meaning as defined in the terms and conditions or methodologies pursuant to Article 37 and Article 45 of CACM Regulation;
 - b) ‘Net position per scheduling area’ means ‘netted sum of the external commercial trade scheduled per scheduling area for all NEMO trading hubs’;
 - a)c) ‘Net position per NEMO trading hub’ means ‘netted sum of internal and external commercial trade schedules for each market time unit for a single NEMO trading hub’;
 - b)d) ‘Scheduling area’ means a scheduling area according to Article 3(2)(91) of the SO Regulation (EU) 2017/1485 with at least one NEMO trading hub¹;

¹ ~~For the requirements set forth in the methodology for the price coupling algorithm and for the continuous trading matching algorithm in accordance with Article 37(5) of Commission Regulation (EU) 2015/1222 the creation of virtual bidding zones may be needed (cfr. Requirement 2.1.k of Annex 1). It may be that these virtual bidding zones~~

e) 'Scheduled Exchanges between NEMO trading hubs' means 'electricity transfer scheduled between NEMO trading hubs operating within or between scheduling areas or bidding zones', as defined in the [algorithm methodology; ACER Decision No 08/2018 on the all NEMOs' proposal for the price coupling algorithm and the continuous trading matching algorithm;](#)

f) 'Net Financial Exposure' shall have the meaning set forth in Article 68(2) of this DA SEC [Proposal Methodology](#).

3. The term 'Scheduled Exchange' is defined ~~within~~ Article 2(32) of CACM Regulation. For the purposes of the DA SEC [Proposal Methodology](#), 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.

~~2.4. The virtual bidding zones that may be needed, set forth in Requirement 2.1.k of Annex I to the algorithm methodology, shall fall under this methodology. These virtual bidding zones may be accompanied by virtual scheduling areas and virtual NEMO trading hubs to ensure proper modelling of the functionality.~~

~~3.~~ In this DA SEC [Proposal Methodology](#), unless the context requires otherwise:

~~5.~~

- 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 – [General principles for the Scheduled Exchanges Calculation](#)

1. [The Scheduled Exchange Calculator shall calculate Scheduled Exchanges between bidding zones, scheduling areas and NEMO trading hubs as defined in this methodology.](#)

~~1.2. The DA Scheduled Exchanges calculation will form an integral part of the price coupling algorithm is integrated in the SDAC in accordance with the algorithm methodology, and consequently performed by the MCO function, pursuant to the ACER Decision No 08/2018 on the all NEMOs' proposal for the price coupling algorithm and the continuous trading matching algorithm. NEMOs are responsible for operating the MCO function, and will therefore perform the task of calculating Scheduled Exchanges as the Scheduled Exchange Calculator in accordance with the algorithm methodology. shall therefore apply the requirements set forth in the methodology for the price coupling algorithm pursuant to Article 37(5) of the CACM Regulation.~~

~~are accompanied by virtual scheduling areas and virtual NEMO trading hubs to ensure proper modelisation of the functionality. These virtual bidding zones fall under this proposal.~~

~~2.3. The Scheduled Exchange Calculator All NEMOs shall use provide the following input information for the Scheduled Exchanges calculation, as described in Articles 4, 5 and 6 of this DA SEC Methodology, pursuant to the algorithm methodology and Article 43(2) of CACM Regulation, resulting from the SDAC, to all TSOs, for each market time unit:~~

- ~~a) net position per bidding zone;~~
- ~~b) net position per scheduling area;~~
- ~~c) net position per NEMO trading hub; and~~
- ~~d) a single clearing price for each bidding zone in EUR/MWh;~~
- ~~e) Scheduled Exchanges for each bidding zone border, between scheduling areas and between NEMO trading hubs; and~~
- ~~f) where relevant, Scheduled Exchanges into and out of individual relevant HVDC interconnectors (difference in Scheduled Exchanges in/out reflecting losses where applicable).~~

~~3. The information listed in Article 3(2)(e) and 3(2)(f) is required to ensure a coherent calculation of Scheduled Exchanges between different capacity calculation regions (hereafter referred to as “CCR”) and to ensure the implementation of arrangements pursuant Article 45 of CACM Regulation.~~

~~4. The TSOs shall develop governance functionalities, which are in line with the SDAC, for the Scheduled Exchange Calculator in coordination with all NEMOs.~~

~~5. The Scheduled Exchange Calculator shall notify the results of the DA Scheduled Exchanges Calculation by 13:00 under normal operation, and will endeavour to deliver these ahead of the intraday gate opening time so that the day ahead post coupling processes can be completed. If there are issues ascertaining the market coupling results, the Schedule Exchange Calculator shall notify the results no later than 15.30 market time day ahead as per CACM Regulation Article 43(2).~~

~~The DA SEC Methodology shall be based on a step wise calculation of DA Scheduled Exchanges. The Scheduled Exchange Calculator shall respect the principles defined in Article 4 of this DA SEC Proposal.~~

~~The DA SEC Methodology shall be based on a step-wise calculation of DA Scheduled Exchanges: The calculation shall be performed per market time unit:~~

~~4.~~

~~i. The Scheduled Exchange calculation shall be performed per market time unit;~~

~~The Scheduled Exchange Calculator shall calculate respective Scheduled Exchanges stepwise for the three different levels (bidding zones, scheduling areas and NEMO trading hubs); The Scheduled Exchange Calculator shall calculate respective Scheduled Exchanges stepwise for the three different levels (bidding zones, scheduling areas and NEMO trading hubs);~~

~~ii.~~

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

~~iv. The calculation of the DA Scheduled Exchanges between bidding zones shall follow the principles described in Article 46 of this DA SEC Proposal Methodology;~~

~~v. The calculation of the Scheduled Exchanges between scheduling areas shall follow the principles described in Article 57 of this DA SEC Proposal Methodology;~~

- vi. The calculation of Scheduled Exchanges between NEMO trading hubs shall follow the principles described in Article 68 of this DA SEC Proposal Methodology; and
- vii. Scheduled Exchanges shall always be calculated for a specific direction i.e. Scheduled Exchange from/to.

5. For cross border HVDC interconnectors within a capacity calculation region (hereafter referred to as "CCR") applying the flow-based approach and where the impact of an exchange over the HVDC interconnector is considered during flow-based capacity allocation, the Scheduled Exchanges over the respective bidding zone border may differ from the Flow Based net positions of the virtual hub used to model the HVDC interconnector to ensure optimal solution in accordance with this DA SEC Proposal Methodology. This allows, if configured as such, a calculation based only on net positions of the scheduling area and bidding zone, a set of constraints and Scheduled Exchanges on relevant bidding zone borders, (as for other AC interconnectors).

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

Article 4 – General Principles for Calculation of Scheduled Exchanges

~~1. The Scheduled Exchange Calculator shall calculate Scheduled Exchanges between bidding zones, scheduling areas and NEMO trading hubs as defined in this methodology and according to the following principles:-~~

- ~~i. Only the Scheduled Exchange Calculator shall calculate the DA Scheduled Exchanges.~~
- ~~ii. The calculation of DA Scheduled Exchanges shall be carried out by the Scheduled Exchange Calculator in such a way that the constraints described in Article 5 of this DA SEC Proposal are respected.~~
- ~~iii. The calculation of DA Scheduled Exchanges as described in Articles 6, 7 and 8 of this DA SEC Proposal shall be based upon the net position of bidding zones, scheduling areas and NEMO trading hubs.~~
- ~~iv.i. For cross border HVDC interconnectors within a CCR applying the flow based approach and where the impact of an exchange over the HVDC interconnector is considered during flow based capacity allocation, the Scheduled Exchanges over the respective bidding zone border may differ from the Flow Based net positions of the virtual hub used to model the HVDC 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 scheduling area and bidding zone, a set of constraints and Scheduled Exchanges on relevant bidding zone borders (as for other AC interconnectors).~~

~~v.i. 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 areas' borders corresponding to this bidding zone border shall equal the Scheduled Exchange on this bidding zone border.~~

Article 5—Methodology for calculating Scheduled Exchanges between bidding zones, scheduling areas and NEMO trading hubs resulting from SDAC

~~1. The DA SEC Methodology shall be based on a step-wise calculation of DA Scheduled Exchanges. The Scheduled Exchange Calculator shall respect the principles defined in Article 4 of this DA SEC Proposal.~~

~~2.1. The calculation shall be performed per market time unit:~~

~~i. The Scheduled Exchange Calculator shall calculate respective Scheduled Exchanges stepwise for the three different levels (bidding zones, scheduling areas and NEMO trading hubs);~~

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

~~iii.i. The calculation of the DA Scheduled Exchanges between bidding zones shall follow the principles described in Article 6 of this DA SEC Proposal;~~

~~iv.i. The calculation of the Scheduled Exchanges between scheduling areas shall follow the principles described in Article 7 of this DA SEC Proposal;~~

~~v.i. The calculation of Scheduled Exchanges between NEMO trading hubs shall follow the principles described in Article 8 of this DA SEC Proposal; and~~

~~vi.i. Scheduled Exchanges shall always be calculated for a specific direction i.e. Scheduled Exchange from/to.~~

Article 46 – Calculation of Scheduled Exchanges between bidding zones

1. The Scheduled Exchange Calculator shall calculate the Scheduled Exchanges between bidding zones based on bidding zone net positions ~~provided by all NEMOs~~ according to Article 3 of this DA SEC ~~Proposal~~[Methodology](#).
2. Bidding zone borders in the calculation in this Article consist of the set of bidding zone borders and, where relevant, individual HVDC interconnectors considered in the SDAC.
3. 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, the Scheduled Exchange [between bidding zones](#) shall respect the active allocation constraint.

4. When the allocation of cross-border capacities is based on bidding zone net positions (e.g. flow-based approach), or in case of indeterminacies², several routes could be possible. The optimisation of the Scheduled Exchanges [between bidding zones](#) shall therefore aim to minimise the costs associated with the Scheduled Exchanges between the involved bidding zones taking into account the principles in Article [3\(4\)4\(1\)](#) of this DA SEC [Proposal Methodology](#). For this minimisation, the Scheduled Exchanges between involved bidding zones shall be used as a set of variables to minimise the target function following:

$$\min \left(\sum_{i=1}^n lc_i * flow_bzb_{i,h} + \sum_{i=1}^n qc_i * flow_bzb_{i,h}^2 \right)$$

With:

- lc_i = linear cost coefficient associated to bidding zone border i
- qc_i = quadratic cost coefficient associated to bidding zone border i
- $flow_bzb_{i,h}$ = Scheduled Exchange on bidding zone border i for market time unit h
- n = total number of bidding zone borders and individual HVDC interconnectors considered in the optimization

5. 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 -bidding zones by setting of the linear cost coefficient
- iii. Prioritisation rule to prioritise certain path (set of bidding zone borders) for exchanges between two bidding zones to avoid path of the flow which will reduce economic efficiency
- iv. For HVDC interconnectors, which apply losses in the SDAC, the linear cost coefficient shall be set to a high value to avoid undue scheduling through the interconnector
- v. For a given bidding zone, in case a bidding zone border has a significantly higher or lower thermal capacity than the other bidding zone borders, then the quadratic cost coefficient of this bidding zone border shall be set appropriately (i.e. bidding zone borders which have a limited installed capacity will set a higher quadratic cost coefficient)

6. The cost coefficients are determined in such a way that the optimisation avoids creating high differences between Scheduled Exchange values it calculates, especially on a given bidding zone's borders, while respecting the objectives set forth in Article [46\(5\)](#). Hence, the ratio between the different cost coefficients on each bidding zone border is more important than the exact value of the cost coefficient.

² 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.

7. CCRs ~~which apply the FB approach or the CNTC approach~~ shall set the same cost coefficients (linear and quadratic) for all borders within the CCR, unless this approach breaches the objectives set forth in Article ~~46~~(5).
8. ~~TSOs and NEMOs shall review the cost coefficients used in the SDAC regularly. Additionally, w~~When a new bidding zone border is added to the SDAC or when a CCR implements either CNTC of ~~flow-based~~FB, the cost coefficients on all bidding zone borders of the CCR bidding zone borders to neighbouring CCR(s) shall be reviewed to ensure compliancy with the requirements set forth in previous Articles. ~~National Regulatory Authorities (NRAs)~~ shall be informed of the changes.

~~9. TSOs and NEMOs shall review the cost coefficients used in the SDAC regularly, at least once every two years, in accordance with Article 43(4) of the CACM Regulation. NRAs shall be informed of any changes to the cost coefficient.~~

~~10. Furthermore, for regions where Flow Based Bilateral Intuitiveness applies, 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:~~

$$~~(Price_B - Price_A) * Scheduled Exchanges_{A \rightarrow B} \geq 0~~$$

~~11.9.~~ The calculated Scheduled Exchanges between bidding zones shall be consistent with the bidding zones' net positions ~~provided by all NEMOs~~ according to Article 3 of this DA SEC ~~Proposal~~Methodology.

~~12.10.~~ The Scheduled Exchange Calculator shall respect the allocation constraints in the SDAC.

Article ~~57~~ – 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. Calculation of Scheduled Exchanges between scheduling areas is only performed between scheduling areas where at least one NEMO operates.
3. 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 areas' net positions ~~provided~~ according to Article 3 of this DA SEC ~~Proposal~~Methodology.
 - 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:

$$\min \left(\sum_{i=1}^n lc_{i,h} * flow_{sab_{i,h}} + \sum_{i=1}^n qc_{i,h} * flow_{sab_{i,h}}^2 \right)$$

With:

- lc_i = linear cost coefficient associated to scheduling area border i
- qc_i = quadratic cost coefficient associated to scheduling area border i
- $flow_{sab_{i,h}}$ = Scheduled Exchange on scheduling area border i and market time unit h
- n = number of scheduling area borders considered in the optimization

- 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 interconnectors on each scheduling area border, following:

$$flow_{sab_{i,h}} = \frac{TC_{sab_i}}{TC_{bzb_k}} flow_{bzb_{k,h}}$$

With:

- $flow_{sab_{i,h}}$ = Scheduled Exchange on scheduling area border i and market time unit h
- TC_{sab_i} = Thermal capacity installed on scheduling area border i
- TC_{bzb_k} = Thermal capacity installed on bidding zone border k of which scheduling area border i is a part of
- $flow_{bzb_{k,h}}$ = Scheduled Exchange on bidding zone border k and market time unit h

4. The linear and quadratic cost coefficients for the scheduling area borders within the same bidding zone border shall be equal.
5. The calculated Scheduled Exchanges between scheduling areas shall be consistent with the scheduling areas' net positions [provided by NEMOs](#) according to Article 3 of this DA SEC [Proposal Methodology](#).

Article 68 – Calculation of Scheduled Exchanges between NEMO trading hubs

1. The Scheduled Exchange Calculator shall calculate the Scheduled Exchanges between NEMO trading hubs based on NEMO trading hubs' net positions [provided by all NEMOs](#) according to Article 3 of this DA SEC [Proposal Methodology](#).

2. The calculation of Scheduled Exchanges between NEMO trading hubs aims at minimizing the Net Financial Exposure (hereinafter referred to as “NFE”) between the central counter parties associated to each NEMO (hereinafter referred to as “CCP”). The NFE between two CCPs A and B depends on the Scheduled Exchanges between the NEMO trading hubs of their corresponding NEMO as follows:

$$NFE_{A|B} = \sum_{t \in T} \sum_{(n_1, n_2) \in L_{A,B}} [p_{n_2}^t \cdot (1 - loss_{n_1, n_2}) \cdot flow_{n_1, n_2}^t - p_{n_1}^t \cdot (1 - loss_{n_2, n_1}) \cdot flow_{n_2, n_1}^t]$$

with:

- A, B being two different CCPs
- $L_{A,B} = \{(n_1, n_2) \in L^d \mid ccp(n_1) = A \text{ and } ccp(n_2) = B\}$ being the set of all lines linking NEMO trading hubs of NEMO corresponding to CCP A and NEMO trading hubs of NEMO corresponding to CCP B.
- L^d is the set of all directed lines connecting NEMO Trading Hubs.
- $ccp(n)$ is a function returning the CCP corresponding to NEMO trading hub n
- p_n^t is the clearing price for bidding zone applying on NTH n at market time unit t
- $flow_{n_1, n_2}^t$ is the Scheduled Exchange from NEMO trading hub n_1 to NEMO trading hub n_2 for market time unit t
- $loss_{n_1, n_2}$ is the loss associated to the network constraint underlying scheduled exchange, or 0 if no such constraint exists
- t is the market time unit and T is the set of all market time units

3. For each market time unit t , Scheduled Exchanges between NEMO trading hubs ($flow_{n, n'}^t$) are found in such a way to minimize sum of absolute net financial exposures (NFE) between all CCP pairs, and sum of scheduled exchanges between NEMO trading hubs and maximum volume (weighted by α parameter):

$$\min \left(\overbrace{\sum_{c \in CCP} \sum_{c' \in CCP \setminus \{c\}} |NFE_{c|c'}|}^{\text{Absolute Exposures}} + \alpha \left(\overbrace{\sum_{t \in T} \sum_{(n, n') \in NTH^2} |flow_{n, n'}^t|}^{\text{Scheduled Exchanges}} + \overbrace{\sum_{t \in T} \sum_{sa \in SA} \max_{(n, n') \in NTH(sa)^2} |flows_{n, n'}^t|}^{\text{Max Volumes}} \right) \right),$$

subject to constraints:

$\overline{flows}_{sa_1, sa_2}^t = \sum_{(n, n') \in L^d \mid SA(n) = sa_1, SA(n') = sa_2} flow_{n, n'}^t$	for $\forall sa_1 \in SA, \forall sa_2 \in SA \setminus \{sa_1\}, \forall t \in T$	(1)
$\overline{NP}_n^t = \sum_{l^- = (n, n') \in L^d} flow_{l^-}^t - \sum_{l^+ = (n', n) \in L^d} flow_{l^+}^t$	for $\forall n \in NTH, \forall n' \in NTH \setminus \{n\}, \forall t \in T$	(2)

with:

- NTH is the set of all NEMO trading hubs
- CCP is the set of all the CCPs, i.e. $CCP = \{ccp(n), \forall n \in NTH\}$
- c is a CCP, c' is another CCP (different than CCP [\(c\)](#))
- $NTH(sa)$ is the set of NEMO trading hubs in the scheduling area sa .
- $SA(n)$ is the function returning the scheduling area associated to NEMO trading hub n
- α is a numeric parameter in €/MW which ensures that financial exposures are minimized before volume terms and at the same time guarantees algorithmic stability. The valid range of values is:
 - $0 < \alpha \leq \frac{0.01}{4} \text{ €/MW}$
- $\overline{flows}_{sa_1,sa_2}$ is the scheduled exchange from scheduling area sa_1 to scheduling area sa_2
- \overline{NP}_n is the net position of NTH n
- $flow_{l-}^t$ and $flow_{l+}^t$ are respectively the flow from NTH n to NTH n' , and NTH n' to NTH n at market time unit t .

The three terms in the “linear” objective function have the following meaning in particular order:

- minimization of the total sum of absolute Net Financial Exposures (Linear)
- minimization of total exchange volumes, to guarantee that loop flows are penalized (Linear)
- minimization of max volumes (Linear), to guarantee that unequally distributed flows are penalized, given that previous terms above hold.

The last two terms are given a lower priority than minimization of NFE by the α parameter.

Constraint (1) ensures that the sum of all inter-NTH exchanges associated to an exchange between two scheduling areas is balanced.

Constraint (2) ensures that the sum of exchanges entering/leaving an NTH is balanced with its related net position.

Article 7 – Information provided by the Scheduled Exchange Calculator

1. The Scheduled Exchange Calculator shall provide the following information pursuant to the algorithm methodology and Articles 43(2) and 49(2) of CACM Regulation, resulting from the SDAC, to relevant NEMOs, central counter parties, shipping agents and TSOs, for each market time unit:
 - a) Net position per bidding zone;
 - b) Net position per scheduling area;
 - c) Net position per NEMO trading hub;
 - d) Scheduled Exchanges for each bidding zone border, between each scheduling areas and between each NEMO trading hubs; and

- e) Where relevant, Scheduled Exchanges into and out of individual relevant HVDC interconnectors (difference in Scheduled Exchanges in/out reflecting losses where applicable).
2. The information listed in Article 7(1)(d) and 7(1)(e) is required to ensure a coherent calculation of Scheduled Exchanges between different CCRs and to ensure the implementation of arrangements pursuant Article 45 of CACM Regulation.
3. The Scheduled Exchange Calculator shall notify the results of the DA Scheduled Exchanges Calculation by 13:00 under normal operation, and will endeavour to deliver these ahead of the intraday gate opening time so that the day-ahead post-coupling processes can be completed. If there are issues ascertaining the market coupling results, the Schedule Exchange Calculator shall notify the results no later than 15:30 market time day-ahead.

Article 89 – Implementation of the DA SEC Methodology

1. The TSOs shall implement the DA SEC Methodology no later than three months after its approval ~~by the competent regulatory authorities, following the implementation of 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 in each bidding zone and its borders.~~

Article 109 – Language

1. The reference language for this DA SEC ~~Proposal Methodology~~ shall be English. For the avoidance of doubt, where TSOs need to translate this DA SEC ~~Proposal Methodology~~ 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 Methodology~~ to their relevant national regulatory authorities.

ANNEX 1

List of TSOs subject to the approved DA SEC methodology:

- APG – Austrian Power Grid AG
- VÜEN – Vorarlberger Übertragungsnetz GmbH
- Elia – Elia System Operator S.A
- ESO – Electroenergien Sistemen Operator EAD
- HOPS - Croatian Transmission System Operator Ltd
- ČEPS - ČEPS, a.s.
- Energinet – Energinet
- Elering – Elering AS
- Fingrid – Fingrid OyJ
- Kraftnät Åland Ab
- RTE - Réseau de Transport d'Electricité, S.A
- Amprion – Amprion GmbH
- Baltic Cable AB
- TransnetBW -TransnetBW GmbH
- TenneT GER – TenneT TSO GmbH
- 50Hertz – 50Hertz Transmission GmbH
- IPTO – Independent Power Transmission Operator S.A.
- MAVIR ZRt. - MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság ZRt.
- EirGrid – EirGrid plc

- [Terna – Terna SpA](#)
- [Augstsprieguma tīkls - AS Augstsprieguma tīkls](#)
- [LITGRID – LITGRID AB](#)
- [CREOS Luxembourg – CREOS Luxembourg S.A.](#)
- [TenneT TSO – TenneT TSO B.V.](#)
- [PSE – PSE S.A.](#)
- [REN - Rede Eléctrica Nacional, S.A.](#)
- [Transelectrica - C.N. Transelectrica S.A.](#)
- [SEPS - Slovenská elektrizačná prenosová sústava, a.s.](#)
- [ELES – ELES, d.o.o.](#)
- [REE - Red Eléctrica de España S.A.U.](#)
- [Svenska Kraftnät - Affärsverket Svenska Kraftnät](#)
- [SONI System Operator for Northern Ireland Ltd.](#)