All TSOs proposal for updating the Common set of requirements for the price coupling algorithm to include TSOs requirements

as per Art. 13(3) of ACER decision on methodology for a co-optimised allocation process for cross-zonal capacity:

Requirements for the price coupling algorithm in accordance with Article 13(3) of the ACER Methodology for a co-optimised allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves

1. Requirements on functionalities and performance

1.1 General requirements.

Requirement deadlines	State	Owner	
		TSOs	NEMOs
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 Regulation; 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 ACER Methodology for a co-optimised allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves.	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	EXISTING	X	X

	procedure referred to in Article 4(15) of the ACER Methodology for a co-optimised allocation process of cross-zonal capacity for the exchange of balancing capacity or sharing of reserves.		
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

7. TSOs set of requirements as for Article 13.3 of Annex I to ACER Decision No 12/2020

General Note: References to linking of bids in this chapter shall be understood as follows:

- Cross-product linking of bids between different Balancing Capacity Markets shall in any case be understood as multilateral cross-product linking of bids.

7.1 Algorithm Structures for the co-optimised allocation process

a)	The Cross-Zonal Capacity Allocation Optimisation Function (”CZCAOF”) shall include all Capacity Procurement Optimisation Functions (”CPOFs”) of all applications applying the timeframe of the co-optimised allocation process pursuant to the harmonised cross-zonal capacity allocation methodology of Article 38(3) of the EB Regulation.		X	
b)	The CZCAOF shall allow to configure which bidding zone borders besides the ones within an application are impacting the application of the co-optimised allocation process and for which Standard Balancing Capacity Product (SBCP) per direction.		X	
c)	The CZCAOF shall be able to process all bidding zone borders where the co-optimised allocation process is active.		X	
d)	For those bidding zone borders where the co-optimised allocation process is configured as active, the CZCAOF shall determine the share of available cross-zonal capacity for the day-ahead market and for each SBCP in each direction.		X	
e)	The CZCAOF shall be able to facilitate the co-optimised allocation process at each bidding zone border for the following SBCPs, aFRR in positive direction, aFRR in negative direction, mFRR in positive direction, mFRR in negative direction, RR in positive direction and RR in negative direction, pursuant to the SPBC methodology.		X	

7.2 General requirements

a)	For each bidding zone and for each bidding zone border, where the co-optimised allocation process is active, the co-optimised allocation process shall comply with the requirements set out in the following sections of this Annex 1:		
	i. 1.1(a)		X	
	ii. 1.1(f)		X	
	iii. 1.1(j)		X	

7.3 Requirements of the CZCAOF

a) For each bidding zone and bidding zone border, where the co-optimised allocation process is active, the CZCAOF shall comply with the requirements set out in the following sections of this Annex 1:

i. 1.1.(a)(i)		X	
ii. 3.1.(a)		X	
iii. 3.1.(b)		X	
iv. 3.1.(d)		X	
v. 3.3.		X	
vi. 5.1.(b)		X	
vii. 5.5		X	
viii. 5.6.		X	
ix. 5.7.		X	
b) The CZCAOF shall aim at maximising the economic surplus for the allocation of CZC between the SDAC and between each SBCP per direction for the next trading day, consistent with time limitations, conditions and requirements established by NEMOs and TSOs.		X	
c) The CZCAOF shall support multiple bidding zones within a country and shall be scalable to cover all bidding zonesparticipating in the co-optimised allocation process.		X	
d) In case the CZCAOF finds solutions with equal sum of social welfare for a certain SBCPin a positive or negative direction and SDAC, the marginal volume of CZC shall be allocated to SDAC.		X	
e) In case a CPOF finds equal outcomes of cost minimisation and the CZCAOF results in the same social welfare optimisation outcome, the CZC shall be allocated by the CZCAOF by default to the SBCP type following the order of aFRR > mFRR > RR and for the same type, direction positive > direction negative. The CZCAOF shall allow to configure a different prioritisation rule per bidding-zone border on request of the respective TSO.		X	
f) The CZCAOF shall be able to perform the co-optimised allocation process both for flow-based and coordinated net transmission capacity methodologies.		X	
g) For flow-based capacity calculation regions, in case a bidding zone border is configured as active in the co-optimised allocation process, at least all bidding zone borders within the CCR shall be a part of the co-optimisated allocation process.		X	
h) For coordinated net transmission capacity calculation regions, only bidding zone borders configured as active shall be part of the co-optimised allocation process.		X	
i) In case of unilateral linking, additional requirements are needed to reflect that bids in the money in SBCP shall always be taken into account.		X	
j) For each MTU and for those bidding zone borders where the co-optimised allocation process is configured as active, the CZCAOF shall provide the following outputs in addition to the current outputs of the price coupling algorithm:			
i. In case of NTC, the updated ATC values for the day-ahead market;		X	
ii. In case of flow-based, the updated PTDFs for the day-ahead market;		X	
iii. The volumes of allocated CZC per bidding zone border for each SBCP per direction.		X	

k) The CZCAOF shall be able for each MTU to constrain the scheduled exchanges from DAM and the allocated CZC volumes for the exchange of balancing capacity and sharing of reserves 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.		X	
l) The CZCAOF shall be able for each MTU to process flow-based parameters, if provided at the defined MTU, when allocating cross-zonal capacities for each bidding zone border to SBCPs.		X	
m) The CZCAOF shall be able for each MTU to ensure that the PTDF matrix multiplied by the net position of day-ahead market and all possible positions following from the exchange of balancing capacity or sharing of reserves is less than or equal to the available margins for each critical network element. The CZCAOF shall take into account on which borders the platforms for the exchange of balancing energy operate in cNTC approach, and which borders operate in flow-based approach.		X	
n) The CZCAOF shall calculate the price of CZC at each bidding zone border per MTU for each SBCP per direction and is based on the price difference of the two marginal clearing prices of the SBCP per direction of the two respective bidding zones of the bidding zone border.		X	
o) The CZCAOF shall be able to calculate the set of possible balancing energy exchanges resulting from the exchange of balancing capacity and sharing of reserve between all relevant bidding zones or scheduling areas. The CZCAOF shall take into account on which borders the platforms for the exchange of balancing energy operate in cNTC approach, and which borders operate in flow-based approach.		X	

7.4 Requirements of the CPOFs

a) For each SBCP aFRR, mFRR and RR in positive and negative direction, where the co-optimised allocation process is active, each CPOF shall comply with the requirements set out in the following sections of this Annex 1:			
i. 4.1.		X	
ii. 4.2.		X	
iii. 5.1(a)		X	
iv. 5.5.		X	
v. 5.7.		X	
vi. 6.1.		X	
b) Each CPOF shall aim at minimising the overall costs of balancing capacity procurement of all balancing capacity products combined according to Art.58(3)(a) of the EB Regulation, for the next trading day, consistent with time limitations, conditions and requirements established by NEMOs and TSOs.		X	
c) Each CPOF shall accept the SBCPs aFRR, mFRR and RR in positive and negative direction, TSO BC demand and match them in respect of allocation constraints such as allocated cross-zonal capacity from the CZCAOF.		X	
d) In case a CPOF finds solutions with equal cost minimisation, it shall apply deterministic rules in order to define prices and net positions for each bidding zone.		X	
e) The outputs of each CPOF per MTU shall be:			

i. procurement volumes of each SBCP per direction per bidding zone;		X	
ii. marginal clearing prices of each balancing capacity market per bidding zone;		X	
iii. In case of unsatisfied demand, the volume of unsatisfied per SBCP per direction		X	
iv. The amount and direction of shared volumes per bidding zone border.		X	
f) Each CPOF shall support multiple bidding zones within a country and shall be scalable to cover all bidding zones eligible for participating in balancing capacity markets.		X	
g) Each CPOF shall place cross-product linked BC bids across the BCMs according to cost minimisation (CPOF requirement Art. 58(3)(a)) and 32(1) of the EB Regulation).		X	
h) Each CPOF shall shift TSO BC demand only from lower quality type of SBCP to higher quality type of SBCP in case of cost minimisation (CPOF requirement Art. 58(3)(a)) and 32(1) of the EB Regulation. The order of shifting demand is from low quality to high quality, with quality order: RR<mFRR<aFRR.		X	
i) In case of sufficient available SBCP in the BZ to satisfy the local TSO BC demand in the BZ, the TSO BC demand shall always be satisfied.		X	
j) In case there is not sufficient available SBCP to satisfy locally the TSO BC demand, the TSO surplus shall be calculated based on a virtual clearing price equal to the maximum possible clearing price of the SBCP.		X	
k) Each CPOF shall be able to calculate the set of possible exchanges of balancing capacity and sharing of reserve between all relevant bidding zones or scheduling areas. Each CPOF shall take into account on which borders the platforms for the exchange of balancing energy operate in cNTC approach, and which borders operate in flow-based approach.		X	
l) Each CPOF shall fulfill the publication requirements of the timeframe of the co-optimised allocation process pursuant to Article 12(3.f) of the EB Regulation.		X	
m) In case a CPOF finds solutions with equal cost minimisation outcomes between different SBCP or per direction and the CZCAOF results in the same social welfare optimisation outcome, by default, each CPOF shall place the cross-product linked SBCP to the type of SBCP in the order of aFRR > mFRR > RR. Each CPOF shall allow to configure a different prioritisation rule on request of the respective TSO(s).		X	
n) In case the total volume of all SBCP bids of two or three BCMs in the same direction do not satisfy each TSO's BC demand of the two or three SBCPs, the cross-product linked SBCPs shall not be cleared in terms of procurement cost minimisation but, by default, in the following order aFRR > mFRR > RR. Each CPOF shall allow to configure a different prioritisation rule on request of the respective TSO(s).		X	

7.5. SBCP market requirements

a) Multilateral cross-product Linking across the BCMs for all the BSP bids per direction shall be made possible.		X	
b) Unilateral cross-product Linking across the BCMs for TSO BC demand in the order from RR to mFRR to aFRR for the positive and for the negative direction shall be made possible.		X	

c) The maximum possible price of each SBCP per direction shall be according to the price rules defined in the harmonised methodology according to Article 38(3) of EB regulation.

d) Further type of linking per SBCP per direction such as temporal or conditional linking shall be made possible on request of the TSO.

	X	
	X	