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All TSOs' proposal for a common grid model methodology in accordance with Article 17 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

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27 May 2016

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All TSOs, taking into account the following:

### Whereas

- (1) This document is a common proposal developed by all Transmission System Operators (hereafter referred to as "TSOs") regarding the development of a proposal for a common grid model methodology (hereafter referred to as "CGMM").
- (2) This proposal (hereafter referred to as the "CGMM Proposal") takes into account the general principles and goals set in Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management (hereafter referred to as "Regulation 2015/1222") as well as Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity (hereafter referred to as "Regulation (EC) No 714/2009"). The goal of Regulation 2015/1222 is the coordination and harmonisation of capacity calculation and allocation in the day-ahead and intraday cross-border markets. To facilitate these aims, it is necessary for all TSOs to use a common grid model. A common grid model can only be created on the basis of a common methodology for building such a model.
- (3) While the CGMM described in the present CGMM Proposal enables a common grid model to be established, the delivery of the generation and load data required to establish the common grid model is addressed in the generation and load data provision methodology pursuant to Article 16 of Regulation 2015/1222.
- (4) Article 17 of Regulation 2015/1222 constitutes the legal basis for this proposal and defines several specific requirements that the CGMM Proposal should take into account:
  1. *By 10 months after the entering into force of this Regulation all TSOs shall jointly develop a proposal for a common grid model methodology. The proposal shall be subject to consultation in accordance with Article 12.*
  2. *The common grid model methodology shall enable a common grid model to be established. It shall contain at least the following items:*
    - (a) *a definition of scenarios in accordance with Article 18;*
    - (b) *a definition of individual grid models in accordance with Article 19;*
    - (c) *a description of the process for merging individual grid models to form the common grid model."*
- (5) Article 2(2) of Regulation 2015/1222 defines the common grid model as:
 

*"a Union-wide data set agreed between various TSOs describing the main characteristic (sic) of the power system (generation, loads and grid topology) and rules for changing these characteristics during the capacity calculation process"*
- (6) Article 2(4) of Regulation 2015/1222 defines a scenario as:
 

*"the forecasted status of the power system for a given time-frame"*
- (7) Article 2(1) of Regulation 2015/1222 defines an individual grid model as:
 

*"a data set describing power system characteristics (generation, load and grid topology) and related rules to change these characteristics during capacity calculation, prepared by the*

*responsible TSOs, to be merged with other individual grid model components in order to create the common grid model"*

- (8) The requirements set out in Article 17 are spelt out in more detail in Articles 18 and 19 of Regulation 2015/1222. Article 18 on scenarios outlines the following:
- "1. All TSOs shall jointly develop common scenarios for each capacity calculation time-frame referred to in Article 14(1)(a) and (b). The common scenarios shall be used to describe a specific forecast situation for generation, load and grid topology for the transmission system in the common grid model.*
- 2. One scenario per market time unit shall be developed both for the day-ahead and the intraday capacity calculation time-frames.*
- 3. For each scenario, all TSOs shall jointly draw up common rules for determining the net position in each bidding zone and the flow for each direct current line. These common rules shall be based on the best forecast of the net position for each bidding zone and on the best forecast of the flows on each direct current line for each scenario and shall include the overall balance between load and generation for the transmission system in the Union. There shall be no undue discrimination between internal and cross-zonal exchanges when defining scenarios, in line with point 1.7 of Annex I to Regulation (EC) No 714/2009."*
- 1.7 of Annex I to Regulation (EC) No 714/2009 outlines the following:
- "When defining appropriate network areas in and between which congestion management is to apply, TSOs shall be guided by the principles of cost-effectiveness and minimisation of negative impacts on the internal market in electricity. Specifically, TSOs shall not limit interconnection capacity in order to solve congestion inside their own control area, save for the abovementioned reasons and reasons of operational security. If such a situation occurs, this shall be described and transparently presented by the TSOs to all the system users. Such a situation shall be tolerated only until a long-term solution is found. The methodology and projects for achieving the long-term solution shall be described and transparently presented by the TSOs to all the system users."*
- (9) Article 19 sets out more specific requirements with respect to individual grid models, the basic building blocks of the common grid model:
- "1. For each bidding zone and for each scenario:*
- (a) all TSOs in the bidding zone shall jointly provide a single individual grid model which complies with Article 18(3); or*
- (b) each TSO in the bidding zone shall provide an individual grid model for its control area, including interconnections, provided that the sum of net positions in the control areas, including interconnections, covering the bidding zone complies with Article 18(3).*
- 2. Each individual grid model shall represent the best possible forecast of transmission system conditions for each scenario specified by the TSO(s) at the time when the individual grid model is created.*
- 3. Individual grid models shall cover all network elements of the transmission system that are used in regional operational security analysis for the concerned time-frame.*
- 4. All TSOs shall harmonise to the maximum possible extent the way in which individual grid models are built.*

- 5. Each TSO shall provide all necessary data in the individual grid model to allow active and reactive power flow and voltage analyses in steady state.*
- 6. Where appropriate, and upon agreement between all TSOs within a capacity calculation region, each TSO in that capacity calculation region shall exchange data between each other to enable voltage and dynamic stability analyses."*
- (10) Article 27(1) of Regulation 2015/1222 formulates a requirement related to the merging process:  
*"1. No later than six months after the decision on the generation and load data provision methodology referred to in Article 16 and the common grid model methodology referred to in Article 17, all TSOs shall organise the process of merging the individual grid models."*
- (11) The first paragraph of Article 9(9) of Regulation 2015/1222 sets out two further obligations:  
*"The proposal for terms and conditions or methodologies shall include a proposed timescale for their implementation and a description of their expected impact on the objectives of this Regulation."*
- (12) Article 28(3) to (5) of Regulation 2015/1222 formulates additional obligations relevant for the CGMM Proposal:  
*"3. For each capacity calculation time-frame, each TSO shall establish the individual grid model for each scenario in accordance with Article 19, in order to merge individual grid models into a common grid model.*  
*4. Each TSO shall deliver to the TSOs responsible for merging the individual grid models into a common grid model the most reliable set of estimations practicable for each individual grid model.*  
*5. For each capacity calculation time-frame a single, Union-wide common grid model shall be created for each scenario as set out in Article 18 by merging inputs from all TSOs applying the capacity calculation process as set out in paragraph 3 of this Article."*
- (13) Article 9(9) of Regulation 2015/1222 requires that the expected impact of the CGMM Proposal on the objectives of Regulation 2015/1222 is described. The impact is presented below (points (14) to (23) of this Whereas Section).
- (14) The CGMM Proposal contributes to and does not in any way hamper the achievement of the objectives of Article 3 of Regulation 2015/1222. In particular, the CGMM Proposal serves the objective of promoting effective competition in the generation, trading and supply of electricity (Article 3(a) of Regulation 2015/1222) in contributing to coordinated capacity calculation by prescribing a common methodology for the preparation of individual grid models to be merged into the common pan-European grid model.
- (15) In respect of ensuring the optimal use of transmission infrastructure further to Article 3(b) of Regulation 2015/1222, the CGMM Proposal establishes a common methodology by which the common grid model is established, which will allow determinations to be made regarding the optimum availability of the transmission grid and thus, the optimal use of the transmission infrastructure.
- (16) The CGMM Proposal takes into account operational security in accordance with Article 3(c) of Regulation 2015/1222 by requiring that individual grid models contain specific modelling of all grid elements, generation and load at 220 kV or above or of less than 220 kV where they are used in regional operational security analysis.

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- (17) In accordance with Article 3(d) of Regulation 2015/1222, and taking into account the capacity calculation methodologies to be developed under Regulation 2015/1222, the creation of the common grid model and use thereof in the capacity calculation process will optimise the calculation and allocation of cross-zonal capacity by ensuring a common methodology and inputs for the preparation of individual grid models to be merged into the common pan-European grid model.
  - (18) By having a common grid model prepared on the basis of a common, binding methodology, the CGMM Proposal will ensure that the objective of fair and non-discriminatory treatment of TSOs, NEMOS, the Agency, regulatory authorities and market participants is met insofar as the creation of a common grid model is based on a binding methodology that has been subject to stakeholder consultation in accordance with Regulation 2015/1222 and that will be approved by regulatory authorities prior to application in the Union. The CGMM Proposal, in providing a common, binding methodology for the provision of the common grid model, and noting the use of the common grid model in the capacity calculation process, additionally contributes to the general aim of equal access to cross-zonal capacity further to Article 3(e) of the Regulation 2015/1222.
  - (19) The CGMM Methodology ensures and enhances the transparency and reliability of information further to Article 3(f) of Regulation 2015/1222 by providing for monitoring of quality indicators and publishing the indicators and the results of the monitoring as part of the data to be provided pursuant to Article 31(3) of Regulation 2015/1222.
  - (20) The CGMM Proposal also contributes to the objective of respecting the need for a fair and orderly market and price formation (Article 3(h) of the Regulation 2015/1222) through the provision of a common grid model to be used in the capacity calculation process on the basis of a common methodology specifying inputs for the preparation of individual grid models to be merged into the common pan-European grid model.
  - (21) The CGMM Proposal will contribute to the efficient long-term operation and development of the electricity transmission system and electricity sector in the Union by virtue of being a common model of the pan-European grid that will be used in a coordinated manner throughout the Union.
  - (22) Finally, the CGMM Proposal contributes to the objective of providing non-discriminatory access to cross-zonal capacity (Article 3(j) of the Regulation 2015/1222) again by the provision of a common grid model, based on a common binding methodology, to be used in the capacity calculation process.
  - (23) In conclusion, the CGMM Proposal contributes to the general objectives of the Regulation 2015/1222 to the benefit of all TSOs, NEMOs, the Agency, regulatory authorities and market participants.

**SUBMIT THE FOLLOWING CGMM PROPOSAL TO ALL REGULATORY AUTHORITIES:**

## Article 1

### Subject matter and scope

1. The common grid model methodology described in this proposal is the common proposal of all TSOs in accordance with Article 17 of Regulation 2015/1222.
2. This methodology shall apply to all TSOs in the area referred to in Article 1(2) of Regulation 2015/1222.
3. TSOs from jurisdictions outside the area referred to in Article 1(2) of Regulation 2015/1222 may provide their IGM, allow it to be merged into the CGM, and join the CGM process on a voluntary basis, provided that
  - a. for them to do so is technically feasible and compatible with the requirements of Regulation 2015/1222;
  - b. they agree that they shall have the same rights and responsibilities with respect to the CGM process as the TSOs referred to in paragraph 1; in particular, they shall accept that this methodology and the generation and load data provision methodology pursuant to Article 16 of Regulation 2015/1222 apply to the relevant parties in their control area as well;
  - c. they accept any other conditions related to the voluntary nature of their participation in the CGM process that the TSOs referred to in paragraph 1 may set;
  - d. the TSOs referred to in paragraph 1 have concluded an agreement governing the terms of the voluntary participation with the TSOs referred to in this paragraph;
  - e. once TSOs participating in the CGM process on a voluntary basis have demonstrated objective compliance with the requirements set out in (a), (b), (c), and (d), the TSOs referred to in paragraph 1, after checking that the criteria in (a), (b), (c), and (d) are met, have approved an application from the TSO wishing to join the CGM process in accordance with the procedure set out in Article 9(2) of Regulation 2015/1222.
4. The TSOs referred to in paragraph 1 shall monitor that TSOs participating in the CGM process on a voluntary basis pursuant to paragraph 3 respect their obligations. If a TSO participating in the CGM process pursuant to paragraph 3 does not respect its essential obligations in a way that significantly endangers the implementation and operation of Regulation 2015/1222, the TSOs referred to in paragraph 1 shall terminate that TSO's voluntary participation in the CGM process in accordance with the procedure set out in Article 9(2) of Regulation 2015/1222.

## Article 2

### Definitions and interpretation

For the purposes of this proposal, the terms used shall have the meaning of the definitions included in Article 2 of Regulation 2015/1222 and the other items of legislation referenced therein. In addition, the following definitions shall apply:

1. 'adjacent grids' means the areas not part of but bordering on the control area or bidding zone for which an IGM is being created;
2. 'agreed measures' means remedial actions agreed to be implemented based upon a common grid model;

3. 'boundary point' means a virtual network element that demarcates the border between two TSOs such that with respect to the modelling of the network (i) all network elements on one side of the boundary point are assigned to the responsibility of one TSO and (ii) all network elements on the other side of the boundary point are assigned to the responsibility of the other TSO and (iii) exactly one TSO is responsible for the modelling of each relevant network element;
4. 'CGM area' means the area covered by the common grid model; this is the set of (i) bidding zones whose TSOs contribute their IGM to the CGM plus (ii) the interconnections linking these bidding zones with bidding zones that do not contribute an individual grid model to the CGM (i.e., are not part of the CGM area);
5. 'CGM process' means all stages and all aspects of the process by which TSOs build and share individual grid models and merge these into common grid models;
6. 'equivalent model' means a set of modelled grid elements which together have the same electrical behavior as a part of the network. Equivalent models are obtained through a process known as model reduction;
7. 'maximum permissible TATL duration' means the maximum period of time that a loading in excess of the PATL and less than or equal to the TATL can be sustained without risk to the equipment;
8. 'network element' means an asset that is part of or connected to a transmission or distribution network including but not limited to grid elements, generation units, and loads;
9. 'operating assumptions' means the variable data such as schedules and settings for various items of equipment needed to describe the forecasted behavior of the transmission system;
10. 'operational monitoring limits' means a subset of operational security limits that a grid model has to comply with;
11. 'PATL (Permanent Admissible Transmission Loading)' means the maximum loading in amperes, MW or MVA that can be sustained on a transmission line, cable or transformer for an unlimited duration without risk to the equipment;
12. 'slack node' means a special virtual node that serves to balance active and reactive power in load flow studies;
13. 'TATL (Temporary Admissible Transmission Loading)' means the maximum loading in amperes, MW or MVA that can be sustained for a limited duration without risk to the equipment;
14. 'tripping current' means the maximum current threshold above which a transmission line, cable or transformer will trip without delay.

### Article 3 Scenarios

1. When building individual grid models for each market time unit two days before the day of delivery for the day-ahead capacity calculation time-frame, each TSO shall apply the general principles set out in paragraph 3 as well as the specific principles for the day-ahead capacity calculation time-frame set out in paragraph 4.
2. When building individual grid models for each market time unit on the day before the day of delivery for the intraday capacity calculation time-frame, each TSO shall apply the general

principles set out in paragraph 3 as well as the specific principles for the intraday capacity calculation time-frame set out in paragraph 5.

3. The following principles are applicable to all scenarios:
  - a. forecast situation for grid topology
    - i. outages, irrespective of the reason for the outage, shall be modelled regardless of whether the network element is expected to be unavailable for the entire duration of the scenario or only part thereof;
    - ii. network elements that support voltage control shall be included although they may be switched off for operational reasons;
    - iii. the topology shall reflect the operational situation.
  - b. where structural data change during the time period that the scenario relates to
    - i. network elements being added or removed shall be included for the entire duration of the scenario and shall be removed from the IGM topology in all scenarios where they are not available for at least part of the duration of the scenario;
    - ii. changes in the characteristics of network elements shall be handled by including those characteristics the use of which is most conservative from the point of view of operational security;
  - c. operational limits
    - i. each TSO shall apply the appropriate limits corresponding to the target season to each network element;
    - ii. for thermal limits, each TSO shall use both PATLs and TATLs.
4. The following specific principles are applicable to the scenarios for the day-ahead capacity calculation time-frame:
  - a. with respect to the forecast situation for generation
    - i. for intermittent generation each TSO shall use the latest forecast of intermittent generation;
    - ii. for dispatchable generation each TSO shall take into account the planned outages and adjust forecast generation, taking into account forecast intermittent generation, such that it balances forecast load and grid losses and the net position;
  - b. with respect to the forecast situation for load
    - i. each TSO shall use the best forecast of load;
  - c. with respect to the net position in each bidding zone and the flow for each direct current line
    - i. each TSO shall follow the approach outlined in Article 19.
5. The following principles are applicable to the scenarios for the intraday capacity calculation time-frame:
  - a. with respect to the forecast situation for generation
    - i. for intermittent generation each TSO shall use the latest forecast of intermittent generation;
    - ii. for dispatchable generation: each TSO shall use schedules;
  - b. with respect to the forecast situation for load
    - i. each TSO shall use the best forecast of load;



- c. with respect to the net position in each bidding zone and the flow for each direct current line
  - i. each TSO shall use the results of the day-ahead market pursuant to Article 18.

#### Article 4

##### Individual Grid Models

1. Each TSO shall build individual grid models for each of the scenarios described in Article 3(1) and 3(2).
2. When building IGMs, each TSO shall complete the following steps:
  - a. create an up-to-date equipment model comprising the structural data described in Articles 5 to 11;
  - b. identify and incorporate structural changes pursuant to the principles set out in Article 3;
  - c. incorporate up-to-date operating assumptions by including the variable data described in Articles 12 to 16 in the model;
  - d. exchange with all other TSOs the data described in Article 17 via the information platform referred to in Article 21;
  - e. apply the common rules for determining the net position in each bidding zone and the flow for each direct current line set out in Articles 18 and 19;
  - f. ensure that the model is consistent with the net positions and flows on direct current lines established in accordance with Articles 18 and 19;
  - g. ensure that remedial actions applied (if any) can be clearly identified and are consistent with the methodology for remedial actions in capacity calculation pursuant to Article 25 of Regulation 2015/1222 and the general objective of fair and non-discriminatory treatment pursuant to Article 3(e) of Regulation 2015/1222;
  - h. perform a load flow solution in order to verify
    - i. solution convergence;
    - ii. plausibility of nodal voltages and active and reactive power flows on grid elements;
    - iii. plausibility of the active and reactive power outputs of each generator;
    - iv. plausibility of the reactive power output / consumption of shunt-connected reactive devices; and
    - v. compliance with applicable operational security standards;
  - i. if required, modify the equipment model and / or operating assumptions and repeat step (h);
  - j. if applicable, carry out network reduction pursuant to Article 11;
  - k. as required by Article 28(3) and (4) of Regulation 2015/1222 export the IGM and make it available for merging into a common grid model via the information platform referred to in Article 21;
  - l. ensure that the IGM meets the quality criteria pursuant to Article 23;
  - m. repeat relevant steps as required and in accordance with the other obligations specified in this methodology.
3. Each TSO shall respect the process for merging IGMs into a CGM described in Article 20.

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4. Each TSO shall update its IGM with agreed measures if applicable,
5. Each TSO shall respect the requirements set out in Article 22. All times stated in this CGMM Proposal refer to market time as defined in Article 2(15) of Regulation 2015/1222.

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## Article 5

### Data to be included in IGMs

1. IGMs shall contain the elements of the high-voltage and extra high-voltage network insofar as these are used in regional operational security analysis for the concerned time-frame.
2. A unique identifier shall be provided for each network element included.
3. Where this methodology refers to a breakdown by primary energy sources, a breakdown into primary energy sources consistent with those used by the central information transparency platform pursuant to Regulation 543/2013 is required.
4. If any of the data required are not available to the TSO, the TSO shall use its best estimate instead.

## Article 6

### Grid elements

1. The grid elements described in paragraph 2 of this Article shall be included in each IGM regardless of whether these are operated by the TSO or a DSO (incl. CDSO) if these grid elements are of a voltage level
  - a. of 220 kV or above;
  - b. of less than 220 kV and the grid elements of which are used in regional operational security analysis.
2. The relevant grid elements and the data to be provided for these are
  - a. sub-stations: voltage levels, busbar sections and if applicable to the modelling approach used by the TSO switching devices, to include switching device identifier and switching device type, comprising either breaker, isolator or load break switch;
  - b. lines or cables: electrical characteristics, the sub-stations to which these are connected;
  - c. power transformers including phase-shifting power transformers: electrical characteristics, the sub-stations to which these are connected, the type of tap changer, and type of regulation, where applicable;
  - d. power compensation devices and flexible AC transmission systems (FACTS): type, electrical characteristics, and type of regulation where applicable.
3. A model or an equivalent model of those parts of the grid operated at a voltage of less than 220 kV shall be included in the IGM regardless of whether these parts of the grid are operated by the TSO or a DSO (incl. CDSO) if
  - a. these parts of the grid have elements which are used in regional operational security analysis, or
  - b. the relevant grid elements in those parts of the grid are connecting

- i. a generation unit or load modelled in detail in accordance with Article 8 or 9 to the 220 kV or higher voltage level;
  - ii. two nodes at the 220 kV or higher voltage level.
4. Models and equivalent models pursuant to paragraph 3 shall contain at least aggregates of load separated from generation and generation capacity separated by primary energy sources and separated from load in the corresponding parts of the grid broken down by sub-stations of the equivalent model or the sub-stations to which the corresponding parts of the grid are connected.

### Article 7

#### Boundary points

1. For each relevant border the TSOs concerned shall demarcate their respective responsibilities as far as the modelling of the network is concerned by agreeing on the corresponding boundary points.
2. Each TSO shall include all relevant network elements on its side of each boundary point in its IGM.
3. Each TSO shall include each boundary point in its IGM with a fictitious injection.

### Article 8

#### Generation

1. Generation units including synchronous condensers and pumps shall be modelled in detail if they are connected at a voltage level
  - a. of 220 kV or above;
  - b. of less than 220 kV and they are used in regional operational security analysis.
2. Several identical or similar generation units may be modelled in detail on a composite basis if this modelling approach is sufficient with respect to regional operational security analysis. For generation units modelled in detail on a composite basis an equivalent model shall be included in the IGM.
3. Generation capacity not modelled in detail shall be included in the IGM modelled as aggregates.
4. For both generation units modelled in detail and for aggregates of generation capacity, separated by primary energy sources and separated from load, the following data shall be included in the IGM:
  - a. connection point;
  - b. primary energy source.
5. For generation units modelled in detail the following data shall be included in the IGM:
  - a. maximum active power and minimum active power; defined as those values which the generation unit can regulate to. In the case of hydroelectric pumped storage generation units, two cycles shall be modelled and two records have to be provided (i.e., one each for the generating and the pumping mode);
  - b. the type of control mode, being one of the following: "disabled", "voltage control", "power factor control", "reactive power control" and, for voltage-controlled generation units, the regulated buses where the scheduled voltage is set up;

- c. maximum and minimum values of reactive power when the minimum and maximum active power is delivered as well as, if this is required for regional operational security analysis, the associated capability curve;
  - d. the auxiliary load of the generation unit representing the internal demand of the generation unit shall be modelled as a non-conforming load at the connection point of the generation unit if this is required for regional operational security analysis.
6. For generation units modelled as aggregates the following data shall be included in the IGM:
- a. aggregates of generation capacity separated by primary energy sources and separated from load in the corresponding parts of the grid broken down by sub-stations of the equivalent model or the sub-stations to which the corresponding parts of the grid are connected.

### **Article 9**

#### **Load**

1. Loads shall be modelled in detail if they are connected at a voltage level
  - a. of 220 kV or above;
  - b. of less than 220 kV and they are used in regional operational security analysis.
2. Several identical or similar loads may be modelled in detail on a composite basis if this modelling approach is sufficient with respect to regional operational security analysis. For loads modelled in detail on a composite basis an equivalent model shall be included in the IGM.
3. Loads not modelled in detail shall be included in the IGM modelled as aggregates.
4. For both loads modelled in detail and for aggregates of loads separated from generation the following data shall be included in the IGM:
  - a. connection point;
  - b. power factor or reactive power;
  - c. conforming flag (where the value "true" means that the active and reactive power consumption of the load shall be scaled when scaling the overall load).
5. For loads modelled as aggregates the following data shall be included in the IGM:
  - a. aggregates of loads (separated from generation) in the corresponding parts of the grid broken down by sub-stations of the equivalent model or the sub-stations to which the corresponding parts of the grid are connected.

### **Article 10**

#### **HVDC links**

1. HVDC links shall be modelled regardless of whether these are located entirely within a single bidding zone or they connect two bidding zones.
2. The TSO within whose bidding zone(s) the HVDC link is located or the TSOs whose bidding zones are connected by the HVDC link shall decide on the degree of detail with which the HVDC link is to be modelled. They shall base their decision on the functions for which the HVDC link is to be used. By default an HVDC link shall be modelled in detail and the AC/DC part of the HVDC link

shall be exchanged by the TSOs concerned unless the functions that it is used for do not require this.

3. For both HVDC links modelled in detail and for those modelled in a simplified manner, the following data shall be included:
  - a. connection points.
4. For cross-zonal HVDC links modelled in detail, the TSOs concerned shall agree on which of them is to provide the detailed model by either including it in its IGM or by making it available separately. In the case of HVDC links that connect the CGM area with a bidding zone that is not part of the CGM area, the TSO that is within the CGM area shall include the detailed model in its IGM. Detailed models of HVDC links shall include
  - a. electrical characteristics;
  - b. type and characteristics of supported control modes.
5. HVDC links modelled in a simplified manner shall be represented by equivalent injections at the connection points.
6. In the case of HVDC links that connect the CGM area with a bidding zone that is not part of the CGM area, the TSO that is within the CGM area shall endeavour to conclude an agreement with the owners of HVDC links not bound by this methodology with the aim of ensuring their cooperation in meeting the requirements set out in this Article.

## Article 11

### Modelling of adjacent grids

1. Each TSO shall model HVDC links with adjacent grids pursuant to Article 10.
2. Each TSO shall model AC links with adjacent grids as described in this Article.
3. At the start of the process described in Article 4, each TSO shall make use of an equivalent model of the adjacent grids in its IGM.

## Article 12

### Topology

1. When building its IGM, each TSO shall ensure that
  - a. the IGM indicates the switched state, either open or closed, of all modelled switching devices;
  - b. the IGM indicates the tap position of all modelled power transformers with tap changers including phase-shifting transformers;
  - c. the topology of the IGM reflects the planned or forced unavailability of modelled items of equipment that are known or expected to be unavailable;
  - d. the topology of the IGM is updated to reflect remedial actions pursuant to Article 25 of Regulation 2015/1222 as well as topological agreed measures, if applicable;

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- e. taking into account c) and d), the topology of the IGM reflects the best forecast operational situation;
- f. the connectivity status of interconnectors and tie-lines to other TSOs is consistent with the IGMs of the relevant neighbouring TSOs;
- g. the topology of all IGMs created for intraday purposes shall reflect the forced unavailability of modelled equipment.

### Article 13

#### Energy injections and loads

1. When building its IGM, each TSO shall respect the following general principles with respect to energy injections and loads:
  - a. For the energy injections pattern
    - i. the IGM specifies an active and reactive power injection for each modelled in-service generation unit including synchronous condensers and pumps and this is applicable for each generation unit whether modelled in detail on an individual or composite basis or modelled as an aggregate;
    - ii. the specified active and reactive power injection for each modelled generation unit is consistent with the specified maximum and minimum active and reactive power limits and/or applicable reactive capability curve;
    - iii. active power injections associated with generation within the IGM shall be consistent with relevant remedial actions in accordance with Article 25 of Regulation 2015/1222 and other measures required to maintain the system within applicable operational security limits including but not limited to provision of sufficient upward and downward active power reserves as required for the purposes of frequency management;
  - b. For the load pattern
    - i. the IGM specifies an active and reactive power withdrawal for each modelled in-service load and pump;
    - ii. the sum of the active modelled load power withdrawals of modelled in-service loads and pumps shall match the total load of the considered scenario.
2. When building its IGM, each TSO shall respect the following principles with respect to energy injections:
  - a. in order to establish the injection pattern for the relevant scenario, the TSO shall scale or otherwise individually modify the active power injections associated with the modelled generation units;
  - b. for generation units modelled in detail, the availability status shall take into account the following:
    - i. outage plans;
    - ii. testing profiles;
    - iii. scheduled unavailability;
    - iv. any active power capacity restrictions;

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- c. for dispatchable generation units modelled in detail, the modelled dispatch pattern shall take into account the following:
    - i. for all scenarios
      - 1. the availability status;
      - 2. the applicable priority dispatch policies and agreements;
    - ii. for the day-ahead capacity calculation timeframe, the best forecast dispatch based upon a selection of the following:
      - 1. the relevant current, historical or forecast commercial/market data;
      - 2. a distinction between base load generation and marginal generation;
      - 3. established generation shift keys, merit orders or participation factors;
      - 4. any other relevant information;
    - iii. for the intraday capacity calculation timeframe
      - 1. the latest available market schedules;
  - d. for dispatchable generation units modelled as aggregates, the modelled dispatch pattern shall take into account
    - i. for all scenarios the best forecast dispatch pattern based on a selection of the following:
      - 1. relevant current, historical or forecast commercial/market data;
      - 2. distinction between base load generation and marginal generation;
      - 3. established generation shift keys, merit orders or participation factors;
      - 4. data on generation capacity of generation units modelled as aggregates, separated by primary energy sources and separated from load, and managed by an aggregator whose data are used in regional operational security analysis broken down by sub-stations of the equivalent model or the sub-stations to which the corresponding parts of the grid are connected;
      - 5. any other relevant information;
  - e. for all scenarios, for intermittent generation units modelled in detail, the modelled dispatch pattern shall take into account the availability status;
  - f. for all intermittent generation units whether modelled in detail or modelled as aggregates, the modelled dispatch pattern shall take into account
    - i. for the day-ahead capacity calculation timeframe the best forecast of intermittent generation derived from meteorological forecasts, updated no earlier than 15:00h in accordance with Article 14(3) of Regulation 2015/1222;
    - ii. for the intraday capacity calculation time-frame the latest forecast of intermittent generation derived from meteorological forecasts.
3. When building its IGM, each TSO shall respect the following principles with respect to loads:
- a. in order to establish the load pattern, the TSO shall scale or otherwise individually modify the nodal active and reactive power withdrawals associated with modelled loads and pumps;
  - b. for all scenarios this shall be based upon a selection of the following:
    - i. representative historical reference data for the relevant season, day, time, and other relevant data;
    - ii. SCADA and/or metered data;

- iii. state estimated data;
- iv. statistical analysis or forecast data;
- v. distinction between conforming and non-conforming load;
- vi. planned outages at least for loads modelled in detail;
- vii. for loads modelled in detail maximum active power consumption and characteristics of reactive power control, where installed as well as maximum and minimum active power available for demand response and the maximum and minimum duration of any potential usage of this power for demand response;
- viii. for loads modelled as aggregates and managed by an aggregator whose data are used in regional operational security analysis, aggregates of maximum and minimum active power available for demand response, separated from generation, and the maximum and minimum duration of any potential usage of this power for demand response managed by the aggregator in the corresponding parts of the grid broken down by sub-stations of the equivalent model or the sub-stations to which the corresponding parts of the grid are connected;
- ix. any other relevant information;
- c. for the day-ahead capacity calculation time-frame, for the loads modelled in detail that have demand response capacity, forecasts of demand response shall be based on
  - i. forecast of unrestricted active power available for demand response and any planned demand response;
  - ii. established generation shift keys, merit orders or participation factors;
- d. for the intraday capacity calculation time-frame, for the loads modelled in detail the IGM shall reflect the scheduled active and forecast reactive consumption.

#### Article 14

##### Monitoring

1. When building each IGM, each TSO shall respect the rules set out in this Article with respect to operational monitoring limits for all modelled grid elements.
2. For each scenario all operational limits shall be consistent with operational conditions including but not limited to the season and other relevant environmental and meteorological factors.
3. For each scenario, each TSO shall ensure that
  - a. the IGM specifies, for each explicitly modelled transmission line, cable, transformer and relevant item of DC equipment, either
    - i. a PATL if the rating does not depend upon meteorological conditions or the pre-fault loading; or
    - ii. the best forecast rating if the rating is dependent upon meteorological conditions or the pre-fault loading;
  - b. the IGM specifies, for the relevant assets, one or more TATLs, reflective of the corresponding season and based on the applicable PATL, for each explicitly modelled transmission line, cable, transformer and relevant item of DC equipment;



- c. the IGM specifies a TATL duration for all items of transmission equipment for which a TATL is specified, for each TATL specified;
- d. the IGM specifies a tripping current for each relevant item of explicitly modelled transmission equipment, if applicable;
- e. the IGM appropriately reflects the maximum and minimum acceptable voltages at each nominal voltage level, as per relevant locally applicable codes, standards, licences, policies and agreements;
- f. operational monitoring limits that apply to interconnectors and tie-lines to other TSOs are consistent with those specified in the IGMs of the relevant neighbouring TSOs;
- g. operational monitoring limits specified in the IGM are consistent with operational security limits;
- h. the IGM specifies artificial PATL and TATL limits on relevant individual items or groups of items of modelled transmission equipment in order to incorporate local transmission constraints that are not associated with steady state thermal or voltage security including constraints associated with transient or voltage stability;
- i. for all equivalent models of transmission equipment and for modelled items of equipment not operated by the TSO, including distribution networks, that are relevant with respect to operational security analysis and cross-zonal capacity calculation, the IGM specifies appropriate equivalent operating limits.

## Article 15

### Control settings

1. When building each IGM, each TSO shall specify appropriate control settings for at least the following items of regulating equipment, where modelled and relevant:
  - a. power transformers and associated tap changers;
  - b. phase-shifting transformers and associated tap changers;
  - c. reactive compensation devices, including but not limited to
    - i. shunt compensators including shunt capacitors or reactors or discretely switchable banks of shunt capacitors or reactors;
    - ii. static VAR compensators;
    - iii. synchronous condensers;
    - iv. static synchronous compensators (STATCOMs) and other flexible AC transmission system (FACTS) devices;
  - d. generators assisting with voltage regulation;
  - e. DC equipment.
2. In the case of the items of equipment referred to in points (a), (b), (c), and (d) of paragraph 1, each IGM shall include the following information, where relevant:
  - a. regulation status -enabled/disabled;
  - b. regulation mode -voltage, active power, reactive power, power factor, current, or other applicable mode;
  - c. regulation target or target range in kV, MW, Mvar, p.u., or other appropriate units;

- 
- d. regulation target deadband;
  - e. regulation participation factor;
  - f. regulated node.
3. In the case of the items of equipment referred to in point (e) of paragraph 1, each IGM shall include all relevant information regarding the following, where relevant:
    - a. operating mode -inverter/rectifier;
    - b. control mode -voltage, active power, reactive power, power factor, current, or other applicable mode;
    - c. active power targets;
    - d. voltage targets;
    - e. regulated nodes.
  4. Where a modelled item of DC equipment forms part of an interconnector each TSO shall ensure that the resultant flows on the interconnector are consistent with the agreed flows on direct current lines for the relevant scenario in accordance with Article 18.
  5. Each TSO shall ensure that target voltages and target voltage ranges are reflective of the relevant scenario and are reflective of applicable voltage control policies and operational security limits.
  6. Each TSO shall specify at least one slack node in each IGM for the purposes of managing mismatches between total generation and demand when performing a load flow solution.

#### Article 16

##### Assumptions on adjacent grids

1. When building each IGM each TSO shall update the operational assumptions with respect to adjacent grids with the most reliable set of estimations practicable. Following the successful completion of the checks described in Article 4(2)(h), the equivalent models of the adjacent grids shall be removed and replaced with equivalent injections at the relevant boundary points.
2. For each IGM the sum of injections at boundary points shall be equal to the corresponding net position.

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#### Article 17

##### Associated information

1. In order to make it possible to apply rules to change the characteristics of individual grid models during capacity calculation and other relevant business processes, each TSO shall make the following information available to all TSOs via the information platform referred to in Article 21:
  - a. generation shift keys.

## Article 18

### Net positions and flows on direct current lines

1. For all scenarios for the day-ahead capacity calculation time-frame pursuant to Article 3, each TSO shall follow the CGM alignment procedure described in Article 19 in order to comply with Article 18(3) of Regulation 2015/1222.
2. For all scenarios for the intraday capacity calculation time-frame pursuant to Article 3, in order to comply with Article 18(3) of Regulation 2015/1222
  - a. the best forecast of the net position for each bidding zone and of the flow on each direct current line shall be based on verified matched scheduled exchanges;
  - b. each TSO shall share with all other TSOs the net position for its bidding zone(s) and the values for the flow on each direct current line used in its IGM via the information platform described in Article 21 in accordance with the CGM process described in Article 22,
3. For all scenarios pursuant to Article 3 in case of bidding zones connected by more than one direct current line, in order to comply with Article 18(3) of Regulation 2015/1222 the TSOs concerned shall agree on consistent values for the flows on direct current lines to be used in each TSO's IGM. These shall also be the values that the TSOs make available to all other TSOs.

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## Article 19

### CGM alignment

1. For each scenario for the day-ahead capacity calculation time-frame pursuant to Article 3, each TSO shall prepare and share with all other TSOs via the information platform referred to in Article 21 in accordance with the CGM process description set out in Article 22, its best forecast of
  - a. the net position for its bidding zone, being its preliminary net position;
  - b. the flow on each direct current line connected to its bidding zone being the preliminary flows on each direct current line;
  - c. any other input data required by the algorithm pursuant to paragraph 2.
2. All TSOs shall jointly define an algorithm which for each scenario and for all bidding zones aligns the preliminary net positions and preliminary flows on each direct current line in such a way that following the adjustment by the algorithm
  - a. the sum of adjusted net positions for all bidding zones in the CGM area balances the targeted net position for the CGM area;
  - b. for all bidding zones connected by at least one direct current line the sum of flows on all direct current lines is mutually consistent for both bidding zones concerned.
3. The algorithm shall have the following properties or features in order to ensure that in accordance with Article 18(3) of Regulation 2015/1222 there is no undue discrimination between internal and cross-zonal exchanges:
  - a. the alignments of preliminary net positions and preliminary flows on each direct current line shall be spread across all bidding zones and no bidding zone shall benefit from any preferential treatment or privileged status with respect to the operation of the algorithm;
  - b. in its objective function the algorithm shall give appropriate weight to the following when determining the adjustments required:

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- i. the size of the adjustments required to each preliminary net position and the preliminary flows on each direct current line, which shall be minimised;
    - ii. the ability of a bidding zone to adjust its preliminary net position and the preliminary flows on each direct current line, based on objective and transparent criteria;
  - c. the algorithm shall specify objective and transparent consistency and quality criteria which the input data required from each TSO shall meet;
  - d. the algorithm shall be robust enough to provide the results pursuant to paragraph 2 in all circumstances given the input data provided to it.
4. TSOs shall agree on procedures
    - a. to reduce the absolute value of the sum of preliminary net positions for all bidding zones in the CGM area; and
    - b. to provide updated input data if necessary; and
    - c. to take into account reserve capacity and stability limits if it becomes necessary to update input data.
  5. TSOs shall regularly review and, if appropriate, improve the algorithm.
  6. TSOs shall publish the algorithm as part of the data to be provided pursuant to Article 31(3) of Regulation 2015/1222. If the algorithm was modified during the reporting period, TSOs shall clearly state which algorithm was in use during which period and they shall explain the reasons for modifying the algorithm.
  7. All TSOs shall jointly ensure that the algorithm is accessible to the relevant parties via the information platform referred to in Article 21.
  8. In accordance with Article 81 of Regulation 2015/1222 each TSO shall designate an alignment agent who shall perform, on behalf of the TSO, the following tasks in accordance with the process described in Article 22:
    - a. check the completeness and quality of the input data provided pursuant to paragraph 1 and, if necessary, replace missing data or data of insufficient quality with substitute data;
    - b. apply the algorithm in order to compute for each scenario and each bidding zone aligned net positions and aligned flows on all direct current lines that meet the requirements set out in paragraph 2 and make these available to all TSOs via the information platform referred to in Article 21;
    - c. ensure that the results obtained are consistent with those obtained by all other alignment agents (if any).
  9. Pursuant to Article 4(2)(f), each TSO shall ensure that its IGM is consistent with the aligned net position and aligned flows on direct current lines provided by the alignment agent.

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## Article 20

### Common Grid Model

1. In accordance with Article 81 of Regulation 2015/1222 and pursuant to Article 27(1) of Regulation 2015/1222 each TSO shall designate a merging agent who shall perform, on behalf of the TSO, the following tasks according to the process described in Article 22;

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- a. check the consistency of the IGMs provided by the TSO against the quality criteria defined pursuant to Article 23;
  - b. if an IGM fails the quality check referred to in (a), either obtain a new IGM of sufficient quality from the TSO responsible or substitute an alternative IGM in accordance with the substitution rules referred to in paragraph 4 and make this validated IGM available via the information platform referred to in Article 21;
  - c. apply the requirements pursuant to paragraph 2 in order to merge all IGMs into a CGM pursuant to Article 28(5) of Regulation 2015/1222 and make the resulting CGMs available to all TSOs via the information platform referred to in Article 21;
  - d. ensure that each CGM created is consistent with those obtained by all other merging agents (if any);
  - e. identify violations of operational security limits in the CGM;
  - f. obtain from the TSOs concerned IGMs updated in the light of the agreed measures if applicable and repeat steps (a) to (e) as required;
  - g. if applicable validate the resulting CGM and make it available via the information platform referred to in Article 21.
2. All TSOs shall jointly define the requirements applicable to the merging agents and the merging process in accordance with Article 24;
  3. Each merging agent shall meet the requirements referred to in paragraph 2 and shall implement the requirements applicable to the merging process referred to in paragraph 2.
  4. All TSOs shall jointly define substitution rules applicable to IGMs that do not meet the quality criteria set out in Article 23.
  5. Each TSO shall provide the data required by the substitution rules referred to in paragraph 4 via the information platform referred to in Article 21.

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## Article 21

### Information platform

1. All TSOs shall delegate the task of implementing and administering a joint information platform that provides at least the services described in paragraph 2 in accordance with Article 81 of Regulation 2015/1222.
2. The information platform shall at a minimum support the CGM process in the following ways and it shall have all the features required to this end:
  - a. intraday capacity calculation time-frame - each TSO shall be able to use the information platform in order to share with all other TSOs the net position for its bidding zone(s) and the values for the flow on each direct current line used in its IGM pursuant to the CGM process described in Article 22;
  - b. the information platform shall allow all relevant information on scheduled exchanges to be available from the information platform;
  - c. day-ahead capacity calculation time-frame - each TSO shall be able to use the information platform in order to share with all other TSOs pursuant to the CGM process described in Article 22 its best forecast of

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- i. the net position for its bidding zone, comprising its preliminary net position;
- ii. the flow on each direct current line connected to its bidding zone comprising the preliminary flows on each direct current line;
- iii. any other input data required by the algorithm further to Article 19(2);
- d. the algorithm pursuant to Article 19(2) shall be accessible via the information platform;
- e. the alignment agent(s) shall be able to make the aligned net positions and aligned flows on direct current lines that meet the requirements set out in Article 19(2) available to all TSOs via the information platform;
- f. each TSO shall be able to make associated information specified in Article 17 available to all TSOs via the information platform;
- g. each TSO shall be able to make all its IGMs available to all TSOs via the information platform;
- h. for each TSO and each scenario, all data required by the substitution rules referred to in Article 20(5) shall be available via the information platform;
- i. the information platform shall be able to provide information on the quality status of submitted IGMs including substitutions that were necessary;
- j. all merging agents shall be able to make the CGM available to all TSOs via the information platform;
- k. all information required with respect to boundary points pursuant to Article 7 shall be available via the information platform;
- l. the following items of information and/or data shall be available to all TSOs via the information platform:
  - i. generation shift keys.

**Article 22**  
**CGM process**

1. When preparing the CGM for the day-ahead capacity calculation time-frame, all TSOs, merging agents and alignment agents shall complete the following steps:
  - a. each TSO shall make preliminary net positions, preliminary flows on direct current lines as well as any other input data required for the CGM alignment process available to all TSOs via the information platform referred to in Article 21;
  - b. the alignment agent(s) shall check the completeness and quality of the input data provided pursuant to Article 19(1) and, if necessary, replace missing data or data of insufficient quality with substitute data;
  - c. the alignment agent(s) shall apply the algorithm in order to compute for each scenario and each bidding zone aligned net positions and aligned flows on direct current lines that meet the requirements set out in Article 19(2);
  - d. the alignment agent(s) shall make these aligned net positions and aligned flows on direct current lines available to all TSOs via the information platform referred to in Article 21;

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**Article 22**  
**Agreed Measures¶**  
<#>In the case of the day-ahead calculation time-frame, merging shall identify and suggest remedial actions based on the CGM to be available by 20:00h two days before the day of delivery. If the coordination among merging agents and TSOs leads to a decision to implement such actions, the relevant TSO shall implement these agreed measures and subsequent updates of its IGM.  
<#>In the case of the intraday calculation time-frame, merging shall identify and suggest remedial actions based on the CGM to be available by 19:00h on the day of delivery. If the coordination among merging agents and TSOs leads to a decision to implement such actions, the relevant TSO shall implement these agreed measures and subsequent updates of its IGM.  
<#>When proposing agreed measures merging agents shall ensure that the agreed measures are consistent with the methodology for remedial action capacity calculation pursuant to Article 25 of Regulation 2015/1222 and in line with the general objective of fair and non-discriminatory treatment pursuant to Article 3(e) of Regulation 2015/1222.

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- e. each TSO shall make its IGM available via the information platform pursuant to Article 21; pursuant to Article 4(2)(f) the TSO shall ensure that its IGM is consistent with the aligned net position and aligned flows on direct current lines provided by the alignment agent(s);
  - f. the TSO's merging agent shall
    - i. check the consistency of the IGM provided by the TSO against the quality criteria defined pursuant to Article 23;
    - ii. if an IGM fails the quality check referred to in (i), either obtain a new IGM of sufficient quality from the TSO responsible or substitute an alternative IGM in accordance with the substitution rules referred to in Article 20 (5) and make this validated IGM available via the information platform referred to in Article 21;
  - g. the TSO's merging agent shall
    - i. apply the requirements pursuant to Article 20(3) in order to merge all IGMs into a CGM pursuant to Article 28(5) of Regulation 2015/1222 and make the resulting CGMs available to all TSOs and coordinated capacity calculators for the purpose of capacity calculation via the information platform referred to in Article 21;
    - ii. validate each CGM obtained and ensure it is consistent with those obtained by all other merging agents (if any);
2. When preparing the CGM for the intraday capacity calculation time-frame, all TSOs, merging agents, and alignment agents shall complete the following steps:
- a. each TSO shall make its net position and flows on direct current lines for each scenario for the intraday capacity calculation time-frame available to all TSOs via the information platform referred to in Article 21. TSOs in bidding zones where the cross-zonal intraday market for the following day opens before 16:30h shall use the data as of 16:00h;
  - b. each TSO shall make its IGM available via the information platform in accordance with Article 21; pursuant to Article 4(2)(f) the TSO shall ensure that its IGM is consistent with the scheduled exchanges referred to in Article 18(2) as well as agreed measures determined on the basis of the CGM prepared in the previous time-frame;
  - c. the TSO's merging agent shall
    - i. check the consistency of the IGM provided by the TSO against the quality criteria defined pursuant to Article 23;
    - ii. if an IGM fails the quality check referred to in (i), either obtain a new IGM of sufficient quality from the TSO responsible or substitute an alternative IGM in accordance with the substitution rules referred to in Article 20(5) and make this validated IGM available via the information platform referred to in Article 21;
  - d. the TSO's merging agent shall
    - i. apply the requirements specified in Article 20(3) in order to merge all IGMs into a CGM pursuant to Article 28(5) of Regulation 2015/1222 and make the resulting CGMs available to all TSOs and coordinated capacity calculators for the purpose of capacity calculation via the information platform referred to in Article 21;
    - ii. validate each CGM obtained to ensure that it is consistent with those obtained by all other merging agents (if any);
  - e. following the validation of the CGM,

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 <#>following the validation of the CGM by 20:00h¶  
 the merging agent shall identify vi of operational security limits in th and propose to the TSOs concerne remedial actions in accordance wi 22;¶  
 if the coordination among agents and TSOs leads to decision to implement suc remedial actions, each TS implement these agreed n in subsequent updates of :

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- i. the merging agent shall, where applicable, make available an updated CGM including any agreed measures.
- 3. All TSOs shall ensure that the merging process and the CGM are completed in time for the day-ahead and intraday operational deadlines set out in Regulation 2015/1222 and methodologies required by Regulation 2015/1222 to be met and such that the most accurate and up to date model possible can be delivered for the purpose of capacity calculation in each timeframe.

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**Article 23**  
**Quality monitoring**

1. All TSOs shall jointly define quality criteria that IGMs have to meet in order to be merged into a common grid model. An IGM that does not meet these quality criteria shall be replaced by a substitute IGM.
2. All TSOs shall jointly define quality criteria that CGMs have to meet before they can be made available via the information platform.
3. All TSOs shall jointly define criteria that the preliminary net positions and preliminary flows on direct current lines as well as the other input data required for the CGM alignment process pursuant to Article 19 have to meet. Data sets that do not meet these criteria shall be replaced by substitute data.
4. All TSOs shall jointly define quality indicators that make it possible to assess all stages of the CGM process including, in particular, the CGM alignment process described in Article 19. They shall monitor these quality indicators and publish the indicators and the results of the monitoring as part of the data to be provided pursuant to Article 31(3) of Regulation 2015/1222.

**Article 24**  
**Timescale for implementation**

1. Upon approval of the present methodology each TSO shall publish it on the internet in accordance with Article 9(14) of Regulation 2015/1222.
2. All TSOs shall jointly develop a governance framework for the information platform referred to in Article 21 which shall at a minimum address the topics of ownership, hosting, cost allocation, licensing requirements, and operational responsibility. This governance framework shall be prepared in a manner timely enough to allow all TSOs to meet the deadline set out in paragraph 3 and it shall respect the provisions on delegation set out in Article 81 of Regulation 2015/1222.
3. By six months after the approval of the present methodology all TSOs shall organise the process of merging the individual grid models by completing the following tasks:
  - a. all TSOs shall jointly develop the governance framework referred to in paragraph 2. They shall respect the provisions on delegation set out in Article 81 of Regulation 2015/1222;
  - b. each TSO shall formalise the delegation agreement with the alignment agent referred to in Article 19. In devising this agreement each TSO shall respect the provisions on delegation set out in Article 81 of Regulation 2015/1222;

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- c. all TSOs shall jointly specify and develop the algorithm referenced in Article 19 and shall also specify the rules and process associated with the said algorithm. All TSOs will publish on the internet the specifications, rules and process associated with the algorithm referenced in Article 19;
  - d. all TSOs shall jointly define the quality criteria and quality indicators referred to in Article 23;
  - e. all TSOs shall jointly formulate the requirements with respect to merging agents and the merging process referred to in Article 20(2) as well as the substitution rules referred to in Article 20(4);
  - f. each TSO shall formalise the delegation agreement with the merging agent referred to in Article 20. In devising this agreement each TSO shall respect the provisions on delegation set out in Article 81 of Regulation 2015/1222.
4. By seven months after the approval of the present methodology or 14 July 2017, whichever is later, the information platform referred to in Article 21 shall be operational. All TSOs, all alignment agents, and all merging agents shall be connected to the information platform and shall be able to make use of all of its features as described in the present methodology.
  5. By thirteen months after the approval of the present methodology or 14 January 2018, whichever is later, all TSOs shall jointly ensure that the CGM process is operational and available for use by coordinated capacity calculators.
  6. All TSOs shall jointly prepare the available data related to quality monitoring in a sufficiently timely manner to allow these to be included in the first report referred to in Article 31 of Regulation 2015/1222 due by 14 August 2017. They shall prepare these data in subsequent years as required.

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## Article 25

### Language

The reference language for this CGMM Proposal shall be English. For the avoidance of doubt, where TSOs need to translate this 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 Regulation 2015/1222 and any version in another language the relevant TSOs shall, in accordance with national legislation, provide the relevant national regulatory authorities with an updated translation of the proposal.

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## How the NRAs' amendment request was incorporated into the Common Grid Model Methodology This version: 21 February 2017

In the summer of 2016, all TSOs submitted the Common Grid Model Methodology (CGMM) to all regulatory authorities for approval under Regulation 2015/1222 ("CACM Guideline"). Stakeholders had earlier been consulted on these documents and the public consultation included a workshop held at ENTSO-E Secretariat on 18 February 2016.

On 13 December 2016, a joint "All NRAs" request for amendment was agreed at the Energy Regulators' Forum. The relevant passage of the request for amendment reads as follows:

"Based on the above rationale, All Regulatory Authorities agree to request an amendment to the CGMM Proposal. This amendment should contain the following elements:

1. All TSOs should remove the CGM deadlines.
  - a. All TSOs should amend the description of the merging process to make clear that all TSOs must complete the merging process and the CGM in time to allow delivery of the day ahead and intraday operational deadlines required by Regulation 2015/1222 and its relevant methodologies.
  - b. In addition, the description must make clear that all TSOs must complete the merging process and CGM in time to allow delivery of the most accurate and up to date model possible for the purposes of capacity calculation in each timeframe.
2. All TSOs should remove the description on agreed measures in Articles 22 and 23 of the CGMM which anticipates the methodologies pursuant to Articles 20(2) and 35(1) of Regulation 2015/1222.
3. All TSOs should not mention that the entity ENTSO-E shall implement and administer the information platform nor that the ENTSO-E shall develop a governance framework for the information platform."

The present note (which was prepared by the CGMM drafting team following the "All TSOs" vote on approval of the amended CGMM for submission to the competent regulatory authorities and was thus not voted on by "All TSOs") outlines how the NRAs' request for amendment was implemented. All Article references refer to the amended CGMM which shall be submitted in two versions:

- With changes clearly tracked in the document (file name: CGMM-2016-05-27-1400h\_WP-1\_v04.pdf)
- With all changes accepted (file name: CGMM-2016-05-27-1400h\_WP-1\_v04\_all\_changes\_accepted.pdf)

### 1. All TSOs should remove the CGM deadlines.

This modification was implemented in Article 22 ("CGM Process"). We note, however, that the CGMM will have to be revised in order to incorporate the requirements of the (currently draft) Commission Regulation (EU) .../... of XXX establishing a guideline on electricity transmission system operation which in Articles 67 and 70, respectively, explicitly requires the incorporation of deadlines for the CGM process.

- a. All TSOs should amend the description of the merging process to make clear that all TSOs must complete the merging process and the CGM in time to allow delivery of the day ahead and intraday operational deadlines required by Regulation 2015/1222 and its relevant methodologies.
- b. In addition, the description must make clear that all TSOs must complete the merging process and CGM in

time to allow delivery of the most accurate and up to date model possible for the purposes of capacity calculation in each timeframe.

This modification was implemented by inserting Article 22(3).

2. All TSOs should remove the description on agreed measures in Articles 22 and 23 of the CGMM which anticipates the methodologies pursuant to Articles 20(2) and 35(1) of Regulation 2015/1222.

This modification was implemented by

- deleting a brief passage in Article 20
- completely removing Article 22 in the original version of the CGMM and
- deleting passages in the (new) Article 22 clearly marked in the amended document.

We note that the amendment request did not ask TSOs to completely avoid using the term "agreed measures". It is essential that the remaining references to "agreed measures" be retained in the CGMM and not be removed or transferred to other methodologies. The reason for this is that it must be absolutely clear from the CGMM that CGMs have to reflect "remedial actions agreed to be implemented based upon a common grid model" (which is the definition of "agreed measures"). Thus if remedial actions are agreed on the basis of a common grid model, TSOs need to be obliged to include these in their IGMs [Article 4(4)] and the merging agents have to ensure that these are included in the resulting CGM [Article 20(1)(f), Article 22(2)(e)(i)]. This requirement needs to be stated in the CGMM proper and not in any other methodology.

3. All TSOs should not mention that the entity ENTSO-E shall implement and administer the information platform nor that the ENTSO-E shall develop a governance framework for the information platform.

This modification was implemented by revising Article 21 and Article 24 accordingly.

Additional changes not explicitly requested by the NRAs

Minor additional changes were required in order to ensure the consistency of the revised document. For example, as Article 22 in the original version of the CGMM was completely removed, cross-references to Articles 22 et seq in the original version needed to be updated. All of these additional changes are also clearly marked as "tracked changes".