netbeheer nederland
energie in beweging

Openbare versie

Vereniging van
Energienetbeheerders
in Nederland

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Datum	12 maart 2018
Onderwerp	Codewijzigingsvoorstel methodologieën en voorwaarden op basis van Verordening (EU) 2017/1485 (GL SO)

Geachte heer Don,

Hierbij ontvangt u een voorstel van de gezamenlijke netbeheerders tot wijziging van de voorwaarden zoals bedoeld in artikel 31, eerste lid, van de Elektriciteitswet 1998. Dit voorstel bevat wijzigingen in de Systeemcode elektriciteit. De wijzigingen hangen samen met verplichtingen die voortvloeien uit de Verordening (EU) 2017/1485 van de Commissie van 2 augustus 2017 tot vaststelling van richtsnoeren betreffende het beheer van elektriciteitstransmissiesystemen (hierna op basis van de Engelse titel afgekort als GL SO), namelijk om een aantal door de gezamenlijke Europese transmissiesysteembeheerders opgestelde methodologieën en voorwaarden op nationaal niveau goed te keuren dan wel vast te stellen. Dat betreft vooralsnog de volgende documenten:

- All TSOs' proposal for the determination of LFC blocks for the Synchronous Area Continental Europe in accordance with Article 141(2) of the Commission Regulation (EU) 2017/1485 of 2 August establishing a guideline on electricity transmission system operation, d.d. 3 januari 2018,
- All TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities (KORRR) relating to Data Exchange in accordance with Article 40(6) of the Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a Guideline on Transmission System Operation,
- All TSOs' proposal for a common grid model methodology in accordance with Articles 67(1) and 70(1) of Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a guideline on electricity transmission system operation,
- All Continental European and Nordic TSOs' proposal for a Cost Benefit Analysis methodology in accordance with Article 156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

ABN-AMRO NL51 ABNA 0613 0010 36
KvK 09175117

Hoofdlijnen van het voorstel
Door middel van dit voorstel wordt een viertal door de gezamenlijke transmissiesysteembeheerders op basis van de GL SO opgestelde methodologieën en voorwaarden vooralsnog verankerd in de nationale codes in afwachting van de opname van een zelfstandige besluitgrondslag bij of krachtens de Elektriciteitswet 1998.

Aanleiding tot het wijzigingsvoorstel
De aanleiding tot dit voorstel is een expliciet verzoek van ACM omdat ACM heeft geconstateerd dat, anders dan bij de methodologieën en voorwaarden op basis van de Verordening (EU) 2015/1222 (GL CACM) en de Verordening (EU) 2016/1719 (GL FCA), artikel 5, zesde lid, van de Elektriciteitswet 1998 aan ACM thans geen grondslag biedt voor de goedkeuring van voorwaarden of methodologieën op basis van de GL SO. De enige andere bruikbare besluitgrondslag in de Elektriciteitswet 1998 is naar het oordeel van ACM artikel 31 en volgende. Door de desbetreffende methodologieën en voorwaarden op te nemen als bijlagen bij de Systeemcode elektriciteit is sprake van een codewijzigingsvoorstel zoals bedoeld in artikel 32 van de Elektriciteitswet 1998.

Inhoud van het voorstel
Wij stellen voor om aan de Systeemcode elektriciteit na artikel 2.2.29 een nieuw artikel toe te voegen dat als volgt luidt:

2.2.30 De netbeheerder van het landelijk hoogspanningsnet en, voor zover van toepassing de andere netbeheerders en overige aangeslotenen, zullen de navolgende voorwaarden of methodologieën in acht nemen:

a. All TSOs' proposal for the determination of LFC blocks for the Synchronous Area Continental Europe in accordance with Article 141(2) of the Commission Regulation (EU) 2017/1485 of 2 August establishing a guideline on electricity transmission system operation, d.d. 3 januari 2018, zoals opgenomen in bijlage 8;
b. All TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities (KORRR) relating to Data Exchange in accordance with Article 40(6) of the Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a Guideline on Transmission System Operation, d.d. <datum>, zoals opgenomen in bijlage 9;
c. All TSOs' proposal for a common grid model methodology in accordance with Articles 67(1) and 70(1) of Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a guideline on electricity transmission system operation, d.d. <datum> , zoals opgenomen in bijlage 10;
d. All Continental European and Nordic TSOs' proposal for a Cost Benefit Analysis methodology in accordance with Article 156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation, d.d. <datum> , zoals opgenomen in bijlage 11.

De aan de Systeemcode elektriciteit toe te voegen bijlagen 8 tot en met 11 zijn als bijlagen 2 tot en met 5 bij deze brief gevoegd.

Ten aanzien van de status van deze documenten geldt dat het in bijlage 8 op te nemen document op 12 januari 2018 reeds door TenneT aan ACM te goedkeuring is aangeboden op grond van artikel 6, derde lid, onderdeel g, gelezen in samenhang met artikel 141, tweede lid, van de GL SO.

De thans bijgevoegde versies van de in de bijlagen 9 tot en met 11 op te nemen documenten betreffen de versies zoals deze door ENTSO-E zijn geconsulteerd. De definitieve, in ENTSO-E verband vastgestelde documenten zijn thans nog niet beschikbaar, maar zullen uiterlijk op 14 maart 2018 door TenneT op grond van de respectievelijke artikelen uit de GL SO aan ACM ter goedkeuring worden aangeboden.

Toelichting op het voorstel
Zoals hierboven onder het kopje "Aanleiding ..." al is aangegeven, wordt dit voorstel ingediend vanwege de constatering van ACM dat een zelfstandige besluitgrondslag voor de methodologieën en voorwaarden op basis van de GL SO vooralsnog ontbreekt in de Elektriciteitswet 1998.

Bij de keuze om als alternatief te kiezen voor het ophangen van de bedoelde documenten als bijlagen bij de nationale codes, rijst de vraag naar de meest geschikte plaats daarvoor. De methodologieën onder de GL SO kunnen qua karakter goed vergeleken worden met de bindende afspraken die in het verleden tussen de Europese transmissiesysteembeheerders zijn gemaakt in UCTE-verband en waar op een aantal plaatsen in de Nederlandse codes naar wordt verwezen. Het is voor de hand liggend om bij de verankering van de onderhavige methodologieën en voorwaarden daarbij aansluiting te zoeken. Dat betreft enerzijds paragraaf 2.2 van de Systeemcode elektriciteit en anderzijds artikel 14 van de Samenwerkingscode elektriciteit. Beide keuzes zijn goed verdedigbaar. Omdat paragraaf 2.2 van de Systeemcode elektriciteit nu al de meeste verwijzingen naar UCTE-afspraken bevat en omdat de Systeemcode elektriciteit nu al een zevental bijlagen kent kiezen we voor de Systeemcode elektriciteit.

Er wordt voorgesteld om alle voorwaarden en methodologieën toe te voegen aan één artikel aan het eind van paragraaf 2.2 en niet, afhankelijk van de inhoud van de betreffende voorwaarden of methodologie, voor elk daarvan een afzonderlijk artikel op verschillende plekken in de codes te zoeken. Daarbij is mede in overweging genomen dat we van doen hebben met een tijdelijke situatie en dat het nu voorgestelde artikel en de bijbehorende bijlagen weer uit de code verdwijnen zodra de zelfstandige besluitgrond bij of krachtens de Elektriciteitswet 1998 is gerealiseerd.

Consequenties voor aangeslotenen en andere partijen
Deze codewijziging heeft geen consequenties voor aangeslotenen of andere betrokken partijen. Eventuele inhoudelijke consequenties volgen uit de onderhavige methodologieën die in Europees verband tot stand zijn gekomen en waarover in Europees verband al stakeholderconsultatie heeft plaatsgevonden. Die eventuele consequenties volgen niet uit de wijze waarop deze methodologieën nu verankerd worden in de Nederlandse codes.

Raakvlakken lopende dossiers
Deze codewijziging heeft geen relaties met andere lopende codewijzigingen.

Waren er alternatieven beschikbaar?
Er waren twee alternatieven beschikbaar. We zouden ervoor hebben kunnen kiezen om de inhoud van de methodologieën en voorwaarden te vertalen en de vertaalde teksten op de per artikel meest geëigende plek in de Nederlandse codes op te nemen. Het risico daarvan is dat er door de vertaling en inpassing onbedoeld verschillen ontstaan tussen de gemeenschappelijke in Europees verband opgestelde Engelstalige tekst en de in de Nederlandse codes geïntegreerde uitwerking daarvan. Wij achten dat een onwenselijke situatie.

Het andere alternatief is dat we geen voorstel voor verankering in de Nederlandse codes zouden hebben ingediend. In dat geval had TenneT in haar rol als transmissiesysteembeheerder de methodologieën ter goedkeuring aan de ACM aangeboden. Hoewel ACM meent dat zij op grond van de Elektriciteitswet 1998 geen goedkeuringsgrondslag voor deze methodologieën heeft, is TenneT van mening dat de Elektriciteitswet 1998 in samenhang met de GL SO deze grondslag wel biedt. De ACM heeft deze goedkeuringsgrondslag uitstekend verwoord in de randnummers 13 tot en met 17 van besluit ACM/DE/2016/208009 van 10 januari 2017. De keuze voor dit alternatief is echter niet gemaakt omdat het niet doelmatig is om een dergelijk procedureel en niet-inhoudelijk verschil van inzicht met ACM via een formele procedure te laten beslechten, mede rekening houdend met alle onzekerheid en vertraging in het besluitvormingsproces die daarvan het gevolg kunnen zijn.

Toetsing van het voorstel aan de criteria uit artikel 36 van de Elektriciteitswet 1998
Voor de toetsing van dit voorstel is alleen onderdeel h van artikel 36, eerste lid, van de Elektriciteitswet 1998 van belang. De GL SO is namelijk één van de Europese codes die op grond van Verordening 714/2009 en de richtlijn zijn opgesteld.

Gevolgde procedure
Het voorstel tot codewijziging is op 25 januari 2018 door de Taakgroep Regulering van Netbeheer Nederland vastgesteld als voorstel van de gezamenlijke netbeheerders zoals bedoeld in artikel 32, lid 1 van de Elektriciteitswet 1998.

Het overleg met de representatieve organisaties van partijen op de elektriciteitsmarkt, zoals bedoeld in artikel 33 van de Elektriciteitswet 1998 heeft plaatsgevonden in een vergadering van het Gebruikersplatform elektriciteits- en gasnetten, gehouden op 22 februari 2018. Het op dit voorstel betrekking hebbende deel van het verslag van deze bijeenkomst is opgenomen in bijlage 1 bij deze brief. Het overleg in het GEN heeft niet geleid tot aanpassingen aan het voorstel.

Implementatie van het codewijzigingsvoorstel
Gezien het karakter van dit voorstel, stellen wij voor om de besluitvorming erover samen te laten vallen met de beoogde gezamenlijke besluitvorming van de Europese toezichthouders over de desbetreffende methodologieën en voorwaarden.

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Uiteraard zijn wij graag bereid dit voorstel nader toe te lichten. U kunt daarvoor contact opnemen met de heer [redacted] van TenneT ([redacted] of [redacted]n@tennet.eu) of de heer [redacted] van ons bureau (gegevens zie briefhoofd).

Met vriendelijke groet,

[redacted]

André Jurjus [redacted]
directeur

Bijlagen
1. Verslag van het Gen, d.d. 22 februari 2018
2. LFC-blocks
3. CGM
4. KORRR
5. CGA

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Bijlage 1 **Relevante passage uit het verslag van de bijeenkomst van het gebruikersplatform elektriciteits- en gasnetten, gehouden op 22 februari 2018**

Van	**GEN 22 februari 2018**
Datum	22 februari 2018
Plaats	NBNL, Den Haag
Voorzitter	[redacted]
Secretaris	[redacted]
Aanwezig	*Namens de representatieve organisaties:* VMNED: [redacted] E-NL [redacted] VEMW: [redacted] *Namens de gezamenlijke netbeheerders:* NBNL: [redacted] TenneT: [redacted] GTS: [redacted]
Afwezig	NEDU, COGEN, Consumentenbond, EFET, FME-CWN, NOGEPA, NVDE, NWEA, UNETO-VNI, PAWEX, VA, VEDEK, Vereniging Eigen Huis, VGGP, VGN, VMNED, VNCI, VNO-NCW en VOEG

[...]

5. Concept codewijzigingsvoorstel methodologieën GL SO (D-2018-08873)

TenneT en **NBNL** geven een toelichting.

VEMW heeft het idee dat GEN hier de problemen van wetgever en toezichthouder aan het oplossen is. Uit Europese verordeningen vloeien nu eenmaal verplichtingen voort.
VEMW begrijpt dat er een update komt van KORRR; dat is aan een zusterorganisatie van VEMW toegezegd.

TenneT legt uit dat nog slechts een van de vier genoemde – als voorstel – definitief is. Voor de andere drie komen er binnenkort nieuwe versies, waarin de resultaten van de in december gehouden consultaties zijn verwerkt. De KORRR is aanzienlijk gewijzigd.
TenneT zal de correcte datum bij dit voorstel invullen.

VEMW vraagt of dit een dynamische verwijzing wordt.

TenneT ontkent dit.

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Bijlage 1 **Relevante passage uit het verslag van de bijeenkomst van het gebruikersplatform elektriciteits- en gasnetten, gehouden op 22 februari 2018**

De **voorzitter** concludeert dat de vergadering unaniem instemt met het doorzenden van het voorstel naar ACM.

All TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities (KORRR) relating to Data Exchange in accordance with Article 40(6) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a Guideline on Electricity Transmission System Operation

27/02/2018

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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 (hereinafter referred to as "TSOs") regarding the key organisational requirements, roles and responsibilities relating to data exchange (hereinafter referred to as "KORRR").

(2) The KORRR takes into account the general principles and goals set in Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereinafter referred to as "SO GL"), Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management, (hereinafter referred to as "CACM"), as well as, Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing (hereinafter referred to as "EB GL"). The purpose of the SO GL is to safeguard operational security, frequency quality and the efficient use of the interconnected system and resources. To achieve these goals, it is necessary that each party of the electric system has the necessary observability of the network elements and services that impact their activities. Especially relevant is the global demand-generation balance through the procurement of balancing services and activation of balancing energy bids, where EG BL assigns the responsibility to the TSO in the EB GL. The KORRR addresses in particular the key roles, requirements and responsibilities of the TSOs, the distribution system operators (hereinafter referred to as "DSOs"), the closed distribution system operators (hereinafter referred to as "CDSOs") and the significant grid users (hereinafter referred to as "SGUs") in relation to the data exchange necessary to ensure that observability.

(3) The KORRR takes into account and complements where necessary the operational conditions and requirements set out in the generation and load data provision methodology (hereinafter referred to as "GLDPM") developed in accordance with article 16 of CACM. While the GLDPM establishes which data has to be provided by whom and when to prepare the common grid model, the KORRR addresses who must exchange data as well as, how and when to perform the tasks defined in the SO GL. Furthermore, the GLDPM only refers to data exchange up to the day ahead, while KORRR also includes data exchange up to real time.

(4) Article 40(6) of the SO GL establishes the legal basis for the KORRR and lists the elements to be covered by the KORRR:

By 6 months after entry into force of this Regulation, all TSOs shall jointly agree on key organisational requirements, roles and responsibilities in relation to data exchange. Those organisational requirements, roles and responsibilities shall take into account and complement where necessary the operational conditions of the generation and load data methodology developed in accordance with Article 16 of Regulation (EU) No 2015/1222. They shall apply to all data exchange provisions in this Title and shall include organisational requirements, roles and responsibilities for the following elements:

(a) obligations for TSOs to communicate without delay to all neighbouring TSOs any changes in the protection settings, thermal limits and technical capacities at the interconnectors between their control areas;

(b) obligations for DSOs directly connected to the transmission system to inform their TSOs, within the agreed timescales, of any changes in the data and information pursuant to this Title;

(c) obligations for the adjacent DSOs and/or between the downstream DSO and upstream DSO to inform each other within agreed timescales of any change in the data and information established in accordance with this Title;

(d) obligations for SGUs to inform their TSO or DSO, within agreed timescales, about any relevant change in the data and information established in accordance with this Title;
(e) detailed contents of the data and information established in accordance with this Title, including main principles, type of data, communication means, format and standards to be applied, timing and responsibilities;
(f) the time stamping and frequency of delivery of the data and information to be provided by DSOs and SGUs, to be used by TSOs in the different timescale
s. The frequency of information exchanges for real-time data, scheduled data and update of structural data shall be defined; and
(g) the format for the reporting of the data and information established in accordance with this Title. The organizational requirements, roles and responsibilities shall be published by ENTSO for Electricity.

(5) Article 40(5) of the SO GL specifies that TSO shall determine, in coordination with DSOs and SGUs, data exchange applicability and scope based on the a) to d) categories in article 40(5) referring to specific articles in Title II of the SO GL. Applicability is therefore to be determined at national level and is subject to approval by the competent authority (National Regulatory Authority or another entity designated by the Member State).

(6) Article 40(7) of the SO GL specifies the TSOs' obligation to agree with relevant DSOs on the process for exchanging information between them, including the format of data exchanges.

(7) The KORRR shall ensure the provision of data necessary to perform the security analysis in accordance with article 75 of the SO GL which specifies the obligation of TSOs to develop a methodology for coordinating operational security analysis.

(8) Article 40(10) of the SO GL entitles DSOs with a connection point to a transmission system to receive relevant structural, scheduled and real-time information from relevant TSOs and to gather relevant structural, scheduled and real-time information from neighbouring DSOs. It also specifies the obligation of neighbouring DSOs to determine in a coordinated manner the scope of information exchanged between them and with the relevant TSO.

(9) Article 6(6) of the SO GL requires a proposed implementation time scale and a description of the expected impact of the KORRR on the objectives of the SO GL.

(10) The KORRR further establishes a common framework for data exchange for all TSOs in the interconnected system, in line with the requirement of article 4(1) (a) of the SO GL.

(11) With the aim of determining common operational planning principles as required in article 4(1) (b) of the SO GL, the KORRR allows for the receipt of data required to prepare scenarios to perform operational security analysis in the planning stage.

(12) The KORRR includes the organisation to exchange, among other, real time data, and the provision of services to determine common load-frequency control processes and control structures as required in article 4(1) (c) of the SO GL.

(13) To ensure the conditions for maintaining operational security throughout the Union as specified in article 4(1) (d) of the SO GL, TSOs need to have good observability of the system in order to perform reliable security analysis. The KORRR aims to set the framework for the TSOs to access necessary data for their respective observability area and prepare accurate scenarios.

(14) Data exchanges on capabilities and active power production are necessary for TSOs to follow processes to maintain a frequency quality level for all synchronous areas throughout the Union as defined in article 4(1) (e) of the SO GL.

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(15)The KORRR takes into account the exchange of structural and scheduled data between TSOs and DSOs to perform security analysis before and in real time to promote the coordination of system operation and operational planning as defined in article 4(1) (f) of the SO GL.

(16)Article 4(1) (g) of the SO GL aims at ensuring and enhancing the transparency and reliability of information about transmission system operation. The KORRR establishes the framework to regulate necessary information among different parties in the electric system to ensure operational security.

(17)The KORRR will contribute to the efficient operation and development of the electricity transmission system and the electricity sector in the Union while having good observability of the system to perform reliable security analysis which help to identify improvements in the transmission system.

(18)The KORRR contributes to the general objectives of the SO GL to the benefit of all TSOs, DSOs, SGUs, consumers, market participants, the Agency and regulatory authorities.

SUBMIT THE FOLLOWING KEY ORGANISATIONAL REQUIREMENTS, ROLES AND RESPONSILBITIES RELATING TO DATA EXCHANGE TO ALL REGULATORY AUTHORITIES:

TITLE 1
General Provisions

Article 1
Subject matter and scope

1. The KORRR as defined in the present document shall be considered the common proposal of all TSOs in accordance with article 40(6) of the SO GL and shall include organisational requirements, roles and responsibilities for data exchange according to Title II of this regulation.
2. The KORRR shall apply to all transmission systems, distribution systems and interconnections in the Union, in the area referred to in article 2(2) of the SO GL.
3. The KORRR shall apply to SGUs as referred to in Article 2(1) of the SO GL. SGUs that provide services to the system individually or through an aggregator shall comply with prequalification rules defined at a national level. The roles and responsibilities of an aggregator shall be defined in the respective service provision agreements in observance of national prequalification rules.
4. The KORRR shall apply to:
   a. CDSOs in their roles as relevant system operators. For the purposes of KORRR, CDSOs shall be considered as DSOs, as stated in article 3 (1) of the Commission Regulation (EC) 1388/2016 establishing a Network Code on Demand Connection (hereinafter referred to as "NC DCC"), and the requirements and responsibilities described shall apply accordingly.
   b. Transmission-connected CDSOs in their roles as SGUs in accordance with article 2(1) of the SO GL and, if determined at a national level within the applicability and scope of data exchanges subject to KORRR.
5. When applying the KORRR, system operators shall:
   a. apply the principles of proportionality and non-discrimination;
   b. ensure transparency;

c. apply the principle of optimisation between the highest overall efficiency and lowest total costs for all parties involved;
d. respect the responsibility assigned to the relevant TSO to ensure system security, as required by national legislation;
e. consult with relevant DSOs and take account of potential impacts on their system; and
f. follow take into consideration agreed European standards and technical specifications.

6. TSOs from jurisdictions outside the area referred to in article 2(2) of the SO GL may adopt the KORRR on a voluntary basis, provided that
   a. For them to do so is technically feasible and compatible with the requirements of SO GL;
   b. They agree that they shall have the same rights and responsibilities with respect to the data exchange process as the TSOs referred to in paragraph 2, in particular, they shall accept that the KORRR applies to the relevant parties in their control area as well;
   c. They accept any other legally feasible conditions related to the voluntary nature of their participation in the data exchange process that the TSOs may set;
   d. The TSOs referred to in paragraph 2 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 data exchange process on a voluntary basis have demonstrated objective compliance with the requirements set out in (a), (b), (c) and (d), of this paragraph, 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 KORRR process in accordance with the procedure set out in Article 5(3) of the SO GL.
7. The TSOs referred to in paragraph 2 shall monitor whether those TSOs participating in the data exchange process on a voluntary basis pursuant to paragraph 6 respect their obligations. If a TSO participating in the data exchange process pursuant to paragraph 6 neglects its essential obligations in a way that significantly endangers the implementation and operation of the SO GL, the TSOs referred to in paragraph 2 shall terminate that TSO's voluntary participation in the data exchange process in accordance with the procedure set out in Article 5(3) of the SO GL.

Article 2
Definitions

1. For the purposes of the KORRR, terms used in this document shall have the meaning of the definitions included in article 3 of the SO GL , article 2 of CACM, article 2 of the EB GL, article 2 of Regulation (EC) 714/2009 on conditions for access to the network for cross-border exchanges in electricity, article 2 of Commission Regulation (EU) 543/2013 on submission and publication of data in electricity markets, article 2 of Commission Regulation (EC) 631/2016 establishing a network code on requirements for grid connection of generators (hereinafter referred to as "NC RfG"), article 2 of NC DCC, article 2 of the Commission Regulation (EC) 1447/2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (hereinafter referred to as "NC HVDC"), as well as article 2 of the Directive 2009/72/EC of the European Parliament and of the Council concerning common rules for the internal market in electricity and the other items of legislation referenced therein.
2. The KORRR shall be binding upon all TSOs, their permitted successors and assigns- and irrespective of any change in the TSOs' names- as well as upon any other entities covered by the SO GL including DSOs and SGUs.

3. In the KORRR, unless the context requires otherwise:

    a. The singular indicates the plural and vice versa;
    b. The table of contents, headings and examples are inserted for convenience only and do not affect the interpretation of the KORRR;
    c. Any reference to legislation, regulations, directive, order, instrument, network code or any other enactment shall include any modification, extension or re-enactment of it then in force.
4. A modification in a network element, power generating module or demand facility is considered significant for the purpose of the KORRR when it is also considered significant in the NC RfG, the NC DCC or the NC HVDC. In this context, national specificities in the implementation process concerning the definition of the term "significant" need to be taken into account.
5. For the purpose of the KORRR, real time data means a representation of the actual state of the power generating modules, demand facilities or network elements when the data is measured.

Article 3
General responsibilities

1. Each TSO, DSO or SGU shall be responsible for the quality of the information they provide regarding their power generating modules, demand facilities or services to other parties.
2. On the basis of articles 48 to 50 and 53 of the SO GL, the KORRR renders the provision of data both to TSOs and DSOs as the default option. Pursuant to article 40 (5) of the SO GL, this approach can be revised at a national level in order to allow SGUs the provision of data only to the TSO or to the DSO to which they are connected unless otherwise required to provide services to the system. In those cases where an SGU only provides data to a TSO or to a DSO to which they are connected, the TSO and the DSO shall exchange between them the data related to that SGU according to the processes agreed according to the article 40(7) of the SO GL.
3. Subject to approval by the competent regulatory authority or by the entity designated by the Member State, in line with article 40 (5) of the SO GL each TSO, in coordination with the DSOs in its control area, shall define whether distribution connected SGUs in its control area shall provide the structural, scheduled and real-time data to the TSO directly or through its connecting DSO or to both. The decision for each type of information and SGU may be independent. When the data is provided directly to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available to the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO. The quality and granularity of the data shall be maintained or improved.
4. When the TSO or the DSO receives the data directly from the SGU, the TSO or DSO shall check that the data complies with the quality requirements specified by TSOs or when applicable by DSOs according to the KORRR before sharing it with another entity.
5. Adjacent DSOs and/or between the downstream DSO and upstream DSO shall inform each other on the processes and formats of any change in the data and information between them according to article 40(6) of the SO GL
6. DSOs shall be responsible for the installation, configuration, security and maintenance of communication links for data exchange with the TSO up to the communication interface point agreed with the TSO.

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7. SGUs providing scheduled data to the TSO and SGUs providing real time data according to article 6(5) of KORRR shall be responsible for the installation, configuration, security and maintenance of the communication links to exchange data up to the communication interface point with the TSO or with the DSO when the data is provided to the DSO, unless explicitly otherwise agreed with the TSO or DSO.
8. The TSO, or the DSO when data is directly provided to the DSO according to article 3(3) of KORRR, shall define the communication interface point for the exchange of scheduled data and real-time data with SGUs.
9. Subject to the agreement of the TSO or the DSO in case of SGUs providing directly data to a DSO, parties required to provide data under the KORRR shall be allowed to delegate all tasks or parts hereof assigned to it under the SO GL to one or more third parties, in case the third party can carry out the respective function at least as effectively as the delegating entity. The delegating entity shall remain responsible for ensuring compliance with the obligations under the SO GL, including ensuring access to information necessary for monitoring by the regulatory authority.

Article 4
Confidentiality

1. Unless otherwise explicitly stated, all data affected by the KORRR shall be confidential. In accordance with article 12 of the SO GL, each party receiving data according to the KORRR shall implement appropriate technical and organizational measures to ensure that data is not disclosed to any other person or authority, without prejudice to cases covered by national law, other provisions of the SO GL or other relevant Union legislation.
2. Subject to the confidentiality obligations set out in article 12 of the SO GL, TSOs may share the data obtained with all other TSOs that have fully implemented the requirements set out in the KORRR.

Article 5
Access to information

1. Each power generating module, demand facility or CDSO considered as a SGU according to article 2(1) of the SO GL shall have access to the structural information referring to its facilities stored by the TSO or DSO.
2. Each DSO shall have access to the structural, scheduled and real-time information of the SGUs connected to its distribution network.
3. According to article 40(10) of the SO GL, DSOs shall have access to the structural, scheduled and real-time information of the commissioned network elements of the transmission network in their connection point. Upon justification of the need for information for operational security reasons, reliable dynamic simulations of their grids, they may request further structural or real-time information from commissioned network elements of the transmission system of the control area they are connected. When the request of information comes from a CDSO, it shall not include the connection point of other CDSOs or SGUs. TSOs may give positive or justified negative answers to such requests.

4. SGUs shall have access to the structural, scheduled and real-time information of the commissioned facilities of the transmission system or distribution system in their connection point. It shall not include the connection point of other SGUs.
5. Competent national regulatory authorities shall have access to all information exchanged subject to the KORRR upon request.
6. The TSOs may share structural information of DSOs or SGU with a third party to comply with the responsibilities defined in the SO GL, subject to the formalization of confidentiality and a limitation of use agreement.

TITLE 2
Key Organisational Requirements, Roles and Responsibilities

Chapter 1
Responsibilities of TSOs

Article 6
General Responsibilities

1. Each TSO shall communicate to the relevant TSOs, the elements of their transmission system identified as part of its observability area according to the methodology of article 75 of the SO GL.
2. Each TSO shall communicate to the relevant DSOs of its control area, the elements of their distribution network identified as part of its observability area according to the methodology of article 75 of the SO GL.
3. Each TSO shall provide updated information of the network elements in its transmission system that is part of the observability area of other TSO to those TSOs in accordance with article 41 and 42 (2) of the SO GL.
4. Each TSO shall exchange real-time data with the other TSOs of the same synchronous area in accordance with article 42 (1) of the SOGL.
5. Subject to approval of the competent regulatory authority or approval of the entity designated by the Member State in accordance with article 40 (5) of SO GL, each TSO, in coordination with the DSOs and SGUs, shall define the SGUs in its control area which shall provide real time data.
6. Each TSO shall provide updated information of DSO network of its control area that is part of the observability area of other TSO to those TSOs.
7. Each TSO may provide updated information of the neighbouring TSO networks which have an impact on the distribution networks of its own control area to the DSOs operating those distribution networks.
8. All transmission and distribution data to be exchanged between TSO control areas shall be exchanged only through TSOs unless otherwise required by national legislation or specific agreements.
9. TSOs shall use the operational planning data environment platform for the exchange of structural and scheduled information with other TSOs for data required in accordance with articles 114, 115, 116 and 117 of the SO GL. All TSOs shall use the harmonized data format for data exchange among them in accordance with article 114 (2) of the SO GL.
10. Each TSO shall electronically store the information needed for its processes for the duration defined by national legislation.

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Structural data

Article 7
Structural data used by TSOs

1. In agreement with relevant DSOs, each TSO shall specify the format and may publish templates for the structural data that DSOs shall provide. The format or template has to include the detailed content of the structural data that have to be provided
2. Each TSO shall specify the format and may publish templates for the structural data that transmission connected SGUs and distribution connected SGUs that exchanges data directly with the TSO shall provide. The format or template has to include the detailed content of the structural data that have to be provided.

Article 8
Notification of changes

1. Each TSO shall review the structural information it shares with other TSOs at least every 6 months and provide updated information of the observability area to the neighbouring TSO in the following situations:
   a. At least 6 months before the planned commissioning of a new network element, power generating module or demand facility;
   b. At least 6 months before the planned final removal from service of the network element, power generating module or demand facility;
   c. At least 6 months before the planned significant modifications in the network element, power generating module or demand facility;
   d. As soon as possible in case there is a change in the observability area;
   e. As soon as an error in the data set transmitted earlier is detected.
2. According to articles 5(3) and 5(4), DSOs and SGUs may request an update of the structural data from its TSO.

Scheduled data

Article 9
Responsibilities of TSOs

1. Each TSO shall be capable of exchanging scheduled data with TSOs and with SGUs, DSOs or third parties with in its control area to whom the exchange of scheduled information may have been delegated. Scheduled data shall at least include generation and consumption schedules between two days ahead and close to real time, unavailability or limitations to active power production or consumption of SGUs and unavailability of network elements in the TSO's observability area.
2. In agreement with DSOs with in the TSOs' control area, each TSO shall specify the format and may publish templates to exchange the scheduled data between them.
3. In coordination with SGUs or third parties with in TSOs´ control area, each TSO shall define and publish the format of the information for the exchange of scheduled data.

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4. Each TSO shall define and publish the technical requirements, including time stamping, for the exchange of scheduled data with SGUs, DSOs or third parties with in its control area. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee the security, confidentiality and redundancy of the communications.

5. Each TSO shall communicate to the DSOs connected to the transmission system their planned and unplanned unavailability of network elements in their connection point. For planned unavailability, they shall agree on the necessary level of coordination and communication between them. For unplanned unavailability, the TSO shall communicate to them as soon as possible.

Real Time data

Article 10
Format of Real Time Information

1. Each TSO, in agreement with the DSOs in its control area, shall specify the detailed content of and publish the format for real-time data exchange between them related to the distribution network observability area within its control area.

2. Each TSO, in coordination with SGUs and DSOs, shall specify the detailed content of and publish the format for real time data exchange related to SGUs within its control area.

3. Each TSO shall specify the technical requirements, including time stamping, for real time data exchange related to the distribution network observability area and to the SGUs with in its control area. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications.

4. Each TSO, when exchanging real time information with other TSOs, shall follow and fulfil all the rules and obligations according to the current all TSOs practices in terms of:

   a. Logical connections between parties and protocols used;
   b. Network architecture including redundancy;
   c. Network security rules;
   d. Identification code (ID) and/or naming convention and data quality;
   e. Data transmission parameters and performance;
   f. Rules of conduct in the case of planned outages and disturbances of communication equipment.

5. Each TSO shall define the refresh rate for the real-time data exchanges in its control area. It shall not be longer than 1 minute.

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Chapter 2
Responsibilities of DSOs

Structural data

Article 11
Notification of changes

1. Each DSO shall review the structural information of network elements in the observability area and power generating modules and demand facilities in the control area it shares with the TSOs at least every 6 months and, in agreement with the TSO, provide updated information to the TSO in the following situations:
    a. At least 6 months before the planned commissioning of a new network element, power generating module or demand facility.
    b. At least 6 months before the planned final removal from service of the network element, power generating module or demand facility.
    c. At least 6 months before the planned significant modifications in the network element, power generating module or demand facility.
    d. As soon as possible in case there is a change in the Observability Area;
    e. As soon as an error in the data set transmitted earlier is detected.
2. Each DSO, in coordination with its TSO, shall specify the format and may publish templates for the structural data that distribution connected SGUs that exchanges directly data with the DSO shall provide. The format or template has to include the detailed content of the structural data to be provided.
3. According to article 5(4), SGUs connected at the distribution level may request the update of the structural data from its DSO.

Scheduled data

Article 12
Rights and responsibilities of DSOs

1. All DSOs within the observability area of the relevant TSO shall provide their planned unavailability of network elements to the TSO, at least in D-2 and D-1 and their unplanned unavailability as soon as possible. For planned unavailability, they shall agree on the necessary level of coordination and communication between them. Transmission connected DSOs shall provide data directly to the TSO. Non-transmission connected DSOs may provide data directly to the TSO or through its connecting DSO or to both, as defined in article 3(3). The frequency of delivery of scheduled data shall be defined at a national level.
2. Each DSO shall have access to the scheduled data of SGUs connected to its network. DSOs shall comply with the requirements defined by the relevant TSO to exchange scheduled data

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Real Time data

Article 13
Real Time Data provided by DSOs

1. Each DSO shall provide to its TSO real time data from the observability area defined by the TSO according to article 44 of SO GL.
2. Each DSO shall fulfil the requirements defined by the TSO in terms of:
   a. Logical connections between parties and protocols used;
   b. Network Architecture including redundancy;
   c. Network security rules;
   d. Identification code (ID) and/or naming convention and data quality;
   e. Data transmission parameters and performance;
   f. Rules of conduct in the case of planned outages and disturbances of communication equipment.
3. Each DSO, in coordination with its TSO and SGUs, shall specify the detailed content of and the requirements for real-time data exchange related to distribution connected SGUs that exchanges data directly with the DSO. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications. Each DSO shall provide the templates and formats to the SGUs for real time data exchange.

Chapter 3
Responsibilities of SGUs

Structural data

Article 14
Structural Data provided by SGUs

1. Each SGU connected to the transmission system shall provide to its TSO the structural data according to articles 45 and 52(1) of SO GL in the format specified by its TSO.
2. Each SGU connected to the distribution system shall provide directly to the TSO or through its connecting DSO or to both, as defined in article 3(3), the structural data according to articles 48 and 53 of the SO GL in the format specified by its TSO or DSO.

Article 15
Notification of changes

1. Each SGU shall review the structural information it shares with the DSOs or TSOs of the control area of SGU belongs to, at least every 6 months and provide updated information to the TSO and DSO in the following situations:

a. At least 6 months, before the planned commissioning of a new network element, power generating module or demand facility.

b. At least 6 months before the planned final removal from service of the network element, power generating module or demand facility.

c. At least 6 months before the planned significant modifications in the network element, power generating module or demand facility.

d. As soon as an error in the data set transmitted earlier is detected.

e. In case of an unforeseeable modification within the period of 6 months before the date of entry into force of the new situation described in points a, b and c, the SGU shall inform the TSO without delay.

Scheduled data

Article 16
Scheduled Data provided by SGUs

1. All SGUs within the control area of the TSO shall provide scheduled data to the TSO. Transmission connected SGUs shall provide data directly to the TSO. Distribution connected SGUs shall provide data directly to the TSO or through its connecting DSO or to both, as defined in article 3(3).
2. SGUs shall comply with the requirements defined by the relevant TSO or by the DSO when the data is exchanged trough the DSO, to exchange scheduled data. The frequency of delivery of scheduled data shall be defined at a national level.

Real Time data

Article 17
Real Time Data provided by SGUs

1. Subject to article 6(5) of KORRR, all concerned SGUs connected to the transmission system shall provide the real-time data directly to the TSO. Subject to article 6(5) of KORRR, all concerned distribution connected SGUs shall provide the real-time data to the TSO directly or through its connecting DSO or to both, as defined in article 3(3). All SGUs which are power generating modules not subject to the NC RfG, or which are HVDC systems not subject to the NC HVDC, or which are demand facilities not subject to the NC DCC, shall inform to the TSO about their technical capabilities for real time data provision. The evaluation process to exempt particular SGUs, in case of non-compliance with the requirement to provide real time data, shall be defined at national level.
2. Each SGU providing data directly to the TSO or the DSO when the data is directly provided to the DSO shall fulfil the requirements defined by the TSO in terms of:

   a. Logical connections between parties and protocols used;

   b. Network architecture including redundancy;

   c. Network security rules;

   d. Identification code (ID) and/or naming convention and data quality;

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e. Data transmission parameters and performance;

f. Rules of conduct in the case of planned outages and disturbances of communication equipment.

TITLE 3
Final provisions

Article 18
Implementation date of the KORRR

1. Upon approval of the KORRR each TSO shall publish it on the internet in accordance with article 8(1) of the SO GL.
2. By 18 months after entry into force of the SO GL, and in accordance with article 192 of the SO GL, TSOs shall apply the KORRR as described in Title 2 as soon as all regulatory authorities have approved the KORRR or a decision has been taken by the Agency in accordance with article 6(8) and 7(3) of the SO GL.

Article 19
Language

The reference language for the KORRR shall be English. For the avoidance of doubt, where TSOs need to translate the KORRR into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with article 8 (1) of the SO GL 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 KORRR.

SUPPORTING DOCUMENT TO ALL TSOS' PROPOSAL FOR THE KEY ORGANISATIONAL REQUIREMENTS, ROLES AND RESPONSIBILITIES (KORRR) RELATING TO DATA EXCHANGE

27.02.2018

1. PURPOSE AND OBJECTIVES OF THE SYSTEM OPERATION GUIDELINES

European Network of Transmission System Operators for Electricity (hereinafter referred to as "ENTSO-E") drafted the Commission Regulation (EU) 2017/1485 guideline on electricity transmission system operation (hereinafter referred to as "SO GL") to set out clear and objective minimum requirements for Operational Security and achieving the main goal of keeping the European interconnected Transmission Systems in continuous operation, in order to contribute to a harmonised framework for completion of the EU Internal Electricity Market (IEM) and to ensure non-discrimination, effective competition and the efficient functioning of the IEM.

Based on the SO Framework Guideline and on the Initial Impact Assessment provided by ACER, the SO GL states the Operational Security principles in terms of technical needs, considering market solutions compatible with and supporting security of supply.

2. PURPOSE AND OBJECTIVES OF KORRR

This document has been developed by the ENTSO-E to accompany the Key Organizational Roles, Requirements and Responsibilities (hereinafter referred to as "KORRR") and should be read in conjunction with that proposal.

It aims to provide interested parties with information about the rationale for the approach set out in the KORRR, outlining the reasons that led to the requirements specified in it.

The content of the KORRR document is created based on the scope for the methodology specified in article 40(6) of SO GL. The wording of the article is:

By 6 months after entry into force of this Regulation, all TSOs shall jointly agree on key organisational requirements, roles and responsibilities in relation to data exchange. Those organisational requirements, roles and responsibilities shall take into account and complement where necessary the operational conditions of the generation and load data methodology developed in accordance with Article 16 of Regulation (EU) No 2015/1222. ***They shall apply to all data exchange provisions in this Title and shall include organisational requirements, roles and responsibilities for the following elements****:*

a) *Obligations for TSOs to communicate without delay to all neighboring TSOs any changes in the protection settings, thermal limits and technical capacities at the interconnectors between their control areas;*
b) *Obligations for DSOs directly connected to the transmission system to inform their TSOs, within the agreed timescales, of any changes in the data and information pursuant to this Title;*
c) *Obligations for the adjacent DSOs and/or between the downstream DSO and upstream DSO to inform each other within agreed timescales of any change in the data and information established in accordance with this Title;*
d) *Obligations for SGUs to inform their TSO or DSO, within agreed timescales, about any relevant change in the data and information established in accordance with this Title;*
e) *Detailed content of the data and information established in accordance with this Title, including main principles, type of data, communication means, format and standards to be applied, timing and responsibilities;*
f) *The time stamping and frequency of delivery of the data and information to be provided by DSOs and SGUs, to be used by TSOs in the different timescales. The frequency of*

information exchanges for real-time data, scheduled data and update of structural data shall be defined; and

g) *The format for the reporting of the data and information established in accordance with this Title.*

The purpose of the KORRR is to define organizational requirements, roles and responsibilities regarding points a) to g), this means that the KORRR shall address how the exchange of information shall be and who shall define the details of that exchange of information, not to define specifically the details for each of those points.

Main added value of the KORRR is to define a general framework to organize the exchange of information between the different parties involved in the security of the electric system. The KORRR will address the organization of the data exchange so each party can get the necessary data to have observability of the part of the network with impact in their facilities to comply with the requirements defined in the SO GL.

2.1 LEGAL STATUS

Legal considerations of KORRR

The development of this document has been done within ENTSO-E, as the primary delivery body for the coordinated proposals relating to the implementation of the network codes. However, as the scope of TSOs required to produce it goes beyond membership those additional parties have also been included during internal review and approval.

The responsibility of providing data remains in the owner of the facility, even when it would be possible to delegate the task of providing the information. The responsibility of ensuring confidentiality remains with the collecting party. However, all data that is required to be shared under SO GL or any other legislation is then subsequently expected to also be covered under the respective confidentiality clauses of such a legislation. When data is required to be provided to the respective National Regulatory Authority (hereinafter referred to as “NRA”) for the purposes of compliance monitoring the responsibility for such data provision is expected to be done directly on a national basis.

Many parties referred to in SO GL and subsequently within the KORRR are by the generic term used within the scope article 2(1) of SO GL. However, it is acknowledged that other designations for similar parties with similar or overlapping roles may exist, e.g. TO, DNO etc. When possible, additional guidance will be given on the inclusion or application of these requirements on such parties. However, the overarching expectation is that the respective member state will determine the correct interpretation and application of these responsibilities on other parties.

The development of the KORRR is done according to the requirements from SO GL. It stablishes responsibilities to transmission system operators (TSOs), distribution system operators (DSOs), closed distribution system operators (CDSOs) and significant grid users (SGUs).

Those TSOs from countries not members of the European Union are not directly bound by this methodology. It needs to be reflected in the wording of the KORRR the possibility for those TSOs to join the methodology in a voluntary basis.

Network Codes (hereinafter referred to as “NC”) shall apply at ENTSO-E level and replace former UCTE Operational Handbook. When it is necessary to reach agreements at Synchronous Area level, a Synchronous Area Operational Agreement (SAOA) will be formalized.

Legal status of the Supporting Document

This document accompanies the KORRR and is provided for information purposes. Consequently, this document has no legally binding status.

2.2 GENERAL PRINCIPLES

SO GL defines the tasks and responsibilities that TSOs shall fulfil to safeguard Operational Security in Normal State and Alert State. Responsibilities in Emergency, Blackout and Restoration system state are defined in Regulation (EU) 2017/2196 Network Code on Emergency and Restoration (NC ER).

The content of the SO GL is divided into three main parts with technical requirements as follows:

Part II – Operational Security (OS) requirements of the SO GL deal with detecting system states, frequency control, voltage control, short-circuit current, power flows, contingency analysis, protection, dynamic stability limits.

Part III – Operational Planning and Scheduling (OPS) requirements of the SO GL deal with data for operational security analysis in operational planning, Operational security analysis, Outage coordination, System adequacy, ancillary services, operational scheduling, as well as the specifications for the ENTSO provided platform for Electricity operational planning data environment (OPDE).

Part IV – Load-Frequency Control and Reserves (LFCR) of the SO GL deal with Operational agreements, Frequency quality, Load-frequency control structure, Operation of load-frequency control, frequency containment reserves (FCR), frequency restoration reserves (FRR), replacement reserves (RR), exchange and sharing of reserves, time control process, co-operation with DSOs and transparency of information.

To be able to carry out the provisions of System Operation Guideline, TSOs needs a crisp and clear status of the system. A crisp and clear status can only be obtained with an adequate exchange of information between the parties involved in keeping the stability of the system.

Stakeholders considered to be significant for the system stability are the following:

- TSO of the control area, control block;
- Neighbouring TSOs;
- DSOs within the control area, control block;
- CDSOs within the control area, control block;
- SGUs in the control area, including both generator and demand facilities according to article 2(1) of SO GL.

The information exchanged shall be adequate to have accurate representations of the status of the electric system in the different timeframes covered by the SO GL, from year-ahead to real time.

In SO GL Part II, Title 2 - Data exchange, the three main categories of information to be considered in the information exchange are:

- **Structural information**: includes all the general and permanent characteristics and attributes of the facility and represents the capabilities of the equipment and is necessary to prepare static and dynamic models of the facilities;
- **Scheduled information**: represents the expected behaviour of the facilities and networks elements in the scheduled time frame and near future, considering near future up to one year according to provisions of SO GL. It includes information related to outage planning and generation/ consumption schedules;
- **Real time information**: represents the present behaviour of the facility.

To perform security analysis in real time and thereby, secure operational security limits in the present, a combination of the structural and the real-time information is compulsory. To be able to reach real time safely, security analysis need to be performed in advance. Structural and scheduled information is needed to prepare cases with the expected situation on the system in the near future.

The objective of the KORRR is to define common rules at European Union (EU) level to address the exchange of the required information between the significant stakeholders of the European electricity system.

To complement this explanation, chapter 6 of "Supporting Document for the Network Code on Operations Security" can be consulted.

Level of Detail

Data exchanged following SO GL shall be the necessary one to perform security analysis and guarantee operational security in the Electric System. Regulation shall achieve a certain level of harmonization between ENTSO-E members and also allow flexibility for future developments. Title 2 of SO GL currently achieves harmonization addressing the required exchange of information without defining all details. Stablishing a specific level of detail in European regulation will be too tight and inflexible because it will need long times to adapt if new developments or requirements of the system appear.

In line with this, to allow national or regional specificities, as the KORRR shall not define the detailed information to be exchanged between TSOs and significant stakeholders but shall establish the responsibilities at national level of **who shall define** and approve the detailed information to be exchanged.

In the end, horizontal TSO-TSO, harmonization shall be reached, adopting ENTSO-E proposal for applied international standards, leaving flexibility for vertical TSO-DSO and TSO-SGU exchange of information, to be defined at national level. In this case, the KORRR shall refer to who defines the exchange of information.

Reciprocity

Title 2 of SO GL provides the framework for the exchange of information between TSOs and the other significant stakeholders of the System to safeguard Operational Security. To achieve it, each agent in the system shall be able to gather the necessary information to comply with the tasks defined by SO GL. Articles 40(8), 40(9) and 40(10) of SO GL consider and regulate the exchange of information from TSOs to DSOs and/or SGUs. In this sense, the KORRR needs to consider bidirectional flows of information between all affected parties and takes it into account in the articles related to confidentiality and accessibility of data.

The TSOs:

- as responsible for balancing shall gather information from SGUs connected both at Transmission and Distribution level.
- as Transmission Network Operators shall gather information from
  - SGUs connected at Transmission level and
  - DSOs regarding Observability Area in the distribution network.
  - Neighbouring TSOs regarding Observability Area in the neighbour Transmission Systems

The DSOs and CDSOs, as Distribution Network Operators shall gather information from:

- SGUs connected to distribution level and
- TSOs regarding their Connection Point(s) in the Transmission System and other assets with relevance for their network
- Neighbouring DSOs

The SGUs gather information from:

- TSOs regarding their Connection Point when they are connected to the transmission system or
- DSOs regarding their Connection Point when they are connected to the distribution network
- Instructions from TSOs regardless of the SGU Connection Point.

Significant Grid Users

The KORRR includes organizational requirements, roles and responsibilities of all the parties involved in the interconnected networks operation: TSO, DSO, SGUs. In particular, according to article 2 of SO GL, the list of the SGUs is the following:

- existing and new power generating modules classified as type B, C and D;
- existing and new transmission-connected demand facilities;
- existing and new transmission-connected closed distribution systems;
- existing and new demand facilities, closed distribution systems and third parties if they provide demand response directly to the TSO;
- providers of re-dispatching of power generating modules or demand facilities by means of aggregation and providers of active power;
- existing and new high voltage direct current (HVDC)

The Grid Users included in the previous list shall provide data to DSOs and TSOs; and they are responsible for the data and its modifications. SGUs are the owners of the information from their facilities or the services they provide to the System so they are responsible for that information. Indirect exchange through a third party, for example Balancing Service Provider (BSP) or Balance Responsible Party (BRP), shall be allowed but the final responsibility of the exchange and quality of the information shall rely always in the owner of the facility.

Distribution connected facility: Article 2 of SO GL defines significant grid users as used in the guideline. SGU Demand is defined in Art d) and e). Demand facilities can only be SGU if they are directly connected to the Transmission System or they provide demand response directly to the TSO or if they provide re-dispatching with their facility. This definition ensures that households or very small loads won't be considered in the SO GL.

When a grid user is qualified to provide services to the system, it becomes a SGU and it will have to fulfil the requirements settled in the SO GL, the KORRR or any other relevant European regulation. Regarding Data Exchange, once a grid user is considered significant, it will have to comply with the requirements of the proposal: communications, infrastructures, quality… In those occasions where the SGU is also providing services, then it will have also to provide the data to the system operator. In the occasions where the SGU is not providing services, it may not be obliged to send data.

Clarity

The KORRR includes specific terms in order to describe the general data exchange in an appropriate detail level. All of the terms that are used are defined in the KORRR itself or in the SO GL. The following terms need a clarification as they were mention in the public consultation:

- Modification: the modification of a facility is defined as an event for sending updated structural data. Since a modification isn't clearly defined, the KORRR can be used for defining the term "modification of a facility". Significant modification is defined in the NC RfG, def. 65. The national implementation of the connections codes shall be also considered.
- The term "Logical connection" is used to indicate the way that the data flows through the network from one device to the next without regard to the physical interconnection of the devices.
- The expression "Rules of conduct" is used to indicate the procedures used in example in the following cases:
    - event in the communication: if the principal link is lost, it's necessary to use the second one, if the second also fails it's necessary to use the email, if it also fails it's necessary to use the telephone…
    - planned outages of the communication link: to inform in advance the parties who receive the data specifying the timing and the possible consequences for the data exchange

Flexibility

One concern regarding flexibility of the KORRR are the various ways of creating the electrical simulation model of a facility may be provided, e.g. by equipment manufacturers, by facility owner, by design consultants. Definitely the responsibility for providing the complete electrical simulation model of a facility is on the shoulder of the facility owner requesting the grid connection.

Flexibility needs to cover at least the following two issues:

- What amount / scope of information to exchange, and,
- The format of that information exchange.

An example of the first aspect of flexibility is the information required to prepare static/ dynamic simulation models. Two opposite approaches can be considered:

- Simulation models to be provided to the TSO as a whole to be directly used for simulations;
- Necessary parameters to be provided to allow TSOs to build the simulation models to be used in simulations of the national grid system.

Either approaches or an intermediate one can be considered at national level. The KORRR does not prescribe neither of them.

For small scale facilities, e.g. main components of type B facilities the electrical simulation model be required as a part of the equipment certificate according to EU 2016/631 (NC RfG) Art. 2 (47). If a member state (NRA) wants to prepare the notification process in an efficient manner, a “positive list” of main components could be created with the pre-approved components included, but this is solely up to the member states to decide.

For large scale facilities, e.g. type C and D facilities the electrical simulation model of the key components could be provide directly to the relevant TSO if required in order to keep track of confidentiality. Still the responsibility for providing the complete electrical simulation model of a facility is on the shoulder of the facility owner requesting the grid connection

Another essential issue of interest for the stakeholder is the big variation in the current applied information exchange practices between the member states. It’s recommended to the TSOs to keep the flexibility in the implementation within its own control area: DSOs and SGUs; and secure a knowledge sharing across the European electricity market in this aspect. This is foreseen to be reflected in the KORRR based on open wording in order to allow flexibility for different practices in different countries.

This will affect how the information is exchanged between the TSO and the SGUs, e. g. directly or indirectly information exchange through the DSO. Each TSO may have different templates for structural information within its control area depending on the impact on the transmission capacity. Even if the double provision is considered the default option, different paths for the information to be exchanged may be coordinated at national level in order to avoid exchange of duplicated information. The same issues will be on scheduled and real-time information.

Different TSOs and DSOs may have different templates for structural, scheduled and real-time information which will be respected to the outmost extend where possible.

2.3 RELATION WITH SO GL: INTERPRETATION OF ARTICLES 40(5) AND 40(7)

Articles 48 to 50 and 53 of the SO GL relates to the exchanges of information between TSOs, DSOs and SGUs connected to the distribution network states that SGUs shall provide data both to the TSO and the DSO they are connected to. The KORRR in article 3(2), in line with it renders it as a default option. This exchange of data can be done by the SGUs through a third party like a control centre, an aggregator or any other entity considered in the national implementation of the network codes.

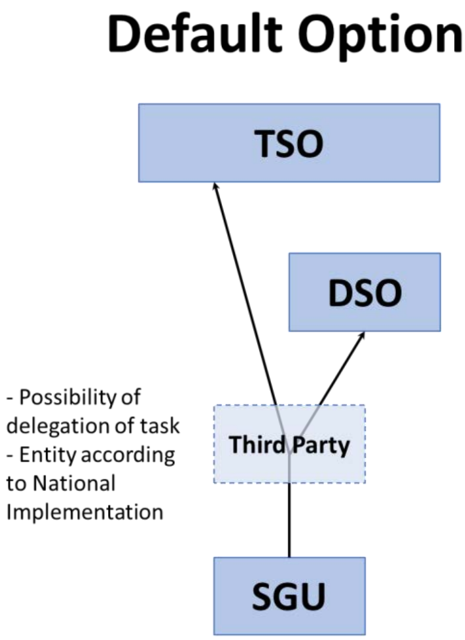

Figure 1. The arrows represent the data related to distribution connected SGUs

In order to facilitate the exchange of data and reduce the costs of SGUs, the KORRR in article 3(3) reflects to possibility that article 40(5) of the SO GL gives the TSO, in coordination with DSOs and SGUs, subject to NRA approval to determine the scope and applicability of articles 44, 47, 48, 59, 50, 51, 52 and 53 so the data is only provided to one System Operator, only to the TSO or only to the DSO. When this is the case, to ensure that both the TSO and the DSO to whose network the SGU is connected have the necessary data, system operators have to exchange between them the data related to the SGU. This has to be done according to the processes to exchange data between TSO and DSO agreed according to article 40(7) of the SO GL.

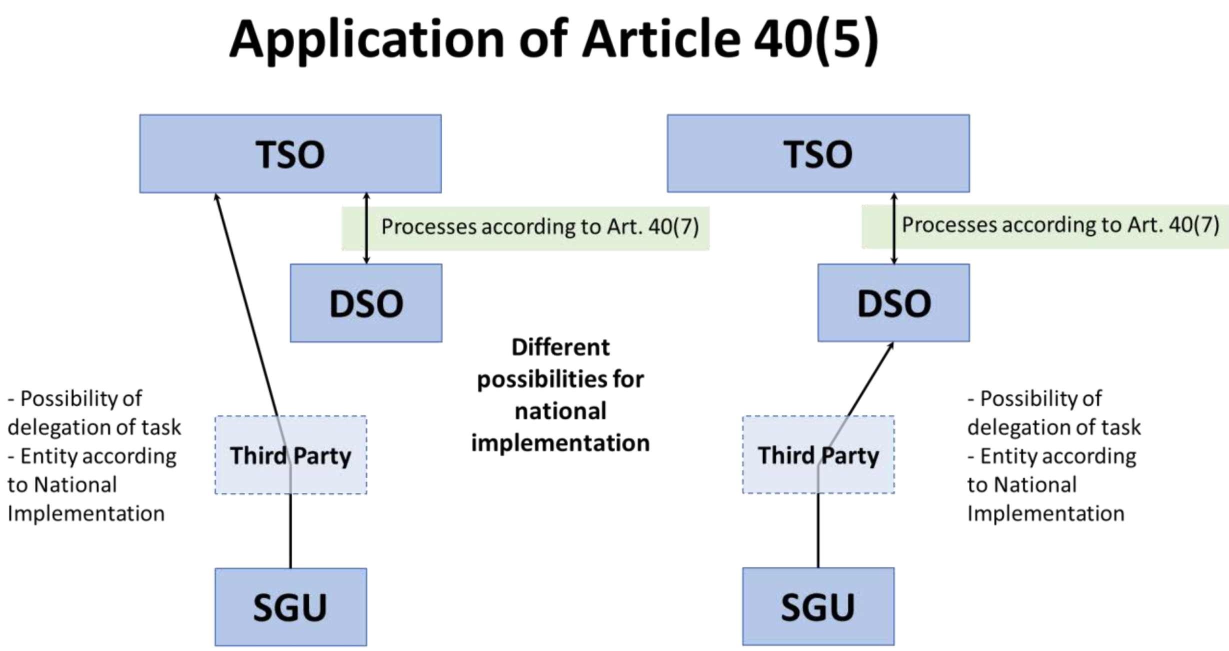

Figure 2. The arrows represent the data related to distribution connected SGUs

Provision of data by SGUs connected to distribution grids to TSOs can be implemented according to of the following three options:

1) TSOs could have access to the required data from a distribution connected SGU through an aggregator or balancing service provider (BSP).
   In many cases, the aggregator or BSP have direct contact with the plant, for example, for bidding in the day-ahead and intraday markets or for issuing instructions to balance their portfolio. The same communication channel from the plant to the aggregator or BSP that is used for participating in the wholesale markets or internal BRP or BSP management may be used for participating in the balancing markets or for other system services like congestion management. In this case, the data can also be sent from the TSOs to the connecting DSO when it is needed to perform the DSO tasks. This option is considered under paragraph 3 (9) of KORRR in which SGUs delegate part of their tasks to a third party.
2) DSOs pass relevant data in an efficient and timely way to the TSO. One option is for the DSO to create direct access to this data via their SCADA systems.
   If DSOs have direct contact and receive directly individual real-time data collected at the point of connection, another implementation option may be that DSOs send the data to TSOs.
3) TSOs could also be able to have access to distribution connected SGUs through a direct technical solution of the TSO.
   The TSO may also access the individual data of the SGU by collecting it directly at the point of connection. This option requires higher communication needs and access to the point of connection in the DSO network by the TSO.

It has to be clarified, that the KORRR national implementation should not be reduced to the three possibilities mentioned before, there will be other possibilities for exchanging data. For example, the case where SGUs enters the data on a common platform to which both TSO and DSO have access to.

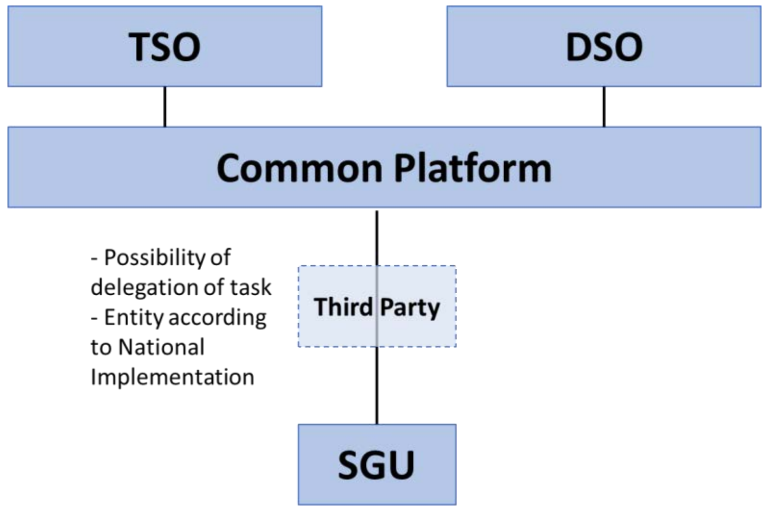

Figure 3. The arrows represent the data related to SGUs that could be share in a common platform

2.4 Relation with other Network Codes and guidelines

2.4.1 Relation with Network Code on Requirements for Generators

(Official Journal of the European Union – 14/04/16)

General requirements

Not included.

Structural data

Article 14 defines the information exchanges of type B modules. Type B power-generating modules shall fulfil the following general system management requirements with regard to information exchange: the relevant system operator, in coordination with the relevant TSO, shall specify the content of information exchanges including a precise list of data to be provided by the power-generating facility.

Article 32 and 35 define the data exchange regarding the power-generating module document (PGMD) within the notification procedure. The format of the PGMD and the information to be given therein shall be specified by the relevant system operator. The relevant system operator shall have the right to request that the power-generating facility owner include the following in the PGMD: detailed technical data of the power-generating module with relevance to the grid connection as specified by the relevant system operator.

Article 41 defines the tasks of the relevant system operator regarding compliance monitoring. The system operator shall make publicly available a list of information and documents to be provided. The list shall cover at least the following information, documents and requirements: details of the technical data on the power-generating module of relevance to the grid connection.

Article 43 defines the data exchange regarding the compliance simulation. The relevant system operator shall provide the power-generating facility owner with technical data and a simulation model of the network.

Scheduled Data

Scheduled data is not included.

Real time data

Article 14 defines the basic capability of power generating modules regarding real time data exchange. Type B power-generating modules shall be capable of exchanging information with the relevant system operator or the relevant TSO in real time or periodically with time stamping, as specified by the relevant system operator or the relevant TSO.

2.4.2 Relation with Network Code on Demand Connection

(Official Journal of the European Union – 17/08/16)

General requirements

Article 18 defines the general requirements regarding the information exchange in terms of compliance to the standards and time stamping specified by the relevant TSO.

Structural data

Article 14 defines the information exchanged regarding the short-circuit current. The relevant TSO shall provide the transmission-connected demand facility owner or the transmission-connected distribution system operator an estimate of the minimum and maximum short-circuit currents to be expected at the connection point. TSO shall request information from a transmission-connected demand facility owner or the transmission-connected distribution system operator concerning the contribution in terms of short-circuit current.

Article 21 defines the requirements regarding the simulation models. Each TSO may require simulation models or equivalent information showing the behaviour of the transmission-connected demand facility owner or the transmission-connected distribution system operator. Content and format of simulation models or equivalent information shall be specified by each TSO.

Article 24 and 25 regarding to the interim operational notification and the final operation notification define additional information may be requested by TSO in terms of technical data, simulation models and studies.

Demand units within a demand facility or a closed distributions system connected at a voltage level of or below 1kV have to provide an installation document including technical data (Article 32).

Scheduled Data

Scheduled data is not included.

Real time data

Real time data is not included.

2.4.3 Relation with Network Code on Emergency and Restoration

(Official Journal of the European Union – 28/11/17)

General requirements

No general requirements.

Structural data

Structural data exchange is not included.

Scheduled Data

Scheduled data exchange is not included.

Real time data

Real time data exchange is not included.

2.4.4 Relation with Guideline Forward Capacity Allocation

(Official Journal of the European Union – 26/09/16)

General requirements

According to article 17 of the FCA GL, no later than six months after the approval of the GLDPM established for CACM GL, all TSOs shall jointly develop a proposal for a single GLDPM for delivering the generation and load data required to establish the common grid model for long-term time frames. The KORRR shall take into account and complement the GLDPM according to Article 16 of CACM GL.

Structural data

Structural data exchange is included in the GLDPM version 2 according to article 17.

Scheduled Data

Scheduled data exchange is included in the GLDPM version 2 according to article 17.

Real time data

Real time data is not included.

2.4.5 Relation with Network Code on High Voltage Direct Current Connections and DC connected Power Park Modules

(Official Journal of the European Union – 26/08/16)

General requirements

Not included

Structural data

If requested by TSOs, HVDC owners shall perform studies to demonstrate that no adverse interaction (for instance Sub-synchronous torsional interaction) may occur. The HVDC System Owner shall provide the TSO all relevant data and models (Articles 29, 31). TSO can require the HVDC System Owner to deliver simulation models which properly reflect the behaviour of the HVDC System in both steady-state, dynamic simulations (fundamental frequency component) and in electromagnetic transient simulations. TSO shall define the format in which models shall be provided (Article 54).

The Relevant Network Operator shall define and provide the method and the pre-fault and post-fault conditions for the calculation of at least the minimum and maximum short circuit power at the Connection Point (Articles 32, 42).

Technical data, models of the HVDC and studies shall be provided by HVDC owners and DC-connected Power Park Modules with the Interim Operational Notification (ION) and Final Operational Notification (FON) (Articles 57, 58, 62, 63).

Scheduled Data

Scheduled data is not included.

Real time data

Real time data is not included.

2.4.6 Relation with guideline on Capacity Allocation and Congestion Management

(Official Journal of the European Union – 24/07/15)

General requirements

According to Article 16, no later than 10 months after the entry into force of this Regulation all TSOs would have had to develop a proposal for a single methodology for the delivery of the generation and load data required to establish the common grid model (GLDPM).

Structural data

Structural data exchange is included in the GLDPM.

Scheduled Data

Scheduled data exchange is included in the GLDPM.

Real time data

Real time data is not included.

2.4.7 Relation with guideline on Electricity Balancing

(Official Journal of the European Union – 18/18/17)

General requirements

No general requirements.

Structural data

Requirements for data exchange specific for the balancing services: defined at European level for the exchange of balancing services between TSOs and at national level for the pre-qualification tests.

Scheduled Data

Requirements for data exchange specific for the balancing services: defined at European level for the exchange of balancing services between TSOs and at national level for the pre-qualification tests and evaluation of the provision of balancing services.

Real time data

Requirements for data exchange specific for the balancing services: defined at European level for the exchange of balancing services between TSOs and at national level for the pre-qualification tests and evaluation of the provision of balancing services.

2.5 RELATION WITH OTHER METHODOLOGIES

2.5.1 Relation with Generation and Load Data Provision Methodology

(Official Journal of the European Union – 24/07/15)

Generation and Load Data Provision Methodology (GLDPM) sets out the generation and load data which may be required by TSOs in order to establish the common grid model.

The methodology specifies:

- which generation units and loads are required to provide information to their respective TSOs for the purposes of capacity calculation: Distribution and closed distribution system operators, generation, load, HVDC links
- the information to be provided by generation units and loads to TSOs: structural data, infrequently changing variable data, variable data (Articles 5-15)
- the deadlines applicable to generation units and loads for providing the information (Article 16)

The KORRR and the GLDPM are related because both refer to the exchange of data between TSOs, DSOs and SGUs but they do not have the same purpose.

The GLDPM was developed following the two market codes CACM and FCA. The purpose is to have the data from relevant loads of generators that are cross-border relevant and may have impact at Capacity Calculation Region level. So, the affected loads and generators are the biggest ones connected to the higher voltage level. Application of this methodology in voluntary in the Member States.

The KORRR is developed following the Operational SO GL. The purpose is to allow TSOs, DSOs and SGUs to access the data to guarantee system security. Opposing to the GLDPM, the KORRR is not voluntary and it applies to all SGUs as defined in article 2(1) of the SO GL and revised at national level according to article 40(5). This means that it affects more users than the GLDPM, not only the biggest ones. The purpose of the KORRR is to be compatible with the GLDPM setting similar or more flexible requirements than the GLDPM. This way, the smaller grid users may have the same or more flexible requirements than the biggest ones and grid users sending data according to the GLDPM would comply also with the KORRR.

3. Results from the survey of data exchange for ENTSO-E members

A questionnaire has been prepared by the project team and sent out to TSOs. This section provides a summary of the answers, reflecting the current practice in data exchange for more than a half of ENTSO-E members.

Note that because multiple answers were possible, the percentages do not necessarily sum up in 100% in the results interpretation below.

Main requirements for information exchanges (structural, schedule and real-time) are imposed by NRA-s (in more than 90% answers) or other non-ENTSO-E methodologies (+71%). ENTSO-E methodologies at present have the highest representation for schedule data (71% of respondents), and for structural and real-time data the representation is only in slightly over 50% of respondents.

Although NRAs mainly prescribe the requirements, information exchange does not flow through the NRA, except in seldom cases: one TSO reported to exchange Market information with their SGUs through the NRA, on intraday and daily basis and one country will implement in 2017 a process to exchange Structural information through NRAs.

3.1 Scope

	Structural Information	Scheduled information	Real Time information
Neighbouring TSOs	92 %	88 %	92 %
DSOs/ CDSOs	96 %	63 %	63 %
Transmission Connected SGU	96 %	92 %	92 %
Distribution Connected SGU	63 %	58 %	71 %
Ancillary Services Providers	76 %	71 %	88 %

NEMOs	17 %	71 %	17 %

Table 1: System agents that exchange information with the TSOs

Regarding structural information, most data is exchanged with those directly connected to the Transmission System: DSOs/ CDSOs (96 %), Transmission Connected SGU (96 %) and Neighbouring TSOs (92 %). It is also important the number of TSOs that exchange structural information with other agents not directly connected to the Transmission System: Distribution Connected SGU (63 %) and Ancillary Services Providers (75 %). For this type of information, NEMOs (17 %) are not very representative.

Real Time Information Exchange have a similar pattern to structural information. Almost all TSOs deal with Neighbouring TSOs (92 %), Transmission Connected TSOs (92 %) and DSOs/CDSOs (83 %). In this case, the number of TSOs that share information with Ancillary Services Providers (88 %). NEMOs (17 %) are also little represented.

The importance of NEMOS is increased in case of Scheduled Information (71 %). On the other hand, the number of TSOs exchanging scheduled information with DSOs/CDSOs is lower (63 %). Neighbouring TSOs (88 %), Transmission Connected SGU (92 %) and Ancillary Services Providers (71 %) keep similar values to Structural Information.

	Direct Exchange with SGU Generator	Direct Exchange from SGU Demand	Direct exchange from DSO	Exchange through DSO from SGU
Before 1st Commissioning	100 %	83 %	75 %	54 %
Final Removal from service	96 %	79 %	71 %	50 %
Modification of the Facility	96 %	83 %	75 %	46 %
Correction of Errors	88 %	71 %	63 %	38 %
Periodic	29 %	21 %	25 %	29 %

Table 2: Criteria/ frequency to exchange structural data

Structural information is exchanged by TSOs at least in five identified cases. This flow of information can happen directly with the owners of the information of through the operator of the network where the agent is connected. Most TSOs directly share information in some cases with SGU and DSOs. This is especially true when they are directly connected to the Transmissions System. On the contrary, only half of the TSOs share the information with Distribution Connected SGU through DSOs.

		Direct Exchange with SGU Generator	Direct Exchange from SGU Demand	Direct exchange from DSO	Exchange through DSO from SGU	Exchange through NEMO from SGU
Outage Planning	Over Year	66 %	29 %	29 %	0 %	8 %
	Yearly	96 %	58 %	58 %	21 %	13 %
	Monthly	58 %	42 %	38 %	13 %	13 %
	Weekly	54 %	38 %	42 %	8 %	13 %
	Other	17 %	8 %	4 %	4 %	4 %
	Event driven	88 %	54 %	63 %	13 %	8 %
Market	D-2	17 %	17 %	4 %	0 %	0 %
	Daily	88 %	58 %	29 %	21 %	29 %
	Intraday	58 %	42 %	13 %	8 %	25 %
	Hourly	54 %	38 %	17 %	8 %	4 %
	Below hour	38 %	25 %	13 %	4 %	8 %
	Other	8 %	8 %	0 %	0 %	0 %
	Event driven	71 %	38 %	29 %	8 %	4 %

Table 3: Criteria/ frequency to exchange scheduled data

Scheduled information can be divided in two parts depending on the time frame: Horizons over the week will be referred to as “Outage planning” and below the week as “Market”. All TSOs that answered the questionnaire said that they have an information system to exchange scheduled information.

Outage planning

- Exchange of over one year scheduled information is mainly done with generators (67 %) and to some extent with SGU Demand (29 %) and DSOs (29 %) directly connected to the Transmission System.
- More important is the Yearly planning. Almost every TSO have this process with generators (96 %) and half of them with SGU Demand (58 %) and DSOs (58 %) directly connected to the Transmission System. In some cases, information from Distribution Connected SGU flows through DSOs (21 %) or NEMOs (13 %).
- Monthly and weekly coordination also takes place. Like in the case all cases, the closest coordination takes place with generators.
- In a few cases there are different time frames to the ones mentioned in the questionnaire.
- Quite usual is the event driven exchange of information, taking place whenever a defined situation happens. There can be many different situations, for example, a change in the data.

Market

- Information exchanged in D-2 is reduced;
- With Daily market, the interlocutors of TSOs is much higher. Most Generators directly exchange with TSOs (88 %) and also SGUs (58 %). Not so frequent is to do the process directly with the DSO (29 %), through the DSO (21 %) or the NEMO (29 %).
- In the intraday market, the amount of energy is smaller and so is the exchange of information. Still, there is some information that flows through NEMOs.
- Hourly and below hour exchanges of information take place with similar distributions but the participation of NEMOs as these services are usually operated by the System Operator.
- In a few cases there are different time frames to the ones mentioned in the questionnaire.
- Quite usual is the event driven exchange of information, taking place whenever a defined situation happens. There can be many different situations, for example, a change in the data.

3.2 LEVEL OF DETAIL

In the questionnaire, we have provided three levels of detail for information exchanged with definitions as follows:

- Overall information (OI): Low level of detail. Models might not be developed with that information so they shall be provided apart;
- Detailed for further processing (DF): Medium level of detail. Further information would be necessary to develop all models; and,
- Very detailed (VD): High level of detail. It would allow to develop all models.

For exchange of structural information, most of respondents are currently exchanging it at levels VD (54%) or DF (33%). Even those that indicated mainly level OI exchange some part of information at higher levels of detail (e.g., for transmission connect at level VD, for distribution connected at level OI).

4. PROVISIONS OF THE KORRR

The KORRR organization can be seen as a matrix. At first, responsibilities of the different agents are grouped to make it easier to read for the different affected parties. Then, for each agent, chapters are grouped for each kind of information. The summary can be seen in the following diagram:

	General	Structural Data	Scheduled Data	Real Time data
Responsibilities of TSOs	**Chapter 1**			
	Art. 6	*Art. 7, 8*	*Art. 9*	*Art. 10*
Responsibilities of DSOs	**Chapter 2**			
	-	*Art. 11*	*Art. 12*	*Art. 13*
Responsibilities of SGUs	**Chapter 3**			
	-	*Art. 14, 15*	*Art. 16*	*Art. 17*

Figure 4: Aspects covered by each article of the KORRR

4.1 Structural Information

Structural data include all the general and permanent information of the assets: characteristics, attributes, capabilities, etc. Structural data are necessary to prepare static and dynamic models of the facilities used to carry out static and dynamic security analysis.

All the parties involved have to exchange at least the list of information defined in SO GL.

The format of the structural data exchanged among TSOs is defined in the Common Grid Model Methodology (CGMM). At national level each TSO has to define the format and publish the templates to be used by DSOs and SGUs to provide structural data.

The update of the information is driven by the following events:

- new network element or facility;
- final removal from service of the network element or facility;
- significant modifications in the network element or facility;
- update of the observability area;
- error

All the data gathered by TSOs have to be stored in a data storage updated and maintained by TSOs. DSOs and SGUs can have access to the information referred to own facilities.

The following scheme summarizes the flow of information among all the parties involved. The reference to the articles of the KORRR is indicated in the scheme.

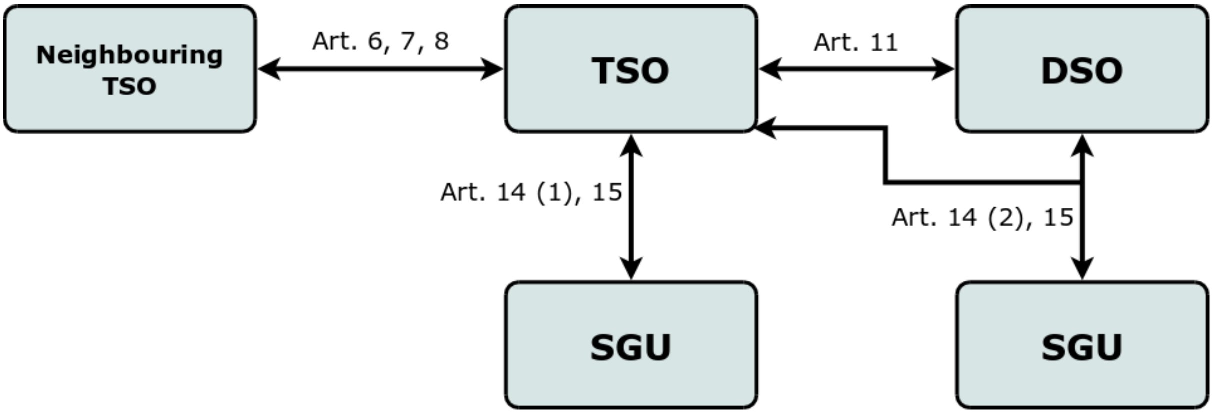

Figure 5: Exchange of Structural information

4.2 Scheduled information

Scheduled information represents the expected functioning of the different elements of the System in the future. Together with structural data allow to prepare a scenario of the expected satiation of the System in a specific moment in the future to perform Security Analysis for that timeframe.

Scheduled information can be divided in two subsets of information: outage planning and generation-load programs, also referred to run-scheduled. All this information can be considered in many different timeframes depending on the moment of the future for which the Analysis are done. Title 2 of SO GL addresses exchanges of scheduled information between Day-ahead and real-time.

At national level, the exchange of run-schedules between a TSO and the DSOs and SGUs within its control area shall be addresses by means of an information system managed by the TSO. The TSO shall define and publish the format of the information and the technical requirements to connect and access the information system. TSOs shall also store information about schedules.

Regarding outage planning, TSOs and DSOs, as grid operators shall communicate the unavailability of their grid elements.

The reference to the articles of the KORRR is indicated in the scheme.

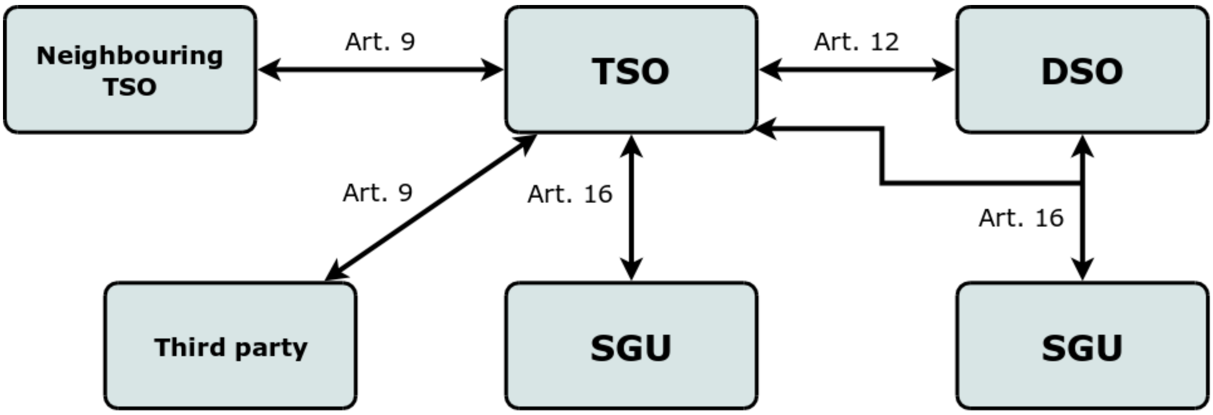

Figure 6: Exchange of Scheduled information

4.3 Real Time information

Real-time data exchanges for TSO include telemetry measurements or calculated (estimated) values for the following non-exhaustive variables:

- active and reactive powers (line flows, interchange power, generation, load, reserves);
- busbar voltages;
- frequency and frequency restoration control error;
- setpoints (load-frequency controller);
- tap changer positions of transformers and compensating equipment;
- open/close position of switching equipment.

Combined with the structural data, they are used to produce study models used to carry out static and dynamic security analysis in real-time.

All the parties involved have to exchange at least the list of information defined in SO GL.

For real-time data exchange, standard but legacy communication protocols are typically used: inter-control centre protocols (ICCP) as specified in the international standard IEC 60870-6 and the device oriented information modelling and mapping to communication protocols specified in the international standard series IEC 61850, IEC 61970, IEC 61968, IEC 61400-25, IEC 62351, IEC 61325. The update of the information is driven by the protocol used and the local configuration.

The IEC and CEN/CENELEC standardization body have analysed the impressive collection of standards in the field of Smart Grid and communication and cyber security aspects. The IEC Smart Grid Standardization Roadmap provides an overview on these standards. Some of these standards are considered to be core standards for any implementation of communication and cyber security aspects within current and future electricity system.

Core standards are standards that have an enormous effect on any communication and security solution. These core standards are forming the “backbone” of the IEC standards portfolio. The fundamental standards are the following:

- IEC 61850 Power Utility Automation, Hydro Energy Communication, Distributed Energy Resources Communication. The standard series is the fundamental specifications for all communication within future electricity network systems.
- IEC 61970 Common Information Model (CIM). Generation management systems, EMS (Energy Management System)
- IEC 61968 Common Information Model (CIM). Generation management systems, DMS (Distribution Management System); DA; SA; DER; AMI; DR; E-Storage
- IEC 61400-25 communication with wind power plants
- IEC 62351 Security aspects
- IEC 61325 Market communication aspects
- IEC 62056 COSEM – smart grid metering communication
- IEC 61508 Functional safety of electrical/electronic/programmable electronic safety-related systems
- IEC 60870-6 Inter Control Centre Protocols (ICCP) secure communication between control centre.

New standards could provide a more advanced and enhanced functionality that may in the future replace these communication protocols.

All the data gathered by TSOs have to be stored in a data storage updated and maintained by TSOs. DSOs and SGUs can have access to the information referred to own facilities (which is untypical for real-time data exchange).

The following scheme summarizes the flow of information among all the parties involved. The reference to the articles of KORRR is indicated in the scheme.

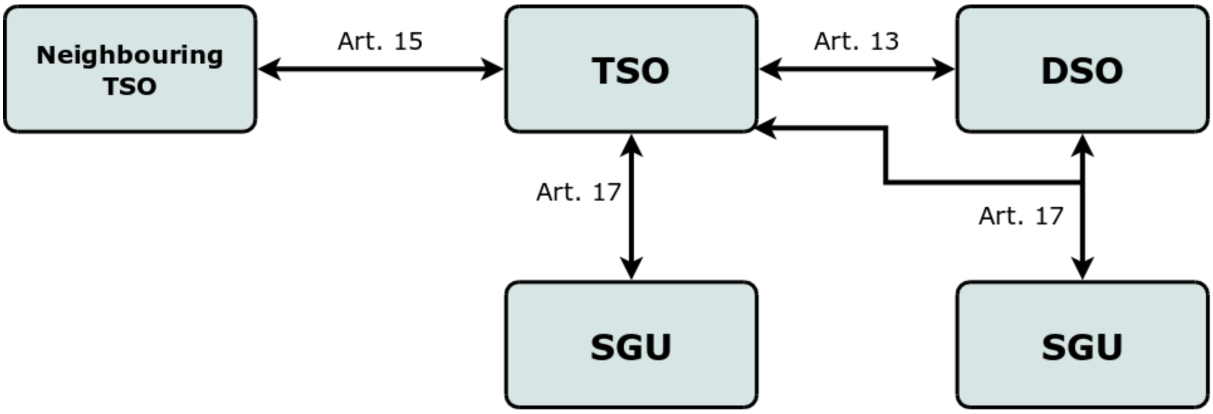

Figure 7: Exchange of Real Time information

5. REFERENCES

[1] "Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation", Official Journal of the European Union, August 2017"

[2] "NC OS Supporting Document", ENTSO-E, September 2013

[3] "OPS Supporting Document", ENTSO-E, September 2013

[4] "Final LFCR Supporting Document", ENTSO-E, September 2013

[5] "Supporting Document for the final Network Code on Emergency and Restoration" ENTSO-E, March 2015

[6] "P.O. 9: Información intercambiada por el operador del sistema" Spanish Regulation, December 2015

[7] "TSO-DSO Data Management report", ENTSO-E, CEDEC, EDSO, Eurelectric, GEODE, July 2016"

[8] SEGCG/M490/G Smart Grid Set of Standards version 4.1, Jan 6th, 2017

6. Assessment of the KORRR against Article 40(6)

	Requirements of Article 40(6) of SO GL	Extent to which the provision is met
40(6)	By 6 months after entry into force of this regulation, all TSOs shall jointly agree on key organisational requirements, roles and responsibilities in relation to data exchange. Those organisational requirements, roles and responsibilities shall take into account and complement where necessary the operational conditions of the generation and load data methodology developed in accordance with Article 16 of Regulation (EU) No 2015/1222. They shall apply to all data exchange provisions in this Title and shall include organisational requirements, roles and responsibilities for the following elements:	**Article 1** of KORRR states the subject matter and scope and defines this proposal as the common one by all TSOs according to article 40 (6) of SO GL. **Whereas (3)** recognizes the link with GLDPM developed according with article 16 of Regulation (EU)2015/1222 establishing a guideline on CACM. GLDPM establishes which data has to be provided by whom and when to prepare the common grid model, while the KORRR addresses who must exchange data as well as, how and when to perform the tasks defined in the SO GL. Furthermore, the GLDPM only refers to data exchange up to the day ahead, while KORRR also includes data exchange up to real time.
a	obligations for TSOs to communicate without delay to all neighbouring TSOs any changes in the protection settings, thermal limits and technical capacities at the interconnectors between their control areas;	All types of information referred to in article 40 (6) (a) are included in the structural data of elements included in observability area**. Article 7** of KORRR states the requirements for TSOs to exchange the structural data necessary to operate the system. The cases to update the structural data share with other TSOs is defined in **Article 8**
b	obligations for DSOs directly connected to the transmission system to inform their TSOs, within the agreed timescales, of any changes in the data and information pursuant to this Title;	**Article 7** states the obligation for DSOs to provide the TSO with the structural information and **article 11 (1)** defines the case when the information needs to be updated. **Article 12 (1)** defines the provision of scheduled data from DSOs to TSOs. **Article 13 (1)** defines the obligation for the DSO to provide real time data to the TSO.
c	obligations for the adjacent DSOs and/or between the downstream DSO and upstream DSO to inform each other within agreed timescales of any change in the data and information established in accordance with this Title;	**Article 3 (5)** states the obligation for adjacent DSOs and/or between the downstream DSO and upstream DSO to inform each other on the processes and formats of any change in the data and information between them. **Article 12 (1)** differentiates between transmission connected DSOs and non-transmission connected DSOs and the obligations of each one regarding the data exchange.

	Requirements of Article 40(6) of SO GL	Extent to which the provision is met
d	obligations for SGUs to inform their TSO or DSO, within agreed timescales, about any relevant change in the data and information established in accordance with this Title;	**Article 14** states the obligation for SGUs to provide the TSO/ DSO with the structural information. **Article 15** defines the cases when the information needs to be updated. Article 16 defines the obligation for the SGUs to provide schedule data to the TSO/DSO. **Article 17** defines the obligation for the SGUs to provide real time data to the TSO/DSO and the requirements that need to be fulfilled.
e	detailed content of the data and information established in accordance with this Title, including main principles, type of data, communication means; formats and standards to be applied, timing and responsibilities;	**Article 7** establishes that the TSO shall define and publish the detailed content and formats to communicate structural information. **Article 9** defines the responsibilities of the TSOs regarding the exchange of scheduled data. Among them there are the settlement of an information system to exchange that information, the format used by the information system and the requirements to connect to it. **Article 10** stated the responsibility for the TSO to define standards for real time data exchange.
f	the time stamping and frequency of delivery of the data and information to be provided by DSOs and SGUs, to be used by TSOs in the different timescales. The frequency of information exchanges for real-time data, scheduled data and update of structural data shall be defined;	**Article 9 (4)** defines timestamping for scheduled data exchanges **Article 10(2)** defines timestamping for real time data exchanges **Article 9 (1)** states the frequency of delivery of scheduled data **Article 10 (5)** states the frequency of delivery of real time data **Articles 8, 11 (1) and 15** establish the cases where structural information needs to be updated.
g	the format for the reporting of the data and information established in accordance with this Title;	**Article 7** stablishes that the TSO shall define and publish the detailed content and formats to communicate structural information. **Article 9(2) and 9(3)** stablish that the TSO shall define the format of the scheduled data for the information system. **Article 10** stablishes that the TSO shall define and publish the requirements and content for real time data exchange.
40(6)	The organisational requirements, roles and responsibilities shall be published by ENTSO for Electricity.	**Article 18(1)** states the obligation for ENTSO-E (and TSOs) to publish the proposal on internet.

All TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities (KORRR) relating to Data Exchange in accordance with Article 40(6) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a Guideline on Electricity Transmission System Operation

Response to public consultation comments received during the consultation held 31 October – 1 December 2017

Remarks:

(i) identical comments from different stakeholders have been grouped where possible, to improve the readability;
(ii) the references to the articles and paragraphs are based on the version of KORRR that was submitted to public consultation (see the KORRR consultation at ENTSO-E consultation hub), the updated references in the final KORRR are included in the column for the response.

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
1	0	ENTSO-E should check the wording, some editorial mistakes.	Yes	**Accepted.** Some editorial mistakes have been detected and solved	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
1	3	Proposal: **3. When applying the KORRR, the TSOs shall:** **◦ d. respect the responsibility assigned to the relevant TSO in order to ensure system security, including as required by national legislation (2009/72/EC).** **NEW ◦ g. respect the responsibility assigned to DSOs (2009/72/EC).** Explanation: 3. It is necessary including the European Directive where responsabilities for TSOs and DSOs are defined: 2009/72/EC. (2009/72/EC-Art 25(1): The distribution system operator shall be responsible for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity, for operating, maintaining and developing under economic conditions a secure, reliable and efficient electricity distribution system in its area with due regard for the environment and energy efficiency.)	No	**Not accepted**. Article 1(3) (d) of KORRR (article 1(5)(d) of the new KORRR version) is in line with Article 4(2) (e) of SO GL and responsibility of DSOs over their grid is considered in Article 1(3) (e) of KORRR (article 1(5)(e) of the new KORRR version) and Article 4(2) (f) of SO GL. As European Directive 2009/72 applies to KORRR there is no need to refer to it.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
1	3	Proposal: **After the article 1-3.c) - "TSOs shall specify a format to exchange data based on existing system as far as possible".** Explanation: Existing SGUs, DSOs or CDSOs have made significant investments to share data with TSOs and additional changes could lead to important costs. Therefore, in order to minimize the costs borne by these existing SGUs, EDF believes that the rules and requirements concerning data exchanged under the KORRR should be based on the principle of using to the best of their capabilities the existing systems and infrastructures already in place.	No	**Not accepted**. Format to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(3) of KORRR (article 1(5) of the new KORRR version) and be examined by the competent NRA.	EDF
1	3	Typographical error (additional word 'and ') in Article 1(3). Should read When applying the KORRR the TSOs shall:	Yes	**Accepted**. Article 1(3) of KORRR (article 1(5) of the new KORRR version) This article has been rewritten in line with Article 4(2) of SO GL solving also the typographical error detected.	SP Energy Networks

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
2	1, 3, 4, 6, 7	**1. For the purposes of the KORRR, terms used in this document shall have the meaning of the definitions included in Article 3 of the Regulation (EU) 2017/1485, Article 2 of Regulation (EU) 2015/1222, Article 2 of Regulation (EC) No 714/2009, Article 2 of Commission Regulation (EU) No 543/2013, Article 2 of Regulation (EC) No 631/2016, Article 2 of Regulation (EC) No 1388/2016, Article 2 of Regulation (EC) No 1447/2016 as well as Article 2 of Directive 2009/72/EC of the European Parliament and of the Council and the other items of legislation referenced therein.** **2. No change** **3. The KORRR shall be binding upon TSOs as referred to herein and their permitted successors and assigns and irrespective of any change in the TSO's names.** **4. No change, but please check for editorial mistakes.** **5. No change.** **6. For the purpose of the KORRR, Real Time Data means a representation of the actual state of the facilities.** **7. For the purpose of the KORRR, SGUs are considered to provide data directly to the TSO or DSO when there is no other system operator between SGU and the receiving TSO or DSO.** Explanation: The change in paragraph 3. is necessary to make the sentence comprehensible, as the original sentence contained unnecessary text remains from a former version. The change in paragraph 6. is necessary to avoid unnecessary and unjustified costs to stakeholders by obliging them to update data every minute even when data didn't change in between. The change in paragraph 7. is necessary to make the paragraph comprehensible.	1.Yes 2.No 3.Yes 4.Yes 5.No 6.Yes 7.Yes	1. **Accepted.** Article 2(1) has been amended. 2. **No action** 3. **Accepted**. Article 2(3) (article 2(2) of the new KORRR version) has been amended to make the sentence comprehensible. 4. **Article 2(4) has been deleted**. 5. **No action** 6. **Accepted**. Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute. 7. **Article 2(7) has been deleted**. Additionally, as Articles 2(4) and 2(7) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level.	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG
2	1	Clarification: 1. Definitions in NC and SO GL are not exactly the same. It could be useful including definitions in this Article to better undertand the document.	No	**Not accepted**. All definitions from Network Codes and European regulation apply and shall be used to understand KORRR. It is not possible to change a definition of a Directive in a lower level regulation.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
2	2	Explanation: 2. This statement is unclear. It should be rewritten.	Yes	**Accepted**. Article 2 (2) (article 2(3) of the new KORRR version) has been amended. Additionally, to clarify the meaning of the statement: 1. Index and names of Articles are used for clarity and does not affect the interpretation	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				of KORRR. The relevant parts of the KORRR are the wording of the articles. 2. All in force directives, and their possible changes, apply to KORRR.	
2	3	Article 2(3) From the wording of this clause it is (to me at least) who the KORRR is binding upon? Reword to aid clarity.	Yes	**Accepted**. Article 2 (3) (article 2(2) of the new KORRR version) This article has been amended to make the sentence comprehensible.	SP Energy Networks
2	4	Proposal: **4. For the purpose of the KORRR, and aggregation means a set of power-generating modules, demand facilities and/or closed distribution systems which can operate as a single facility or closed distribution system for the purposes of offering one or more balancing or ancilliary service.** Explanation: 4. Power-generating module is the term used in the RfG and the GL OS. Aditionally, aggregators may provide other services besides congestion management, whith this regard article 108 of the GL SO refers to ancilliary services.	Yes	**Article 2(4) has been deleted** Additionally, as Articles 2(4) has been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
2	4	Proposal: **Art 2-4 - Delete** Explanation: The aim of this document is to make a proposal for the key organizational requirements, roles and responsibilities. EDF considers that the introduction of definitions is not in the scope of the KORRR.	Yes	**Accepted. Article 2(4) has been deleted** Additionally, as Articles 2(4) has been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level.	EDF
2	4	Article 2(4) requires a clarification (the SO-GL delegates the responsibility for data to the owner of the unit) Proposal: **A set of power units that is aggregated for the purpose of direct marketing is not an aggregation for the purpose of the KORR.**	Yes	**Article 2(4) has been deleted** Additionally, as Articles 2(4) has been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level	EnBW Energie Baden-Württemberg AG BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
2	4, 6	The text is in (4) unclear/garbled. Suggest change (4) to: **For the purpose of the KORRR, and aggregation means a set that can include any of power generation unites, demand facilities, and closed distribution systems which can operate as a single facility or closed distribution system for the purposes of offering one or more balancing or congestion management service** **Art 2(6)** **Defining real time as <1minute is not in the scope of organizational requirement, roles or responsibility. It is a feature of the data that is in the scope of SOGL Art 40(5) and 40(7)- not KORRR**	1 Yes 2. Yes	1. **Article 2(4) has been deleted** Additionally, as Articles 2(4) has been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level 2. **Accepted**. Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute.	Energy Networks Association
2	4	**For the purpose of the KORRR, aggregation means a set of power generation units, demand facilities, closed distribution systems which operate as a single facility or closed distribution system for the purposes of offering for example one or more balancing or congestion management services** Art2 4° states: "For the purpose of the KORRR, aggregation means a set of power generation units, demand facilities, closed distribution systems which can operate as a single facility or closed distribution system for the purposes of offering one or more balancing or congestion management services" [with correction of spelling mistakes]. This is a copy of the definition in SOGL, but creates its own problems as 1. aggregation can also be used outside for balancing or congestion management (e.g. in the energy markets themselves) and 2. this would imply that any company with multiple sites and/or power generation units is to be considered an aggregator here(as it says "can operate" and not "operates"). It would even in extremis mean that any individual (residential) grid user with two "demand facilities" (e.g. when you have a second residence) would be an aggregator as he "can operate" (but probably won't) these installations as a single facility. Last, facilities can be part of portfolios of different aggregators depending on the service that is being offered (e.g. participating with one part of a site with one aggregator in one service and with another part of a site with another aggregator to a second service and directly to a third service). It would moreover also be interesting to ad a clear definition of "facility" insofar KORRR is concerned, as the general use of the word is not very clear (RfG nor DCC define "facility" not its	Yes	**Article 2(4) has been deleted** Additionally, as Articles 2(4) has been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level.	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		own)			
2	5	Proposal: **5. For the purpose of the KORRR, a modification is considered significant when it is significant in EU 2016/631 (NC RfG), EU 2016/1388 (NC DCC) or EU 2016/1447 (NC HVDC). In this context, it must be considered specificities made byt each Member State in their own implementation process.** Explanation: 5. To be a modification considered as significant, it also requires the specifications (in the implementarion process) passed in each country. The NCs per se are not enough.	Yes	**Accepted**. Article 2(5) (article 2(4) of the new KORRR version) has been amended to clarify it and to take into account national implementation.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
2	6	Proposal: **For the purpose of the KORRR, Real Time Data means a representation of the actual state of the facilities no more than one minute old. The communication of real-time-data is at least necessary if the state of the facility changes.** Explanation: The definition of real-time data says that the data should not be older than one minute. This causes much efforts and massive data volume that is not necessary to ensure system operation. Instead it is sufficient to provide data if the state of the facility changes.	Yes	**Partially accepted.** Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute.	TIWAG-Tiroler Wasserkraft AG - Dispatching
2	6	Proposal: **Art.2-6 - "For the purpose of the KORRR, Real Time Data means a representation of the actual state of facilities"** Explanation: The §6 states that "real time data means a representation of the actual state of facilities no more than one minute". EDF believes that these KORRR should be less prescriptive and not set out a time frame of one minute. EDF first wonders what the rationale for setting the maximum admissible granularity of one minute is and then whether, providing data older than one minute could be acceptable and relevant. In some cases, it could be more efficient to send the data only when the value has been updated or changed, especially to optimize the total volume of data received and computed by TSO, as it has an impact on the cost of the infrastructures. Therefore, the appropriate level of granularity should definitely be discussed during the national consultation.	Yes	**Partially accepted.** Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute.	EDF
2	6	The article 2 (6) requires a change Proposal (from line 205): **For the purpose of the KORRR, Real Time Data means a representation of the actual state of the facilities no more than one minute old. The communication of real-time-data is at least necessary if the state of the facilitiy changes.** **The definition of real-time data says that the data should not be older than one minute. This causes much efforts and massive data volume that is not necessary to ensure a secure sys-tem operation. Instead it is sufficient to provide data if the state of the facilitiy changes.**	Yes	**Partially accepted.** Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute.	EnBW Energie Baden-Württemberg AG BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
2	6	Article 2(6) - Do not believe that the KORRR which is to do with requirements, roles, responsibilities has the mandate to state what real time data means. This should be within Regulation 2017/1485 Article 40.	Yes	**Partially accepted.** Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute.	SP Energy Networks
2	6	**6. For the purpose of the KORRR, Real Time Data means a representation of the actual state of the facilities as agreed between the relevant TSO, DSOs and SGUs.**	Yes	**Partially accepted.** Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
2	7	Clarification: It should be clarified that the data from SGUs should not be provided twice. The multiple provisions of data cause costs and inefficiency. Instead the distribution and transmission system operators shall exchange the data among each other.	Yes	**Article 2(7) has been deleted**. Additionally, as Articles 2(4) and 2(7) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System.	TIWAG-Tiroler Wasserkraft AG - Dispatching

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
2	7	"7. For the purpose of the KORRR, SGUs are considered to provide data directly to the TSO or DSO when they are the first TSO or DSO that receives that data from the SGU." should be changed either to **"For the purpose of the KORRR, SGUs are considered to provide data directly and only to the TSO or DSO they are directly connected to."** or even better to: **"For the purpose of the KORRR, SGUs are considered to provide data directly and only to the TSO in whose Observation area they are when it is the first TSO that receives that data from the SGU. TSOs forward respectively exchange data with other TSOs or DSOs if necessary."** SGUs only should have one Point of contact for data delivery in order to avoid unessential efforts and costs. **7. For the purpose of the KORRR, SGUs are considered to provide data directly to the TSO or ITS CONNECTING DSO ACCORDING TO ARTICLE 3(4), when they are the first TSO or DSO that receives that data from the SGU.** Article 2 (7) should be referenced to article 3 (4) from KORRR and clarify that the data should be provided based on an agreement between the DSO and the TSO.	Yes	**Article 2(7) has been deleted**. Additionally, as Articles 2(4) and 2(7) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System.	RWE Generation SE Stromnetz Hamburg GmbH
2	7	Clarification of article 2 (7) Article 2(7) is unclear. It should be clarified that the data from SGUs should not be provided twice. The multiple provisions of data cause costs and inefficiency. Instead the distribution and transmission system operators shall exchange the data among each other. As much of the data is already being sent to the TSO, SGUs should be able to use this also for potential additional data.	Yes	**Article 2(7) has been deleted**. Additionally, as Articles 2(4) and 2(7) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System.	EnBW Energie Baden-Württemberg AG BDEW- German Association of Energy and Water Industries
2	7	7. For the purpose of the KORRR, SGUs are considered to provide data directly to the TSO or DSO when there is no other system operator between SGU and the receiving TSO or DSO.	Yes	**Article 2(7) has been deleted**. Additionally, as Articles 2(4) and 2(7) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
2	7	For the purpose of the KORRR, SGUs are considered to provide data directly to the TSO and to the DSO when they are the first TSO or DSO that receives that data from the SGU. Explanation: The proposed provision from Article 2 (7) of the KORRR document is incompatible with the provisions of Articles 48, 49 and 50 of Commission Regulation (EU) 2017/1485 (SO GL) which call for the data transmission to OSD and TSO.	Yes	**Article 2(7) has been deleted**. Additionally, as Articles 2(4) and 2(7) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System.	PTPiREE
2	8	Modification proposal #1: **Art. 2.8 (new)**: **"For the purpose of the KORRR, Member States should be free to consider possible modifications in the definitions of SGU based on the particular National circumstances."** Justification: Art. 2 of the KORRR provides the relevant definitions for the KORRR, which are referenced to definitions set out in other Network Codes; in particular, SGU's definition is indirectly but inextricably linked to the definitions provided in the System Operation Guidelines and Network Code Requirements for Generators. In particular, on one hand art. 2 of the former set out that a SGU is a power generating module classified as B, C or D. On the other hand art. 5 of the latter foresees that the minimum threshold from which a SGU can be considered significant is by default 1 MW, while leaving room to Member States to reduce this threshold based on a consultation carried out by the TSO. We believe that such provision, which correctly captures the principle that each Member State can modify definitions to be applicable to grid connections where efficient, cannot be transposed as is to other operational network codes, since it is not granted that the same definitions would be the most efficient for purposes other than network connection. We believe that in the case of the KORRR and the system operation guideline, the idea to ensure exchange of data on all SGUs that follow a certain framework for the connection to the grid is potentially inefficient for the system as a whole as it would lead to the obligation to exchange a lot of information on generation units even if they won't participate to the operation of the system. Therefore we believe that the KORRR should leave it open to every Member State the possibility to introduce different definitions of SGU based on the particular National circumstances.	No	**Not accepted.** All definitions from Network Codes and European regulation apply and shall be used to understand KORRR. The definition of SGU is stated in article 2 of SO GL and they are classified in accordance with the criteria set in Article 5 of Commission Regulation (EU) 2016/631 (Network Code Requirements for Generators) It is not possible to change a definition of a Directive in a lower level regulation.	Enel

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
2	1, 3, 4, 6, 7	**"1. For the purposes of the KORRR, terms used in this document shall have the meaning of the definitions included in Article 3 of the Regulation (EU) 2017/1485, Article 2 of Regulation (EU) 2015/1222, Article 2 of Regulation (EC) No 714/2009, Article 2 of Commission Regulation (EU) No 543/2013, Article 2 of Regulation (EC) No 631/2016, Article 2 of Regulation (EC) No 1388/2016, Article 2 of Regulation (EC) No 1447/2016 as well as Article 2 of Directive 2009/72/EC of the European Parliament and of the Council and the other items of legislation referenced therein.** **2. No change** **3. The KORRR shall be binding upon TSOs as referred to herein and their permitted successors and assigns and irrespective of any change in the TSO's names.** **4. No change, but check editorial mistakes.** **5. No change.** **6. For the purpose of the KORRR, Real Time Data means a representation of the actual state of the facilities as agreed between the relevant TSO, DSOs and SGUs.** **7. For the purpose of the KORRR, SGUs are considered to provide data directly to the TSO or DSO when there is no other system operator between SGU and the receiving TSO or DSO.** The change in paragraph 3. is necessary to make the sentence comprehensible, as the original sentence contained unnecessary text remains from a former version. The change in paragraph 6. is necessary to avoid unnecessary and unjustified costs to stakeholders by obliging them to update data every minute even when data didn't change in between, and irrespective of actual TSO needs. The change in paragraph 7. is necessary to make the paragraph comprehensible."	1.Yes 2.No 3.Yes 4.Yes 5.No 6.Yes 7.Yes	1. **Accepted.** Article 2(1) has been amended. 2. **No action** 3. **Accepted**. Article 2(3) (article 2(2) of the new KORRR version) has been amended to make the sentence comprehensible. 4. **Article 2(4) has been deleted**. 5. **No action** 6. **Accepted**. Article 2(6) (article 2(5) of the new KORRR version) has been amended to clarify real time data definition and to remove the reference to 1 minute. 7. **Article 2(7) has been deleted**. Additionally, as Articles 2(4) and 2(7) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
2	New	Proposal: **New paragraph - "The rules and requirements set out in these KORRR shall apply to the parties mentioned in the article 2 of the SO GL Regulation".** Explanation: There is no definition of SGU, DSO or CDSO in article 3 of Regulation EU 2017/1485. It is needed to clarify that the rules and requirements set out in these KORRR shall apply to the parties mentioned in article 2 of Regulation EU 2017/1485.	No	**Not accepted**. Article 2(1) of the SO GL already defines the scope of the regulation and the SGUs it applies to. The KORRR is drafted as a development of the SO GL so it applies to the same SGUs. It can be further reviewed at national level according to Article 40(5) of SO GL.	EDF

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	1	**Proposal:** **1a. CDSOs shall be considered as DSOs for the purposes of the KORRR. Therefore, transmission connected CDSOs and TSOs shall agree on data exchanges between them according art. 40(7) of Regulation 2017/1485.** Explanation: 1a. CDSOs shall have the same roles, requirements and responsibilities that DSOs with regard to data exchange.	Yes	**Accepted**. A new article 1(4) has been added to the new KORRR version to reflect closed distribution system roles that shall apply in the KORRR.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
3	1, 2, 3, 4, 5, 6,7, 8	**"New 1. This methodology sets out the key organisational requirements, roles and responsibilities in relation to data exchange with TSOs. Each TSO shall have the right but not the obligation to obtain or receive the data set out in Title II of Regulation (EU) 2017/1485 from the owner of the relevant network element or the party responsible for providing the information, as the case may be, provided that all of the following conditions are met:** **a. the TSO requires the data in order to carry out the operational security analysis in accordance with Article 72 of Regulation (EU) 2017/1485; the set of required data shall be the minimum set that enables the TSO to do so;** **b. the data are not already available to the TSO:** **i. either pursuant GLDPM and CGMM;** **ii. pursuant national legislation or regulation, contractual basis or based upon any other kind of legally binding mechanism;** **iii. or if the data is publicly available.** **c. the data are not already available to the respective DSO. In such a case, the data shall be exchanged directly between the TSO and the DSO.** **New 2. This KORRR does not confer TSOs the right to request data not explicitly described in Title 2 of Regulation (EU) 2017/1485. For avoidance of doubt, data regarding grid elements outside the observability area of the respective TSO are out of scope.** **New 3. The harmonisation intention of Article 40(6) of Regulation (EU) 2017/1485 shall be understood to refer to the harmonisation of key organisational requirements, roles and responsibilities in relation to data exchange. TSOs shall not invoke the harmonisation requirement in order to obtain data which they do not require for their legal tasks assigned by Regulation (EU) 2017/1485.** **"** **"1. Each TSO, DSO, CDSO or SGU shall be responsible for the quality of the information they provide regarding their facilities or services. Except where**	New 1.No New 2. No New 3. No 1. Yes 2. Yes 3. Yes 4.Yes 5. No 6. Yes 7. Yes 8. Yes	**New 1 and 3. Not accepted.** SO GL in its title 2 establishes the mandatory data exchange for TSOs, DSO and SGUs without conditions. KORRR requirements are aligned with the data defined in Title 2 of Regulation (EU) 2017/1485 that represent the maximum set of information that TSOs can request. During SOGL implementation at national level, article 40(5) allows to each TSO, in coordination with DSOs and SGUs and subject to NRAs approval, to establish the scope and applicability of data exchange. It means that TSOs can stablish which information under Title 2 is necessary to carry out TSO´s responsibilities defined in the regulation and also TSOs can indicate for which means the exchange data must be used. Once this is defined and approved by NRAs, is applicability is mandatory. **New 2. Not accepted.** Although, SO GL does not allow TSOs to request without agreement information under title 2 it doesn´t forbid to manage agreements to exchange them. Additionally, not all the data out of the observability area is out of scope, for example there can be SGUs connected out of observability area that have to exchange data with the TSO.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		explicitly otherwise stated, they shall be the party required to provide the data. **2. Delete paragraph.** **3. Delete paragraph.** **4. Distribution connected SGUs shall provide the structural, scheduled and real time data directly to the DSO they are connected to. However, exceptionally, each TSO, in agreement with the DSOs in its Control Area, may define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data directly to the TSO or to the DSO they are connected to. When the data is directly provided to the TSO, the TSO shall provide it to the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO.** **5. No change.** **6. CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to.** **7. DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems, excluding the communication channel, to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO.** **8. Delete the last part of the paragraph: ""The delegating entity shall remain responsible for ensuring compliance with the obligations under Regulation 2017/1485, including ensuring access to information necessary for monitoring by the regulatory authority."" "** Explaination: "The additional first three paragraphs are necessary to make sure fundamental principles of European Union law are respected, this is: the principle of proportionality (Article 5(4) of the Treaty on European Union), the principle of subsidiarity (Article 5(3) of the Treaty on European Union) and the principle of data scarcity (e.g. laid down in article 6(1) of (EU) 2016/679). The change in paragraph 1. is necessary to adapt the wording to a form suitable to legal documents. Paragraph 2. and 3. should be deleted, as they refer solely to parties offering services to TSOs. From our point of view, services provided to TSOs and any obligation stemming from that should not be defined in KORRR, but can be bilaterally agreed when procuring such services.		1. **Partly accepted.** Article 3(1) has been amended to reflect "shall wording". It is considered that in the first part of the actual article, the proposal "Except where explicitly otherwise stated, they shall be the party required to provide the data" it is included. 2. **Accepted**. **Article 3(2) has been deleted** 3. **Accepted. Article 3(3) has been deleted** 4. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) is included to highlight the NRA approval. 5. **No action** 6. **Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as the default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to. 7. **Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO. 8. **Not accepted**. However, article 3(8) (article 3(9) of the new KORRR version) has been amended to clarify it. Additionally, as Articles 3(2) and 3(3) have	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Paragraph 4 should define cascaded data exchange as the general principle for data exchange regarding SGUs connected to distribution systems. This general rule was agreed in the TSO-DSO data management report (page 16 of the report:""Generally, each system operator should be responsible for directly collecting data from users connected to its grid (generators, consumers, storage, etc.). [...]"" Paragraph 4. sentence 1 should be changed from ""coordination"" to ""agreement"", as agreement is required by article 40(7) of (EC) 2017/1485 for all data exchanges related to distribution systems. Sentence 2 should be deleted as it creates inefficiencies and legal and economic uncertainties and risks if multiple decisions on data exchange are possible for each and every SGU. In sentence 3, ""make it available"" must be changed into ""provide it"", as TSOs are obliged to provide it to the DSO to fulfill their obligations from 72/EC/2009, art. 12 e):""Each transmission system operator shall be responsible for:(e)providing to the operator of any other system with which its system is interconnected sufficient information to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system;"" Data related to SGUs at the distribution system is unquestionably necessary to ensure the secure and efficient operation of the (distribution) system. The last sentence of paragraph 4 should be deleted, as it is unclear how quality and/or granularity of data could be improved by the receiving party. Furthermore, when assuming cascaded data exchange, the highest efficiency lever is untapped by data aggregation and thus refinement. Such solutions are prohibited by the requirement contained in the last sentence without any necessity nor justification. " "Paragraph 6 should explicitly prohibit duplicated data transfer, as it is inefficient and constitutes unnecessary costs to stakeholders. In paragraph 7 it cannot be the sole responsibility of the DSOs, CDSOs and SGUs for the installation, configuration, security and maintenance of the communication channels. The TSO has an equal responsibility. Paragraph 8: It should be possible to transfer to all responsibilities."		been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national. Related TSO-DSO data management report a clarification should be done. KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level.	
3	1	Art 3 1° A definition of "facilities" will be needed, as RfG and DCC have a different scope (machine-level versus site-level), in order to avoid double counting (e.g. a PGM on a site sending information directly under RfG but also aggregated on site level under DCC).	Yes	**Accepted**. Article 3(1) has been amended.	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	2	Proposal: Art.3-2- “In the case of an aggregator, the aggregation of the facilities shall be considered as the SGU and the aggregator responsible for the data provision. In some cases, an individual power generating module or demand facility included in the aggregation may also be an SGU. In this case, obligations to provide data under Regulation 2017/1485 is the responsibility of aggregator or SGU". Explanation: EDF understands that an aggregator and a SGU could provide the same data to TSO or DSO. EDF believes the redundancy is inefficient and should be avoided. Therefore, the data should be provided either by the SGU or by the aggregator.	Yes	**Article 3(2) has been deleted**. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level.	EDF
3	2, 4, 5, 7	Art 3(2) It is not clear exactly what is meant by “considered as the SGU” Suggest: n the case of an aggregator, the aggregation of the facilities shall be considered as theto be a SGU and the aggregator shall be responsible for the SGU’s data provision. In some cases an individual power generating module or demand facility included in the aggregation may also be an SGU and may still have obligations to provide data under Regulation 2017/1485 independently of the aggregator Also Art 3(2) This should be developed by each TSO as part of A40(5) and not imposed by KORRR Art 3(4) This should be developed by each TSO as part of A40(5) and not imposed by KORRR Art 3(5) There do not seem to be any quality requirements in the KORRR – nor should there be. Art 3(7) What is the object of this sentence? Is it the data or the communication system	1.Yes 2.No 3.Yes 4.Yes	**1. Article 3(2) has been deleted**. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level. 2. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval. 3. **Not accepted. However,** article 3(5) of KORRR (article 3(4) of the new KORRR version) has been amended to clarify it 4 **Not accepted.** However, article 3(7) of KORRR has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO, and SGUs for the communication systems until the communication interface point with the TSO.	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		“according to KORR”?			
3	2	Art3 2° "in the case of an aggregator, the aggregation ...": Two questions arise, more precisely an aggregator of what (not specified) and of course the above-mentioned issue with the definition of aggregation (art2 4°). This is specifically important as "the aggregation shall be considered as the SGU", which means this aggregation will have a number of responsibilities and tasks, although this can change fast/frequently and a single facility might even be part of different aggregation portfolios, which then raises the question who will be responsible for communicating the information, to avoid double (or more) counting.	Yes	**Article 3(2) has been deleted**. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level.	IFIEC Europe
3	2,3	**Delete paragraph.** Paragraph 2. and 3. should be deleted, as they refer solely to parties offering services to TSOs. From our point of view, services provided to TSOs and any obligation stemming from that should not be defined in KORRR, but can be bilaterally agreed when procuring such services.	1. Yes 2. Yes	**Accepted. Article 3(2) and article 3(3) have been deleted**. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
3	3	**Proposal:** **3. Transmission connected SGUs shall provide data directly to the TSO.** Explanation: 3. In order to avoid duplicity in data exchanges, direct provision of data (to the TSO) from SGUs connected to the distribution network shall be restricted to data not submitted to the DSO (as stated in this same article -point 6-). Therefore it shall be removed or reworded the following sentence "and SGUs provinding services directly to the TSO".	Yes	**Article 3(3) has been deleted**. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national level. .	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	New	Change: Article 3 should provide general principles with regard to data ex-change **Proposal for amendment of Article 3 (new text from line 213):** **1. This methodology sets out the key organizational requirements, roles and responsibili-ties in relation to data exchange with TSOs. Each TSO shall have the right but not the obligation to obtain or receive the data set out in Title II of Regulation (EU) 2017/1485 from the owner of the corresponding network element or the party responsible for pro-viding the information, as the case may be, provided that all of the following conditions are met:** **a) the TSO requires the data in order to carry out the operational security analysis in accordance with Article 72 of Regulation (EU) 2017/1485; the set of required data shall be the minimum set that enables the TSO to do so;** **b) the data are not already available to the TSO:** **i. either pursuant GLDPM and CGMM;** **ii. pursuant national legislation or regulation, contractual basis or based upon any other kind of legally binding mechanism;** **iii. or if the data is publicly available;** **c) the data are not already available to the respective DSO. In such a case, the data shall be exchanged directly between the TSO and the DSO.** **2. This methodology does not confer TSOs the right to request data not explicitly de-scribed in Title 2 of Regulation (EU) 2017/1485. For avoidance of doubt, data regarding grid elements outside the observability area of the respective TSO are out of scope.** **3. The harmonization requirement set out in Article 40(6) of Regulation (EU) 2017/1485 shall be understood to refer to the harmonization of key organizational requirements, roles and responsibilities in relation to data exchange. TSOs shall not invoke the har-monization requirement in order to obtain data which they do not require for their legal tasks assigned by Regulation (EU) 2017/1485.** Article 40 (7) of the regulation 2017/1485 says: “18 months after entry into force of this Regulation, each TSO shall agree with the relevant DSOs on effective, efficient and proportional processes for providing and managing data exchanges between them, including, where required for efficient net-work operation, the provision of data related to distribution systems and SGUs. Without prejudice to the provisions of paragraph 6(g), each TSO shall agree with	New1. No New2. No New3. No	**New 1 and 3. Not accepted.** SO GL in its title 2 establishes the mandatory data exchange for TSOs, DSO and SGUs without conditions. KORRR requirements are aligned with the data defined in Title 2 of Regulation (EU) 2017/1485 that represent the maximum set of information that TSOs can request. During SOGL implementation at national level, article 40(5) allows to each TSO, in coordination with DSOs and SGUs and subject to NRAs approval, to establish the scope and applicability of data exchange. It means that TSO can stablish which information under Title 2 is necessary to carry out TSO´s responsibilities defined in the regulation and also TSOs can indicate for which means the exchange data must be used. Once this is defined and approved by NRAs, is applicability is mandatory. **New 2. Not accepted.** Although, SO GL does not allow TSOs to request without agreement information under title 2 it doesn´t forbid to manage agreements to exchange them. Additionally’ not all the data out of the observability area is out of scope, for example there can be SGUs connected out of observability area that have to exchange data with the TSO.	BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		the relevant DSOs on the format for the data exchange." Regulation (EU) 2017/1485 clearly defines how the DSO and the TSO work together. As the minor document to Regulation (EU) 2017/1485 the KORRR proposal should not differ from it. In order to avoid inefficiency, the data provided by the SGU is either send to the DSO or the TSO. The distribution and transmission system operators shall exchange the data among each other, so that the SGU can provide the data to one single point of contact. The last sentence of Article 3 (4) causes misunderstandings as well. The highest efficiency level of cascaded data exchange is untapped by data aggregation. Such solutions are prohib-ited by this requirement without any needs or reasons.			
3	New	**New 3. The harmonisation intention of Article 40(6) of Regulation (EU) 2017/1485 shall be understood to refer to the harmonisation of key organisational requirements, roles and responsibilities in relation to data exchange. TSOs shall not invoke the harmonisation requirement in order to obtain data which they do not require for their legal tasks assigned by Regulation (EU) 2017/1485.**	No	**New 3. Not accepted.** SO GL in its title 2 establishes the mandatory data exchange for TSOs, DSO and SGUs without conditions. KORRR requirements are aligned with the data defined in Title 2 of Regulation (EU) 2017/1485 that represent the maximum set of information that TSOs can request. During SOGL implementation at national level, article 40(5) allows to each TSO, in coordination with DSOs and SGUs and subject to NRAs approval, to establish the scope and applicability of data exchange. It means that TSO can stablish which information under Title 2 is necessary to carry out TSO´s responsibilities defined in the regulation and also TSOs can indicate for which means the exchange data must be used. Once this is defined and approved by NRAs, is applicability is mandatory.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
3	3	**Modification proposal**: Transmission connected SGUs shall provide data directly to the TSO. <u>Justification</u>: The sentence is contradicting the no-one-size-fits-all principle laid down in art. 3.4, as it already imposes that SGUs connected to DSOs will have to provide information directly to TSOs.	Yes	**Article 3(3) has been deleted**. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As	Enel

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				aggregations purpose is to offer service to the System, they shall be defined at national level.	
3	4	Proposal: 4. Distribution connected SGUs shall provide the structural, scheduled and real time data directly to the DSO they are connected to. However, exceptionally, each TSO, in agreement with the DSOs in its Control Area, may define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data directly to the TSO and/or to the DSO they are connected to. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall provide this information to the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO. The quality, granularity and refresment rate of the data shall be maintained or improved. Explanation: 4.It should be defined the cascaded data exchange as the general principle for data exchange regarding SGUs connected to distribution systems. This general rule was agreed in the TSO-DSO data management report (page 16 of the report:"Generally, each system operator should be responsible for directly collecting data from users connected to its grid (generators, consumers, storage, etc.). [...]". Additionally, Art 40(10) of the GL SO establishes that "DSOs with a connection point to a transmission system shall be entitled to RECEIVE the relevant structural, scheduled and real-time information from the relevant TSOs (...)". This article sets the general rule. Art 51 of the GL SO only concerns power-generating modules (not SGUs in general). Additionally, provision of data between TSOs and DSOs shall also mantain the refreshment rate, especially in the provision of Real-Time data.	Yes	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval. Related TSO-DSO data management report a clarification should be done. KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	4	The article 3 (4) requires some changes. Proposal (from line 222): SGUs provide the structural, scheduled and real time data directly to the TSO or to the DSO they are connected. The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall provide it to the DSO to fulfill its obligation from 72/EC/2009, art. 12 . When the data is provided to the DSO, the DSO shall provide the data to the TSO.	Yes	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval.	EnBW Energie Baden-Württemberg AG
3	4	Changes of Article 3 (4) Proposal (from line 222): Each TSO, in agreement with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data directly to the TSO and/or to the DSO they are connected. The decision for each type of information and type of SGU may be inde-pendent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall provide it to the DSO to fulfil its obligation from 72/EC/2009, Art. 12 . When the data is provided to the DSO, the DSO shall provide the data to the TSO.	Yes	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval.	BDEW- German Association of Energy and Water Industries
3	4	4. Distribution connected SGUs shall provide the structural, scheduled and real time data directly to the DSO they are connected to. However, exceptionally, each TSO, in agreement with the DSOs in its Control Area, may define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data directly to the TSO or to the DSO they are connected to. When the data is directly provided to the TSO, the TSO shall provide it to the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO.	Yes	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
3	4	**Modification proposal**: "each TSO, **in agreement** with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real-time data directly to the TSO or to the DSO they are connected". Where TSOs have direct access to scheduled and real-time data from SGUs, TSOs should timely share such data with DSOs, and viceversa. Justification: We believe that, in order to maximize system efficiency and avoid overlaps or	Yes	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval.	Enel

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		coordination failures among TSO and DSOs, each information should be sent only once by SGUs. Therefore, we believe that art. 3.4. of the KORRR should be amended in a way that ensures that information is exchanged only once, i.e. removing the word “and”. This would allow each TSO to define in agreement with the DSOs (and not just in coordination, please refer to our general comment section) the model for data exchange. At the same time, it is of utmost importance that in both cases (SGU communicating data to the DSO or directly to TSO), the other party (TSO or DSO respectively) is reciprocally informed. In fact, as argued in the general comment section, it is extremely important to ensure that all parties are well aware of structural, scheduled and operational data, in order to guarantee an efficient network planning as well as system security and quality of service.			
3	4	Art3 4° "Each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs ...": Does this only involve those distribution connected demand facilities that deliver Demand Side Response services to system operators, as all other distribution connected demand facilities are not to be considered SGUs.	No	**Not accepted.** The KORRR shall apply to SGUs as referred to in rticle 2(1) SO GL	IFIEC Europe
3	4	The actual version of the KORRR sets the framework for data exchange models that are unilaterally decided by the TSO. This does not guarantee that those models are the overall most efficient ones. For example: • According to Art 3.4, the TSO is the party who defines how data from distribution-connected SGU are exchanged (either SGUàDSOàTSO or SGUàTSO(àDSO). Even though coordination with DSOs is mentioned, this article leaves the final decision power at the TSO and does not seek an agreement with the DSO on how to organize this in the most efficient way.	Yes	**Not accepted.** KORRR does not impose neither the DSOs nor the SGUs the use of a specific model. It sets the TSO to define the models it will use and to publish the formats to receive the data to prepare that model. Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval.	Belgian DSOs: Eandis, Infrax, Sibelga, ORES, Resa

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	4	Each TSO, in agreement with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data directly to the TSO and/or to the DSO they are connected. The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO. The quality and granularity of the data shall be maintained or improved. Explanation: The proposed solution give bigger probability that the developed solution will take into account the position of the DSO	Yes	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval.	PTPiREE
3	5	Article 3(5) - KORRR doesn't seem to specific quality requirements - and I would not it expect it to do so. REMOVE REFERENCE	Yes	**Not accepted.** Requirements are not specified in the KORRR, the methodology just reflects who has to define them. However, article 3(5) of KORRR (article 3(4) of the new KORRR version) has been amended to clarify it.	SP Energy Networks
3	6	Proposal (from line 232): CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to. Explanation: For the SGUs every data provision cases costs and bureaucracy. Thus, the SGU shall provide the data only once. The distribution and transmission system operators shall exchange the data among each other, so that the SGU can provide the data to one single point of contact.	Yes	**Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as the default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to.	TIWAG-Tiroler Wasserkraft AG - Dispatching
3	6	Proposal: Art.3-6 – "CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to" . Explanation: EDF believes it is not efficient – burdensome and costly - to provide twice the same data.	Yes	**Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as the default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to.	EDF

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	6	The article 3 (6) requires a change. Proposal (from line 232) As far as reasonably possible CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to. For the SGUs every data provision cases costs and bureaucracy. Thus, the SGU shall provide the data only once. The distribution and transmission system operators shall exchange the data among each other, so that the SGU can provide the data to one single point of contact. To ensure the least possible number of points of contact, SGUs provide the data only to the TSO.	Yes	**Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as the default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to.	EnBW Energie Baden-Württemberg AG
3	6	Change of Article 3 (6) Proposal (from line 232) CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to. For the SGUs every data provision cases costs and bureaucracy. Thus, the SGU shall provide the data only once. The distribution and transmission system operators shall exchange the data among each other to ensure the least possible number of contact points.	Yes	**Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as the default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to.	BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	6	6. CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to.	Yes	**Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as the default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
3	7	Proposal: DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, secu-rity and maintenance of the communication systems to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO. The re-sponsibility has nothing to do with the costs. Explanation: Article 3 (7) defines the responsibility for the installation, configuration, security and mainte-nance of the communication systems. At the workshop in Brussels on the 14th of November ENTSO-E confirms that the responsibilities have nothing to do with the costs. The assignment of any costs is not covered by the regulation 2017/1485. In addition the SO-GL does not state that the data have to be provides to the control center of the TSO. In every case it is a two-way-communication. It is not a proper solution that one party has to cover the whole respon-sibility and probably all the costs. In order to avoid misunderstandings this should be taken into account for the KORRR proposal.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO, CDSOs and SGUs for the communication systems until the communication interface point with the TSO.	TIWAG-Tiroler Wasserkraft AG - Dispatching

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	7	Proposal: 7. SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems to exchange data with the TSO and the DSO according to the KORRR unless explicitly otherwise agreed with the party that receives the data (TSO or DSO). Explanation: 7. This point should be reworded affecting only to SGUs because of the following reasons: - Data exchanges between TSOs and DSOs shall be agreed according to art. 40(7) of the GL SO. - CDSOs should be considered as DSOs within the KORRR; therefore, data exchanges with CDSOs connected to the transmision network should be agreed with the TSO. - Communication systems to exchange data with system operators (TSOs and DSOs) must be treated equally.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO. Related to CDSOs comment, a new article 1(4) has been added to the new KORRR version to reflect closed distribution system roles that shall apply in the KORRR.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
3	7	Proposal: Art.3-7 – “DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the equipment necessary to provide data to the TSO according to the KORRR up to the connection point or telecommunication terminal of TSOs or DSOs unless explicitly otherwise agreed with the TSO or DSO". Explanation: EDF considers that DSOs, CDSOs and SGUs are responsible for installation, configuration, security and maintenance of their own exchange data equipment up to the connection point with the transportation or distribution system, or up to TSOs’ or DSOs’ telecommunication terminals. Modem and telecommunication links are the properties of TSOs or DSOs. DSOs, CDSOs and SGUs cannot be held responsible for the damages or outages on this telecommunication network.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	EDF
3	7	The article 3 (7) requires a change. Proposal (from line 234): DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, secu-rity and maintenance of the communication systems to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO. ´ (The responsibility has nothing to do with the costs.)	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO, CDSOs and SGUs for the communication systems until the communication interface point with the TSO.	EnBW Energie Baden-Württemberg AG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	7	Change of Article 3 (7) Proposal (from line 234): DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO. The responsibility has nothing to do with the costs. Article 3 (7) defines the responsibility for the installation, configuration, security and mainte-nance of the communication systems. At the workshop in Brussels on the 14th of November ENTSO-E confirmed that the responsibilities have nothing to do with the costs. The assignment of any costs is not covered by the regulation 2017/1485. In addition the SO-GL does not state that the data have to be provided to the control center of the TSO. In every case it is a two-way-communication. It is not a proper solution that one party has to cover the whole responsibility and probably all the costs. In order to avoid misunderstandings this should be taken into account for the KORRR proposal.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	BDEW- German Association of Energy and Water Industries
3	7	Article 3(7) - Are TSOs abdicating any responsibility for any communication systems and requesting other parties to look after their communications systems . Needs further clarification to what 'systems' this is applying to.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	SP Energy Networks

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	7	7. DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems, excluding the communication channel, to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
3	7	**Modification proposal**: Art. 3.7: “SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems **of their unit, up to the network connection point**, to exchange data with the TSO or DSO according to the KORRR unless explicitly otherwise agreed with the TSO or DSO.” Justification: It has to be clarified that SGU have to install and operate not the entire communication system, but only up to the interface with connection point, in order to communicate with network communication systems.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	Enel
3	7	Art3 7° IFIEC proposes to remove the word "explicitly otherwise agreed", as it doe not see the interest of this word. Alternatively, this indication should be added to any agreement.	Yes	**Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	IFIEC Europe
3	7	The actual version of the KORRR sets the framework for data exchange models that are unilaterally decided by the TSO. This does not guarantee that those models are the overall most efficient ones. Furthermore, art 3.7 makes the TSOs counterparties, such as DSOs and SGUs, responsible for investing and maintaining the communication systems to exchange data with the TSO. Thus, the TSO is insensible for the costs caused to other parties, and has no strong incentive to take the costs incurred by other parties into account when defining his specifications.	Yes	**Not accepted.** KORRR does not impose neither the DSOs nor the SGUs the use of a specific model. It sets the TSO to define the models it will use and to publish the formats to receive the data to prepare that model. However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the	Belgian DSOs: Eandis, Infrax, Sibelga, ORES, Resa

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Although Art 1.3c does generally state that the TSO applies the principle of optimization between the highest overall efficiency and lowest total costs, the rest of the KORRR does not provide the provisions to ensure the objective application of this principle. • The KORRR does not foresee in processes at which the NRA or other competent authority may interfere, and may challenge whether the data exchange models defined by the TSO is the overall optimum. For the cases where specifications are defined by the TSO (see the articles mentioned above), it is not clear whether the regulator has the role or competence to comment these, approve or disapprove these, or has no role at all.		communication interface point with the TSO. To clarify, KORRR requirements are aligned with the data defined in Title 2 of Regulation (EU) 2017/1485 that represent the maximum set of information that TSOs can request. During SOGL implementation at national level, article 40(5) allows to each TSO, in coordination with DSOs and SGUs and subject to NRAs approval, to establish the scope and applicability of data exchange. It means that TSO can stablish which information under Title 2 is necessary to carry out TSO´s responsibilities defined in the regulation and also TSOs can indicate for which means the exchange data must be used. Once this is defined and approved by NRAs, is applicability is mandatory.	
3	4, 6, 7	- Remove paragraph 6 and in paragraph 4 change the first sentence ending with "...directly to the TSO and/or to the DSO they are connected." to "... TSO or DSO" - Para 7. DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems "until the point of connection/ point of common coupling" to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO. For the case of SGUs, physical infrastructure of communication systems will be limited up to its ownership boundary (typically the Point of Common Coupling). Explanation: - Paragraph 6 is not required when this is handled in paragraph 4. There should be single point of contact of the CDSOs or SGUs. Otherwise complexity and the required solution costs will increase. - SGUs should not be made responsible to cover the whole costs of installing and maintaining a whole (physical) communication system that we will be managed	4. Yes 6. Yes 7. Yes	4. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval. 6. **Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as he default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to. 7. **Not accepted.** However, article 3(7) has	WindEurope

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		by the TSO and that might extend for long distances. Thus, the responsibility should end at the point where the SGU is also responsible to comply with the connection code. -It should be clear that SGU are responsible for the installation of physical communication infrastructure (and its maintenance) up to point of ownership boundary between the SGU installation and the TSO or DSO facilities. Any physical infrastructure requiered from the SGU to the relevant TSO control /data centre is the responsability of the relevant TSO or DSO. Need answer: DSOs, CDSOs and SGUs in paragraph 7 are required to be responsible for installation, configuration, security etc. This is true only if the above stated participants are delivering the communication/data solution. What if due to reducing complexity and having unified solution compatible with the TSO SCADA system, the TSO is deciding on delivering their own designed unit? Or does this mean that TSO's are not able to propose any solutions?		been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	
3	8	Proposal: 8. Subject to the agreement with the party that receives the data (TSO or DSO), parties required to provide data under the KORRR shall be allowed to delegate all or part of any tasks assigned to it under Regulation 2017/1485 to one or more third parties like BRP, BSP, aggregators or similar entities, in case the third party can carry out the respective function at least as effectively as the delegating entity. The delegating entity shall remain responsible for ensuring compliance with the obligations under Regulation 2017/1485, including ensuring access to information necessary for monitoring by the regulatory authority. Explanation: 8. TSOs and DSOs must be treated equally regarding this issue.	Yes	**Accepted.** Article 3(8) (article 3(9) of the new KORRR version) has been amended to consider the agreement also with DSO in case of SGUs providing directly data to the DSO .	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
3	8	Delete the last part of the paragraph: "The delegating entity shall remain responsible for ensuring compliance with the obligations under Regulation 2017/1485, including ensuring access to information necessary for monitoring by the regulatory authority." Paragraph 8 should be deleted, as it is unclear whether it consitutes an extension of the provisions of art. 12 of (EU) 2017/1485 or not. To avoid legal uncertainties, the provision of art. 12 should be deemed sufficient for the cases paragraph 12	Yes	**Not Accepted.** Article 3(8) (article 3(9) of the new KORRR version) has been amended to clarify it.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		aims at.			
3	8	Modification proposal: Art. 3.8. “Subject to the agreement of the TSO **or DSO**, parties required to provide data under the KORRR shall be allowed to delegate all or part of any tasks assigned to it under Regulation 2017/1485 to one or more third parties like BRP, BSP, aggregators or similar entities, in case the third party can carry out the respective function at least as effectively as the delegating entity. Justification: It has to be clarified that data can be exchanged either with TSOs or DSOs, in coherence with article 3.4. Therefore data communication with DSOs should be envisaged.	Yes	**Accepted.** Article 3(8) (article 3(9) of the new KORRR version) has been amended to consider the agreement also with DSO in case of SGUs providing directly data to the DSO .	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
3	8	Is this not already covered within Regulation 2017/1485 articles? Does it need to be repeated?	No	**Not accepted.** This article is needed to define how the delegation is to be done and to clearly state where the responsibility remains.	SP Energy Networks
3	8	Art3 8° IFIEC has an issue with "similar entities" as this is very unclear and could exclude certain future actors. Either ENTSO-e clarifies "similar" or replaces it by "other"	Yes	**Accepted.** Article 3(8) (article 3(9) of the new KORRR version) has been amended to clarify it and also the list of examples for third parties has been deleted.	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	4,6,7	"4. Each TSO, in coordination/AGREEMENT with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data directly to the TSO and/or to the DSO they are connected. The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO. The quality and granularity of the data shall be maintained or improved" should be changed to: "...and real time data directly to the TSO or to the DSO they are connected..." or even better to "...and real time data directly to the TSO they are connected...." accordingly 5. and 6. "As far as reasonably possible CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to." to "CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to." in addition: "7. DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO." should be changed to "DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of their own communication systems to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO." due to cost reasons According to article 40(7) of the Regulation 2017/1485 the TSO and DSO shall AGREE on effective, efficient and proportional processes for providing and managing data exchanges between them […] and SGUs. The KORRR as implementation of the regulation should reflect that idea and not differ from it.	4. No 6. Yes 7.Yes	4. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) of SO GL is included to highlight the NRA approval. 6. **Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as he default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to.**7.** 7**. Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	RWE Generation SE Stromnetz Hamburg GmbH

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	New1, new2, new3, 1,2,3,4, 5,6,7,8	New 1. This methodology sets out the key organisational requirements, roles and responsibilities in relation to data exchange with TSOs. Each TSO shall have the right but not the obligation to obtain or receive the data set out in Title II of Regulation (EU) 2017/1485 from the owner of the relevant network element or the party responsible for providing the information, as the case may be, provided that all of the following conditions are met: a. the TSO requires the data in order to carry out the operational security analysis in accordance with Article 72 of Regulation (EU) 2017/1485; the set of required data shall be the minimum set that enables the TSO to do so; b. the data are not already available to the TSO: i. either pursuant GLDPM and CGMM; ii. pursuant national legislation or regulation, contractual basis or based upon any other kind of legally binding mechanism; iii. or if the data is publicly available. c. the data are not already available to the respective DSO. In such a case, the data shall be exchanged directly between the TSO and the DSO. New 2. This KORRR does not confer TSOs the right to request data not explicitly described in Title 2 of Regulation (EU) 2017/1485. For avoidance of doubt, data regarding grid elements outside the observability area of the respective TSO are out of scope. New 3. The harmonisation intention of Article 40(6) of Regulation (EU) 2017/1485 shall be understood to refer to the harmonisation of key organisational requirements, roles and responsibilities in relation to data exchange. TSOs shall not invoke the harmonisation requirement in order to obtain data which they do not require for their legal tasks assigned by Regulation (EU) 2017/1485. 1. Each TSO, DSO, CDSO or SGU shall be responsible for the quality of the information they provide regarding their facilities or services. Except where explicitly otherwise stated, they shall be the party required to provide the data. 2. Delete paragraph. 3. Delete paragraph. 4. Distribution connected SGUs shall provide the structural, scheduled and real time data directly to the DSO they are connected to. However, exceptionally, each TSO, in agreement with the DSOs in its Control Area, may define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data directly to the TSO and/or to the DSO they are connected to. When the data is directly provided to the TSO, the TSO shall	New 1.No New 2. No New 3. No 1. Yes 2. Yes 3. Yes 4.Yes 5. No 6. Yes 7. Yes 8. Yes	**New 1 and 3. Not accepted.** SO GL in its title 2 establishes the mandatory data exchange for TSOs, DSO and SGUs without conditions. KORRR requirements are aligned with the data defined in Title 2 of Regulation (EU) 2017/1485 that represent the maximum set of information that TSOs can request. During SOGL implementation at national level, article 40(5) allows to each TSO, in coordination with DSOs and SGUs and subject to NRAs approval, to establish the scope and applicability of data exchange. It means that TSO can stablish which information under Title 2 is necessary to carry out TSO´s responsibilities defined in the regulation and also TSOs can indicate for which means the exchange data must be used. Once this is defined and approved by NRAs, is applicability is mandatory. **New 2. Not accepted.** Although, SO GL does not allow TSOs to request without agreement information under title 2 it doesn´t forbid to manage agreements to exchange them. Additionally not all the data out of the observability area is out of scope, for example there can be SGUs connected out of observability area that have to exchange data with the TSO. 1. **Partly accepted.** Article 3(1) has been amended to reflect “shall wording”. It is consider that in the first part of the actual article, the proposal “Except where explicitly otherwise stated, they shall be the party required to provide the data” it is included. 2. **Accepted. Article 3(2) has been deleted** 3. **Accepted. Article 3(3) has been deleted**	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		provide it to the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO. 5. No change. 6. CDSOs, SGUs shall not be required to provide the same data directly to both the TSO and the DSO it is connected to. 7. DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems, excluding the communication channel, to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO. 8. No change. Explanation: The additional first three paragraphs are necessary to make sure fundamental principles of European Union law are respected, this is: the principle of proportionality (Article 5(4) of the Treaty on European Union), the principle of subsidiarity (Article 5(3) of the Treaty on European Union) and the principle of data scarcity (e.g. laid down in article 6(1) of (EU) 2016/679). The change in paragraph 1. is necessary to adapt the wording to a form suitable to legal documents. Paragraph 2. and 3. should be deleted, as they refer solely to parties offering services to TSOs. From our point of view, services provided to TSOs and any obligation stemming from that should not be defined in KORRR, but can be bilaterally agreed when procuring such services. Paragraph 4 should define cascaded data exchange as the general principle for data exchange regarding SGUs connected to distribution systems. This general rule was agreed in the TSO-DSO data management report (page 16 of the report:"Generally, each system operator should be responsible for directly collecting data from users connected to its grid (generators, consumers, storage, etc.). [...]" Paragraph 4. sentence 1 should be changed from "coordination" to "agreement", as agreement is required by article 40(7) of (EC) 2017/1485 for all data exchanges related to distribution systems. Sentence 2 should be deleted as it creates inefficiencies and legal and economic uncertainties and risks if multiple decisions on data exchange are possible for each and every SGU. In sentence 3, "make it available" must be changed into "provide it", as TSOs are obliged to provide it to the DSO to fulfill their obligations from 72/EC/2009, art. 12 e):"Each transmission system operator shall be responsible for:(e)providing to the operator of any other system with which its system is interconnected sufficient		4. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) is included to highlight the NRA approval. 5. **No action** 6. **Not accepted.** On the basis or articles 48 to 50 and 53 of SOGL the KORRR renders the provision of data both to the TSO and to the DSOs as he default option. Article 3(6) (article 3(2) of the new KORRR version) has been amended to reflect the possibility that at national level this approach can be revised in order to allow SGUs the provision of data only to the TSO or to the DSO they are connected to. 7. **Not accepted.** However, article 3(7) has been split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO. 8. **No action.** However article 3(8) (article 3(9) of the new KORRR version) has been amended to clarify it. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to the new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national. Related TSO-DSO data management report a	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		information to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system;" Data related to SGUs at the distribution system is unquestionably necessary to ensure the secure and efficient operation of the (distribution) system. The last sentence of paragraph 4 should be deleted, as it is unclear how quality and/or granularity of data could be improved by the receiving party. Furthermore, when assuming cascaded data exchange, the highest efficiency lever is untapped by data aggregation and thus refinement. Such solutions are prohibited by the requirement contained in the last sentence without any necessity nor justification. Paragraph 6 should explicitly prohibit duplicated data transfer, as it is inefficient and constitutes unnecessary costs to stakeholders. In paragraph 7 it cannot be the sole responsibility of the DSOs, CDSOs and SGUs for the installation, configuration, security and maintenance of the communication channels. The TSO has an equal responsibility.		clarification should be done. KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level.	
3	2, 4	Article 3(2), 3(4) - This is a requirement of Regulation 2017/1485, and is incumbent upon each TSO to define and therefore shouldn't be within the KORRR . REMOVE reference.	2.Yes 4.Yes	2. **Accepted**. **Article 3(2) has been deleted** 4. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) read in conjunction with Articles 58 to 50 and 53 of SO GL. A reference to Article 40(5) is included to highlight the NRA approval. Additionally, as Articles 3(2) and 3(3) have been deleted, a new article 1(3) has been added to new KORRR version to consider national flexibility for defining requirements for service provision to the System. As aggregations purpose is to offer service to the System, they shall be defined at national.	SP Energy Networks

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
3	New 9	**New paragraph 9**: Even more important than confidentiality is privacy. One could argue that, when we speak about data exchange TSO-DSO, we do not immediately think of data of an individual person, but is not excluded by KORRR. It might become even realistic when low voltage grid users start to deliver balancing services to the TSO, for example with sanitary heat boilers, through an aggregator. In that case, we all have to comply with the European General Data Protection Regulation (GDPR), which imposes a lot of things in order to have robust processes (audited), to guarantee that individual data are not divulged, and that each individual person can always know who does what with data about him.	No	**Not accepted.** Both KORRR and article 12 of SO GL on confidentiality obligations refer to "other relevant Union legislation" therefore also including the General Data Protection Regulation.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
4	0	If the responsibility etc exists in SOGL to share data with third parties, it should be left to be covered in the SOGL and should not be covered in KORRR Delete the article	No	**Not accepted** This article stablishes the confidentiality framework for KORRR.	Energy Networks Association
4	0	2) The consulted version of the KORRR lacks any reference to the General Data Protection Regulation. Article 4 ("confidentiality") seeks to protect the confidentiality of data, this may not be sufficient, especially in the case where data of private persons are used. Article 4 should also specify that the TSO and his counterparties with whom he exchanges data with, shall collaborate where needed, to enable each other to demonstrate compliance with the European General Data Protection Regulation. This is especially relevant if personal data are exchanged. Personal data may be involved in cases where for example balancing services are supplied to the TSO – through an aggregator - by low voltage grid users (e.g. by electrical vehicles, home batteries, heating or cooling devices…). In this case, depending on the data exchange models that the TSO and relevant DSO should jointly elaborate, there could be an exchange of personal data related to the grid users that participate to this service (although the first approach should be to avoid this wherever possible). In the proposed version of the KORRR, Article 4 still leaves the door open to share data amongst TSOs (art 4.6) or regulators (4.7) without specifying detailed procedures or conditions before doing so. Even if these parties can be considered as trusted, commercially neutral parties and bound to confidentiality obligations (which must be verified how this is defined on European level), the sharing of data may still be an infringement against the GDPR if no further measures are taken to ensure full transparency towards the end customers, on	No	**Not accepted** Both KORRR and article 12 of SO GL on confidentiality obligations refer to "other relevant Union legislation" therefore also including the General Data Protection Regulation.	Belgian DSOs: Eandis, Infrax, Sibelga, ORES, Resa

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		who has insight in their data and for which purpose.			
4	4,6,8	4. According to Article 40(10) of Regulation 2017/1485, DSOs with a connection point to a transmission system shall be entitled to receive the relevant Structural, Scheduled and Real Time information from the relevant TSOs and to gather the relevant Structural, Scheduled and Real Time information from the neighbouring DSOs. Neighbouring DSOs shall determine, in a coordinated manner, the scope of information that may be exchanged. Paragraph 4 must be exchanged against an unmodified copy of article 40(10) of (EU) 2017/1485. The original version of this paragraph constitutes a restriction of rights of DSOs stemming from art. 40(10), which is inacceptable. A prerequisite for paragraph 6 is that the NRA is obliged to treat the data that he receives from system operators as confidential. If not, this paragraph would open the door to breach confidentiality via regulators. Paragraph 8 should be deleted, as it is unclear whether it consitutes an extension of the provisions of art. 12 of (EU) 2017/1485 or not. To avoid legal uncertainties, the provision of art. 12 should be deemed sufficient for the cases paragraph 12 aims at.	4.No 6.No 8.No	4. **Not accepted.** Article 4 (4) (article 5(3) of the new KORRR version) doesn't forbid the DSO may have access to further information respect to the connection point but it specifies that further requests shall be justified by operational security reasons and after agreement with TSO 6. **Not accepted.** Article 4(1) of KORRR states that all data affected by the KORRR shall be confidential and that each party receiving data according to the KORRR shall implement appropriate technical and organizational measures to ensure that data is not divulged to any other person or authority. NRAs shall respect Art. 4(1). 8. **Not accepted** Article 4(8) (article 5(6) of new version) is not an extension of provisions in article 12 of SO GL but a definition of the conditions to share any data under that article	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				of the SO GL.	
4	1	1. Delete paragraph. Paragraph 1 should be deleted, as it is very similar but not identical to the provisions of article 12 of (EU) 2017/1485. Providing similar but deviating provisions in this methodology will lead to legal uncertainties for stakeholders, as it is not immediately clear which document has to be respected when provisions deviate from each other.	No	**Not accepted** This article stablishes the confidentiality framework for KORRR.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
4	4	Proposal: 4. DSOs and CDSOs shall have access to the Structural, Scheduled and Real Time information of the commissioned facilities of the Transmission Network in their connection point. Upon justification of the need of the information for operational security reasons, reliable dynamic simmulations of their grids, they may request to the TSO further structural or Real Time information from commissioned facilities in the Transmission System of the Control Area they are connected and other Transmission Systems with an influence on their networks. When the request of information comes from a CDSO, it shall not include the Connection Point of other CDSOs or SGUs. TSOs shall refuse to provide this information only if DSOs or CDSOs don't provide a solid justification of the need of the information for operational security reasons. Explanation: 4. Operational security in distribution networks is affected by: - commisioned facilities in its TSO system (mainly power-generating modules, demand facilities and substations). - commisioned facilities in other adjacent TSOs systems (i.e spanish distribution systems are affected by french and portuguese transmission systems) Additionally, access to data for operational security reasons shall be guaranteed as long as a solid justification is provided. DSOs are regulated entities with responsibilities in SoS and QoS that must fulfill severe confidentiality requirements; therefore, data shall not be denied to them.	Yes	**Accepted**. Article 4(4) (article 5(3) of the new KORRR version) is reworded to take into account the Dynamic simulations and to reflect the need of a justification for the DSO.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
4	4	Proposal: DSOs and CDSOs shall have access to the Structural, Scheduled and Real Time information of the commissioned facilities of the Transmission Network in their connection point. Upon justification of the need of the information for operational security reasons, they may request further structural or Real Time information from commissioned facilities of the Transmission System of the Control Area they are connected or the adjacent ones. When the request of information comes from a CDSO, it shall not include the Connection Point of other CDSOs or SGUs. TSOs may give positive or justified negative answer to the request. Explanation:	Yes	**Not accepted.** However new articles 6 (7) and 6(8) of new KORRR version have been added to reflect the necessity stated,	Swissgrid

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		If the DSO is near the Country boarder, he could need some information of the network elements out of the connected control area to do calculations. So he should be able to get the data from the adjacent control zones if needed.			
4	6	6. Competent National Regulatory Authorities shall have access to all information exchanged according to the KORRR upon motivated request. The NRAs are obliged to treat the data they receive from TSOs and/or DSOs as confidential.	No	**Not accepted.** Article 4(1) of KORRR states that all data affected by the KORRR shall be confidential and that each party receiving data according to the KORRR shall implement appropriate technical and organizational measures to ensure that data is not divulged to any other person or authority. NRAs shall respect Art. 4(1).	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
4	5	Proposal: Art 4.5 – "SGUs shall have access to the Structural, Scheduled and Real Time information of the commissioned facilities of the Transmission System or Distribution System in their connection point. I shall not include the Connection Point of other CDSOs or SGUs". Explanation: SGUs shall have also access to scheduled information.	Yes	**Accepted.** Article 4(5) (article 5(4) of new KORRR version) has been amended to include scheduled data.	EDF
4	8	8. Delete paragraph.	No	**Not accepted.** No reason added in the comment.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
4	6	Competent National Regulatory Authorities shall have access to all information exchanged according to the KORRR upon request. Real time data, however, shall be requested only in the form of a report, presenting archival data from the period indicated in the request. Explanation: The proposed provision from Article 4 (6) of the KORRR document may raise interpretations concerns, especially regarding NRAs access to DSOs' SCADA systems. Without this change DSOs are concerned about the possibility of NRAs may request the direct access to the DSOs' SCADA system, which technically is highly complicated.	No	**Not accepted.** As stated in Article 4 (6) (article 5(5) of new KORRR version), NRAs will not receive data by default, only upon request. In line with this, conditions to receive this data are not currently defined in the KORRR and shall be defined following the request from the NRA.	PTPiREE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
4	7	Proposal: 7. Subject to the confidentiality obligations set out in Article 12 of Regulation 2017/1485, TSOs may share the data obtained with all other TSOs that have fully implemented the requirements set out in KORRR proposal. With this regard, the data exchange shall be only posible if needed by the TSO to fulfill its resposabilities. Explanation: 7. According to SO GL Art 12(4)	NO	**Not accepted.** The obligation to exchange the data only to fulfil their responsibilities is already covered by the reference to Article 12 of Regulation 2017/1485.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
4	New	New 9. If there is an exchange of personal data between TSO and DSO, TSO and DSO collaborate to enable each other to be compliant with the GDPR (European General Data Protection Regulation). New paragraph 9: Even more important than confidentiality is privacy. One could argue that, when we speak about data exchange TSO-DSO, we do not immediately think of data of an individual person, but is not excluded by KORRR. It might become even realistic when low voltage grid users start to deliver balancing services to the TSO, for example with sanitary heat boilers, through an aggregator. In that case, we all have to comply with the European General Data Protection Regulation (GDPR), which imposes a lot of things in order to have robust processes (audited), to guarantee that individual data are not divulged, and that each individual person can always know who does what with data about him.	No	**Not accepted.** Both KORRR and article 12 of SO GL on confidentiality obligations refer to "other relevant Union legislation" therefore also including the General Data Protection Regulation. It also referees to national law or other	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
4	-	1. Delete paragraph. 2. No change. 3. No change. 4. According to Article 40(10) of Regulation 2017/1485, DSOs with a connection point to a transmission system shall be entitled to receive the relevant Structural, Scheduled and Real Time information from the relevant TSOs and to gather the relevant Structural, Scheduled and Real Time information from the neighbouring DSOs. Neighbouring DSOs shall determine, in a coordinated manner, the scope of information that may be exchanged. 5. No change. 6. Competent National Regulatory Authorities shall have access to all information exchanged according to the KORRR upon motivated request. The NRAs are obliged to treat the data they receive from TSOs and/or DSOs as confidential. 7. No change.	1.No 2. No 3. No 4. No 5. No 6. No 7. No 8. No New 9. No	1. **Not accepted This** article stablishes the confidentiality framework for KORRR 2. **No action** 3. **No action** 4. **Not accepted.** Article 4 (4) (new articles 5(3) of new KORRR version) doesn't forbid the DSO may have access to further information respect to the connection point but it specifies that further requests shall be justified by operational security reasons and after agreement with TSO 5. **No action** 6. Article 4(1) of KORRR states that all data affected by the KORRR shall be confidential	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		8. Delete paragraph. New 9. If there is an exchange of personal data between TSO and DSO, TSO and DSO collaborate to enable each other to be compliant with the GDPR (European General Data Protection Regulation). Explanation: Paragraph 1 should be deleted, as it is very similar but not identical to the provisions of article 12 of (EU) 2017/1485. Providing similar but deviating provisions in this methodology will lead to legal uncertainties for stakeholders, as it is not immediately clear which document has to be respected when provisions deviate from each other. Paragraph 4 must be exchanged against an unmodified copy of article 40(10) of (EU) 2017/1485. The original version of this paragraph constitutes a restriction of rights of DSOs stemming from art. 40(10), which is inacceptable. A prerequisite for paragraph 6 is that the NRA is obliged to treat the data that he receives from system operators as confidential. If not, this paragraph would open the door to breach confidentiality via regulators. Paragraph 8 should be deleted, as it is unclear whether it consitutes an extension of the provisions of art. 12 of (EU) 2017/1485 or not. To avoid legal uncertainties, the provision of art. 12 should be deemed sufficient for the cases paragraph 12 aims at. New paragraph 9: Even more important than confidentiality is privacy. One could argue that, when we speak about data exchange TSO-DSO, we do not immediately think of data of an individual person, but is not excluded by KORRR. It might become even realistic when low voltage grid users start to deliver balancing services to the TSO, for example with sanitary heat boilers, through an aggregator. In that case, we all have to comply with the European General Data Protection Regulation (GDPR), which imposes a lot of things in order to have robust processes (audited), to guarantee that individual data are not divulged, and that each individual person can always know who does what with data about him.		and that each party receiving data according to the KORRR shall implement appropriate technical and organizational measures to ensure that data is not divulged to any other person or authority. NRAs shall respect Art. 4(1). 7. **No action**. 8. **Not accepted.** Article 4(8) (article 5(6) of new version) is not an extension of provisions in article 12 of SO GL but a definition of the conditions to share any data under that article of the SO GL. **New 9**. **Not accepted.** Both KORRR and article 12 of SO GL on confidentiality obligations refer to "other relevant Union legislation" therefore also including the General Data Protection Regulation. It also refers to national law or other.	
4	New	Proposal: NEW 9. If there is an exchange of personal data between TSO and DSO, TSO and DSO collaborate to enable each other to be compliant with the GDPR (European General Data Protection Regulation).	No	**Not accepted.** Both KORRR and SO GL article 12 on confidentiality obligations refer to "other relevant Union legislation" therefore also including the General Data Protection Regulation. It also refers to national law or	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Explanation: 9. We all have to fulfill with the European General Data Protection Regulation (GDPR), which imposes a lot of requirements in order to have robust processes (audited), to guarantee that individual data are not divulged, and that each individual person can always know who does what with data about him.		other.	
4	New	Proposal: New paragraph – "Data cannot be used by for anything not defined in Regulation 1485/2017." Explanation: Data cannot be used by for anything other than their intended purpose.	No	**Not accepted.** Confidentiality of the information and use only for the purpose defined in regulation 2017/1485 is already defined in Article 12 of SO GL and Article 4 of KORRR.	EDF
4	New 9	It needs to be stated somewhere that a TSO cannot seek data from a DSO not in its control area, even if that DSO is in its observability area. Such data must come from the TSO in whose control area the DSO is	Yes	**Accepted.** New paragraphs in article 6 of new KORRR version (Responsibilities of TSOs) have been added to clarify this point.	Energy Networks Association
5	0	Everywhere the article says "DSOs" should be added "and CDSOs" The comment on CDSOs is valid for all of the document as clarification, as according to DCC DSOs and CDSOs are to be considered on the same level, and thus this would increase the readability of the document if this would be added everywhere.	Yes	.**Accepted**. A new article 1(4) has been added to the new KORRR version to reflect closed distribution system roles that shall apply in the KORRR.	IFIEC Europe
5	0	Moreover, as a general comment, it would also be advisable to add an article on how grid users can get data from the TSOs, as the article mainly describes the general responsibilities towards other TSOs, but not towards grid users.	No	**Not accepted.** Articles 4(2) and 4(5) of KORRR (articles 5(1) and 5(4) of new KORRR version) reflects the SGU´s access to data from the TSOs or DSOs	IFIEC Europe
5	2	Proposal: 2. Each TSO shall define the observability area of the connected distribution network of its control area according to the methodology of Article 75 Regulation 2017/1485 and communicate it to the affected DSOs. In general, it shall be no more than a lower voltage level. Explanation: 2. It is necessary to limit the grid voltage level that will be considered as observability area by the TSO.	No	**Not accepted.** The determination of the observability area cannot be limited in the KORRR because it has to be defined in the methodology developed according to Article 75 of SO GL.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
5	4	**New** 4. Each TSO shall provide updated information of their transmission system that is part of the observability area of neighbouring DSOs to those DSOs. New paragraph 4. Following the state of the art, some DSOs have their own observability areas stretching out to elements of the transmission system. To account for that and to ensure the necessary observability for DSOs as defined in whereas-section (2) of KORRR, TSOs should be obliged to provide data relating to the transmission system to neighbouring DSOs.	No	**Not accepted.** Drafting of KORRR takes into consideration Article 40(10) of the SO GL. In line with it, Article 4 (4) of KORRR (article 5(3) of new KORRR version) allows the DSOs to access the data from the transmission system that may have impact in their grid. The update of that information in reflected in Article 7.2 of KORRR (article 8(2) of new KORRR version). Processes to exchange data among neighbouring DSOs shall be agreed between relevant DSOs.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
5	2	2. According to Article 43(1) of Regulation (EU) 2017/1485, each TSO shall determine the observability area of the transmission-connected distribution systems which is needed for the TSO to determine the system state accurately and efficiently, based on the methodology developed in accordance with Article 75. Paragraph 2 provides provisions very similar but not identical to the provisions of article 43 of (EU) 2017/1485. Providing similar but deviating provisions in this methodology will lead to legal uncertainties for stakeholders, as it is not immediately clear which document has to be respected when provisions deviate from each other. To avoid any legal uncertainty, competing provisions should be avoided. To account for it, an identical copy of the provisions of (EU) 2017/1485 is a solution.	Yes	**Accepted**. Article 5(2) (article 6(2) of new KORRR version) has been amended to include only the requirement to communicate the observability area to the parties involved.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
5	5	5. TSOs shall use the information platform developed in accordance with Article 114 of Regulation 2017/1485 to exchange structural and scheduled information with other TSOs. Paragraph 5 should be adapted to ensure TSOs use OPDE, as the establishment of another, parallel system for the same type of data would be inefficient.	Yes	**Accepted.** Article5 (5) (new article 6 (9) of new KORRR version)has been amended.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
6	1,2,3	1. Delete paragraph. 2. Each TSO shall store electronically the structural data of the electric system as long as it is necessary to fulfill its legal tasks. The storage shall contain the information from the Transmission System, from the observability area in the Distribution Networks, from the observability area in neighbouring Transmission Systems and from the SGU according to articles 41, 43, 45, 48, 51 and 52 of Regulation 2017/1485.	1.- Yes 2.-Yes 3.- Yes	1. **Accepted.** Article 5(1) has been deleted. 2. **Partially accepted**. Article 6(2) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version. This new article reflects that time to store structural information will be defined by national	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		3. Each TSO shall specify the format and may publish templates for the structural data that transmission-connected SGUs shall provide. Each TSO shall agree with the DSO on the format and may publish templates for the structural data that the DSO and distribution-connected SGUs shall provide. When doing so, each TSO shall take into account and complement, where necessary, the definitions provided following Article 18 of GLDPM and GLDPM v2. Paragraph 1 should be deleted, as it is very similar but not identical to the provisions of article 40(2) and 40(3) of (EU) 2017/1485. Providing similar but deviating provisions in this methodology will lead to legal uncertainties for stakeholders, as it is not immediately clear which document has to be respected when provisions deviate from each other. To avoid any legal uncertainty, competing provisions should be avoided. Furthermore, paragraph 1 seems to go beyond what is provided for in article 40(2) and 40(3) of (EU) 2017/1485. TSOs are not entitled to define provisions going beyond (EU) 2017/1485. Paragraph 2 should limit data storage to the time period data is necessary to fulfill legal tasks. As soon as it is no longer necessary, such data should be deleted, following the principle of data scarcity. Paragraph 3 should be adapted to respect the provisions contained in Article 40(7) of (EU) 2017/1485 and oblige TSOs to take into account what is already defined stemming from GLDPM. Any parallel defintion of data formats etc. would be inefficient and cause unjustified costs to stakeholders.		legislation. 3. **Accepted.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
5	-	1. No change. 2. According to Article 43(1) of Regulation (EU) 2017/1485, each TSO shall determine the observability area of the transmission-connected distribution systems which is needed for the TSO to determine the system state accurately and efficiently, based on the methodology developed in accordance with Article 75. 3. No change. New 4. Each TSO shall provide updated information of their transmission system that is part of the observability area of neighbouring DSOs to those DSOs. 4. No change. 5. TSOs shall use the information platform developed in accordance with Article 114 of Regulation 2017/1485 to exchange structural and scheduled information with other TSOs. Explanation: Paragraph 2 provides provisions very similar but not identical to the provisions of article 43 of (EU) 2017/1485. Providing similar but deviating provisions in this methodology will lead to legal uncertainties for stakeholders, as it is not immediately clear which document has to be respected when provisions deviate from each other. To avoid any legal uncertainty, competing provisions should be avoided. To account for it, an identical copy of the provisions of (EU) 2017/1485 is a solution. New paragraph 4. Following the state of the art, some DSOs have their own observability areas stretching out to elements of the transmission system. To account for that and to ensure the necessary observability for DSOs as defined in whereas-section (2) of KORRR, TSOs should be obliged to provide data relating to the transmission system to neighbouring DSOs. Paragraph 5 should be adapted to ensure TSOs use OPDE, as the establishment of another, parallel system for the same type of data would be inefficient.	1. No 2. Yes 3. No New 4. No 4. No 5. Yes	**1. No action** **2. Accepted**. Article 5(2) (article 6(2) of new KORRR version) has been amended to include only the requirement to communicate the observability area to the parties involved. **3. No action** New 4. Drafting of KORRR takes into consideration Article 40(10) of the SO GL. In line with it, Article 4 (4) of KORRR (article 5(3) of new KORRR version) allows the DSOs to access the data from the transmission system that may have impact in their grid. The update of that information in reflected in Article 7.2 of KORRR (article 8(2) of new KORRR version). Processes to exchange data among neighbouring DSOs shall be agreed between relevant DSOs. 4.- **No action** 5. **Accepted..** Article5 (5) (new article 6 (9) of new KORRR version) has been amended.	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
5	New	Proposal: NEW. Each TSO shall provide updated information of the neighbouring TSO network which is part of the observability area of DSO to those DSOs. Explanation: All data flow should be bidirectional. Not only the DSO shall provide data for neighbouring TSO also neighbouring TSO shall provide data to neighbouring DSOs if they are part of the observable area of the DSO.	Yes	**Partially accepted.** New articles 6 (7) and 6(8) of new KORRR version have been added to reflect the necessity stated,	Swissgrid
6	1	This seems to be already covered by various Articles in Regulation 2017/1485, so does it need to be repeated in the KORRR as well?	Yes	**Accepted.** Article 6(1) has been deleted.	SP Energy Networks
6	3	3. Each TSO shall specify the format and may publish templates for the structural data that transmission-connected SGUs shall provide. Each TSO shall agree with the DSO on the format and may publish templates for the structural data that the DSO and distribution-connected SGUs shall provide. When doing so, each TSO shall take into account and complement, where necessary, the definitions provided following Article 18 of GLDPM and GLDPM v2. Paragraph 3 should be adapted to respect the provisions contained in Article 40(7) of (EU) 2017/1485 and oblige TSOs to take into account what is already defined stemming from GLDPM. Any parallel defintion of data formats etc. would be inefficient and cause unjustified costs to stakeholders.	Yes	**Accepted.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
6	3	Proposal: Each TSO shall agree with DSO and SGU on the common format and templates for the structural data that DSOs and SGUs shall provide. The for-mat or templates have to include the detailed content of the structural data that have to be provided. Explanation: Some countries, e.g. Germany have more than one TSO. It is not cost efficient to apply new formats or to use different format for each control area.	Yes	**Accepted.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	TIWAG-Tiroler Wasserkraft AG - Dispatching

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
6	3	Proposal: 3. Each TSO shall specify the format and publish templates for the structural data that SGUs shall provide. The format or template have to include the detailed content of the structural data that have to be provided. Explanation: 3. DSOs shall not be included in this provision because the format of data exchanges between DSOs and TSOs shall be agreed according to art 40(7) of the GL SO. On the other hand, publication of templates should not be voluntary. Finally, this provision (only applicable to SGUs) should be moved to art. 3 because it is not related to data storage.	Yes	**Accepted**. Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
6	3	Proposal: Art.6-3 – "Each TSO shall specify the format and shall publish templates for the structural data that DSOs and SGUs shall provide, in coordination with them. The format or template have to include the detailed content of the structural data that have to be provided". Explanation: The format for the structural data that DSOs and SGUs shall provide needs to be discussed between TSOs and DSOs and SGUs. Moreover, these IT systems to exchange data are very costly and an evolution of format requires time and would lead to additional costs for DSOs and SGUs. Therefore, it is necessary that the formats remain as stable as possible. Finally, for purpose of transparency, EDF considers that TSOs shall (and not "may") publish templates.	Yes	**Accepted.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	EDF
6	3	3. Each TSO shall AGREE with DSO and SGUs on the COMMON format and may publish templates for the structural data that DSOs and SGUs shall provide. The format or template have to include the detailed content of the structural data that have to be provided. Some countries, e.g. Germany, have more than one TSO. It is not cost efficient to apply new formats or to use different formats for each control area. According to article 40(7) of the Regulation 2017/1485 the TSO and DSO shall AGREE on effective, efficient and proportional processes for providing and managing data exchanges between them […] and SGUs. The KORRR as implementation of the regulation should reflect that idea and not differ from it.	Yes	**Accepted.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	Stromnetz Hamburg GmbH RWE Generation SE BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
6	2	2. Each TSO shall store electronically the structural data of the electric system as long as it is necessary to fulfill its legal tasks. The storage shall contain the information from the Transmission System, from the observability area in the Distribution Networks, from the observability area in neighbouring Transmission Systems and from the SGU according to articles 41, 43, 45, 48, 51 and 52 of Regulation 2017/1485. Paragraph 2 should limit data storage to the time period data is necessary to fulfill legal tasks. As soon as it is no longer necessary, such data should be deleted, following the principle of data scarcity.	Yes	**Partially accepted**. Article 6(2) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version. This new article reflects that time to store structural information will be defined by national legislation.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
7	1	1. Each TSO shall review the structural information it shares with other TSOs and DSOs at least every 6 months and provide updated information of the observability area to the neighbouring TSO and DSO in the following situations: a) to e): No change. DSOs are system operators as well and shall be treated as such. According to Article 40(10) of Regulation 2017/1485, "DSOs with a connection point to a transmission system shall be entitled to receive the relevant structural, scheduled and real-time information from the relevant TSOs." This entitlement encompasses updates, as information can only be relevant if it is up to date. Definition of error needed: What does "error" mean in paragraph 1 (d)? Does it mean an error in the data set transmitted earlier or does it mean a malfunction of the SGU?	1.-No 2.-Yes	1**. Not accepted.** Article 7 (1) (article 8(1) of new KORRR version) reflects updates between TSOs while article 7(2) (article 8(2) of new KORRR version) reflects the possibility for DSOS and SGUs to request updated information to the TSO according to article 5(4) (article 5(3) of new KORRR version). 2. **Accepted**. Article 7(1) (article 8(1) of new KORRR version) has been amended to clarify that “error” means an error in the data set transmitted earlier	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
6	3	Art 6(3) This is already covered in Arts 43, 45, 48 and 53 of SOGL. Can delete this paragraph.	Yes	**Not Accepted.** Article 6(3) reflects the requirement stated in article 40 (6) of SO GL that should be covered by the KORRR it does not reflect the data that has to be exchange mention in articles 43, 45, 48 and 53 of SO GL. However, article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
6	-	1. Delete paragraph. 2. Each TSO shall store electronically the structural data of the electric system as long as it is necessary to fulfill its legal tasks. The storage shall contain the information from the Transmission System, from the observability area in the Distribution Networks, from the observability area in neighbouring Transmission Systems and from the SGU according to articles 41, 43, 45, 48, 51 and 52 of Regulation 2017/1485. 3. Each TSO shall specify the format and may publish templates for the structural data that transmission-connected SGUs shall provide. Each TSO shall agree with the DSO on the format and may publish templates for the structural data that the DSO and distribution-connected SGUs shall provide. When doing so, each TSO shall take into account and complement, where necessary, the definitions provided following Article 18 of GLDPM and GLDPM v2. Explanation: Paragraph 1 should be deleted, as it is very similar but not identical to the provisions of article 40(2) and 40(3) of (EU) 2017/1485. Providing similar but deviating provisions in this methodology will lead to legal uncertainties for stakeholders, as it is not immediately clear which document has to be respected when provisions deviate from each other. To avoid any legal uncertainty, competing provisions should be avoided. Furthermore, paragraph 1 seems to go beyond what is provided for in article 40(2) and 40(3) of (EU) 2017/1485. TSOs are not entitled to define provisions going beyond (EU) 2017/1485. Paragraph 2 should limit data storage to the time period data is necessary to fulfill legal tasks. As soon as it is no longer necessary, such data should be deleted, following the principle of data scarcity. Paragraph 3 should be adapted to respect the provisions contained in Article 40(7) of (EU) 2017/1485 and oblige TSOs to take into account what is already defined stemming from GLDPM. Any parallel defintion of data formats etc. would be inefficient and cause unjustified costs to stakeholders.	1. Yes 2. Yes 3. Yes	**1. Accepted.** This article has been deleted. **2. Partially accepted**. Article 6(2) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version. This new article reflects that time to store structural information will be defined by national legislation. **3. Accepted.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG
6	New	Proposal: NEW 4. Each TSO shall electronically store the information at least only during the necessary time to comply with its tasks. Explanation: 4. "At least" is too ambigous. Data Storage should be restricted to only the	Yes	**Partially accepted**. Article 6(2) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version. This new article reflects that time to store structural information will be defined by national	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		necessary time.		legislation.	
7	1	Proposal: 1. Each TSO shall review the structural information it shares with other TSOs and DSOs at least every 6 months and provide updated information of the observability area to the neighbouring TSO and DSOs in the following situations: ◦ a. At least 3 months before commissioning of a new network element or facility; Explanation: 1. DSOs are system operators as well and shall be treated as such. According to Article 40(10) of Regulation 2017/1485, "DSOs with a connection point to a transmission system shall be entitled to receive the relevant structural, scheduled and real-time information from the relevant TSOs." This entitlement encompasses updates, as information can only be relevant if it is up to date.	No	**Not accepted.** Article 7 (1) (article 8(1) of new KORRR version) reflects updates between TSOs while article 7(2) (article 8(2) of new KORRR version) reflects the possibility for DSOS and SGUs to request updated information to the TSO according to article 5(4) (article 5(3) of new KORRR version).	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
7	2	2. According to the information stated in the Articles 4(5), SGUs may request the update of the structural data to its TSO. DSOs are system operators as well and shall be treated as such. According to Article 40(10) of Regulation 2017/1485, "DSOs with a connection point to a transmission system shall be entitled to receive the relevant structural, scheduled and real-time information from the relevant TSOs." This entitlement encompasses updates, as information can only be relevant if it is up to date.	No	**Not accepted.** Article 7 (1) (article 8(1) of new KORRR version) reflects updates between TSOs while article 7(2) (article 8(2) of new KORRR version) reflects the possibility for DSOS and SGUs to request updated information to the TSO according to article 5(4) (article 5(3) of new KORRR version).	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
7	1	With respect to significant modifications, it is important to add that the timing of such modifications can be adapted during the on-going work. This should also be reflected in this article. Moreover, the article should also foresee a bullet for unforeseen events (e.g. accident, explosion, ...) which would change the structural data from the site but which cannot by there nature be communicated at least three months in advance (and which are not covered by point e on errors, as these relate to data errors)	Yes	**Accepted.** Article 7 (1) (article 8(1) of new KORRR version) has been reworded to take into account first part of the comment as second part is related to SGU chapter. This is why a new point 15(1) (e) in the new KORRR version was added to reflect second part of the comments related to the situation of unforeseen modifications,	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
8	2	Scheduled data exchange between TSOs and DSOs is beyond the scope of KORRR and has no corresponding article within Regulation 2017/1485. Needs clarification. Also not appropriate for KORRR to impose standards on DSOs and SGUs without their consultation.	No	**Not accepted.** Exchange of outage planning data between TSOs and DSOs is relevant for the operation of the system. It is reflected in Part III; Title 3 of the SO GL and the implementation methodologies of CACM like the GLDPM. KORRR does not impose any specific standard, it recommends the adoption of international standards.	SP Energy Networks
7	-	1. Each TSO shall review the structural information it shares with other TSOs and DSOs at least every 6 months and provide updated information of the observability area to the neighbouring TSO and DSO in the following situations: a) to e): No change. 2. According to the information stated in the Articles 4(5), SGUs may request the update of the structural data to its TSO. Explanation: DSOs are system operators as well and shall be treated as such. According to Article 40(10) of Regulation 2017/1485, "DSOs with a connection point to a transmission system shall be entitled to receive the relevant structural, scheduled and real-time information from the relevant TSOs." This entitlement encompasses updates, as information can only be relevant if it is up to date.	No	**Not accepted.** Article 7 (1) (article 8(1) of new KORRR version) reflects updates between TSOs while article 7(2) (article 8(2) of new KORRR version) reflects the possibility for DSOS and SGUs to request updated information to the TSO according to article 5(4) (article 5(3) of new KORRR version).	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG
7	-	Article 7 - clarification As the data exchange from the TSO to the DSO is not mentioned in the KORR document, it should be added in Article 7. Alternatively an additional article can be added. The networks of TSO and DSO are connected. Changes in the grid of the DSO affect the TSO and vice versa. Though, the DSO should get the same quality and quantity of information from the TSO.	No	**Not accepted.** The requirements to exchange data from TSO to DSOs are defined in article 5(4) of KORRR (article 5(3) of new KORRR version).	EnBW Energie Baden-Württemberg AG BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
8	1	Proposal: 1. Each TSO shall be capable of exchanging scheduled data with NEMOS, SGUs, DSOs or third parties to whom the exchange of scheduled information may have been delegated. Scheduled data shall at least include the generation and load schedules resulting from markets trade between Day ahead and real time, unavailability or limitations to active power production or consumption of SGUs, unavailability of network elements of DSOs in the TSO's observability area. TSOs are not allowed to require SGUs to send scheduled data concerning hours that have not been settled yet in the day ahead market. Explanation: UPM-Kymmene Oyj supports the idea proposed by ENTSO-E in article 8 (1) but wishes to make a clarifying amendment to the proposal. To ensure the accuracy of demand-generation balance information, UPM-Kymmene Oyj proposes an amendment to rule out the possibility of TSOs to require SGUs to send scheduled data concerning hours that have not been settled yet in the day ahead market. UPM-Kymmene Oyj suggests that scheduled data is sent to TSOs only after the settlement of day ahead orders as stated as a minimum requirement in article 8 (1). This would better reflect the consumption and generation patterns that are likely to take place as consumption and generation forecasts made before day-ahead trading do not include the effect of actualized price dependent orders. This data does not take into account e.g. the demand flexibility taking place in industrial electricity consumption. The amendment would also prevent possible additional regulatory burden to industrial electricity consumption units with possibility to demand flexibility.	No	**Not accepted.** Scheduled data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with art. 40(5) of SO GL on determination of applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a service. Financial settlement is out of the scope of the KORRR.	UPM-Kymmene Oyj
8	1	1. Each TSO shall be capable of exchanging scheduled data with SGUs, DSOs or third parties to whom the exchange of scheduled information may have been delegated. Scheduled data shall at least include the generation and load schedules resulting from market trades between Day ahead and real time, unavailability or limitations to active power production or consumption of SGUs, unavailability of network elements of DSOs in the TSO's observability area. "Paragraph 1 should avoid referring to NEMOs, as NEMOs are not subject of (EU) 2017/1485 and therefore should not be subject of KORRR.	Yes	**Accepted.** Article 8(1) (article 9(1) of new KORRR version) has been amended and the reference to NEMOs has been deleted.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
8	2	Art 8(2) The format of data between a TSO and DSOs and SGUs in its control area is the subject of Articles 43-55. It is not appropriate to impose a standard only necessary for the communication between TSOs onto DSOs and SGUs. Delete this paragraph.	Yes	**Not accepted** Article 8(2) reflects the requirement stated in article 40 (6) of SO GL that should be covered by the KORRR it does not reflect the data that has to be exchange mention in articles 43-55 of SO GL. . KORRR does not impose any specific standard, it recommends the adoption of international standards However, article 8(2) has been split into 2 articles (9(2) and 9(3) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL. Related to the use of harmonised data format for data exchange among TSO as per 114 of SO GL has to be define by TSOs is reflected in article 6(9) of new version of KORRR	Energy Networks Association
8	2	Proposal: 2. Each TSO shall define and publish the format of the information and the technical requirements to exchange the scheduled data. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications. Explanation: UPM-Kymmene Oyj supports the idea proposed by ENTSO-E in article 8 (1) but wishes to make a clarifying amendment to the proposal. To ensure the accuracy of demand-generation balance information, UPM-Kymmene Oyj proposes an amendment to rule out the possibility of TSOs to require SGUs to send scheduled data concerning hours that have not been settled yet in the day ahead market. UPM-Kymmene Oyj suggests that scheduled data is sent to TSOs only after the settlement of day ahead orders as stated as a minimum requirement in article 8 (1). This would better reflect the consumption and generation patterns that are likely to take place as consumption and generation forecasts made before day-ahead trading do not include the effect of	No	**No action. No change is proposed.** Also in article 8(2) (article 9(2) of new KORRR version) KORRR refers to technical requirement and it does not refer to TSOs and SGUs exchanges. **Clarification.** Scheduled data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with	UPM-Kymmene Oyj

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		actualized price dependent orders. This data does not take into account e.g. the demand flexibility taking place in industrial electricity consumption. The amendment would also prevent possible additional regulatory burden to industrial electricity consumption units with possibility to demand flexibility.		art. 40(5) of SO GL on determination of applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a service.	
8	2	Proposal: 2. Each TSO shall define and publish the format of the information and the technical requirements to exchange the scheduled data with NEMOs and SGUs that are not CDSOs. Each TSO shall agree with DSOs and CDSOs the format of the information and the technical requirements to exchange the scheduled data with them. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications. Explanation: 2. DSOs and TSOs shall agree on the format for data exchange between them according art 40(7) GL SO.	Yes	**Partially accepted.** Article 8(2) has been split into 2 articles (9(2) and 9(3) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
8	2	Proposal: Art 8.2 - "Each TSO shall define and publish the format of the information and the technical requirements to exchange the scheduled data, in coordination with DSOs and SGUs and submitted to NRA approval." Explanation: The format for the scheduled data that DSOs and SGUs shall provide needs to be discussed between TSOs and DSOs and SGUs, and is of utmost importance to design the IT systems accordingly. The IT systems to exchange data are very costly and an evolution of format and/or of the technical requirements requires time and would lead to additional costs for DSOs and SGUs. Therefore, it is necessary that the format and the technical requirements remains as stable as possible.	Yes	**Partially accepted.** Article 8(2) has been split into 2 articles (9(2) and 9(3) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL.	EDF

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
8	2	2. Each TSO shall define, in agreement with the DSOs, and publish the format of the information and the technical requirements to exchange the scheduled data. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications. When doing so, each TSO shall take into account and complement, where necessary, the definitions provided following Article 18 of GLDPM and GLDPM v2.	Yes	**Accepted.** Article 8(2) has been split into 2 articles (9(2) and 9(3) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
8	3	3. Delete paragraph. Paragraph 3 should be deleted, as the content is already covered in Article 6 of KORRR.	Yes	**Partially accepted**. Article 8(3) refers to scheduled data and article 6 refers to structural data. However, article 8(3) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
8	3	Proposal: 3. Each TSO shall electronically store the information at least during the necessary time to comply with its tasks. Explanation: UPM-Kymmene Oyj supports the idea proposed by ENTSO-E in article 8 (1) but wishes to make a clarifying amendment to the proposal. To ensure the accuracy of demand-generation balance information, UPM-Kymmene Oyj proposes an amendment to rule out the possibility of TSOs to require SGUs to send scheduled data concerning hours that have not been settled yet in the day ahead market. UPM-Kymmene Oyj suggests that scheduled data is sent to TSOs only after the settlement of day ahead orders as stated as a minimum requirement in article 8 (1). This would better reflect the consumption and generation patterns that are likely to take place as consumption and generation forecasts made before day-ahead trading do not include the effect of actualized price dependent orders. This data does not take into account e.g. the demand flexibility taking place in industrial electricity consumption. The amendment would also prevent possible additional regulatory burden to industrial electricity consumption units with possibility to demand flexibility.	Yes	**No action**. No change is proposed in this article. However, article 8(3) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version. **Clarification.** Scheduled data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with art. 40(5) of SO GL on determination of	UPM-Kymmene Oyj

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a service.	
8	3	Proposal: DELETE 3. Each TSO shall electronically store the information at least during the necessary time to comply with its tasks. Explanation: 3. This provision should be moved to art. 6 data storage.	Yes	**Partially accepted**. Article 8(3) refers to scheduled data and article 6 refers to structural data. However**,** article 8(3) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
8	4	4. Each TSO shall communicate to the DSOs directly connected to the transmission system their planned and unplanned unavailability of network elements in the observability area of the DSOs. For planned unavailabilities, they shall agree on the necessary level of coordination and communication between them. For unplanned unavailabilities, the TSO shall communicate them as soon as practicable." For paragraph 4, if a planned unavailability of a network element in the connection points needs an action by the DSO (for example if the DSO has to do switching actions to supply a part of his system through another connection point), a communication on D-1 by the TSO to the DSO is far too late. Furthermore, it should not be only communicated but must be coordinated: such actions must be part of the operational planning of the TSO and DSO which must be aligned. Good practice in MS is that the TSO and the DSO agree that a planned outage with a certain impact must be jointly coordinated and prepared by TSO and DSO. The level of coordination and preparation depends on the impact that a planned outage at the TSO grid may have on the DSO. The agreement ensures that each party is able to plan in advance, if deemed appropriate, the necessary actions that must be undertaken to ensure the quality of supply to its grid users, or at least to reduce its negative impact on it to a reasonable level, during the unavailability. For unplanned unavailabilities, no communication can be done in advance. "	Yes	**Accepted.** Article 8(4) (article 9(5) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
8	4	Proposal: 4. Each TSO shall communicate to the DSOs directly connected to the transmission system their planned and unplanned unavailability of network elements in their connection point at least during day-ahead or before. Explanation: UPM-Kymmene Oyj supports the idea proposed by ENTSO-E in article 8 (1) but wishes to make a clarifying amendment to the proposal. To ensure the accuracy of demand-generation balance information, UPM-Kymmene Oyj proposes an amendment to rule out the possibility of TSOs to require SGUs to send scheduled data concerning hours that have not been settled yet in the day ahead market. UPM-Kymmene Oyj suggests that scheduled data is sent to TSOs only after the settlement of day ahead orders as stated as a minimum requirement in article 8 (1). This would better reflect the consumption and generation patterns that are likely to take place as consumption and generation forecasts made before day-ahead trading do not include the effect of actualized price dependent orders. This data does not take into account e.g. the demand flexibility taking place in industrial electricity consumption. The amendment would also prevent possible additional regulatory burden to industrial electricity consumption units with possibility to demand flexibility.	No	**No action**. No change is proposed. Also in article 8(4) (article 9(5) of new KORRR version) KORRR refers to exchanges between TSOs and DSOs and it do no refer to TSOs and SGUs exchanges. **Clarification.** Scheduled data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with art. 40(5) of SO GL on determination of applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a service.	UPM-Kymmene Oyj
8	4	Proposal: 4. Each TSO shall communicate to the DSOs directly connected to the transmission system their unplanned unavailability of network elements in their connection point, as soon as possible. For planned unavailability of network elements, TSO shall communicate to the DSOs at least a week in-advance. Explanation: 4. It is necessary to distinguish between planned and unplanned. For planned, the	Yes	**Partially accepted.** Article 8(4) (article 9(5) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		communication should be week before.			
3	8	Modification proposal: Art. 3.8. "Subject to the agreement of the TSO or DSO, parties required to provide data under the KORRR shall be allowed to delegate all or part of any tasks assigned to it under Regulation 2017/1485 to one or more third parties like BRP, BSP, aggregators or similar entities, in case the third party can carry out the respective function at least as effectively as the delegating entity. Justification: It has to be clarified that data can be exchanged either with TSOs or DSOs, in coherence with article 3.4. Therefore data communication with DSOs should be envisaged.	Yes	**Accepted.** Article 3(8) (article 3(9) of the new KORRR version) has been amended to consider the agreement also with DSO in case of SGUs providing directly data to the DSO	Enel
8	5	**Modification proposal** **Art. 8.5 (new)**: "Each TSO shall timely communicate to the DSOs directly connected to the transmission system the information on scheduled data related to distribution connected SGUs." Justification: As explained in the general comments, in order to guarantee reciprocity in the exchange of information, further responsibilities should be added for TSOs. In particular, TSOs should timely communicate operational data to DSOs, in order to guarantee to the maximum extent a coordinated system operation thus avoiding deterioration of security of supply or quality of service. This is of particular importance in those Member States where, based on the no-one-size-fits-all principle for data management set out in art. 3.4, it will be defined that distribution connected SGUs send their data directly to TSOs. Furthermore, as pointed out in the general comments, where data are sent by SGUs to TSOs, DSOs should timely have access to scheduled and real-time data. Furthermore, in order to guarantee security of supply, DSOs should be entrusted	No	**Not accepted.** Reciprocity between TSOs and DSOs is guaranteed by article 3(3) of the new version of the KORRR that reflects the wording and intention of Article 40(5) read in conjunction with Articles 58 to 50 and 53 of SO GL. The DSO access to the information about the Transmission system and the SGUs connected to distribution network is reflected in articles 5(2), 5(3), 6(7), 8 (3) and 9(5) of new version of the KORRR. Articles of KORRR where exchanges between DSO and TSO should be done under agreement have been amended.	Enel

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		of a systematic validation activity of dispatching orders given by TSOs when they can violate operational constraints.			
8	-	1. Each TSO shall be capable of exchanging scheduled data with SGUs, DSOs or third parties to whom the exchange of scheduled information may have been delegated. Scheduled data shall at least include the generation and load schedules resulting from market trades between Day ahead and real time, unavailability or limitations to active power production or consumption of SGUs, unavailability of network elements of DSOs in the TSO's observability area 2. Each TSO shall define, in agreement with the DSOs, and publish the format of the information and the technical requirements to exchange the scheduled data. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications. When doing so, each TSO shall take into account and complement, where necessary, the definitions provided following Article 18 of GLDPM and GLDPM v2. 3. Delete paragraph. 4. Each TSO shall communicate to the DSOs directly connected to the transmission system their planned and unplanned unavailability of network elements in the observability area of the DSOs. For planned unavailabilities, they shall agree on the necessary level of coordination and communication between them. For unplanned unavailabilities, the TSO shall communicate them as soon as practicable.	1. Yes 2. Yes 3. Yes 4. Yes	1. **Accepted.** Article 8(1) (article 9(1) of new KORRR version) has been amended and the reference to NEMOs has been deleted. 2. **Accepted.** Article 8(2) has been split into 2 articles (9(2) and 9(3) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL. 3. **Accepted.** Article 8(3) has been deleted and a new general article related to all types of information has been added as new article 6(10) of new KORRR version. 4. **Accepted.** Article 8(4) (article 9(5) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs.	EWE Netz GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Explanation: Paragraph 1 should avoid referring to NEMOs, as NEMOs are not subject of (EU) 2017/1485 and therefore should not be subject of KORRR. Paragraph 2 should be amended to ensure the requirements defined following GLDPM and GLDPM v2 are taken into account. Defining parallel, deviating requirements for the same set of data another time is inefficient and causes unnecessary costs. The definition of the format for scheduled data should be done in agreement with the DSOs (cf. remarks above). Paragraph 3 should be deleted, as the content is already covered in Article 6 of KORRR. Paragraph 4: If a planned unavailability of a network element in the connection points needs an action by the DSO (for example if the DSO has to do switching actions to supply a part of his system through another connection point), a communication on D-1 by the TSO to the DSO is far too late. Paragraph 4 should not be limited to elements in the connection point, but should follow the approach of observability area. Of course DSOs have their own observability area with regard to the transmission system, as the TSO has with regard to the distribution system. Furthermore, it should not be only communicated but must be coordinated: such actions must be part of the operational planning of the TSO and DSO which must be aligned. In Belgium and Germany, for example, the TSO and the DSO agree that a planned outage with a certain impact must be jointly coordinated and prepared by TSO and DSO. The level of coordination and preparation depends on the impact that a planned outage at the TSO grid may have on the DSO. The agreement ensures that each party is able to plan in advance, if deemed appropriate, the necessary actions that must be undertaken to ensure the quality of supply to its grid users, or at least to reduce its negative impact on it to a reasonable level, during the unavailability. For unplanned unavailabilities, no communication can be done in advance. In paragraph 4 there is a possible misunderstanding with 'at least', which would be better replaced by 'at the latest'. Of course for unplanned unavailability no communication can be done in advance."			

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
9	0	Proposal: This sentence should be deleted: Each TSO may specify more detailed content of the real time information exchanged according to Articles 42, 44, 47, 50, 52 and 53 of Regulation 2017/1485 Explanantion: The regulation 2017/1485 specifies the scope of the data exchange. It does not say that that the TSO have the right to get more information than it is written down in the SO-GL, which is obviously the intention of article 9. Thus, the article 9 is not necessary and shall be deleted.	Yes	**Accepted. Article 9 has been deleted.**	TIWAG-Tiroler Wasserkraft AG - Dispatching
9	0	Proposal: Art.9 – "In coordination with all parties involved, Each TSO may specify more detailed content of the real-time information exchanged according to Articles 42, 44, 47, 50, 52 and 53 of Regulation 2017/1485. These additional requirements must be duly justified by TSO and submitted to NRA approval." Explanation: EDF could understand that TSOs "may specify more detailed content of the real time information exchanged". However, such additional requirements would have to be duly justified by TSOs and they should be discussed with all parties involved.	Yes	**Accepted. Article 9 has been deleted.**	EDF
9	0	KORRR cannot request for more detailed information than already specified with Regulation 2017/1485. REMOVE ARTICLE	Yes	**Accepted. Article 9 has been deleted.**	SP Energy Networks
9	0	More detailed than what? The KORRR cannot specify more detailed data than is permitted in the SOGL. Delete this Article.	Yes	**Accepted. Article 9 has been deleted.**	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
9	1	1. Each TSO may specify more details with regard to real time information exchanged according to Articles 42, 44, 47, 50, 52 and 53 of Regulation 2017/1485. With regard to Article 44, 50 and 53 of Regulation 2017/1485 the specifications of the TSO is subject to an agreement with the respective DSO according to Article 40(7) of Regulation 2017/1485. Explanation: It must be clear that only more details on the data set already defined in (EU) 2017/1485 may be provided. "Content" is ambiguous in this regard, as it is not clear to stakeholders whether that may mean additional data. Such additional data would constitute a more stringent requirement in comparison to what is laid down in (EU) 2017/1485 and therefore prohibited. Again, an agreement between TSO and DSO is foreseen in Article 40(7) of (EU) 2017/1485 for all data related to distribution systems and distribution-connected SGUs. Proposal (from line 346): Delete the following sentence: Each TSO may specify more detailed content of the real time information exchanged according to Articles 42, 44, 47, 50, 52 and 53 of Regulation 2017/1485. Explanation: The regulation 2017/1485 specifies the scope of the data exchange. It does not say that that the TSO have the right to get more information than it is written down in the SO-GL, which is obviously the intention of Article 9. Thus, the Article 9 is not necessary and shall be deleted.	Yes	**Accepted. Article 9 has been deleted.**	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG BDEW- German Association of Energy and Water Industries RWE Generation SE
9	1	This article remains very vague. Moreover, it is important to stipulate that the TSO cannot require more data than SOGL allows, as has also been discussed in the SO ESC on this topic. The scope of this article only carries on more precise clarifications of what exactly the TSO will demand (e.g. formats), but cannot carry on any additional data	Yes	**Accepted. Article 9 has been deleted.**	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
9	1	1. Each TSO may specify more details with regard to real time information exchanged according to Articles 42, 44, 47, 50, 52 and 53 of Regulation 2017/1485. With regard to Article 44, 50 and 53 of Regulation 2017/1485 the specifications of the TSO is subject to an agreement with the respective DSO according to Article 40(7) of Regulation 2017/1485. Explaination: It must be clear that only more details on the data set already defined in (EU) 2017/1485 may be provided. "Content" is ambiguous in this regard, as it is not clear to stakeholders whether that may mean additional data. Such additional data would constitute a more stringent requirement in comparison to what is laid down in (EU) 2017/1485 and therefore prohibited. Again, an agreement between TSO and DSO is foreseen in Article 40(7) of (EU) 2017/1485 for all data related to distribution systems and distribution-connected SGUs.	Yes	**Accepted. Article 9 has been deleted.**	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
10	1	Proposal: 1. The Relevant System Operator (TSO or DSO) that direclty receives the real-time data, shall specify and publish the format for real-time data exchange related to SGUs. NEW 1a. Each TSO, in agreement with the DSOs of its control area, shall specify and publish the format for real-time data exchange related to the distribution network observability area within its Control Area. Explanation: 1. For the sake of rasonability, the Relevant System Operator (TSO or DSO) that direclty receives the real-time data shall be responsible for defining the format of data exchange. 1a. DSOs and TSOs shall agree on the format for data exchange betwen them according art 40(7) GL SO.	Yes	**Partially accepted.** Article 10(1) has been reworded to split the requirements between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and TSOs or DSOs, not subject to Article 40(7) of SO GL (10(1) and 10(2) of new KORRR version).	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
10	1	1. Each TSO, in agreement with the DSOs of its control area, shall specify and publish the format for real time data exchange related to the distribution network control area and to the SGUs within its Control Area. "The change in paragraph 1 and 2 is necessary as an agreement between TSO and DSO is foreseen in Article 40(7) of (EU) 2017/1485 for all data related to distribution systems and distribution-connected SGUs. The original proposal does not take this requirements sufficiently into account. Avoid confusion between observability area and control area for the DSOs.	Yes	**Partially accepted.** Article 10(1) has been reworded to split the requirements between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL (10(1) and 10(2) of new KORRR version).	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
10	1	Each TSO, in agreement with the DSOs of its control area, shall specify and publish the format for real-time data exchange related to the distribution network observability area and to the SGUs within its Control Area. Explanation: The proposed provision from Article 2 (7) of the KORRR document is incompatible with the provisions of Article 40 (7) of Commission Regulation (EU) 2017/1485 (SO GL) which call for the necessity of making agreement between OSD and TSO.	Yes	**Partially accepted.** Article 10(1) has been reworded to split (10(1) and 10(2) of new KORRR version) the requirements between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL.	PTPiREE
10	2	I miss some clarifying regarding this paragraph in SO GL 40(6), "(f) the time stamping and frequency of delivery of the data and information to be provided by DSOs and SGUs, to be used by TSOs in the different timescales. The frequency of information exchanges for real-time data, scheduled data and update of structural data shall be defined" Especially I miss a clarification of “Time stamping”. Whether it for real-time data should be delivered by the actual value or if it is acceptable to set the time stamp at the arrival time? And then forward the value and time stamp to the third party if requested? Svenska Kraftnät (Swedish TSO) now gets real time values from external actors without any time stamp; do we need to require that from now on? As it is not mentioned in the KORRR is it up to Svenska Kraftnät to decide? If the values are stored and used for disturbances analysis the time stamp might be important.	No	**Clarification**: Articles 8(2) and 10(2) (articles 9(4) and 10(2) of new KORRR version) have been amended to take into account the requirement of article 40(6) (f) of SO GL related to time stamping. In those articles it is stated that each TSO shall define the technical requirements for the exchanges of scheduled and real time data. Related to define the frequency of delivery of the data in KORRR according with article 40(6)(f) of SO GL, KORRR defines a maximum refresh rate for real time data of 1 minute than may be reviewed at national level during national implementation. Additionally, the provision of real time data can be defined event-based (when there is a change). The requirement shall be defined by each TSO and/or DSO according to their needs.	Svenska Kraftnät
10	2	Proposal: Art10.2- “In coordination with all parties involved and submitted to NRA approval, Each TSO shall specify the requirements for real-time data exchange related to the distribution network observability area and to the SGUs within its Control Area". Explanation: EDF considers that TSOs’ requirements should be discussed with all parties involved and approved by the NRA. The IT systems to exchange data are very	No	**Not accepted** Requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(3) of KORRR (article 1(5) of the new KORRR version) and be examined by the competent NRA. According to article 40.7, KORRR refers to the agreement	EDF

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		costly and an evolution of format and the technical requirements requires time and would lead to additional costs for DSOs and SGUs. Therefore, it is necessary that the format and the technical requirements remains stable as far as possible.		between TSO and DSOs for the processes to exchange data between them. Wording of some articles has been amended to improve clarity regarding this topic.	
10	2	2. Each TSO, in agreement with the DSOs of its control area, shall specify the requirements for real-time data exchange related to the distribution network control area and to the SGUs within its Control Area. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications. "The change in paragraph 1 and 2 is necessary as an agreement between TSO and DSO is foreseen in Article 40(7) of (EU) 2017/1485 for all data related to distribution systems and distribution-connected SGUs. The original proposal does not take this requirements sufficiently into account. Avoid confusion between observability area and control area for the DSOs.	Yes	**Partially accepted.** Article 10(2)(article 10(2) of new KORRR version) has been reworded to split the requirements between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL (10(1) and 10(2) of new KORRR version).	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
10	3	Define: Logical connection in paragraph 3.	No	**Clarification.** The definition of logical connection will be added to the supporting document	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
10	3	Article 10(3) - where will these all TSO practices be specified? In the KORRR or will they separately be developed? These should be subject to public consultation especially if they drive costs onto other parties who are required to comply with them	No	**Clarification.** All TSO practices will be defined and published at ENTSO-E level, so unified at European level, and refer to the exchange of information among TSOs not with other parties.	SP Energy Networks
10	4	Clarification: It is not clear why the TSO shall define the refresh rate instead of directly specifying it in the KORRR proposal. Any option of differentiating between several control areas should be avoided.	No	**Clarification**. Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data. Requirements of refresh rates defined in KORRR refer to the data provided by the SGUs when they do not provide services to the System. Requirements may be in each country so KORRR set a maximum threshold that can be adjusted by each TSO at national level.	TIWAG-Tiroler Wasserkraft AG - Dispatching

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
10	4	Proposal: 4. Each TSO shall define the refresh rate for the real time data exchanges in its control area. It shall not be longer than 1 minute. Explanation: 4. It should be deleted, as KORRR is limited to data exchange as described in Title II of (EU) 2017/1485, as clearly stated in Article 40(6) of (EU) 2017/1485. Data exchange related to load-frequency control is out of the scope of Title II and therefore not be part of KORRR.	Yes	**Accepted.** Article 10(4) (article 10(5) of new KORRR version) has been reworded to consider national flexibility for defining requirements for service provision to the System. Every active power injection or consumption is related to the load-frequency control: when the provision of data is related to service, it shall be subject to those national requirements; when the provision of data is not related to a service, it shall be subjected to the KORRR.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
10	4	Proposal: Art.10.4 – Delete this paragraph Explanation: EDF believes data related to automatic load-frequency control processes should be defined in the certification criteria for load-frequency. Moreover, as previously mentioned, EDF believes that these KORRR should be less prescriptive and not set out a timeframe of one minute. Therefore, EDF considers that this paragraph should be deleted.	Yes	**Not accepted.** Article 40(6)(f) of SO GL requires the KORRR to define the frequency of delivery of the data. In this sense, KORRR defines a maximum refresh rate for real time data of 1 minute than may be reviewed at national level during national implementation. Additionally, the provision of real time data can be defined event-based (when there is a change). The requirement shall be defined by each TSO and/or DSO according to their needs. Current status of SCADA systems allows exchange of real time data with a refresh rate of 1 minute. However, article 10(4) (article 10(5) of new KORRR version) has been reworded to consider national flexibility for defining requirements for service provision to the System. Every active power injection or consumption is related to the load-frequency control: when the provision of data is related to service, it shall be subjected to those national requirements; when the provision of data is not related to a services, it shall be subjected to the KORRR.	EDF

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
10	4	Article 10 (4) - clarification It is not clear why the TSO shall define the refresh rate instead of directly specifying it in the KORRR proposal. Any option of differentiating between several control areas should be avoided.	No	**Clarification**. Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of of the data. Requirements of refresh rates defined in KORRR refer to the data provided by the SGUs when they do not provide services to the System. Requirements may be in each country so KORRR set a maximum threshold that can be adjusted by each TSO at national level.	BDEW- German Association of Energy and Water Industries RWE Generation SE
10	4	4. Each TSO shall define the refresh rate for the real time data exchanges in its control area. It shall not be longer than 1 minute. " The last sentence of paragraph 4 should be deleted, as KORRR is limited to data exchange as described in Title II of (EU) 2017/1485, as clearly stated in Article 40(6) of (EU) 2017/1485. Data exchange related to load-frequency control is not subject of Title II and therefore not be part of KORRR. "	Yes	**Accepted.** Article 10(4) (article 10(5) of new KORRR version has been reworded to consider national flexibility for defining requirements for service provision to the System. Every active power injection or consumption is related to the load-frequency control: when the provision of data is related to service, it shall be subjected to those national requirements; when the provision of data is not related to a services, it shall be subjected to the KORRR	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
10	4	IFIEC finds the definition of real time data as "no longer than 1 minute" quite strict, as this will lead to not only enormous amounts of data that will need to be transferred (with corresponding costs for all the SGU, including those demand facilities that want to deliver DSR services to system operators, creating a new barrier for participation) but that it is also still very unclear what the TSOs will actually do with these billions (!) of data points that they will receive every year.	No	**Not accepted.** Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data. In this sense, KORRR defines a maximum refresh rate for real time data of 1 minute than may be reviewed at national level during national implementation. Additionally, the provision of real time data can be defined event-based (when there is a change). The requirement shall be defined by each TSO and/or DSO according to their needs. Current status of SCADA systems allows exchange of real time data with a refresh rate of 1 minute.	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
10		1) The actual version of the KORRR sets the framework for data exchange models that are unilaterally decided by the TSO. This does not guarantee that those models are the overall most efficient ones. For example: • On various occasions, the KORRR mandates the TSO to define data exchange specifications. The KORRR does not require that the TSO agrees with the involved parties, motivates his needs or considers issues of technical feasibility or costs that is incurred by other parties because of these specifications. This is – in the relation TSO-DSO - for example the case in art 10.4, art 13.2 and art 14.2, where the wording "defined by the TSO" (or similar) is used to describe the data exchange processes, the necessary resolution, redundancy, protocols … that the DSO must comply with or must use. In summary, given the unilateral decision power that is attributed to the TSO, the duty of the TSO's counterparties to bear the costs to invest in data systems that respond to the TSOs specifications, and the absence – or at least lack of clarity – of regulatory aspects, we conclude that the KORRR leaves a lot of decision power to the TSO without ensuring that the TSO seeks for the best data exchange solution, considering the overall efficiency and overall cost. We especially regret the unequilibrium that this KORRR would establish in the relation TSO – DSO. This contradicts numerous position papers, amongst others the joint position paper by ENTSO-E and the DSO associations , where collaboration between TSO and DSO – considered as equal partners - is identified as a necessary condition for secure and efficient system management and market facilitation.	No	**Clarification**. KORRR does not impose neither the DSOs nor the SGUs the use of a specific model. It sets the TSO to define the models it will use and to publish the formats to receive the data to prepare that model. Related to the comment on article 10(4) (article 10(5) of new KORRK version): Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data. Requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them. Wording of some articles has been amended to improve clarity regarding this topic. Related to position papers: KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level.	Belgian DSOs: Eandis, Infrax, Ores, Resa and Sibelga

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
10	-	1. Each TSO, in agreement with the DSOs of its control area, shall specify and publish the format for real time data exchange related to the distribution network control area and to the SGUs within its Control Area. 2. Each TSO, in agreement with the DSOs of its control area, shall specify the requirements for real-time data exchange related to the distribution network control area and to the SGUs within its Control Area. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications. 3. No Change. 4. Each TSO shall define the refresh rate for the real time data exchanges in its control area. It shall not be longer than 1 minute. Explanation: The change in paragraph 1 and 2 is necessary as an agreement between TSO and DSO is foreseen in Article 40(7) of (EU) 2017/1485 for all data related to distribution systems and distribution-connected SGUs. The original proposal does not take this requirements sufficiently into account. Avoid confusion between observability area and control area for the DSOs. The last sentence of paragraph 4 should be deleted, as KORRR is limited to data exchange as described in Title II of (EU) 2017/1485, as clearly stated in Article 40(6) of (EU) 2017/1485. Data exchange related to load-frequency control is not subject of Title II and therefore not be part of KORRR. Define: Logical connection in paragraph 3.	1. Yes 2. No 3. No 4. Yes	1. **Accepted.** Article 10(1) has been reworded to split the requirements between to TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL (10 (1) and 10 (2) of new KORRR version). 2. **Not accepted.** Requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them. Wording of some articles has been amended to improve clarity regarding this topic. 3. **Clarification.** The definition of logical connection will be added to the supporting document 4. **Accepted.** Article 10(4) (article 10(5) of new KORRR version has been reworded to consider national flexibility for defining requirements for service provision to the System. Every active power injection or consumption is related to the load-frequency control: when the provision of data is related to service, it shall be subjected to those national requirements; when the provision of data is not related to a services, it shall be subjected to the KORRR.	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
10	2, 4	Article 10(2) and 10(4) This for individual TSO to agree with DSOs and SGUs to together - not be imposed by the TSO. REMOVE CLAUSES	2. No 4. No	2. **Not accepted.** Requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA. 4. **Not accepted.** Article 40(6)(f) of SO GL requires the KORRR to define the frequency of delivery of the data. In this sense, KORRR defines a maximum refresh rate for real time data of 1 minute than may be reviewed at national level during national implementation. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them. Wording of some articles has been amended to improve clarity regarding this topic.	SP Energy Networks
11	0	This article is completely redundant; it only repeats the SOGL and adds no value. Delete this Article.	Yes	**Accepted. Article 11 has been deleted.**	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
11	0	Delete this article completely. Explaination: Article 11 should be deleted, as it provides no added value to the provisions already provided in (EU) 2017/1485. In fact the question arises whether the current version of the article requires DSOs to exchange all data described in article 43 of (EU) 2017/1485. That shows this article in its current version is a source of legal uncertainty. To avoid this legal uncertainty, it should be deleted.	Yes	**Accepted. Article 11 has been deleted.**	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
11	1	REMOVE ARTICLE - it is merely a restatement of Regulation 2017/1485 Article 43 and does not add value to this document.	Yes	**Accepted. Article 11 has been deleted.**	SP Energy Networks
11	-	Delete this article completely. Explanation: Article 11 should be deleted, as it provides no added value to the provisions already provided in (EU) 2017/1485. In fact the question arises whether the current version of the article requires DSOs to exchange all data described in article 43 of (EU) 2017/1485. That shows this article in its current version is a source of legal uncertainty. To avoid this legal uncertainty, it should be deleted.	Yes	**Accepted. Article 11 has been deleted.**	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG
12	1	REMOVE ARTICLE 12(1)(a) to (c) - this documents is meant to be about Key Roles, responsibilities and requirements and the information here is meant to be agreed between individual TSOs and their DSOs	Yes	**Partially accepted.** Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of structural data. Article 12(1) of KORRR (article 11(1) of new KORRR version) set a minimum threshold for updating information that can be adjusted by each TSO at national level during national implementation. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them, so wording of article 12(1) (article 11(1) of new KORRR version) has been amended to improve clarity regarding this topic.	SP Energy Networks
12	1	Art 12(1)(a) to (c) It is for each individual TSO to agree these timing requirements with its own affected DSOs. If it was important for the data to follow a particular time line that would be in the SOGL. It is not appropriate to put these requirements in a document that purports to be about organizational arrangements.	Yes	**Accepted**. Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of structural data. Article 12(1) of KORRR (article 11(1) of new KORRR version) set a minimum threshold for updating information that can be adjusted by each TSO	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				at national level during national implementation. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them, so wording of article 12(1) (article 11(1) of new KORRR version) has been amended to improve clarity regarding this topic.	
12	1	Article 12 -1 a, b & c imposes obligations in addition to those defined in SOGL. This is out of the scope of the KORRR and these additional requirements should be deleted.	No	**Not Accepted**. Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of structural data. Article 12(1) of KORRR (article 11(1) of new KORRR version) set a minimum threshold for updating information that can be adjusted by each TSO at national level during national implementation. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them, so wording of article 12(1) (article 11(1) of new KORRR version) has been amended to improve clarity regarding this topic.	Northern Powergrid
12	1	"1. Each DSO shall review the DSO asset structural information it shares with the TSOs of its control area at least every 6 months and in agreement between the TSO and DSO, the DSO may provide updated information to the TSO in the following situations: a) At least 3 months before planned commissioning of a new network element or facility. If agreed with the DSO, the TSO may define a different timeline; b) At least 3 months before planned final removal from service of the network element or facility. If agreed with the DSO, the TSO may define a different	Yes	**Partially accepted.** Article 12(1) of KORRR (article 11(1) of new KORRR version) set a minimum threshold for updating information that can be adjusted by each TSO at national level during national implementation. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE, EWE NETZ GmbH innogy SE SWM Infrastruktur

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		timeline; c) At least 3 months before planned significant modifications in the network element or facility. If agreed with the DSO, the TSO may define a different timeline; d) As soon as practicable in case there is a change in the Observability Area; e) As soon as practicable if an error is detected in the structural data." Explaination: "The original version of this article goes beyond the framework given by (EU) 2017/1485, it is more stringent, which is prohibited. There is a clear update cycle of 6 months foreseen in Article 43(4) of (EU) 2017/1485. The provision of an update cycle of 3 months as foressen by TSOs is more stringent. TSOs are not entitled to define more stringent requirements. Furthermore, (EU) 2017/1485 does not provide for the exchange of data of new network elements of distribution system (cf. Article 43 of (EU) 2017/1485). Of course this can be agreed bilaterally. The whole content of Article 12 of KORRR is subject to an agreement between TSO and DSO stemming from Article 40(7) of (EU) 2017/1485. This precondition of an agreement should be clearly stated in KORRR. Additionally, use of the phrase ""in agreement between the TSO and DSO"" gives the DSO a chance to formally acknowledge what is required by the TSO and to be compliant. Use of the phrase ""DSO Asset"" brings specificity to the information being exchanged; that it will be asset data that is exchanged. Use of the word “planned” brings specificity to the situations described. It could be interpreted that the DSO is non-compliant if it did not inform the TSO of an unplanned event even if it had no prior knowledge of the event – this is not practical. We must take account of this situation. We suggest the same for TSOs and SGUs in this document so that they also have equal chance of being as compliant as possible. Use of the word “practicable” allows for an unplanned change in the observability area or for practical feedback if there is an error."		processes to exchange data between them, so wording of article 12(1) (article 11(1) of new KORRR version) has been amended to improve clarity regarding this topic. Also the article has been amended to introduce some of the changes proposed in points from a) to e) and amend the reference to 3 months	GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
12	1	With respect to significant modifications, it is important to add that the timing of such modifications can be adapted during the on-going work. This should also be reflected in this article. Moreover, the article should also foresee a bullet for unforeseen events (e.g. accident, explosion, ...) which would change the structural data from the site but which cannot by there nature be communicated at least three months in advance (and which are not covered by point e on errors, as these relate to data errors)	Yes	**Partially accepted.** Article 12(1) (article 11(1) of new KORRR version) has been reworded to take into account first part of the comment as second part is related to SGU chapter. This is why a new point 15(1) (e) in the new KORRR version was added to reflect second part of the comments related to the situation of unforeseen modifications.	IFIEC Europe
12	1d	Definition of error needed: What does "error" mean in paragraph 1 (d)? Does it mean an error in the data set transmitted earlier or does it mean a malfunction of the SGU?	Yes	**Accepted.** Article 12(1) (article 11(1) of new KORRR version) has been amended to clarify that “error” means an error in the data set transmitted earlier	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
13	1	Proposal: 1.All DSOs within the observability area and the control area of the TSO shall provide their planned unavailability of network elements to the TSO, at least in D-2 and day-ahead, and as soon as possible for unplanned. Transmission connected DSOs shall provide the data directly to the TSO. Non-transmission connected DSOs may provide the data directly to the TSO or through its connecting DSO according to Article 3(4). Explanation: 1. D-2 is not an "unplanned period of time".	Yes	**Accepted.** Article 13(1) (article 12(1) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
13	1	Article 13-1 imposes a new requirement to share planned and unplanned unavailability of network elements in particular timescales. This is out of the scope of the KORRR and these additional requirements should be deleted.	No	**Clarification.** Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of scheduled data. Article 13(1) (article 12(1) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation	Northern Powergrid

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				timeframes.	
13	1	"1. Transmission connected DSOs shall provide data directly to the TSO. In general, non-transmission connected DSOs shall provide data through their connecting DSO. In agreement between TSO and transmission-connected DSO, non-transmission connected DSOs may provide the data directly to the TSO. 2. TSOs shall provide the scheduled data regarding power schedules of distribution-connected SGUs to each DSO or CDSO, in case these schedules are not yet available to DSO or CDSO through the cascaded data exchange. TSOs, DSOs and CDSOs shall agree on requirements to exchange scheduled data. 3. DSOs shall have the right but not the obligation to represent the data related to distribution-connected SGUs connected to its system as injections and withdrawals at each node at the border of TSO's individual grid model referred to in Article 64 of (EU) 2017/1485. " Explaination: "Sentence 1 of paragraph 1 should be deleted, as KORRR is limited to data exchange as described in Title II of (EU) 2017/1485, as clearly stated in Article 40(6) of (EU) 2017/1485. Data exchange related to D-2 and day-ahead schedules of distribution systems is not subject of Title II. TSOs are therefore not entitled to define anything with regard to that in KORRR. Paragraph 1 should define cascaded data exchange as the general principle for data exchange regarding non-transmission connected DSOs connected to transmission-connected distribution systems. This general rule was agreed in the data management final report of the TSO-DSO-platform (page 16 of the final report:""Generally, each system operator should be responsible for directly collecting data from users connected to its grid (generators, consumers, storage, etc.)."" Subject to an agreement between TSO and transmission-connected DSO (as required in Article 40(7) of (EU) 2017/1485), deviating solutions might be agreed bilaterally. Paragraph 2 Sentence 1 should foresee a provision of data from TSO to DSO instead of defining only the right to request for DSOs. TSOs are obliged to provide schedules of distribution-connected SGUs to DSOs to fulfill their obligations from 72/EC/2009, art. 12 e):""Each transmission system operator shall be responsible for:(e)providing to the operator of any other system with which its system is	No	**Not accepted.** Article 13(1) (article 12(1) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes. Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Data exchanges and formats between the DSO and the TSO should be agreed according to article 40.7. Wording of some articles has been amended to improve clarity regarding this topic. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA. Related to position papers: KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE, EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		interconnected sufficient information to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system;"" Data related to schedules of SGUs at the distribution system is unquestionably necessary to ensure the secure and efficient operation, coordinated development and interoperability of the (distribution) system by putting the DSO in a position to do its operational planning. Paragraph 2 sentence 2 must foresee an agreement between TSO and DSO (and CDSO) on requirements with regard to data exchange as an agreement between TSO and DSO is foreseen in Article 40(7) of (EU) 2017/1485 for all data related to distribution systems. Article 13 should be extended by the right of DSOs to aggregate data of distribution-connected SGUs connected to their system as injections and withdrawals at each node at the border of the TSO's individual grid model. TSOs are obliged to represent the information obtained following Article 40(3) of (EU) 2017/1485 into injections and withdrawals of their individual grid model, as provided in Article 40(4) of (EU) 2017/1485. For the sake of efficiency and to avoid unnecessary data transfer and processing, this task should be carried out by DSOs before providing detailed data to the TSO. That means, the additional paragraph is necessary to make sure fundamental principles of European Union law are respected, i.e.: the principle of proportionality (Article 5(4) of the Treaty on European Union) and the principle of data scarcity (e.g. laid down in article 6(1) of (EU) 2016/679)."			
13,14	1	Art 13(1) We are not aware of any SOGL obligation to meet these requirements; ie D-2 and day ahead. Where is this in SOGL? Art 13(1) It needs to be made clear that it is only the TSO in whose area the DSO is who will receive DSO data directly. suggest: Each DSO shall provide to its the TSO in whose control area it is connected, the Real Time data from the observability area defined by the TSO according to Articles 43(1) and 43(2) of Regulation 2017/1485.	1.Yes 2. No	**1.-Clarification.** Timeframes considered in article 13(1) (article 12(1) of new KORRR version) are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes. However, this article has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. **2. Partially accepted.** Unless reference to 13(1) it is not correct as it refers to article 14(1). Article 14(1) (article 13(1) of new KORRR version) has been amended as the reference to articles 43(1) and 43(2) of SOGL	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				wasn´t correct, those articles of SO GL are for structural data. The correct one, related to real time data, is article 44 of SOGL. In that article the data provision is related to observability area of the TSO.	
13	1	**Modification proposal** Art. 13.1: "all DSOs within the observability area and the control area of the TSO shall provide their planned unavailability of network elements to the TSO, at least in D-2 and day-ahead". <u>Justification</u>: We point out that, due to the unforeseeable nature of unplanned interruptions, this wording is not applicable, since it requires DSOs to provide unplanned unavailability to the TSO in D-2 or day-ahead, where by definition this information is not known yet. **We propose to remove the unplanned unavailabilities from paragraph 13.1.** Unplanned unavailabilities could however be still exchanged in the context of real time information exchange.	Yes	**Partially accepted.** Article 13(1) (article 12(1) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes.	Enel
13	1	All DSOs within the observability area and the control area of the TSO shall provide their planned, at least in D-2 and day-ahead, and unplanned unavailability of network elements to the TSO. The wording did not make sense, as it is impossible to provide unplanned unavailability to the TSO in D-2 or day ahead. For the latter, when should this information be communicated?	Yes	**Partially accepted.** Article 13(1) (article 12(1) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes.	IFIEC Europe
13	2	Proposal: 2. Each DSO or CDSO shall receive the scheduled data regarding power schedules of SGUs connected to its network. DSOs and CDSOs shall comply with the requirements agreed with the relevant TSO to exchange scheduled data.	Yes	**Partially accepted.** Current wording of KORRR already allows DSOs and CDSOs to define the data they need to perform their tasks and receive it. Proposed wording would obly them	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Explanation: 2. According to 72/EC/2009, art. 12 e):"Each transmission system operator shall be responsible for:(e)providing to the operator of any other system with which its system is interconnected sufficient information to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system;" Data related to schedules of SGUs at the distribution system is unquestionably necessary to ensure the secure and efficient operation, coordinated development and interoperability of the (distribution) system by putting the DSO in a position to do its operational planning. Moreover, it must foresee an agreement between TSO and DSO (and CDSO) on requirements with regard to data exchange as an agreement between TSO and DSO is foreseen in Article 40(7) of (EU) 2017/1485 for all data related to distribution systems.		to receive the data even in the case they do not need it. Article 12(e) of directive 2009/72 refer to other TSOs as it is referring to "interconnected system."	
13	2	Article 13(2) in which Regulation /Article are the D-2 and day ahead requirements placed on DSOs. Do not appear to be in regulation 2017/1485	No	**Clarification** unless reference it is not correct. In article 13(1) (article 12(1) of new KORRR version) timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes.	SP Energy Networks
13	2	1) The actual version of the KORRR sets the framework for data exchange models that are unilaterally decided by the TSO. This does not guarantee that those models are the overall most efficient ones. For example: • On various occasions, the KORRR mandates the TSO to define data exchange specifications. The KORRR does not require that the TSO agrees with the involved parties, motivates his needs or considers issues of technical feasibility or costs that is incurred by other parties because of these specifications. This is – in the relation TSO-DSO - for example the case in art 10.4, art 13.2 and art 14.2, where the wording "defined by the TSO" (or similar) is used to describe the data exchange processes, the necessary resolution, redundancy, protocols … that the DSO must comply with or must use. In summary, given the unilateral decision power that is attributed to the TSO, the duty of the TSO's counterparties to bear the costs to invest in data systems that respond to the TSOs specifications, and the absence – or at least lack of clarity – of regulatory aspects, we conclude that the KORRR leaves a lot of decision power	No	**Clarification**. KORRR does not impose neither the DSOs nor the SGUs the use of an specific model. It sets the TSO to define the models it will use and to publish the formats to receive the data to prepare that model. Related to the comment on article 13(2) (article 12(2) of new KORRK version): Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 13 (2) (article 12(2) of new KORRRR version) we refer to requirements,	Belgian DSOs: Eandis, Infrax, Sibelga, ORES, Resa

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		to the TSO without ensuring that the TSO seeks for the best data exchange solution, considering the overall efficiency and overall cost. We especially regret the unequilibrium that this KORRR would establish in the relation TSO – DSO. This contradicts numerous position papers, amongst others the joint position paper by ENTSO-E and the DSO associations , where collaboration between TSO and DSO – considered as equal partners - is identified as a necessary condition for secure and efficient system management and market facilitation.		and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them. Wording of some articles has been amended to improve clarity regarding this topic. Related to position papers: KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level.	
13	-	It is not clear how any unplanned unavailability could be provided before it occurs... Data only can be provided as soon as possible after a unplanned unavailability occured!	Yes	**Accepted.** Article 13(1) (article 12(1) of new KORRR version) has been reworded to differentiate between planned and unplanned outages and to better define the level of coordination between TSO and DSOs.	RWE Generation SE
13	-	Article 13 - clarification The DSO shall provide unplanned and planned unavailabilitiesy of network elements d-2 and day-ahead. By the SO-GL the DSO are not obliged to provide these data. The TSOs are consequently not entitled to include additional data exchanges in the KORRR proposal. It is to specify that planned date have to be provided d-2. Unplanned events shall be provided as soon as possible.	Yes	**Clarification**. Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the scheduled data. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes. Article 13(1) (article 12(1) of new KORRR version) has been reworded to differentiate	EnBW Energie Baden-Württemberg AG BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				between planned and unplanned outages and to better define the level of coordination between TSO and DSOs. Timeframes considered are Day-Ahead and 2 days-ahead in accordance with CACM capacity calculation timeframes.	
14	1	Article 14 - reword to reflect that these need to be agreed by the TSOs with the relevant DSOs not imposed.	Yes	**Partially accepted.** Article 14(1) (article 13(1) of new KORRR version) has been amended as the reference to articles 43(1) and 43(2) of SOGL wasn´t correct, those articles of SO GL are for structural data. The correct one, related to real time data, is article 44 of SOGL. Article 44 of SO GL is under article 40(5) of SO GL so agreement between TSO and DSOs hasn´t has to be reflect in article 14(1) (article 13(1) of new KORRR version)	SP Energy Networks
14	1,2	Art 14(1) It needs to be made clear that it is only the TSO in whose area the DSO is who will receive DSO data directly. Suggest: Each DSO shall provide to its the TSO in whose control area it is connected, the Real Time data from the observability area defined by the TSO according to Articles 43(1) and 43(2) of Regulation 2017/1485. Art 14(2) These are to be agreed with the DSO (SOGL Art 40.7), not simply defined by the TSO.	1.Yes 2. No	1. **Partially accepted.** Article 14(1) (article 13(1) of new KORRR version) has been amended as the reference to articles 43(1) and 43(2) of SOGL wasn´t correct, those articles of SO GL are for structural data. The correct one, related to real time data, is article 44 of SOGL. In that article the data provision is related to observability area of the TSO. Article 44 of SO GL is under article 40(5) of SO GL so agreement between TSO and DSOs hasn´t has to be reflect in article 14(1) (article 13(1) of new KORRR version) 2. **Not accepted.** Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article 13(2) of new KORRRR	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	
14	1, 2	Article 14–1 imposes a requirement for the DSO to provide real time data to the TSO, whereas Article 44 of the SOGL provides flexibility for the TSO to agree where real time data is required. Reference is made to Article 43 rather than 44. o Article 14–2 requires permits the TSO do define the requirements that should be fulfilled; these should the subject of agreement between the DSO and TSO	1.Yes 2. No	1. **Partially accepted.** Article 14(1) (article 13(1) of new KORRR version) has been amended as the reference to articles 43(1) and 43(2) of SOGL wasn´t correct, those articles of SO GL are for structural data. The correct one, related to real time data, is article 44 of SOGL. Article 44 of SO GL is under article 40(5) of SO GL so agreement between TSO and DSOs hasn´t has to be reflect in article 14(1) (article 13(1) of new KORRR version) 2. **Not accepted.** Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article 13(2) of new KORRRR version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	Northern Powergrid

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
14	1,2	1. Subject to an agreement between TSO and DSO, DSOs shall provide real-time data according to Article 44 of Regulation 2017/1485 to the TSO. Paragraph 1 and paragraph 2 should provide for an agreement between TSO and DSO, as stipulated in Article 40(7) of (EU) 2017/1485. Furthermore, real-time data exchange is described in Article 44 of (EU) 2017/1485, the original reference is wrong.	1.Yes 2. No	1. **Partially accepted.** Article 14(1) (article 13(1) of new KORRR version) has been amended as the reference to articles 43(1) and 43(2) of SOGL wasn´t correct, those articles of SO GL are for structural data. The correct one, related to real time data, is article 44 of SOGL. Article 44 of SO GL is under article 40(5) of SO GL so agreement between TSO and DSOs hasn´t has to be reflect in article 14(1) (article 13(1) of new KORRR version) 2. **Not accepted.** Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article 13(2) of new KORRRR version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
14	2	Proposal: DELETE 2. Each DSO shall fulfil the requirements defined by the TSO in terms of: ◦ a) Logical connections between parties and protocols used; ◦ b) Network Architecture including redundancy; ◦ c) Network security rules; ◦ d) ID and/or naming convention and data quality; ◦ e) Data Transmission Parameters and performance; ◦ f) Rules of conduct in the case of planned outages and disturbances of communication equipment. Explanation: 2. Out of scope of KORRR. According to art. 40(7) this must be agreed with DSOs.	No	**Not accepted**. Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article 13(2) of new KORRRR version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
14	2	Article 14(2) wording should be consistent with Article 10(3) i.e. use of 'current all TSO practices'	No	**Clarification:** TSO practices will be defined and published at ENTSO-E level so unified at European level. They refer to the exchange of information among TSOs not with other parties, this is why it is only reflect in article 10 (3) (article 10 (4) of new KORRR version). In article 14(2) (article 15(1) of new KORRR version) KORRR refers to real time data provided by SGUs, so to give flexibility to the national implementation it wasn´t include the reference to “current all TSOs practices” in that article, but it will be also possible to implement those practices agreed between TSOs if it is possible.	SP Energy Networks
14	2	2. TSO and DSO shall agree on requirements in terms of: a) Logical connections between parties and protocols used; b) Network Architecture including redundancy; c) Network security rules; d) ID and/or naming convention and data quality; e) Data Transmission Parameters and performance; f) Rules of conduct in the case of planned outages and disturbances of communication equipment."	No	**Not accepted**. Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article 13(2) of new KORRRR version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
14	2	Point f introduces "rules of conduct". For IFIEC, it is unclear which rules of conduct are meant here and who will introduce tem and approve them.	No	**Clarification.** The definition of rules of conduct will be added to the supporting document	IFIEC Europe
14	2	1) The actual version of the KORRR sets the framework for data exchange models that are unilaterally decided by the TSO. This does not guarantee that those models are the overall most efficient ones. For example: • On various occasions, the KORRR mandates the TSO to define data exchange specifications. The KORRR does not require that the TSO agrees with the involved	No	**Clarification**. KORRR does not impose neither the DSOs nor the SGUs the use of a specific model. It sets the TSO to define the models it will use and to publish the formats to receive the data to prepare that model. Related to the comment on article 14(2)	Belgian DSOs: Eandis, Infrax, Sibelga, ORES, Resa

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		parties, motivates his needs or considers issues of technical feasibility or costs that is incurred by other parties because of these specifications. This is – in the relation TSO-DSO - for example the case in art 10.4, art 13.2 and art 14.2, where the wording "defined by the TSO" (or similar) is used to describe the data exchange processes, the necessary resolution, redundancy, protocols … that the DSO must comply with or must use. In summary, given the unilateral decision power that is attributed to the TSO, the duty of the TSO's counterparties to bear the costs to invest in data systems that respond to the TSOs specifications, and the absence – or at least lack of clarity – of regulatory aspects, we conclude that the KORRR leaves a lot of decision power to the TSO without ensuring that the TSO seeks for the best data exchange solution, considering the overall efficiency and overall cost. We especially regret the unequilibrium that this KORRR would establish in the relation TSO – DSO. This contradicts numerous position papers, amongst others the joint position paper by ENTSO-E and the DSO associations , where collaboration between TSO and DSO – considered as equal partners - is identified as a necessary condition for secure and efficient system management and market facilitation.		(article 13(2) of new KORRK version): Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article 13(2) of new KORRRR version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA. According to article 40.7, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them. Wording of some articles has been amended to improve clarity regarding this topic. Related to position papers: KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level.	
14	2	"Each DSO shall fulfil the requirements defined by the TSO in terms of:" should be changed to "Each DSO shall fulfil the requirements commonly defined and agreed with the TSO in terms of:"	No	**Not accepted**. Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article	RWE Generation SE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				13(2) of new KORRRR version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	
14	1,2	1. Subject to an agreement between TSO and DSO, DSOs shall provide real-time data according to Article 44 of Regulation 2017/1485 to the TSO. 2. TSO and DSO shall agree on requirements in terms of: a) Logical connections between parties and protocols used; b) Network Architecture including redundancy; c) Network security rules; d) ID and/or naming convention and data quality; e) Data Transmission Parameters and performance; f) Rules of conduct in the case of planned outages and disturbances of communication equipment. Explanation: Paragraph 1 and paragraph 2 should provide for an agreement between TSO and DSO, as stipulated in Article 40(7) of (EU) 2017/1485. Furthermore, real-time data exchange is described in Article 44 of (EU) 2017/1485, the original reference is wrong. Explain: Logical Connections	1.Yes 2. No	1. **Partially accepted.** Article 14(1) (article 13(1) of new KORRR version) has been amended as the reference to articles 43(1) and 43(2) of SOGL wasn´t correct, those articles of SO GL are for structural data. The correct one, related to real time data, is article 44 of SOGL. Article 44 of SO GL is under article 40(5) of SO GL so agreement between TSO and DSOs hasn´t has to be reflect in article 14(1) (article 13(1) of new KORRR version) 2. **Not accepted.** Article 40(6) of SO GL requires the KORRR to define the requirements, roles and responsibilities in relation with data exchange. Those data exchanges and formats between the DSO and the TSO should be agreed but in the case of article 14 (2) (article 13(2) of new KORRRR version) we refer to requirements, and those requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. **Clarification.** The definition of logical connection will be added to the supporting document	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
15	1	Proposal: Each SGU connected to the transmission system shall provide to its TSO the updated structural data according to Article 45, 52(1) of Regulation 2017/1485 of the facility operated by them in the format agreed with its TSO. Explanation: In countries with more than one TSO, it seems not to be cost efficient to apply new formats or to use different format for each control area. We propose a common (European) format which at least is used by the neighbouring TSOs. For expense and cost reasons in particular, different datasets in different data formats to different TSOs.	No	**Not accepted**. formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, but formats for the data exchange between TSOs and SGUs are not subject to article 40 (7). Formats and requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	TIWAG-Tiroler Wasserkraft AG - Dispatching
15	1	Proposition: "1. Each SGU connected to the transmission system shall provide to its TSO the updated structural data according to Article 45, 52(1) of Regulation 2017/1485 of the facility operated by them in the format specified by its TSO, in coordination with SGUs Explanation: In order to be consistent with article 6.3, EDF considers the format needs to be discussed with SGUs.	No	**Not accepted**. Formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, but formats for the data exchange between TSOs and SGUs are not subject to article 40 (7). **Clarification.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	EDF
15	2	Proposal: 2. Generally, each SGU connected to the distribution system shall provide the data to the DSO, according to Article 3(4), the updated structural data according to Article 48 and 53 of Regulation 2017/1485 of the facility operated by them in the format agreed between its DSO and TSO. Explanation: 2. To reflect the suggested wording for art. 3(4) of KORRR.	No	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 15 (2) of KORRR (article 14(2) of the new KORRR version) as it is written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) "each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO.” KORRR cannot be given preference to only one way to provide the data as it is reflected in the new proposal.	
15	2	Proposal: 2. Each SGU connected to the distribution system shall provide to the TSO or DSO, according to Article 3(4), the updated structural data according to Article 48 and 53 of Regulation 2017/1485 of the facility operated by them in the format specified by its TSO, in coordination with SGUs". Explanation: In order to be consistent with article 6.3, EDF considers the format needs to be discussed with SGUs.	No	**Not accepted**. Formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, but formats for the data exchange between TSOs and SGUs are not subject to article 40 (7). **Clarification.** Article 6(3) has been split into 2 articles (7(1) and 7(2) of new KORRR version) to differentiate data exchange between the TSOs and the DSOs, subject to Article 40(7) of SO GL and between SGUs and System Operators, not subject to Article 40(7) of SO GL	EDF
15	2	2. Generally, each SGU connected to the distribution system shall provide the data to the DSO, according to Article 3(4), the updated structural data according to Article 48 and 53 of Regulation 2017/1485 of the facility operated by them in the format agreed between its DSO and TSO." Explainat ion: Paragraph 2 should define cascaded data exchange as the general principle for data exchange regarding SGUs connected to distribution systems. This general rule was agreed in the data management final report of the TSO-DSO-platform (page 16 of the final report: "Generally, each system operator should be	No	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 15 (2) of KORRR (article 14(2) of the new KORRR version) as it is written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) “each TSO, in coordination with the DSOs in its Control Area, shall define whether	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		responsible for directly collecting data from users connected to its grid (generators, consumers, storage, etc.). [...]". Additionally, paragraph 2 should provide for an agreement between TSO and DSO on data format etc., as agreement is required by article 40(7) of (EC) 2017/1485 for all data exchanges related to distribution systems.		the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO." Related to agreement: Only formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, as formats for the data exchange between TSOs and SGUs are not subject to article 40 (7). Related TSO-DSO data management report a clarification should be done. KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level. KORRR cannot be given preference to only one way to provide the data as it is stated in the explanation of the comment.	
15	2	Article 15 (2) - reword or remove - needs to reflect that format is to be agrred by TSOs and relevant DSOs as per Regulation 2017/1485 Article 40(7).	No	**Not accepted**. Formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, but	SP Energy Networks

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				formats for the data exchange between TSOs and SGUs are not subject to article 40 (7).	
15	2	Art 15(2) The formats are for agreement, not to be defined by the TSO in isolation (SOGL Art 40.7),.	No	**Not accepted**. Formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, but formats for the data exchange between TSOs and SGUs are not subject to article 40 (7).	Energy Networks Association
15	1, 2	Change to: 1. Each SGU connected to the transmission system shall provide to its TSO the updated structural data according to Article 45, 52(1) of Regulation 2017/1485 of the facility operated by them in the format agreed with its TSO. 2. Each SGU connected to the distribution system shall provide to the TSO or DSO, according to Article 3(4), the updated structural data according to Article 48 and 53 of Regulation 2017/1485 of the facility operated by them in the format agreed with its TSO. Explanation: In countries with more than one TSO, it seems not to be cost efficient to apply new formats or to use different format for each control area. BDEW proposes a common (European) format which at least is used by the neighbouring TSOs. For expense and cost reasons in particular, it is not reasonable for internationally operating utilities to send the same or possibly even different datasets in different data formats to different TSOs.	No	**Not accepted.** Formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, but formats for the data exchange between TSOs and SGUs are not subject to article 40 (7). Formats and requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level.	RWE Generation SE BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
15	1, 2	1. No change. 2. Generally, each SGU connected to the distribution system shall provide the data to the DSO, according to Article 3(4), the updated structural data according to Article 48 and 53 of Regulation 2017/1485 of the facility operated by them in the format agreed between its DSO and TSO. Explanation: Paragraph 2 should define cascaded data exchange as the general principle for data exchange regarding SGUs connected to distribution systems. This general rule was agreed in the data management final report of the TSO-DSO-platform (page 16 of the final report: "Generally, each system operator should be responsible for directly collecting data from users connected to its grid (generators, consumers, storage, etc.). [...]". Additionally, paragraph 2 should provide for an agreement between TSO and DSO on data format etc., as agreement is required by article 40(7) of (EC) 2017/1485 for all data exchanges related to distribution systems.	1. No 2. No	1. **No action** 2. **Not accepted**. Formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, but formats for the data exchange between TSOs and SGUs are not subject to article 40 (7). .	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG
16	1	Proposal: Each SGU shall review the structural information it shares with the TSOs of its control area at least every 12 months and provide updated information to the TSO and DSO in the following situations: ... Explanation: There is no reason why the SGUs are obliged to review their structural data every six month. According to the letters a) to d) the important changes in structural data have to be provided within three month anyway. This is an unfounded requirement and shall be adapted to the existing process.	Yes	**Not accepted**, Article 16(1) of KORRR (article 15(1) of new KORRR version) sets a minimum threshold for updating information in line with article 45 of SO GL requirements for DSO. The proposal is neither in accordance with SOGL or GLDPM. However, to clarify the article, it has been amended to unify the reference to 6 months instead of the reference to 3 months	TIWAG-Tiroler Wasserkraft AG - Dispatching
16	1	Proposal: “Each SGU shall review the structural information it shares with the TSOs of its control area and provide updated information to the TSO or DSO in the following situations”. Explanation: A systematic review of the structural information at least every 6 month is too frequent, given that significant changes have already to be communicated within 3 months to TSOs or DSOs.	Yes	**Not accepted**, Article 16(1) of KORRR (article 15(1) of new KORRR version) sets a minimum threshold for updating information in line with article 45 of SO GL requirements for DSO. However, to clarify the article, it has been amended to unify the reference to 6 months instead of the reference to 3 months	EDF

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
16	1	1. Each SGU shall review the structural information it shares with the TSOs of its control area at least every 6 months and provide updated information to the TSO and DSO in the following situations: a) At least 3 months before planned commissioning of a new network element or facility. Upon justification the TSO may define a different timeline in agreement with the DSO. b) At least 3 months before planned final removal from service of the network element or facility. Upon justification the TSO may define a different timeline in agreement with the DSO. c) At least 3 months before planned significant modifications in the network element or facility. Upon justification the TSO may define a different timeline in agreement with the DSO. d) As soon as practicable if an error is detected in the strcutural data. Explanation: Use of the phrase "in agreement with DSO" gives the DSO a chance to formally acknowledge what is required by the TSO and to be compliant when transferring info from the SGU. Use of the word “planned” brings specificity to the situations described. It could be interpreted that the DSO is non-compliant if it did not inform the TSO of an unplanned event even if it had no prior knowledge of the event – this is not practical. We must take account of this situation. Use of the word “practicable” allows for an unplanned change in the observability area or for practical feedback if there is an error. Definition of error needed: What does "error" mean in paragraph 1 (d)? Does it mean an error in the data set transmitted earlier or does it mean a malfunction of the SGU?	Yes	**Partially accepted.** According to article 40(7) of SO GL, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them so wording of article 16(1) of KORRR (article 15(1) of new KORRR version) is correct as it does not refer to this type of exchanges. However, the article has been amended to introduce some of the changes proposed in points from a) to e), to amend the reference to 3 months and to clarify that “error” means an error in the data set transmitted earlier	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG
16	1	REMOVE ARTICLE 16 (1)(a) to (c) - this documents is meant to be about Key Roles, responsibilities and requirements and the information here is meant to be agreed between individual TSOs and their DSOS and SGUs. These should have been included within Regulation 2017/1485 if it was thought that these timings were important.	Yes	**Not accepted.** Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of structural data. Article 16(1) of KORRR (article 15(1) of new KORRR version) set a minimum threshold for updating information that can be adjusted by each TSO at national level during national	SP Energy Networks

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				implementation. According to article 40(7) of SO GL, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them so wording of article 16(1) of KORRR (article 15(1) of new KORRR version) is correct as it does not refer to this type of exchanges. However, the article has been amended to introduce some changes in points from a) to e), to amend the reference to 3 months and to clarify that "error" means an error in the data set transmitted earlier	
16	1	It is for each individual TSO to agree these timing requirements with the affected SGUs. If it was important for the data to follow a particular time line that would be in the SOGL. It is not appropriate to put these requirements in a document that purports to be about organizational arrangements.	Yes	**Not accepted.** Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of structural data. Article 16(1) of KORRR (article 15(1) of new KORRR version) sets a minimum threshold for updating information in line with article 45 of SO GL requirements for DSO. According to article 40(7) of SO GL, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them so wording of article 16(1) of KORRR (article 15(1) of new KORRR version) is correct as it does not refer to this type of exchanges. However, the article has been amended to introduce some changes in points from a) to e), to amend the reference to 3 months and to clarify that "error" means an error in the data set transmitted earlier	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
16	1	"1. Each SGU shall review the structural information it shares with the TSOs of its control area at least every 6 months and provide updated information to the TSO and DSO in the following situations: a) At least 3 months before planned commissioning of a new network element or facility. Upon justification the TSO may define a different timeline in agreement with the DSO and SGU. b) At least 3 months before planned final removal from service of the network element or facility. Upon justification the TSO may define a different timeline in agreement with the DSO and SGU. c) At least 3 months before planned significant modifications in the network element or facility. Upon justification the TSO may define a different timeline in agreement with the DSO and SGU. d) As soon as practicable if an error is detected in the structural data." Definition of error needed: What does "error" mean in paragraph 1 (d)? Does it mean an error in the data set transmitted earlier or does it mean a malfunction of the SGU? Explaination: "Use of the phrase ""in agreement with DSO"" gives the DSO a chance to formally acknowledge what is required by the TSO and to be compliant when transferring info from the SGU. Use of the word “planned” brings specificity to the situations described. It could be interpreted that the DSO is non-compliant if it did not inform the TSO of an unplanned event even if it had no prior knowledge of the event – this is not practical. We must take account of this situation. Use of the word “practicable” allows for an unplanned change in the observability area or for practical feedback if there is an error. Agreement with SGUs is needed to make sure that any request from the TSO can be seen as reasonable by all parties."	Yes	**Partially accepted.** According to article 40(7) of SO GL, KORRR refers to the agreement between TSO and DSOs for the processes to exchange data between them so wording of article 16(1) of KORRR (article 15(1) of new KORRR version) is correct as it does not refer to this type of exchanges. However, the article has been amended to introduce some of the changes proposed in points from a) to e), to amend the reference to 3 months and to clarify that “error” means an error in the data set transmitted earlier	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
16	1	With respect to significant modifications, it is important to add that the timing of such modifications can be adapted during the on-going work. This should also be reflected in this article. Moreover, the article should also foresee a bullet for unforeseen events (e.g. accident, explosion, ...) which would change the structural data from the site but which cannot by there nature be communicated at least three months in advance (and which are not covered by point e on errors, as these relate to data errors)	Yes	**Partially accepted.** Article 16(1) (article 15(1) of new KORRR version) has been reworded to take into account the comment A new point e) has been added to reflect second part of the comments related to the situation of unforeseen modifications.	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
16	1	Proposal (from line 435): Each SGU shall review the structural information it shares with the TSOs of its control area at least every 12 months and provide updated information to the TSO and DSO in the following situations: [...] Explanation: There is no reason why the SGUs are obliged to review their structural data every six month. According to the letters a) to d) the important changes in structural data have to be provided within three month anyway. This is an unfounded requirement and shall be adapted to the existing processes.	Yes	**Not accepted.** Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of structural data Article 16(1) of KORRR (article 15(1) of new KORRR version) sets a minimum threshold for updating information in line with article 45 of SO GL requirements for DSO. However, the article has been amended to introduce some changes in points from a) to e), to amend the reference to 3 months and to clarify that "error" means an error in the data set transmitted earlier	BDEW- German Association of Energy and Water Industries
16	1	It is not clear why there is a need to update Information every 6 month when there are already shorter deadlines specified in the following for data relevant changes. A 12 months deadline should be sufficient.	Yes	**Clarification.** Article 40(6) (f) of SO GL requires the KORRR to define the frequency of delivery of the data to be provided by DSO, including the update of structural data. Article 16(1) of KORRR (article 15(1) of new KORRR version) sets a minimum threshold for updating information in line with article 45 of SO GL requirements for DSO. However, the article has been amended to introduce some changes in points from a) to e), to amend the reference to 3 months and to clarify that "error" means an error in the data set transmitted earlier	RWE Generation SE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
17	1	Proposal: 1. All SGUs within the control area of the TSO shall provide scheduled data to the TSO. Transmission connected SGUs shall provide the data directly to the TSO. Non-transmission connected SGUs may provide the data directly to the TSO or through its connecting DSO according to Article 3(4). Explanation: UPM-Kymmene Oyj wants to point out, that SGUs should not under any circumstances be obliged to follow the scheduled data sent to TSO. The obligation would decrease the possibilities of industrial demand flexibility.	No	**Clarification.** Scheduled Data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with art. 40(5) of SO GL on determination of applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a service.	UPM-Kymmene Oyj
17	1	Proposal: 1. All SGUs within the control area of the TSO shall provide scheduled data to the TSO. Transmission connected SGUs shall provide the data directly to the TSO. Non-transmission connected SGUs shall provide the data directly to the DSO, unless otherwise agreed between TSO and DSO according to Article 3(4). Explanation: 1. Acording to the new Article 3(4) wording.	No	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 17 (1) of KORRR (article 16(1) of the new KORRR version) as it is written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) “each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO.” Related to agreement: Formats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, while formats for the data exchange between TSOs or DSOs and SGUs are not subject to article 40 (7).	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
17	1,2, new 3	"1. SGUs within the control area of the TSO shall provide scheduled data to their TSO. Transmission connected SGUs shall provide the data directly to the TSO. Generally, distribution connected SGUs shall provide the data to the TSO through its connecting DSO according to Article 3(4). 2. Transmission-connected SGUs shall comply with the requirements defined by the relevant TSO to exchange scheduled data. Distribution-connected SGUs shall comply with the requirements agreed between the relevant TSO and DSO to exchange scheduled data. 3. SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems, excluding the communication channel, to exchange scheduled data with the TSO or DSO unless explicitly otherwise agreed with the TSO or DSO." Explaination: "Paragraph 1 should define cascaded data exchange as the general principle for data exchange regarding SGUs connected to distribution systems. This general rule was agreed in the data management final report of the TSO-DSO-platform (compare page 16 of the final report:""Generally, each system operator should be responsible for directly collecting data from users connected to its grid (generators, consumers, storage, etc.). [...]"" Subject to an agreement between TSO and transmission-connected DSO (as required in Article 40(7) of (EU) 2017/1485), deviating solutions might be agreed bilaterally. Additionally, paragraph 2 should provide for an agreement between TSO and DSO on data format etc., as agreement is required by article 40(7) of (EC) 2017/1485 for all data exchanges related to distribution systems. Paragraph 3 should be adapted to take into account data exchanged with the TSO via the DSO. Furthermore it should be made clear that the data channel is out of the responsibility range, as often public telecom networks are used. General remark: It should be possible for SGUs to only provide updates of scheduled data in case of changes compared to the previous communicated data. In case no changes apply to the unit, sending redundant information should be avoided."	1. No 2. No 3. Yes	1. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 17 (1) of KORRR (article 16(1) of the new KORRR version) as it is written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) "each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO." Related TSO-DSO data management report a clarification should be done. KORRR has been drafted following the mandate of Article 40.6 of the SO GL. The main reference during the drafting of the proposal has been the European in force regulation. Position papers have been taken into account but they cannot be given preference over regulation, especially to limit the possibilities of implementation at national level. KORRR cannot be given preference to only one way to provide the data as it is stated in the explanation of the comment.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				2. **Not accepted. F**ormats for the data exchange between TSOs and relevant DSOs shall be agreed according to article 40(7) of SO GL, while formats for the data exchange between TSOs or DSOs and SGUs are not subject to article 40 (7). Requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(3) of KORRR (article 1(5) of the new KORRR version) and be examined by the competent NRA. **3. Partially accepted.** Article 17(3) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 17(3) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO. **Related to general remark:** Article 17(1) of KORRR (article 16(1) of new KORRR version) sets a minimum threshold for updating information in line with article 45 of SO GL requirements for DSO.	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
17	1	Art. 17.1: "Transmission connected SGUs shall provide the data directly to the TSO. Non-transmission connected SGUs may provide the data directly to the TSO or through its connecting DSO according to Article 3(4)". <u>Justification</u>: The previous sentence should be removed, since it contradicts the principle already outlined under article 3.4., i.e. each Member State chooses its data exchange model according to its local features.	No	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 17 (1) of KORRR (article 16(1) of the new KORRR version) as it is written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) "each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO." KORRR does not impose the SGUs the use of a specific model. It sets the TSO to define the models it will use and to publish the formats to receive the data.	Enel

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
17	2	Proposal: 2. SGUs shall comply with the requirements defined by the relevant TSO to exchange scheduled data. Explanation: UPM-Kymmene Oyj wants to point out, that SGUs should not under any circumstances be obliged to follow the scheduled data sent to TSO. The obligation would decrease the possibilities of industrial demand flexibility.	No	**No action. No change is proposed.** **Clarification.** Scheduled Data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets, for example balancing markets. Scheduled data shall not be binding because it has been provided to the TSO. It shall be binding depending on the market it has been negotiated. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with art. 40(5) of SO GL on determination of applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a service.	UPM-Kymmene Oyj
17	2	Proposal: 2. SGUs shall comply with the requirements defined by the relevant System Operator (TSO or DSO) that directly receives the scheduled data. Explanation: 2. For the sake of rasonability, the Relevant System Operator (TSO or DSO) that direclty receives the scheduled data shall be responsible for defining relevant issues related to this data exchange.	Yes	**Accepted.** Article 17(2) (article 16(2) of new KORRR version) has been reworded to clarify the requirement.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
17	2	Proposal: "SGUs shall comply with the requirements defined by the relevant TSO, in coordination with SGUs, and submitted to NRA approval, to exchange scheduled data". Explanatio: EDF considers the format needs to be discussed with SGUs.	No	**Not accepted**. Format and requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(3) of KORRR and be examined by the competent NRA.	EDF
17	3	Proposal: 3. SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems to exchange scheduled data with the TSO unless explicitly otherwise agreed with the TSO. Explanation: UPM-Kymmene Oyj wants to point out, that SGUs should not under any circumstances be obliged to follow the scheduled data sent to TSO. The obligation would decrease the possibilities of industrial demand flexibility.	No	**No action. No change is proposed.** **Clarification.** Scheduled Data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets, for example balancing markets. Scheduled data shall not be binding because it has been provided to the TSO. It shall be binding depending on the market it has been negotiated. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with art. 40(5) of SO GL on determination of applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a service.	UPM-Kymmene Oyj

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
17	3	Proposal: SGUs and TSOs shall establish an communication system to exchange scheduled data between them. Explantation: The way on which scheduled Data is exchanged between SGUs and TSO has to be defined in a bilateral way. SGUs can not be obliged to bear the responsibility for installation, configuration, operation and maintenance of the communication systems especially the SGUs dosen't know the configuration of such a system. (for example: Internet is not secure at all)	No	**Not accepted.** Article 17(3) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 17(3) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	TIWAG-Tiroler Wasserkraft AG - Dispatching
17	3	Proposal: 3. SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems to exchange scheduled data with the relevant system operator (TSO or DSO) unless explicitly otherwise agreed with the Relevant System Operator. Explanation: 3. For the sake of rasonability, the Relevant System Operator (TSO or DSO) that direclty receives the scheduled data shall be responsible for defining relevant issues related to this data exchange.	Yes	**Partially accepted.** Article 17(3) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 17(3) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
17	3	Proposal: Delete point 3. Explanation: It is duplicate of article 3.7	Yes	**Partially accepted.** Article 17(3) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 17(3) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done	Swissgrid

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	
17	3	**Modification proposal** Art. 17.3. "SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems **of their unit, up to the network connection point**, to exchange scheduled data with the TSO or DSO unless explicitly otherwise agreed with the TSO or DSO." Justification: It has to be clarified that SGU have to install and operate not the entire communication system, but only up to the interface with connection point, in order to communicate with network communication systems. As also explained in previous comments, it has to be clarified that data can be exchanged either with TSOs or DSOs, in coherence with article 3.4, as per our modification. Therefore data communication with DSOs should be envisaged.	Yes	**Partially accepted.** Article 17(3) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 17(3) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	Enel
17	3	DSOs, CDSOs and SGUs shall be responsible for the installation, configuration, security and maintenance of the communication systems "until the point of connection/ point of common coupling" to exchange data with the TSO according to the KORRR unless explicitly otherwise agreed with the TSO. For the case of SGUs, physical infrastructure of communication systems will be limited up to its ownership boundary (typically the Point of Common Coupling). Explanation: - SGUs should not be made responsible to cover the whole costs of installing and maintaining a whole (physical) communication system that we will be managed by the TSO and that might extend for long distances. Thus, the responsibility should end at the point where the SGU is also responsible to comply with the connection code. -It should be clear that SGU are responsible for the installation of physical communication infrastructure (and its maintenance) up to point of ownership boundary between the SGU installation and the TSO or DSO facilities. Any physical	Yes	**Partially accepted.** Article 17(3) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 17(3) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	WindEurope

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		infrastructure requiered from the SGU to the relevant TSO control /data centre is the responsability of the relevant TSO or DSO. Need explenation: Should Article 17 be removed as the text provisions have been already handled in Article 3? - DSOs, CDSOs and SGUs in paragraph 7 are required to be responsible for installation, configuration, security etc. This is true only if the above stated participants are delivering the communication/data solution. What if due to reducing complexity and having unified solution compatible with the TSO SCADA system, the TSO is deciding on delivering their own designed unit? Or does this mean that TSO's are not able to propose any solutions?			
17	4	Proposal: 4. To enable price dependent demand response, SGUs cannot be obliged to follow the scheduled data sent to TSOs. Explanation: UPM-Kymmene Oyj wants to point out, that SGUs should not under any circumstances be obliged to follow the scheduled data sent to TSO. The obligation would decrease the possibilities of industrial demand flexibility.	No	**Not accepted.** Scheduled Data to be provided to the TSO or DSO under SO GL and KORRR aims to reflect the better forecast to perform, among other tasks, security analysis for the expected situation of the network. These schedules may come from markets or different kind of contracts and may change in subsequent timeframes and markets, for example balancing markets. Scheduled data shall not be binding because it has been provided to the TSO. It shall be binding depending on the market it has been negotiated. Considering the use of scheduled data by the TSO or DSO, the data should be of minimum quality. The firmness or the binding character of the scheduled data shall be determined on national level by the TSO in compliance with art. 40(5) of SO GL on determination of applicability and scope. An obligation to provide schedules does not lead to a limitation on the commercialization of flexibility. The relation between schedules and flexibility should be clarified on national level in the requirements for the delivery of a	UPM-Kymmene Oyj

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				service.	
17	3	Change to "SGUs shall comply with the requirements agreed with the relevant TSO to exchange scheduled data"	Yes	**Not accepted.** Requirements for the data exchange between TSOs or DSOs and SGUs are not subject to article 40 (7) so they don´t have to be agreed. However, article 17(3) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 17(3) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	RWE Generation SE
18	1	Clarification: According to the text, each SGU that cannot provide real-time-data has to give reasons why it is not capable of doing so. In Austria and Germany a larger number of SGUs can be concerned in being not capable of providing these data. Instead each TSO should justify why the data that is not older than one minute instead.	Yes	**Clarification.** SGUs required to provide data, including real time data, can be defined at national level according to article 40(5) of SO GL subject to NRA approval. Those SGUs will be responsible for providing data according to their capabilities. SGUs subject to Connection Codes shall have the capabilities to exchange real time data. SGUs not subject to Connection Codes are required to provide data according to their current capabilities, not to adapt to the connection codes requirements. Those capabilities need to be communicated to the System Operators to know how the SGUs can provide real time	TIWAG-Tiroler Wasserkraft AG - Dispatching

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				data. Article 18 (1) (article 17(1) of new KORRR version) has been amended to clarify it, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval.	
18	1	Proposal: 1. Provision of real time data shall be performed as soon as possible after the entry into force of the KORRR. In any case, provision of real time data shall be performed from 2 years after the entry into force of the KORRR. Explanation: 1. This provision should be removed based on the following reasons: - Unlike the Connection Network Codes (CNCs), the GL SO gives no room for exemptions to existent facilities. - In the CNCs, exemptions are granted by the NRA not by system operators. - All facilities are subject to CNCs either as new facilities or existent facilities. Therefore, the proposed wording makes nosense. Since exemptions are not considered in the GL SO, a long implementation time seems a good approach to deal with this issue.	Yes	**Partially accepted**. Article 18(1) (article 17(1) of new KORRR version) does not define the entry into force of Articles 41 to 53 of SO GL because it is already defined in Article 192 of SO GL. Article 40(5) of SO GL allow TSOs, in coordination with DSOs and SGUs and subject to NRA approval to define the scope and applicability of this data exchange. According to this, it would be possible not to request to provide real time data to all SGUs, but all SGUs defined in line with Article 40(5) of SO GL shall provide data according to their capabilities, independently of being subject or not to the Connection Codes. However, article 18 (1) (article 17(1) of new KORRR version) has been amended to clarify it, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
18	1	Proposal: Art18.1 - “All SGUs which are power generation modules not subject to the EU Regulations 2016/631, or which are HVDC systems not subject to EU Regulations 2016/1447, or which are demand facilities not subject to EU Regulations 2016/1388, shall comply with the requirements under this KORRR regarding to the real-time data exchange. The delay to comply with the requirements in the KORRR shall be set during national coordination. TSOs or DSOs publishes non-discriminatory criteria to exempt particular SGU from requirement to provide real time data. These criteria have to be approved by NRA. Explanation: This paragraph states that all existing SGUs shall comply by 3 months after the applicability of requirements in the KORRR. The timeline to comply with the KORRR will highly depend on requirements adopted by each TSO at national level. The investments to be made and consequently the timeline to comply will most probably be very different. It would be better to define the deadline for compliance during the national consultation. Furthermore, “in case of non-compliance, […] SGUs shall provide TSO or DSO technical justification, that shall be evaluated by TSOs or DSOs”. EDF is very surprised that TSOs or DSO could evaluate the technical justifications provided by SGUs and to decide to exempt or not the SGUs. EDF considers that TSOs or DSOs have to publish non-discriminatory criteria to exempt SGUs and that these criteria have to be approved by NRA.	Yes	**Partially accepted.** Article 18(1) (article 17(1) of new KORRR version) does not define the entry into force of Articles 41 to 53 of SO GL because it is already defined in Article 192 of SO GL. Article 40(5) of SO GL allow TSOs, in coordination with DSOs and SGUs and subject to NRA approval to define the scope and applicability of this data exchange. According to this, it would be possible not to request to provide real time data to all SGUs, but all SGUs defined in line with Article 40(5) of SO GL shall provide data according to their capabilities, independently of being subject or not to the Connection Codes. However, article 18 (1) (article 17(1) of new KORRR version) has been amended to clarify it, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval.	EDF
18	1	Article 18(1) - require clarity on what this means and who it is trying to apply the requirements of KORRR. It seems to be extending the reach of KORRR to things outwith the grid connection codes how can you be an SGU which is not subject to the Grid Connection Codes?		**Clarification.** Article 40(5) of SO GL allow TSOs, in coordination with DSOs and SGUs and subject to NRA approval to define the scope and applicability of this data exchange. According to this, it would be possible not to request to provide real time data to all SGUs, but all SGUs defined in line with Article 40(5) of SO GL shall provide data according to their capabilities, independently of being subject or not to the Connection Codes. SGUs required to provide data, including real	SP Energy Networks

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				time data, can be defined at national level according to article 40(5) of SO GL subject to NRA approval. Those SGUs will be responsible for providing data according to their capabilities. SGUs subject to Connection Codes shall have the capabilities to exchange real time data. SGUs not subject to Connection Codes are required to provide data according to their current capabilities, not to adapt to the connection codes requirements. Those capabilities need to be communicated to the System Operators to know how the SGUs can provide real time data. Article 18 (1) (article 17(1) of new KORRR version) has been amended to clarify it, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval.	
18	1	IFIEC has voiced strong concerns with this point during the workshop and wants to reiterate these comments here. As Art18 1° is written now, all SGUs which cannot provide 1 minute values (de facto, presumably at least a very large subset of all existing installations) because this capability is lacking as the requirement did not exist at the time of commissioning of these installations will each individually have to provide a dossier with technical justification to the TSO or DSO (and CDSO?) by 3 months after applicability of the requirements in the KORRR, representing a huge workload for all these grid users without any added value to the grid. Moreover, the TSO will have to evaluate all these technical justifications or will have to coordinate on them with the DSOs (and CDSOs?) and take a decision (and as always, ENTSO-e has not foreseen any deadline for the TSO to take such decision). This is an enormous workload (and cost) for all involved parties, without any clear added value. Moreover, a decision by the TSO could lead to discrimination or at least arbitrary decisions. Such decision would maybe rather be taken by an independent authority, but this would only add to		**Clarification.** Article 40(5) of SO GL allow TSOs, in coordination with DSOs and SGUs and subject to NRA approval to define the scope and applicability of this data exchange. According to this, it would be possible not to request to provide real time data to all SGUs, but all SGUs defined in line with Article 40(5) of SO GL shall provide data according to their capabilities, independently of being subject or not to the Connection Codes. SGUs required to provide data, including real time data, can be defined at national level according to article 40(5) of SO GL subject to	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		the system cost. IFIEC pleads strongly for a more pragmatic approach which will not create a huge administrative burden for all existing installations and all system operators, without clear added value of this procedure.		NRA approval. Those SGUs will be responsible for providing data according to their capabilities. SGUs subject to Connection Codes shall have the capabilities to exchange real time data. SGUs not subject to Connection Codes are required to provide data according to their current capabilities, not to adapt to the connection codes requirements. Those capabilities need to be communicated to the System Operators to know how the SGUs can provide real time data. Article 18 (1) (article 17(1) of new KORRR version) has been amended to clarify it, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval.	
18	1,2,3,4	"1. Delete 2. All SGUs within the control area of the TSO shall provide real time data in accordance with Articles 47, 50, 52(3) and 53 of Regulation 2017/1485 to the TSO. Transmission connected SGUs shall provide the data directly to the TSO. In general, non-transmission connected SGUs shall provide data through their connecting DSO. In agreement between TSO and DSO, non-transmission connected SGUs may provide the data directly to the TSO. 3. Each SGU providing data directly to the TSO or DSO shall fulfil the requirements defined by the TSO in terms of: a) Logical connections between parties and protocols used; b) Network architecture including redundancy; c) Network security rules; d) ID and/or naming convention and data quality; e) Data Transmission Parameters and performance; f) Rules of conduct in the case of planned outages and disturbances of communication equipment.	1. Yes 2. Yes 3. Yes 4. Yes	1. **Not accepted.** However article 18 (1) (article 17(1) of new KORRR version) has been amended to clarify it 2. **Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 18 (2) of as it was written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) "each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		4. SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems, excluding the communication channel, to exchange real time data with the TSO or DSO unless explicitly otherwise agreed with the TSO or DSO." Explaination: "Paragraph 1 should be deleted completely. It is completely unjustified why a retrospective application of the requirements should be necessary. TSOs should provide thorough justification before applying any requirements retrospectively. Furthermore, the process for exemptions is costly, bureaucratic and unsuitable. E.g. Germany faces more than 50000 existing SGUs. If all of these SGUs should be required to apply for justified exemption, costs will exceed 50 Mio. EUR (if we assume 1000,- EUR per SGU to be processed). Furthermore, DSOs would have to assess each and every of these justifications, a process they are not prepared for. Additionally, SGUs have the right to complain at the NRA if they do not agree to the outcome of the assessment, i.e. NRAs will face a significant number of complaints. Paragraph 2 has been adapted as in the previous articles. Paragraph 4 should be adapted to take into account data exchanged with the TSO via the DSO. Furthermore it should be made clear that the data channel is out of the responsibility range, as often public telecom networks are used."		decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO." KORRR cannot be given preference to only one way to provide the data. However, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval. 3. Accepted. Article 18(3) (article 17(3) of new KORRR version) has been amended to reflect data exchanged with the TSO or with the DSO. 4. Partially accepted. Article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
18	2,3,4	2. All SGUs within the control area of the TSO shall provide real time data in accordance with Articles 47, 50, 52(3) and 53 of Regulation 2017/1485 to the TSO. Transmission connected SGUs shall provide the data directly to the TSO. In general, non-transmission connected SGUs shall provide data through their connecting DSO. In agreement between TSO and DSO, non-transmission connected SGUs may provide the data directly to the TSO. 3. Each SGU providing data directly to the TSO or DSO shall fulfil the requirements defined by the TSO in terms of: a) Logical connections between parties and protocols used; b) Network architecture including redundancy; c) Network security rules; d) ID and/or naming convention and data quality; e) Data Transmission Parameters and performance; f) Rules of conduct in the case of planned outages and disturbances of communication equipment. 4. SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems, excluding the communication channel, to exchange real time data with the TSO or DSO unless explicitly otherwise agreed with the TSO or DSO. Explanation: Paragraph 1 should be deleted completely. It is completely unjustified why a retrospective application of the requirements should be necessary. TSOs should provide thorough justification before applying any requirements retrospectively. Furthermore, the process for exemptions is costly, bureaucratic and unsuitable. E.g. Germany faces more than 50000 existing SGUs. If all of these SGUs should be required to apply for justified exemption, costs will exceed 50 Mio. EUR (if we assume 1000,- EUR per SGU to be processed). Furthermore, DSOs would have to assess each and every of these justifications, a process they are not prepared for. Additionally, SGUs have the right to complain at the NRA if they do not agree to the outcome of the assessment, i.e. NRAs will face a significant number of complaints. Paragraph 2 has been adapted as in the previous articles. Paragraph 3 should be adapted to take into account data exchanged with the TSO via the DSO. Furthermore it should be made clear that the data channel is out of the responsibility range, as often public telecom networks are used.	2. Yes 3. Yes 4. Yes	2**. Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 18 (2) of as it was written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) "each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO." KORRR cannot be given preference to only one way to provide the data. However, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval. 3. **Accepted.** Article 18(3) (article 17(3) of new KORRR version) has been amended to reflect data exchanged with the TSO or with the DSO. 4. **Partially accepted**. Article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Explain: Logical Connections		version of KORRR. Also, an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO. . **Clarification.** The definition of logical connection will be added to the supporting document	
18	2	Proposal: 2. All SGUs within the control area of the TSO shall provide real time data in accordance with Articles 47, 50, 52(3) and 53 of Regulation 2017/1485 to the TSO. Transmission connected SGUs shall provide the data directly to the TSO. Non-transmission connected SGUs shall provide the data directly to the DSO, unless otherwirse agreed between TSO and DSO according to Article 3(4). Explanation: 2. Acording to the new Article 3(4) wording.	Yes	**Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 18 (2) of as it was written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) “each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO." KORRR cannot be given preference to only one way to provide the data. However, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval.	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
18	1,2	1. All SGUs which are power generation modules not subject to the EU Regulations 2016/631, or which are HVDC systems not subject to EU Regulations 2016/1447, or which are demand facilities not subject to EU Regulations 2016/1388, shall comply with the requirements under this KORRR regarding to the real time data exchange. In case of non-compliance, "TSOs or DSO might request SGUs to technical justifications, that shall be evaluated by TSO or DSO. On the basis of this evaluation TSO or DSO in coordination with the TSO, may exempt particular SGU from requirement to provide real time data." 2. All SGUs within the control area of the TSO shall provide real time data in accordance with Articles 47, 50, 52(3) and 53 of Regulation 2017/1485 to the TSO. Transmission connected SGUs shall provide the data directly to the TSO. Non-transmission connected SGUs must provide the data directly to its connecting DSO according to Article 3(4). Explanation: 1. As ENTSO-e explained during the stakeholders workshop, TSOs do not intent to force existing SGUs to retroffiting their existing installations to comply with real-time data exchange requirement. However TSOs wanted to ensure that those SGUs which today have the capabilities (and do communicated in real time) continue to have such an obligatation. We shouldn't set by default the proof of non-compliance to all existing SGUs, as this might create a huge administrative burders for thousands/million of small facilities (which do not have the technical capabilities). If TSOs observe that certain large plants (which are supposed to have the capabilities) do not comply, then TSO should have the option to demand explanations 2. The arguments above are developed because it might be difficult for old installations to comply with 100% of the new rules without significant R&D and hardware change effort. In some cases, it might even be needed to adjust the wind farm software as well (so it becomes even more complicated). 3. There should be only one point of contact DSO, TSO or Agregator in order to reduce complexity and costs.	1. Yes 2. Yes	**1. Not accepted.** Article 18 (1) (article 17(1) of new KORRR version) has been amended to clarify it **2. Not accepted.** Article 3(4) of KORRR (article 3(3) of the new KORRR version) reflects the wording and intention of Article 40(5) of SO GL read in conjunction with Articles 58 to 50 and 53 of SO GL. Article 18 (2) of as it was written reflects the wording and intention of article 3(4) (article 3(3) of the new KORRR version) "each TSO, in coordination with the DSOs in its Control Area, shall define whether the distribution connected SGUs in its control area shall provide the structural, scheduled and real time data to the TSO directly or through its connecting DSO or to both The decision for each type of information and type of SGU may be independent. When the data is directly provided to the TSO, after request of the DSO to whose network the SGU is connected, the TSO shall make it available for the DSO. When the data is provided to the DSO, the DSO shall provide the data to the TSO." KORRR cannot be given preference to only one way to provide the data. However, article 18(2) has been deleted and a new article 6(5) was added to the new KORRR version to include a reference to Article 40(5) of SO GL to make clear the scope of the article and the need of NRA approval.	WindEurope

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
18	3	Proposal: 3. Each SGU shall fulfil the requirements defined by the relevant system Operator (TSO or DSO) in terms of: Explanation: 3. For the sake of rasonability, the Relevant System Operator (TSO or DSO) that direclty receives the real-time data shall be responsible for defining relevant issues related to this data exchange.	Yes	**Accepted.** Article 18(3) (article 17(3) of new KORRR version) has been amended to reflect data exchanged with the TSO or with the DSO.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
18	3	Proposal: Art18.3 - "Each SGU providing data directly to the TSO shall fulfil the requirements, defined by the TSO up to connection point or telecommunication terminal, in coordination with SGUs, in terms of: a) Logical connections between parties and protocols used,; b) Network architecture including redundancy, c) Network security rules; d) ID and/or naming convention and data quality; e) Data Transmission Parameters and performance; f) Rules of conduct in the case of planned outages and disturbances of communication equipment". Explanation: EDF considers that the format needs to be discussed with SGUs. Furthermore, EDF considers SGUs would be able to fulfill the requirements up to the connection point or telecommunication terminal (for example up to the connection point for power plant). Finally, EDF wonders about the definition of "performance" and would like it to be clarified.	Yes	**Not accepted.** SGUs shall be responsible for the communication systems until the "communication interface point," from this "communication interface point", the responsibility shall be of the System Operator. The "communication interface point" between TSO and DSO shall be agreed among them and between the SGUs and the System Operators, it shall be defined by the System Operator. However, article 18(3) (article 17(3) of new KORRR version) has been amended to reflect data exchanged with the TSO or with the DSO and article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old version of KORRR. Also, an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	EDF
18	3	As a final remark on art18 3°, "rules of conduct" is introduced again. For IFIEC, it is unclear which rules of conduct are meant here and who will introduce tem and approve them.	No	**Clarification.** The definition of rules of conduct will be added to the supporting document	IFIEC Europe

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
18	3	Change to "Each SGU providing data directly to the TSO shall fulfil the requirements agreed with the TSO in terms of..."	Yes	**Not accepted.** Requirements for the data exchange between TSOs or DSOs and SGUs are not subject to article 40 (7) so they don´t have to be agreed. However, article 18(3) (article 17(3) of new KORRR version) has been amended to reflect data exchanged with the TSO or with the DSO.	RWE Generation SE
18	4	Proposal: 4. SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems to exchange real time data with the relevant system operator (TSO or DSO) unless explicitly otherwise agreed with the Relevant System Operator. Explanation: 4. For the sake of rasonability, the Relevant System Operator (TSO or DSO) that direclty receives the real-time data shall be responsible for defining relevant issues related to this data exchange.	Yes	**Partially accepted**. Article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	UNESA -THE SPANISH ASSOCIATION OF THE ELECTRICITY UTILITIES-
18	4	Proposal: Delete point 4. Explanation: It is duplicate of article 3.7	Yes	**Partially accepted**. Article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old version of KORRR. Also an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	Swissgrid

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
18	4	Proposal: Art.18-4 – “SGUs shall be responsible for the installation, configuration, security and maintenance of the equipment necessary to provide data to the TSO according to the KORRR up to the connection point or telecommunication terminal of TSOs or DSOs’ unless explicitly otherwise agreed with the TSO or DSO". Explanation: EDF considers that DSOs, CDSOs and SGUs are responsible for installation, configuration, security and maintenance of their own exchange data equipment up to the connection point with the transportation or distribution system, or up to TSOs’ or DSO’s telecommunication terminals. Modem and telecommunication links are the properties of TSOs or DSOs, therefore SGUs cannot be held responsible for the damages or outages on this telecommunication network.	Yes	**Partially accepted**. Article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old version of KORRR. Also, an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	EDF
18	4	Article 18(3) wording should be consistent with Article 10(3) i.e. use of 'current all TSO practices'	No	**Clarification:** TSO practices will be defined and published at ENTSO-E level so unified at European level. They refer to the exchange of information among TSOs not with other parties, this is why it is only reflected in article 10 (3) (article 10 (4) of new KORRR version). In article 18(3) (article 17(2) of new KORRR version) KORRR refers to real time data provided by SGUs, so to give flexibility to the national implementation it wasn´t include the reference to “current all TSOs practices” in that article, but it will be also possible to implement those practices agreed between TSOs if it is possible.	SP Energy Networks

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
18	4	**Modification proposal** Art. 18.4. "SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems of their unit, up to the network connection point, to exchange real time data with the TSO or DSO unless explicitly otherwise agreed with the TSO or DSO." Justification: It has to be clarified that SGU have to install and operate not the entire communication system, but only up to the interface with connection point, in order to communicate with network communication systems. As also explained in previous comments, it has to be clarified that data can be exchanged either with TSOs or DSOs, in coherence with article 3.4, as per our modification. Therefore data communication with DSOs should be envisaged.	Yes	**Partially accepted**. Article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old version of KORRR. Also, an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	Enel
18	4	3.10. Article 18 - clarification Proposal (from line 479): SGUs shall be responsible for the installation, configuration, operation and maintenance of the communication systems to exchange real time data with the TSO unless explicitly otherwise agreed with the TSO. The responsibility has nothing to do with the costs. Explanation: According to the text, each SGU that cannot provide real-time-data has to give reasons why it is not capable of doing so. In Germany a large number of SGUs can be concerned in being not capable of providing these data. Instead each TSO should justify why the data that is not older than one minute is needed. Besides, aggregators cannot be hold responsible for the provision or quality of data that is provided by third parties (e.g. power generation modules with separate owners). Responsibility (ref. line 479): The responsibility has nothing to do with the costs.	Yes	**Partially accepted**. Article 18(4) has been deleted as it will be reflected in the new KORRR version as new article 3(7), unifying article 18(4) and article 3(7) from the old version of KORRR. Also, an amendment in article 3(7) of the old version has been done as it will be split into 3 new articles (article 3(6) 3(7) and 3(8) of the new KORRR version) to clarify responsibilities of DSO and SGUs for the communication systems until the communication interface point with the TSO.	BDEW- German Association of Energy and Water Industries EnBW Energie Baden-Württemberg AG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
19	0	Article 19 should be deleted completely. Explanation: Paragraph 19 should be deleted completely, as KORRR is limited to data exchange as described in Title II of (EU) 2017/1485, as clearly stated in Article 40(6) of (EU) 2017/1485. Data exchange between TSOs and NEMOs is not subject of Title II. TSOs are therefore not entitled to define anything with regard to NEMOs in KORRR.	Yes	Accepted. Article 19 has been deleted	EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG
19	0	Proposal (from line 483): Delete the whole Article As there is no regulation to NEMOS in the SO-GL, they should not be mentioned in the KORRR proposal. BDEW proposes to delete the whole Article 19.	Yes	Accepted. Article 19 has been deleted.	BDEW- German Association of Energy and Water Industries
19	1,2,3,4	Proposal: This article should be deleted: Explanation: As there is no regulation to NEMOS in the SO-GL, they should not be mentioned in the KORRR proposal.	Yes	Accepted. Article 19 has been deleted.	TIWAG-Tiroler Wasserkraft AG - Dispatching
19	1,2,3,4	Proposal: Delete article. Explanation: We suggest deleting Article 19 of the present proposal. We understand the approach to mention all involved parties in the data exchange process. However, the obligation for NEMOs to share market results and cooperate with TSOs is already stipulated in other EU legislation, incl. Commission Regulation 2015/1222 (CACM, mainly Article 62) and Commission Regulation 543/2013 on the submission and publication of data in electricity markets. Furthermore, the SO GL itself does not mention any NEMO roles or responsibilities, and KORRR is only an implementing and not a legislative document. The enforceability of Article 19 would not be given as it is not in line with the SO GL.	Yes	Accepted. Article 19 has been deleted.	Association of European Energy Exchanges (Europex)

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
19	-	Article 19 should be deleted completely. Explaination: Paragraph 19 should be deleted completely, as KORRR is limited to data exchange as described in Title II of (EU) 2017/1485, as clearly stated in Article 40(6) of (EU) 2017/1485. Data exchange between TSOs and NEMOs is not subject of Title II. TSOs are therefore not entitled to define anything with regard to NEMOs in KORRR.	Yes	**Accepted. Article 19 has been deleted.**	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
19	-	We suggest to delete the whole article 19. We understand the approach of the drafting team to mention all the parties involved in the data exchange process as it was analyzed, however the obligation of NEMOs to share the market results and cooperate with TSOs is already foreseen in other EU legislation, commission regulation 2015/1222 CACM (mainly article 62) and commission regulation 543/2013 on submission and publication of data in electricity markets. Furthermore the SOGL itself does not mention the NEMO roles or responsibilities and KORRR is only implementary legislation document. The enforceability of the Article 19 by law may be difficult as it is not in line with SOGL.	Yes	**Accepted. Article 19 has been deleted**	OTE, a.s.
20	1	"1. Upon approval of this KORRRs proposal ENTSO-E and each TSO shall publish it on the internet in accordance with Article 8(1) of Regulation 2017/1485. 2. TSOs shall apply the proposed KORRRs as described in Title 2 as soon as all regulatory authorities have approved the proposed KORRRs or a decision has been taken by the Agency in accordance with Article 6(8) and 7(3) of the Regulation 2017/1485." Explaination: "Regulation (EU) 2017/1485 clearly states in ist Article 40(6):""The organisational requirements, roles and responsibilities shall be published by ENTSO for Electricity."". Draft KORRR should respect this obligation. KORRR can only be applied after the acceptance of all NRA or a decision by the Agency. For the avoidance of doubt, the reference to ""18 months after entry into force..."" should be deleted. The earliest application date is the day after its final acceptance. "	1. No 2. No	**1. Not accepted.** In KORRR it is reflected the requirement stated in article 8(1) of SO GL: “TSOs responsible for specifying the terms and conditions or methodologies in accordance with this Regulation shall publish them on the internet following approval by the competent regulatory authorities or, where no such approval is required, following their specification, except where such information is considered confidential in accordance with Article 12.” So KORRR respects the obligation reflected in article 40 (6) of SOGL as they should be seen as complementary. ENTSO-E shall publish the KORRR to comply with SO GL and TSOs shall publish it to comply with KORRR. **2. Not accepted.** According to article 192 of	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE, EWE NETZ GmbH innogy SE SWM Infrastruktur GmbH & Co. KG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
				SOGL "Articles 41 to 53 shall apply 18 months after the entry into force of this Regulation […]" also article 40 (7) of SO GL refers to 18 months period.	
21		"The reference language for this KORRR Proposal shall be English. For the avoidance of doubt, TSOs need to translate this KORRR Proposal into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with Article 8 (1) of the Commission Regulation (EU) 2017/1485 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 KORRR." Explaination: Data flow implementation documentation of TSO's needs to be available in national language + English (international business language)	No	**Not accepted.** Second part of article 21 (article 19 of new KORRR version) is a clarification not an obligation. With the change proposed, KORRR will impose the obligation for TSOs to translate the KORRR into their national languages. KORRR just want to clarify what happens in the event of inconsistencies between the English version and any other version in another language.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		Clarification: Regulation 2017/1485 constitutes the legal basis for organisational requirements, roles and responsibilities relating to data exchange. Therefore the TSOs' proposal (KORRR proposal) has to be developed within the legal framework of the Guidelines provisions and cannot impose additional requirements. The Guidelines force that additional requirements can be defined during the national consultation but not in the KORRR.	No	**Clarification:** KORRR purpose is not to define additional requirements but to establish the roles, requirements and responsibilities when implementing at national level the data exchange processes according to SO GL. It shall be implemented in conjunction with the implementation of Articles 40(5) and 40(7).	EDF

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		Clarification: The content of the document is quite generic and it is therefore difficult to provide very specific comments. EUTurbines would like to hereby make the following general remarks: The requirements and Real Data to be exchanged shall be coordinated between TSO and SGU and between DSO and SGU, depending on the configuration. The number of data and requirements shall be reasonable (technically and economically) and shall not create an unnecessary cost burden. The number of data can be taylored, depending on technology-specific information. In this respect, TSOs and DSOs shall be responsible to ensure a minimum level of harmonisation on requirements, limiting an unnecessary burden when considering efficient solutions (eventually in agreement with SGU and industry). In addition, it remains unclear who is in charge of the security of the system (cyber security) and data protection exchanged, which shall be TSO's and DSO's responsibility. The Data exchanged shall be defined in order not to affect the SGU safe operation (and eventually the safety of the electrical system). It is not clear from the document who takes this responsibility. TSOs can define the data, but SGU can limit such request in case there is a consistent risk to their plant/equipment operation. 3 months time shall be the timing for defining the solution rather than to implement it. Understanding, collecting data, studying the problem, defining and implementing the solution can be very easy on a small system but can be very complex in a big system. This can even require the shut-down of the unit, which is typically an action that needs planning time. The level of disruption, on which the request is based, needs to be defined.	No	**Clarification:** **1.** Format and requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA. **2.** In accordance with articles 3(6), 3(7) and 3(8) of KORRR, SGUs shall be responsible for the communication links until the "Communication Interface Point," from this "Communication Interface Point," the responsibility shall be of the System Operator. The "Communication Interface Point" between TSO and DSO shall be agreed among them and between the SGUs or CDSOs and the System Operators, it shall be defined by the System Operator. **3.** Data exchange shall not affect safe operation of the plant/equipment. In case the SGU consider that there is a risk caused by the data provision, it can be communicated to the System Operator and to the NRA who shall examine the proportionality of que requirement.	EUTurbines – European Association of Gas and Steam Turbine Manufacturers
General		With respect to already existing high efforts for SGUs to providing data to TSOs additionla efforts by changing data formats in existing processes, changing data flows to different IT-systems, or by using different formats for sending data to differen TSOs (for international active SGUs) should be avoided. In general data	No	**Clarification:** Format and requirements to exchange data between the TSOs, DSOs and SGUs in each control area may be defined at national level. The proportionality of the	RWE Generation SE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		formats and data Exchange processes shpuld be agreed between TSOs, DSOs, and SGUs in order to minimize efforts.		System Operator decision has to be respected according to articles 4(2) of SO GL and 1(5) of KORRR and be examined by the competent NRA.	
General		EnBW Energie Baden-Württemberg AG (EnBW) welcomes the opportunity to comment on ENTSO-E´s draft version of the "All TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities (KORRR) relating to Data Exchange in accordance with Article 40(6) of the Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a Guide-line on Transmission System Operation" (KORRR proposal). In order to simplify the national implementation of the SO-GL EnBW would like stress the following points: • Some references in the KORRR proposal are unclear and quite a few interpretations of the legal framework do not correspond to the usual interpretation of the SO-GL. It has to be ensured that the KORRR proposal is consistent with the underlying legal framework. • In Countries with more than one TSO, it seems not to be cost efficient to use different format for each control area. • In order to avoid inefficiency, the data provided by the SGU is either send to the DSO or the TSO. The distribution and transmission system operators shall exchange the data among each other, so that the SGU can provide the data to one single point of contact. As much of the data is already being sent to the TSO, SGUs should be able to use this also for potential additional data. • Changes in the grid of the DSO affect the TSO and vice versa. Though, the DSO should get the same quality and quantity of information from the TSO. The Data ex-change from the TSO to DSO should be part of the KORRR proposal.	No	**Clarification:** 1. KORRR purpose is not to define additional requirements but to establish the roles, requirements and responsibilities when implementing at national level the data exchange processes according to SO GL. It shall be implemented in conjunction with the implementation of Articles 40(5) and 40(7). 2. KORRR does not prevent TSOs in the same country to agree on a common formats or procedures for the data exchange 3. The KORRR reflects the idea SGUs should be allowed to provide data only to the TSO or to the DSO to which they are connected and then the TSO and the DSO shall exchange between them the data related to those SGU according to article 40(7) of SOGL 4. Reciprocity between TSOs and DSOs is guaranteed by article 3(3) of the new version of KORRR that reflects the wording and intention of article 40 (5) in conjunction with articles 48 to 50 and 53 of SO GL. However those articles of KORRR where exchanges between DSO and TSO should be done under agreement have been amended	EnBW Energie Baden-Württemberg AG

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		1) The last but two sentence of recital (2) need to be changed: "[...] To achieve this goal, it is necessary that each party of the electric system has the necessary observability of the network elements and services with impact in their activities.[...]" to make sure the reference is unambiguous. The last but one sentence of recital two ("Of special relevance is the global demand-generation balance, whose responsibility is assigned to the TSO in Regulation (EC) No 714/2009.") should be deleted completely. The task of global demand-generation balance assigned to TSOs in (EC) 714/2009 refers to the long-term timeframe in the range of the TYNDP. It has no relevance for the timeframe KORRR refers to nor is it subject to Title II of (EU) 2017/1485, to which KORRR is limited. 2) The last sentence of recital (3) ("This complementarity refers to who, how and when the data defined in GLDPM has to be exchanged.") should be deleted. GLDPM already defines who, how and when data has to be exchanged. Cf. e.g. Art. 3(4) (who), art. 4 (how) and art. 16 (when) of GLDPM. If TSOs deem those definitions insufficient they shoud justify any further need. 3) In recital (6), article 40(7) of (EU) 2017/1485 should be cited correctly:"Article 40(7) specifies the obligation for the TSOs to agree with the relevant DSOs on the process for exchanging provision and management of information between them, including, where required for efficient network operation, the provision of data related to distribution systems and SGUs." 4) In recital (7), the last sentence ("The KORRR shall include the method for assessing the relevant of network elements to define the observability area of the TSO.") should be deleted. It is not the task of KORRR to include such a method, but the task of the methodology to be developed following art. 75 of (EU) 2017/1485. This is clearly defined in art. 75 (2) of (EU) 2017/1485:"[...]The methods referred to in point (a) of paragraph 1 shall allow the identification of all elements of a TSO's observability area, being grid elements of other TSOs or transmission-connected DSOs, power generating modules or demand facilities.[...]" 5) Recital (8) should be rewritten to:"Article 40(10) specifies the right of DSOs with a connection point to a transmission system to receive the relevant structural, scheduled and real-time information from the relevant TSOs and to gather the relevant structural, scheduled and real- time information from the neighbouring DSOs." to cite the first sentence of art. 40(10) of (EU) 2017/1485 correctly.	1. Yes 2. Yes 3. Yes 4. Yes 5. Yes 6. No 7. Yes 8. Yes 9. Yes 10. Yes	1. **Accepted.** Recital (2) of whereas section has been amended to clarify the reference to achieve the goal of the SO GL. It also has been updated with a reference to the guideline on electricity balancing that has already entered into force instead of the reference to Regulation (EC) No 714/2009. 2. **Not accepted**. However, the last sentence of recital (3) has been amended to clarify it and also to state that GLDPM only refers to data exchange until day ahead, while KORRR also covers real time data exchange. 3. **Accepted**. Recital (6) has been amended to take into account "agree" word in the text instead "coordinate" 4. **Accepted**. Last sentence of recital (7) has been deleted. 5. **Accepted.** Recital (8) has been amended to take into account first part of article 40 (10) of SO GL. 6.**Not accepted**. Article 4.1.b of the SO GL sets as an objective determining common interconnected system operational principles but the SO GL is not limited to that objective. Thus, application of the KORRR shall not be limited to the data exchanged according to the GLDPM that has been developed according to the CACM. On the other hand, investment done to exchange data according to the GLDPM will allow to exchange that data in the application of the SO GL. 7. **Recital (12)** has been amended. 8. **Accepted.** Recital (13) has been amended9. 9. **Not accepted.** However, Recital (17) has been amended in line with article 4 (1) (h). 10. **Accepted**. Recital (18) has been amended	SWM Infrastruktur GmbH & Co. KG, Innogy SE, EWE NETZ GmbH

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		6) Recital (11) should be rewritten to:"In the aim to facilitate common operational planning principles as requested by Article 4(1)(b) of Regulation 2017/1485, KORRR Proposal takes into account all data already requested by GLDPM and GLDPM v2 to prepare scenarios to perform operational security analysis in the planning stage. This data is deemed sufficient to fulfill this task". Data necessary for coordinated security analysis and operational planning is already requested by GLDPM and GLDPM v2. If the data set of these two GLDPM-documents is insufficient, data demand going beyond that should be thoroughly justified. Stakeholders already invest in data exchange technologies to facilitate data exchange emanating from GLDPM and GLDPM v2. If data demand is changed by KORRR, stakeholders see the risk of stranded investments. 7) Recital (12) should be rewritten to:"KORRR Proposal includes the organization to exchange, among other, real time data between TSOs, necessary to perform the load-frequency control processes as defined in Article 4(1)(c) of Regulation 2017/1485 and, more specifically, in Article 141(3) of Regulation 2017/1485 for each monitoring area." The only application of real time data and its exchange for load-frequency control processes is the monitoring of real-time active power exchange between monitoring areas (and, consequently, LFC blocks and synchronous areas). Therefore, real-time data exchange for LFC should be limited to this purpose. 8) Recital (13) should be rewritten to:"To ensure the conditions for maintaining operational security throughout the Union as specified in Article 4(1)(d) of Regulation 2017/1485, TSOs need to have good observability of the System in order to perform reliable security analysis. KORRR proposal aims to set the framework for the TSOs to access necessary data of their respective observability area." This change is necessary to make clear it is not the task of KORRR to ensure observability, but the methodology stemming from article 75 of (EU) 2017/1485. 9) Recital (17) should be changed to:"KORRR Proposal will contribute to the efficient operation and development of the electricity transmission system and electricity sector in the Union while having good observability of the system to perform reliable security analysis and thus identifying necessary improvements in the Transmission System." As it would be sufficient and efficient to identify necessary improvements instead of possible improvements. 10) Recital (18) should be rewritten to:"In conclusion, the KORRR Proposal contributes to the general objectives of the Regulation 2017/1485 to the benefit of consumers." to put consumers at heart of this methodology.		to add consumers.	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		The German Association of Energy and Water Industries (BDEW) represents over 1,800 members of the electricity, gas and water industry. In the energy sector, BDEW represents companies active in generation, trading, transmission, distribution and retail. BDEW represents e.g. 95% of the DSO-Grid in Germany. BDEW welcomes the opportunity to comment on ENTSO-E´s draft version of the "All TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities (KORRR) re-lating to Data Exchange in accordance with Article 40(6) of the Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a Guideline on Transmission System Operation" (SO-GL, KORRR proposal). Taking into account that the transmission system operators (TSOs) organised within BDEW are, among others, responsible for the drafting and finalisation of the KORRR proposal, the BDEW Position Paper has been developed with the abstention of the German TSOs. In order to simplify the national implementation of the SO-GL BDEW would appreciate a KORRR proposal that is legally clear. That means that it neither extends nor contradicts the content of the SO-GL. Thus, BDEW would like to stress the following points: • Some references in the KORRR proposal are unclear and quite a few interpretations of the legal framework do not correspond to the wording of the SO-GL. It has to be ensured that the KORRR proposal is consistent with the underlying legal framework. For example, KORRR should strictly be limited to data exchanges necessary for the legal tasks assigned to TSOs in the SO-GL and described in Title II of the SO-GL. Data exchanges relating to load-frequency control or market-related activities in general are not described in Title II of the SO-GL and therefore not addressed in KORRR. Another example is Article 40 (7) of the SO-GL: Whereas the Guideline says that TSOs and DSOs shall agree on procedures the KORRR proposal consistently speaks of „(to) coordinate ", which is much weaker. • In countries with more than one TSO, it seems not to be cost efficient to use different formats for each control area. BDEW proposes a common format which at least is used by the neighbouring TSOs. If it comes to the necessity of a new format it should be a European one. Scheduled data shall be provided in a uniform dataset and format. • In order to avoid inefficiency, the data provided by the Significant Grid User	No	**Clarification** to each point: 1. Data exchanges relating service provisions shall be defined at national level, recital (12) has been deleted amended. Related to article 40(7) of SO GL some articles of KORRR have been amended to take into account agreements between TSO and DSO when refers to exchanges between them under article 40(7) of SOGL. 2. KORRR does not prevent TSOs in the same country to agree on a common formats or procedures for the data exchange 3. The KORRR reflects the idea SGUs should be allowed to provide data only to the TSO or to the DSO to which they are connected and then the TSO and the DSO shall exchange between them the data related to those SGU according to article 40(7) of SOGL 4. Reciprocity between TSOs and DSOs is guaranteed by article 3(3) of the new version of KORRR that reflects the wording and intention of article 40 (5) in conjunction with articles 48 to 50 and 53 of SO GL. However those articles of KORRR where exchanges between DSO and TSO should be done under agreement have been amended	BDEW- German Association of Energy and Water Industries

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		(SGU) should be sent only once. The distribution and transmission system operators shall exchange the data among each other. As much of the data is already being sent to the TSO, SGUs should be able to use this way also in the future. Duplicated data provision should be avoided. The same formats for data exchange from the SGUs shall be used. • Changes in the grid of the TSO affect the DSO much stronger than vice versa. Though, the DSO should get at least the same quality and quantity of information from the TSO. The Data exchange between the TSO to DSO should be part of the KORRR proposal and put both system operators on equal footing.			
General		Reicital (13) should be rewritten to:"To ensure the conditions for maintaining operational security throughout the Union as specified in Article 4(1)(d) of Regulation 2017/1485, TSOs need to have good observability of the System in order to perform reliable security analysis. KORRR proposal aims to set the framework **for the TSOs to access necessary data of their respective observability area**." This change is necessary to make clear it is not the task of KORRR to ensure observability, but the methodology stemming from article 75 of (EU) 2017/1485.	Yes	**Accepted.** Recital (13) has been amended	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		Recital (17) should be changed to:"KORRR Proposal will contribute to the efficient operation and development of the electricity transmission system and electricity sector in the Union while having good observability of the system to perform reliable security analysis and thus identifying **necessary** improvements in the Transmission System." As it would be sufficient and efficient to identify necessary improvements instead of possible improvements.	Yes	**Not accepted.** However, Recital (17) has been amended in line with article 4 (1) (h).	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		Recital (18) should be rewritten to:"In conclusion, the KORRR Proposal contributes to the general objectives of the Regulation 2017/1485 to the benefit of consumers." to put consumers at heart of this methodology.	Yes	**Accepted**. Recital (18) has been amended to add consumers	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		Oesterreichs Energie would like to represent the interests of the joint statement of the European DSO associations on the draft "All TSOs' proposal for the Key Organizational Requirements, Roles and Responsibilities (KORRR) relating to Data Exchange". Note, that through delivering the comments, the agreed amendments and additions should be reinforced and corroborated accordingly in the consultation procedure. The last but two sentence of recital (2) need to be changed: "[...] To achieve this goal, it is necessary that each party of the electric system has the necessary observability of the network elements and services with impact in their activities.[...]" to make sure the reference is unambiguous. The last but one sentence of recital two ("Of special relevance is the global demand-generation balance, whose responsibility is assigned to the TSO in Regulation (EC) No 714/2009.") should be deleted completely. The task of global demand-generation balance assigned to TSOs in (EC) 714/2009 refers to the long-term timeframe in the range of the TYNDP. It has no relevance for the timeframe KORRR refers to nor is it subject to Title II of (EU) 2017/1485, to which KORRR is limited. The last sentence of recital (3) ("This complementarity refers to who, how and when the data defined in GLDPM has to be exchanged.") should be deleted. GLDPM already defines who, how and when data has to be exchanged. Cf. e.g. Art. 3(4) (who), art. 4 (how) and art. 16 (when) of GLDPM. If TSOs deem those definitions insufficient they shoud justify any further need. In recital (6), article 40(7) of (EU) 2017/1485 should be cited correctly:"Article 40(7) specifies the obligation for the TSOs to agree with the relevant DSOs on the process for exchanging provision and management of information between them, including, where required for efficient network operation, the provision of data related to distribution systems and SGUs." In recital (7), the last sentence ("The KORRR shall include the method for assessing the relevant of network elements to define the observability area of the	1. Yes 2. Yes 3. Yes 4. Yes 5. Yes 6. No 7. Yes 8. Yes 9. Yes 10. Yes	1. **Accepted.** Recital (2) of whereas section has been amended to clarify the reference to achieve the goal of the SO GL. It also has been updated with a reference to the guideline on electricity balancing that has already entered into force instead of the reference to Regulation (EC) No 714/2009. 2. **Not accepted**. However, the last sentence of recital (3) has been amended to clarify it and also to state that GLDPM only refers to data exchange until day ahead, while KORRR also covers real time data exchange. 3. **Accepted**. Recital (6) has been amended to take into account "agree" word in the text instead "coordinate" 4. **Accepted**. Last sentence of recital (7) has been deleted. 5. **Accepted.** Recital (8) has been amended to take into account first part of article 40 (10) of SO GL. 6.**Not accepted**. Article 4.1.b of the SO GL sets as an objective determining common interconnected system operational principles but the SO GL is not limited to that objective. Thus, application of the KORRR shall not be limited to the data exchanged according to the GLDPM that has been developed according to the CACM. On the other hand, investment done to exchange data according to the GLDPM will allow to exchange that data in the application of the SO GL. 7. **Recital (12) has been amended**. 8. **Accepted.** Recital (13) has been amended 9. **Not accepted.** However, Recital (17) has been amended in line with article 4 (1) (h). 10. **Accepted**. Recital (18) has been amended	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		TSO.") should be deleted. It is not the task of KORRR to include such a method, but the task of the methodology to be developed following art. 75 of (EU) 2017/1485. This is clearly defined in art. 75 (2) of (EU) 2017/1485:"[...]The methods referred to in point (a) of paragraph 1 shall allow the identification of all elements of a TSO's observability area, being grid elements of other TSOs or transmission-connected DSOs, power generating modules or demand facilities.[...]" Recital (8) should be rewritten to:"Article 40(10) specifies the right of DSOs with a connection point to a transmission system to receive the relevant structural, scheduled and real-time information from the relevant TSOs and to gather the relevant structural, scheduled and real- time information from the neighbouring DSOs." to cite the first sentence of art. 40(10) of (EU) 2017/1485 correctly. Recital (11) should be rewritten to:"In the aim to facilitate common operational planning principles as requested by Article 4(1)(b) of Regulation 2017/1485, KORRR Proposal takes into account all data already requested by GLDPM and GLDPM v2 to prepare scenarios to perform operational security analysis in the planning stage. This data is deemed sufficient to fulfill this task". Data necessary for coordinated security analysis and operational planning is already requested by GLDPM and GLDPM v2. If the data set of these two GLDPM-documents is insufficient, data demand going beyond that should be thoroughly justified. Stakeholders already invest in data exchange technologies to facilitate data exchange emanating from GLDPM and GLDPM v2. If data demand is changed by KORRR, stakeholders see the risk of stranded investments. Recital (12) should be rewritten to:"KORRR Proposal includes the organization to exchange, among other, real time data between TSOs, necessary to perform the load-frequency control processes as defined in Article 4(1)(c) of Regulation 2017/1485 and, more specifically, in Article 141(3) of Regulation 2017/1485 for each monitoring area." The only application of real time data and its exchange for load-frequency control processes is the monitoring of real-time active power exchange between monitoring areas (and, consequently, LFC blocks and synchronous areas). Therefore, real-time data exchange for LFC should be limited to this purpose.		to add consumers.	

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Reicital (13) should be rewritten to:"To ensure the conditions for maintaining operational security throughout the Union as specified in Article 4(1)(d) of Regulation 2017/1485, TSOs need to have good observability of the System in order to perform reliable security analysis. KORRR proposal aims to set the framework for the TSOs to access necessary data of their respective observability area." This change is necessary to make clear it is not the task of KORRR to ensure observability, but the methodology stemming from article 75 of (EU) 2017/1485. Recital (17) should be changed to:"KORRR Proposal will contribute to the efficient operation and development of the electricity transmission system and electricity sector in the Union while having good observability of the system to perform reliable security analysis and thus identifying necessary improvements in the Transmission System." As it would be sufficient and efficient to identify necessary improvements instead of possible improvements. Recital (18) should be rewritten to:"In conclusion, the KORRR Proposal contributes to the general objectives of the Regulation 2017/1485 to the benefit of consumers." to put consumers at heart of this methodology.			

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		The draft of the KORRR that is being currently consulted upon does not seem to fulfil the purpose set out for it in the SOGL. Article 40.6 of the SOGL requires a document wherein the TSOs jointly agree on the organization requirements, on the roles and responsibilities that TSOs and others must implement associated with the efficient transfer of data. The list of particulars in SOGL Article 40.6.a through to Article 40.6.g are those aspects that must be considered in creating the requirements for roles, responsibilities and organization requirements. It is not a list of characteristics or criteria that will be implemented outside of the SOGL Article 40.5 or Article 40.7 processes. For example KORRR Article 16 includes specific data characteristics, a three month refresh rate or notification period. This is an intrinsic characteristic of the data and is to be determined under Article 48 of SOGL as modified by Article 40.5.a. In fact the whole of KORRR is more of an addition and commentary on the SOGL data exchange articles of 40 to 53. As such it is adding, inappropriately, detail of the "what" that is to be exchanged rather than the "how". This leads to a lack of clarity about the respective roles of SOGL articles 40-53 and the KORRR, with overlapping requirements on TSOs and other parties. The KORRR should be re-written to focus on issues of co-ordination and management of data exchange, and not on the nature of the data. whereas (6) Article 40(7) of SOGL requires TSOs to agree, not co-ordinate, with the DSOs replace with: Article 40(7) specifies the obligation for the TSOs to coordinate agree with the relevant DSOs on the process for exchanging information between them, including the format of the data exchanges. Whereas (7) The relevance of network elements to the security analysis should be developed in that document, not in the KORRR. In any event it is far from clear that the KORRR achieves this objective	1. Yes 2. Yes 3. No 4. Yes	1. **Accepted**. Recital (6) has been amended to take into account "agree" word in the text instead "coordinate" 2**. Accepted**. Last sentence of recital (7) has been deleted. 3. **Not accepted.** KORRR contributes to setting a common framework for the data exchange for all TSOs as it sets common roles requirements and responsibilities for all relevant TSOs defining how, when and by whom. 4. **Recital (12)** has been amended. It also has to be added, that SO GL already defines "what" information has to be exchanged. In line with that, KORRR does not ask for further data but to define how, when and by whom the data has to be exchanged. The example given of the notification period of 3 months for the structural information is defined in line with article 40.6.f: update of structural information.	Energy Networks Association

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
		Whereas (10) It is not at all clear that KORRR does this. As drafted KORRR suggests some new requirements for the content and timing of data that should instead be developed under Articles 40-53 of the SOGL. From the requirements of SOGL 40.6 the KORRR should explain how the necessary processes will be governed and implemented, ie the how, not the what. Whereas (12) It really is not clear that KORRR does “include the organization” to exchange real time data. It merely restates the SOGL need to do so.			

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		General comments on the matter: In order to fully grasp the potentialities of flexibility of distributed resources connected at distribution level while guaranteeing security and quality of supply, it is key to ensure that DSOs and TSOs cooperate on equal footing in the key processes of the system operation when it comes to dispatch distributed generation. Data exchange is one of the most important aspects of such coordination between DSOs and TSOs in order to ensure an efficient system operation. According to art. 40(10) of Regulation 2017/1485 establishing a System Operation Guideline, DSOs […] shall be entitled to receive the relevant structural, scheduled and real-time information from the relevant TSOs and to gather the relevant structural, scheduled and realtime information from the neighboring DSOs. However, we note that the general framework of the KORRR could be improved by ensuring a higher degree of reciprocity between TSOs and DSOs when it comes to define key responsibilities and coordination among them. This lack of reciprocity and proper coordination in the exchange of information could cause the violation of operational constraints on distribution networks and thus could entail consequences in terms of quality of supply for grid users. Therefore, we believe that reciprocity could be enhanced all along the proposed KORRR if the wording “TSOs, in coordination with DSOs” would be replaced by “TSOs, in agreement with DSOs”, as to take the utmost account of DSOs opinions. This is in line with the spirit of the System Operation Guideline (art. 40). Furthermore, where TSOs have direct access to scheduled and real-time data from SGUs, such data should be timely shared with DSOs. In addition, in order to guarantee security of supply we believe that the future rules for system operation should adequately reflect at least two principles: - The participation of DSOs to the pre-qualification phase of distributed resources to participate to dispatching markets; - A systematic validation activities of dispatching orders given by TSOs to distributed resources in order to violate operational constraints. In next sections, we laid down our specific comments on the various articles of the KORRR proposal.	No	**Clarification:** Reciprocity between TSOs and DSOs is guaranteed by article 3(3) of the new version of the KORRR that reflects the wording and intention of Article 40(5) read in conjunction with Articles 58 to 50 and 53 of SO GL. The DSO access to the information about the Transmission system and the SGUs connected to distribution network is reflected in articles 5(2), 5(3), 6(7), 8 (3) and 9(5) of new version of the KORRR. Articles of KORRR where exchanges between DSO and TSO should be done under agreement have been amended. Definition of prequalification tests and requirements for service provision are out of scope of the KORRR and shall be define at national level.	Enel

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		The last but two sentence of recital (2) need to be changed: "[...] To achieve **this goal**, it is necessary that each party of the electric system has the necessary observability of the network elements and services with impact in their activities.[...]" to make sure the reference is unambiguous. The last but one sentence of recital two ("Of special relevance is the global demand-generation balance, whose responsibility is assigned to the TSO in Regulation (EC) No 714/2009.") should be deleted completely. The task of global demand-generation balance assigned to TSOs in (EC) 714/2009 refers to the long-term timeframe in the range of the TYNDP. It has no relevance for the timeframe KORRR refers to nor is it subject to Title II of (EU) 2017/1485, to which KORRR is limited.	Yes	**Accepted.** Recital (2) of whereas section has been amended to clarify the reference to achieve the goal of the SO GL. It also has been updated with a reference to the guideline on electricity balancing that has already entered into force instead of the reference to Regulation (EC) No 714/2009.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		The last sentence of recital (3) ("This complementarity refers to who, how and when the data defined in GLDPM has to be exchanged.") should be deleted. GLDPM already defines who, how and when data has to be exchanged. Cf. e.g. Art. 3(4) (who), art. 4 (how) and art. 16 (when) of GLDPM. If TSOs deem those definitions insufficient they shoud justify any further need.	Yes	**Not accepted**. However, the last sentence of recital (3) has been amended to clarify it and also to state that GLDPM only refers to data exchange until day ahead, while KORRR also covers real time data exchange.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		In recital (6), article 40(7) of (EU) 2017/1485 should be cited correctly:"Article 40(7) specifies the obligation for the TSOs **to agree** with the relevant DSOs on the process for exchanging provision and management of information between them, including, where required for efficient network operation, the provision of data related to distribution systems and SGUs."	Yes	**Accepted**. Recital (6) has been amended to take into account "agree" word in the text instead "coordinate"	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		In recital (7), the last sentence ("The KORRR shall include the method for assessing the relevant of network elements to define the observability area of the TSO.") should be deleted. It is not the task of KORRR to include such a method, but the task of the methodology to be developed following art. 75 of (EU) 2017/1485. This is clearly defined in art. 75 (2) of (EU) 2017/1485:"[...]The methods referred to in point (a) of paragraph 1 shall allow the identification of all elements of a TSO's observability area, being grid elements of other TSOs or transmission-connected DSOs, power generating modules or demand facilities.[...]"	Yes	**Accepted**. Last sentence of recital (7) has been deleted.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

Article	Para-graph	Comment/ Suggestion	Change in KORRR yes/no	Response	Reviewer affiliation
General		Recital (8) should be rewritten to:"**Article 40(10) specifies the right of DSOs with a connection point to a transmission system to receive the relevant structural, scheduled and real-time information from the relevant TSOs and to gather the relevant structural, scheduled and real- time information from the neighbouring DSOs**." to cite the first sentence of art. 40(10) of (EU) 2017/1485 correctly.	Yes	**Accepted.** Recital (8) has been amended to take into account first part of article 40 (10) of SO GL.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		Recital (11) should be rewritten to:"**In the aim to facilitate common operational planning principles as requested by Article 4(1)(b) of Regulation 2017/1485, KORRR Proposal takes into account all data already requested by GLDPM and GLDPM v2 to prepare scenarios to perform operational security analysis in the planning stage. This data is deemed sufficient to fulfill this task**". Data necessary for coordinated security analysis and operational planning is already requested by GLDPM and GLDPM v2. If the data set of these two GLDPM-documents is insufficient, data demand going beyond that should be thoroughly justified. Stakeholders already invest in data exchange technologies to facilitate data exchange emanating from GLDPM and GLDPM v2. If data demand is changed by KORRR, stakeholders see the risk of stranded investments.	No	**Not accepted**. Article 4.1.b of the SO GL sets as an objective determining common interconnected system operational principles but the SO GL is not limited to that objective. Thus, application of the KORRR shall not be limited to the data exchanged according to the GLDPM that has been developed according to the CACM. On the other hand, investment done to exchange data according to the GLDPM will allow to exchange that data in the application of the SO GL.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE
General		Recital (12) should be rewritten to:"KORRR Proposal includes the organization to exchange, among other, real time data between TSOs, necessary to perform the load-frequency control processes as defined in Article 4(1)(c) of Regulation 2017/1485 and, more specifically, in Article 141(3) of Regulation 2017/1485 for each monitoring area." The only application of real time data and its exchange for load-frequency control processes is the monitoring of real-time active power exchange between monitoring areas (and, consequently, LFC blocks and synchronous areas). Therefore, real-time data exchange for LFC should be limited to this purpose.	Yes	**Recital (12)** has been amended.	Oestereichs Energie / Österreichs E-Wirtschaft CEDEC, EDSO for Smart Grids, Eurelectric and GEODE

European Network of
Transmission System Operators
for Electricity

All TSOs' proposal for a common grid model methodology in accordance with Articles 67(1) and 70(1) of Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a guideline on electricity transmission system operation

12 February 2018

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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) 2017/1485 of 02 August 2017 establishing a guideline on electricity transmission system operation (hereafter referred to as "Regulation 2017/1485") 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 2017/1485 is to lay down detailed guidelines on requirements and principles concerning system operation with the aim of ensuring the safe operation of the interconnected system. To facilitate this aim, 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) Article 17 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (hereafter referred to as "Regulation 2015/1222") is referred to in Article 67(1) and Article 70(1) of Regulation 2017/1485 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."

(4) Article 67(1) of Regulation 2017/1485 constitutes the legal basis for the proposal for a common grid model methodology as far as year-ahead common grid models are concerned and sets out several additional requirements:

"By 6 months after entry into force of this Regulation, all TSOs shall jointly develop a proposal for the methodology for building the year-ahead common grid models from the individual grid models established in accordance with Article 66(1) and for saving them. The methodology shall take into account, and complement where necessary, the operational conditions of the common grid model methodology developed in accordance with Article 17 of Regulation (EU) 2015/1222 and Article 18 of Regulation (EU) 2016/1719, as regards the following elements:

(a) deadlines for gathering the year-ahead individual grid models, for merging them into a common grid model and for saving the individual and common grid models;

(b) quality control of the individual and common grid models to be implemented in order to ensure their completeness and consistency; and

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(c) correction and improvement of individual and common grid models, implementing at least the quality controls referred to in point (b)."

(5) Article 70(1) of Regulation 2017/1485 constitutes the legal basis for the proposal for a common grid model methodology as far as day-ahead and intraday common grid models are concerned and contains the following additional requirements:

"By 6 months after entry into force of this Regulation, all TSOs shall jointly develop a proposal for the methodology for building the day-ahead and intraday common grid models from the individual grid models and for saving them. That methodology shall take into account, and complement where necessary, the operational conditions of the common grid model methodology developed in accordance with Article 17 of Regulation (EU) 2015/1222, as regards the following elements:

(a) definition of timestamps;

(b) deadlines for gathering the individual grid models, for merging them into a common grid model and for saving individual and common grid models. The deadlines shall be compatible with the regional processes established for preparing and activating remedial actions;

(c) quality control of individual grid models and the common grid model to be implemented to ensure their completeness and consistency;

(d) correction and improvement of individual and common grid models, implementing at least the quality controls referred to in point (c); and

(e) handling additional information related to operational arrangements, such as protection setpoints or system protection schemes, single line diagrams and configuration of substations in order to manage operational security."

(6) Whereas the CGMM pursuant to Regulation 2015/1222 aims at establishing a CGM for the purpose of calculating capacity for the day-ahead and intraday capacity calculation time frames and the CGMM pursuant to Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation aims at establishing a CGM for the purpose of calculating long-term capacity, the present CGMM Proposal addresses the building of CGMs for various system operation processes. Since the methodologies required by Article 67(1) and Article 70(1), respectively, referred to above are inherently linked, for the sake of efficiency this CGMM Proposal is a joint proposal for both methodologies.

(7) 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"

(8) Article 2(4) of Regulation 2015/1222 defines a scenario as:

"the forecasted status of the power system for a given time-frame"

(9) 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"

(10) 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

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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."

(11) Article 19 of Regulation 2015/1222 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."

(12) Article 79(5) of Regulation 2017/1485 sets out the following requirement with respect to regional security coordinators:

" In accordance with the methodologies referred to in Articles 67(1) and 70(1), and in accordance with Article 28 of Regulation (EU) 2015/1222, a regional security coordinator shall

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be appointed by all TSOs to build the common grid model for each time-frame and store it on the ENTSO for Electricity operational planning data environment."

(13) Article 6(6) of Regulation 2017/1485 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."

The expected impact on the objectives is presented below (points (13) to (18) of this Whereas Section).

(14) The CGMM Proposal contributes to and does not in any way hamper the achievement of the objectives of Article 4(1) of Regulation 2017/1485. In particular, the CGMM Proposal serves the objective of determining common operational security requirements and principles by prescribing a common methodology for the preparation of individual grid models to be merged into the common pan-European grid model.

(15) In accordance with Article 4(b) of Regulation 2017/1485, and taking into account the additional methodologies to be developed under Regulation 2017/1485, the creation of the common grid model and use thereof in operational planning will contribute to determining common interconnected system operational planning principles by ensuring a common methodology for the preparation of individual grid models to be merged into the common pan-European grid model.

(16) By having a common grid model prepared on the basis of a common, binding methodology, the CGMM Proposal will ensure that the objective of contributing to the efficient operation and development of the electricity transmission system and electriciy sector in the Union 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 2017/1485 and that will be approved by regulatory authorities prior to application in the Union.

(17) The CGM Methodology ensures and enhances the transparency and reliability of information on transmission system operation by providing for monitoring of quality indicators and publishing the indicators and the results of the monitoring.

(18) The CGMM Proposal also contributes to the objective of ensuring the conditions for maintaining operational security throughout the Union (Article 4(1)(d) of Regulation 2017/1485) through the provision of a common grid model 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.

(19) Finally, the CGMM Proposal will promote the coordination of system operation and operational planning by virtue of providing for the establishment of a common model of the pan-European grid that will be used in a coordinated manner throughout the Union (Article 4(1)(f) of Regulation 2017/1485).

(20) In conclusion, the CGMM Proposal contributes to the general objectives of Regulation 2017/1485 to the benefit of all TSOs, NEMOs, the Agency, regulatory authorities and market participants.

SUBMIT THE FOLLOWING CGMM PROPOSAL TO ALL REGULATORY AUTHORITIES:

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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 67(1) and Article 70(1) of Regulation 2017/1485.
2. This methodology shall apply to all TSOs in the area referred to in Article 2(2) of Regulation 2017/1485.
3. TSOs from jurisdictions outside the area referred to in Article 2(2) of Regulation 2017/1485 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 2017/1485;
    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 applies 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 5(3) of Regulation 2017/1485.
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 2017/1485, 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 5(3) of Regulation 2017/1485.

Article 2
Definitions and interpretation

For the purposes of this proposal, the terms used shall have the meaning of the definitions included in Article 3 of Regulation 2017/1485 and the other items of legislation referenced therein as well as Article 2 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222.

Article 3
Scenarios

1. When building year-ahead IGMs pursuant to Article 66 of Regulation 2017/1485, each TSO shall build a year-ahead IGM for each of the scenarios developed pursuant to Article 65 of Regulation 2017/1485 as well as any additional scenarios defined pursuant to the common grid model methodology developed in accordance with Article 18 of Regulation (EU) 2016/1719.

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2. When building day-ahead IGMs for each market time unit on the day before the day of delivery and when building intraday IGMs for each future market time unit of the day of delivery, each TSO shall apply the principles set out in paragraph 3.
3. The following principles are applicable to all day-ahead and intraday 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 Article 14(3) to each network element;
        ii. for thermal limits, each TSO shall use both PATLs and TATLs.
    d. 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 base its forecast on schedules;
    e. with respect to the forecast situation for load
        i. each TSO shall base its forecast on the best forecast of load;
    f. with respect to the net position in each bidding zone and the flow for each direct current line
        i. each TSO shall use the latest available results pursuant to Article 13 and Article 18.

Article 4
Individual Grid Models

1. Pursuant to Article 66(1) of Regulation 2017/1485, each TSO shall build a year-ahead IGM for each of the scenarios developed pursuant to Article 65 of Regulation 2017/1485.
2. Pursuant to Article 70(2) of Regulation 2017/1485, each TSO shall build a day-ahead IGM for each market time unit of the day of delivery. The mid-point of each market time unit shall be used as the reference timestamp.
3. Pursuant to Article 70(2) of Regulation 2017/1485, prior to each reference time each TSO shall build an intraday IGM for each market time unit of the day of delivery between the reference time and the time eight hours later than the reference time. The reference times shall be 00:00h,

08:00h, and 16:00h. The mid-point of each market time unit shall be used as the reference timestamp.

4. Pursuant to Articles 70(2) and 76(1)(a) of Regulation 2017/1485, each TSO of each capacity calculation region shall build an intraday IGM for each market time unit of the day of delivery between the additional reference times defined pursuant to Article 76(1)(a) (if any) and the time T hours later than the reference time. All TSOs of each capacity calculation region shall jointly define the parameter T as well as the additional reference times pursuant to Article 76(1)(a) of Regulation 2017/1485 and publish this information (if any) on the internet. The mid-point of each market time unit shall be used as the reference timestamp.
5. When building IGMs, in order to ensure their quality, completeness and consistency 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 ENTSO for Electricity operational planning data environment 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 already decided (if any) are included in the model, can be clearly identified as required by Article 70(4) of Regulation 2017/1485 and are consistent with, inter alia, the methodology for the preparation of remedial actions managed in a coordinated way pursuant to Article 76(1)(b) of Regulation 2017/1485 and the general objective of non-discriminatory treatment pursuant to Article 4(2)(a) of Regulation 2017/1485;
    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 79(2) of Regulation 2017/1485 export the IGM and make it available for merging into a common grid model via the ENTSO for Electricity operational planning data environment 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.
6. Each TSO shall respect the process for merging IGMs into a CGM described in Article 20.

7. 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.

Article 5
Data to be included in IGMs

1. IGMs shall contain the elements of the 220 kV and higher voltage transmission systems, including HVDC systems. Elements of the transmission system with voltage below 220kV shall be included if these have significant impact on the TSO's transmission system. At a minimum, this requires including the elements of the high-voltage network insofar as these are used in regional operational security analysis for the concerned time-frame as well as all additional grid elements which it is necessary to include for an appropriate representation of the corresponding parts of the grid including the grid elements connected to these.
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 (including 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 (including 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 or equivalent models of those parts of the grid operated at a voltage of less than 100 kV shall only be included in IGMs insofar as this is necessary for an appropriate representation of the corresponding parts of the grid including the grid elements connected to these.
5. Regardless of voltage level, models and equivalent models pursuant to paragraph 3 or 4 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 to be unavailable in line with the scenarios described in Article 3;
   d. the topology of the IGM is updated to reflect remedial actions decided on the basis of the methodologies pursuant to Article 76(1)(b) of Regulation 2017/1485 as well as other topological remedial actions if applicable;
   e. taking into account c) and d), the topology of the IGM reflects the best forecast operational situation;
   f. the details of modelling and the connectivity status of interconnectors and tie-lines to other TSOs are 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.

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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 76(1)(b) of Regulation 2017/1485 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 in line with the scenarios described in Article 3:
        i. outage plans;
        ii. testing profiles;
        iii. scheduled unavailability;
        iv. any active power capacity restrictions;
    c. for dispatchable generation units modelled in detail, the modelled dispatch pattern shall take into account the following in line with the scenarios described in Article 3:
        i. for all scenarios
            1. the availability status;
            2. the applicable priority dispatch policies and agreements;
        ii. for year-ahead models, 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 day-ahead and intraday models
                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 in line with the scenarios described in Article 3;
    f. for all intermittent generation units whether modelled in detail or modelled as aggregates, the modelled dispatch pattern shall take into account in line with the scenarios described in Article 3
        i. for year-ahead models the most appropriate forecast in line with the scenarios developed pursuant to Article 65(1) of Regulation 2017/1485;
        ii. for day-ahead and intraday models 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. for loads modelled as aggregates and managed by an aggregator whose data are used in regional operational security analysis, a forecast of unrestricted active power available for demand response and any planned demand response;

x. for day-ahead and intraday models, for loads modelled in detail the IGM shall reflect the scheduled active and forecast reactive consumption;

xi. any other relevant information.

Article 14
Monitoring

1. When building each IGM, each TSO shall respect the rules set out in this Article with respect to operational security 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 security 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 security limits specified in the IGM are mutually consistent;
    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(5)(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.

Article 17
Associated information

1. In order to make it possible to apply rules to change the characteristics of IGMs during relevant business processes, each TSO shall make the following information available to all TSOs via the ENTSO for Electricity operational planning data environment 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 year-ahead IGMs pursuant to Article 3, each TSO shall follow the CGM alignment procedure described in Article 19.
2. For all scenarios for the day-ahead and intraday IGMs pursuant to Article 3,
    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 ENTSO for Electricity operational planning data environment 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, 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.

Article 19
CGM alignment

1. For each scenario for the year-ahead models pursuant to Article 3, each TSO shall prepare and share with all other TSOs via the ENTSO for Electricity operational planning data environment 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.

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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 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:
        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 and Article 26(3) of Regulation 2016/1719. 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 ENTSO for Electricity operational planning data environment referred to in Article 21.
8. Each TSO shall designate a regional security coordinator 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 ENTSO for Electricity operational planning data environment referred to in Article 21;

c. ensure that the results obtained are consistent with those obtained by all other regional security coordinators (if any).

9. Pursuant to Article 4(5)(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 regional security coordinator.

Article 20
Common Grid Model

1. In accordance with Article 77(1)(a) of Regulation 2017/1485 each TSO shall designate a regional security coordinator who shall perform, on behalf of the TSO, the following tasks according to the process described in Article 22:
   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 ENTSO for Electricity operational planning data environment 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 79 of Regulation 2017/1485 and make the resulting CGMs available to all TSOs via the ENTSO for Electricity operational planning data environment referred to in Article 21;
   d. ensure that each CGM created is consistent with those obtained by all other regional security coordinators (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 remedial actions agreed if applicable and repeat steps (a) to (e) as required;
   g. validate the resulting CGM by checking that it is consistent with those obtained by all other regional security coordinators (if any) and make it available via the ENTSO for Electricity operational planning data environment referred to in Article 21.
2. All TSOs shall jointly define the requirements applicable to the regional security coordinators and the merging process in accordance with Article 23.
3. Each regional security coordinator 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 ENTSO for Electricity operational planning data environment referred to in Article 21.

Article 21
ENTSO for Electricity operational planning data environment

1. All TSOs shall delegate the task of implementing and administering a joint ENTSO for Electricity operational planning data environment that provides at least the services described in paragraph 2 in accordance with Article 114 of Regulation 2017/1485.

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2. The ENTSO for Electricity operational planning data environment shall at a minimum support the CGM process in the following ways and it shall have all the features required to this end:
    a. year-ahead models - each TSO shall be able to use the ENTSO for Electricity operational planning data environment in order to share with all other TSOs pursuant to the CGM process described in Article 22 its best forecast of
        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);
    b. the algorithm pursuant to Article 19(2) shall be accessible via the ENTSO for Electricity operational planning data environment;
    c. the regional security coordinator(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 ENTSO for Electricity operational planning data environment;
    d. day-ahead and intraday models - each TSO shall be able to use the ENTSO for Electricity operational planning data environment 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;
    e. the ENTSO for Electricity operational planning data environment shall allow all relevant information on scheduled exchanges to be available from the ENTSO for Electricity operational planning data environment;
    f. each TSO shall be able to make associated information specified in Article 17 available to all TSOs via the ENTSO for Electricity operational planning data environment;
    g. each TSO shall be able to make all its IGMs available to all TSOs via the ENTSO for Electricity operational planning data environment;
    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 ENTSO for Electricity operational planning data environment;
    i. the ENTSO for Electricity operational planning data environment shall be able to provide information on the quality status of submitted IGMs including substitutions that were necessary;
    j. all regional security coordinators shall be able to make the CGM available to all TSOs via the ENTSO for Electricity operational planning data environment;
    k. all information required with respect to boundary points pursuant to Article 7 shall be available via the ENTSO for Electricity operational planning data environment;
    l. the following items of information and/or data shall be available to all TSOs via the ENTSO for Electricity operational planning data environment:
        i. generation shift keys.

Article 22
CGM process

1. When preparing year-ahead CGMs, all TSOs and regional security coordinators shall complete the following steps:

a. by 15 July plus three business days of the year preceding the year of delivery, 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 ENTSO for Electricity operational planning data environment referred to in Article 21;
b. by 15 July plus five business days of the year preceding the year of delivery, the regional security coordinator(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. by 15 July plus six business days of the year preceding the year of delivery, the regional security coordinator(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. by 15 July plus nine business days of the year preceding the year of delivery, the regional security coordinator(s) shall make these aligned net positions and aligned flows on direct current lines available to all TSOs via the ENTSO for Electricity operational planning data environment referred to in Article 21;
e. by 01 September each TSO shall make its IGM available via the ENTSO for Electricity operational planning data environment pursuant to Article 21; pursuant to Article 4(5)(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 regional security coordinator(s);
f. by 01 September plus five business days the TSO's regional security coordinator 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(4) and make this validated IGM available via the ENTSO for Electricity operational planning data environment referred to in Article 21;
g. by 01 September plus ten business days the TSO's regional security coordinator shall
    i. apply the requirements pursuant to Article 20(3) in order to merge all IGMs into a CGM pursuant to Article 79(5) of Regulation 2017/1485 and make the resulting CGMs available to all relevant parties via the ENTSO for Electricity operational planning data environment referred to in Article 21;
    ii. validate each CGM obtained and ensure it is consistent with those obtained by all other regional security coordinators (if any).

2. Pursuant to Article 68(1) of Regulation 2017/1485, where applicable TSOs shall send updated models up until the cut-off date of 01 September of each year and pursuant to Article 68(2) of Regulation 2017/1485 regional security coordinators shall prepare updated CGMs until the cut-off date of 01 September plus ten business days of each year.
3. The deadlines set out in paragraph 1 apply to the preparation of a year-ahead CGM covering a full calendar year beginning on 01 January and ending on 31 December. Where the target time horizon for the year-ahead CGM differs from this, the deadlines shall shift accordingly. All TSOs may jointly agree to shorten the deadlines in such a way that less time is allowed for the completion of one or more of the tasks listed in paragraph 1.

4. T0 is defined as that point in the day-ahead CGM process at which each TSO needs to have submitted its IGMs for the following day in order for the CGM process to advance in a timely manner given all the subsequent steps in the process. T3 is defined as that point in the day-ahead CGM process at which a CGM based on at least one full iteration; i.e., based upon a set of IGMs updated in the light of a preceding version of the CGM; has to be available in order to allow for the completion of all subsequent steps in the process in a timely manner. T5 is defined as that point in the day-ahead CGM process at which all findings and decisions based on the coordinated security analysis building on the CGM have been consolidated and communicated and the process ends. When preparing day-ahead CGMs, all TSOs and regional security coordinators shall complete the following steps:
    a. by time T0 minus 95 minutes on the day before the day of delivery each TSO shall make its net position and flows on direct current lines for each day-ahead scenario available via the ENTSO for Electricity operational planning data environment referred to in Article 21. These net positions and flows on direct current lines shall reflect cross-zonal exchanges as of time T0 minus 120 minutes. TSOs in bidding zones where the cross-zonal intraday market for the following day opens before time T0 minus 90 minutes shall use the data as of time T0 minus 120 minutes;
    b. by time T0 minus 90 minutes on the day before the day of delivery aligned net positions and flows on direct current lines for each day-ahead scenario shall be available to all TSOs via the ENTSO for Electricity operational planning data environment referred to in Article 21.
    c. immediately after time T0 minus 15 minutes on the day before the day of delivery updated net positions and flows on direct current lines for each day-ahead scenario shall be made available to all TSOs via the ENTSO for Electricity operational planning data environment referred to in Article 21 by those TSOs whose net positions and flows on direct current lines change relative to the values established at T0 minus 120 minutes due to preventive remedial actions activated by these TSOs. The updated net positions and flows on direct current lines shall reflect cross-zonal exchanges as of T0 minus 120 minutes as well as TSO-TSO transactions entered into between that time and T0 minus 20 minutes for the purpose of activating preventive remedial actions.
    d. by time T0 minus 10 minutes on the day before the day of delivery updated aligned net positions and flows on direct current lines for each day-ahead scenario shall be available to all TSOs via the ENTSO for Electricity operational planning data environment referred to in Article 21.
    e. by time T0 on the day before the day of delivery each TSO shall make its IGM available via the ENTSO for Electricity operational planning data environment in accordance with Article 21; pursuant to Article 4(5)(f) the TSO shall ensure that its IGM is consistent with the scheduled exchanges referred to in Article 22(4)(d) as well as agreed remedial actions determined in the previous time frame;
    f. by time T0 plus 50 minutes on the day before the day of delivery the TSO's regional security coordinator 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(4) and make this validated IGM available via the ENTSO for Electricity operational planning data environment referred to in Article 21;

g. by time T0 plus 60 minutes on the day before the day of delivery the TSO's regional security coordinator shall
   i. apply the requirements specified in Article 20(2) in order to merge all IGMs into a CGM pursuant to Article 79(5) of Regulation 2017/1485 and make the resulting CGMs available to all relevant parties via the ENTSO for Electricity operational planning data environment referred to in Article 21;
   ii. validate each CGM obtained to ensure that it is consistent with those obtained by all other regional security coordinators (if any);
h. following the validation of the CGM at time T0 plus 60 minutes on the day before the day of delivery
   i. TSOs and regional security coordinators shall carry out coordinated operational security analyses as required by the methodology for coordinating operational security analysis pursuant to Article 75(1) of Regulation 2017/1485, the common provisions for regional operational security coordination pursuant to Article 76(1) and other relevant procedures and agreements;
   ii. the regional security coordinator shall, where applicable, make available an updated CGM including any remedial actions agreed by time T3;
i. the process shall be repeated between time T0 and time T5 as required by the methodology for coordinating operational security analysis pursuant to Article 75(1) of Regulation 2017/1485.

5. All TSOs shall jointly define times T0 and T3 and T5 in accordance with the methodology for coordinating operational security analysis pursuant to Article 75(1) of Regulation 2017/1485 and publish these times on the ENTSO-E website. All TSOs may jointly agree to shorten the deadlines in such a way that less time is allowed for the completion of one or more of the tasks listed in paragraph 4.
6. When preparing intraday CGMs, all TSOs and regional security coordinators shall complete the following steps:
   a. by 1 hour 35 minutes before the reference time each TSO shall make its net position and flows on direct current lines for each intraday scenario available to all TSOs via the ENTSO for Electricity operational planning data environment referred to in Article 21. These net positions and flows on direct current lines shall reflect cross-zonal exchanges as of the reference time minus 2 hours;
   b. by 1 hour 30 minutes before the reference time aligned net positions and flows on direct current lines for each TSO and for each intraday scenario shall be available to all TSOs via the ENTSO for Electricity operational planning data environment referred to in Article 21;
   c. by 1 hour before the reference time each TSO shall make its IGM for each market time unit between the reference time and the time eight hours later than the reference time available via the ENTSO for Electricity operational planning data environment in accordance with Article 21; pursuant to Article 4(5)(f) the TSO shall ensure that its IGM is consistent with the scheduled exchanges referred to in Article 22(6)(b) as well as agreed remedial actions determined in the previous time-frame;
   d. by 55 minutes before the reference time the TSO's regional security coordinator 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(4) and make this validated IGM available via the ENTSO for Electricity operational planning data environment referred to in Article 21;
e. by 45 minutes before the reference time the TSO's regional security coordinator shall
   i. apply the requirements specified in Article 20(2) in order to merge all IGMs into a CGM pursuant to Article 79(5) of Regulation 2017/1485 and make the resulting CGMs available to all relevant parties via the ENTSO for Electricity operational planning data environment referred to in Article 21;
   ii. validate each CGM obtained to ensure that it is consistent with those obtained by all other regional security coordinators (if any);
f. without undue delay, following the validation of the CGM 45 minutes before the reference time
   i. the regional security coordinator shall, where applicable, make available an updated CGM based on updated IGMs to be provided by each TSO including any remedial actions agreed in accordance with the methodology for coordinating operational security analysis pursuant to Article 75(1) of Regulation 2017/1485, the common provisions for regional operational security coordination pursuant to Article 76(1) and other relevant procedures and agreements.

7. The reference times referred to in paragraph 6 shall initially be 00:00h, 08:00h, 16:00h. All TSOs may jointly agree to define additional reference times and / or to shorten the deadlines in such a way that less time is allowed for the completion of one or more of the tasks listed in paragraph 6. Pursuant to Article 76(1)(a) of Regulation 2017/1485 as well as Article 4(4), all TSOs of a capacity calculation region may jointly agree to define additional reference times applicable to the TSOs of that capacity calculation region only as well as the associated substitution rules.
8. All TSOs shall ensure that the merging process and the CGM are completed in time for the relevant operational deadlines set out in the applicable legislation and associated methodologies to be met and such that the most accurate and up to date model possible can be delivered for each timeframe.

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 ENTSO for Electricity operational planning data environment.
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 as well as Article 26(3) of Regulation 2016/1719.

Article 24
Timescale for implementation

1. Upon approval of the present methodology each TSO shall publish it on the internet in accordance with Article 8(1) of Regulation 2017/1485.
2. All TSOs shall jointly develop a governance framework for the ENTSO for Electricity operational planning data environment 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.
3. By three months after the approval of the common grid model methodology submitted pursuant to Articles 67(1) and 70(1) of Regulation 2017/1485 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;
    b. each TSO shall formalise the delegation agreement with the regional security coordinator referred to in Article 19;
    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 regional security coordinators 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 regional security coordinator referred to in Article 20.
4. By six months after the approval of the common grid model methodology submitted pursuant to Articles 67(1) and 70(1) of Regulation 2017/1485, the ENTSO for Electricity operational planning data environment referred to in Article 21 shall be operational. All TSOs and all regional security coordinators shall be connected to the ENTSO for Electricity operational planning data environment and shall be able to make use of all of its features as described in the present methodology. All TSOs shall jointly ensure that the CGM process is operational and available for use by all relevant parties.
5. All TSOs shall jointly publish the available data related to quality monitoring on a yearly basis following the implementation of the OPDE.

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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 8(1) of Regulation 2017/1485 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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Unique_comment_ID	Comment refers to line number	Comment refers to Article	Comment refers to Paragraph	Comment / Suggestion	PT CGM WP-1 response	Reviewer name	Organisation / Affiliation
01		8		Bonjour, I first want to thank you for the transparency effort that this consultation represents. This is my first contribution. Beeing non familiar with all the codes and regulations and their future changes, my contributions may be inapropprioate. Having a tool to predict the adequacy of anticipated productions and loads and a check that the transmission capacities are available to connect them at different timescale is a pre-requisite to achieve the goal of 'ensuring the safe operation of the connected system.'. The proposal of the specifications of your common tool and of the individual grid models seems to fullfil this prerequisite. Nevertheless, I feel like some informations and some capacities of this common model are missing and may prevent the security coordinators to achieve the objective "e" define in Paragraphe 1 of article 20 : "identify violations of operational security limits". With the development of new cross borders markets such as Frequency Restoration Reserves, some TSOs will be purchasing security/ancillary services abroad. For instance, Belgium TSO is clearly describing this in the study (1) as the prefered options so as no to built new gaz power plants that may increase the local CO2 emissions despite (or worse because of !) the developpment of renewables. If for some reasons, some interconnections are triping or being congested, it is possible at least theoretically, that the adequacy is reached locally, but that the different type of reserves may not be fully available, which would be a violation of the operational security limits. My comment is that the contributions of the generation capacities to ancillary services markets, in particular outside of their associated TSO grid should be given in their description. This may help the security coordinators to be aware of potential of such situations. Bonne journée,	The purpose of the CGM process is to prepare the CGM which is designed in order to run steady-state computations. These computations do not take into account explicitly the modelling of reserves as well as other elements that are out of scope of this type of model such as dynamic data. However, you are right in noting that the constraints could arise from exchanges of balancing power and that these need to be taken into account. This is done, for example, by setting appropriate safety margins in the different business processes using the CGM. Thus the CGM model covers the needs of SO GL services.	Adrien Bidaud	Grenoble Institute of Technology / CNRS / Université Grenoble Alpes, France
02		8 generation and 9 load		Bonjour, I first want to thank you for the transparency effort that this consultation represents. This is my first contribution. Beeing non familiar with all the codes and regulations and their future changes, my contributions may be inapropprioate. Having a tool to predict the adequacy of anticipated productions and loads and a check that the transmission capacities are available to connect them at different timescale is a pre-requisite to achieve the goal of 'ensuring the safe operation of the connected system.'. The proposal of the specifications of your common tool and of the individual grid models seems to fullfil this prerequisite. Nevertheless, I feel like some informations and some capacities of this common model are missing and may prevent the security coordinators to achieve the objective "e" define in Paragraphe 1 of article 20 : "identify violations of operational security limits". It is being said that during the last black out that was followed by a separation of european grid on different smaller grid, the unsollicited reconnection of hundreds of MW of wind power contributed to reduce the speed of grid restoration. I do not know how and if this question triggered specific points in the recent network codes. Given the enormous and growing amount of decentralised productions compared to reducing dispatchable generation, the availability a certain amount of dispatchable generation capacities must be monitored carefully. As the required generation capacity may be connected outside of the TSO control zone trough european connections, this information should be made visible to the regional security coordinator in the GCMM. My comment is that the reconnection procedure (automatic or authorized by the TSO) of generation and load capacities should be given in their description.	This kind of event is out of scope of the services that will use the CGM according to SO GL. Thus the CGM does not model the reconnection procedure as you describe it.	Adrien Bidaud	Grenoble Institute of Technology / CNRS / Université Grenoble Alpes, France

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~~03~~	~~227-229~~	~~2~~		~~Add at the end of Article 2:~~ ~~In addition, the following definitions shall apply:~~ ~~1. 'adjacent grids' means the areas not part of but bordering on the transmission system for which an IGM is being created;~~ ~~Justification:~~ ~~The amendment is necessary to facilitate the changes proposed in the following comments of innogy. "Adjacent grids" are not limited to transmission grids but might also be distribution grids. This should be respected by the definition. DSOs do not see the need to define "adjacent grid" as "control area or bidding zone", as is the case in CGMMv2. The definition from CGMMv2 is problematic, too. Bidding zones are subject to Change and might stretch out to more than one TSO, whereas the term "control area" is not defined in SOGL or any underlying European legislation~~	Comment needed to be restated; see below.	~~Michael Wilch~~	~~innogy SE~~
03_restated_01_of_03	227-229	2		(restated comment; part 1 of 3) Article 2 - Original version: For the purposes of this proposal, the terms used shall have the meaning of the definitions included in Article 3 of Regulation 2017/1485 and the other items of legislation referenced therein as well as Article 2 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222. Article 2 - Proposed version: For the purposes of this proposal, the terms used shall have the meaning of the definitions included in Article 3 of Regulation 2017/1485 and the other items of legislation referenced therein as well as Article 2 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222. In addition, the following definitions shall apply: 1. 'adjacent grids' means the areas not part of but bordering on the transmission system for which an IGM is being created;	As for the definition of "adjacent grids", note that Article 2(1) of the CGMM-v1-plus defines "adjacent grids" as follows: "adjacent grids' means the areas not part of but bordering on the control area or bidding zone for which an IGM is being created;" The term "adjacent grid" is used in a very specific way in the CGMM-v1-plus which has been approved and is in force. Regardless of the merits of the proposal, changing the definition of "adjacent grids" would potentially lead to inconsistencies.	Drafting team on behalf of Michael Wilch (cf. email sent by MW 2017-12-04-1703h)	PT CGM WP-1
03_restated_02_of_03	227-229	2		(restated comment; part 2 of 3; "justification") "In the view of innogy, it is sensible to base the CGM on individual grid models (IGMs) developed by the TSOs (Article 64.1 of the SOGL regulation) and to prescribe that "The individual grid models shall include the structural information and data set out in Article 41." (Article 64.2 of the regulation SOGL). Obviously, Article 41 of SOGL describes exclusively elements of the transmission system down to "transformers connecting the DSOs" (Article 41.1.c of SOGL). Structural data of distribution systems are described in Article 48 of SOGL and, as evidenced by Article 64.2, SOGL does not entitle TSOs to include detailed distribution-system related data in their IGM. However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs' individual grid models (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" (Article 5 of the draft CGMM proposal). This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying SOGL regulation. This is not in line with the basics of European legislation. innogy therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is regarded transmission on national level. Without doubt it is subject to the member states to define which part of the interconnected system is regarded transmission and which is distribution (cf. Article 2.3 and Article 2.5 of Directive 2009/72/EC). Following the principle of subsidiarity (Article 5(3) of the Treaty on European Union), it is at the discretion of the member state to find a proper demarcation between transmission and distribution, as it is left open in the corresponding Directive. Neither ENTSO-E nor any TSO is entitled to change this definition.	The claim that "the high-voltage grids are not part of the transmission system" in Germany seems not to be in line with the position of Germany's regulator BNetzA in its 08 December 2017 approval of the GLDPM-v2. To keep consistency between methodology and acknowledge the common understanding of the Network Codes requirements up to now, we would prefer to stick to our proposal.	Drafting team on behalf of Michael Wilch (cf. email sent by MW 2017-12-04-1703h)	PT CGM WP-1

Unique_comment_ID	Comment refers to line number	Comment refers to Article	Comment refers to Paragraph	Comment / Suggestion	PT CGM WP-1 response	Reviewer name	Organisation / Affiliation
03_restated_03_of_03	227-229	2		(restated comment; part 3 of 3; "justification" continued) The limitation of IGM and CGM to elements of the transmission system can consistently be derived from SOGL. Article 41.3.b, which gives more information on the establishment of the common grid model, reads:"[…] to establish the common grid model, […]each TSO shall exchange […]:(b) a model or an equivalent of the transmission system with voltage below 220 kV with significant impact on its own transmission system; […]". That means there is a twofold exclusion of distribution systems from the CGM: not only is the CGM limited to elements of the transmission system, but specifically to those elements of the transmission system with significant impact on the transmission system of a neighbouring TSO. Both provisions make clear distribution elements cannot be part of the CGM. Next to the provision in Article 5, innogy sees need for revision of Articles 6.1 and 6.3 of the present CGMM proposal. These Articles describe in detail which grid elements shall be included in the IGMs. Among these there are numerous grid elements belonging to the high-voltage grids. In these paragraphs, ENTSO-E acknowledges that these grids may be run either by TSOs or by DSOs; but the provisions say that the grid elements have to be included in the IGMs regardless of the operator. From innogy's point of view, this provision is not based on the requirements laid down in the SOGL regulation. It has to be made clear that, for grids of less than 220 kV, the provision of equivalent models for the distribution systems by the respective DSOs shall be deemed sufficient. This principle is already laid down in Article 11.3 of the present CGMM proposal which requires TSOs to make use of equivalent models of their adjacent grids, which shall also contain distribution systems. Hence, innogy asks for rephrasing Articles 6.1 and 6.3 following the principles of Article 11.3 of the draft CGMM proposal. Additionally, the definition of "adjacent grids" must be adapted, as it currently uses "control area or bidding zone" instead of "transmission system", following Article 2.1 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222."	The CGM methodology states that mandatory elements are : - the ones of 220 kV and above - the elements needed for an appropriate representation of the grid The implementation of these requirements are under the responsibility of the TSOs, having in mind the aim of the global CGM process. Thus, it seems to us that your concern is not in the scope of the CGM Methodolgy as a pan-european methodology. The legal definition of a "control area" is given in Article 2(6) of Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council: 'control area' means a coherent part of the interconnected system, operated by a single system operator and shall include connected physical loads and/or generation units if any;	Drafting team on behalf of Michael Wilch (cf. email sent by MW 2017-12-04-1703h)	
~~04~~	~~332-333~~	~~5~~	~~1~~	~~1. IGMs shall contain the elements of the high-voltage and extra high-voltage transmission network insofar as these are used in regional operational security analysis for the concerned time-frame.~~ ~~[....]~~ ~~SOGL prescribes that "The individual grid models shall include the structural information and data set out in Article 41." (Article 64.2 of the regulation SOGL). Obviously, Article 41 of SOGL describes exclusively elements of the transmission system down to "transformers connecting the DSOs" (Article 41.1.c of SOGL). Structural data of distribution systems are described in Article 48 of SOGL and, as evidenced by Article 64.2, SOGL does not entitle TSOs to include detailed distribution-system related data in their IGM.~~ ~~However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs' individual grid models (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" (Article 5 of the draft CGMM proposal).~~ ~~This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying SOGL regulation. This is not in line with the basics of European legislation. innogy therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is regarded transmission on national level.~~ ~~Without doubt it is subject to the member states to define which part of the interconnected system is regarded transmission and which is distribution (cf. Article 2.3 and Article 2.5 of Directive 2009/72/EC). Following the principle of subsidiarity (Article 5(3) of the Treaty on European Union), it is at the discretion of the member state to find a proper demarcation between transmission and distribution, as it is left open in the corresponding Directive. Neither ENTSO-E nor any TSO is entitled to change this definition.~~ ~~The limitation of IGM and CGM to elements of the transmission system can consistently be derived from SOGL. Article 41.3.b, which gives more information on the establishment of the~~	Comment needed to be restated; see below	~~Michael Wilch~~	~~innogy SE~~
04_restated	332-333	5	1	Article 5 - Original Version "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. [....]" Article 5 - Proposed Version "1. IGMs shall contain the elements of the high-voltage and extra high-voltage transmission network insofar as these are used in regional operational security analysis for the concerned time-frame. [....]" Explanation: see 03_restated_02_of_03 and 03_restated_03_of_03	See reply to 03_restated_02_of_03 and 03_restated_03_of_03	Drafting team on behalf of Michael Wilch (cf. email sent by MW 2017-12-04-1703h)	PT CGM WP-1

Unique_comment_ID	Comment refers to line number	Comment refers to Article	Comment refers to Paragraph	Comment / Suggestion	PT CGM WP-1 response	Reviewer name	Organisation / Affiliation
~~05~~	~~344-349~~	~~6~~	~~1~~	~~Change to: "1. The transmission grid elements described in paragraph 2 of this Article shall be included in each IGM 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."~~ ~~SOGL prescribes that "The individual grid models shall include the structural information and data set out in Article 41." (Article 64.2 of the regulation SOGL). Obviously, Article 41 of SOGL describes exclusively elements of the transmission system down to "transformers connecting the DSOs" (Article 41.1.c of SOGL). Structural data of distribution systems are described in Article 48 of SOGL and, as evidenced by Article 64.2, SOGL does not entitle TSOs to include detailed distribution-system related data in their IGM.~~ ~~However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs' individual grid models (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" (Article 5 of the draft CGMM proposal).~~ ~~This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying SOGL regulation. This is not in line with the basics of European legislation. innogy therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is regarded transmission on national level.~~ ~~Without doubt it is subject to the member states to define which part of the interconnected system is regarded transmission and which is distribution (cf. Article 2.3 and Article 2.5 of Directive 2009/72/EC). Following the principle of subsidiarity (Article 5(3) of the Treaty on European Union), it is at the discretion of the member state to find a proper demarcation between transmission and distribution, as it is left open in the corresponding Directive. Neither ENTSO-E nor any TSO is entitled to change this definition.~~ ~~The limitation of IGM and CGM to elements of the transmission system can consistently be~~	Comment needed to be restated; see below	~~Michael Wilch~~	~~innogy SE~~
05_restated	344-349	6	1	Article 6 - Original version "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 (including 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. [....] 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 (including 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. [...]" Article 6 - Proposed version "1. The transmission grid elements described in paragraph 2 of this Article shall be included in each IGM 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. [....] 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 (including 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. System operators may agree on using models instead of equivalent models. [...]" Explanation: see 03_restated_02_of_03 and 03_restated_03_of_03	See reply to 03_restated_02_of_03 and 03_restated_03_of_03	Drafting team on behalf of Michael Wilch (cf. email sent by MW 2017-12-04-1703h)	PT CGM WP-1

Unique_comment_ID	Comment refers to line number	Comment refers to Article	Comment refers to Paragraph	Comment / Suggestion	PT CGM WP-1 response	Reviewer name	Organisation / Affiliation
~~06~~	~~360-368~~	6	3	~~Change to:"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 (including 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.~~ ~~System operators may agree on using models instead of equivalent models.~~ ~~[...]"~~ ~~SOGL prescribes that "The individual grid models shall include the structural information and data set out in Article 41." (Article 64.2 of the regulation SOGL). Obviously, Article 41 of SOGL describes exclusively elements of the transmission system down to "transformers connecting the DSOs" (Article 41.1.c of SOGL). Structural data of distribution systems are described in Article 48 of SOGL and, as evidenced by Article 64.2, SOGL does not entitle TSOs to include detailed distribution-system related data in their IGM.~~ ~~However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs' individual grid models (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" (Article 5 of the draft CGMM proposal).~~ ~~This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying SOGL regulation. This is not in line with the basics of European legislation. innogy therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is regarded transmission on national level.~~ ~~Without doubt it is subject to the member states to define which part of the interconnected~~	Comment needed to be restated	~~Michael Wilch~~	~~innogy SE~~
07	18-20	Whereas	-1	EDF welcomes this ENTSO-E consultation on the TSOs common proposal for a common grid model methodology in accordance with Article 67(1) and 70(1) of Regulation 2017/1485 establishing a guideline on electricity transmission system operation (SOGL). Indeed, the involvement of stakeholders in the implementation process of the CACM, FCA and SOGL Guidelines is of paramount importance to ensure the transparency and accountability of the proposals made by TSOs. Therefore, stakeholders should play an active role in the process for the elaboration of the methodologies as well as in their regional or national implementation. Moreover, TSO's proposals of terms and conditions and methodologies deriving from Guidelines and Network Codes are often liable to have significant impacts on grid users and market participants, so that the proposed solutions should be backed by impact assessments and cost-benefit analyses, where needed. EDF would like to reiterate its requests for the access of the market participants to the IGMs and CGMs. The reason for keeping CGMs data confidential is not very clear, especially for long-term timeframes, as far as they reflect the best forecast made by system operators without any confidential or commercially sensitive information. The availability of this data would be useful to provide stakeholders with a better visibility on the level of available cross-border capacity and to enable market participants to better anticipate the potential evolutions of market prices. It may also contribute to improve the accuracy of the forecasts provided by Significant Grid Users (SGUs). A good level of transparency on the CGMs would also be consistent with : (i)the objectives of SOGL Regulation which notably aims at ensuring and enhancing the transparency and reliability of information on transmission system operation (Article 4.1 (g)) (ii)the obligations imposed on TSOs by the Third Energy Package to provide estimates and information on the available transfer capacity of their networks and on the availability and use of generation and load assets (article 15 of Regulation 714/2009	On the publication of IGMs and CGMs we refer to our explanations on this point in the Response to Consultation Comments for the CGMM pursuant to Regulation 2015/1222	Nadia HENRY	EDF
08	21-31	Whereas	-2	EDF takes note that this "CGMM Proposal", as defined in the title of the document and in Whereas (2) covers requirements stipulated in Article 67(1) and 70(1) of SOGL Regulation. It is not completely clear whether this CGMM proposal is to encompass the three network codes CACM, FCA and SOGL, as so many references to CACM and FCA have now disappeared from the articles. For sake of clarity and simplicity, the CGM Methodology requirements for these three networks codes should be included in the same document. In the previous version of the CGMM methodology submitted to consultation, "CGMM v2", ENTSOE had taken this approach, by including additional requirements from FCA regulation to the existing CGM methodology for CACM regulation.	TSOs are bound by the regulators' requirement that a dedicated methodology be prepared for each of the three Network Codes / Guidelines that require a Common Grid Model Methodology	Nadia HENRY	EDF
09	132	Whereas	-3	Concerning the definition of the "best possible forecast" of transmission system to be used in each individual grid model, EDF would like to stress the fact that TSOs should not take into account to the nature of long term rights. This is to prevent any bias related with political agreements on minimum interconnection capacity on specific borders.	This topic is outside the scope of the CGMM.	Nadia HENRY	EDF

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10	196-197	Article 1	1.	EDF takes note that the scope of this "CGMM Proposal" covers requirements stipulated in Article 67(1) and 70(1) of SOGL Regulation. It is not completely clear whether this CGMM proposal is to encompass the three network codes CACM, FCA and SOGL, as so many references to CACM and FCA have now disappeared from the articles. For sake of clarity and simplicity, the CGM Methodology requirements for these three networks codes should be included in the same document. In the previous version of the CGMM methodology submitted to consultation, "CGMM v2", ENTSOE had taken this approach, by including additional requirements from FCA regulation to the existing CGM methodology for CACM regulation.	TSOs are bound by the regulators' requirement that a dedicated methodology be prepared for each of the three Network Codes / Guidelines that require a Common Grid Model Methodology	Nadia HENRY	EDF
11	234	3	1	In the previous consultation for CGMM v2, TSOs had proposed to publish the scenarios built for year ahead and month ahead IGMs (including their descriptions and the periods they are to be used) and make them available publicly to market participants, as part of the data to be provided in the Biennal Report on capacity calculation and allocation provided to ACER pursuant to Article 31(3) of Regulation 2015/1222 and Article 26(3) of Regulation 2016/1719, respectively. EDF would like to clarify that the scenarios developed under Article 65 of SOGL Regulation will also be available publicly	The year-ahead scenarios are explicitly out of the scope of the CGMM-v3, so it would not be appropriate for the CGMM drafting team to comment on this point. However, the wording of Article 65(4) of the SO GL seems clear enough: to publish means to make publicly available.	Nadia HENRY	EDF
12	1038-1040	24	3.c	EDF welcomes TSO's' proposal to publish on the internet the algorithm for CGM alignment as described in Article 19 of the CGMM proposal. This will enhance transparency ensure accountability of the TSO proposals. Moreover, it enables interested parties to contribute to the improvement of the methodologies used by TSOs, with a benefit on the efficiency of the system operation.	We are pleased to read that you endorse our proposal	Nadia HENRY	EDF
13	1054-1055	24	5	EDF welcomes TSO's proposal to publish on a yearly basis the available data related to the quality criteria that the IGM, CGM, and CGM alignment algorithm have to meet. This will enhance transparency ensure accountability of the TSO proposals. Moreover, it enables interested parties to contribute to the improvement of the methodologies used by TSOs, with a benefit on the efficiency of the system operation.	We are pleased to read that you endorse our proposal	Nadia HENRY	EDF
14	332	Article 5	1	The aim of the common grid model methodology is to enable the TSOs to establish a common grid model, based on the data received by distribution system operators (DSOs) as well as grid users as described in the GLDPM or the SO GL. The interdependencies between transmission grids cause TSOs to have to synchronise not only the operation but also the planning of their grids. Therefore, BDEW supports the idea to establish a common grid model (CGM) in order to enable TSOs to develop their transmission networks in accordance with the demands of the next decades. In the view of BDEW, it is sensible to base the CGM on individual grid models (IGMs) developed by the TSOs (Article 17.2.b of the CACM regulation) and to prescribe that "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" (Article 19.3 of the CACM regulation; our emphasis). The SO GL also not expands these specifications. However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs' individual grid models (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" (Article 5 of the draft CGMM proposal; our emphasis). This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by the TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying CACM regulation. This is not in line with the basics of European legislation. BDEW therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is run by the TSOs. With regard to the incoherency with the underlying CACM regulation, BDEW would very much welcome a revision of the above mentioned requirements in the CGMM proposal.	The claim that "the high-voltage grids are not part of the transmission system" in Germany seems not to be in line with the position of Germany's regulator BNetzA in its 08 December 2017 approval of the GLDPM-v2. To keep consistency between methodology and acknowledge the common understanding of the Network Codes requirements up to now, we would prefer to stick to our proposal.	Laura Emmermacher	BDEW
15	344	Article 6	Articles 6.1 and 6.3	Next to the provision in Article 5, BDEW sees need for revision of Articles 6.1 and 6.3 of the present CGMM proposal. These Articles describe in detail which grid elements shall be in-cluded in the IGMs. Among these there are numerous grid elements belonging to the high-voltage grids. In these paragraphs, ENTSO-E acknowledges that these grids may be run ei-ther by TSOs or by DSOs; but the provisions say that the grid elements have to be included in the IGMs regardless of the operator. From BDEW's point of view, this provision is not based on the requirements laid down in the CACM regulation. It has to be made clear that, for grids of less than 220 kV, the provision of equivalent models for the distribution systems by the respective DSOs shall be deemed sufficient. This principle is already laid down in Article 11.3 of the present CGMM proposal which requires TSOs to make use of equivalent models of their adjacent grids, which also contain distribution systems. Hence, BDEW asks for rephras-ing Articles 6.1 and 6.3 following the principles of Article 11.3 of the draft CGMM proposal. With regard to the incoherency with the underlying CACM regulation, BDEW would very much welcome a revision of the above mentioned requirements in the CGMM proposal.	We are puzzled by the reference to the CACM GL, as this CGMM-v3 is prepared pursuant to the SO GL. The CGM methodology states that mandatory elements are : - the ones of 220 kV and above - the elements needed for an appropriate representation of the grid The implementation of these requirements are under the responsibility of the TSOs, having in mind the aim of the global CGM process. Thus, it seems to us that your concern is not in the scope of the CGM Methodolgy as a pan-european methodology. The legal definition of a "control area" is given in Article 2(6) of Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council: 'control area' means a coherent part of the interconnected system, operated by a single system operator and shall include connected physical loads and/or generation units if any;	Laura Emmermacher	BDEW

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16		2		Proposed version: For the purposes of this proposal, the terms used shall have the meaning of the definitions included in Article 3 of Regulation 2017/1485 and the other items of legislation referenced therein as well as Article 2 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222. In addition, the following definitions shall apply: 1. 'adjacent grids' means the areas not part of but bordering on the transmission system for which an IGM is being created; Justification: In the view of EURELECTRIC, it is sensible to base the CGM on individual grid models (IGMs) developed by the TSOs (Article 64.1 of the SOGL regulation) and to prescribe that "The individual grid models shall include the structural information and data set out in Article 41." (Article 64.2 of the regulation SOGL). Obviously, Article 41 of SOGL describes exclusively elements of the transmission system down to "transformers connecting the DSOs" (Article 41.1.c of SOGL). Structural data of distribution systems are described in Article 48 of SOGL and, as evidenced by Article 64.2, SOGL does not entitle TSOs to include detailed distribution-system related data in their IGM. However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs' individual grid models (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" (Article 5 of the draft CGMM proposal). This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying SOGL regulation. This is not in line with the basics of European legislation. EURELECTRIC therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is regarded transmission on national level. Without doubt it is subject to the member states to define which part of the interconnected system is regarded transmission and which is distribution (cf. Article 2.3 and Article 2.5 of Directive 2009/72/EC). Following the principle of subsidiarity (Article 5(3) of the Treaty on European Union), it is at the discretion of the member state to find a proper demarcation between transmission and distribution, as it is left open in the corresponding Directive. Neither ENTSO-E nor any TSO is entitled to change this definition. The limitation of IGM and CGM to elements of the transmission system can consistently be derived from SOGL. Article 41.3.b, which gives more information on the establishment of the common grid model, reads:"[…] to establish the common grid model, […]each TSO shall exchange […]:(b) a model or an equivalent of the transmission system with voltage below 220 kV with significant impact on its own transmission system; […]". (tbc)	See reply to 03_restated_02_of_03 and 03_restated_03_of_03	Sanni Aumala	EURELECTRIC
17		2		(continuing) That means there is a twofold exclusion of distribution systems from the CGM: not only is the CGM limited to elements of the transmission system, but specifically to those elements of the transmission system with significant impact on the transmission system of a neighbouring TSO. Both provisions make clear distribution elements cannot be part of the CGM. Next to the provision in Article 5, EURELECTRIC sees need for revision of Articles 6.1 and 6.3 of the present CGMM proposal. These Articles describe in detail which grid elements shall be included in the IGMs. Among these there are numerous grid elements belonging to the high-voltage grids. In these paragraphs, ENTSO-E acknowledges that these grids may be run either by TSOs or by DSOs; but the provisions say that the grid elements have to be included in the IGMs regardless of the operator. From EURELECTRIC's point of view, this provision is not based on the requirements laid down in the SOGL regulation. It has to be made clear that, for grids of less than 220 kV, the provision of equivalent models for the distribution systems by the respective DSOs shall be deemed sufficient. This principle is already laid down in Article 11.3 of the present CGMM proposal which requires TSOs to make use of equivalent models of their adjacent grids, which shall also contain distribution systems. Hence, EURELECTRIC asks for rephrasing Articles 6.1 and 6.3 following the principles of Article 11.3 of the draft CGMM proposal. Additionally, the definition of "adjacent grids" must be adapted, as it currently uses "control area or bidding zone" instead of "transmission system", following Article 2.1 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222.	See reply to 03_restated_02_of_03 and 03_restated_03_of_03	Sanni Aumala	EURELECTRIC

Unique_comment_ID	Comment refers to line number	Comment refers to Article	Comment refers to Paragraph	Comment / Suggestion	PT CGM WP-1 response	Reviewer name	Organisation / Affiliation
18		5		Proposed version: 1. IGMs shall contain the elements of the high-voltage and extra high-voltage transmission network insofar as these are used in regional operational security analysis for the concerned time-frame. [....] Justification: In the view of EURELECTRIC, it is sensible to base the CGM on individual grid models (IGMs) developed by the TSOs (Article 64.1 of the SOGL regulation) and to prescribe that "The individual grid models shall include the structural information and data set out in Article 41." (Article 64.2 of the regulation SOGL). Obviously, Article 41 of SOGL describes exclusively elements of the transmission system down to "transformers connecting the DSOs" (Article 41.1.c of SOGL). Structural data of distribution systems are described in Article 48 of SOGL and, as evidenced by Article 64.2, SOGL does not entitle TSOs to include detailed distribution-system related data in their IGM. However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs' individual grid models (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" (Article 5 of the draft CGMM proposal). This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying SOGL regulation. This is not in line with the basics of European legislation. EURELECTRIC therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is regarded transmission on national level. Without doubt it is subject to the member states to define which part of the interconnected system is regarded transmission and which is distribution (cf. Article 2.3 and Article 2.5 of Directive 2009/72/EC). Following the principle of subsidiarity (Article 5(3) of the Treaty on European Union), it is at the discretion of the member state to find a proper demarcation between transmission and distribution, as it is left open in the corresponding Directive. Neither ENTSO-E nor any TSO is entitled to change this definition. The limitation of IGM and CGM to elements of the transmission system can consistently be derived from SOGL. Article 41.3.b, which gives more information on the establishment of the common grid model, reads:"[…] to establish the common grid model, […]each TSO shall exchange […]:(b) a model or an equivalent of the transmission system with voltage below 220 kV with significant impact on its own transmission system; […]". (tbc)	See reply to 03_restated_02_of_03 and 03_restated_03_of_03	Sanni Aumala	EURELECTRIC
19		5		(continuing) That means there is a twofold exclusion of distribution systems from the CGM: not only is the CGM limited to elements of the transmission system, but specifically to those elements of the transmission system with significant impact on the transmission system of a neighbouring TSO. Both provisions make clear distribution elements cannot be part of the CGM. Next to the provision in Article 5, EURELECTRIC sees need for revision of Articles 6.1 and 6.3 of the present CGMM proposal. These Articles describe in detail which grid elements shall be included in the IGMs. Among these there are numerous grid elements belonging to the high-voltage grids. In these paragraphs, ENTSO-E acknowledges that these grids may be run either by TSOs or by DSOs; but the provisions say that the grid elements have to be included in the IGMs regardless of the operator. From EURELECTRIC's point of view, this provision is not based on the requirements laid down in the SOGL regulation. It has to be made clear that, for grids of less than 220 kV, the provision of equivalent models for the distribution systems by the respective DSOs shall be deemed sufficient. This principle is already laid down in Article 11.3 of the present CGMM proposal which requires TSOs to make use of equivalent models of their adjacent grids, which shall also contain distribution systems. Hence, EURELECTRIC asks for rephrasing Articles 6.1 and 6.3 following the principles of Article 11.3 of the draft CGMM proposal. Additionally, the definition of "adjacent grids" must be adapted, as it currently uses "control area or bidding zone" instead of "transmission system", following Article 2.1 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222.	See reply to 03_restated_02_of_03 and 03_restated_03_of_03	Sanni Aumala	EURELECTRIC
20		6		Proposed version: 1. The transmission grid elements described in paragraph 2 of this Article shall be included in each IGM 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. [....] 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 (including 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. System operators may agree on using models instead of equivalent models. [...]	The CGM methodology states that mandatory elements are : - the ones of 220 kV and above - the elements needed for an appropriate representation of the grid The implementation of these requirements are under the responsibility of the TSOs, having in mind the aim of the global CGM process. Thus, it seems to us that your concern is not in the scope of the CGM Methodolgy as a pan-european methodology. The legal definition of a "control area" is given in Article 2(6) of Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council: 'control area' means a coherent part of the interconnected system, operated by a single system operator and shall include connected physical loads and/or generation units if any;	Sanni Aumala	EURELECTRIC

Unique_comment_ID	Comment refers to line number	Comment refers to Article	Comment refers to Paragraph	Comment / Suggestion	PT CGM WP-1 response	Reviewer name	Organisation / Affiliation
				Justification: In the view of EURELECTRIC, it is sensible to base the CGM on individual grid models (IGMs) developed by the TSOs (Article 64.1 of the SOGL regulation) and to prescribe that “The individual grid models shall include the structural information and data set out in Article 41.” (Article 64.2 of the regulation SOGL). Obviously, Article 41 of SOGL describes exclusively elements of the transmission system down to “transformers connecting the DSOs” (Article 41.1.c of SOGL). Structural data of distribution systems are described in Article 48 of SOGL and, as evidenced by Article 64.2, SOGL does not entitle TSOs to include detailed distribution-system related data in their IGM. However, the present CGMM is not fully in line with this provision. As stated in Article 5 of the present draft CGMM proposal, the data included in the TSOs’ individual grid models (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” (Article 5 of the draft CGMM proposal). This provision in the CGMM proposal does not take into account that in many European countries, e. g. in Germany, the high-voltage grids are not part of the transmission system and are not operated by TSOs but by DSOs. With regard to these grids, the CGMM proposal goes beyond the scope of application set by the above cited provisions in the underlying SOGL regulation. This is not in line with the basics of European legislation. EURELECTRIC therefore pledges to overhaul the provision in Art. 5 of the draft CGMM proposal and to limit its scope of application to those elements which are part of the grid which is regarded transmission on national level. Without doubt it is subject to the member states to define which part of the interconnected system is regarded transmission and which is distribution (cf. Article 2.3 and Article 2.5 of Directive 2009/72/EC). Following the principle of subsidiarity (Article 5(3) of the Treaty on European Union), it is at the discretion of the member state to find a proper demarcation between transmission and distribution, as it is left open in the corresponding Directive. Neither ENTSO-E nor any TSO is entitled to change this definition. The limitation of IGM and CGM to elements of the transmission system can consistently be derived from SOGL. Article 41.3.b, which gives more information on the establishment of the common grid model, reads:”[…] to establish the common grid model, […]each TSO shall exchange […]:(b) a model or an equivalent of the transmission system with voltage below 220 kV with significant impact on its own transmission system; […]”. (tbc)			
21		6		(continuing) That means there is a twofold exclusion of distribution systems from the CGM: not only is the CGM limited to elements of the transmission system, but specifically to those elements of the transmission system with significant impact on the transmission system of a neighbouring TSO. Both provisions make clear distribution elements cannot be part of the CGM. Next to the provision in Article 5, EURELECTRIC sees need for revision of Articles 6.1 and 6.3 of the present CGMM proposal. These Articles describe in detail which grid elements shall be included in the IGMs. Among these there are numerous grid elements belonging to the high-voltage grids. In these paragraphs, ENTSO-E acknowledges that these grids may be run either by TSOs or by DSOs; but the provisions say that the grid elements have to be included in the IGMs regardless of the operator. From EURELECTRIC's point of view, this provision is not based on the requirements laid down in the SOGL regulation. It has to be made clear that, for grids of less than 220 kV, the provision of equivalent models for the distribution systems by the respective DSOs shall be deemed sufficient. This principle is already laid down in Article 11.3 of the present CGMM proposal which requires TSOs to make use of equivalent models of their adjacent grids, which shall also contain distribution systems. Hence, EURELECTRIC asks for rephrasing Articles 6.1 and 6.3 following the principles of Article 11.3 of the draft CGMM proposal. Additionally, the definition of “adjacent grids” must be adapted, as it currently uses “control area or bidding zone” instead of “transmission system”, following Article 2.1 of the Common Grid Model Methodology pursuant to Article 17 of Regulation 2015/1222.	See reply to 03_restated_02_of_03 and 03_restated_03_of_03	Sanni Aumala	EURELECTRIC

European Network of
Transmission System Operators
for Electricity

All Continental Europe and Nordic TSOs' proposal for assumptions and a Cost Benefit Analysis methodology in accordance with Article 156(11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

Date: 2 March 2018

Contents

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All Continental Europe and Nordic TSOs, taking into account the following,

Whereas

(1) This document is a common proposal jointly developed by all Transmission System Operators of the Continental Europe and the Nordic synchronous areas (hereafter referred to as the "TSOs") regarding the determination of assumptions and a methodology for a Cost Benefit Analysis (hereafter referred to as "CBA") to be conducted, in order to assess the time period required for frequency containment reserves (hereafter referred to as "FCR") providing units or groups (hereafter referred to as "FCR providers") with limited energy reservoirs to remain available during alert state, in accordance with Article 156(11) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (hereafter referred to as "System Operation Guideline Regulation"). This proposal is hereafter referred to as "CBA methodology for FCR Proposal".

(2) The CBA methodology for FCR Proposal takes into account the general principles and goals set in the System Operation Guideline Regulation 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 the System Operation Guideline Regulation is safeguarding operational security, frequency quality and the efficient use of the interconnected system and resources. It sets for this purpose requirements to FCR providers ensuring that their FCR providing units or groups with limited energy reservoirs are able to fully activate FCR continuously in alert state for a minimum time period to be defined pursuant to Article 156 (10) and (11) of the System Operation Guideline Regulation.

(3) Article 156(9) of the System Operation Guideline Regulation provides that, in case no time period has been determined pursuant to Article 156 (10) and (11) of the System Operation Guideline Regulation, each FCR provider shall ensure that its FCR providing units or groups with limited energy reservoirs are able to fully activate FCR continuously for at least 15 minutes or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time, or for a period defined by each TSO, which shall not be greater than 30 or smaller than 15 minutes. Furthermore, it provides that, if a time period has been determined pursuant to Article 156(10) and (11) of the System Operation Guideline Regulation, each FCR provider shall ensure that its FCR providing units or groups with limited energy reservoirs shall be able to fully activate FCR continuously in alert state for that time period assessed.

(4) Article 156(10) of the System Operation Guideline Regulation requires all Continental Europe and Nordic TSOs to develop a proposal concerning the minimum activation period to be ensured by FCR providers, and specifies that the period determined shall not be greater than 30 or smaller than 15 minutes. Such proposal shall take full account of the results of the CBA conducted pursuant to Article 156(11) of the System Operation Guideline Regulation.

(5) Article 156(11) of the System Operation Guideline Regulation requires the TSOs of the Continental Europe and Nordic synchronous areas to propose assumptions and methodology for a CBA to be conducted, in order to assess the time period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state.

The CBA shall take into account at least:

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(a) experiences gathered with different timeframes and shares of emerging technologies in different LFC blocks;
(b) the impact of a defined time period on the total cost of FCR reserves in the synchronous area;
(c) the impact of a defined time period on system stability risks, in particular through prolonged or repeated frequency events;
(d) the impact on system stability risks and total cost of FCR in case of increasing total volume of FCR;
(e) the impact of technological developments on costs of availability periods for FCR from its FCR providing units or groups with limited energy reservoirs.

(6) This CBA methodology for FCR Proposal is exclusively related to FCR providing units or group with limited energy reservoirs.

According to Article 6(6) of the System Operation Guideline Regulation, the expected impact of the CBA methodology for FCR Proposal on the objectives of the System Operation Guideline Regulation (as listed in Article 4(1) of the System Operation Guideline Regulation) has to be described. The proposed CBA methodology for FCR Proposal generally contributes to the achievement of the objectives of Article 4(1) of the System Operation Guideline Regulation. Specifically, the CBA methodology for FCR Proposal provides the TSOs of the CE and Nordic synchronous areas with a methodology to assess and develop a proposal concerning the minimum activation period to be ensured by FCR providers. The determination of a minimum activation period to be ensured by FCR providers during alert state contributes to the determination of common operational security requirements and principles as set in the Article 4 (1) (a) of System Operation Guideline Regulation. It furthermore contributes to ensuring the conditions for maintaining operational security throughout the Union as set in Article 4 (1) (d) of System Operation Guideline Regulation. Finally it contributes to the efficient operation and development of the electricity transmission system and electricity sector in the Union as set in Article 4 (1) (h) of System Operation Guideline Regulation. The CBA methodology for FCR Proposal does not impact on the other objectives listed in Article 4(1) of the System Operation Guideline Regulation.

(7) In conclusion, the CBA methodology for FCR Proposal contributes to pursue the general objectives of the System Operation Guideline Regulation of safeguarding operational security by defining the proper time period for the full FCR activation in the alert state taking into account costs and benefits of the defined time period, to the benefit of all market participants and electricity end consumers.

SUBMIT THE FOLLOWING CBA METHODOLOGY FOR FCR PROPOSAL TO ALL REGULATORY AUTHORITIES OF THE CE AND NORDIC SYNCHRONOUS AREA:

Article 1
Subject matter and scope

The CBA assumptions and methodology as determined in this CBA methodology for FCR Proposal shall be considered as the common proposal of all Continental Europe and Nordic TSOs in accordance with Article 156(11) of the System Operation Guideline Regulation and shall form the basis on which the TSOs of the CE and Nordic synchronous areas shall assess the minimum activation period to be ensured by FCR providers in accordance with Article 156(10) of the System Operation Guideline Regulation.

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Article 2
Definitions and interpretation

1. For the purposes of the CBA methodology for FCR Proposal, terms used in this document shall have the meaning of the definitions included in Article 3 of the System Operation Guideline Regulation, of Regulation (EC) 714/2009, Directive 2009/72/EC and Regulation (EU) 543/2013.

2. In addition, in this CBA methodology for FCR Proposal, unless the context requires otherwise, the following terms shall have the meaning below:
   a) 'LER' means 'FCR production units or groups with limited energy reservoirs';
   b) 'LER Share' means the 'share of LER on the total FCR providers';
   c) 'Market induced imbalances' means the 'generation-load imbalance caused by the change in generation set points according to the results of the market scheduling'.
   d) 'System droop' means 'the ratio between frequency deviation and steady state power response provided by FCP';
   e) 'FCR cost curve' means 'the set of all the offered quantity of FCR with their corresponding cost';
   f) 'Time Period', according to Article 156 (9) of System Operation Guideline Regulation, means 'the time for which each FCR provider shall ensure that its FCR providing units or groups with limited energy reservoirs are able to fully activate FCR continuously, as of triggering the alert state and during the alert state';
   g) 'Long lasting frequency deviation' means an 'event with an average steady state frequency deviation larger than the standard frequency range over a period longer than the time to restore frequency'.
   h) 'FAT' means 'FRR Full Activation Time' as defined in Article 3 (101) and (143) of System Operation Guideline Regulation.
   i) 'Equivalent reservoir energy capacity' means the energy requirement for LER associated to the Time Period and shall amount to twice the energy provided by the full activation of LER for the Time Period.

3. In this CBA methodology for FCR Proposal, unless the context requires otherwise:
   a) the singular indicates the plural and vice versa;
   b) unless otherwise provided, any reference to an Article means an article of this CBA methodology for FCR Proposal;
   c) the table of contents and headings are inserted for convenience only and do not affect the interpretation of this CBA methodology for FCR Proposal; and
   d) any reference to legislation, regulation, directive, order, instrument, code or any other enactment shall include any modification, extension or re-enactment of it then in force.

Article 3
CBA methodology outcomes and processes

For each combination of LER Share and Time Period (as described in Article 6 (2)(a) and Article 6 (2)(b)), the outcomes of the CBA methodology are:

a) the FCR cost (as described in Article 4 and Article 5);
b) the acceptability of the combination against the most relevant real frequency events (as described in Article 7).

The FCR cost is calculated by means of two sequential processes.

The first process is a Probabilistic Simulation Model (described in Article 4) whose outcome is the amount of FCR.

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The second process is an Assessment of cost of FCR (described in Article 5) which associates a cost to the required amount of FCR calculated by the Probabilistic Simulation Model.

The acceptability of the combination against the most relevant real frequency events is assessed by means of a dedicated process (described in Article 7).

Article 4
Probabilistic Simulation Model

1. All TSOs of a synchronous area shall develop a Probabilistic Simulation Model able to calculate the minimum amount of FCR needed to mantain the steady state frequency within maximum steady state frequency deviation.

2. The following sources of frequency disturbance are inputs of the Probabilistic Simulation Model:
   a. Deterministic frequency deviation.
   The TSOs shall consider the market induced imbalances, analyse frequency historical trend of each synchronous area over several years, and then statistically determine the typical trends and amplitudes of these frequency deviations in order to use them as an input of the Probabilistic Simulation Model.
   b. Long lasting frequency deviation.
   The TSOs shall take into account Long lasting frequency deviations.
   They shall analyse frequency historical trends in order to characterize the phenomena from a statistical point of view. The analysis shall determine:
      • the number of occurrences of these events;
      • the typical duration;
      • a representative frequency deviation trend;
      • typical time of occurrence, if highlighted by statistical analysis.
   c. Outages of relevant grid elements.
   The TSOs shall define a list of all the grid elements whose outages lead to relevant load or generation losses and indeed to relevant FCR activation.
   The grid elements outages to be investigated are at least: generation plants failure, critical busbar fault and critical substation blackout. For each outage a probability of failure shall be defined.

   All the available informations related to the dependence amongst the three sources of frequency disturbance listed above shall be taken into account in order to avoid the double counting of phenomena.

3. The Probabilistic Simulation Model shall be used to calculate the requested FCR in each scenario described in Article 6. Therefore also the following variables represent inputs for the model:
   a. Time Period;
   b. LER Share;
   Moreover, also the average FAT of the synchronous area is an input parameter for the Probabilistic Simulation Model.

4. The Probabilistic Simulation Model calculates the required FCR using an iterative method. At every iteration the Probabilistic Simulation Model uses a Monte Carlo Simulation Process in order to verify if the steady state frequency is within maximum steady state frequency deviation. If the condition is not fulfilled, the Probabilistic Simulation Model increases gradually the FCR and calculates the next iteration. The iterations stop once the condition is fulfilled. The output of the Probabilistic Simulation

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Model is the FCR required to mantain the steady state frequency within maximum steady state frequency deviation.

5. The Monte Carlo Simulation Process shall be able to simulate several years of operation conditions of each synchronous area by means of random draws of long lasting frequency deviations and outages of relevant grid elements. It has the aim to generate a large number of random combinations of all the possible sources of frequency disturbance. Since the Monte Carlo Simulation Process works on the time domain, this approach requires to simulate a long system operation period. The operation period to be simulated shall be long enough to generate statistically significant results.

6. The Monte Carlo Simulation Process uses a Dynamic Simulation Model in order to calculate the frequency deviation. The Dynamic Simulation Model uses as input the sources of frequency disturbance as randomly generated by Monte Carlo Simulation Process and simulates the FCP and FRP.

7. The Dynamic Simulation Model shall be able to simulate the depletion of LER and its effects on the frequency deviation, taking into account the LER Share and the Time Period.

Article 5
Assessment of cost of FCR

1. The minimum amount of FCR needed to mantain the steady state frequency within maximum steady state frequency deviation calculated by the Probabilistic Simulation Model shall be used to assess the FCR cost associated to each scenario by means of a FCR cost curve.

2. All TSOs of a synchronous area shall define a FCR cost curve which includes both LER and non-LER FCR providers.

   The FCR cost for non-LER FCR providers shall be calculated at least by comparing the marginal cost of the FCR provider with the energy marginal price of the bidding zone. The comparison allows to estimate the cost of reserving capacity for FCR provision.

   The FCR cost for future installed LER shall be calculated considering: investment, OPEX and opportunity costs (if any). These contributions shall be considered only if they are sustained in order to qualify for FCR provision.

   The FCR cost for already existing LER shall be calculated considering: OPEX and opportunity costs (if any). These contributions shall be considered only if they are sustained in order to qualify for FCR provision.

   The impact on FCR cost for LER due to variations of energy reservoir requirement (associated to the Time Period) shall be taken into account.

Article 6
Simulation scenarios

1. The analyses and processes described in Articles 4 and 5 shall be performed considering different scenarios and allow to calculate both FCR dimensioning and cost of FCR taking into account different assumptions. Scenarios are aimed to address uncertainties and assess the impact of different hypotheses which can affect the results of the CBA.

2. The set of scenarios shall include all the combinations of the following assumptions:
   a) Time Period. In order to evaluate the best solution in terms of minimum activation period which is not greater than 30 or smaller than 15 minutes, the interval of possible solutions have to be explored adopting an opportune discretization. When implementing the CBA methodology for FCR Proposal, the TSOs shall consider a discretization of 5 minutes, thus the results considering Time Periods of 15, 20, 25 and 30 minutes shall be assessed.
   b) LER Share. The share of the LER can be affected by the cost effectiveness of LER but also by other factors, such as the presence of a market based procurement of FCR, or other technical and regulatory impacts on LER deployment. For this reason, different LER Shares shall be analysed in the 10-100% range with 10% discretization.

3. All the analyses shall be performed considering potential future developments of the energy system and regulations in the short term.

4. The elaboration of the results obtained performing the analyses described in Articles 4 and 5 to the whole set of scenarios shall allow to obtain FCR dimensioning and costs of FCR for each combination of Time Period and LER Share.

Article 7
Simulation of the most relevant real frequency events in presence of LER

1. The most relevant frequency disturbances occurred in the past shall be simulated modelling the presence of LER and assessing how the potential energy depletion would have affected the system stability.

2. Simulation of the most relevant real frequency events shall be performed for each combination of Time Period and LER Share defined in Article 6 (2a) and (2b). If a combination of Time Period and LER Share worsens operational security potentially leading to a blackout state, the combination shall be considered not acceptable.

Article 9
Determination and update of Time Period

According to Article 156 (11), by 12 months after approval of the assumptions and methodology contained herein by all regulatory authorities of the concerned region, the TSOs of the CE and Nordic synchronous areas shall submit the results of their cost-benefit analysis to the concerned regulatory authorities, suggesting a Time Period which shall not be greater than 30 or smaller than 15 minutes.
In any case following any significant change of the assumptions for the cost benefit analysis after entering into force of the Time Period, all TSOs of the CE and Nordic synchronous areas shall submit the results of an updated cost-benefit analysis to the concerned regulatory authorities, suggesting an updated Time Period which shall not be greater than 30 or smaller than 15 minutes.

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Article 10
CBA assumptions

1. The Probabilistic Simulation Model described in Article 4(1)(2)(3)(4), the Monte Carlo Simulation Process described in Article 4(1)(5)(6) and the Dynamic Simulation Model described in Article 4(6)(7) shall be referred to a whole synchronous area.
2. The Dynamic Simulation Model shall simulate the FRP with a single FRP controller without FRR limitations.
3. The Dynamic Simulation Model can neglect the entire Cross-Border Load-Frequency Control Process.
4. The Dynamic Simulation Model can neglect both system inertia and FCP deployment dynamic.
5. The Dynamic Simulation Model shall simulate at least the FRP deployment dynamic, the system droop and the self-regulation of load.
6. If a continuous exceeding of the standard frequency range leads to the triggering of an alert state, the activated energy and the residual energy in the reservoir is calculated from the first exceeding of the standard frequency range limits.
7. At the full availability of the reservoir, the energy level will be considered equal to half of the Equivalent reservoir energy capacity.

Article 11
Annex

The annexed document aims to provide interested parties with the background information, explanation and further details about the requirements specified in the CBA methodology for FCR Proposal and should be read in conjunction with CBA methodology for FCR Proposal.

Article 12
Publication and implementation of the CBA methodology for FCR Proposal

1. Each Continental Europe and Nordic TSO shall publish the CBA methodology for FCR Proposal without undue delay after all NRAs have approved the proposed CBA methodology for FCR Proposal, in accordance with Article 8 of the System Operation Guideline Regulation.

2. The Continental Europe and Nordic TSOs shall have implemented the adopted CBA methodology for FCR Proposal by 12 months after its approval by all regulatory authorities of the CE and Nordic synchronous areas. The implementation shall take place by submitting the results of the CBA conducted by the TSOs of the CE and Nordic synchronous areas according to the adopted CBA methodology for FCR Proposal to the concerned regulatory authorities suggesting a time period for FCR providers with limited energy reservoirs during which they shall be able to fully activate FCR continuously in alert state, whereas this time period shall not be greater than 30 or smaller than 15 minutes.

Article 13
Language

The reference language for this CBA methodology for FCR Proposal shall be English. For the avoidance of doubt, where TSOs need to translate this CBA methodology for FCR Proposal into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with Article 8(1) of the System Operation Guideline Regulation 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 CBA methodology for FCR Proposal.

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European Network of
Transmission System Operators
for Electricity

Explanatory document of the proposal for assumptions and methodology for a Cost Benefit Analysis (CBA) compliant with the requirements contained in Article 156(11) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (System Operation Guideline Regulation – SOGR)

28 February 2018

Contents

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1 List of acronyms

ACE	Area Control Error
CE	Continental Europe
LER	FCR providing units or groups with limited energy reservoir
FCR	Frequency Containment Reserve
FCP	Frequency Containment Process
FRR	Frequency Restoration Reserve
FRP	Frequency Restoration Process
FSM	Frequency Sensitive Mode
Non-LER	FCR providing units or groups without limited energy reservoir
NP RES	Non Programmable Renewable Energy Sources
RES	Renewable Energy Sources
SO GL	System Operation Guideline
$T_{min\ LER}$	As of triggering the alert state and during the alert state, time for which each FCR provider shall ensure that its FCR providing units with limited energy reservoirs are able to fully activate FCR continuously.

2 Introduction

2.1 Context and Scope of the Report

The System Operation Guideline (SO GL) drafted by European Network of Transmission System Operators for Electricity (ENTSO-E) with guidance from the Agency for the Cooperation of Energy Regulators (ACER) was approved in comitology in May 2016 and adopted by European Commission in August 2017.

Article 156(11) of the SO GL requires the definition of a methodology for a Cost-Benefit-Analysis (CBA) for assessing the time period required for FCR providing units or groups with limited energy reservoirs (LER) to remain available during alert state in Continental Europe (CE) and Nordic synchronous areas.

Within 12 months after the approval of assumptions and methodology by all regulatory authorities of the interested region, the TSOs of the Central Europe and Nordic synchronous areas shall present the results of their cost-benefit analysis, suggesting a time period between 15 and 30 minutes to be available during Alert State.

The main objective of the CBA methodology described in this document is the selection of the solution which minimises FCR costs without jeopardising operational security. The aforementioned time period that will be identified after the application of this methodology will be used as a requirement for BSPs using resources with limited energy reservoirs for FCR provision. These BSPs will have to make sure that, at any point during normal state, the LER resources have always an energy content that will allow them to remain available for the minimum time defined by the study during alert state, by using an energy charging strategy.

According to the Article 18 (2c) of SO GL the transmission system shall be considered in alert state when:

- absolute value of the steady state system frequency deviation is not larger than the maximum steady state frequency deviation; and
- The absolute value of the steady state system frequency deviation has continuously exceeded 50 % of the maximum steady state frequency deviation for a time period longer than the alert state trigger time or the standard frequency range for a time period longer than time to restore frequency.

The minimum time period defined implementing the present CBA methodology is a requirement which shall be fulfilled in alert state while the FCR provider shall ensure that the FCR from its FCR providing units or groups with limited energy reservoirs are continuously available during normal state (Article 156 (9) of SO GL regulation).

The results of this study will be used by the TSOs to define the prequalification rules for LERs. In fact, after this study, each TSO should calculate the total minimum energy capacity that a LER should have in order to be prequalified for FCR provision.
The requirements for the operation of the above mentioned LER resources when frequency is within the standard frequency range are out of scope for this methodology.
This document provides the definition of the methodology meeting the requirements contained in Article 156 (11) of the System Operation Guideline Regulation, which shall constitute the basis for the subsequent implementation of the CBA.

2.2 Organisation of the Report

Section 3 provides an overview of FCR and EU regulation requirements for its provision. Section 4 outlines the key assumptions considered for the development of the methodology with respect to the timescale involved in the simulation model.

Section 5 illustrates the methodology, providing:

- The generic workflow of the procedure (input-output schemes);
- Methodology for the calculation of the power imbalance to be balanced by Frequency Containment Process (FCP) starting from historical frequency data and probability of grid elements outages;
- The probabilistic approach for assessing the operational security and system stability related to different scenarios with a defined minimum time period;
- Key hypotheses and descriptions of cost estimation;
- Description of the scenarios adopted to represent potential future developments of the power system and generation technologies.
- Outline of criteria for assessment of the time period required for LER to remain available during alert state including analyses of the stability risk during the most relevant real frequency events;

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3 Description of FCR

Frequency Containment Reserve (FCR) in the European Union Internal Electricity Balancing Market refers to operating reserves necessary for continuous containment of frequency deviations from nominal value in order to constantly maintain the power balance in the entire synchronous interconnected system.

A definition of FCR is provided in Article 3(6) of the SO GL where the FCR represents "the active power reserves available to contain system frequency after the occurrence of an imbalance".

Activation of this reserve results in a restored power balance at a frequency deviating from nominal value.

The FCR in a synchronous area is of utmost importance for the operational reliability of the area since it allows the stabilization of the system frequency in the time-frame of seconds at an acceptable stationary value in case of a disturbance or an incident. FCR depends on the reserve made available to the system by FCR providing units (e.g. generating units, controllable load resources and HVDC links). FCR provided by generating units is a fast-action, automatic and decentralized function that adjusts the generating units' power output as a consequence of the system frequency deviation. FCR is activated locally and automatically at the site of the FCR providing unit, independently from the activation of other types of reserves.

Further details on such topic can rather be found in the European Union SO GL. Especially, the guidelines require at article 156, at least for the CE & Nordic synchronous areas, that:

- An FCR providing unit shall guarantee the continuous availability of its FCR during the period of time in which it is obliged to provide FCR (with the exception of a forced outage);
- An FCR providing unit with an energy reservoir that does not limit its capability to provide FCR shall activate its FCR for as long as the frequency deviation persists;
- A FCR providing unit with an energy reservoir that limits its capability to provide FCR shall activate its FCR for as long as the frequency deviation persists, unless its energy reservoir is exhausted in either the positive or negative direction with the following clarifications:
    - during normal state, the FCR from FCR providing units with limited energy reservoirs shall be continuously available.
    - as of triggering the alert state and during the alert state, the FCR from FCR providing units with limited energy reservoirs shall be fully activated continuously for a time period to be defined according to a CBA. Where no period has been determined, each FCR provider shall ensure that its FCR providing units with limited energy reservoirs are able to fully activate FCR continuously for at least 15 minutes or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time, or for a period defined by each TSO, which shall not be greater than 30 or smaller than 15 minutes.

4 Main assumption of the methodology

4.1 Simulation timeframe

The present CBA methodology shall be based on a realistic simulation model useful to understand the actual effects of LER on the frequency regulation in different scenarios.

A main issue that should be evaluated in order to define a proper simulation model for the FCR provision analysis is related to the timescale of phenomena involved.

The dynamic phenomena and regulations relevant in the frequency behaviour are the following:

- System inertia. The system inertia (both rotating and synthetic) limits the frequency gradient following a system disturbance. It has effect on a very short time scale (0÷15s) and it is crucial in limiting the frequency maximum/minimum values during a transient before the FCR comes in.
- FCR dynamic response. Each FCR providing unit delivers its FCR capacity with a specific dynamic trend related to its technical issues. The maximum delivering time is defined in SO GL Article154.
- FRR dynamic response. It is referred to the time scale in which both automatic and manual FRR are deployed (1÷15 min).

For the objective of the present CBA methodology proposal, both system inertia and FCR dynamic response phenomena will be neglected. The methodology has in fact the aim to investigate the effects of the limited energy reservoir of part of the FCR providers on the frequency regulation framework.

For the purpose of this methodology, the presence of LER has an effect on the system once the energy reservoir is depleted. According to the SO GL Article156(10) this depletion must occur not before 15 minutes after the triggering of an alert state or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time.

This means that the effects of LER depletion take place on a timescale much larger than the timescales in which inertia and FCR dynamic response show their effects.

If a contingency occurs on the system, the frequency drop with a gradient related to the synchronous system inertia until the FCR is completely deployed. The minimum frequency reached during the transient depends only on both system inertia and FCR delivery dynamics. The presence of LER does not affect the system frequency in this context, since LER deliver their reserve regardless of their reservoir.

According to these considerations, the problem related with the limited system inertia, due to the increasing penetration of inverter-based generation technologies, is independent from the presence of LER and from the dimensioning of their energy reservoir.

Moreover, the present CBA methodology has the aim to investigate the effect of LER regardless of their specific technology. LER could be inverter-based (e.g. electrochemical cells) or rotating (e.g. small hydro power plants); they could have indeed different effects on frequency transient due to their different inertia and FCR deployment dynamic.

The frequency quality analysis on short term (as affected by inertia and FCR deployment dynamic) goes therefore beyond the aims of this CBA methodology, because it does not affect the selection of the time period.

The simulation model implemented shall then take into account the FCR deployment without its dynamic response (considering the system always in a steady-state regarding the FCR) and the FRR deployment with its dynamic response.

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5 Methodology

The main objective of the CBA methodology proposal described in this paragraph is to identify the combination of minimum time period ($T_{min\ LER}$) of full activation during alert state, LER share and total amount of FCR to be procured in the synchronous area which entails the lowest FCR cost in a short term time horizon without jeopardising the system security. The FCR increase has only the aim to assess system stability risks and total cost of FCR in case of increasing total volume of FCR as requested by Article 156 (11 d) of the SO GL. It must be highlighted the FCR dimensioning is defined in Article 153 of SO GL, therefore it cannot be the subject of this CBA methodology.

In order to reach that goal the methodology is organised in the following tasks:

- Frequency Containment Process (FCP) assessment in presence of LER based on simulations and considering a probabilistic approach for the main causes of frequency deviations. The activity aims to quantify the total FCR costs and FCR dimensioning considering different scenarios.
- Assessment of power system stability simulating the presence of LER during the most relevant real frequency events. There are complex sequences of events which can lead to significant power imbalances that cannot be investigated by means of probabilistic simulations. The proposed approach to overcome this modelling complexity is to simulate different scenarios of LER participation on FCR during the most relevant actually occurred events starting from recorded frequency data. The activity aims to verify that the combinations of time period, LER share and FCR dimensioning do not jeopardise system stability, potentially leading to a blackout state, even during most relevant real frequency disturbances.

The methodology will be based only on stability risk evaluation. It implies that the potential deterioration of frequency quality – related to different time periods - will be neglected.

The following paragraph will describe in detail the assumptions and methodology of in the CBA as well as the criteria for assessment to be adopted.

5.1 FCP assessment in presence of LER: Workflow

In this paragraph the workflow for assessing the FCP in presence of LER is presented.

The workflow takes as an input a set of variables identifying the scenario that shall be investigated. Besides the minimum time period $T_{min\ LER}$, several other variables are needed for FCP assessment – all this variables characterise a scenario. A description of the scenarios to be considered in the CBA and their main assumptions is reported in paragraph 5.7.

The output of the workflow is a cost associated to the scenario. The different scenarios can be then analysed by comparing these output costs. For a generic simulation scenario the process workflow is illustrated in Figure 1.

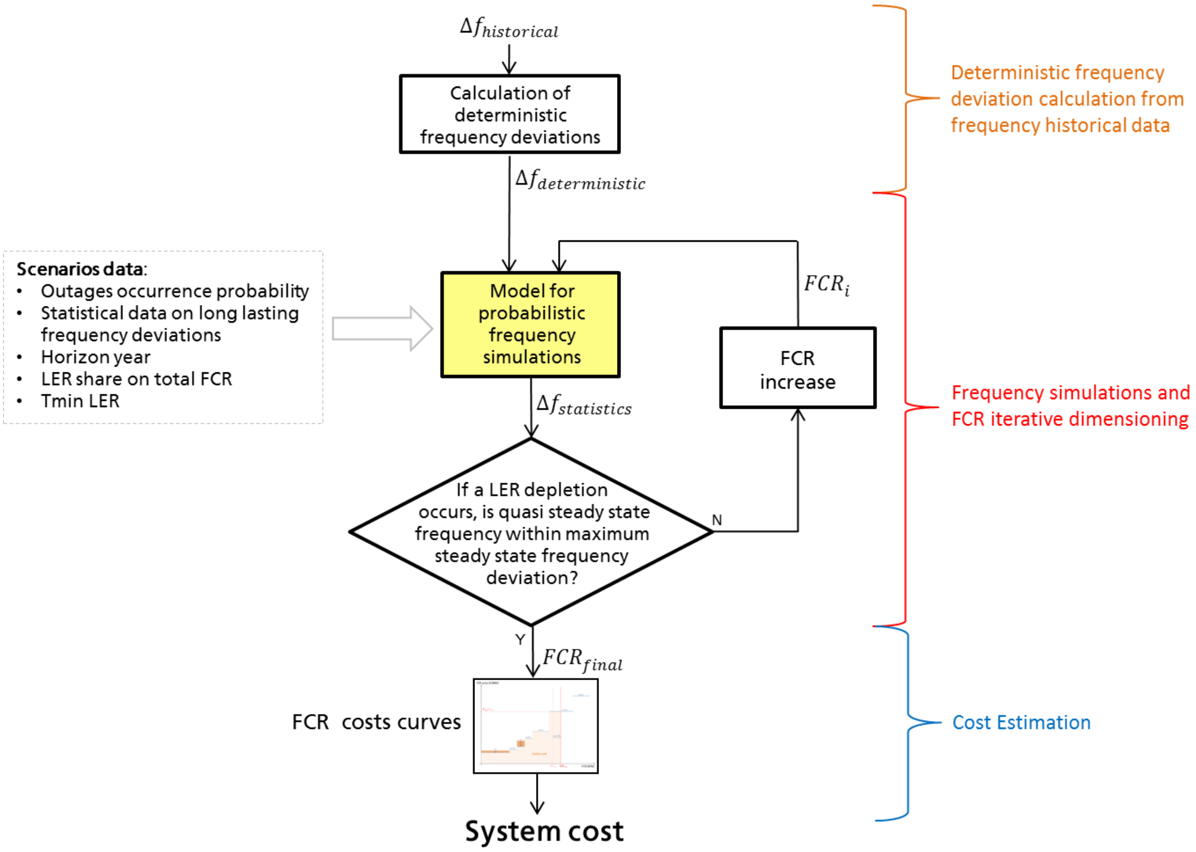

Figure 1 Process workflow

The process is summarized in the following steps:

1. The historical frequency trend ($\Delta f_{historical}$) is analyzed in order to define the deterministic frequency deviation as described in paragraph 5.2.
2. The probabilistic simulation model (paragraph 5.4) is used in order to calculate the statistics of simulated frequency (Δf_{sim}).
3. The simulated frequency statistics are analyzed in order to calculate the potential effects of LER depletion on system stability.
4. If the probabilistic analysis highlights LER depletions that entail the frequency deviation to reach the maximum steady state threshold, the FCR dimensioning is increased (by a defined power step) and another simulation is run.
5. The previous steps 2, 3 and 4 are repeated in an iterative process until the requirements defined in the step 4 are fulfilled.

   The final output of this iterative loop is the final FCR dimensioning value (FCR_{final}). This is the minimum increased FCR value that allows to avoid that LER depletion bring the frequency to reach the maximum steady state threshold.
6. The FCR_{final} is used to estimate the total system cost by using the reserve cost curves (as defined in paragraph 5.6.1.1).
7. The final output of the process is the total system cost.

As highlighted in Figure 1 the procedure can be split in four different sections:

- deterministic frequency deviation calculation from frequency historical data
- model for probabilistic frequency simulation
- FCR iterative dimensioning

- cost estimation

A detailed description of each section is provided in the next paragraphs.

5.2 Deterministic frequency deviation calculation from frequency historical data

The power imbalance on a synchronous area causes the frequency deviations that FCP and FRP must contain and restore.

The power imbalance can be described as the instantaneous difference between load and generation. Many factors can have an impact on power imbalance, for example:

- market induced effects due to the power difference between continuous ramping of load and discontinuous/stepwise ramping of generation according to the scheduling resulted from the market;
- outages of relevant grid elements (generators, loads, HVDC links, etc.);
- errors in load forecasts;
- forecast error of Non Programmable Renewable Energy Sources (NP RES) (e.g. Wind and solar);

Some of these phenomena are deterministic (e.g. market induced effects) - they can be predicted with good approximation.

Some phenomena can be evaluated only from a statistical point of view – e.g. it is theoretical possible to evaluate to probability distribution of forecast errors looking at the typical errors made in the past.

There are finally other phenomena that are only statistically foreseeable (e.g. outages).

A complete simulation of FCP and FRP should take into account all these effects, however, it can be difficult to get reliable information on all of them and it is even more challenging to estimate their evolution in the future.

The main source of information is of course the historical frequency records of each synchronous area. These data however are the results of the combination of all the different effects with the system reaction due to FCP and FRP.

Determining different power imbalance components from frequency data can be indeed a very complex process.

The power imbalance to be managed by FCP and FRP in the assessment will be calculated considering only the most relevant effects on the frequency, which are outages and the market induced effects. Other factors affecting power imbalance regarding forecast errors of loads and NP-RES are considered implicitly in long lasting frequency deviation (Paragraph 5.3) which are based on the statistical analysis on frequency historical data.

The outages will be modelled with a probabilistic Monte Carlo approach (Paragraph 5.4) – the market induced imbalances will be calculated starting from historical frequency data.

The market induced imbalances are generation-load imbalances caused by the change in generation set points according to the results of the market scheduling. These are one of the most important imbalance phenomena since they can cause an overcome of standard frequency range for several times every day.

The main characteristic of these deviations is that they occur in specific periods during the day, with specific trend patterns. They typically occur during the change of the hour.

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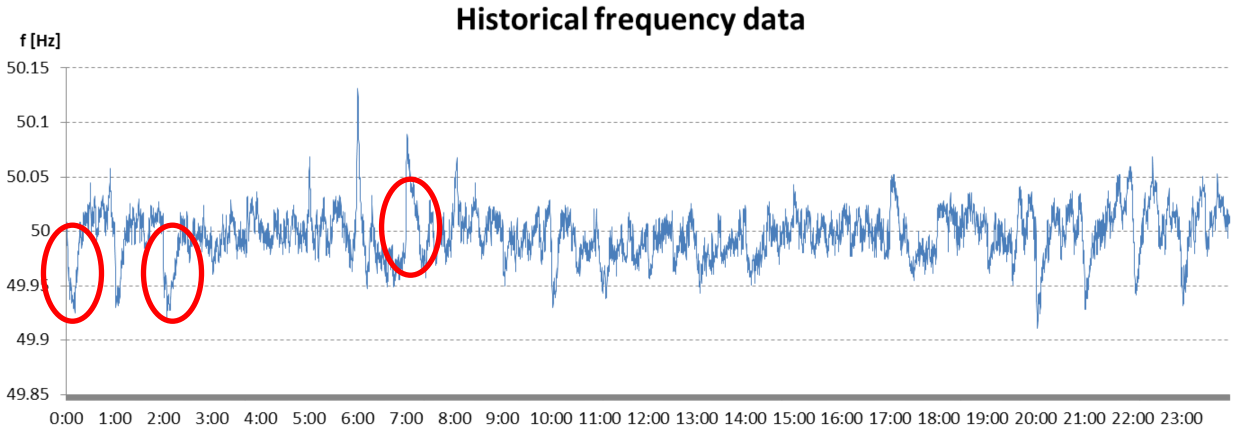
Thanks to this predictability, the phenomena are called deterministic frequency deviations[1].

The deterministic frequency deviations will be analysed starting from the historical frequency data recorded by TSOs in the last 15 years, 2017 included.

A historical deterministic frequency deviation trend shall be calculated starting from frequency data of each synchronous area. As depicted in Figure 2, the deterministic frequency deviation considered in the FCP assessment will be obtained analysing historical frequency deviation and considering the settlement rules of the market.



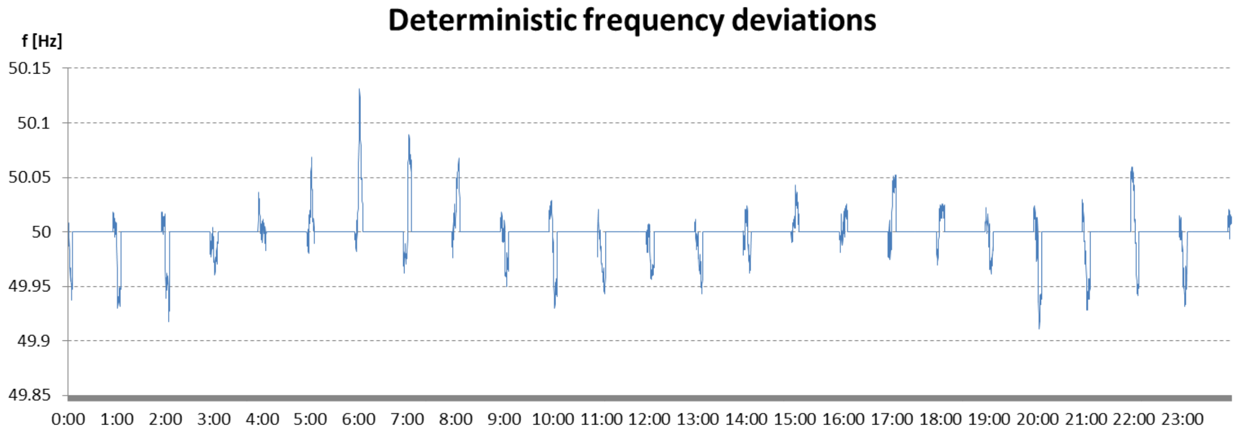


Figure 2: Example of a day trend of historical frequency data and deterministic frequency deviation

The deterministic frequency deviation trend is further analysed in order identify the potential overlap with other phenomena. In particular overlaps with specific recorded outages in the synchronous area shall be identified and eliminated.

Since the outages are taken into account separately via the Monte Carlo approach, the identified actually occurred events shall be neglected.

The deterministic frequency deviation ($\Delta f_{deterministic}$) represents one of the input of the probabilistic simulation model.

[1] ENTSO-E, "Supporting Document for the Network Code on Load-Frequency Control and Reserves", 2013.

5.3 Long lasting frequency deviations

During the operation of each synchronous area, some events in which the frequency deviation cannot be restored to 50 Hz by FRP can occur (even without the triggering of an alert state).
During these events (long lasting frequency deviations) the frequency remains around the standard frequency range over a prolonged period without triggering the alert state.
Long lasting frequency deviations are typically related to the exhaustion of FRR in a single LFC area. It may happen that, due to contingencies on a single LFC area, the total amount of available FRR of that area is activated – this activation can be however not enough to restore the frequency deviation to zero because the dimensioned FRR is less than the power imbalance caused by the contingencies. In this situation part of the power imbalance is constantly balanced by FCR in the whole synchronous area potentially causing a long lasting frequency deviation. The FRR of other LFC areas not affected by the contingencies are unable to restore the frequency deviation to zero because it is not only activated based on frequency.

Considering the exhaustion of FRR by the means of long lasting frequency deviation, allows to avoid taking into account the saturation of FRR in the simulation model block diagram.

This kind of events shall be taken into account since they may overlap with other sources of frequency deviation such as the outages simulated in the Monte Carlo process.

Since the long lasting frequency deviations are unpredictable events, the best way to consider them is via a probabilistic approach.

By analyzing the frequency historical trends recorded by TSOs in the last 15 years, 2017 included, is possible to characterize the phenomena from a statistical point of view.

The analysis will consider as long lasting frequency deviation all the events with an average steady state frequency deviation larger than the standard frequency deviation over a period longer than the time to restore frequency.

Taking into account several years of frequency trends for each synchronous area, the analysis shall determine:

- number of occurrences of these events;
- the typical duration;
- a representative frequency deviation trend.
- typical time of occurrence, if highlighted by statistical analysis.

These synthetic statistical information shall be used as an input for the probabilistic Monte Carlo simulation model.

The Monte Carlo model shall then simulates the long lasting frequency deviations randomly during the year and accordingly to the aforementioned statistical information.

5.4 Model for probabilistic frequency simulation

The frequency simulation model is the main tool to analyze the effects of LER on the frequency compared to the actual operational condition for Load-Frequency Control and Reserves.

The simulation model can be represented as an input-output model as shown in Figure 3

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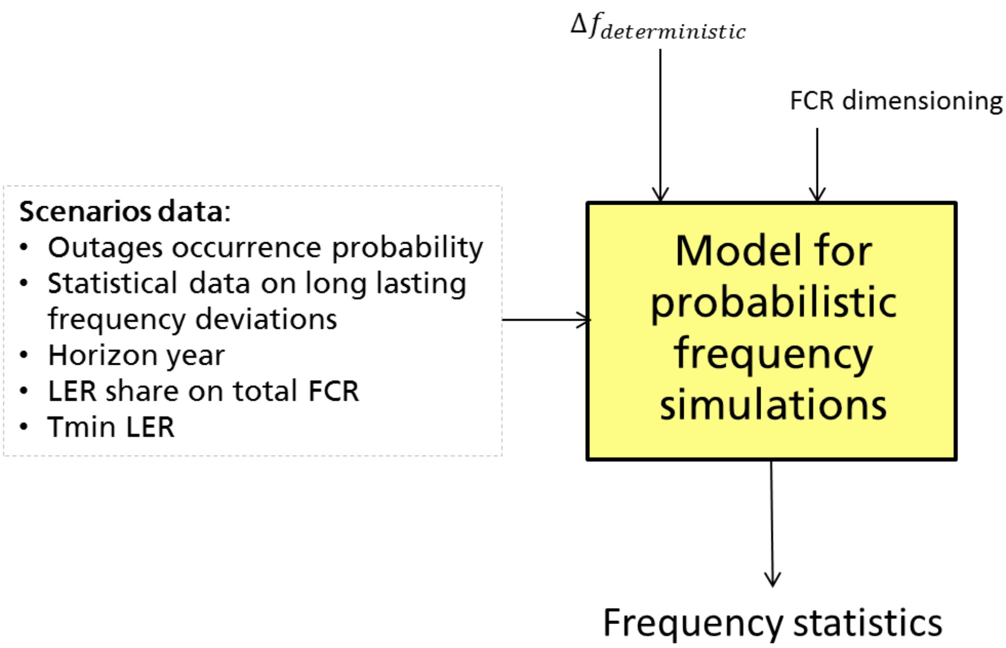

Figure 3

The aim of the model is to simulate the Load–Frequency Control Process adopting a probabilistic approach.

The model shall be able to simulate both FCP and FRP for each synchronous area and therefore to calculate a probabilistic frequency ($\Delta f_{probabilistic}$) in different scenarios.

As discussed in 4.1 the simulations neglect both system inertia and FCR dynamic response, while the steady state FCR effects and the FRR (with its dynamics) are taken into account.

The input data considered for calculating the probabilistic frequency shall be:

- FCR: total amount of frequency containment reserve in the whole synchronous area. The FCR will be reduced when a depletion of LER occurs, since their FCR is no longer available;
- FRR full activation time;
- A list of outages of relevant grid elements which bring to a change in power imbalance. Probability of occurrence of outages by type of event and by generation technology shall be obtained by means of statistics about historical data considering at least:
  - ENTSO-E transparency platform data;
  - Information collected in the LFC report related to the most relevant power imbalances (power imbalances greater than 1000 MW);
  - Research studies based on statistics of unit failure.
- The deterministic frequency deviations as described in 5.2;
- The statistical information related to long lasting frequency deviation defined according to paragraph 5.3.

5.4.1 Monte Carlo approach

The probabilistic approach has the objective to calculate several operational conditions for the Load-Frequency Control Process, taking into account deterministic frequency deviations, the long lasting frequency deviation and the outages effects.

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This kind of approach can be implemented by using Monte Carlo algorithms in which a large number of years are simulated: contingency will then occur depending on their probability.

A schematic workflow for the algorithm is depicted in Figure 4.

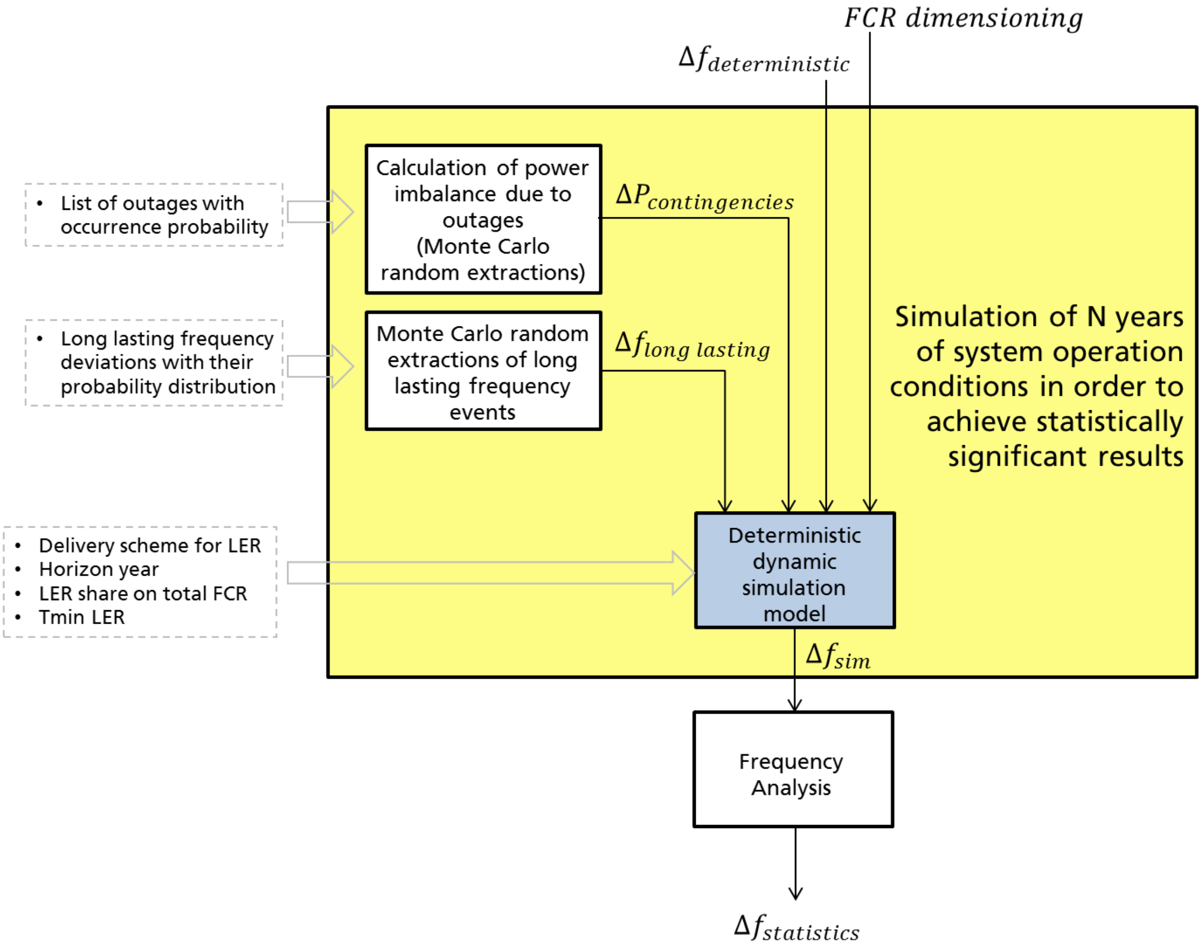

Figure 4 Monte Carlo simulation schematic workflow

The coloured area represents the process that shall be repeated N times in order to simulate the widest possible operational condition of the system. N parameter must be large enough to reach statistically significant results.

Each simulation represents a possible condition of the system over a year.

The power imbalance due to outages is calculated starting from a list of possible contingencies with their own probability of occurrence. There must be a block able to generate randomly the outages taking into account the actual failure rate of each element in the considered list.

The block shall also be able to randomly extract the long lasting frequency deviation events, starting from their typical frequency of occurrence.

Contingency events (combination of outages and long lasting frequency deviation events) will be considered as stochastically independent from each other. This is an approximation of the real system operation, in fact a correlation between outages and significant frequency deviation caused by other factors could occur, e.g. an unplanned outage of a generation unit can be caused by the activation of its under frequency protection, increasing the power imbalance even during critical conditions.

Contingencies and deterministic frequency deviation are input for the deterministic dynamic model (5.4.2) that simulates a simplified load frequency control process calculating the frequency deviation.

Each simulation generates as an output a trend of frequency deviation.

A further block integrates the information from all the simulated years. The decision of whether increase FCR or not in order to compensate a depletion of LER which cannot be outweighed by residual FCR providers will then be made considering all the simulated years in order to be the most representative as possible of all the potential operational conditions that FCP and FRP have to deal with.

5.4.2 Simulation model block diagram

A logical diagram for the simulation model is shown in the following Figure 5.

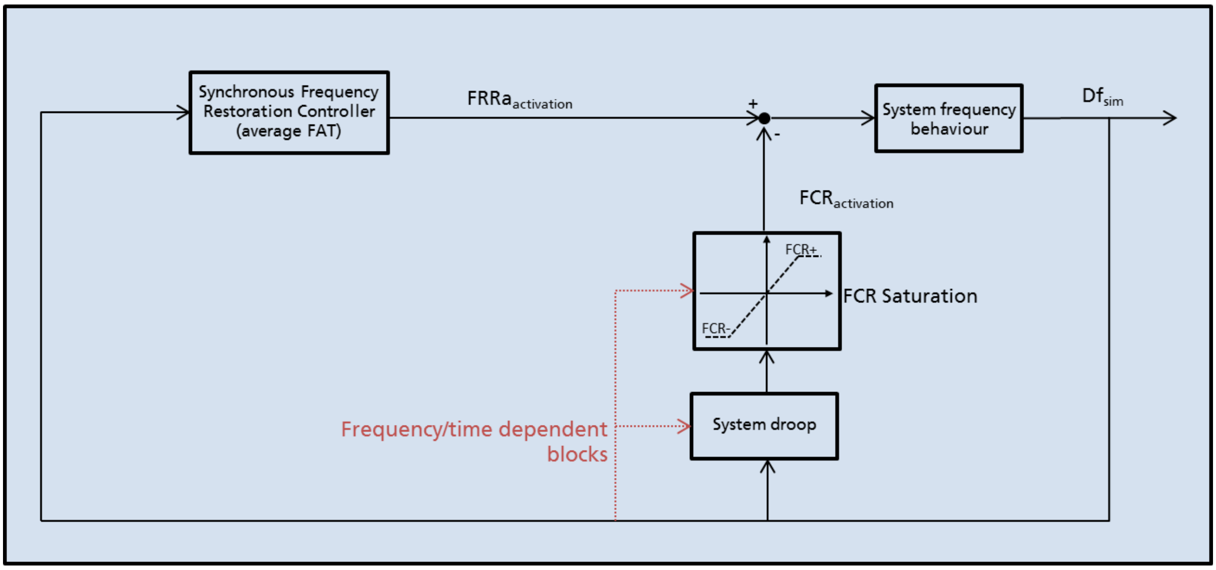

Figure 5

The model is referred to a whole synchronous system. Each block is described in the following paragraphs.

Synchronous Frequency Restoration Controller

The FRP has the aim to control the Frequency Restoration Control Error towards zero. Where a Synchronous Area contains more than one LFC Area the Frequency Restoration Control Error - or Area Control Error (ACE) - is calculated from the deviation between the scheduled and actual power interchange of a LFC Area (including Virtual Tie-Lines if any) corrected by the frequency bias (K-Factor of the LFC Area multiplied by the Frequency Deviation).

Since the implemented model simulates the system of the whole synchronous area the entire Cross-Border Load-Frequency Control Process could be then neglected.

The Synchronous Frequency Restoration Controller models indeed only the proportional–integral action of FRP on frequency error Δf_{sim}.

The whole Frequency Restoration Process of the synchronous area is modeled with a single controller with a Full Activation Time (FAT) calculated as an average of the FAT of all the LFC areas belonging to the synchronous area weighted on FRR K-factor.

The Synchronous Frequency Restoration Controller does not model the saturation of FRR. The resource is considered without limitations since the FRR-exhaustion-related phenomena are taken implicitly into account considering the Long Lasting Frequency Deviation events.

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The simulated FRP operates only on the disturbances caused by the outages as both Standard Frequency Deviations and Long Lasting Frequency Deviations already implicitly involve an activation of FRR. The model shall be developed in order to distinguish the two different kind of disturbance and to activate FRR only in relation to the outages.

FCR Saturation

The saturation block models the limited availability of FCR of the synchronous area.

The FCR saturation values depend on the dimensioning criteria adopted in each synchronous area.

With this block is possible to model the behavior of LER with a defined minimum time period in which they must provide FCR.

This block is then frequency-dependent: if part of the FCR is provided by LER, the saturation values must be reduced once they have depleted the energy reservoir.

System droop

The system droop block represents the global MW/Hz curve of the whole synchronous area.

The curve is the sum of the different MW/Hz curves of LFC areas which are part of the synchronous area.

Also this block is frequency-dependent: if part of the FCR providers is given by LER, the droop varies once they have depleted the energy reservoir.

System frequency behavior

The block models the relationship between power imbalance and frequency deviation.

5.4.3 Simulation of energy depletion of LER

In the SO GL Art.156 (9) is specified that LER must be continuously available during normal state.

The LER are considered without energy limitations while frequency remains inside the standard frequency range.

If a continuous exceeding of the standard frequency range includes the triggering of an alert state, the activated energy and the residual energy in the reservoir is calculated from the first exceeding of the standard frequency range limits.

The residual energy is taken into account even if the alert state is not yet triggered; this choice of implementation is due to the fact that the alert state is triggered after the alert state trigger time.

Considering a generic situation in which the alert state is triggered, the actual trigger of the alert state occurs after a period with a frequency deviation beyond the standard frequency deviation. For example, in Nordic synchronous area, the alert state can occur due to a frequency deviation continuously above 250 mHz for at least 5 minutes.

Considering the Nordic system thresholds as an example, even if the period between the overcoming of ±100mHz and the trigger of alert state can be considered as normal state, it is very unlikely that the LER can keep their energy reservoir fully available in this situation.

The actual energy consumption during this transition from normal state to alert state shall be then taken into account. Figure 6 provides an example related to Nordic synchronous area.

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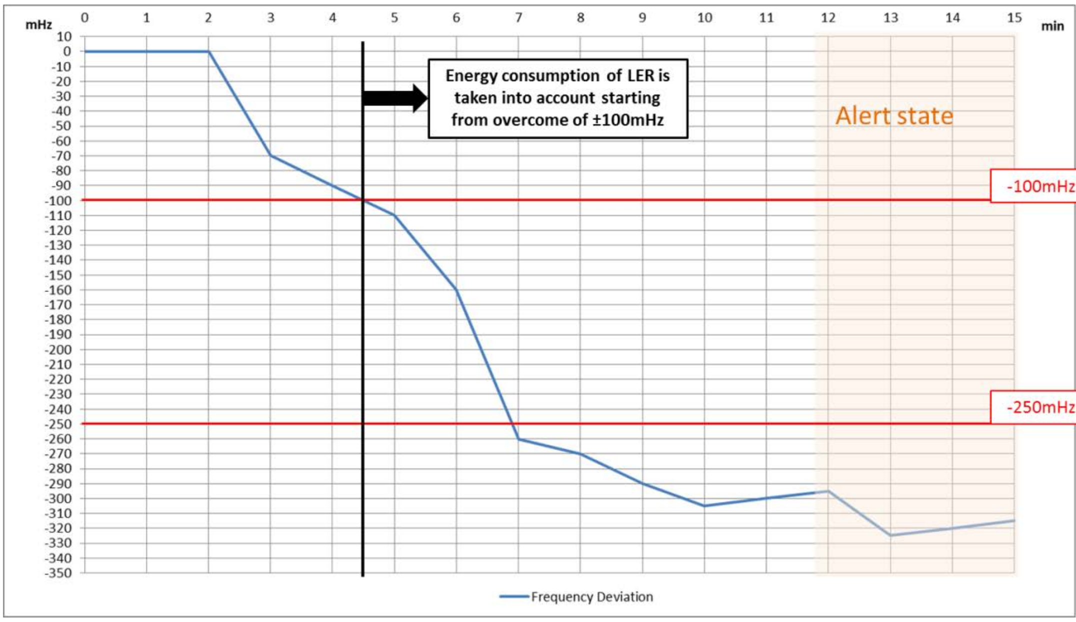

Figure 6: Starting thresholds for LER consumption analysis (Example referred to Nordic synchronous area)

It must be highlighted that taking into account the energy consumption before the actual trigger of alert state does not imply any over dimensioning of the LER reservoir according to SO GL Art.156. The energy provided by LER before the moment in which the alert state is triggered is accounted for in the calculation of the energy requested.

In fact, the time period used in the simulations is reflected in an energy content requested to LER reservoir. This energy content is equal to the full activation of FCR for the time period (e.g. a time period equal to 15 minutes in the Nordic system is reflected in an energy content equal to the provision of FCR due to 500 mHz deviation that lasts for 15 minutes). The energy consumed before the alert state trigger is included in this energy content.

The following Figure 7 provides an example of how the consumption of energy is simulated in the methodology. In this example, if a 15 minutes time period is simulated, the equivalent requested energy (equal to full activation of FCR for 15 minutes) starts to be used once the frequency deviation exceeds the standard frequency range. It implies that the complete depletion can occur before that 15 minutes of alert state have elapsed.

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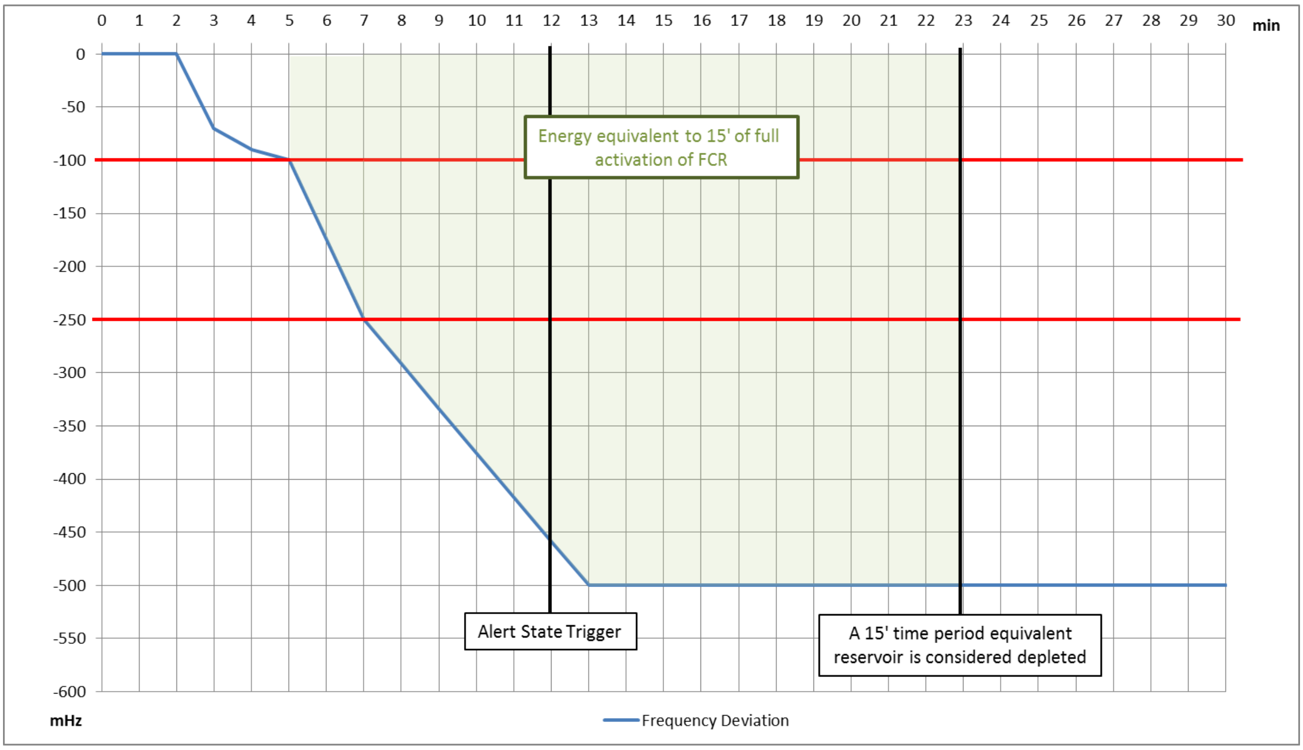

Figure 7: Example of depletion for a 15' equivalent reservoir in the Nordic system

At the full availability of the reservoir, the starting value of energy level will be equal to half of the equivalent reservoir energy capacity. The equivalent energy capacity (E_{max}) is calculated for each time period ($T_{\min LER}$) with the following formula:

$$E_{max} = 2 * \frac{T_{\min LER}}{60} * FCR_{LER} \qquad [MWh]$$

Where FCR_{LER} is the FCR provided by LER [MW].

At the depletion of energy reservoir, the LER stop to provide FCR – it means that both MW/Hz curve and the total amount of FCR on the system are modified.

5.5 FCR iterative dimensioning

The aim of the present CBA is to assess the system costs associated with different minimum time period in which LER must provide FCR considering their impact on stability risk. The simulation model used to calculate the probabilistic frequency error in presence of LER amongst FCR providers is expected to quantify a potential worsening of frequency compared to a condition in which all the FCR providers are without energy limitations.

It is expected that the more $T_{\min\ LER}$ decreases the more it is possible that LER could deplete as a consequence of a particular combination of outages and deterministic frequency deviations.

Due to security reasons, it is assumed that a LER depletion can be acceptable only if it never brings to a saturation of FCR. In other words, a LER depletion shall never entails the steady state frequency to overcome the maximum steady state frequency deviation.

If a LER depletion occurs, the activated FCR provided by LER disappears. This activated FCR must be replaced by residual non-LER providers. The residual non-LER providers must have a sufficient not yet activated FCR to replace the depleted LER activated FCR.

Two generic examples related to CE synchronous area are reported in the following Figure 12 and Figure 13.

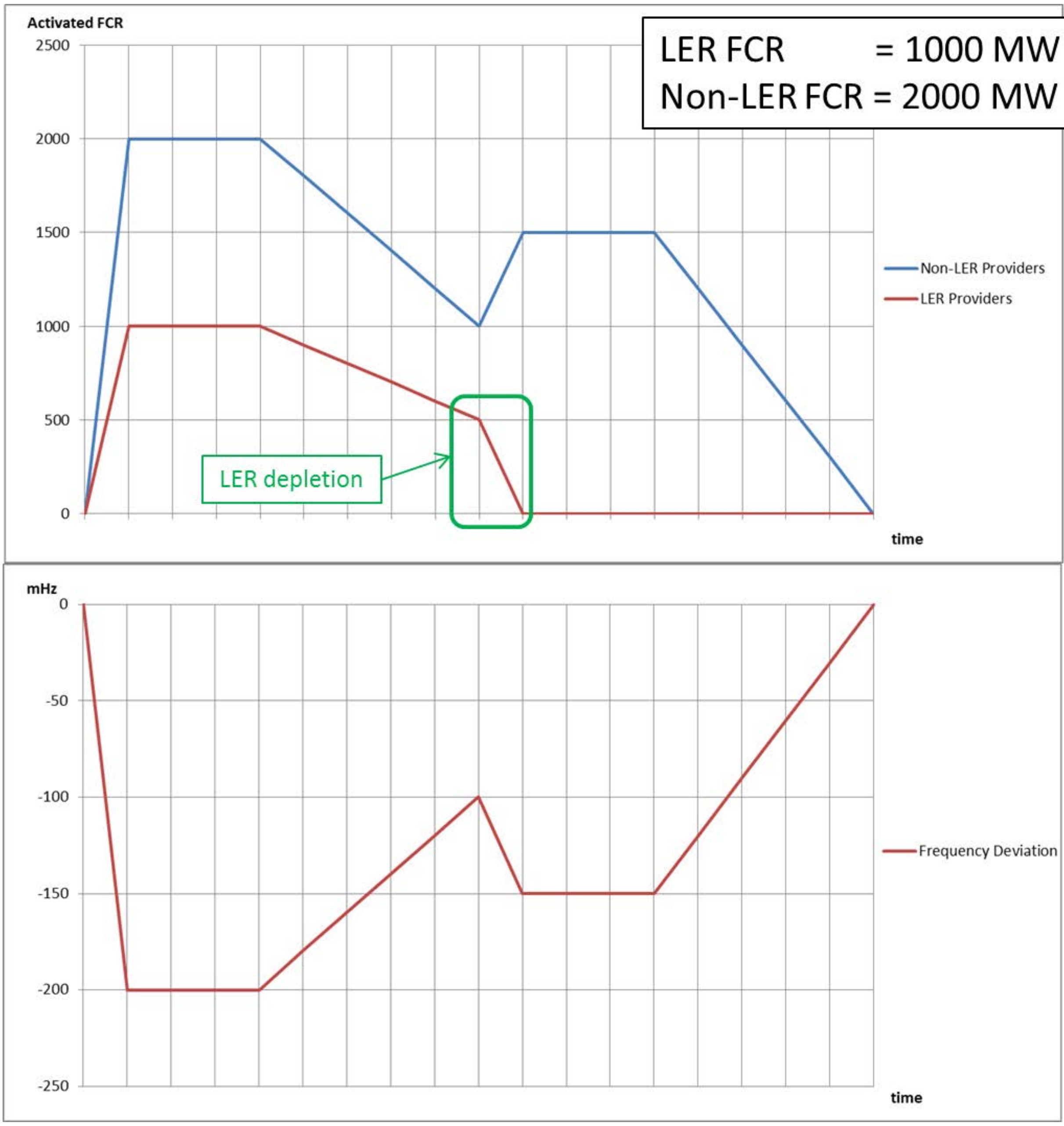

Figure 8: Acceptable situation - depleted LER can be replaced by non-LER

In Figure 12 is shown a situation where the LER depletion is acceptable since it does not jeopardise system stability. There are 1000 MW of LER FCR and 2000 MW of non LER FCR.

The full FCR activation occurs due to a power imbalance. The frequency deviation reaches a stable value equal to maximum steady state frequency deviation (200 mHz in CE).

The FRR starts to restore frequency.

At the moment of LER depletion, the LER are providing 500 MW of FCR. This contribution can be replaced by non LER since these sources are not saturated: the total non-LER FCR is 2000 MW, of which only 1000 MW were activated before LER depletion.

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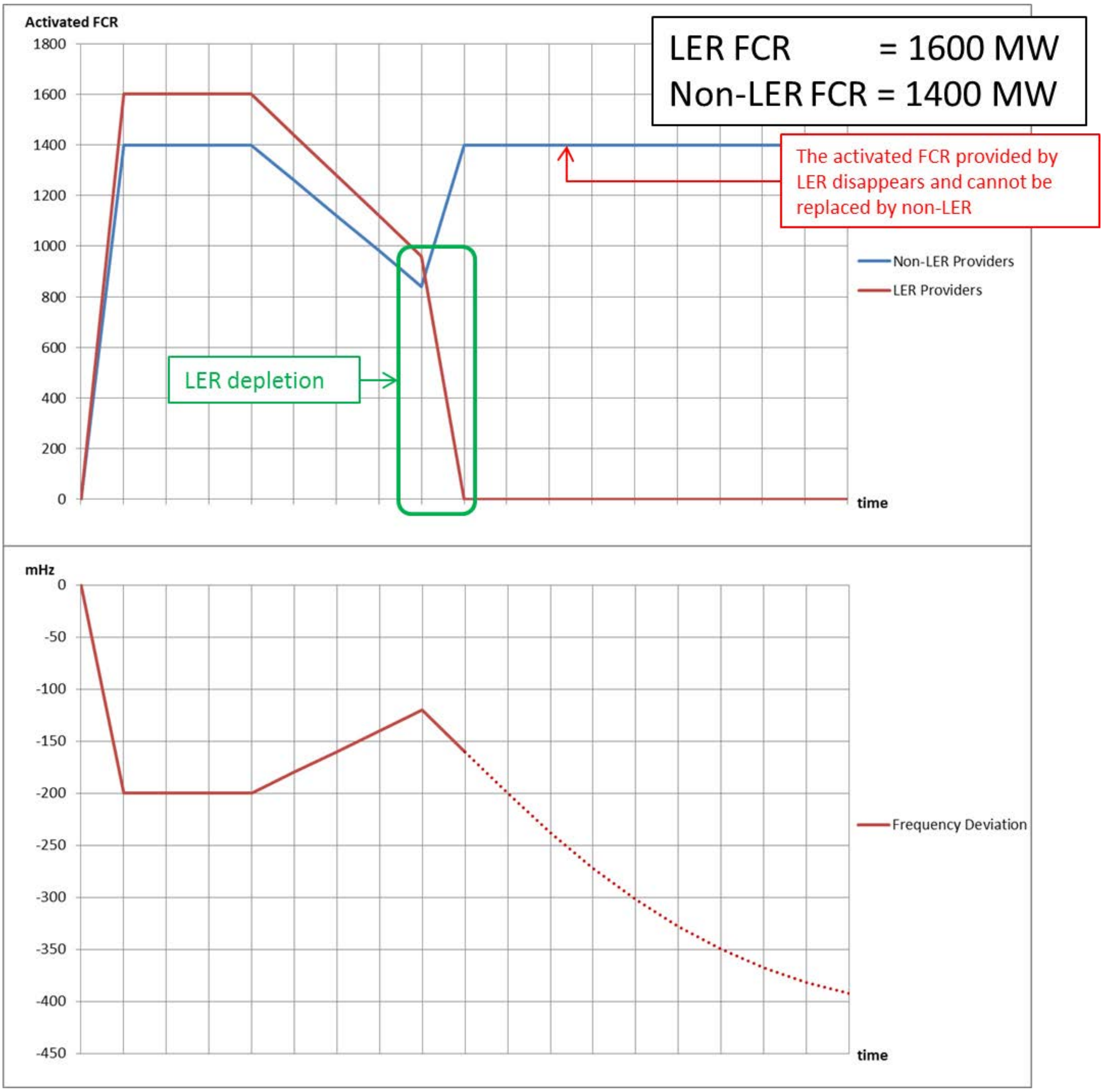

Figure 9: Not acceptable situation - depleted LER cannot be replaced by non-LER

In Figure 13 is shown a situation where the LER depletion is not acceptable. There are 1600 MW of LER FCR and 1400 MW of non LER FCR.

After the full FCR activation and a partial restoration of frequency deviation thanks to FRR, the LER depletion occurs.

At the moment of depletion the LER are providing 960 MW of FCR while the non-LER are providing 840 MW of FCR.

The 960 MW of LER disappears but they cannot be replaced by non LER since they can provide only up to 1400 MW.

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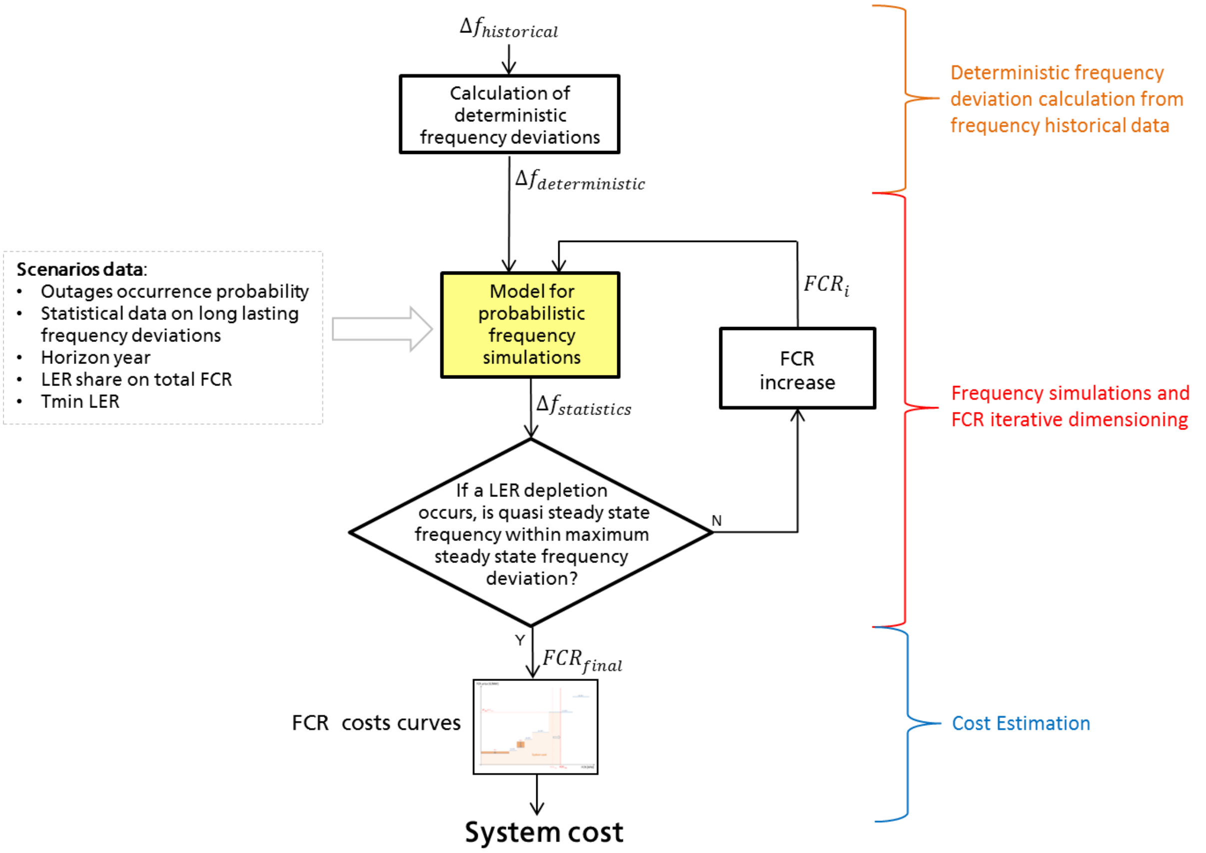
The power imbalance caused by LER depletion cannot be covered by the residual non-LER FCR. As a consequence, the frequency deviation cannot be contained and starts to decrease (partially limited only by FRR activation).

In high LER penetration scenarios, the described requirement entails that an energy depletion must never occur.



The workflow contains an iterative process in which, if the requirements on LER depletion are not fulfilled, the FCR total amount is gradually increased.

The iterative process stops once the requirements on LER depletion are fulfilled.

5.6 Assumption and description of cost estimation

As set out in the European Commission's "Guide to Cost-Benefit Analysis for Investment Projects", the main aim of a CBA is to determine welfare changes. The key concept is to reflect the social opportunity cost of goods and services (in this case FCR), instead of prices observed in the market, which may be distorted.

As stated in the Guide, the main sources of price-distortion are:

- non-efficient markets, where strategic behavior and market power might be present;
- duties and fiscal requirements, which should never be accounted for in CBA;
- administered tariffs.

Hence, within the FCR context, the CBA has to determine if and how system costs change, taking into account a competitive setting, where no forms of distortion are present. For instance, this analytical setting implies that bids are the mere presentation of marginal opportunity costs. Therefore, it is possible that actual market outcomes could differ considerably from the simulations carried out within a CBA.

Furthermore, given that the CBA has a future perspective, the cost curve definition will be based on the long-run marginal cost concept, where all factors of production are endogenous, including investment costs.

To this respect, it is important to highlight that only prospective investments will be taken into account as they have an impact on welfare. On the other hand, investments both in LER and non-LER that have already taken place will be considered as sunk costs.

An increase in FCR entails an increase of system costs that shall be assessed.

The cost estimation related to each $T_{min\ LER}$ in different scenarios is an evaluation of FCR system costs considering the total amount of FCR defined with the iterative dimensioning process.

It is possible that when $T_{min\ LER}$ decreases, a greater volume of FCR is needed to fulfil the stability requirements.

It must be highlighted that the increase in FCR does not directly represents a real option to cope with the limited energy of LER. This approach has only the aim to assess system stability risks and total cost of FCR in case of increasing total volume of FCR as requested by Article 156 (11 d) of the SO GL.

5.6.1 Costs associated to an increase in FCR

An ideal FCR providers' cost curve shall be defined assuming that:

- A competitive FCR market is developed to reflect the costs of FCR provision.
- The offered cost curve perimeter extends to the whole synchronous area without constraints between LFC areas and LFC blocks belonging to the synchronous area.

Both providers with limited energy reservoir (LER) and unlimited energy reservoir (non-LER) are considered in the FCR providers cost curve definition (Figure 10).

A specific cost (€/MW) is then associated to the providers for their available FCR (MW).

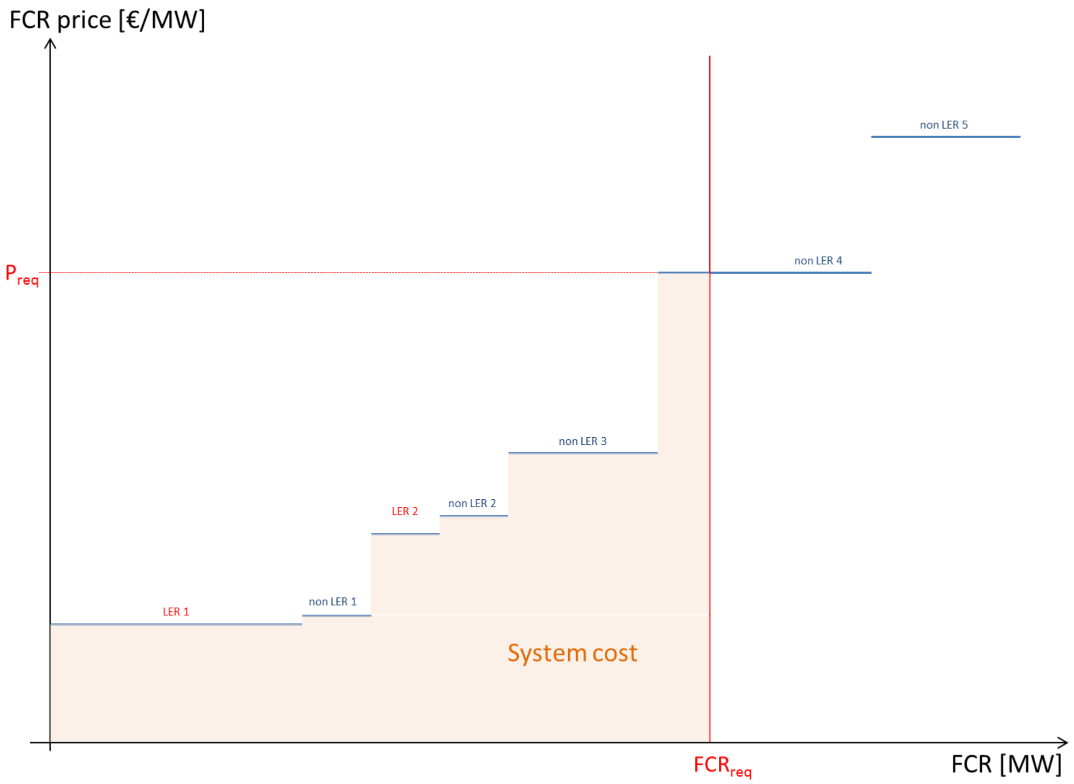


Figure 10: FCR ideal costs curve

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The synchronous area FCR requirements as a result of the iterative process described in 5.5 (FCR_{req}) intercept the costs curve on a generic marginal cost P_{req} and the coloured area of Figure 10 represents the FCR costs of the synchronous area.

A decrease of $T_{min\ LER}$ can have a dual effect on the FCR costs:

- if the system need a larger amount of FCR because of the presence of LER with less reservoir capacity, the required FCR increases;
- a smaller $T_{min\ LER}$ entails lower investment costs for LER, then the costs curve varies: the costs of FCR provided by LER decrease.

These effects are shown in the Figure 11.

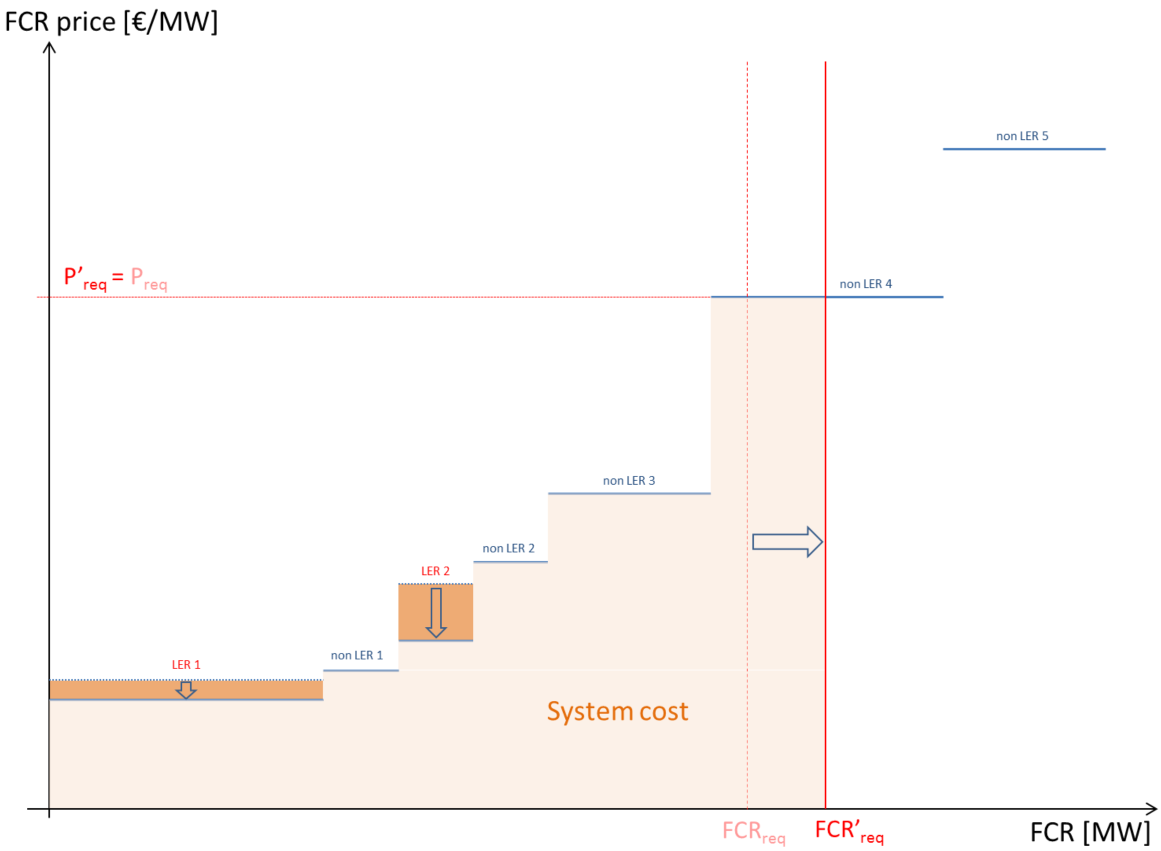

Figure 11: FCR ideal costs curve with a decrease of Tmin LER.

A higher $T_{min\ LER}$ entails both a potential reduction of FCR cost (due to the lesser increase of FCR volume needed) and an increase due to higher costs of LER (related to greater investment costs).

The global effect on the total cost is indeed related to the combination of these two separated effects.

It should be noted that these effects take place even without an actual variation in the FCR marginal cost.

The dependence between $T_{min\ LER}$ and system costs must be deeply investigated to find out the $T_{min\ LER}$ that minimise the total FCR costs.

The main aspects that should be taken into account to describe this dependence are:

- the relationship between $T_{min\ LER}$ and required FCR. The required FCR is the value resulting from an iterative process and is dimensioned in order to avoid stability issues in presence of LER.

- A significant FCR market costs curve for both LER and non-LER on a whole synchronous area. (5.6.1.1).
- The costs variation of LER as the $T_{min\ LER}$ varies. This variation can be related to the increased cost of investments due to greater $T_{min\ LER}$ (5.6.1.2)

5.6.1.1 FCR costs curve

Conventional non-LER plants costs

This kind of approach is very useful since in this way it is possible to model the costs of non-LER FCR providers (hydro and thermoelectric plants) in terms of:

- Energy price;
- Marginal production cost.

All the providers without energy reservoir limitations are considered as conventional FCR providers– these kind of producers typically operates on both ancillary services (e.g. FCR) and energy markets.

There is a relationship between the quantity that these providers can offer on ancillary markets and the energy that they can offer on the energy market.

The costs of ancillary services are then related to the price of energy as traded on energy market.

The typical relationship between the FCR costs and the marginal production costs is shown in Figure 12.

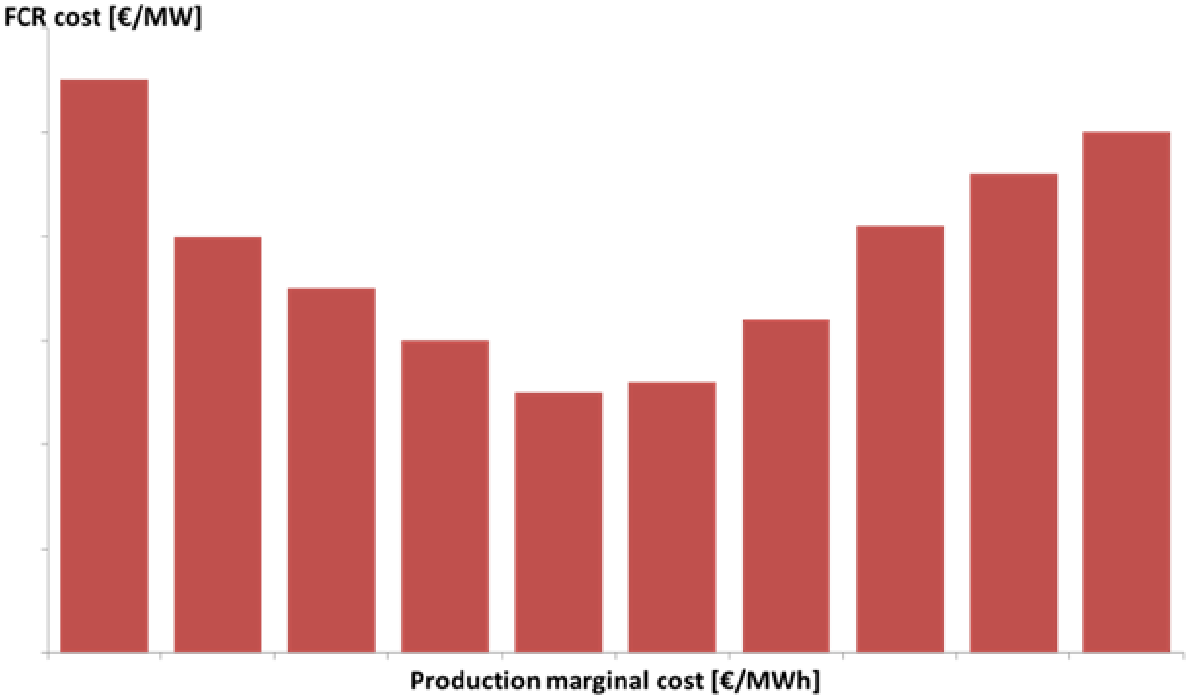

Figure 12: Dependence between FCR cost and variable cost for conventional plants

The FCR cost has a minimum value in correspondence to the marginal energy price (as determined on the energy market). In Figure 12 the energy price is then around the central columns.

The illustrated cost structure can be explained considering that FCR is a symmetrical service: providers must run their plants at a power level from which it is possible to decrease and increase power output of an amount equal to the FCR capacity. This entails a constraint in terms of power that can be sold on the wholesale energy market.

A low-variable-cost plant should sell as much energy as possible if the energy price (EP) is higher than its marginal costs (MC). This implies running the plants at their maximum power output.

Selling FCR would reduce the energy sold on the market; thus the FCR cost can be calculated as the hindered margin related to this reduction.

The cost per unit of the margin is:

$$EP - MC$$

This is also the cost associated to the sale of FCR service for low-variable-cost plants (left columns in Figure 12).

The relatively high-variable-cost plants (right columns in Figure 12) are in the opposite conditions when the energy price is lower than their marginal costs.

Neglecting the technical minimum output, these plants are out of the market and should be kept off (zero power output). Selling FCR would mean running the plants at least at the offered FCR capacity (in order to guarantee the downward reserve). It entails an economic loss equal to the difference between plant's marginal cost and energy price:

$$MC - EP$$

This value can be considered as the cost per unit of FCR for those type of plants.

If the minimum output (MO) is taken into account, the provider must run its plant at a higher power output (MO + offered FCR) – resulting in a higher economic loss and indeed to a FCR cost per unit higher than MC – EP.

Since the decision to run or not a relatively high-variable-cost plant during low energy price periods is made taking into account several factors (the possibility to sell FCR is just one of them), the economic loss related to the production of minimum output should be only partially charged on FCR cost.

Based on the previous considerations it is possible to assume that the most economic non-LER are those with marginal costs closer to energy price.

LER plants costs

As anticipated above, the FCR cost for LER shall be calculated as follows:

- The FCR cost for future installed LER shall be calculated considering: investment, OPEX and opportunity costs (if any). These contributions shall be considered only if they are sustained in order to qualify for FCR provision.
- The FCR cost for already existing LER shall be calculated considering: OPEX and opportunity costs (if any). These contributions shall be considered only if they are sustained in order to qualify for FCR provision.

For both new and existing providers, costs will differ according to the defined time period requirement.

An illustrative trend of LER FCR cost is reported in Figure 13.

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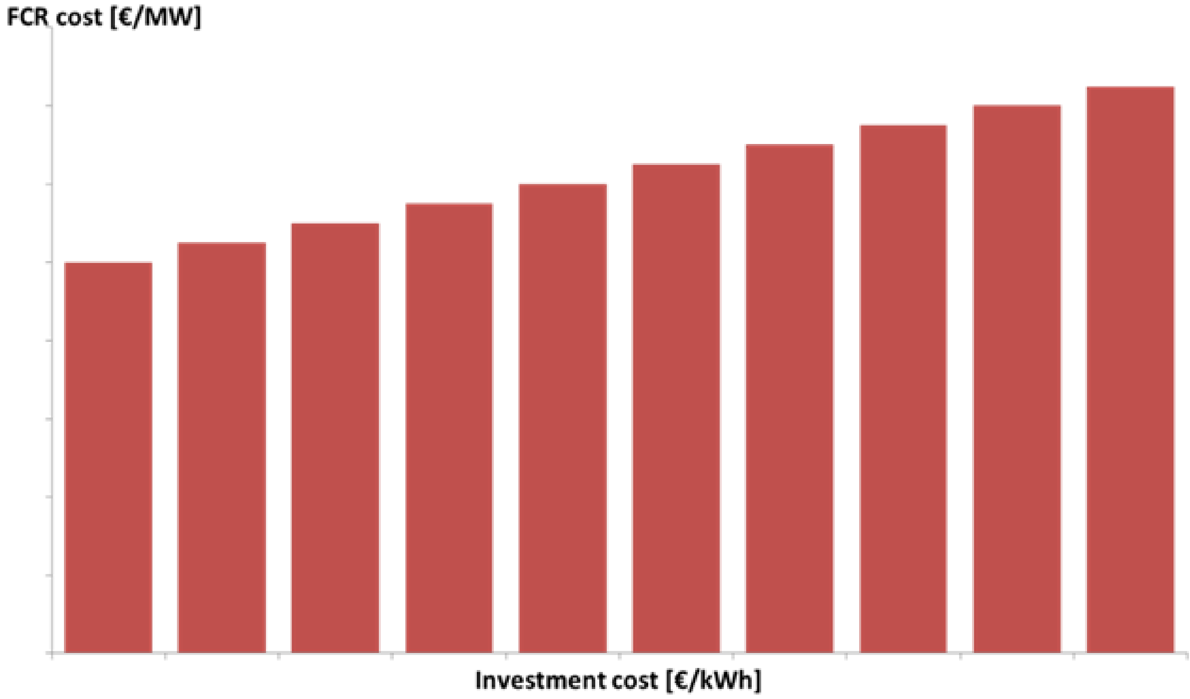

Figure 13: Dependence between FCR cost and investment cost for LER plants

The cost estimation will be performed in the methodology considering at least the following LER technologies:

- Pumped storage;
- Battery Energy Storage System (BESS), including electric vehicle batteries provided with V2G technology;
- Other limited energy technologies (e.g. flywheels and supercapacitors) will be considered if their energy storage capacity can fulfil at least with the minimum time period (15 minutes).

Also the evolution of the costs will be investigated and considered in the different scenarios (as detailed in 5.7).

It is possible to investigate also LER that can provide other services beside the FCR, such as electric vehicles frequency response, battery systems coupled to PV/Wind plants, etc.

In those cases the plants are developed for services that are different from providing FCR. The investment costs should be then only partially charged on the FCR costs.

On the other hand, for those plants providing FCR implies allocating part of the power and energy capacity to this specific service, resulting in a reduction of the power and energy capacity available for their "main assignment". This reduction results into costs that should be charged on the offered FCR.

Offering quantity

It is possible to associate an available FCR quantity for each different conventional technology (nuclear, coal, lignite, CC gas turbine, hydro, battery, etc.).

The available FCR quantity is related to:

- the possibility of each different technology to provide FCR in compliance with technical requirements (i.e. deployment dynamic).
- the installed power for each different technology, which can change in future scenarios.

Building of FCR market curve

Taking into account the previous considerations, it is possible to build a cost/quantity curve for the synchronous area by ordering all the cost/quantity pairs.

The data required to build the curve are:

- Energy market results (energy market prices);
- An estimate of production marginal costs of the different generation technologies installed in the synchronous area;
- An estimate of the costs for LER plants.

5.6.1.2 Dependence of LER FCR cost from minimum time period ($T_{min\ LER}$)

If the $T_{min\ LER}$ increases, the LER must be equipped with a larger reservoir or must reduce its ratio between offered FCR and energy reservoir. This requirement has an effect on the cost of FCR provided by LER plants, since it entails a greater investment cost or reduced revenue from FCR market (Figure 13).

This dependence shall be further investigated in order to distinguish between already existing plants (which can only adapt their energy/power ratio) and future plants (which can invest in larger reservoirs).

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5.7 Scenarios description

Scenarios are defined to represent potential short term developments of the energy system and regulations. Scenarios are also defined in order to address uncertainties and assess the impact of different assumptions which can affect the results of the cost-benefits analysis.

The present CBA will explore different scenarios in terms of share of LER in the FCR provision mix. The share of the LER can be affected by the cost effectiveness of LER but also by other factors, such as the presence of a market based procurement of FCR, or other technical and regulatory impacts on LER deployment. For this reason, the proposed approach is to analyse different shares of LER in the FCR provision mix (10-100% range with 10% discretization).

For each time period, all the different possible LER shares shall be analysed, resulting in the set of combinations summarized in Table 1:

		LER share on total FCR providers									
		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
T_{min} LER	15 min										
	20 min										
	25 min										
	30 min										

Table 1 Different combinations of LER share and Tmin LER to be assessed in the CBA

The workflow described in paragraph 5.1 allows to calculate for each combination both FCR dimensioning [MW] and its costs [€].

5.8 Assessment of power system stability during the most relevant real frequency events in presence of LER

According to Article 156(11 d) of the SO GL, shall be considered also the LER impact on system stability risks for each synchronous area.

The probabilistic approach aforementioned has the aim to assess the effects of LER depletion on a wide set of possible system conditions as calculated by the Monte Carlo method.

The model used for the probabilistic approach is a simplification of the real power system – it neglects important phenomena (such as lines overload, voltage problems, etc.) that only a complete synchronous area dynamic simulation could take into account.

Indeed, there are certainly important possible sequences of events that cannot be tested with the proposed Monte Carlo simulation also because the historical period of observation does not guarantee an adequate probabilistic representativeness of those rare occurrences.

In order to test the LER effects at least in some of these possible sequence of events, it is needed to simulate the most important actual grid disturbances that each synchronous area experienced in the past 15 years.

For Continental Europe, for example, it will be tested the system disturbance on 4 November 2006 and 28 September 2003 blackout in Italy (for the effects on the rest of the system).

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During these events the FCP had a crucial role in avoiding a further deteriorating of the system conditions and in help to restore the stability.

Since these extreme working conditions are possible, it is fundamental to assess how the system with LER would react.

This assessment shall be done testing the system with LER on the same frequency conditions that occurred in the past. In other words, the real grid disturbances shall be simulated considering the presence of LER and assessing how the potential energy depletion would have affected the frequency.

The real frequency data recorded during the events shall be used as an input of the simulation model described in 5.4.2; it shall be verified if the LER would have been depleted during the disturbance and if this depletion would have been the cause of further critical worsening in the power system conditions.

		LER share on total FCR providers									
		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
T_{min} LER	15 min	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
	20 min	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
	25 min	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
	30 min	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Table 2 Assessment of power system stability during the most relevant real frequency events for different combination of LER share and Tmin LER – Pass/fail condition (Y/N)

Each combination of LER share-$T_{min\ LER}$ reported in Table 1 shall be tested on these events. For each scenario, the result of the test shall be a pass/fail (Y/N) condition.

The combination of LER share-$T_{min\ LER}$ passes the test if it does not endanger system stability in the most relevant real frequency events simulations. If the combination of LER share-$T_{min\ LER}$ worsens operational security potentially leading to a blackout state during these events the LER share-$T_{min\ LER}$ combination will not be considered acceptable (fail condition).

Only the LER share-$T_{min\ LER}$ combination which passed the assessment of the most relevant real frequency events are taken into account for the identification of the best combination, adopting as a criteria for selection the lowest FCR cost.

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5.9 Determination of Time Period

According to Article 156 (11), by 12 months after approval of the assumptions and methodology contained herein by all regulatory authorities of the concerned region, the TSOs of the CE and Nordic synchronous areas shall submit the results of their cost-benefit analysis to the concerned regulatory authorities, suggesting a time period which shall not be greater than 30 or smaller than 15 minutes.

The suggestion shall be made in accordance to the results of the methodology in terms of LER share and FCR dimensioning / costs (Table 1). In addition the proposed time period shall also consider the results in terms of system stability (Table 2): the suggested time period shall not jeopardise the system stability during the most relevant real frequency events.

If the assumptions adopted in the cost benefit analysis will significantly change after entering into force of the time period, all TSOs of the CE and Nordic synchronous areas shall submit the results of an updated cost-benefit analysis to the concerned regulatory authorities, suggesting an updated time period which shall not be greater than 30 or smaller than 15 minutes.

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Answers and clarifications to the comments received during the public consultation of the proposal for assumptions and methodology for a Cost Benefit Analysis (CBA) compliant with the requirements contained in Article 156(11) of Commission Regulation (EU) 2017/1485 of 2 August 2017

28 February 2018

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Summary

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1. Introduction

The public consultation on "All Continental European and Nordic TSOs' proposal for a Cost Benefit Analysis methodology" was carried out from 10th January 2018 to 18th February 2018, through announcement on ENTSO-E website. This consultation concerns the proposal on the assumptions and methodology for a cost-benefit analysis to be conducted, in order to assess the time period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state, developed in accordance with article 156(11) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SO GL). The public consultation on this proposal is requested according to SO GL procedures and represents an important step to improve the quality of the outcome and to consider the perspectives of the interested parties. For this reason, the TSOs thank all the stakeholders who have reviewed and answered the consultation document with their constructive feedbacks. The TSOs carefully considered all comments which were provided and updated the methodology in light of the proposed changes and comments. This document includes all the answers to stakeholder comments raised in the public consultation, providing a sound justification for including or not the views of the stakeholders within the methodology.

LEGENDA:

Comment by stakeholders

Answer or clarification by All TSOs

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2. Comment by: SwissGrid

Draft of Swissgrid feedback for the public consultation regarding the Cost Benefit Analysis methodology for Limited Energy Storage units delivering FCR

As per the methodology proposed, statistical analysis of long lasting frequency events is an input.(slide 12 public workshop).

Article 157, Paragraph C of SOGL states:

"all TSOs of a LFC block shall determine the ratio of automatic FRR, manual FRR, the automatic FRR full activation time and manual FRR full activation time in order to comply with the requirement of paragraph (b). For that purpose, the automatic FRR full activation time of a LFC block and the manual FRR full activation time of the LFC block shall not be more than the time to restore frequency"
As per Table 1 „Frequency quality defining parameters of the synchronous areas" of SOGL the time to restore frequency is 15 Minutes.
The question arises as to why long lasting frequency events should occur when the full activation time for FRR is 15 minutes.
Improper FRR delivery is one of the major reasons for the long lasting frequency deviations. If long lasting frequency deviations are being used as a input for dimensioning FCR availability time, this means that FCR product is indirectly bearing the cost of improper FRR product activation.

Suggestion: In the methodology when the input long lasting frequency deviation is considered it should first be determined why this deviation occurred and if it is due to incorrect FRR activation, then this input should be modified accordingly.

SO GL art 156 (11) requests considering prolonged or repeated frequency events. The frequency statistics of the last years doesn't shows a clear trend of better frequency quality in terms of long lasting events, hence it is proposed, in order to properly reflect the present scenario, not to mitigate the statistics of the frequency.

FCR acts independently by FRR and it is the most important, the first and the last line of defense of the power system available to TSOs. We acknowledge that there may be solutions to improve long lasting frequency deviations and deterministic frequency deviations, but until we see a significant improvement, we cannot exclude these events. It's not our intention to let FCR play the role of FRR or other balancing reserves, since it shall able to face this kind of events.

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3. Comment by: Axpo Trading AG

We thank ENTSO-E for the opportunity to comment on the proposal for a Cost Benefit Analysis methodology in accordance with Article 156(11) of the System Operation Guideline Regulation. We do not have specific comments on the methodology itself, however, we would like to emphasize the risk associated with production units with limited energy reservoirs (LER) in the FCR market. Given the importance of FCR, the main target should be operational security, also in case of system stress. The analysis should not only focus on disturbances occurred in the past, but also on potential future stress scenarios, such as several large outages within a short time period. Today, existing sources can supply enough FCR with high reliability at low costs. The inclusion of LER should therefore be treated with caution, we specifically see an activation period smaller than 30 minutes as critical. While the inclusion of LER may reduce procurement costs, it should not come at the expense of system security.

We get the rationale of the comment; the proposed methodology has indeed a twofold approach:

The probabilistic approach aims to simulate a wide set of possible system conditions as calculated by the Monte Carlo method (considering also the possibility of several events in a short time period, if this condition is highlighted from a probabilistic perspective);

Risk assessment check during the most relevant real frequency events, since there are complex sequences of events which can lead to significant power imbalances that cannot be investigated by means of probabilistic simulations

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4. Comment by: Swisscom Energy Solutions (tiko)

We have three different comments on the consultation document and the proposed cost-benefit-analysis in accordance with Art 156 (11) of the Commission Regulation 2017/1485 of 2 August:

First, it is not clear what «FCR providing units or groups with limited energy reservoirs» means. The Commission Regulation 2017/1485 of 2 August 2017 does not contain a definition concerning «units or groups with limited energy reservoirs». The consultation document does not contain a definition either. It seems to us, that this is an essential gap to be filled.
Swisscom Energy Solutions thinks that not only batteries have a limited energy reservoir, but also hydro-power plants, biogas plants, and others. Without a proper definition, 95% of the FCR providing units in Switzerland could be seen as "units or groups with limited energy reservoirs», as almost all of the FCR production comes from hydro-power plants. Both (pumped) storage power plants and run of river power plants do not have unlimited energy reservoirs. If the hydro power plants are seen as "FCR providing units or groups with limited energy reservoirs», they would also have to fall under the cost benefit analysis.

We acknowledge the comment; TSOs of CE and Nordic are working in order to clearly define LER FCR provider.

According to Commission Regulation 2017/1485 Art. 156 (11) the cost-benefit analysis shall take into account at least "(e) the impact of technological developments on costs of availability periods for FCR from its FCR providing units or groups with limited energy reservoirs». The cost-benefit analysis would have to take into account the technological advances for storage technologies like batteries but also those linked to the hydro power plants.

CBA is technology neutral as it considers all kind of technologies representing LER, not only batteries. Methodology will analyze a short-term scenario: in our opinion the proposed approach for non-LER costs calculation is then adequate to reflect the FCR costs for those technologies. A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

Second, the cost-benefit-analysis would have to address the implications of any modifications concerning the FCR market for the aFRR market.
Article 6 «Simulation scenarios» of the common proposal foresees that simulation scenarios shall include all the combinations of the following assumptions:

Time Period
LER Share
Time horizon

Swisscom Energy Solutions thinks that a fourth dimension (d.)) has to be considered: the one of aFRR. There is no doubt that the FCR activation time will have an influence on aFRR activation and related cost. Therefore Swisscom Energy Solutions thinks that all the analyses shall be performed considering also the influence of the FCR activation time on aFRR activation and related cost.

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As described in the proposal the aFRR will be considered in the dynamic model without saturation. The FAT of FRR will be a weighted average of the FATs among LFCBs of each SA. A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

Third, the model of the influence of the activation time on the bids (section 5.6.1 in the explanatory document) has to take into account also the bid size, not only the bid price. If the activation time is increased, it affects not only the bid price but also the bid size. Depending on the technology, the influence of the activation time on the possible bid size can be much stronger than on the bid price. The following figure should outline this dependency (compare with Fig. 9 and 10 in the explanatory document).

The dependency FCRLER = f (1/TminLER) becomes obvious when analyzing the equation on page 16 of the explanatory document:
From E_"max" =2 T_("min" LER)/60 〖FCR〗_LER we get 〖FCR〗_LER= 〖60E〗_"max" /(2 T_("min" LER)).
We can confirm for our technology and market experience that the LER capacity (and therefore the bid size) decreases with increased activation time.

For existing LER FCR providers, methodology will also take into account the possibility to reduce the FCR amount offered

We thank you very much to take into account the three points when considering the cost-benefit-analysis in accordance with Art 156 (11) of the Commission Regulation 2017/1485.

Best regards
Kátrin Schweren
Head of Regulatory and Public Affairs
Mob. 0041 79 237 46 30

And

Martin Geidl
Head of Energy Services

PS: if there is a problem to see the graph and the formulas we used, we would be grateful to be able to send our contribution as a pdf to an email adress that you indicated to us.

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5. Comment by: Compagnie Nationale du Rhône

1) Presentation of our company LER Renewable Energy Hydraulic Power, supplier of FCR:
Compagnie Nationale du Rhône, CNR is a renewable energy company of the Rhone River. We operate with our type of hydraulic power that is a stream hydraulics power/ run of river hydros. So the FCR is providing by groups with limited energy reservoir (LER). The maximum and minimum water levels of each of the tanks must be respected in the regulatory framework for operation and for hydraulic safety. The primary source of energy that is water is available depending on weather conditions, tributaries and hydraulic inputs coming from Switzerland. Regulatory operating constraints must be respected.
CNR is the second-largest French supplier of primary reserve (45-50MW on average [0 to 110MW] following the flow because of our units run of river hydros. Each plant has 4 to 6 units and each unit is ~ 30 to 70MW).

2) FEEDBACK
a) Introduction:
FCR of CNR is therefore a LER renewable energy.
CNR wishes to play a leading role as renewable energy company in Europe and in line with the European objective to facilitate the integration of Renewable Energies.
The subject around "assessing the time period required for FCR providing units or groups with limited energy reservoirs (LER) to remain available during alert state" is a very impacting and critical subject for CNR and may appear as discriminant.

b) Summary:
Strong and real concerns exist by the assumptions made that led to the configuration of this study and the structure, the "theoretical" definition of the alert state, the feeling of not taking into account the Renewable Energy LER Hydraulics with their regulatory constraint of exploitation / safety and primary source "not loadable according to certain constraints" (unlike a battery), the question on the concrete use of the result which will emerge from the model of which the assumptions of starting-looping and the definition of "state alert" structure by essence the result.
Below our detailed remarks.

c) Assumptions made that led to the configuration of this study and which structure and remarks on the input assumptions for the model:
As we have explained above, the observation of an average frequency during the time of the day or in the day other than 50 Hz can not in any case lead to the conclusion that the FCR adjustment must be increased with, for example, a duration of 30 minutes. On the contrary, this finding should lead to the conclusion that secondary and / or tertiary adjustments, in particular, have failed.
As a reminder: with the current frequency of evolution (except “200mHz”), the limited energy of the LERs is used and reconstituted and beyond a duration of 30 min (because limit not reached) and so far the frequency drifts identified really exist, which supports the thesis of a problematic on secondary / tertiary reserves. Increasing the technical specification of the primary control behavior is not a solution to the problem and discriminated against the FCR in relation to the real role that the secondary reserve aFRR

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(which acts in 200s (3.5 min) in full regime) should bring and tertiary mFRR / RR (which acts from 12 min) to restore the frequency to 50Hz.

Thus the historical frequency that will be used to determine input frequencies of the model integrates the issues that are not only the mainspring of the primary reserve. On the contrary, the failure of the secondary and tertiary adjustment leads to requesting the primary adjustment beyond its actual technical specifications. The conclusion that could therefore appear is the need to use the primary reserve (and therefore the increase in the duration Tmin LER) to compensate for the lack of secondary and tertiary reserve.

On the other hand, this dysfunction of the secondary reserve (with the coordination-coherence between TSO which improves recently) / tertiary (or also FCR volume too low with 3000 MW for Europe if the secondary and tertiary reserve do not make their role) leads our LER plants (like the non-LER ones) to already participate in more time than they should (current case within the overall volume of LERs for a current frequency <200mHz, see previous paragraph).

This observation is even more visible with the frequency taken in real and not in global statistics as the model suggests.

There is therefore an important bias to look only at the resolution of frequency deviations through the FCR by making it play the role of secondary and tertiary reserve! without paying for it and while strongly constraining some FCR sectors beyond their possibility (which may cause them to disappear like the LER run of river hydros with regulatory technical constraints and subject to external conditions). Basically this breaks down the very basis of the scheduling and the various balancing reserves (FCR-aFRR-mFRR-RR) and brings a non-coherence in the simulation that will denature the FCR and thus incite to increase the Tmin LER.

FCR acts independently by FRR and it is the most important, the first and the last line of defense of the power system available to TSOs. We acknowledge that there may be solutions to improve long lasting frequency deviations and deterministic frequency deviations, but until we see a significant improvement, we cannot exclude these events. This does not imply that FCR shall play the role of FRR or other balancing reserves, since it shall able to face this kind of events.

d) Hypotheses taken for the state alert, the looping of the algorithm on this subject and the output of digit result for "the time period required for FCR providing units or groups with limited energy reservoirs (LER)" "

We note a misunderstanding and a non-coherent / unacceptable result with the type of calculation "alert state".

For example, following the definition of the state alert if the start of the state alert is declared only during a continuous frequency at 99mHz after 15 min (alert state definition => 50mHz -15min or 5min if> 100mHz) then compared to currently for the same energy 200mHz-15min, we will have started (with 99mHz after 15 min) already half of the energy of the LER and without counting for the alert state !! inconceivable !!

Continuing this example if after the 15 min at 99mHz, we have 200mHz then with the same energy / requirement / volume than today (200mHz-15min) we would hold 7.5min (because volume 15min to

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99mHz already done). But in the context of this definition "alert state" we would have done only 7.5 min of alert state and if we must hold for the alert state 15 min we should double volume compared to today or if it was necessary hold 30 min, quadruple the volume !!
On the one hand it is not conceivable for LERs constrained by default by the external and regulatory context and on the other hand one is authorized to create discriminating and unacceptable rules for the FCR because modifies the coherence of the balancing products (FCR-aFRR which intervenes in full power from 3.5 min and tertiary from 12-15 min as described previously).
There is therefore a fundamental problem of definition adapted to the duration itself for the state alert and thus directly impacting the result to be applied which could leave the model.

It should be noted that the implicit observation of this problem was made in the ENTSOE document of the consultation by integrating into the calculations a phase of pre-alert! before the beginning of the declaration of the alert state and where the energy of the LERs was demonstrated already used (cf page 16) but without counting it in the duration of use for the state alert !!
We find the same observation with the default 5 minutes that are not counted for the state alert even if the energy / volume will be used for 200mHz. If the result of the model leads to be at 30 min, it will actually be at least 35 min even if it was 200mHz all the time instead of the current 15min, 2.33 times more!
In the context of this example, we can note that this evolution from 15min to maybe 35 min ("implied" 30 min in the texts but in reality 35 min) for the LERs and with the statements previously stated brings a lot of questions and concerns about the actual implementation of the texts and the forthcoming interpretation of the results of the study.

In addition to the result that will come out of the study and for the approach:
As mentioned above our concern is important, given the assumptions made. We can not agree without having had reassuring elements in relation to our remarks (which could be erroneous if our interpretation turns out to be incorrect). We ask for a detailed point of step on this consultation and following the return of all the actors.
Moreover, it obviously seems necessary that the actors can have different points of steps clearly explained to avoid, as much do this little, the non-transparency and the presentation of result "self-satisfactory" by the assumptions or the closure of the algorithm.

The pre-alert is normal state; the methodology will take into account only events (long lasting frequency deviations, deterministic frequency deviations, outages, or combination of those) that trigger alert state: in this case the assumption is that energy use starts above frequency deviations higher than standard frequency range. Recharging strategy when alert state is not triggered is out of scope of this methodology. The energy amount calculated this way will then be used to calculate an energy equivalent Time Period of full activation.

To note in addition to our previous remarks considering the possible impact of the result on our installations and the incoherence compared to the model of today, we have questions of type: what impact for the existing installations (important evolution of the constraint, operational implementation of an adjustable warning threshold as a function of the value of the frequency and in relation to different durations and a triggering delay of the alert!, real validation of the non-counting of the duration during the use of LER?, ...)? link with ROI-renovation-maintenance-solicitation?, desired disappearance of the participation LER RES type run-river hydros (with regulatory constraints / non-adaptable hydraulic safety and thus limited volume / energy without reloading possible according to cases of constraints and beyond non-coherent threshold/state) ? link with desired standard product from the market?

The aim of the methodology is to evaluate the energy content of frequency transients, with a consequent estimation of costs for a short term scenario which takes into account the impact of the various Time Periods. If a significant evolution regarding the CBA assumptions occurs, the methodology will be applied again in order to propose a Time Period in accordance with this evolution. Other aspects not related with this approach are considered out of scope of the methodology.

e) Other important points:
- Figure 8 (page 18) and his argument:
o all LERs and non-LERs can not all be in the same operating state at the same time, they must have an offset in the curves and not a simultaneity for all LERs and not LERs

o Wrong graph because the reserves aFRR, mFRR, RR are restored (on the adjustment mechanism, etc ...) and therefore the frequency does not decrease. Each balancing product does its part. We recall that the aFRR intervenes n steady state in 3.5 min and mFRR / RR in 12 and 15 min (cf 1st remarks)

Figure 8 is just an illustrative example and it already takes into account FRR activation. The dashed line has the aim to describe the impact of an insufficient FCR, compared to the power imbalance. The frequency is not contained anymore; balancing reserves other than FCR can balance the system but only on a longer time-scale (i.e. minutes).

- All things being equal, the LER price will increase if Tmin LER increases relative to the recurring intrinsic cost and the imposition of decreasing capacity in relation to energy. This may also lead to the final elimination of competitive RES sectors and, also to these new non-coherent technical constraints (effective implementation of these "theoretical" results that are not adapted to the actual functioning of the installations and to the safety of the system in question in link with the different balancing products) the LER run of rivers hydros.

- Article 156 (9) identifying that "limited energy reservoirs are permanently available when in a normal state (ie +/- 50mHz)" is not conceivable if the average frequency is is not at 50Hz. It's "theory". If the frequency remains on average permanently at 50.049mHz, the LER will obviously empty. Hence also another difficulty on the result of the study and its interpretation in relation with this article.

Requirements for frequency deviations within standard frequency range are out of the scope of this methodology; assumption is that thanks to appropriate State of Charge management there is no energy depletion of LER FCR providers during this frequency regime. This methodology does not take into account these strategies or other FCR properties.

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On the other hand, we find here the inconsistency where the LER will be empty and therefore the beginning of the " alert state" will not trigger and it will be asked again after (and without real possibility because LER emptied) to hold "the duration of the alert state that will come out of the model". We recall that for LER run of river, unlike batteries if the hydraulic or regulatory safety requirement (in relation to the defined volume) has been "touched" it will not be able to "recharge".

SO GL asked for several requirements that LER shall be fulfilled: the Time Period is one of these requirement; the aim of this methodology is to support the identification in terms of cost and benefits the best solutions. The FCR provider shall satisfy this requirement together with other technical constraints that will be identified for prequalification process (which is out of scope for this methodology).

Thanking you in advance for your reading and for the analysis of our remarks.
We remain at your disposal.

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6. Comment by: EnBW AG

Simulation design

We do not have specific comments on the choice of frequency data or combination with empirical events. We are convinced that the TSOs will properly assess the required FCR capabilities.

Alert State

For the current CBA, the alert state definition is used in simulations to represent the limitations of LER units. The “pre-alert state” is also allowed to be taken into account when considering the Tmin LER energy equivalent. This contradicts SOGL Art. 156(9) which requires an energy reservoir for full FCR activation “as of triggering and during the alert state”. In practice, occurrence of a “pre-alert state” cannot be determined beforehand, anyway. Only after triggering an alert state (frequency deviations above +/- 100 mHz for 5 minutes in CE) the time before can be identified as “pre-alert”.

While a common definition of an alert state is given, the interpretation on the consequences for Tmin LER is arbitrary, even though SOGL Art. 156(9) is pretty clear about this. For investment decisions prequalification standards, operational procedures and subsequent monitoring a common understanding and harmonized application are vital.

The pre-alert is normal state; the methodology will take into account only events (long lasting frequency deviations, deterministic frequency deviations, outages, or combination of those) that trigger alert state: in this case the assumption is that energy use starts above frequency deviations higher than standard frequency range. Recharging strategy when alert state is not triggered is out of scope of this methodology. The energy amount calculated this way will then be used to calculate an energy equivalent Time Period of full activation.

The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is the aim of this process.

LER depletion

Two situations of LER depletion are presented:

In the first example with predominantly non-LER bids, the non-LER bids are supposed to cover up for the depleted LER units in alert-state. The frequency deviation inflated this way (+50% in the example) can now easily exceed the +/- 200 mHz limit for full FCR provision. Furthermore, the immediate provision of backup services for LER units in the alert-state does pose an additional effort for non-LER units.

With a large share of LER bids, additional non-LER bids can become necessary in order to permanently ensure sufficient FCR capacity.

Both additional services of non-LER units (immediate backup and additional capacity) should be clearly identified and remunerated properly. Basically, a system-wide backup for LER depletion in alert-state is created.

The methodology does not allow a steady-state frequency deviation exceeding +/- 200 mHz. If non-LER bids cannot cover depleted LER, a new simulation run will be triggered considering a higher FCR procurement. Two situations are considered as acceptable:

- LER are not be depleted
- If depletion of LER occurs, non-LER have to cover missing capacity

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Cost calculation

The reduction of system costs as a consequence of reducing the Tmin LER is not valid, for two reasons:

- In a combined auction with non-LER bids, the LER bidder does not have any motivation to include a cost advantage compared to a longer Tmin LER (as illustrated in Figure 10) into his bids. This does become even more obvious when imposing a marginal-pricing scheme, but also holds for pay-as-bid settlement.
- Bidding into the FCR auction will not be based on investment costs for LER units. At the time of bidding, the investment is sunk cost and any revenue generated by bid prices above short-run marginal costs will be accepted, regardless of the investment being profitable eventually.

Therefore, system costs can at best stay the same and will otherwise increase. Any cost advantage that is generated for LER investments by reducing the Tmin LER will remain with the LER BSP.

For the cost increase by adding non-LER capacity, it is unclear how the available volumes of non-LER units are determined. It is not guaranteed that sufficient non-LER capacity is technically or economically available and is sufficiently incentivized to bid into the market.

Within the FCR context, the CBA has to determine if and how system costs change, taking into account a competitive setting, where no forms of distortion are present. For instance, this analytical setting implies that bids are the mere presentation of marginal opportunity costs.

In addition, the CBA has a long-run perspective, then the cost curve definition will be based on the long-run marginal cost concept, where all factors of production are endogenous, including investment costs for new installed FCR providing units.

Further assumptions about these topics will be released at the implementation stage

Share of LER bids

For different shares of LER bids the additional capacity of non-LER bids is calculated to determine additional system costs. This additional non-LER capacity is required for secure system operation. Once an acceptable situation has been identified, the targeted LER share has to be restricted during procurement. Otherwise the extra non-LER capacity will be insufficient.

The implementation of the market design is out of scope of the CBA.

The methodology provides a matrix of possible solutions based on which all TSOs will make a proposal for a time period to NRAs for approval considering these main key factors:

- FCR amount
- Total FCR costs estimated
- LER share

Most relevant frequency events

Generally, we support the approach of adding additional historical scenarios for stressing the simulations with extreme observations. Of course care has to be taken, if the conditions under which the situation occurred are still valid. Nevertheless, the situation can serve as an example for future incidents.

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Yes, extreme events will not be taken into account for the definition of the frequency statistics, but they will only be taken for the risk assessment.

Incidents are not foreseeable and can happen again. Instead of assessing deterministic worst cases the historical data are used and considered appropriate for the mitigation of simplified model assumptions: e.g. the network topology and the consequences of line tripping in different grid scenarios are not represented in the methodology.

General remarks

While the CBA aims to describe scenarios for technical simulations, the implied market consequences will decide about actual feasibility and costs. It is of utmost importance that a consistent market design is described. With respect to the different types of FCR provision, three qualities can be identified: LER units that are allowed to become unavailable in alert state, non-LER units covering up in case of LER depletion and additional non-LER capacity for FCR adequacy.

The additional relevance that is placed on non-LER units needs to be properly remunerated to keep participation attractive. For example, a separate clearing price for LER and non-LER bids could be applied in case of marginal pricing, linked to the maximum LER share. Also, the extra non-LER capacity that is only required for counteracting LER depletion in alert state could be procured and activated separately.

The cost curve will already consider the viability of FCR provided by non-LER, without the need of additional remuneration.

LER units that are part of a pool with non-LER units not increasing the BSP offered volume should still be considered as non-LER (as is done in Germany currently). In such a case the portfolio bids count as non-LER bids.

Methodology deals with costs estimation and not with bidding strategies for FCR provision. Furthermore, methodology will take into account a modelling of market curve for FCR. All assumptions and input data about these topics will be released at the implementation stage.

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7. Comment by: Enercon GmbH

General: We think that the introduction of asymmetric bids in the FCR is very important. In today's system with symmetric bids only, the market access for the participation of technologies is limited and a level playing field between all (new and existing) market participants isn't given.
Separate auctions for upward and downward FCR are preferred, because the allocation of upward and downward capacity may come with different prices and will be delivered by different market participants (wind, biomass, virtual power plants) in the future.
Of the two auctions for upward and downward FCR, the one with the larger number of offers in terms of total capacity, is to be executed first so additional quantities could be opened for the second auction.

The methodology will consider the current best practices in term of FCR procurement (e.g. FCR cooperation). A new market design and its implication on the results is out of scope for this CBA.

The methodology will apply with a symmetrical procurement of time period: in case of further developments in terms of asymmetrical FCR provision, the possibility to apply again the CBA will be considered

Article 6 a) We think that a shorter minimum activation period (15min) will enable more technologies to participate in the market and therefore lead to higher competition and lower overall costs for the provision of FCR. Longer minimum activation periods would create market barriers, hence inefficiencies.

SO GL Article 156(9)-(11) explicitly asks for a minimum activation period comprised between 15 and 30 min. The CBA methodology proposal aims to assess also the impact of a shorter minimum activation period on FCR costs.

Article 6 c) Today, LER resources can be easily backed up by non-LER resources for instance in FCR pools. Due to the fact that the CBA simulation takes different time horizons into consideration, we think that it makes sense to increase the requirement for the Time Period during which LER shall be able to fully activate FCR continuously in alert state - if at all gradually i.e. proportional to the shutdown of non-LER resources.
Existing LER providing FCR could be easily retrofitted in the future when related investment costs have further decreased which leads to lower overall costs for the provision of FCR.

The methodology approach is an estimation of costs for a short term scenario. If a significant evolution regarding the CBA assumptions occurs, the methodology will be applied again in order to propose a Time Period in accordance with this evolution.

Article 9 From our point of view the Time Period during which LER shall be able to fully activate FCR continuously in alert state, should be not more than 15 minutes. High security margins in the energy rating of a LER lead to significantly higher upfront costs.

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The CBA aims to minimize the social cost over the time horizon without jeopardising the system stability.

Based on our operational experience we state that recharging the LER via scheduled energy market transactions allows to sufficiently balance the SoC of a LER and is therefore a suitable alternative to high security margins. This approach leads to a variabilisation of a share of the upfront investment and therefore to lower costs for the provision of FCR.

Please remark that only an adequate energy/power ratio can avoid the depletion in case of prolonged and repeated unidirectional frequency deviations, whereas the SOC management of a LER in such conditions could not be sufficient.

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8. Comment by: VGB

The methodology will use historical frequency disturbances as examples to define the duration of FCR (15 minutes or 30 minutes) in the future.
It is not allowed to use the historical examples as such because evolutions of the electrical system have to be taken into account.

If conditions will change, CBA will be applied again

Deterministic frequency deviations are initiated by commercial flows between synchronous areas. In the future the impact of such commercial flows will be limited by Art. 137 of the GL SO. The article 137 allows a limitation of the ramping rate of HVDC installations and PGMs by a TSO. TSOs have to define their position : OR apply article 137 OR accept that deterministic frequency deviations will continue to exist because art. 137 is not applied in the future.

The frequency statistics of the last years doesn't shows a clear trend of better frequency quality. The TSOs of SA CE and Nordic proposes, in order to properly reflect the present scenario, not to mitigate the statistics of the frequency, being the FCR the most important, the first and the last line of defense of the power system. We acknowledge that there may be solutions to improve long lasting frequency deviations, but until we see a significant improvement, we cannot exclude these events. If conditions will change, CBA will be applied again.

The incident of 4/11/2006 is an example of a long lasting frequency event. This is NOT correct because wind farms in Spain tripped by islanding protection and made this incident too big. The islanding protection of wind farms is modified since that incident and the consequences of an identical cause would stay smaller in the future.
Also the manual FRR was not activated as it should have been ; also this issue is solved now.
So the incident of 4/11/2006 can be used only PARTIALLY as a historical example.
This comment is also applicable for other incidents used as example.

Incidents are not foreseeable and can happen again. Instead of assessing deterministic worst cases the historical data are used and considered appropriate for the mitigation of simplified model assumptions: e.g. the network topology and the consequences of line tripping in different scenarios are not represented in the methodology.

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9. Comment by: TIWAG - Tiroler Wasserkraft AG

1) TIWAG-Tiroler Wasserkraft AG generally agrees with the ENTSO-E proposal. We would like to stress once more that the security of the energy system is the backbone of Europe's economy. In cases of doubt the system security has to be the guideline for our common rules.
2) We support the inclusion of the extreme events in the past decades, e.g. the system disturbances of 2003 and 2006 as mentioned in the explanatory document (5.8).
Justification: the proposed probabilistic methods of data analysis – e.g. for the frequency behaviour – have the disadvantage that they do not represent very rare events properly. We would also welcome the inclusion of a narrow sequence of strong synthetic events. Finally the system has to hold for all cases albeit some occur rarely.
3) The method should include the case in which no new LERs are entering the market. We think it would be already possible to run the system safely with existing LERs at no additional investment/welfare costs and at the 30 min – best – security level. At least a distinction between newly to be built LER and existing LER has to be made.

A scenario representative of the current share will be simulated. Also the distinction between existing and new LER are considered in the CBA methodology proposal.

4) The economic assumptions are not comprehensible. We do not see which sources are used for prices, marginal and investment costs and non-LER capacities. The calculation of the NVP needs the criteria for cash-flow/return distribution to be uniquely defined in common terms. For this we ask for more information and transparency.

The detailed adopted assumptions will be defined during the implementation phase.

NPV is no more used since there is only one short term scenario. A specific disclaimer has been added to clarify that as soon as the scenario is not representative anymore the CBA has to be run again.

5) The proposed 4 % discount rate is lower than the common long term expectation for energy investments on volatile markets. Nevertheless we argue for a low "4 %" rate because most technologies in this sector will not specifically be calculated on FCR cash only. Many business models will have flexible sources of cash and the FCR market can only yield additional revenue due to its market size. Thus the zero entry "risk" into an optional market is represented adequately with a lower discount rate in the ENTSO-E proposal.

NPV is no more used since there is only one short term scenario. A specific disclaimer has been added to clarify that as soon as the scenario is not representative anymore the CBA has to be run again.

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10. Comment by: Vorarlberger Illwerke AG

Thank you for the opportunity to comment your proposal and highlight a few aspects of importance to us.

First, we like to state that we seriously question the approach to combine different technical requirements for different FCR-providers in one market. The often-discussed level playing field is obviously not respected here. LER providers profit from non-LER providers who ensure system stability and receive the same renumeration. Instead, if necessary, we would suggest the introduction of an additional FCR product for LER providers with specific technical requirements. Thereby no market participant would be discriminated or favored.

On the basis of the SO GL there are no the necessary conditions to assume different markets for LER and non-LER providers. These considerations are anyway out of scope of the CBA since the Art.156 (11) only requests for a CBA methodology for the definition of a minimum time period of FCR full activation in alert state and not for a market design of FCR procurement

Furthermore we would like to add the following remarks:

Article 4:
Instead of running a huge amount of different (Monte Carlo generated) scenarios, the focus should be on the edges of the distribution. Especially those frequency deviations with a huge amplitude and/or a long period are critical. Thereby it is not that important to understand the source but the consequences. Perhaps it is useful not only to use the past to model those deviation but also synthetically deviations (extreme values) to represent future uncertainties.

The use of Monte Carlo method has precisely the aim to explore a large part of all the possible combinations of the uncertainties sources in the future.

A probabilistic approach is more consistent than a deterministic approach that determines - with a "a priori" criterion - the edges of the distribution.

Article 5:
Building of FCR market curve
System cost prediction in this methodology strongly depends on marginal cost estimation, which is in practice rather complex. Marginal costs of non LERs have to include assumption on plant efficiencies and further technical restriction associated to FCR provision. Marginal costs of LER providers have a reciprocal dependency to energy prices, here hourly or quarter hourly prices, which determine possible income from energy only selling/buying and thereby the FCR bidding price. A methodology how to determine those prices is missing and in the comparison (LER<> non LER) together with the consideration of further investment costs the most important factor.

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In our opinion instead of concentrating on cost assumptions, that are changing constantly, and complicated analyses the whole procedure should concentrate on the technical necessities to define the FCR needs and separate between non LER and LER Providers right form the beginning. Meaning different FCR products if needed and the same requirements for all providers.

The Article 156 requires to define a cost-benefit analysis in order to assess the time period required for FCR providing units.

Article 156 11 (b) explicitly requires to take into account "the impact of a defined time period on the total cost of FCR reserves in the synchronous area".

Article 156 11 (d) explicitly requires to take into account the impact on total cost of FCR in case of increasing total volume of FCR.

Article 156 11 (e) explicitly requires to take into account the impact of technological developments on costs.

There is then the need to define a proper methodology to assess the effects of time period requirements on FCR costs.

In the proposed methodology, marginal cost estimation relies on ENTSO-E TYNDP scenarios. Any needed further assumption shall be made during the implementation phase.

Assuming and defining different products for FCR provision is not the aim of the CBA methodology.

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11. Comment by: Eurelectric

Assumptions and methodology for a Cost Benefit Analysis for FCR providing groups with limited energy reservoir

Eurelectric welcomes this public consultation and appreciates the opportunity to express its views on this proposal for assumptions and methodology for a Cost Benefit Analysis, for FCR providing groups with limited energy reservoir (LER).

1) The methodology described in the document does not seem to be in line with the article 156 of the SO GL, regarding the consideration of the pre-alert state period. Indeed, the guideline requires that:

"a FCR providing unit with an energy reservoir that limits its capability to provide FCR shall activate its FCR for as long as the frequency deviation persists, unless its energy reservoir is exhausted in either the positive or negative direction with the following clarifications:

- during normal state, the FCR from FCR providing units with limited energy reservoirs shall be continuously available.

- as of triggering the alert state and during the alert state, the FCR from FCR providing units with limited energy reservoirs shall be fully activated continuously for a time period to be defined according to a CBA. Where no period has been determined, each FCR provider shall ensure that its FCR providing units with limited energy reservoirs are able to fully activate FCR continuously for at least 15 minutes or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time, or for a period defined by each TSO, which shall not be greater than 30 or smaller than 15 minutes."

This definition means that it is the responsibility of FCR providing units with LER to make sure that, at any point during normal state, the LER resources have always an energy content that will allow them to remain available as of triggering the alert state and during alert state for the minimum time which will be defined by the CBA, between 15 and 30 minutes (called Tmin LER).

The period which is called "pre-alert state" from which (overcome of +- 100 mHz), the energy consumption of LER is taken into account in the CBA, is not what the article 156 of the SO GL strictly requires (the notion of "pre-alert state" does not exist in this article).
In summary, while a common definition of an alert state is given, the interpretation on the consequences for Tmin LER seems arbitrary, even though SOGL Art. 156(9) is pretty clear about this. For investment decisions, prequalification standards, operational procedures and subsequent monitoring a common understanding and harmonized application is vital.

The pre-alert is normal state; according to article 156(4) of System Operation GuidelineSO GL, FCR should be constantly available in normal state. Because of this assumption, the CBA methodology ignores the events that do not trigger alert state, assuming a theoretical no impact on the energy consumption. The methodology will then take into account only events that trigger alert state: in this case the assumption is that If a continuous exceeding of the standard frequency range includes the triggering of an alert state, the activated energy and the residual energy in the reservoir is calculated from the first exceeding of the standard frequency range limits. Recharging strategy when alert state is not triggered is out of scope of this methodology. The energy amount calculated this way will then be used to calculate an energy equivalent Time Period of full activation

The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is part of this process.

2) Normal state being out of the scope of this methodology, there is the risk that requirements for this state differ significantly from one area to the other.

We regret that the methodology doesn't look at the requirements needed to ensure full availability in normal state, as this will probably mean that each TSO will then stay free of asking what they consider needed, which still leads to possible market distortions from one country to another.

We understand the rationale of the comment. The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is part of this harmonization process. Also FCR cooperation project has been started on a volunteer basis by nine TSOs, although it is not requested by GL EB.

3) Eurelectric has some doubts about the need for this methodology

Eurelectric considers that a Tmin LER higher than 15 min represents an over-specification of FCR product. Indeed, "FCR providing units shall be able to fully activate FCR continuously until the activation of FRR". Considering full FRR activation within the time to restore Frequency, (15 minutes for CE: SO GL, Article 157), this requirement would result in extra costs for FCR supply.

FCR acts independently by FRR and it is the most important, the first and the last line of defense of the power system available to TSOs. We acknowledge that there may be solutions to improve long lasting frequency deviations and deterministic frequency deviations, but until we see a significant improvement, we cannot exclude these events. This does not imply that FCR shall play the role of FRR or other balancing reserves, since it shall able to face this kind of events.

4) LER and non LER services

Eurelectric considers that non LER will probably have to play an extra role in case of LER depletion situations. The additional relevance that is placed on non-LER units needs to be properly remunerated to keep participation attractive.

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Regarding the share of non-LER, their additional capacity is calculated to determine additional system costs. This additional non-LER capacity is required for secure system operation. Once an acceptable situation has been identified, the targeted LER share has to be restricted during procurement. Otherwise the extra non-LER capacity will be insufficient.

The implementation of the market design is out of scope of the CBA.

The methodology provides a matrix of possible solutions based on which all TSOs will make a proposal for a time period to NRAs for approval considering these main key factors:
- FCR amount
- Total FCR costs estimated
- LER share

5) Hypothesis considered for the calculation are questionable, and need more transparency

For instance, eurelectric considers that more transparency on FRR dimensioning rules, among which the Full Activation Time of aFRR which will be taken for the study is needed.

As described in the proposal the aFRR will be considered in the dynamic model without saturation. The FAT of FRR will be a weighted average of the FATs among LFCBs of each SA. A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

The approach of adding additional historical scenarios for stressing the simulations with extreme observations may be relevant if used with care. About the frequency historical trends of 15 years, eurelectric thinks that this period which include the incidents occurred in September 2003 and in November 2006, is too large and not representative of the current European Electricity Network.

Extreme events will not be taken into account for the definition of the frequency statistics.

To properly represent the present scenario and consider the effects that the mitigation measures will have on frequency the CBA methodology has been amended: the future scenarios has been moved out and a specific disclaimer clarify that as soon as the scenario is not representative anymore the CBA has to be run again.

15 years of data have been chosen for to represent an adequate amount of data for the statistics of frequency and also mitigate model assumptions: incidents are not foreseeable and can happen again. Instead of assessing deterministic worst cases the historical data are used and considered appropriate for the mitigation of simplified model assumptions: e.g. the network topology and the consequences of line tripping in different scenarios are not represented in the CBA methodology.

Eurelectric asks for transparency with the assumptions and sources of data needed for the Monte Carlo simulation as the choice of the TYNDP scenario, the relevant real frequency events as frequency profiles.

We acknowledge your comment. The detailed adopted assumptions will be defined and published during the implementation phase, including frequency statistics. The CBA analysis will be performed considering a short term development instead of multiple time horizons.

A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs of CE and Nordic SAs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

Eurelectric would like to know which assumptions will be taken to consider the evolutions of electricity mix in each country and market design (ISP, Balancing…). Eurelectric considers that a duplication of the past into the future is foreseen, whereas many market design parameters have been changing or will change meantime.For example, with a 15 min imbalance settlement, the deterministic frequency deviation phenomena should decrease, as it has been assessed recently by ENTSO-E.

The CBA analysis will be performed considering a short term development instead of multiple time horizons.

A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

For more clarity and transparency with the sources of the data, it is important that the assumptions and the methodology needed to build FCR market curves would be released.

The detailed adopted assumptions will be defined and published during the implementation phase, including market curves modelling

a. Which energy market prices will be used for the study?

The detailed adopted assumptions will be defined and published during the implementation phase.

b. As the settlement of BSP which participate at the FCR Procurement market, is actually a Pay as Bid settlement (ie the costs per unit are actually not public), which assumptions will be taken to evaluate the costs of LER and non LER FCR providers?

The methodology does not deal with remuneration schemes and bid approach but with cost estimation of FCR

c. It is also necessary to calculate the FCR market curves with sensibilities.

The CBA analysis will be performed considering a short term scenario instead of multiple time horizons.

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A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs of CE and Nordic SAs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

As written in page 6 but not in pages 23/24, EURELECTRIC considers that run of river units with LER should be considered for the study.

We acknowledge your comment. CBA is technology neutral as it considers all kind of technologies representing LER, not only batteries.

The implication of the stakeholders and the transparency of ENTSO-E are key for the results of CBA, to minimize FCR costs without jeopardizing operational security. The collect of data and the definition of assumptions needed for the study should be done in consultation with stakeholders. Thus, it is also important that the detailed results of the study become public.

We acknowledge your comment. The detailed adopted assumptions will be defined and published during the implementation phase.

Finally, eurelectric considers that the CBA methodology should be discussed during a “Stakeholders Committee” before its submission to regulatory authorities.

The tight schedule does not allow a further step with the Stakeholder Committee before the submission of the CBA methodology to the NRAs. Anyhow the involvement by ENTSO-E of ESC will keep continuing during the whole process.

A clear planning with the next steps should also be released.

We acknowledge the request; a planning of the next steps will be available during the implementation phase.

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12. **Comment by: European Association for Storage of Energy (EASE)**

On 10 January 2018, ENTSO-E published its "All Continental European and Nordic TSOs' proposal for a Cost-Benefit Analysis methodology in accordance with Article 156 (11) of the Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity on transmission system operation".

The European Association for Storage of Energy (EASE) welcomes the efforts by ENTSO-E to propose a methodology suitable for assessing the time period required for FCR providing units or groups with limited energy reservoirs (LER) to remain available during alert state in Continental Europe (CE) and Nordic synchronous areas. However, we wish to propose several amendments and clarifications: some aspects of the proposed methodology might, in our view, lead to strong distortions of the results or to an incomplete CBA.

Please note that the full version of the EASE reply to this public consultation has been sent via email to Mr Alexander Mondovic (Alexander.Mondovic@entsoe.eu).

1. Definition of the FCR states and FRR conditions introduced in the methodology

a. CBA scope and FCR states definition

The ENTSO-E assessment defines neither the scope of the different FCR states nor their time period. In fact, one of the states that ENTSO-E mentioned is not included in the system operation guidelines: the pre alert state. Therefore, the ideal solution would be to stick to the SO GL definitions and, if not possible, to clearly define the scope of the different states, their technical management criteria, and their time periods. This is crucial or LER FCR providers to correctly size their equipment and participate in FCR services.

Pre-alert state is a part of the normal state. Art. 156(9) of SO GL requires that the FCR from FCR providing units or groups with limited energy reservoirs are continuously available during normal state.

More importantly, we strongly believe that this CBA should cover all the possible states, and not only the "alert state". Indeed, should the perimeter stay as currently defined, each TSO will keep, by the end of the process, a strong level of margin to complement the requirements, as they would decide each on their own the sizing needed in normal state.

We understand the ratio of the comment. The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is part of this process.

This would then make most of the current process useless, as it would still result in TSOs requiring different sizing within the same synchronous zone.

We understand the ratio of the comment. The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is part of this process.

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b. More transparency with regards to the assumption on aFRR deployment

Additionally, the complementarity and interaction among the different system reserves and their management criteria should be clearly established. The participation of aFRR in order to restore the frequency value has an enormous impact on the way the frequency will behave, and therefore, on the FCR requirements: the technical criteria to size and manage aFRR, including its timely intervention to release FCR contribution, should be included in the approach.

As described in the proposal the aFRR will be considered in the dynamic model without saturation. The FAT of FRR will be a weighted average of the FATs among LFCBs of each SA.

2. Greater amount of information regarding the selection of frequency behaviour

Regarding Article 153 of the System Operation Guideline, the reserve capacity for FCR required for the CE and Nordic synchronous area shall cover at least the reference incident and the results of the probabilistic dimensioning approach for FCR carried out, the reference incident being defined as 3,000 MW in positive and negative direction.

Overall, we believe that ENTSO-E should give more information on their probabilistic approach (Monte Carlo simulation) and we propose some lines of improvement.

Please note that the probabilistic approach for FCR dimensioning described in SO GL art. 153 is not mandatory and the Monte Carlo simulation proposed for the CBA methodology aims to assess the stability risk in presence of LER with a probabilistic approach.

a. Absence of correlation between long lasting frequency deviation events and power imbalance due to outages

The methodology proposed by ENTSO-E does not take into account the correlation between the long lasting frequency deviation events and the power imbalance due to outages. If this correlation is not taken into consideration, the volatility of Monte Carlo simulation outputs will be higher, producing some weird results during the simulation process (non-relevant incident could cause important outages and vice versa):

When considering the long lasting events the outage will be tracked in order to avoid double counting: long lasting events caused by multiple outages will not be used as input for the statistics. More in general all the available information related to the dependence amongst the three sources of frequency disturbance (Long lasting, deterministic frequency deviations and outages) will be taken into account in order to avoid the double counting of phenomena.

The results of not taking into account the dependency could lead to a higher probability of large impact due to the incidents. This higher impact is relevant to establish the FCR size and its activation period, increasing the period which is obtained in order to fulfil the security criteria.

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There are some non-complex analytic approaches to include the correlation among the several in this simulation process to take into consideration the dependence. Finally, the assessment approach assumes that the requirements of reservoir up and down are equivalent.
The hypothesis that the needs for reserves are symmetrical should be verified with the historical information: in case this hypothesis is not proven, the result of the historical analysis should be taken into consideration.

The methodology will consider the current best practices in term of FCR procurement (e.g. FCR cooperation). A new market design and its implication on the results is out of scope for this CBA.

b. Most relevant real frequency events

The simulation of both 2003 and 2006 incidents in order to take into consideration some possible sequence events would not be suitable because:

- Article 153 establishes that the reference incident is 3,000 MW. The two incidents considered have a bigger impact due to extraordinary events that could not be repeated again, considering a.o. that new mechanisms to restore frequency have been put in place.

Besides, this type of incident is out of scope of the criteria (d) included in the article 153 for dimensioning FCR.

Instead of assessing deterministic worst cases the historical data are used and considered appropriate for the mitigation of simplified model assumptions: e.g. the network topology and the consequences of line tripping in different scenarios are not represented in the CBA methodology; also please consider that 15 years have been chosen because we can consider since 2003 a process starts in the path of more close cooperation between the TSOs.

- The simulation of those two events would imply the consideration of too many assumptions and hypotheses regarding the system evolution after the power imbalance.

The assessment of the system security considering the presence of LER during those events will be made considering the frequency trend and the consequent FCR activation requested to the LER. This simplifies the assumptions regarding the system evolution after the power imbalance to avoid an excessive modelling complexity to deal with.

- The technological evolution should be taken into consideration. In last years, the technology and the electricity system operation procedures have changed dramatically, with a big impact on the generation and demand behaviours (greater amount of renewable energy connected to the grid, self-consumption, energy efficiency measurements, penetration of energy storage devices, more effective coordination among the European TSOs, etc.). Due to the fact that this evolution has a great effect on the number of incidents that could occur in the electricity grid and their relevance, it should be taken into consideration in the simulation.

We therefore ask ENTSO-E to further clarify the criteria used to define the number of years to be taken into account in their Monte Carlo simulation and advise them to consider incidents no older than 10 years.

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15 years of data have been chosen for to represent an adequate amount of data for the statistics of frequency and also mitigate model assumptions: incidents are not foreseeable and can happen again.

Considering what above mentioned and that the frequency statistics of the last years doesn't show a clear trend of better frequency quality the TSOs of SA CE and Nordic proposes, in order to properly reflect the present scenario, not to mitigate the statistics of the frequency, being the FCR the most important, the first and the last line of defense of the power system.

Furthermore the CBA analysis will be performed considering a short term developments instead of multiple long-term time horizons.

A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

The Monte Carlo simulation, which should in our opinion exclude the simulation of the 2003 and 2006 events, would therefore not guarantee that the worse-case situation is observed in this analysis.

The worst case events of the past years will not be taken into account in the frequency statistics and as an input of the probabilistic simulations.

3. CBA methodology approach

a. Cost calculation method proposed by ENTSO-E

Some information provided by ENTSO-E to determine the cost of the system according to delivery schemes for LER, horizon years, LER share and minimum LER-FCR time period must be clarified:

- The definition of the price range used for FCR cost of LER resources and the type of evolution of FCR cost (linear, piecewise linear, quadratic, etc.).

Methodology will analyze a short-term scenario: in our opinion assumptions on costs in a short term reduces the exposure to costs forecast uncertainties. All assumptions about these topics will be released at the implementation stage. If the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

- The characteristics of the units (% of the reserve allocated to FCR and FRR for each technology in each country, for coal, gas, co-generation, hydro, nuclear, etc.).

Methodology will take into account a modelling of market curve for FCR provision (note: the methodology does not implement a complete market model of FCR and FRR): the detailed adopted assumptions will be defined during the implementation phase

- The hypotheses on remuneration schemes for the FCR services: capacity only in €/MW, capacity in €/MW and energy in €/MWh?

The methodology will consider the current best practices in term of FCR procurement (e.g. FCR cooperation). A new market design and its implication on the results is out of scope for this CBA.

- How ENTSO-E deals with the impact of a lack of harmonisation between Member States' remuneration schemes on the costs for providing FCR in the different Member States.

The methodology does not deal with remuneration schemes and bid approach but with cost estimation of FCR.

- The hypotheses on bidding strategies by different FCR providers:
    - For LER, we would ask for a better description of the bidding strategies. A bidding strategy proportional to investment costs seems less suitable for LER since investments costs sunk once the LER has been built.

Within the FCR context, the CBA has to determine if and how system costs change, taking into account a competitive setting, where no forms of distortion are present. For instance, this analytical setting implies that bids are the mere presentation of marginal opportunity costs.

In addition, the CBA has a long-run perspective, then the cost curve definition will be based on the long-run marginal cost concept, where all factors of production are endogenous, including investment costs for new installed FCR providing units.

o For non–LER, a few questions need to be answered: if there is only capacity payment, are we sure that non-LER will bid only the opportunity cost (of not participating in the DA market)? When will non-LER recover their marginal cost (e.g. fuel costs) if there is no energy payment (either implicit or explicit)?

Methodology will analyze a short-term scenario: in our opinion the proposed approach for non-LER costs calculation is adequate to reflect the FCR costs for those technologies. If the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs will submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

We would also like to underline that:

- The LER-FCR investment costs should consider the possibility for LER to stack revenues.

The investment costs for LER shall be considered only if they are sustained in order to qualify for FCR provision. As described in the methodology, in case of storage revenue stacking the investment cost should be associated only to the share sustained for FCR provision.

- ENTSO-E should specify if they will consider energy costs considering that the proposed methodology seems to take into consideration only capacity costs (€/MW), i.e. balancing capacity.

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The methodology will consider the current best practices in term of FCR procurement (e.g. FCR cooperation), then capacity costs (€/MW) will be taken into account.

Additionally, the ENTSO-E economic approach defines a discount rate according to “societal” criteria: real discount rate of 4% (societal discount rate). Major details should be given on the choice of the value of this parameter, and eventually a sensitivity analysis performed.

Discount rate is no more used for the calculation of NPV of costs starting from the results of different forecast scenarios since there is only one short term scenario. A specific disclaimer has been added to clarify that as soon as the scenario is not representative anymore the CBA has to be run again.

b. NPV comparative in CBA methodology

EASE strongly welcomes the ENTSO-E analysis covering various levels of LER penetration. However, we would like to get more information on how the decision to choose a minimum activation period will be taken if results differ strongly according to the LER penetration rate.

The methodology provides a matrix of possible solutions based on which all TSOs will make a proposal for a time period to NRAs for approval considering these main key factors:

- FCR amount
- Total FCR costs estimated
- LER share

c. Proposal for a new CBA approach

ENTSO-E proposes an economic approach to run the CBA. This approach is complex considering the difficulty to determine the appropriate cost of each possible technical result obtained from the Monte Carlo simulation. Therefore, EASE would propose to split the methodology into two separate approaches:

• A technical approach to size the frequency containment reserve and establish the criteria to determine the time period required of this reserve.

o First of all, the evaluation according to technical requirements, in terms of the amount of energy that should be provided by LER-FCR units and the system needs regarding security and reliability.
According to a rational criterion, FCR should dimension regarding the reference incident (3,000 MW) and the worst incident in the last 10 years.
However, if a simulation process is developed, the threshold reliability value (as a probability) that must be taken into account should be clearly identified in advance.

o Once all the points and aforementioned data have been determined, and therefore the LER share and activation time period have been calculated regarding different horizon years and the fulfilment with the security and reliability criteria, the cost analysis can be conducted.

• An economic approach to evaluate the impact of frequency containment reserve’s time period in terms of cost-benefit.

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It seems that CBA methodology already comprises all of these steps: evaluation of energy amount for FCR, cost estimation and a risk assessment analysis

4. Summary of key EASE messages

Energy storage technologies can provide an important contribution to system security while enabling the transition to a decarbonised energy system. The fast dynamic response of energy storage devices is expected to help cope with the system inertia decrease and the RES intermittency, thereby contributing to grid stability. However, energy storage can only provide such services if there are no undue barriers in the network code provisions.

EASE therefore welcomes the opportunity to review and comment on the draft methodology to ensure that the ENTSO-E proposal constitutes a transparent and balanced approach that will allow TSOs to minimise FCR costs while safeguarding operational security.

EASE has carefully evaluated the proposal for a CBA methodology. EASE welcomes the efforts by ENTSO-E to propose a methodology suitable for assessing the time period required for FCR providing units or groups with limited energy reservoirs (LER) to remain available during alert state in Continental Europe (CE) and Nordic synchronous areas.

However, we wish to propose several amendments and clarifications, since some aspects of the proposed methodology might lead to strong distortions of the results or to an incomplete CBA:

- Normal state, pre alert state, alert state and emergency state parameters should be clearly defined to correctly run the CBA: these parameters should be based on the definitions of the System Operation Guideline and if not possible, more clearly defined in the draft CBA methodology.

If we support the ENTSO-E proposal to analyse the sizing of LER-FCR reservoirs during the pre-alert and alert states, we also believe that all other states should be analysed in order to correctly size these reservoirs. Should the assessment be limited to pre-alert and alert state, we are afraid the whole approach proposed might be jeopardised, as each TSO would eventually keep large level of margins to adapt the sizing (resulting in different prequalification criteria for each TSO, and therefore market distortion).

Pre-alert state is a part of the normal state. Art. 156(9) of SO GL requires that the FCR from FCR providing units or groups with limited energy reservoirs are continuously available during normal state.

We understand the ratio of the comment. The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is part of this process.

- The FRR behaviour should also be clearly defined in terms of the amount of energy provided by this service and the way this energy is provided in time, since this can have an important effect on FCR provision.

As described in the proposal the aFRR will be considered in the dynamic model without saturation. The FAT of FRR will be a weighted average of the FATs among LFCBs of each SA

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- There should be more transparency regarding the relevant frequency profiles and historical data used to determine the different scenarios and Monte Carlo sampling assumptions. Incidents older than 10 years should not be taken into consideration because they do not reflect the current electricity system behaviour. The correlation between long lasting frequency deviations and power outages should be taken into account to produce a more precise evaluation.

Input data and frequency statistics will be released at the implementation stage

15 years of data have been chosen for to represent an adequate amount of data for the statistics of frequency and also mitigate model assumptions: incidents are not foreseeable and can happen again. Instead of assessing deterministic worst cases the historical data are used and considered appropriate for the mitigation of simplified model assumptions: e.g. the network topology and the consequences of line tripping in different scenarios are not represented in the CBA methodology; also please consider that 15 years have been chosen because we can consider since 2003 a process starts in the path of more close cooperation between the TSOs.

Considering what above mentioned and that the frequency statistics of the last years doesn't shows a clear trend of better frequency quality the TSOs of SA CE and Nordic proposes, in order to properly reflect the present scenario, not to mitigate the statistics of the frequency, being the FCR the most important, the first and the last line of defense of the power system.

When considering the long lasting events the outage will be tracked in order to avoid double counting: long lasting events caused by multiple outages will not be used as input for the statistics. More in general all the available information related to the dependence amongst the three sources of frequency disturbance (Long lasting, deterministic frequency deviations and outages) will be taken into account in order to avoid the double counting of phenomena.

- Regarding the economic approach needed to evaluate the cost-benefit impact of the FCR provision, more information should be given on how the costs will be determined. We need among others to better understand the hypotheses made regarding the characteristics of the units (% of the reserve allocated to FCR and FRR for each technology in each country, for coal, gas, co-generation, hydro, nuclear, etc.). As these data are very uncertain and hard to obtain, large sensitivities should be performed on the results, and EASE stresses the need to exchange on the sensitivities to be conducted in order to reach a consensual result.

Methodology will take into account a modelling of market curve for FCR provision (note: the methodology does not implement a complete market model of FCR and FRR): the detailed adopted assumptions will be defined during the implementation phase.

- Following the previous remark and given the complexity to assess the reserve cost, we would also suggest to split the proposed methodology into two parts:
  - First, an evaluation of the technical requirements for FCR, taking into account system needs in terms of security and reliability.
  - Then the CBA.

It seems that CBA methodology already comprises all of these steps: evaluation of energy amount for FCR, cost estimation and a risk assessment analysis

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13. Comment by: Energy Pool

Energy Pool, aggregator participating in the FCR common market, welcomes the decision from the ENTSOE to clarify energy requirement for BSPs using resources with limited energy reservoirs for FCR provision.

Our comments regarding this proposal mainly deal with our expectations of clear, sustainable and fair rules to provide FCR through a market from different types of units (generation plants, consumers, storage) potentially subjected to different local TSOs' regulations:

- Energy Pool favours the clarification of rules allowing storage operators to size the optimal system to provide FCR. The inclusion of a new specific class of assets (LER) is however a source of concerns in the frame of markets allowing single standard products. Outputs of the presented methodology include the acceptable share of LER in the FCR. Energy Pool would like to make sure definition of LER, eventual specific market conditions (such as a specific cap), situation in aggregated units will be clearly tackled and stated at a market level.

We acknowledge the comment; TSOs of CE and Nordic are working in order to clearly define LER FCR provider.

- Requirements for Normal state operations are considered out of scope for this methodology and assigned to TSOs responsibilities. While the present methodology will hopefully homogenise the Alert State requirements, it will not provide answers to the requirements for standard frequency range. Still, normal state operations seem to impact system stability since they contribute to defining the regulation quality and the possible states in which LER would reach the beginning of relevant frequency events considered in this methodology. Another concern to Energy Pool is the difference in acceptable sizing and therefore competitivity of LER located in balancing areas under distinct TSO rules. Differences already appear in requirements stated by European TSOs on this matter so far. A solution would be to include in this methodology the requirements for normal State operations.

We understand the rationale of the comment. The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is part of this process. Also FCR cooperation project has been started on a volunteer basis by nine TSOs, although it is not requested by GL EB.

- Costs of LER technologies and the relationship between costs and sizing are structuring assumptions in this methodology. Could the ENTSOE detail how these costs will be evaluated?

The CBA proposal will be amended clarifying that FCR cost for LER shall be calculated as follows:
- For new LER providers considering:
  - investment,
  - OPEX
  - opportunity costs (if any)

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if they are sustained in order to qualify for FCR provision;

- For existing LER providers considering instead:
    - OPEX
    - opportunity costs (if any)

  if they are sustained in order to qualify for FCR provision.

14. Comment by: EDF

EDF welcomes this ENTSO-E public consultation and appreciates the opportunity to express its views on this proposal for assumptions and methodology for a Cost Benefit Analysis, to determine the minimum time (Tmin) for FCR providing groups with limited energy reservoir (LER) to provide FCR.

First, EDF would like to recall its doubts about the relevance of the requirement described in article 156 (11) of the System Operation Guideline (SO GL) as already expressed during the comitology phase. Considering a Tmin for FCR providers with LER higher than 15 min represents, in our view, an over-specification of FCR products, as the general rule is that “FCR providing units shall be able to fully activate FCR continuously until the activation of FRR”. Considering full FRR activation within the time to restore Frequency (which is 15 minutes for CE, cf. SO GL, Article 157), this requirement would result in extra-costs for FCR providers. EDF recalls that preserving the right balance between minimizing system operation costs (here FCR provision costs) on the one hand and ensuring operational security of the system on the other should not be forgotten.

Beyond that statement, EDF would like to deliver some general comments in terms of process and CBA methodology, and some more specific points on the present draft methodology submitted to consultation.

In terms of general comments and principles, EDF first considers that:

- In order to foster acceptability, the data, the scenarios and the methodology used to perform cost-benefit analyses must be undisputed or at least consensual : this requires transparency on the reference scenarios used, on the sensitivity analyses in order to ensure relevance, on the costs and benefits taken into account ; it also requires that some processes are guaranteed, notably the transparent access to (or controllability for confidential data) of the data used to perform the CBA, as well as the possibility to be informed and to discuss while the CBA is being carried out.

Future scenarios have been moved out in order to minimize the uncertainties. A specific disclaimer clarify that as soon as the scenario used for the methodology is not representative anymore the CBA has to be run again

Data will be published, also in terms of market curves modelling during the implementation phase.

More in general the detailed adopted assumptions will be defined and published during the implementation phase.

- A clear categorization of categories of costs and benefits for the system must be carried out in order not to forget some of them (i.e. stranded costs, value destruction, ancillary services, CAPEX, etc.) as well as to avoid double counting.

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The methodology provides a matrix of possible solutions based on which all TSOs will make a proposal for a time period to NRAs for approval considering these main key factors:

- FCR amount
- Total FCR costs estimated
- LER share

The solutions are identified analyzing the solutions which entails the lowest social cost without jeopardizing the system stability.

- The CBA is a tool to objectively assess an evolution from an economical point of view on the basis of all the potential costs and benefits that can be monetized. If other relevant non-monetary indicators are used, it has to happen in a second step in the frame of a multi-criteria assessment.

In terms of process, EDF considers that the CBA methodology should also be discussed in the System Operation European Stakeholders Committee (SO-ESC) prior to its submission to the regulatory authorities in order for ENTSO-E to explain the changes brought or not further to the present consultation and for stakeholders to react. Stakeholders shall not be left waiting for a potential written report on the comments received to be published weeks or months afterwards. Moreover, a clear planning with the next steps should be released.

The tight schedule does not allow a further step with the Stakeholder Committee before the submission of the CBA methodology to the NRAs. Anyhow the involvement by ENTSO-E of ESC will keep continuing during the whole process.

EDF's more specific comments to the proposed methodology are the following:

EDF approves and appreciates the Monte Carlo approach used to reproduce realistic scenarios, as opposed to basing the CBA on hypothetical worst-case scenarios for example. It is also appreciated that intermediate values of Tmin (15, 20, 25, 30 min) will be examined, rather than comparing only the 15 minutes and 30 minutes scenarios.

However,

1) The definition of Time Period included in the TSOs proposal is compliant with article 156 of the SO GL but the methodology described in the explanatory document does not seem to be in line with this article, regarding the consideration of the pre-alert state period. Indeed, the guideline requires that:

"a FCR providing unit with an energy reservoir that limits its capability to provide FCR shall activate its FCR for as long as the frequency deviation persists, unless its energy reservoir is exhausted in either the positive or negative direction with the following clarifications:

- during normal state, the FCR from FCR providing units with limited energy reservoirs shall be continuously available.

- as of triggering the alert state and during the alert state, the FCR from FCR providing units with limited energy reservoirs shall be fully activated continuously for a time period to be defined according to a CBA.

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Where no period has been determined, each FCR provider shall ensure that its FCR providing units with limited energy reservoirs are able to fully activate FCR continuously for at least 15 minutes or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time, or for a period defined by each TSO, which shall not be greater than 30 or smaller than 15 minutes."

This definition means that FCR providing units with LER have to make sure that, (i) at any point during normal state, the LER resources still have an energy content that will allow them to remain available as of triggering the alert state and (ii) during alert state must be capable of delivering full FCR continuously for a minimum time to be defined by the CBA, between 15 and 30 minutes (Tmin LER).

In the TSOs' proposal (consultation document), Time Period means "the time for which each FCR provider shall ensure that its FCR providing units with limited energy reservoirs are able to fully activate FCR continuously, as of triggering the alert state and during the alert state". This definition is consistent with article 156 of SO GL. However, in the explanatory document, the actual energy consumption between the overcoming of the limits of the Standard Frequency Range and the trigger of alert state is taken into account, even though, by definition (cf. article 18(2)), the system is not in Alert State during this period. This integration is not only uncompliant with SOGL but also is inconsistent with the definition of Time Period in TSOs' proposal. Consequently, EDF would like the methodology to be clarified to ensure consistency between the guidelines and the TSOs' proposal.

The pre-alert is normal state; the methodology will take into account only events (long lasting frequency deviations, deterministic frequency deviations, outages, or combination of those) that trigger alert state: in this case the assumption is that energy use starts above frequency deviations higher than standard frequency range. Recharging strategy when alert state is not triggered is out of scope of this methodology. The energy amount calculated this way will then be used to calculate an energy equivalent Time Period of full activation.

2) Normal state being out of the scope of this methodology, there is the risk that requirements for this state of the system differ significantly from one area to the other.

We regret that the methodology does not look at the requirements needed to ensure full availability of FCR providing units in normal state, as this will probably mean that each TSO will then remain free to ask what they consider to be needed. This could lead to potential market distortions from one country to another.

We understand the rationale of the comment. The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period is part of this harmonization process.

3) Hypotheses considered for the calculation are questionable, and require more transparency

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EDF considers that more transparency is needed on Frequency Restoration Reserve (FRR) dimensioning rules, among which the Full Activation Time of aFRR which will be taken into account for the study.

ENTSO-E bases its assumptions purely on historical trends and EDF regrets that they are not more forward-looking. Regarding the frequency historical trends of the last 15 years, EDF believes that this period is too large and not representative of the current European Electricity Network in terms of deterministic frequency deviations as it includes the incidents of September 2003 and November 2006. These cases are no longer representative of the situation in the current European power system, due to improvements brought to the system since then.

The FAT of FRR will be a weighted average of the FATs among LFCBs of each SA.

SO GL art 156 (11) requests to consider prolonged or repeated frequency events. The frequency statistics of long lasting events of the last years doesn't shows a clear trend of better frequency quality, hence it is proposed, in order to properly reflect the present scenario, not to mitigate the statistics of the frequency. Moreover a specific disclaimer has been added and clarifies that as soon as the scenario is not representative anymore the CBA will be run again.

Extreme events will not be taken into account for the definition of the frequency statistics.

15 years of data have been chosen for to represent an adequate amount of data for the statistics of frequency and also mitigate model assumptions: incidents are not foreseeable and can happen again. Instead of assessing deterministic worst cases the historical data are used and considered appropriate for the mitigation of simplified model assumptions: e.g. the network topology and the consequences of line tripping in different scenarios are not represented in the CBA methodology.

EDF calls for transparency in the assumptions and sources of data needed for the Monte Carlo simulation as well as for the choice of the TYNDP scenario, the relevant real frequency events as frequency profiles.

We acknowledge your comment. The detailed adopted assumptions will be defined and published during the implementation phase, including frequency statistics. The CBA analysis will be performed considering a short term developments instead of multiple time horizons in order to reduce possible uncertainties.

A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

EDF would like to know which assumptions will be considered to take into account the evolutions of the electricity mix in each country and as well as the market design evolutions (ISP, Balancing…). EDF considers that a duplication of the past into the future is not satisfactory, whereas many market design parameters have been changing or will change meantime. For example, with a 15 min imbalance settlement, the deterministic frequency deviation phenomena should decrease, as it has been assessed by ENTSO-E himself in the joint ENTSO-E/EURELECTRIC report of 2011 and works on the impact analyses carried out in 2012.

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We acknowledge your comment. The CBA analysis will be performed considering a short term scenario instead of multiple time horizons in order to reduce possible uncertainties.

A disclaimer will clarify that if the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs shall submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

For more clarity and transparency on the sources of the data, it is important that the assumptions and the methodology required to build the FCR market curves be released. Here are some examples of questions that are raised:

a. Which energy market prices will be used for the study?

The detailed adopted assumptions will be defined and published during the implementation phase.

b. As the settlement of Balancing Service Providers participating at the FCR Procurement market, is actually a "Pay as Bid" settlement (ie the costs per unit are actually not public), which assumptions will be taken to evaluate the costs of LER and non LER FCR providers? EDF recalls that the FCR market curves have to be calculated with sensitivity analyses.

The methodology does not deal with remuneration schemes and bid approach but with cost estimation of FCR

Among the types of FCR providing units to be considered in the study, EDF is surprised to see no mention of run of rivers (written in page 6 but not in pages 23/24 where the question of the costs of the different technologies is developed). EDF considers that run of river units with LER are to be considered for the study, as they represent 15 % of the FCR need in France.

CBA is technology neutral as it considers all kind of technologies representing LER, not only batteries.

The implication of the stakeholders and the transparency of ENTSOE in this process are key for the results of CBA. The collection of data and the definition of the assumptions needed for the study should be done in consultation with stakeholders. Thus, it is also important that the detailed results of the study are made public.

The detailed adopted assumptions will be defined and published during the implementation phase.

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15. **Comment by: Enel**

Enel strongly believes that storage will have an increasingly important role in electricity systems, contributing with its flexibility and allowing further penetration and integration of renewable energy sources.

Enel, therefore, welcomes the opportunity to review and comment the proposed methodology and assumptions for a cost-benefit analysis, developed in accordance with article 156(11) System Operation Guidelines (SO GL).

The proposal under consultation takes into due consideration the complexity of the analysis to be performed in order to identify minimum activation time requirements for LER FCR providers that, while minimizing the costs of the FCR process for the system, will guarantee a secure network operation.

However, the assumptions described in the document under consultation as well as in presentation used during the workshop of 15th of January 2018 need to be further clarified by ENTSO-E with respect to SO GL provisions: in fact, the results of the CBA could be highly affected by eventual incorrect hypothesis.

1. Object of the CBA and system states

The System Operation Guideline (SO GL), in article 156, specifies that:

- An FCR providing unit shall guarantee the continuous availability of its FCR during the period of time in which it is obliged to provide FCR (with the exception of a forced outage);
- An FCR providing unit with an energy reservoir that does not limit its capability to provide FCR shall activate its FCR for as long as the frequency deviation persists;
- A FCR providing unit with an energy reservoir that limits its capability to provide FCR shall activate its FCR for as long as the frequency deviation persists, unless its energy reservoir is exhausted in either the positive or negative direction with the following clarifications:
- during normal state, the FCR from FCR providing units with limited energy reservoirs shall be continuously available;
- as of triggering the alert state and during the alert state, the FCR from FCR providing units with limited energy reservoirs shall be fully activated continuously for a time period to be defined according to a CBA. Where no period has been determined, each FCR provider shall ensure that its FCR providing units with limited energy reservoirs are able to fully activate FCR continuously for at least 15 minutes or, in case of frequency deviations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time, or for a period defined by each TSO, which shall not be greater than 30 or smaller than 15 minutes.

The provisions for LER FCR providers are, then, given for normal state (in terms of continuous availability) and alert state (in terms of minimum activation period, to be determined through a CBA).

The methodology under consultation, instead, when describing the simulation model and the energy depletion of LER FCR providers, makes the following assumptions:

- The LER are considered without energy limitations while frequency remains inside the standard frequency range.
- Once the simulated frequency exceeds this range, the model starts to calculate the activated energy and the residual energy in the reservoir.
- The residual energy is taken into account even if the alert state is not yet triggered

The model which ENTSO-E intends to use in the future CBA considers that LER FCR providers start to deplete their energy reservoir when entering the “pre-alert state”, a state which is not defined in the SO

GL. As far as it can be understood, the model starts consuming the LER energy and depleting the reservoir before entering the alert state, this last being the object of the CBA and of the SO GL requirements in terms of minimum activation period.
ENTSO-E should better explain the assumptions taken in the proposed methodology and reconcile them with what required by SOGL in article 156 for normal states and alert states. A definition of pre-alert state should also be given.
Finally, the document under consultation and SO GL should clearly define the requirements for FCR LER providers in terms of an equivalent energy content [MWh] for a given FCR provided by them [MW], in all system states, i.e. normal, pre-alert (if needed) and alert states. This parameter is the most important one, both for potential market participants to size their equipments and offer services in the electricity markets, than for TSOs to evaluate the real contribution of LER.
Otherwise, should this not be clarified, there is the risk that each TSO will have margins to complement these requirements, as they would decide each on their own the sizing needed in normal state. This would then make most of the current process useless, as it would still result in TSOs requiring different sizing within the same synchronous zone. Besides, the results and assumptions of the CBA would be questionable, as the model would start to deplete LER resources of the energy required for alert state before entering the alert state, without considering the additional possible energy requirements of TSOs for normal state.

The pre-alert is normal state; the methodology will take into account only long lasting frequency deviations that trigger alert state: in this case the assumption is that energy use starts above frequency deviations higher than standard frequency range. Recharging strategy when alert state is not triggered is out of scope of this methodology. The energy amount calculated this way will then be used to calculate an energy equivalent Time Period of full activation

2. Intervention of FCR and FRR reserves

The LER depletion acceptance criterion FCR used in the iterative model presented by ENTSOE requires additional FCR to be added until a quasi-steady state frequency is not reached with a deviation < 200mHz.
We think that major details should be given on the hypothesis taken on FRR intervention, in terms of volumes, timing of intervention and FAT. In fact, the contribution of FRR to restore system frequency has a great impact on the control of frequency and, therefore, on the requirements for FCR. The complementarity and interaction among the different reserves should be clearly established, taking also into account the requirements currently under definition in the aFRR and mFRR platforms.
Stakeholders should be ensured that FCR is not oversized due to poor sizing and wrong assumptions taken on FRR contribution.

The FAT of FRR will be a weighted average of the FATs among the LFCBs of each SA.

Finally, the methodology proposed by ENTSO-E is based on the SOGL requirement of a full FCR activation for a frequency deviation of 200mHz. In some countries, the practice of the FCP can be different, conventional units have to reserve a certain band with respect to the nominal power and FCR is activated as per the droop value imposed by TSOs. How these differences are taken into account in the methodology proposed by ENTSO-E?

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The methodology considers the FCR response at SA level, acting by droop. This also corresponds to a full activation of the FCR amount at 200 mHz. The dynamic of the FCR response is not taken into consideration since the methodology deals with energy evaluations. About conventional units, it is assumed that they will provide FCR as long as the frequency deviation persists, acting as non-LER.

3. FCR costs evaluation

The evaluation of total FCR costs is done globally on multi-years scenarios, considering the NPV of costs sustained in different years. The following aspects have to be clarified by ENTSO-E.

- The actualization of costs sustained in different years is done considering a discount factor “r” of 4%, which is not clearly defined and substantiated. The choice of this factor has to be better explained and at least a sensitivity analysis should be performed.
- LER penetration in the market and their minimum time of activation are considered in a static way in the model: we think that there is a recursive aspect not considered in the simulation, due to the fact that the choice of Tmin, LER strongly influences LER development and their share in the FCR provision. Smaller Tmin, LER should, in principle, translate into lower entry barriers for new entrants, major competition, less market power and offers of a lower value. Besides, it is not clear if the NPV in a given scenario is calculated considering a fixed couple of parameters “LER shares and Tmin, LER” or if their evolution is considered.

Future scenarios have been moved out in order to minimize the uncertainties. A specific disclaimer clarifies that as soon as the scenario used for the methodology is not representative anymore the CBA has to be run again

Data will be published, also in terms of FCR cost curves modelling during the implementation phase.

More in general the detailed adopted assumptions will be defined and published during the implementation phase.

- FCR markets are not harmonized in EU countries. How ENTSO-E deals with the impact of a lack of harmonisation between Member States’ remuneration schemes on the costs for providing FCR in the different Member States? Which are the hypotheses on remuneration schemes for the FCR services (capacity only in €/MW, capacity in €/MW and energy in €/MWh, settlement of imbalances)? ENTSO-E should clarify if the model uses a unified rule or the existing market rules in each Member State.

The methodology does not deal with remuneration schemes and bid approach but with cost estimation of FCR.

- Bidding strategies of FCR providers seem to be unified in the model, without considering possible different market arrangements and remuneration schemes in the different countries. The following questions should be answered and explained in the methodology.

The methodology does not deal with remuneration schemes and market design but with cost estimation of FCR. The key concept is to reflect the social opportunity cost of FCR instead of prices observed in the

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market. The proposed approach to be adopted for cost estimation is detailed in the CBA methodology proposal and is different for LER and non-LER providers but uniform within the SA since the costs can be considered not affected by the market arrangements and remuneration schemes.

- For LER providers, the bidding strategy proposed is a bid proportional to investment costs, but investments costs could be considered sunk costs once the LER has been built and no marginal cost is taken into account.

The cost curve definition will be based on the long-run marginal cost concept, where all factors of production are endogenous, including investment costs. To this respect, it is important to highlight that only prospective investments will be taken into account as they have an impact on welfare. On the other hand, investments both in LER and non-LER that have already taken place will be considered as sunk costs.

- For non–LER providers, in case there would be only an FCR capacity payment, we are not sure that they will bid only the opportunity cost (of not participating in the DA market). When will non-LER recover their marginal cost (e.g. fuel costs) if there is no energy payment (either implicit or explicit)?

Methodology will analyze a short-term scenario: in our opinion the proposed approach for non-LER costs calculation is adequate to reflect the FCR costs for those technologies. If the assumptions adopted will change significantly after entering into force of the Time Period, all TSOs will submit the results of an updated CBA to the concerned regulatory authorities, suggesting an updated Time Period.

4. Frequency deviation assumptions.

Real events of the past will be used both in the Monte Carlo simulation and in the final "test". This last test, in particular, is performed once the NPV is calculated and, being a pass/no-pass test, strongly influences the possible adoption of a certain value of Tmin, LER.

Particular attention should be kept on the hypothesis that will be taken and the real events that will be chosen for the simulation and for the final test: some severe events of the past should not be tested if currently not foreseeable, for example due to the increased cooperation between TSOs at system operation level.

In the last years, the technology and the electricity system operation procedures have changed dramatically, with a big impact on the generation and demand behaviours (greater amount of renewable energy connected to the grid, self-consumption, penetration of energy storage devices, more effective coordination among the European TSOs). Due to the fact that this evolution has a great effect on the number of incidents that could occur in the electricity grid and their relevance, it should be taken into consideration in the simulation. Therefore, considering incidents older than 10 years would not be appropriate.

Extreme events will not be taken into account for the definition of the frequency statistics.

To properly represent the present scenario and consider the effects that the mitigation measures will have on frequency in the future the CBA methodology has been amended: the future scenarios has been moved out to reduce uncertainties and a specific disclaimer clarify that as soon as the scenario is not representative anymore the CBA has to be run again.

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Incidents are not foreseeable and can happen again. Instead of assessing deterministic worst cases the historical data are used and considered appropriate for the mitigation of simplified model assumptions: e.g. the network topology and the consequences of line tripping in different scenarios are not represented in the CBA methodology.

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16. **Comment by: ETH Zurich / THEMA Consulting Group**

I hereby reply to the "proposal on the assumptions and methodology for a cost-benefit analysis to be conducted, in order to assess the time period required for FCR providing units or groups with limited energy reservoirs to remain available during alert state, developed in accordance with article 156(11) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SO GL)"

I am currently a consultant with THEMA Consulting Group in Norway. We consult companies, authorities and other stakeholders in the power sector and adjacent sectors on strategic, regulatory and market issues. However, I want to make it clear that this reply to the proposal is my personal opinion as a researcher in power systems and not the opinion of my company. In fact, this reply is written without prior knowledge or consent of my employer and should be treated as a personal submission. Prior to my current position, I worked at ETH Zurich as a research assistant where I received my doctoral degree, in part due to the research I did specifically on provision of primary control (FCR) by batteries and other resources with limited energy storage capacity.

After reading the proposal and participating in the ENTSO-E workshop, I have come to the conclusion that the proposal has fundamental flaws that must be addressed, and that the CBA in its current form needs to be rejected and redesigned. The CBA is not able to correctly evaluate the benefits and costs of provision of primary control by limited energy resources. Two main issues I will elaborated on are

1) The CBA does not specify which state-of-charge (SoC) management strategy, if any, is chosen. The SoC management or recharging strategy has essential implications on the interaction with other balancing services, and on overall system stability

SoC management is out of scope and LER energy capacity will be assumed completely available within the standard frequency range.

2) The CBA assumes one large control area; however, this simplification ignores elemental parts of the interaction of balancing service, specifically in the highlighted situation of long-lasting frequency deviations.

We are aware of this. The methodology is a simplification in which an unlimited amount of FRR in a synchronous area is assumed, but only in case of counteracting deterministic frequency deviations in combination with outages of generating units. This assumption is realistic because it is, on the other hand, unrealistic to assume that multiple outages of generating units take place in the same control area. Such outages rather take place dispersed over many control areas and thus not surpass the available amount of FRR in each of them. As to long lasting frequency deviation, they indeed stem from FRR saturation and the CBA methodology, contrary to your assumption, does not postulate an unlimited amount of FRR in this case.

3) Less relevant, but still noteworthy, the CBA ignores relevant positive effects of participation of energy constrained units (ECUs) in primary control provision

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If energy constrained FCR units, as you described them, “cease to react to the frequency signal when a frequency deviation persists for a long period of time”, they will not be certified as FCR providers with limited energy reservoirs (LER). To pass the certification, FCR LER providers have to demonstrate permanent power output in normal operation and in alert state during a time period to be determined by the CBA. It is assumed in GL SO that this duration is sufficient to counteract all frequency deviations that could endanger the system operation (i.e. also long lasting frequency deviations). Therefore, the additional features of energy constrained FCR units are welcome, but not essential. This means that the CBA does not ignore, as you say, the “relevant positive effects of participation of energy constrained units (ECUs) in primary control provision”. The CBA simply does not have the task to deal with this kind of additional capability.

1 RECHARGING STRATEGIES AND IMPLICATION FOR SYSTEM STABILITY

The CBA avoids clarifying which recharging strategies are permissible or are assumed for the analyses. While this is understandable concerning the current uncertainty and lack of harmonization in the regulation, it prevents any form of useful analysis: different recharging strategies lead to very different outcomes in terms of system stability and system security, and hence to different outcomes in the costs. Also, well-designed recharging strategies are proven to put minimal stress on the system and minimize system costs of FCR provision.

1.1 Recharging strategies need to be specified

To underline this point, I briefly discuss 4 different recharging strategies:
1) immediate recharging on reaching a SoC limit,
2) no recharging,
3) unspecified recharging,
4) moving-average recharging.

1.1.1 Immediate recharging

This “dumb” strategy indeed puts the system at additional risk. Not only does the battery completely stop provision of reserves, it also immediately puts an additional strain on the balancing resources, further deteriorating the situation. If several assets with similar parameters use this strategy, they would concurrently impose this stress on the system, potentially leading to a black out. This strategy must not be used.

1.1.2 No recharging

If – for the sake of the CBA – no recharging is assumed, this effectively leaves the system without reserves after some time. The consequences for system security are severe, as additional faults can no longer be handled. This effect would, to my understanding, not be taken into account in the current CBA design. Independent of if this is handled by the CBA or not, a strategy of not recharging would not realistically be used by any ancillary service provider

1.1.3 Unspecified recharging

A similar issue arises with unspecified recharging: effectively the CBA cannot make any meaningful statement on system stability if the asset behavior is not specified.

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1.1.4 Moving-average recharging

A moving average strategy continuously recharges the asset by the average consumption or production of the last, e.g., 15 minutes. This strategy has several properties

- The battery SoC always stays close to the reference point
- The asset always responds with full capacity and full ramping rate to any change in system frequency, hence providing exact the response that the system needs to stay stable
- The recharging operating point (power) changes only slowly, even after a step in system frequency
- The recharging is predictable for other parties, such as the TSO, without real-time communication between the asset and the TSO, as long as the parameters of the storage system are known.
- The recharging energy must be provided by a third party. If it is consumed as balancing energy, 1) the total amount of energy is very small compared to the provision of balancing energy by FRR resources; and 2) since the change in set point is smooth and slow, it does not increase requirements on ramping rates of FRR.

This strategy was proposed in a paper from 2013 [1], and is currently being applied for example by the utility EKZ in Switzerland since (I think) 2014. The EKZ system is participating in the Swiss ancillary service market without pooling with a dispatchable power plant [3].

1.1.5 Summary

From the above it should be clear that the choice of recharging strategy is essential, and that smart, predictable recharging strategies exist.

1.2 Smart recharging puts only limited stress on the system

As described above, a recharging strategy based on a moving average can be used for SoC management. Even if an asset using this strategy is not pooled with a dispatchable plant nor explicitly buys energy on intra-day markets, but rather recharges by consuming (or producing) balancing energy, the detrimental effects on FRR are negligible.

In a study [2] using frequency and area generation control (AGC) data for a time horizon of one year, we could show that

- the additional energy requested by FRR is on the order of 1% of the average energy provision by FRR resources
- no additional ramping requirements arise
- no additional capacity requirements arise

Furthermore, the asset would be required to pay for the consumed balancing energy, thus financing the additional energy provision by FRR. As mentioned, this approach is used since several years by a utility in Switzerland and in accordance with Swissgrid.

To conclude, I have highlighted 1) why the choice of recharging is essential, and 2) that smart recharging methods exist, are in use, and are proven to work both from simulations and years of practical experience.

2 LIMITED ENERGY RESOURCES IN SYNCHRONOUS SYSTEMS WITH SEVERAL CONTROL AREAS

The CBA methodology as proposed takes into account only one aggregated control area for each synchronous area. This simplification makes it impossible to investigate and understand the quite complex interaction between energy constrained resources providing FCR and those providing FRR. The main points in the argument are 1) FCR is a global control, while FRR is a control-area wide control, 2) long-lasting frequency deviations stem always from saturation of FRR in one or several control areas, 3) todays system is not secure when it is in alert state, and 4) energy constrained resources with a well-designed recharging strategy actually improve system security in situation with lasting frequency deviations. While going through these arguments, it will become evident that an aggregated modelling of FRR is not sufficient for the purpose of the CBA.

2.1 FCR and FRR have different scopes not only in time, but also in space

FCR is an inherently system wide response. It is a proportional response to the frequency assumed to be synchronous in a synchronous area. Except for dynamic effects on time scales much faster than those considered here, it can be assumed that all FCR resources receive the same input signal and respond in unison to a frequency deviation.

Secondary control or FRR is an inherently local control only concerned about the balance of each control area. In fact, the Area Control Error (ACE) is the main input, and it takes into account the exchanges with neighboring areas, as well as the frequency response in the own area by FCR resources and natural damping. Hence it will exclusively respond to local imbalances.

2.2 Ignoring that the scope of FRR is limited to the local control area masks the basic effects that should be investigated, rendering the analysis meaningless

To substantiate this claim, I will highlight only two points: 1) long lasting frequency deviations stem from the effect that FRR is saturated in one control area, and the remaining FRRs are not supporting that area; 2) if one would aggregate all areas, the lasting frequency deviation would vanish.

A lasting frequency deviation ensues when one control area is out of balance, and the local FRR can no longer handle the imbalance. Since the neighboring control areas compute the ACE in such a manner that they only respond to imbalance in their own areas, they are not being activated despite the remaining imbalance. Hence the frequency will deviate until the global FCR response covers the imbalance.
If one would now look at one large system with the same imbalance in one area, but aggregate the FRR response, the imbalance would be handled by this larger capacity of control reserves.

While the CBA methodology is trying to take this into account by only looking at changes in frequency and changes in activation, the over-simplified approach of the CBA methodology cannot capture the interaction between FCR provision by energy constrained units, nor the effect on tie-line flows if energy-constrained units provide FCR, and hence the actual activation pattern of FRR in such situations is not represented. Refer to [2] for an alternative approach.

2.3 Todays' system is not secure in alert state, as FCR resources are blocked

During a lasting frequency deviation, todays' system can no longer react to a design fault. This is because the FCR resources, which are the only resources able to provide power capacity quickly enough after a

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fault (and after the inertial response), are occupied by support a lasting, slowly changing imbalance in the system which could easily be handled by FRR resources. Hence, in case of an additional outage, FCR would not provide the required response and the system might collapse. This issue arises, as FRR is designed in such a way that it only reacts to imbalances within the control area.

Please be reminded, that this describes todays situation with unconstrained resources providing FCR. The issue in the current design of balancing services is, that in case of lasting frequency deviations primary control is activated, even though this would be a task much better suited for secondary control.

2.4 Counter-intuitively, energy-constrained units providing FCR can improve system security during lasting frequency deviations by forcing FRR to be activated

With a well-designed recharging strategy, the behavior of energy constrained FCR providers forces FRR resources to be activated during lasting frequency deviations. This is a more appropriate behavior than todays' response described above.

This happens because of the following effects:

a) A lasting frequency deviation occurs due to an imbalance and saturation of FRR in area A. During this event FCR will be activated in both area A and all other areas B.

b) However, the ACE in areas B will be zero, as the sum of measured frequency deviation and unscheduled tie-line flows, driven by FCR provision, cancel out. FRR in areas B is not activated.

c) If a frequency deviation persists for a long period of time, energy constrained FCR units will cease to react to the frequency signal. Accordingly, the ACE in all areas B with energy constrained units will differ from zero, as the frequency deviates from nominal but no unscheduled tie-line flows persist.

d) Hence, FRR in areas B will be activated up to the point of the previous FCR provision by energy constrained units

Importantly, if the recharging algorithm is designed appropriately, we have the following behavior

a) All energy constrained FCR units are still able to react to sudden changes in frequency, in either direction

b) Ceasing provision of balancing energy during the steady-state deviation happens in a smooth way, allowing the slower FRR reserves to take over

Exactly this behavior is guaranteed by the moving-average recharging strategy mentioned above. Please find also a full analysis of the described effect and related issues in [4], Chapters 11 and 12.

3 OTHER ISSUES

The CBA methodology also ignores a number of other potential benefits of provision of FCR by energy constrained units. The main effect ignored is the fact that most ECUs can react much faster than conventional power plants or even hydro power plants. This fast response might become more and more relevant in the future, especially as the overall inertia in the system decreases. The need for either virtual inertia or faster FCR resources is already recognized by the TSOs in the Nordics, and by EirGrid in Ireland. While acknowledging that this is an effect that is hard to quantify at this stage, it should be taken into account in a qualitative CBA.

4 CONCLUSION

It is the task of the TSOs to ensure a secure and economic provision of energy to all consumers. Hence the question of FCR provision is a very relevant topic, and the consideration of costs and benefits of using alternatives for FCR provision to the existing approaches should be taken with utmost care.

In this response, I pointed out two main faults in the current CBA methodology:

1) The recharging strategy of ECU providing FCR is not defined, despite the elemental effect on system security and interaction with FRR
2) Modeling the system as one area is insufficient, as FRR is an inherently control-area wide control strategy, while FCR covers the whole synchronous area. The interaction between these scopes must not be ignored.

I further pointed out that well designed recharging strategies exist and are currently being used in both pilot and commercial projects.
I hope that ENTSO-E will take the points raised in this response into account. I also would like to request that the sources below are being cited if the CBA is updated accordingly.

With kind regards,
Dr. Theodor Borsche

[1] T. Borsche, A. Ulbig, M. Koller, and G. Andersson, "Power and Energy Capacity Requirements of Storages Providing Frequency Control Reserves," in IEEE PES General Meeting, Vancouver, 2013.
[2] T. Borsche, A. Ulbig, and G. Andersson, "Impact of Frequency Control Reserve Provision by Storage Systems on Power System Operation," in 19th IFAC World Congress, Cape Town, 2014.
[3] Michael Koller, Theodor Borsche, Andreas Ulbig and Goran Andersson, Review of Grid Applications with the Zurich 1MW Battery Energy Storage System, Electric Power Systems Research (EPRS), volume 120, pages 128–135, March 2015
[4] Theodor Borsche, Impact of Demand and Storage Control on Power System Operation and Dynamics, Doctoral Thesis, ETH Zurich, 2015. Available at:
https://www.research-collection.ethz.ch/bitstream/handle/20.500.11850/117223/eth-49281-02.pdf?sequence=2

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17. Comment by: EKZ Elektrizitätswerke des Kantons Zürich

I hereby reply to the proposal on the assumptions and methodology for a cost-benefit analysis to be conducted, in order to assess the time period required for FCR providing units or groups with limited energy reservoirs.

I am the Chief Technology Officer (CTO) of Elektrizitätswerke des Kantons Zürich (EKZ) in Switzerland. We are a prequalified ancillary services provider and provide FCR with Li-Ion batteries since 2014.

Looking at the proposal I would suggest revision to the following points of the methodology:

1) Looking at historic frequency measurements and events is a reasonable and practical approach. However, one should remove all the periods from the time series during which FRR in one of the control zones did not perform according to grid codes an requirements leading to a lasting frequency deviation. Those instances of FRR failure should not be covered by FCR but be fixed by enforcing the existing ENTSO-E quality requirements in all control zones. This would surely be more cost effective (not to mention more just) than larger duration requirements for FCR.

FCR is the most important line of defense of the power system. We agree that acting on alleviating the root causes is the best solution, but until we see a significant improvement, we cannot exclude these events. Currently, there is no profound evidence that long lasting events and deterministic frequency deviations have been alleviated.

2) The evaluation should explicitly include the energy balancing strategies of LER providing FCR and their effect on system stability, FRR activation and LER duration requirements. Recommendations regarding recharging strategies should follow from the analysis in regard to their positive or negative effects on the overall cost benefit analysis

Recharging strategy when alert state is not triggered is out of scope of this methodology.

3) FRR modeling should be multi-zonal in order to examine effects of recharging strategies of LER providing FCR. A closed loop analysis of a multi-zone system is necessary for safe recommendations.

Recharghing strategy, with the exception of what explicitly defined in art. 156(13)(b), is out of scope of this methodology.

The methodology proposes a simplification in which an unlimited amount of FRR in a synchronous area is assumed, but only in case of counteracting deterministic frequency deviations in combination with outages of generating units. This assumption is realistic because it is, on the other hand, unrealistic to assume that multiple outages of generating units take place in the same control area. Such outages rather take place dispersed over many control areas and thus not surpass the available amount of FRR in each of them. In addition considering the exhaustion of FRR by the means of long lasting frequency deviation, allows to avoid taking into account the saturation of FRR in the single LFC area.

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4) The cost benefit analysis disregards one of the potential key benefits of many LER technologies. Faster response times than currently required by the grid code could provide big benefits for faults occurring during low inertia hours with a large share of the generation coming from inverter coupled renewables (mainly wind and solar). Faster response times would minimize the magnitude of the transient frequency excursion and prevent the system from reaching critical frequency thresholds by reaching the steady state frequency deviation much faster. This dynamic analysis of the potential benefits of LER should be evaluated (for example 5 seconds to full activation instead of 30 seconds).

FCR dynamics for LER FCR providers is not taken into account considering that:
- System inertia and FCR dynamics will be neglected since the aim of the methodology is to evaluate the energy content of frequency transients over 15-30 minutes (or even more) duration.
- The subsistence of system inertia is out of the scope of this methodology;

Failure to include remedies to address the issues mentioned above will result in a skewed cost benefit analysis disfavoring LERs over conventional FCR units. Since LERs are to a large degree novel technologies this would not only lock out new market participants from a competitive market but also limit the diffusion of these technologies in continental Europe compared to geographies such as a variety of synchronous zones in North America or in the UK and in the long run put the continental European power system at a technological disadvantage.

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18. **Comment by: Statkraft**

Dear Alexander,

Please find herewith our contribution to the consultation on the CBA for the requirements related to Article 156 of the SOGR. I would really appreciate if you can still take the comments into account, and we do not expect an official answer.

Statkraft would like to first underline that:

1. Priority must be given to international harmonisation of balancing products (including FCR products) to facilitate cross-border participation and thus a better functioning power market.

Harmonization is not comprised within the scope of the CBA tasks

2. Equal treatment of all assets and technologies (including generations, storage and demand response) is a prerequisite as otherwise competition would be distorted which would result in inefficiencies and ultimately higher costs.

Yes, different technologies of LER are taken into account. Non LER different technologies are also taken into account in the costs assessment.

Secondly, Statkraft wonders whether the cost estimation (as described in section 5.6) can be performed with sufficient accuracy. The FCR costs for non-LER plants as described in section 5.6.1.1, are opportunity costs. It can be questioned whether these are the only costs to consider. More importantly, it is questionable whether these opportunity costs can be calculated correctly. For example, which "energy price" and "marginal production costs" will be chosen? If it is the day-ahead price, then one should add opportunity costs and outage risks in the marginal production costs. These opportunity costs and outage risk costs are related to changing intra-day and imbalance prices. These considerations also apply to the quantification of the FCR costs for LER plants.

Methodology will take into account a modelling of market curve for FCR provision (note: the methodology does not implement a complete market model of FCR and FRR): all assumptions about these topics will be released at the implementation stage.

Finally, it is extremely hard to estimate the impact of innovations on FCR costs both in terms of new technologies as well as in new business models to exploit decentralised FCR providers.

The methodology approach is an estimation of costs for a short term scenario. If a significant evolution regarding the CBA assumptions occurs, the methodology will be applied again in order to propose a Time Period in accordance with this evolution.

Therefore, Statkraft is of the opinion that:

1. The technical requirements (so also on the time period for FCR providing units to remain available) must be primarily based on the needs of the system.

Since in the methodology is envisaged to calculate an increased FCR dimensioning in order to fulfill the needs of the system, a proper cost assessment is needed. The cost assessment is requested in Article 156 (11) of SO GL.

2. Market participants must be able to pool assets when delivering FCR. In this way individual assets that cannot meet the 30 min requirement can still provide value through such pooling.

It is possible. It is up to the aggregator to fulfill the requirements for FCR qualification.

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19. **Comment by: Ørsted A/S**

System security:
It is important to note that the FCR product is crucial to the stability of the grid and to avoid blackouts. The system security should therefore never be at risk. It is hence important that the sufficient amount of FCR is present in the system at all times. It is therefore critical if this is not the case because some reserves deplete too early. With this in mind we have the following concern:

- It is described that the initial condition for the LER is half the equivalent energy capacity and the model starts calculating the activated energy/residual energy when the standard frequency range is crossed (changing from green to yellow area in figure slide 35 in the presentation from the workshop). To our opinion it is not sufficiently conservative to assume that the LER is optimally placed regarding energy reservoir at that instant of time. In practice the reservoir will in practice not be at its optimum, a reservoir reduction of some percentage should be included for instance because of the activation from 0 to -50 mHz and generally because of the activation the preceding period (~1-2 hour) before the instance. Which in practice results in a too early depletion.

SoC management is out of scope and LER energy capacity will be assumed completely available within the standard frequency range.

Correct cost curves are crucial:
Correct cost curves are crucial to obtain the correct dimensioning of the FCR reserves. We are for the reasons stated below concerned about the result due to huge inaccuracies on the used cost assumptions.

As we are sure you know, batteries are well suited for provision of very fast reacting frequency response. Furthermore, the costs of batteries have declined rapidly and is expected to continue to do so in the future. Therefore, the costs of providing very fast responding reserves are likely to decline significantly – and probably faster than other technologies that can provide frequency response. This evolution needs to be captured accurately in the CBA as that may change the results concerning the most cost efficient way of ensuring overall system stability (ie. it may change the optimal share of fast responding reserves).

It is also important to capture the correct cost of conventional Non-LER FCR resources. Calculating it as a simple must run cost and an opportunity cost is too simple. A variety of different types of FCR resources exist which has another cost structure and are subject to constraints which results in the described model is not valid:

- Hydro power plants are typically not
- Plants subject to district heating production do not necessarily operate at low load at low DA-prices due to forced district heating production.
- Combination of different technologies (eg. downwards/upwards reserves) results in much more cost effective ways to provide FCR reserves.
- …

The proposed approach for calculating the costs of conventional non-LER is considered as an adequate approximation of real costs of FCR for non-LER. More complex models for a restricted amount of providers will not be considered in order to avoid an excessive modelling complexity to deal with.

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20. **Comment by: REstore**

Firstly, REstore strongly calls for the Cost Benefit Analysis undertaken by the TSOS in application of article 156 of System Operation Guideline to aim at setting a harmonized number of minutes to be requested from limited energy reservoir assets in FCR in TOTAL, and not only during alert state.

As presented by the TSOs during the workshop held on January 15, Pursuant to Art.156(9) the time period shall be ensured “as of triggering the alert state and during the alert state”, but in reality the storage capacity associated to a time period is exploited also in pre-alert state. To reflect this, it is likely that TSOs will request reservoirs taking this into account, i.e asking for the required number of minutes in alert state from the CBA + a certain amount to cover pre-alert state.

The key ambition of this CBA should be in the end to get a harmonized requirement implemented for all LER assets participation in FCR in continental Europe. Indeed, if the CBA limits its scope at a number of minutes for alert state, and ignoring the pre-alert state mode, then in the end each individual TSO can end in requesting different pre-qualification requirements for LER in terms of reservoir size. As the procurement of FCR is increasingly done at a European level, having different requirements would lead to significant and unacceptable differences between control areas: the cost of investing and developing a LER asset is highly dependent on the size of the reservoir requested.

As REstore has underlined in the ENTSO-E consultation closed on February 15 on the design of the FCR cooperation, it is key that such requirements are harmonized as soon as possible to avoid such distortions. We believe this CBA analysis is a very relevant project to seek for harmonized requirements on LER assets regarding the size of their reservoirs. As a illustration, would the CBA conclude that 15 minutes for alert state only is a good value, then each TSO in Europe could set requirements ranging from 15 minutes only to 30 minutes (15+15) or even more, and therefore costs of investing in LER assets being 100% higher in a control area compared to another which would not be acceptable.

We understand the rationale of the comment. Pre-alert state is normal state, out of scope of this methodology. The harmonization of the FCR product is not comprised within the scope of the CBA tasks but the definition of the Time Period for alert state is the aim of this process.

Secondly, REstore strongly argues that the approach chosen by the TSOs should not lead to size the reservoir of LER assets in FCR to cope with inefficiencies of other parts of the market: just because FCR is one of the last resort reserve, it should not be designed just for the sake of covering other issues (like unavailability of aFRR for whatever reason). As presented during the workshop on January 15, what is at stake here are the situations where the system faces lengthy frequency deviations, where the energy content is relevant (and not the speed of the response or the inertia). What is required from FCR providers should stick to the features of the product, i.e containing the frequency after an incident (and not restoring it, which is the job of FRR and RR reserves). FCR should in no way be charged to cover all the potential failures of other market segments. If TSOs feel they need an additional insurance, then they should call for the implementation of additional reserves, or increase the amount of relevant ones to cover energy content incidents.

FCR regulation operates in order to contain frequency deviation and does not restore frequency to its nominal value after a power imbalance occurs.

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SO GL art 156 (11) requests to consider prolonged or repeated frequency events. The frequency statistics of long lasting events of the last years doesn't show a clear trend of better frequency quality, hence it is proposed, in order to properly reflect the present scenario, not to mitigate the statistics of the frequency, being the FCR the most important, the first and the last line of defense of the power system available to TSOs. Moreover a specific disclaimer has been added and clarifies that as soon as the scenario is not representative anymore the CBA will be run again.

Finally, REstore underlines that the elements of response brought to the proposed methodology shall not be used afterwards by the TSOs in order to comfort or discard one or the other of the results obtained. At this stage, it is very difficult to provide answers on the methodology only, without being able to fully assess their impact and the potential results. We therefore reserve ourselves the right to complete our response and comments further on in the process, once the TSOs will present concrete results and hypothesis following the CBA, and before submitting to NRAs a concrete value.

We acknowledge your comment.

The input data and hypothesis for the methodology will be published.

21. Comment by: SmartEn

To whom it may concern,

Thank you for providing us the opportunity to comment on the "Proposal for a Cost Benefit Analysis methodology" consultation.

If you have any more questions or feel that we can assist you in any way, please don't hesitate in contacting us.

SmartEn would like to comment and provide suggestions on the following topics of the Cost Benefit Analysis methodology:

1. A clear definition is needed on what constitutes a "unit or group with limited energy reservoirs". Neither the consultation document nor the Commission Regulation 2017/1485 of 2 August 2017 includes a definition concerning limited energy reservoirs (LER).
Without a clear definition, non-battery technologies might be excluded from this category that wouldn't be otherwise. For example (pumped) storage power plants and run of river power plants, as none of them have unlimited energy reservoirs. Not only batteries have a limited energy reservoir, and these technologies would be left outside of the cost-benefit analysis.

We acknowledge the comment. TSOs of CE and Nordic are working in order to clearly define LER FCR provider

2. Any change in the FCR activation time will have an influence in the aFRR activation and its cost. For this reason, any analysis performed has to take into account the influence and impact that any modifications to the FCR activation will have on the aFRR, and keep this impact to a minimum.

As described in the proposal the aFRR will be considered in the dynamic model without saturation. We don't take into account any impact on aFRR activation and costs because the increase of activation of aFRR due to LER presence occurs only in case of their depletion and it is expected to be negligible both in terms of costs and volumes.

3. The proposed model doesn't take into account the bid size, but only the bid price. If the activation time is increased, it affects the bid price and the bid size. Taking into account the different technologies, the influence of the activation time can be stronger on the bid size than on the bid price.

For existing LER plants, methodology will also take into account the possibility to reduce the FCR amount offered

4. The current SOGL drafting is not comprehensive. The cost-benefit analysis gives only a defined number of minutes for the alert state, between 15 and 30 minutes, while it should provide with a total amount of time requested for limited energy reservoir assets to serve in FCR.

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SmartEn asks the TSOs involved in this project to be more ambitious and propose a harmonized amount of total minutes, that will be implemented by other TSOs through the prequalification process.

Definition of Prequalification process is out of scope.

5. We are of the opinion that the cost-benefit analysis should guarantee that the FCR is dimensioned in an appropriate way for its purpose and not as a catch-all to cover inefficiencies in other markets. We strongly oppose an over dimensioned FCR that provides coverage to other issues that should be addressed by their own mechanisms, for the only reason that it serves as one of the last resort reserves.

FCR dimensioning is out of scope of the CBA proposal. The impact of an FCR increased amount will be taken into account in the CBA as requested by SO GL 156(11). FCR is the most important line of defense of the power system. We acknowledge that there may be solutions to improve other issues, but until we see a significant improvement, we cannot exclude these events. Currently, there is no profound evidence that long lasting events and deterministic frequency deviations have been alleviated.

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22. **Comment by: BVES – German Energy Storage Association**

Introduction

The German Energy Storage Association BVES is the leading industrial association of German energy storage companies that is open to all technologies in the areas of electricity, heat, gas and mobility. Our association represents companies and institutes along the whole value chain of energy storage (R&D, industry, aggregators, operators).

General Comments

BVES appreciates the endeavour to constitute a transparent, and balanced approach that will allow TSOs to minimise FCR costs while safeguarding operational security.

For BVES market transparency and uniform prequalification requirements for all market participants are of first priority. Batteries can provide their highest accuracy within milliseconds and are able to deliver FCR better than any other technology.

The fact, that batteries are classified as "technical units with a limited energy reservoir" (LER) and have to fulfil higher technical requirements to be able to enter the market, clearly contradicts the technologically open approach according to the European law. Thus, BVES underlines, that it is indispensable to have a market design which is open to all technologies.

CBA methodology is technology neutral as it considers different kind of technologies representing LER, not only batteries. LER do not have to fulfil higher technical requirements.

In its proposal for a Cost Benefit Analysis methodology to assess the frequency containment reserve, ENTSO-E introduced two main approaches:

- An analytic approach to size FCR and determine the time period for this service, based on Monte Carlo simulations using historical data of frequency deviations in the European transmission network;
- An economic approach to evaluate the cost-benefit impact of the FCR provision, according to the following criteria:
  - o The FCR cost for non-LER technologies: difference between the energy price and the marginal cost of the technology.
  - o The FCR cost for LER technologies: according to the investment cost of the solutions.

Together with the European Association for Storage of energy BVES has evaluated this methodology focusing on proposing improvements to enhance the proposed methodology. In detail, BVES would like to propose the following amendments and clarifications:

1. Clear definition of parameters

Normal state, pre alert state and emergency state parameters should be clearly defined in the draft methodology. The pre alert state, that ENTSO-E mentioned, is not included in the system operation guidelines. Moreover, as according to the system operation guideline, it seems that the time period neither greater than 30 minutes nor smaller than 15 minutes is only referred to the alert state, it is absolutely necessary to achieve transparency in the pre alert state definition in order to correctly size the LER-FCR reservoirs.

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Pre alert is normal state; nevertheless only when dealing with long lasting frequency deviations that triggers alert state the assumption is that energy use starts above frequency deviations higher than standard frequency range in order to represent the reality of energy depletion of LER. Recharging strategy when alert state is not triggered is out of scope of this methodology. The result of the methodology is then to be applied to alert state and to be considered as equivalent full activation time.

The FRR behaviour should also be clearly defined in terms of the amount of energy provided by this service and the way this energy is provided in time, since this can have an important effect on FCR provision.

As described in the proposal the aFRR will be considered in the dynamic model without saturation. The FAT of FRR will be a weighted average of the FATs among LFCBs of each SA.

2. Data base and time frame

There should be more transparency regarding the relevant frequency profiles and historical data used to determine the different scenarios and Monte Carlo sampling assumptions.

When implementing the CBA methodology, frequency statistics will be published.

- Regarding Article 153 of the System Operation Guideline, the reserve capacity for FCR required for the CE and Nordic synchronous area shall cover at least the reference incident and the results of the probabilistic dimensioning approach for FCR carried out, being the reference incident defined as 3,000 MW in positive and negative direction and a worse case established according to probabilistic criteria. ENTSO-E has established this probabilistic procedure as a Monte Carlo simulation process.

Please note that the probabilistic approach for FCR dimensioning described in SO GL art. 153 is not mandatory and the Monte Carlo simulation proposed for the CBA methodology aims to assess the stability risk in presence of LER with a probabilistic approach.

- In addition, if there has been a worse incident in the last 20 years, this incident must be considered. Regarding the establishment of a worse case according to probabilistic criteria, the detailed definition of the probabilistic procedure to determine this worse case should be included in the ENTSO-E approach. That is why it is not necessary to develop the proposed Monte Carlo approach because it is less transparent and it complicates the assessment.

The use of Monte Carlo method has the aim to explore a large part of all the possible combinations of the uncertainties sources in the future.

A probabilistic approach is more consistent than a deterministic approach that determines - with a "a priori" criterion - the edges of the distribution.

- In the last years, the technology evolution has changed dramatically, with a big impact on the generation and demand behaviours. Additionally, more cooperation between the TSOs has been

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achieved. As this evolution has a great effect on the incidents that could occur in the electricity network, it would be appropriate to evaluate FCR time period taking into account only incidents from the last 10 years. Incidents older than 10 years should not be taken into consideration, because they do not reflect the current electricity system behaviour.

15 years of data have been chosen for representing an adequate amount of data for the statistics of frequency and also mitigate model assumptions: incidents are not foreseeable and can happen again.

Considering what above mentioned and that the frequency statistics of the last years doesn't shows a clear trend of better frequency quality the TSOs of SA CE and Nordic proposes, in order to properly reflect the present scenario, not to mitigate the statistics of the frequency, being the FCR the most important, the first and the last line of defense of the power system.

3. Uniform approaches for cost determination

Regarding the economic approach needed to evaluate the cost-benefit impact of the FCR provision, more information should be given in order to determine those costs. A detailed and complete cost evaluation method should be provided by ENTSO-E. Additionally, a real discount rate should be used in order to estimate the NPV of the investments, instead of a new one based on societal criteria (4%).

The information provided by ENTSO-E to determine the cost of the system according to delivery schemes for LER, horizon year, LER share and minimum LER-FCR time period is not enough to clarify the methodology implemented to calculate the costs.

Defining the price range used for FCR cost of LER resources and the type of evolution of FCR cost (linear, piecewise linear, quadratic, etc.) is necessary. In addition, the partiality of LER-FCR investment costs considering that LER resources could also provide other services, shall also be defined.
The cost methodology differentiates between two procedures to estimate the cost of FCR provision, one for non-LER and other for LER technologies:

- The method considers that the FCR cost for non-LER technologies is the difference between the energy price and the marginal cost.

- However, the method does not take into consideration the cost of the capacity to provide the service (available capacity).

- The method considers that the FCR cost for LER technologies is proportional to the investment costs.

- However, this approach neither includes the percentage of the investment cost to allocate the MWh to provide the FCR service, nor the procedure to do it and/or to obtain the revenue.

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Within the FCR context, the CBA has to determine if and how system costs change, taking into account a competitive setting, where no forms of distortion are present. For instance, this analytical setting implies that bids are the mere presentation of marginal opportunity costs.

The investment costs for LER shall be considered only if they are sustained in order to qualify for FCR provision. As described in the methodology, in case of storage revenue stacking the investment cost should be associated only to the share sustained for FCR provision.

4. The importance of SOC-management

To give the complete picture, BVES wants to point out as well the importance of SOC-management, which is essential for the successful operation of storage in FCR.
In particular, SOC management enables a fast bi-directional functionality by quickly absorbing or releasing energy in both directions. It must therefore be taken into account when simulating the "long lasting frequency deviation". In fact, in previous operating experience such events could be fully compensated by the SOC management (e.g., January 2017, 7h frequency deviation around 50mHz).
As well in the occasion of an interrupted communication connection, the storage entity can provide FCR independently and decentrally. On top it also includes an emergency reloading management which autonomously controls loading or unloading as a function of the SOC.

SOC-management is out of scope. Harmonization of SOC-management is not comprised within the scope of the CBA tasks

Please also consider that only an adequate energy/power ratio of FCR obligation can avoid the depletion in case of prolonged or repeated unidirectional frequency deviations during alert state, whereas the SOC management of a LER in such conditions could not be sufficient.

5. Fair level-playing field for all participating market parties

BVES clearly underlines the necessity of a technology neutral approach and transparent process.

CBA is technology neutral as it considers all kind of technologies representing LER, not only batteries.

The described simulation method could discriminate batteries because it is assumed that deterministic frequency deviations (meaning hourly peaks) are simply accepted. However, these are caused by power plants that have simultaneously provided the entire FCR. In fact, at an hourly change, we have a loss of most of the FCR reserve and an exhaustion of the other part. With a higher proportion of batteries, this effect would be eliminated as they are providing exclusively FCR being available at all times. Thus, the deterministic frequency response would have to be adjusted in the simulation.

As above, CBA is technology neutral. Deterministic frequency deviation is linked to ramping behavior and not related to the loss of technology providing FCR.

As a second point, BVES wants to clarify emphatically, that a CBA result of only an allowed LER share of a certain percentage in the FCR market would not be acceptable. In particular, this raises the central question of how a LER limitation could get implemented in a later market design and how this could be in accordance with the European law.

The implementation of the market design is out of scope of the CBA.
The methodology provides a matrix of possible solutions based on which all TSOs will make a proposal for a time period to NRAs for approval considering these main key factors:

- FCR amount
- Total FCR costs estimated
- LER share

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23. Comment by: ENGIE

ENGIE welcomes and appreciates the consultation on the CBA Methodology Proposal. We expect the public consultation as a starting point for some alignments in the requirements to provide FCR from units with limited energy reservoir (LER), which shall be implemented in full dialogue with both market participants and National Regulatory Authorities.
ENGIE is active on the FCR market from our portfolio (including production units but also batteries, pump-storage power plants) in France, Belgium, the Netherlands and Germany. ENGIE is also man-aging several projects in order to deliver FCR from new technologies (batteries, load,..). ENGIE is in favor of a market as large and diversified as possible in order that FCR need could be provided in an optimum way. Our main feedback deals with the following topics:
- analysis of the system needs
- assumptions and the grid model
- costs calculation
- consultation process

Analysis of the system needs

The main objective of the CBA is the selection of a minimum time period between 15 minutes and 30 minutes when LERs remain available during Alert State. According to the System Operation Guideline (SOGL), the transmission system is considered in alert state when the absolute value of the steady state system frequency deviation has continuously exceeded 50 % of the maximum steady state frequency deviation for a time period longer than the alert state trigger time or the standard frequency range for a time period longer than time to restore frequency. Thus, the Alert State may be unlimited in time. Nevertheless, in case of LERs, the availability of the unit may come to an end after a time period between 15 minutes and 30 minutes if the system is in Alert State. In other words, in case of a frequency deviation of +/- 200 mHz in the Continental European Synchro-nous Area (+/- 500 mHz , in the Nordic Synchronous Area), LERs are supposed to be able to be fully activated during the first 5 minutes (alert state trigger time), and, in addition, a time period to be selected between 15 minutes and 30 minutes. In this methodology LER might be requested to pro-vide its maximum capacity during 35 minutes in the worst case scenario.

It must be highlighted that taking into account the energy consumption before the actual trigger of alert state does not imply any over dimensioning of the LER reservoir according to SO GL Art.156. The energy provided by LER before the moment in which the alert state is triggered is accounted for in the calculation of the energy requested in the alert state as an equivalent full activation Time Period. Please take into account that also long lasting events triggering alert state will be considered for the energy evaluation.

However, in the period of time of 15 minutes (time to restore frequency), the TSOs are able to fully activate aFRR and mFRR. As a consequence, this proposal does not focus on the minimum FCR re-quirements for LER in alert state, but also requirements to deliver other reserves such as aFRR and mFRR. This is not acceptable. ENGIE is in favor of defining few standard products of which the min-imum requirements are differentiated without any doubt.

We understand this point, but it is not within the scope of this methodology to develop these products. As a result, we base our analysis on the current situation. Please also consider that the CBA methodology has been amended: the future scenarios have been moved out to reduce uncertainties and a specific disclaimer clarify that as soon as the scenario is not representative anymore the CBA has to be run again.

In our understanding, introducing a definition of an alert state may allow TSOs align their technical requirements on LER once the alert state has been triggered (taking into account that the time to restore frequency is 15 minutes). On one hand, the system needs common rules in order that a single balancing area (with "interruptible" FCR capacity because of storage constraint) does not jeopardize the safety of the whole grid. On the other hand, common rules will make the FCR mar-ket larger and more efficient. The first step is conducting a full technical analysis about the system response in alert state. This may lead to an assessment of a need in energy in alert state, and then a minimum time period for LERs. In any case, assessing a time period of availability in Alert State is not enough, because this is not just a question of time, but also a question of capacity. Since the time to restore frequency is 15 minutes, for ENGIE, the period of time when the FCR capacity remains fully activated cannot be more than 15 minutes.

Article 18 of System Operation Guideline gives a clear definition of the alert state. The proposed CBA methodology includes an analysis of cases where the system is in alert state. However, the dynamics of the system have been excluded since the methodology aims at defining the energy content of the FCR product in terms of a Time Period which shall not be greater than 30 or smaller than 15 minutes, according the SO GL requirements.

assumptions and grid model

In the proposal, the study will bring to the force the link between the share of LER in the FCR pro-vider mix and the time period that shall be ensured by LER as of triggering the alert state and during the alert state. The energy depletion of LER is simulated following these two assumptions:

- The LER are considered without energy limitation while frequency remains inside the standard frequency range
- Once the simulated frequency exceeds this range, the model starts to calculate the activat-ed energy and the residual energy in the reservoir.

In practice, because of long lasting frequency deviation events, the need in energy storage is above the requirement of full FCR activation during 15 minutes. Actually, these long lasting frequency de-viation events do not trigger the alert state, and LERs are required to provide FCR continuously. As a consequence, it is possible to assume that LERs do not have energy limitations in normal state. However, in the model, the energy consumption of LERs is taken into account starting from +/- 50 mHz in the Continental Europeans Synchronous Area (+/- 100 mHz in the Nordic Synchronous Ar-ea), which is not the alert state. Following this methodology, the need of energy storage to be en-sured during the alert state will be over-estimated.

Some hypothesis may be assumed for the period before the alert state, and for the FRR contribution. But the methodology shall assess the accuracy of these assumptions, and the confidence in-tervals of the results. The need of energy during the alert state has to be assessed only during the alert state.

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According to article 156.4 SO GL, FCR should be constantly available in normal state. Because of this assumption, the CBA methodology ignores the long lasting events that do not trigger alert state, assuming a theoretical no impact on the energy consumption. The methodology will then take into account only long lasting frequency deviations that trigger alert state: in this case the assumption is that energy use starts above frequency deviations higher than standard frequency range. Recharging strategy when alert state is not triggered is out of scope of this methodology. The energy amount calculated this way will then be used to calculate an energy equivalent Time Period of full activation.

In the proposal, the criterion of LER depletion acceptance is the following: in case of LER depletion, the missing FCR is replaced by residual non-LER. However, in practice, the availability of the full capacity of FCR is ensured by local specifications. Some FCR capacities still remain available in the system for the TSOs, in addition to the total needed FCR volume. As a consequence, this criterion will overestimate the impact of LER depletion in the system.

The CBA methodology takes into account the FCR requirements according to Synchronous Area (SA) dimensioning rules provided by the SO GL. Local needs with no SA obligation can't be taken into account.

Moreover, when LER share on total FCR provider increases, the model will calculate that the time period will increase from 15 minutes to 30 minutes. In the meantime, the previous LER qualified for FCR (with a lesser time period) will be pushed out of the market, which will tend to decrease the available capacities in the system, and at the end the safety of the grid. ENGIE understands that this is just a modelling that might illustrate some links, but it is not accurate enough in order to assess a time period that will be implemented.

We understand the rationale of the comment. However the definition of the description of the full FCR product and market is out of scope of the CBA methodology.

Cost calculations

According to the proposed methodology, on one hand, a smaller time period might entail lower investments costs for the LERs, and, as a result, LER will offer their capacity at a lower price On the other hand, the required FCR volume could increase to fulfil the condition of replacing a LER deple-tion.
In our understanding, these assumptions are questionable. First it is necessary to define the scope of the market studied in this analysis. The proposal focuses on the capacity market. However, the methodology seems to assess the minimum energy that LERs shall deliver in alert state. As a consequence, in practice, it is necessary to take into account in LER costs not only the investment costs (like it is proposed), but also the energy cost necessary to manage the energy reservoir.

FCR is a service that is continuously activated on both directions. As a result, the energy content during a specific duration of the service is close to 0. It is true that the energy price of charging LERs in order to maintain their setpoint is not necessarily the same as the price for discharging for the same reason. As a

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result, LERs could have a small positive or negative cost during a specific procurement period. However, this cost/profit may be equalized by the other procurement periods. This is a level of detail that is not expected to significantly change the results especially in a case where not the actual costs are interested but the cost difference.

FCR market is a niche market. In spite of the minimum technical requirements, the market design and the product definition have a huge impact on FCR price. The time period may change the current competition and the attractiveness of the FCR market. Moreover, the scope of the methodology is not large enough. Writing common rules for LER in alert state will increase the safety of the system, will improve the competition thanks to the entrance of new capacities, and will expand the market for new investments (reducing the cost of the capacities). However, if the time duration is not relevant with the current capacities, and/or with the standard products (such as aFRR, and mFRR), this will increase the costs of the system. As a consequence, TSOs should work in full dialogue with market players on this modelling. This part of the CBA is a second step. The different assumptions (costs, social welfare benefits, market model) shall be established in working groups.

The scope and timing of this analysis is defined by art 156.11 of SO GL. The CBA methodology has been amended: the future scenarios have been moved out to reduce uncertainties and a specific disclaimer clarifies that as soon as the scenario (including FRR product development) is not representative anymore the CBA has to be run again.

Consultation process

The System Operation Guideline (SOGL) prescribes in article 156 (9) that “where no period has been determined, each FCR provider shall ensure its FCR providing units with limited energy reser-voirs are able to fully activate FCR continuously for at least 15 minutes, or in case of frequency devi-ations that are smaller than a frequency deviation requiring full FCR activation, for an equivalent length of time, or for a period defined by each TSO, which shall not be greater than 30 or smaller than 15 minutes.”

But, the SOGL notes that if a time period has been determined, each FCR provider shall ensure that its FCR providing units or groups with limited energy reservoirs shall be able to fully activate FCR continuously in alert state for that time period assessed. As a consequence, the results of this pro-posed CBA will have a huge impact on the LERs already in operations, and the development of LERs in the Continental European and the Nordic synchronous areas.

TSOs shall publish the data used in the analysis (both technical and market data) and shall launch working groups that will, among other things, address the various issues raised during the study (definition of the time period, local implementation, impact on the current system).

The detailed adopted assumptions will be defined during the implementation phase. Data will be published, also in terms of market curves modelling.

European Network of
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All TSOs' proposal for the determination of LFC blocks for the Synchronous Area Continental Europe in accordance with Article 141(2) of the Commission Regulation (EU) 2017/1485 of 2 August establishing a guideline on electricity transmission system operation

Date 03/01/2018

Contents

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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 of Synchronous Area Continental Europe (hereafter referred to as "TSOs") regarding the development of a proposal for the determination of LFC blocks (hereafter referred to as "LFC blocks determination") in accordance with Article 141(2) of Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as "SO GL").

(2) The LFC blocks determination proposal takes into account the general principles and goals set in the SO GL, the Commission Regulation (OJ publication pendig) establishing a network code on electricity emergency and restoration (NC ER) as well as in the 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 the SO GL/Regulation is the safeguarding of operational security, frequency quality and the efficient use of the interconnected system and resources. It sets for this purpose requirements to determine the LFC blocks per synchronous area, which shall comply with the followings requirements:

a. a monitoring area corresponds to or is a part of only one LFC area.
b. an LFC area corresponds to or is a part of only one LFC block.
c. an LFC block corresponds to or is a part of only one synchronous area; and
d. each network element is part of only one monitoring area, only one LFC area and only one LFC block.

(3) The LFC blocks determination proposal takes into account the load-frequency control structure of each synchronous area in accordance with Article 139 of SO GL. The operation of Load-Frequency Control processes is based on operational areas, where every area has their individual responsibilities with respect to the LFC structure. The superior structure is the synchronous area in which frequency is the same for the whole area. The synchronous area CE consists of several LFC Blocks, each LFC Block consists of one or more LFC Areas. An LFC Area itself consists of one or more Monitoring areas.

(4) The scope of the LFC blocks determination proposal is to establish the LFC blocks, LFC areas and monitoring areas for Continental Europe, while respecting the requirements set in Article 141(2) of the SO GL.

(5) According to Article 6(6) of the SO GL, the expected impact of the LFC blocks determination proposal on the objectives of the SO GL has to be described. It is presented below. The proposed LFC blocks determination proposal generally contributes toward determining the common load-frequency control processes and control structures required by Article 4(1)(c) of the SO GL.

(6) In particular, the LFC blocks determination proposal specifies the LFC blocks, LFC areas and Monitoring areas in Continental Europe, in line with requirement of Article 4(1) (c) of SO GL.

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(7) In conclusion, the LFC blocks determination proposal contributes to the general objectives of the SO GL Regulation to the benefit of all market participants and electricity end consumers.

SUBMIT THE FOLLOWING LFC BLOCKS DETERMINATION PROPOSAL TO ALL REGULATORY AUTHORITIES:

Article 1
Subject matter and scope

1. The determination of LFC blocks as specified in this proposal shall be considered as the common proposal of all TSOs in accordance with Article 141(2) of SO GL Regulation.
2. For the LFC blocks encompassing the LFC areas of third country TSOs, the fulfilment of the obligations set out in SO GL towards these LFC blocks shall be subject to the content of an agreement concluded by all Synchronous Area Continental Europe TSOs with the third country TSOs in accordance with Article 13 of SO GL.

Article 2
Definitions and interpretation

1. For the purposes of the LFC blocks determination proposal, terms used in this document shall have the meaning of the definitions included in Article 3 of the SO GL Regulation, of Regulation (EC) 714/2009 and Directive 2009/72/EC .

2. In this LFC blocks proposal, unless the context requires otherwise:
   a) the singular indicates the plural and vice versa;
   b) the table of contents and headings are inserted for convenience only and do not affect the interpretation of this LFC blocks determination proposal; and
   c) any reference to legislation, regulations, directive, order, instrument, code or any other enactment shall include any modification, extension or re-enactment of it then in force.

Article 3
Synchronous Area Continental Europe LFC blocks, LFC areas and monitoring area

The synchronous area Continental Europe shall consist of the LFC blocks, LFC areas and monitoring area set out in Table 1. LFC blocks encompassing the LFC areas of third country TSOs shall be subject to re-determination after the entry into force of the agreement mentioned in Article 1.2 above .

Country	TSO (full company name)	TSO (short name)	Monitoring Area	LFC Area	LFC Block
Albania	Operatori sistemit transmetimit	OST	OST	OST	OST
Austria	Austrian Power Grid AG	APG	APG	APG	APG
	Vorarlberger Übertragungsnetz GmbH	VUEN			
Bosnia and Herzegovina	Nezavisni operator sustava u Bosni i Hercegovini	NOS BiH	NOS	NOS	SHB
Belgium	Elia System Operator SA	Elia	ELIA	ELIA+	ELIA+
Bulgaria	Electroenergien Sistemen Operator EAD	ESO	ESO	ESO	ESO
Switzerland	Swissgrid AG	Swissgrid	SG	SG	SG
Czech Republic	ČEPS a.s.	ČEPS	CEPS	CEPS	CEPS

Germany	TransnetBW GmbH	TransnetBW	TNG	TNG	TNG+TTG+AMP+50HZT+DKW+LU
	TenneT TSO GmbH	TenneT GER	TTG	TTG+DKW	TNG+TTG+AMP+50HZT+DKW+LU
	Amprion GmbH	Amprion	AMP	AMP+LU	TNG+TTG+AMP+50HZT+DKW+LU
	50Hertz Transmission GmbH	50Hertz	50HZT	50HZT	TNG+TTG+AMP+50HZT+DKW+LU
Denmark	Energinet.dk	Energinet.dk	DK	TTG+DKW	TNG+TTG+AMP+50HZT+DKW+LU
Spain	Red Eléctrica de España: S.A.	REE	REE	REE	REE
France	Réseau de Transport d'Electricité	RTE	RTE	RTE	RTE
Greece	Independent Power Transmission Operator S.A.	IPTO	IPTO	IPTO	IPTO
Croatia	HOPS d.o.o.	HOPS	HOPS	HOPS	SHB
Hungary	MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság	MAVIR ZRt.	MAVIR	MAVIR	MAVIR
Italy	Terna - Rete Elettrica Nazionale SpA	Terna	TERNA	TERNA	TERNA
Luxembourg	CREOS	CREOS	LU	AMP+LU	TNG+TTG+AMP+50HZT+DK+LU
Montenegro	Crnogorski elektroprenosni sistem AD	Crnogorski elektroprenosni sistem	CGES	CGES	SMM
FYR of Macedonia	Macedonian Transmission System Operator AD	MEPSO	MEPSO	MEPSO	SMM
Netherlands	TenneT TSO B.V.	TenneT NL	TTB	TTB	TTB
Poland	PSE S.A.	PSE S.A.	PSE	PSE	PSE(+Western WPS)[1]
Portugal	Rede Eléctrica Nacional, S.A.	REN	REN	REN	REN
Romania	C.N. Transelectrica S.A.	Transelectrica	TEL	TEL	TEL
Serbia	Joint Stock Company Elektromreža Srbije	EMS	EMS	EMS	SMM
Slovenia	ELES, d.o.o.	ELES	ELES	ELES	SHB
Slovak Republic	Slovenska elektrizacna prenosova sustava, a.s.	SEPS	SEPS	SEPS	SEPS
Turkey	TEIAS	TEIAS	TEIAS	TEIAS	TEIAS

Table 1: List of Monitoring Areas, LFC Areas and LFC Blocks.

Article 4
Publication and implementation of the LFC blocks determination proposal

1. The TSOs shall publish the LFC blocks determination proposal without undue delay after all NRAs have approved the proposal or a decision has been taken by the Agency for the Cooperation of Energy Regulators in accordance with Article 8(1) of the SO GL.

2. By 18 months after entry into force of SO GL, the TSOs shall implement the LFC blocks determination proposal as soon as regulatory authorities have approved the proposal in accordance with Article 6 (3) SO GL or a decision has been taken by the Agency in accordance with Article 6(8) SO GL.

[1] Temporary solution for the period before the agreement pursuant to Article 13 of SOGL enters into force

Article 5
Language

The reference language for this LFC blocks determination Proposal shall be English. For the avoidance of doubt, where TSOs need to translate this LFC blocks determination proposal into their national language(s), in the event of inconsistencies between the English version published by TSOs in accordance with Article 8 of the SO GL Regulation 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 LFC blocks determination proposal.

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European Network of
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Explanatory note for the determination of LFC blocks proposal for synchronous area Continental Europe

Date 28/11/2017

DISCLAIMER
This document is released on behalf of the all transmission system operators ("TSOs") only for the purposes of the public consultation on the all TSOs' proposal for the determination of LFC blocks ("LFC blocks determination") in accordance with Article 141(2) of the Commission Regulation (EU) No 2017/1485 of 2 August establishing a guideline on electricity transmission system operation ("SO GL"). This version of the LFC blocks determination Proposal does not in any case represent a firm, binding or definitive TSOs' position on the content.

Explanatory note

The operation of Load-Frequency Control (LFC) processes is based on operational areas, where every area has their individual responsibilities with respect to the LFC structure. The superior structure is the synchronous area in which frequency is the same for the whole area. The synchronous area Continental Europe (CE) consists of several LFC Blocks, each LFC Block consists of one or more LFC Areas. An LFC Area itself consists of one or more Monitoring areas.

The above described hierarchy is illustrated in Figure 1. Each of these operational areas has their own obligations. A Monitoring Area has the obligation to calculate and measure the active power interchange in real-time in that area. A LFC Area has the additional obligation to fulfil the frequency restoration quality target parameters by using the frequency restoration process. A LFC Block is in addition responsible for the dimensioning of frequency restoration reserve (FRR) and replacement reserves (RR). The Synchronous Area has the obligation to fulfil the frequency quality target parameters by using the frequency containment process.

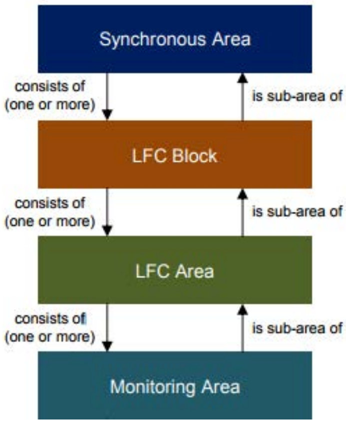

Figure 1. Types and hierarchy of areas operated by TSOs

According to the Article 141(2) of Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereafter referred to as "SO GL"), by 4 months after entry into force of this Regulation, all TSOs of a synchronous area shall jointly develop a common proposal regarding the determination of LFC blocks, which shall comply with the following requirements:

- a monitoring area corresponds to or is part of only one LFC area;
- a LFC area corresponds to or is part of only one LFC block;
- a LFC block corresponds to or is part of only one synchronous area; and
- each network element is part of only one monitoring area, only one LFC area and only one LFC block.

This proposal covers all the previous requirements, taking into account the load-frequency control structure in accordance with Article 139 of SO GL.

Finally, and according to the Article 6(3)(g), this proposal shall be subject to approval by all regulatory authorities of the Synchronous Area Continental Europe.

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