European Network of
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Explanatory document to the All asynchronously connected TSOs' proposals for Common settlement rules for exchanges of energy between synchronous areas in accordance with the Articles 50(4) and 51(2) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

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DISCLAIMER
This document is submitted by all transmission system operators (TSOs) to all NRAs for information purposes only accompanying the all asynchronously connected TSOs' proposals for Common settlement rules for exchanges of energy between synchronous areas in accordance with the Articles 50(4) and 51(2) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing.

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1. Introduction

AC interconnectors are passive elements. The flow over an AC interconnector results from the given power equilibrium on either side and of electrotechnical laws. A trip on an AC interconnector circuit under N-1 security affects neither frequency nor ACE with any TSO, but does affect parallel flows and grid security.

HVDC interconnectors are by contrast active grid elements, and HVDC flows are as such independent from the power equilibrium on either side, and therefore also independent from flows on parallel HVDC links. Flow on an HVDC link between synchronous areas however contributes to the power equilibrium in both connected synchronous areas.

Although flows of HVDC interconnectors are generally intentional, unintended exchange may still occur. A trip of the interconnector (before countertrade is performed) and inaccuracy in the actual technical operation are expected to be the main causes of unintended exchange.

For asynchronously connected TSOs, TSO-TSO exchange only takes place between these parties. For this reason, exchange between asynchronously connected TSOs is today a bilateral issue.

2. The asynchronously connected TSOs

Both Article 50(4) and 51(2) of the EBGL refer to the "asynchronously connected TSOs" as the TSOs that must develop a proposal for "common settlement rules".

The asynchronously connected TSOs for the two proposals that have been developed are the following: *50Hertz, BritNed, Eirgrid, ElecLinK, Elering, Elia, Energinet, Fingrid, Litgrid, Moyle, National Grid ESO, NGIL, PSE, RTE, SONI, Statnett, Svenska kraftnät, TenneT DE* and *TenneT NL*.

3. The energy exchanges to be settled and scope of the proposals

3.1. Settlement of FCP energy

According to Article 50(4)(a) of the EBGL, the settlement rules should be applicable to energy exchange resulting from the frequency containment process pursuant to SOGL Article 172 and 173.

Article 172 of the SOGL gives all TSOs in different, connected synchronous areas the right to implement a frequency coupling process. Article 173 of the SOGL gives all TSOs involved in such a frequency coupling process the right to exchange FCR capacity. Article 174 of the SOGL, which gives TSOs involved in such a frequency coupling process the right to share FCR capacity, is not mentioned in Article 50(4)(a) of the EBGL and is therefore considered out of scope of the article.

The settlement parties to the energy exchange resulting from FCP are the asynchronously TSOs exchanging the FCR capacity. The effect of frequency coupling within the relevant synchronous areas will be handled in the proposals according to EBGLs Article 50 (3) (a).

Currently, the only asynchronously connected TSOs that are expected to be engaged in exchange of FCR capacity when these settlement rules will be implemented are Fingrid and Elering.

3.2. Settlement of ramping energy

According to Article 50(4)(b) of the EBGL, the settlement rules should be applicable to energy exchange resulting from "ramping restrictions for active power output on synchronous area level pursuant to Article 137" of the SOGL (underlining added).

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Article 137(1) of the SOGL states that (underlining added):

> "*1. All TSOs of two synchronous areas shall have the right to specify in the synchronous area operational agreement restrictions for the active power output of HVDC interconnectors between synchronous areas to limit their influence on the fulfilment of the frequency quality target parameters of the synchronous area [emphasis added] by determining a combined maximum ramping rate for all HVDC interconnectors connecting one synchronous area to another synchronous area*."

The added emphasis shows that Article 137(1) of the SOGL refers to restrictions specified in the synchronous area operational agreement aiming at limiting the influence on parameters at the synchronous area level in line with the requirement in Article 50(4)(b) of the EBGL that the ramping restrictions should apply to output "on synchronous area level".

Article 137(3) of the SOGL states that (underlining added):

> "*3. All connecting TSOs of an HVDC interconnector shall have the right to determine in the LFC block operational agreement common restrictions for the active power output of that HVDC interconnector to limit its influence on the fulfilment of the FRCE target parameter of the connected LFC blocks by agreeing on ramping periods and/or maximum ramping rates for this HVDC interconnector. Those common restrictions shall not apply for imbalance netting, frequency coupling as well as cross-border activation of FRR and RR over HVDC interconnectors. All TSOs of a synchronous area shall coordinate these measures within the synchronous area.*"

As such Article 137(3) does not refer to restrictions on output on the synchronous area level, and consequently Article 50(4)(b) is interpreted to leave ramping energy resulting from SOGL 137(3) out of scope of the settlement of intended exchange.

The proposal is therefore only relevant for exchange of ramping energy resulting from SOGL 137(1). However, there is no such exchange today, and no such exchange where such restrictions would give actual restrictions for the exchange is currently foreseen[1]. Article 50(4) of the EBGL allows all asynchronously TSOs to develop common settlement rules applicable to intended exchange "as the result of one or both" a) FCP energy and b) ramping energy.

As there is no requirement to develop settlement rules for both, and as no such exchange from ramping exists today or is currently foreseen, the TSOs have chosen not to include settlement of ramping energy in the proposal for intended exchange of energy in accordance with 50(4).

Settlement rules for intended exchanges of energy as the result of restrictions for the active power output of HVDC interconnectors between synchronous areas pursuant to Article 137(1) of the SOGL shall be defined when such restrictions apply. As indicated in Articles 5(2) and 6(2) of the proposal for settlement rules for intended exchanges of energy between synchronous areas, an amendment shall then be submitted for approval to the relevant regulatory authorities. All TSOs of the relevant synchronous areas will be part to this amendment process.

[1] Currently, only the synchronous area operational agreement of Ireland/Northern Ireland is expected to include a combined maximum ramping rate according to Article 137(1) of the SOGL. However, the LFC block operational agreement of Ireland and Northern Ireland imposes maximum ramping rates on the two interconnectors between Ireland and Northern Ireland and Great Britain. The sum of these individual ramping restrictions is equal to or less than the combined maximum ramping rate in the synchronous area operational agreement. This implies that simultaneous ramping according to the LFC block operational agreement maximum ramping rate on both interconnectors will not violate the maximum ramping rate in the synchronous area operational agreement. As such, the ramping restriction according Article 137(1) of the SOGL does not impose a binding restriction on ramping whereby it does not lead to exchange of ramping energy between synchronous areas.

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3.3. Settlement of unintended exchange

The EBGL provides no definition of unintended exchange. As explained in the introduction, unintended exchange can occur for example due to a trip of the interconnector (before countertrade is performed) and inaccuracy in the actual technical operation of the interconnector.

In short, the unintended exchange on an interconnector is the difference between the metered exchange and all intended exchanges. Both the metered exchange and intended exchange will refer to a reference point, which is determined for each interconnector. The reason for the need for a reference point is losses, which are not part of the scope for this proposal.

The EBGL consistently refers to the SOGL for identification of the intended exchanges that must be settled under the EBGL:

- Article 50(1) of the EBGL refers to Articles 146, 147, and 148 of the SOGL (Imbalance Netting, FRR and RR),
- Article 50(3) of the EBGL refers to Articles 136 and 142 of the SOGL (Ramping Period and FCP);
- Article 50(4) of the EBGL refers to Article 137, 172, and 173 of the SOGL (Ramping restrictions and FCP).

However, these references to the SOGL do not map all intended exchanges of energy. Such exchange also occurs in accordance with the CACM and FCA guidelines and in addition other TSO-TSO exchange than mentioned above. The latter is understood to include the energy exchange resulting from FCR sharing according to Article 174 and the exchange of ramping energy according to Article 137(3) of the SOGL, which are not included in Article 50 (4) (a) and (b) as explained earlier.

All HVDC interconnectors will have unintended exchange. However, according to Article 44(4) of the EBGL, if a BRP is introduced as the entity settled for the injection and withdrawal of energy of the interconnector towards one or both of the connecting TSOs, there can be no settlement of this same energy under TSO-TSO settlement. As such, settlement of unintended exchange under EBGL Article 51(2) between the involved TSOs is out of scope when a BRP is introduced for the interconnector at one or both ends.

The settlement of unintended exchange is out of scope of the settlement rules under Article 51(2) of the EBGL for the following HVDC interconnectors:

HVDC interconnector	Connecting TSO1	Connecting TSO2
East-West Interconnector	EirGrid	National Grid ESO
Moyle	SONI	National Grid ESO
IFA1&2	RTE	National Grid ESO
ElecLink	RTE	National Grid ESO
NEMO link	Elia	National Grid ESO
BritNed	TenneT NL	National Grid ESO
Baltic Cable	Tennet DE	Svenska kraftnät

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4. Overview of the settlement proposals

4.1. High-level design

Any exchange of energy settled according with these proposals are an exchange between defined asynchronously connected TSOs. As such any exchange of energy results in a payment from one TSO to another TSO.

4.2. Sign convention

The sign convention applying to energy volumes is the following:

- A positive energy volume corresponds to an export of energy by the TSO, i.e. if the TSO is long, the unintended exchange is positive.
- A negative energy volume corresponds to an import of energy by the TSO, i.e. if the TSO is short, the unintended exchange if negative.

The settlement amount per TSO-TSO settlement period, corresponding to the multiplication of the energy volumes and the price are therefore governed by the following sign convention:

- A positive settlement amount corresponds to a payment owed to this TSO: an export of energy when the price is positive leads to a gain.
- A negative settlement amount corresponds to a payment from this TSO: an import of energy when the price is positive leads to a cost.

4.3. Settlement period

A TSO-TSO settlement period of 15 minutes has generally been agreed upon, although the proposal allows for TSOs to set a different settlement period. This general TSO-TSO settlement period corresponds to the time unit, for which accounting and settlement of FCP energy and unintended exchange is performed. For each TSO-TSO settlement period, the volumes of these energy exchanges as well as a price are calculated.

Despite differences across the asynchronously connected TSOs in market time units and the imbalance settlement period, a harmonized TSO-TSO settlement period in the proposal is in theory possible already now. The price base of the settlement price can be mapped to each imbalance settlement period (which has a higher time granularity) within each market time unit. As such, harmonization of the settlement period could technically be introduced.

However, a general transition to 15 minutes for the TSO-TSO settlement period, (say) the balancing market time unit, and the imbalance settlement period will allow TSOs to more efficiently implement this transition. As the imbalance settlement period is reduced to 15 minutes according to Article 53 of the EBGL and market time units are similarly reduced to higher time granularity, all TSOs will in time transition to 15-minute TSO-TSO settlement period.

4.4. Volume determination for FCP

Energy exchange due to FCP according to Article 50 (4) (a) of the EBGL will result from an exchange of FCR capacity over an HVDC interconnector. The actual energy exchange will depend on the type of FCR capacity that is being exchanged and the technical requirement for the relevant FCR capacity product. For example, in the Nordic synchronous area two FCR capacity products are procured. In the continental European synchronous areas, only one FCR capacity product is procured. As such if there is exchange of FCR capacity from Continental Europe to the Nordics, it must be determined which of the two types is exchanged in order to calculate intended exchange correctly. If the exchange of FCR capacity is instead from the Nordics to continental Europe, a different calculation of volumes is necessary.

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Based on this, the volume determination of FCP energy is defined in a specific annex per interconnector if there is such exchange. In other words, there is no general volume determination in the main body of the proposal.

4.5. Volume determination for unintended exchange

Unintended exchange is defined in the same principal way for all interconnectors included in the proposal. The volume determination is therefore included in the main body of the proposal.

4.6. Price determination for both FCP and unintended exchange

Article 50(3) and 50(4) in the EGBL require development of "common settlement rules". By this is interpreted a requirement to develop a harmonized price calculation method for each of these articles.

The exchange of the energy between asynchronously connected TSOs covered in the two proposals for Article 50(4) (a) and 51(2) in the EBGL is today generally settled based on either balancing energy or imbalance prices. For both articles, the balancing energy prices are therefore generally (a significant part) of the price base for the current price calculation for different interconnectors.

However, both balancing energy pricing and imbalance pricing will be unharmonized until the proposals in accordance with Article 30 (1) and 52 (2) of the EBGL are implemented. Developing a common methodology for calculating the settlement prices in the two proposals now could therefore give unintended consequences which can be difficult to foresee. For this reason, the settlement rules are proposed to be kept separate per interconnector and included as separate annexes to the proposal, until such time that informed harmonized price calculation methods can be developed. In both legal proposals, a review mechanism is proposed to be started by the end of 2022 in order to develop a common methodology for calculating the settlement prices.

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