European Network of
Transmission System Operators
for Electricity

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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 EB Regulation 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 EB Regulation, the settlement rules should be applicable to energy exchange resulting from the frequency containment process pursuant to SO Regulation Article 172 and 173.

Article 172 of the SO Regulation gives all TSOs in different, connected synchronous areas the right to implement a frequency coupling process. Article 173 of the SO Regulation gives all TSOs involved in such a frequency coupling process the right to exchange FCR capacity. Article 174 of the SO Regulation, 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 EB Regulation 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 EB Regulation 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 EB Regulation, 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 SO Regulation. This is understood to include ramping restrictions pursuant to both Article 137(1) and 137(3) of the SO Regulation.

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There is energy exchange resulting from ramping restrictions pursuant to Article 137(3) today. However, there is no such exchange pursuant to Article 137(1), and no such exchange where such restrictions would give actual restrictions for the exchange which is currently foreseen[1].

Settlement rules for intended exchanges of energy from ramping pursuant to Article 137(1) of the SO Regulation shall be defined when such restrictions apply. As indicated in Articles 5(3) and 6(3) 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.

With regards to the settlement rules for intended exchange of energy from ramping pursuant to Article 137(3) of the SO Regulation, this is included in the Proposal for the relevant asynchronously connected TSOs. According to Article 44(4) of the EB Regulation, 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 and these settlement rules. As such, settlement of intended exchange from ramping under EB Regulation Article 50(4)(b) between the involved TSOs is out of scope when a BRP is introduced for the interconnector at one or both ends.

The settlement of intended exchange of ramping is out of scope of the settlement rules under Article 50(4)(b) of the EB Regulation 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

3.3. Settlement of unintended exchange

The EB Regulation 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.

[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 SO Regulation. 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 SO Regulation 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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The EB Regulation consistently refers to the SO Regulation for identification of the intended exchanges that must be settled under the EB Regulation:

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

However, these references to the SO Regulation 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 SO Regulation, 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 EB Regulation, 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 EB Regulation 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 EB Regulation 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

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:

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- 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 harmonised 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, harmonisation 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 EB Regulation 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 EB Regulation 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.

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.

4.1. Volume determination for ramping

Energy exchange due to ramping according to Article 50(4)(b) pursuant to Article 137(3) of the SO Regulation is defined in the same principle way for all interconnectors included in the proposal. The volume determination is therefore included in the main body of the proposal.

The term "active power schedule" is used in Article 46(2) of the SO Regulation.

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4.2. 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.

4.3. Price determination for FCP, ramping 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 harmonised price calculation method for each of these articles.

The price for the exchange of the energy between asynchronously connected TSOs in the two proposals for Article 50(4)(a) and (b), and 51(2) in the EB Regulation, is today generally 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 unharmonised until the proposals in accordance with Article 30 (1) and 52 (2) of the EB Regulation 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 harmonised 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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