IMBALANCE NETTING IMPLEMENTATION PROJECT

ENTSO-E – ECS Workshop on Electricity Balancing

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Vienna, 2017/04/25
GL EB – Imbalance Netting - Requirements

**IGCC** formally identified as starting point

- IGCC
- INC
- Not bound by legislation
- E-GCC
- Accession process to IGCC started

**Status Quo**

- Implementation Framework
- Implementation Framework approval

**All TSO Platform**

- Appointment of entity
- Implementation of platform
1. Introduction
2. History of IGCC
3. European Platform
4. Timeline & Next Steps
Basic Principle

Imbalance Netting – Example 1

Without Netting

Imbalance Netting

Example 2

Without Netting

Imbalance Netting

With Netting
Basic Principle

- **aFRR-Activation**: Triggered when an imbalance occurs.
- **Control Area Balance**: Maintains the balance of power demand and supply.
- **Secondary Controller**: Manages the aFRR process in each control area.
- **ACE (Area Control Error)**: Determines the imbalance.
- **aFRR-Demand**: Request for demand reduction.
- **Correction**: Adjusts for any imbalance.

The diagram illustrates the flow of aFRR requests from various control areas to the balance and secondary controllers, ultimately leading to adjustments for balance and netting processes throughout the system.
Integration into the Secondary Control Loop and Signal Exchanges

Basic Principle

- aFRR demand of IGCC member
- Correction value via Virtual Tie-Line (VTL)
- ATC, profile, manual limits
- On/off signal
History of IGCC

- Since May 2010, all four German TSOs have launched the so called Grid Control Cooperation (GCC) to optimize secondary control procurement and activation.

- In the area of imbalance netting the International Grid Control Cooperation (IGCC) has been set up which is currently consisted of **11 TSOs from 8 countries**.

- REE and REN plan to join the cooperation by 2018.

Status Quo

Basic Principle
The IGCC MLA

All IGCC Members are parties to one agreement

A two level working structure

Strengthen decision making

✓ Clear rules in decision process

Flexibility: Update of Annexes

Solution about liability clauses, rules for cost sharing
Benefits of Imbalance Netting

Monthly Volumes of Netted Imbalances

Amount of Netted Imbalances (Short+Long) - Monthly Values (GWh)

- DE
- DK
- NL
- CH
- CZ
- BE
- AT
- FR

GWh

Month

10/11 01/12 04/12 07/12 10/12 01/13 04/13 07/13 10/13 01/14 04/14 07/14 10/14 01/15 04/15 07/15 10/15 01/16 04/16 07/16 10/16

0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 425 450 475 500 525

Month
Benefits of Imbalance Netting

Monthly Percentage of Avoided pos. aFRR-Activations (last 6 Months)

Reduction of positive aFRR activation due to Imbalance Netting

<table>
<thead>
<tr>
<th>Month</th>
<th>DE</th>
<th>DK</th>
<th>NL</th>
<th>CH</th>
<th>CZ</th>
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Monthly Value of Netted Imbalances

![Graph showing monthly values of netted imbalances in various countries over a period from 2011 to 2016. The x-axis represents months from October 2011 to October 2016, and the y-axis represents the value in million Euros, ranging from 0 to 13. Countries represented include DE, DK, NL, CH, CZ, BE, AT, and FR. The graph illustrates the benefits of imbalance netting.]
Benefits of Imbalance Netting

Value of Netted Imbalances - Development

Value of Netted Imbalances - Monthly Values (Million €)

Month

Mil. €

DE DK NL CH CZ BE AT FR

10/11 01/12 04/12 07/12 10/12 01/13 04/13 07/13 10/13 01/14 04/14 07/14 10/14 01/15 04/15 07/15 10/15 01/16 04/16 07/16 10/16

Value of Netted Imbalances - Monthly Values (Million €)
Development of European Platform

Members of PT

**IGCC** formally identified as starting point
Deadlines and Requirements

Way of working

- **Implementation project**
  - IGCC
  - IGCC Member 1
  - EG IGCC
  - SC IGCC

- **European discussion**
  - PT IN
    - PT IN Member 1

  - basis for discussion
  - provides input

- **Key Issues**
  - Identification
  - EB GL
  - ACER

- **requirements**
  - development
  - approves
  - Implementation Framework

- **ENTSO-E (MC oder SOC)**

- **Amendment**
  - decision
Requirements from GL EB

Implementation Framework

1. Introduction
2. High level design of the European Platform
3. Roadmap & Timelines for the implementation
4. Definition of functions
5. Governance
6. Proposal of entity
7. Framework for harmonization of the terms and conditions
8. Cost sharing
9. Algorithm

Designation of entity/entities

Implementation of Platform

Settlement of intended exchange
Settlement Principle

✓ The determination of the IGCC energy quantities is performed for each settlement period ➔ 15 min

✓ The IGCC energy is separate for export and import

✓ Settlement is determined for each settlement period for IGCC import and IGCC export of all IGCC Members

✓ The IGCC settlement aims ➔ sharing of gained benefits in a fair manner between IGCC Members

✓ Based on avoided aFRR energy costs

✓ No Negative benefit for an IGCC member while IGCC has overall positive benefit
## Current IGCC Settlement

### Opportunity Prices for Imbalance Netting

**without IGCC**

- \( aFRR_{\text{before IGCC}} \) [MWh]
- \( aFRR \text{ price}_{\text{before IGCC}} \) [€/MWh]

**with IGCC**

- \( aFRR_{\text{after IGCC}} \) [MWh]
- \( aFRR \text{ price}_{\text{after IGCC}} \) [€/MWh]

**IGCC exchange**

- \( aFRR_{\text{exchange}} \) [MWh]
- \( aFRR \text{ price}_{\text{exchange}} \) [€/MWh]

### IGCC Settlement Price

- IGCC Settlement Price \( (C_{\text{IGCC}}): \text{Energy weighted } (E_{\text{Imp,}i} \text{ and } E_{\text{Exp,}i}) \text{ average of the opportunity prices } (C_{\text{Imp,}i} \text{ and } C_{\text{Exp,}i})\)
- Symmetric price for IGCC imports and exports

\[
C_{\text{IGCC}} = \frac{\sum_{i=1}^{n} (C_{\text{Imp,}i}E_{\text{Imp,}i} + C_{\text{Exp,}i}E_{\text{Exp,}i})}{\sum_{i=0}^{n} (E_{\text{Imp,}i} + E_{\text{Exp,}i})}
\]

### Calculation of Cost Reduction

- Cost reduction for a participant is driven by the spread between the opportunity price and the IGCC settlement price

\[
R_{\text{IGCC}} = \sum_{i=1}^{n} (C_{\text{Imp,}i} - C_{\text{IGCC}}) \cdot E_{\text{Imp,}i} + \sum_{i=1}^{n} (C_{\text{IGCC}} - C_{\text{Exp,}i}) \cdot E_{\text{Exp,}i}
\]
### Timeline and Next steps

- **Finalization of Implementation Framework**
- **Settlement of intended exchange (TSO-TSO settlement)**
- **Impact assessment**
- **Priorization of IN and aFRR**

#### Assumed EIF

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<th>2019</th>
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Questions?

IGCC@entsoe.eu
Backup
Algorithm

Parameters
- Optimisation Regions
- Optimisation Functions
- Equal Treatment

Imbalances

aFRR-Optimization

Objective Function:
\[ \min k^T x \]

Constraints:
\[ Ax = b \]
\[ Cx \leq d \]
\[ x_l \leq x \leq x_u \]

ATCs
ATFs