
ENTSO-E Cross Border Electricity Balancing Pilot Projects

2 Month Report on Pilot Project 9 (IGCC)

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1. Introduction

This report comprises of the following general issues:

1. The main information of the pilot project;
2. The implementation of relevant targets ahead of the Network code on Electricity Balancing (NC EB);
3. An update on any specific targets of the pilot project not directly linked to NC EB, but key for the pilot project itself;
4. An update on any additional general and particular success/monitoring indicators of each pilot project, taking into account what pilots are or not under a “go live” phase;
5. Balancing products: products implemented/to be implemented at pilot project level, analysing the possibility to harmonise between different pilot projects that deal with the same type of balancing product.

The table below indicates when information has been last updated.

	Last updated
2.a Participating TSOs	October 2015
2.b Scope and goals of the pilot project	June 2015
2.c Recent achievements of the pilot project	October 2015
2.d Learning points	October 2015
2.e Specific questions	October 2015
3.a Updated project roadmap	October 2015
3.b Impact on current practice and future market design	October 2015
3.c Cross-border exchange relevant data	October 2015
3.d Matching, ATC management and bids update process	October 2015
3.e Pricing-Settlement	October 2015
3.f Experience from the implementation	October 2015
3.g Extensibility and cooperation	October 2015
4.a Pilot project roadmap in comparison to NC EB	October 2015
4.b Contribution to standard product definition	June 2015

2. Executive summary

a) Participating TSOs

50Hertz Transmission GmbH, Amprion GmbH, APG, ČEPS, Elia, Enrginet.dk, Swissgrid, TenneT TSO B. V. (TenneT NL), TenneT TSO GmbH (TenneT DE) and TransnetBW GmbH. RTE in cooperation with IGCC members has notified the goal to join and start operation within IGCC in February 2016

b) Scope and goals of the pilot project

The objective of IGCC (International Grid Control Cooperation) as a pilot project on the future Network Code Electricity Balancing (NC EB) is to further develop the technical and organisational cooperation in the field of balancing using as basis

- the existing scalable and reliable framework; and
- positive experiences from more than three years of operation.

The pilot project can be structured in three main parts:

- 1) Further organisational development of IGCC (governance structure, decision processes, agreements)
- 2) Further technical development of IGCC (aFRR assistance, upgrade of congestion management for imbalance netting, operational procedures)
- 3) Monitoring and further development of the value of netted imbalances and settlement.

c) Recent achievements of the pilot project

Further organisational development:

- Creation of IGCC Steering Committee and IGCC Expert Group (1/2013)
- Non-disclosure agreement (NDA) in order to enable studies with interested TSOs (8/2014)
- The new multilateral agreement (MLA) has been approved by the IGCC Steering Committee (10/2015). Launching of signature process of the MLA (11/15).
- Development of a concise implementation guide with all the necessary steps for joining IGCC. The guide can be used by interested TSOs to accede IGCC and to operate the imbalance netting process (9/15)

d) Learning Points

Learnings Q1: Identify learnings that can be useful for other pilots or collaboration initiatives in general

The technical framework in IGCC corresponds to the technical framework in GCC, eGCC (CEPS, SEPS and MAVIR) or INC (APG and Eles) and therefore is not described here in detail. The report focuses on the key learning points related to the development of the cooperation:

- In the first phase of IGCC the cooperation grew organically as a set of bilateral cooperations between the German TSOs and the respective neighbour. The organic growth was a success factor for the cooperation leading to an extension of IGCC to six countries outside Germany.
- With the rising number of IGCC members, a multi-lateral structure became necessary to promote cooperation among the members. In this process, the members established the IGCC Steering Committee (IGCC SC) and the IGCC Expert Group (IGCC EG) with the first task of drafting a new multi-lateral agreement (MLA) based on the existing bilateral agreements with the German TSOs. Although the MLA was drafted for an already existing cooperation, the drafting process raised several questions, which were not relevant in the organic growth phase leading to a significantly longer drafting period than originally expected. Therefore, the learning point for other initiatives is that contractual issues can significantly prolong the implementation of a new initiative.
- Establishing well-functioning governance bodies to strengthen the working and decision making structure is essential for further development of cooperation.
- The flexible structure of the Multilateral Agreement is necessary in order to allow the easier adaptation of specific parts of it (e.g. Annexes related to algorithm, accounting), for tackling new issues that arise within such a multiparty cooperation spanning across different countries.

e) Specific questions

Potential Q1: What are the expected benefits? (quantify) Who will benefit and how are the benefits distributed (e.g. grid tariffs)?

Currently, the value of netted imbalances amounts to approx. €4 – €6 Million per month. The distribution of the imbalance netting values among the TSOs is done based on the TSO-TSO settlement of the cooperation. Its further distribution in the respective countries is performed according to national regulatory frameworks and is not part of the investigations performed by the pilot project.

Potential Q2: Is the potential benefit of any other balancing cooperation affected by this initiative?

No

3. Detailed of the pilot project

a) Updated project roadmap

The cooperation is running. The activities are focused on the entry into force of the multilateral agreement, the expansion of the cooperation with new TSOs, the update of TSO-TSO settlement process and the evaluation of further concepts for the cooperation.

- Signature process of MLA – 11/15
- Expansion of cooperation with RTE - 02/2016
- Timeline for settlement update has been agreed – 02/2016 and 05/2016

There are no concrete deadlines for further improvements.

b) Impact on current practice and future market design

Scope/influence 1: Are there side-effects on existing markets (price, liquidity, gate-closure time)?

Imbalance netting abstracts from existing market designs and can therefore be implemented everywhere. Usually imbalance netting leads to a decrease in activation of aFRR in an LFC Area. Generally, the imbalance netting process is located in the period of real-time operation preventing counteracting aFRR activation in the time resolution of seconds. Therefore, imbalance netting is located after all market gate-closure times and after the occurrence of imbalances.

Scope/influence 2: Does the pilot provide for a better integration of renewable / demand-side flexibility into the market?

Imbalance netting is a pure TSO-TSO cooperation. There is no interaction with other market participants.

Incentives 1: Are there any changes to BRP incentives? (e.g. via imbalance settlement, to be balanced in day-ahead/real-time, to help restoring the system balance, to become active in day-ahead/intraday trading)

The general question is, if BRP incentives are connected to the amount of aFRR activation. This incentive system is part of the national regulatory frameworks and is not changed by the cooperation.

Incentives 2: Does the pilot provide special incentives to certain BSP units (generators/load)? (Incentives for investment in new/existing technology enforced/void)

Imbalance netting is a pure TSO-TSO cooperation. There is no interaction with other market participants.

Incentives 3: What are the TSO's incentives for economic efficiency?

Incentives derive from the core principle – avoidance of aFRR power activation thus keeping or decreasing cost for balancing. The distribution of benefits is done through the TSO-TSO settlement. Incorporation of benefits depends on national regulatory or balancing market schemes.

System security: Q1: Does the pilot project provide an enhancement/impairment to system security in the involved control zones?

The pilot project provides an enhancement of system security due to imbalance netting and closer cooperation between TSOs.

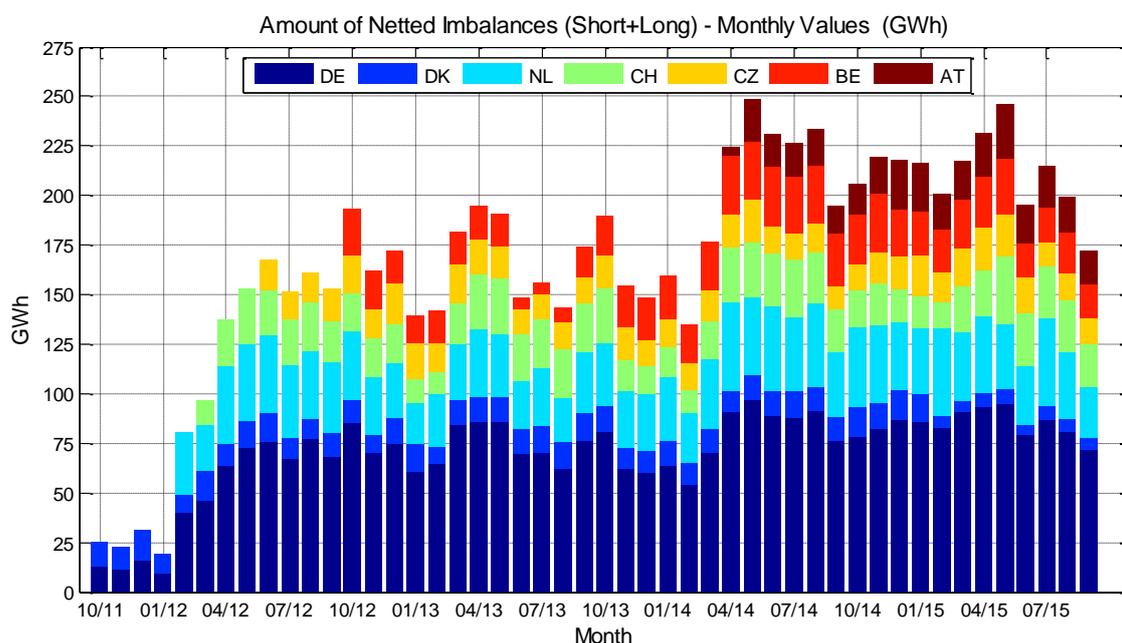
Transparency Q1: What is the (additional) operational information that is provided to BSPs and BRPs in the participating systems?

The information is published according to national regulatory frameworks.

Transparency Q2: Is there a continuous evaluation and communication of quality?

The information is published according to national regulatory frameworks.

c) Cross-border exchange



d) Pricing – Settlement

Matching algorithm (First Come First Served or CMO through an optimisation tool or others)

The allocation of imbalance netting potential is calculated based on the principle of “proportional distribution”, i.e. the imbalance netting for each TSO is proportional to its share of the imbalance with the same sign. Prices are not taken into account. Simplified example:

- TSO A: +100 MW (short)
- TSO B: +300 MW (short)
- TSO C: -150 MW (long)
- TSO D: -50 MW (long)
- Imbalance Netting potential: $\text{MIN}(100+300, |-150-50|) = 200 \text{ MW}$
- Netting of positive imbalance for TSO A: $100 \cdot 200 / (100+300) \text{ MW} = 50 \text{ MW}$
- Netting of positive imbalance for TSO B: $300 \cdot 200 / (100+300) \text{ MW} = 150 \text{ MW}$
- Netting of negative imbalance for TSO C: 150 MW
- Netting of negative imbalance for TSO D: 50 MW

Cross border capacity management (ATC/flow based) and its interaction with intraday market and

previously activated slower balancing products.

The imbalance netting is limited to the ATC values after intraday allocation to market participants. Thanks to successful operation of the flow-based congestion management within GCC the IGCC is currently evaluating its usage in IGCC.

Balancing bids update process and how this update process is coordinated with previous intraday energy market and previously activated slower balancing products

Since the project is focused only on imbalance netting, balancing bids are out of scope of the project.

Information on TSO-TSO settlement scheme

The current scheme is done by calculating a settlement price for netted imbalances per settlement period, which is the result of the weighted average of opportunity prices for imbalance netting per country. This scheme can lead to distortions of settlement in the case of diverging aFRR energy prices of individual TSOs:

- Unequal benefit distribution among the IGCC members
- Negative benefit for some IGCC members in some settlement periods while IGCC has overall positive benefit

Further divergence of the opportunity prices resulted in deepening these effects

Netting is done proportionally to energy volume, without any opportunity price consideration; thus all TSOs contribute to the benefit (proportional to the energy), which is not reflected in the current settlement.

The definition of what is „fair“ is still pending (focus on fair price for energy or on fair benefit per exchanged MWh re-distribution of local savings).

The TSOs currently investigate the change of the settlement scheme in order to solve the root of the problem and to give the right incentives, considering the differences in between the local markets (local regulatory regime, local market concentration /power etc.)

Information on TSO-BSP settlement scheme

Since the project is focused only on imbalance netting, balancing bids are out of scope of the project.

BRP’s imbalance settlement scheme

Since the project is focused only on imbalance netting, imbalance settlement is out of scope of the project.

How cross border balancing actions will be taken into account at the imbalance settlement mechanism?

These rules differ from country to country according to the national regulatory framework. No harmonisation is intended.

Details about imbalance settlement period at pilot project level

The settlement period for the settlement of netted imbalances between TSOs is 15 min.

e) Experience from the implementation

CBA finished for a certain process.

There was a study analysing in how many GCC’s modules could be neighbouring countries involved, how could be the exchanged energy priced and what are the expected exchanges. As the overall outcome was positive, the involved TSOs decided to start with GCC’s module 1 (imbalance netting).

Internal regulatory change approval, cost recognition from NRAs.

Involvement of NRA differs from country to country.

Update about on-going internal regulatory changes associated with pilot project objective.
Reporting about contracts signed (at TSO-TSO level, for instance MoU signature between participating TSOs, at TSO – platform owner level, etc.) Members have focused on creation of a multilateral agreement over almost two past years. The MLA has been finished (10/15) and should be signed by end of 2015. The MLA establishes, among others, a two level governance structure and a decision making process. There is also an NDA for the TSO(s) whose wish to become member(s) and a quick implementation guide on how to join IGCC has been created.
What were the implementation costs and risks? Costs are mainly related to the connection of the control systems, modification of control loops and the modification of business systems.
Governance issues: platforms management and ownership.
Flow based feasibility study finished (if relevant). IGCC members are investigating usage of the flow-based approach as an additional operational tool.
Reporting about stakeholder involvement at pilot project level (Workshops held, relevant feedback obtained from stakeholders) The IGCC TSOs have organised an international stakeholder workshop in November 2014. Because IGCC is an existing cooperation the respective market participants already knew the implementation in the national market and regulatory frameworks. Therefore, the focus of the workshop was to provide an overview of the IGCC framework from a European perspective including an overview of different balancing market design frameworks in the participating countries.
Cross Border capacity reservation experience No capacity needs to be reserved, only free ATC after intraday market is used.
Other comments.

f) Extensibility

Extensibility Q1: Please provide details about potential harmonisation of balancing products of the same process or justify any possible barriers: Imbalance netting is an easy process for which a TSO needs to know the ACE, aFRR activation and free ATC after the cross-border intraday market. The next step is to programme an algorithm running in real-time comparing deviations and to determining correction values (power to be exchanged). Consequently, the algorithm sends the correction back to SCADAs of TSOs. There is no need for a standard product.
Extensibility Q2: Under which conditions can the cooperation be extended? (Reciprocity for BRPs and BSPs is guaranteed, specific regulatory/legal framework required?) Besides the technical implementation, there are no specific conditions. New initiative will need to create an agreement, governance structure and build network of experts.
Extensibility Q3: What is the regional extensibility of the method, due to technical restrictions? (Uniformly applicable within regions of limited extension or no restrictions on extensibility) A TSO needs a central IT tool running in real-time, modification of own control loop, redundant communication lines and an IT tool to match data of exchanged energy.

4. Contribution of Pilot Project to NC Implementation

a) Pilot project roadmap in comparison to NC EB

Where relevant explain briefly the expected or the already achieved contribution of each pilot to any of the NC milestones (A-J) listed below and also complete the timing in the corresponding table.

<p>A. Proposal of regional implementation framework:</p> <p>We can share experiences with establishing, extending and creating internal decision and working structures. We have also shared high-level principles for used imbalance netting algorithm, opportunity price determination and settlement methodology during the public workshop in November 2014. The presentation is available on demand.</p>
<p>B. Implementation of the regional integration model:</p> <p>By concluding the IGCC MLA we will be one step closer to become CoBA, however, still far away due to lacking harmonization in individual national balancing and technical frameworks. Nevertheless, thanks to relative immunity of the imbalance netting – no underlying product, just real-time imbalance - we can share experiences to other cooperations which strive for implementation of imbalance netting.</p>
<p>C. Proposal of modification of the European integration model</p>
<p>D. Proposal of the European implementation framework</p>
<p>E. Proposal of common settlement rules</p> <p>IGCC is based (at the moment) on one price for each exchanged MWh same for each IGCC Member. The formulae comprises of import, export and opportunity prices – reflecting costs, savings or value of delivered balancing energy – of each IGCC Member. Weighting factor is absolute total amount of exchanged energy among IGCC Members. Settlement formulae was presented during the public workshop in November 2014. The presentation is available on demand.</p>
<p>F. Proposal of settlement harmonisation</p>
<p>G. Proposal of standard products definition</p>
<p>H. Proposal of standard products pricing</p>
<p>I. Proposal of standard products algorithms</p>
<p>J. Proposal for common settlement rules of intended exchanges of energy associated to the Frequency Containment Process</p>
<p>Other expected contributions? (if yes, explain contribution and indicate both NC road map and pilot project road map)</p>

The timing of the pilot project in relation to the NC EB implementation schedule (A-J), should be completed where applicable. Note: EIF of the NC EB is not known at the time of completing the report.

Process: Imbalance Netting										
NC EB Milestone	A	B	C	D	E	F	G	H	I	J
Deadline from NC EB (EIF+)	6 m	2y	3 y	4 y	2 y	3 y	1 y	1 y	1 y	
Pilot Project 9	<p>A, B and E are partially fulfilled (there is no CoBA). E to be updated in May 2016 There is no plan for C and D now as we are focusing on finalization of the IGCC MLA. F, G, H, I and J are not relevant for imbalance netting.</p>									

Describe current or expected mismatches of pilot project with respect to the NC EB.
Describe the reasons behind these mismatches.
Describe (if feasible) forecasted date to overcome mismatches.

b) Contribution to standard product definition

The IGCC pilot project is limited to imbalance netting, therefore there is no contribution to the definition of standard products.

Appendix 1. Project road map Summary

The IGCC Members focused their work on the MLA. The MLA is now finalised and will be signed by the end of 2015. In parallel and after this finalisation, the members are evaluating possible extensions or modifications of the cooperation (settlement, flow-based congestion management, aFRR assistance).