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# ENTSO-E Cross Border Electricity Balancing Pilot Projects

Report on Pilot Project 3

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

## 2. Executive summary

### a) Participating TSOs

*The e-GCC project is based on imbalance netting process (“INP”). It was established in March 2012 by CEPS and SEPS. In April 2013 MAVIR joined the project.*

*In June 2012 CEPS joined another IN initiative (IGCC, Balancing Pilot Project 9), causing that netting in e-GCC is followed by IGCC. This hierarchical participation in both INPs runs automatically.*

### b) Scope and goals of the pilot project

*The main goal of the pilot project can be seen in the following areas:*

- *to gain operational experiences resulting from real-time system imbalance exchange;*

- to gain IT development experiences and real-time data exchange; and
- to evaluate usage of the fix price in the long term.

An additional benefit for the participating TSOs is the possibility to decrease amounts of activated balancing energy from the automatic frequency restoration process (“aFRR”). It is expected that the experiences can be shared with other interested LFC Blocks (TSOs).

### c) Recent achievements of the pilot project

The project was approved as a stable and a robust solution by the system operation committee of ENTSO-E in October 2013.

### d) Learning points

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

*The cooperation is based on multilateral agreement with same rights and obligations for all participating TSOs. The TSOs can share experiences and difficulties they have been facing during projects creation.*

#### **Learnings Q2: Identify learnings that can be useful towards the NC EB implementation**

*As the balancing market shall be based on TSO-TSO model, the project can contribute with experiences gained from TSO-TSO real-time cooperation and settlement.*

### e) Specific questions

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

*The benefit exists. However, it is different for each member as the incorporation of the benefits differs due to national frameworks. In general, the benefits are transferred back to end consumers via grid tariffs.*

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

*There is no potential benefit of any other cooperation, which is affected by this initiative.*

## 3. Detailed of the pilot project

### a) Updated project roadmap

The detailed project roadmap is to be added in the Annex 1 of this report. Deliverables of WPs and milestones in the project implementation should be shown in it. Please report and additional information to that here.

#### **Additional information on the pilot project road map**

## b) Impact on current practice and future market design

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

*The imbalance netting has no impact on any national and cross-border energy market. The exchange is done only in case there is remaining, not used cross-border capacity after the last intraday gate-closure time.*

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

*There is no direct impact on renewables and their integration. Thanks to the speed of imbalance netting, it can support to balance the volatile RES output causing imbalance.*

### 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)

*No change. The main incentive to be balanced remains with national rules.*

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

*No, it does not.*

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

*Netting of different power systems' imbalances is the best way to enhance the economic efficiency. Less balancing energy bids are needed for activation to keep the system in balance. In opinion of the participating TSOs, the basic idea of the imbalance netting process – to avoid counter activation of aFRRs – is efficient enough by itself. However, such situations occur seldom and from a long-term perspective the process brings benefits to all.*

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

*In general, the imbalance netting increases the system security by relieving the aFRR capacity to cope with further imbalances. It also a very fast source of a balancing energy as the energy is already in the power system and it is not necessary to wait for activation of BSPs.*

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

*Provided information differ for each member due to national frameworks for information publication.*

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

*The TSOs evaluate the quality regularly especially from a technical and billing point of view. This is done internally by each TSO.*

## c) Cross-border exchange relevant data

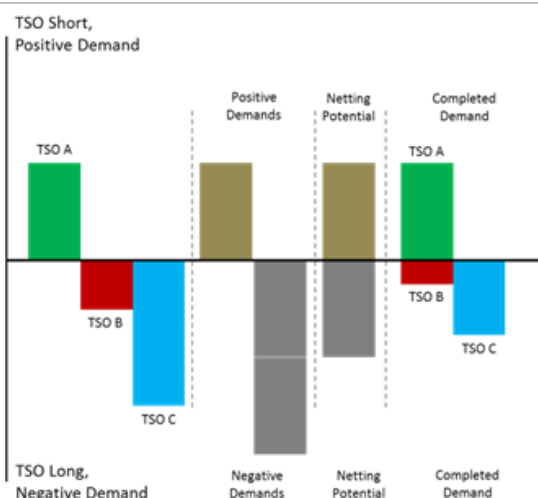
|   |          |          |          |          |         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|---|----------|----------|----------|----------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| Product: RR, mFRR, aFRR, lmb. netting   | Apr 2013 | May 2013 | Jun 2013 | Jul 2013 | aug. 13 | Sep 2013 | Oct 2013 | Nov 2013 | Dec 2013 | Jan 2013 | Feb 2013 | Mar 2014 | Apr 2014 | May 2014 | Jun 2014 | Jul 2014 | Aug 2014 | Sep 2014 | Oct 2014 | Nov 2014 | Dec 2014 | Jan 2015 | Feb 2015 | Mar 2015 | Apr 2015 | May 2015 | Jun 2015 | Jul 2015 | Aug 2015 | Sep 2015 |  |
| Upward volume (MWh) of XB balancing energy/reserve interchanged at project level. (*)               | 10 070   | 17 248   | 16 128   | 16 032   | 13 610  | 19 850   | 13 319   | 15 846   | 14 149   | 16 935   | 13 146   | 12 353   | 10 779   | 11 925   | 10 364   | 11 891   | 13 902   | 9 720    | 8 787    | 9 445    | 10 441   | 8 909    | 11 855   | 11 019   | 10 997   | 12 776   | 12 110   | 9 383    | 12 385   | 8 274    |  |
| Downward volumes (MWh) of XB balancing energy/reserve interchanged at project level. (*)            | 10 070   | 17 248   | 16 128   | 16 032   | 13 610  | 19 850   | 13 319   | 15 846   | 14 149   | 16 935   | 13 146   | 12 353   | 10 779   | 11 925   | 10 364   | 11 891   | 13 902   | 9 720    | 8 787    | 9 445    | 10 441   | 8 909    | 11 855   | 11 019   | 10 997   | 12 776   | 12 110   | 9 383    | 12 385   | 8 274    |  |
| Total upward volume (MWh) of balancing energy/reserve at project level. (**)                        | 10 070   | 17 248   | 16 128   | 16 032   | 13 610  | 19 850   | 13 319   | 15 846   | 14 149   | 16 935   | 13 146   | 12 353   | 10 779   | 11 925   | 10 364   | 11 891   | 13 902   | 9 720    | 8 787    | 9 445    | 10 441   | 8 909    | 11 855   | 11 019   | 10 997   | 12 776   | 12 110   | 9 383    | 12 385   | 8 274    |  |
| Total downward volume (MWh) of balancing energy/reserve at project level. (**)                      | 10 070   | 17 248   | 16 128   | 16 032   | 13 610  | 19 850   | 13 319   | 15 846   | 14 149   | 16 935   | 13 146   | 12 353   | 10 779   | 11 925   | 10 364   | 11 891   | 13 902   | 9 720    | 8 787    | 9 445    | 10 441   | 8 909    | 11 855   | 11 019   | 10 997   | 12 776   | 12 110   | 9 383    | 12 385   | 8 274    |  |
| Weighted average price (€/MWh) (***) of XB upward balancing energy/reserve at XB project level. (*) |          |          |          |          |         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
| Weighted average price (€/MWh) (***) of XB downward balancing energy/reserve at project level. (*)  |          |          |          |          |         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
| Weighted average price (€/MWh) (***) of total upward balancing energy/reserve at project level. (*) |          |          |          |          |         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
| Weighted average price (€/MWh) (***) of total downward balancing energy / reserve at project level  |          |          |          |          |         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |

#### d) Algorithm, ATC management

##### Optimisation algorithm

*The imbalance exchange is based on the demands of participating TSOs and their limits, which are always taken into consideration. The demand (upward (import) or downward (export)) is the minimum of the sum of area control error and already activated aFRR without imbalance netting process (INP) exchange, the remaining, not used cross-border capacity limit after the intraday cross-border energy market gate closure (import or export), and the available aFRR (upward or downward).*

*The exchanged balancing energy for the TSO is determinate as a ratio (“Input ratio”) between TSO’s demand and the sum of demands of all TSOs for the same direction of demand (pro rata principle).*



*Demands:*

*TSO A (short): + 100 MW*

*TSO B (long): - 50 MW*

*TSO C (long): -150 MW*

*Demand altogether (short): +100 MW*

*Demand altogether (long): - 200 MW*

*Netting Potential:  $\min|+100, -200| = 100$  MW*

*Completed Demands:*

*TSO A: +100 MW*

*TSO B:  $-50 \cdot (100 / (50 + 150)) = -25$  MW*

*TSO C:  $-150 \cdot (100 / (50 + 150)) = -75$  MW.*

**Cross border capacity management (ATC/flow based) and its interaction with intraday market and previously activated slower balancing products.**

*Imbalance exchange can be completed only in case there is remaining, not used cross-border capacity on the involved border.*

*Real time Flow Based congestion management has not been considered yet. As e-GCC is of a size where flow-based congestion management would not bring benefits. We prefer to wait for experiences gained by pilot 1 and 9 (there is a vision to implement flow-based congestion management) before we start thinking about implementation.*

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

*None*

**e) Pricing – Settlement**

**Information on TSO-TSO settlement scheme**

*The fix price is used. Each TSO nets its exports and imports leading on final position. A TSO pays*

|   |
|---|
| <i>for import to other(s) TSO(s).</i>   |
| <b>Information on TSO-BSP settlement scheme</b><br><i>None</i>  |
| <b>BRP's imbalance settlement scheme</b><br><i>None</i>   |
| <b>How cross border balancing actions will be taken into account at the imbalance settlement mechanism?</b><br><i>Exchanged imbalance is considered as a delivery of balancing energy by the TSO. The pricing methodologies are approved by each NRA.</i> |
| <b>Details about imbalance settlement period at pilot project level</b><br><i>Each TSO has its own imbalance settlement period. No harmonization was necessary.</i>   |

## f) Experience from the implementation

|  |
|--|
| <b>CBA finished for a certain process.</b>   |
| <b>Internal regulatory change approval, cost recognition from NRAs.</b><br><i>The necessary changes were introduced after internal discussion with stakeholders and relevant regulator. The recognition of costs connected to the project did not change the existing processes.</i> |
| <b>Update about on-going internal regulatory changes associated with pilot project objective.</b><br><i>There is no on-going internal regulatory change at any of the involved TSOs.</i>   |
| <b>Reporting about contracts signed (at TSO-TSO level, for instance MoU signature between participating TSOs, at TSO – platform owner level, etc.)</b>   |
| <b>What were the implementation costs and risks?</b><br><i>Implementation costs were incurred by creating the optimisation tool, the matching and billing module. The other part of costs is due to integration of the central tools in local systems.</i>                           |
| <b>Governance issues: platforms management and ownership.</b><br><i>CEPS owns and operates the central tools – the real-time module, the reconciliation and the billing module.</i>  |
| <b>Flow based approach (and associated feasibility study accomplished, if proceed).</b><br><i>Not relevant.</i>  |
| <b>Reporting about stakeholder involvement at pilot project level (Workshops held, relevant feedback obtained from stakeholders)</b><br><i>Not relevant.</i>   |
| <b>Cross Border capacity reservation experience</b><br><i>Not relevant.</i>  |
| <b>Other comments.</b>   |

## g) Extensibility and cooperation



**Extensibility Q1: Identify any potential extensions of this project towards other pilots or other areas in general**

*None at the moment.*

**Extensibility Q2: Please provide details about potential harmonisation of balancing products of the same process or justify any possible barriers**

*Not applicable.*

**Extensibility Q3: Under which conditions can the cooperation be extended? (Reciprocity for BRPs and BSPs is guaranteed, specific regulatory/legal framework required?)**

*Participating TSOs, respectively countries should seek for a positive benefit in any case. If there is a benefit, we are open to merge or to extend.*

*In general, we are open to merge with any imbalance netting cooperation. However, such merge must bring benefit for us. Such benefit should outweigh costs associated with the merger and we do not see such high benefit anywhere at the moment.*

**Extensibility Q4: What is the regional extensibility of the method, due to technical restrictions? (Uniformly applicable within regions of limited extension or no restrictions on extensibility)**

*Thanks to a limited need for interaction with national BSP and BRP arrangements, the only factor that needs to be elaborated, from a feasibility point of view, is the technical side of the cooperation.*

## 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.

#### A. Proposal of regional implementation framework:

*We can share experiences learned from creation of the multilateral agreement, as this is the basic document for the cooperation. It contains the operational rules, settlement rules, liability rules and define boundaries of the cooperation in general.*

#### B. Implementation of the regional integration model:

*We can share experiences coming from IT design, implementation and testing phase as well as experiences learned from early operation phase.*

#### C. Proposal of modification of the European integration model

*None.*

#### D. Proposal of the European implementation framework

*None.*

#### E. Proposal of common settlement rules

*The data of the exchanged energy is matched on a daily base via a centralised and fully automatic data matching process. This process can be used as one of the inputs for the*

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| <i>development of the TSO-TSO settlement tools and for the rules as well.</i>  |
| <b>F. Proposal of settlement harmonisation</b><br><i>None.</i>   |
| <b>G. Proposal of standard products definition</b><br><i>None.</i>   |
| <b>H. Proposal of standard products pricing</b><br><i>None.</i>  |
| <b>I. Proposal of standard products algorithms</b><br><i>None – there is no standard product exchanged.</i>                                    |
| <b>J. Proposal for common settlement rules of intended exchanges of energy associated to the Frequency Containment Process</b><br><i>None.</i> |
| <b>Other expected contributions? (if yes, explain contribution and indicate both NC road map and pilot project road map)</b><br><i>None.</i>   |

The timing of the pilot project in relation to the NC EB implementation schedule (A-J), should be completed where applicable. Note: EIF is estimated in Q4 2015.

| Process                    | A   | B                | C  | D  | E  | F  | G  | H  | I  | J |
|----------------------------|-----|------------------|----|----|----|----|----|----|----|---|
| Imbalance netting          |     |                  |    |    |    |    |    |    |    |   |
| Deadline from NC EB (EIF+) | 6 m | 2y               | 3y | 4y | 2y | 3y | 1y | 1y | 1y |   |
| Pilot Project 3            |     | Partly completed |    |    |    |    |    |    |    |   |

**Describe current or expected mismatches of pilot project with respect to the NC EB.**

*The fix price.*

**Describe the reasons behind these mismatches.**

*The network code is not in force. Participating TSOs highly value transparency and simplicity of the fix price. Opportunity prices are quite hard to check. In some cases are the final prices known several months after the month of delivery.*

**Describe (if feasible) forecasted date to overcome mismatches.**

*There is no exact roadmap for changing the pricing methodology. Participating TSOs highly value transparency and simplicity of the fix price.*

*The other currently used pricing scheme – opportunity price – allows increased consistency with market prices of electricity in regional level (assuming the electricity market price is reflected in balancing energy bid prices). On the other hand, the scheme is highly complex with lower transparency and simplicity in comparison with the fixed price scheme. Until there is a better (more simple and transparent) scheme we, e-GCC, do not intend to change the fixed pricing scheme.*

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## 5. Additional relevant information of the pilot project

*The cooperation is in operation for over a year and provides positive benefit for all the participating TSOs. The TSOs are open to any extension or merge and they are in discussions with other cooperations, searching for common benefits. Until then, the TSOs do not intend to proceed with further development and put the so called “participation among the balancing pilots” on hold. This is not that the TSOs will stop the cooperation but the reporting will be updated in case there is a development.*

## Appendix 1. Project road map Summary

|  | 2013 |    |    |    | 2014 |    |    |    | 2015 |    |    |    | 2016 |    |    |    | 2017 |    |    |    | 2018 |    |    |    | 2019 |    |    |    |  |  |  |  |
|--|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|--|--|--|--|
|  | Q1   | Q2 | Q3 | Q4 | Q1   | Q2 | Q3 | Q4 | Q1   | Q2 | Q3 | Q4 | Q1   | Q2 | Q3 | Q4 | Q1   | Q2 | Q3 | Q4 | Q1   | Q2 | Q3 | Q4 | Q1   | Q2 | Q3 | Q4 |  |  |  |  |
| <i>Design phase</i>  |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |
| <i>NRA approval</i>  | █    |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |
| <i>Decision go live/ not to go<br/>(under a CBA)</i>                             |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |
| <i>IT Implementation</i>   | █    | █  |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |
| <i>Testing</i>   |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |
| <i>Go Live</i>   | █    |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |
| <i>Monitoring of economic<br/>variables (costs, volumes,<br/>social welfare)</i> | █    | █  | █  | █  | █    | █  | █  | █  | █    | █  | █  | █  |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |
| <i>NC EB proposal of<br/>modification of target model</i>                        |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |  |  |  |  |