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# ENTSO-E Cross Border Electricity Balancing Pilot Projects

2 Month Report on Pilot Project 2

Patrick Gasser – Swissgrid

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

## 2. Executive summary

### a) Participating TSOs

The founding TSOs – the Austrian TSO (APG) and the Swiss TSO (Swissgrid) – were joined by the FCR cooperation of the German TSOs (50Hertz, Amprion, TenneT DE and TransnetBW), the Danish TSO Energinet.dk and the Dutch TSO (TenneT NL), thanks to the simultaneous participation of Swissgrid in both projects. Energinet.dk has participated in the project, but could not join the market due to the decision of the German NRA. The Belgian TSO Elia and French TSO RTE showed interest in joining the cooperation. Discussions with them started mid-2015.

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

The initial goal of this project is to establish one common market for the procurement of FCR. This initiative aims at a full scale integration of the different markets for FCR and not only at an “opportunistic” exchange of balancing services based on specific needs and circumstances.

Apart from all possible advantages one could expect from having a bigger market, specific aspects of this project could act as a learning basis for the benefit of all TSOs towards an integration of the European balancing market.

Firstly, this initiative constitutes a pioneer example of a clear TSO-TSO model in which each party has equal rights in accordance to the stipulations in the NC EB. Individual TSOs serve as the sole interface towards market participants in the respective countries.

In addition, the optimization function implemented in this project (called Central Clearing Function CCF) is in line with the stipulations of the NC EB. Thus this function could be used one to one to implement what is required in the NC EB in relation to cross-border procurement of balancing capacity. It should be stressed that this function can be used also for balancing capacity products other than FCR. As the CCF considers different market characteristics and rules (e.g. various types of bids: not divisible, conditional), it is not necessary to harmonize all product characteristics in the first place. Moreover, this cross-border collaboration is based on flexible system architecture and software setups that make the extension to other interested TSOs easier.

On July 3<sup>rd</sup>, 2013, APG and Swissgrid created a common market for FCR. On April 7<sup>th</sup>, 2015, the successful extension of the cooperation to German and Dutch TSOs was achieved.

As further development of the collaboration, the already participating TSOs welcome all potential TSOs who are interested in joining, for example Elia in Belgium and RTE in France.

### c) Recent achievements of the pilot project

On April 7<sup>th</sup>, 2015, the cooperation merged with another FCR-cooperation and thus now includes all the German, Austrian, Dutch and Swiss TSOs.

As both cooperations showed, such cooperation leads to higher liquidity and competition in the market, allowing lower FCR procurement costs. Especially having the relation between the procurement costs for balancing capacity and balancing energy in mind, the procurement of balancing capacity is considered of high importance.

### d) Learning points

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

Efficient project structure, clear objectives and the flexibility of involved parties are essential for the success of the project.

Flexibility and efficiency of involved parties is crucial for the design and the implementation of increasingly complex projects.

The cost and benefit experiences with geographical extension showed price convergence, significant price volatility decrease and increase of both social welfare and liquidity.

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

This pilot project shows a successful cooperation based on the TSO-TSO model with fair governance and equal rights. The cooperation is operated on a central clearing system. This Central Clearing System includes an algorithm which minimises the cost of the procurement of the overall FCR reserves taking into account technical constraints.

The implementation allows different product setups. Therefore, pilot project 2 has demonstrated the possibility to integrate different markets with non-harmonised products into a single one, where each participant has separate type of balancing capacity products (divisible and non-divisible bids). This was again proven with the extension of the cooperation to Germany and the Netherlands.

### e) Specific questions

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

Benefits are linked to the introduction of one big common market for FCR and the expected economic benefits, i.e. price convergence, increase of social welfare, etc. In addition, the settlement scheme in this project was based on the principle that each TSO may profit from the cheaper remaining bids of other TSOs, without resulting in a disadvantage for the other ones. It was thus guaranteed that all the parties benefited from the collaboration while avoiding cross-subsidising.

This has changed with the market expansion on April 7<sup>th</sup>, 2015, when the principle of the average procurement price has been introduced for the settlement among TSOs.

It should be mentioned that the payment scheme is “pay-as-bid”, which induces no change in the market outcome in terms of selected bids, etc. Resulting economic benefits are considered when calculating the grid tariffs.

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

No balancing cooperation is affected.

**Key regulatory/legal issues overcome or blocking at each pilot project**

One regulatory issue was related to the delayed publishing of the auction results according to the request of the Austrian Regulator. However, this is not a blocking issue for the pilot project.

Another issue was the blocking of the participation of Denmark by a decision of the German NRA due to expected congestions between Germany and Denmark. A new model for calculation of the TRM has been created. After a first successful test phase, a second test phase is carried out until the end of 2015. Results will be presented to the German NRA and a decision about Denmark’s participation in the common market is expected to be made by the German NRA in Q1/2016.

**Potential Q3: Will market participants/stakeholders accept non-harmonised products in the long term?**

To be discussed.

## 3. Detailed of the pilot project

### a) Updated project roadmap

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

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

The project has been in the live phase since July 3<sup>rd</sup>, 2013. The focus is put on further developments in the collaboration and the evaluation of the common market.

The extension of this project to other interested TSOs remains a long term goal.

The project roadmap is updated in appendix 1.

### **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 independent FCR markets that existed in Switzerland and Austria on the one side and the common market of Germany and the Netherlands on the other side were merged into one common FCR auction. All other market mechanisms, either for balancing or for energy trading, are not affected by this auction since procurement is done on a weekly basis and the gate closure is some days ahead of the delivery period: auction on Tuesday of the week previous to delivery.

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

Once a BSP is prequalified for the FCR market, it can participate in the common auction. Extra opportunities rise for market participants in all the countries since the demand now is 783 MW. There are no special incentives for renewables or demand-side management. They can participate under the same conditions and requirements as conventional BSPs.

#### **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 changes regarding the rules for BRPs have been introduced due to the nature of the project, i.e. no direct implication for the energy market.

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

General incentives to existing BSPs and to new units due to the bigger demand that must be covered in all the control areas.

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

TSOs profit of a more liquid market without losing something in terms of system security, since all BSPs participating follow the respective rules since they are prequalified. In case it is needed, the market clearing algorithm can accommodate constraints for allocating a specific amount of the demand to bids coming from one area. The settlement principle applied guarantees a fair cost allocation and the system structure gives to all the TSOs equal rights in the governance.

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

Since all units participating in the project need to be prequalified, it is certain that they contribute to restrict frequency deviations based on specific guidelines. Moreover, by extending the FCR market the probability of facing scarcity of resources (e.g. due to seasonal effects) is reduced.

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

No additional information is provided to the BSPs and BRPs. Bids are submitted to the platforms of all the TSOs and then are forwarded to the common clearing system. Therefore, current bidding tools remain the sole interface towards market participants. Stakeholders have been involved in the design phase of the pilot project and their inputs have been considered before proceeding to the implementation.

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

The market is continuously evaluated by the TSOs.

**c) Cross-border exchange relevant data**

The prices for the total volume are reported separately subject to different restriction on publication from the regulators.

**REMARKS**

- The exchanged product in Pilot Project 2 is symmetric and therefore no distinction is done between upward/downward reserves.
- Each week, a certain amount of reserves is exchanged
- The reserved balancing capacity is 783 MW per week (for 2015, both Austria and the Netherlands have to reserve 67 MW in FCR per week, Switzerland 71 MW and Germany 578 MW). The Netherlands procure remaining 29 MW in a separate auction.

**d) Matching, ATC management and bids update process**

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

Central cost optimization function with subject to technical limits is used for market clearing.

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

No interaction with ID market. The exchange of reserves is done over the TRM.

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

Not applicable for pilot project 2. The duration of reserves bids is one week.

**e) Pricing – Settlement**

**Information on TSO-TSO settlement scheme**

For each tender the BSPs submit their bids to the respective responsible tendering platform for their control block, including volumes [MW], prices [EUR/MW] and indication for block bids or bid steps. The tendering platforms submit the collected bids to the CCSs where the most favourable bids are determined by the CCF. The results of CCS(s) are checked against each other. The CCS(s) submit back the full bid list, including information on which bids have to be awarded, to the tendering platforms. The respective bids are awarded accordingly and the Contracting Parties conclude contracts with their BSPs according to the

awarded volumes and prices. Based on these contracts the Contracting Parties have to pay their BSPs.

With this manner of procurement, each Contracting Party contracts for the provision of FCR that differs from its own demand and therefore incurs costs that deviate from its target costs. The goal of the TSO-TSO settlement is to distribute the costs that arise from the tendering process, proportionally to the allocated demand per TSO.

This is achieved by conducting the following steps, which are described in detail below:

1. Determination of actual costs per TSO
2. Determination of target costs per TSO
3. Determination of TSO-TSO settlement position
4. Determination of payment flows between the TSOs

**Information on TSO-BSP settlement scheme**

Pay as bid.

**BRP's imbalance settlement scheme**

N/A

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

N/A

**Details about imbalance settlement period at pilot project level**

N/A

**f) Experience from the implementation**

**CBA finished for a certain process.**

N/A

**Internal regulatory change approval, cost recognition from NRAs.**

N/A

**Update about on-going internal regulatory changes associated with pilot project objective.**

N/A

**Reporting about contracts signed (at TSO-TSO level, for instance MoU signature between participating TSOs, at TSO – platform owner level, etc.)**

**TSO-TSO contract signed in June 2013 and revised in March/April 2015.**

**What were the implementation costs and risks?**

Implementation costs included the development of the common auctioning platform with all its features. During the implementation phase several tests took place to ensure that the system is robust. Costs for the upgrade of the central platform operated in the first phase (in the future a parallel operation of two platforms is planned) as well as its operation are born by the hosting TSO Swissgrid.

**Governance issues: platforms management and ownership.**

The Central Clearing Platform is owned by Swissgrid. Further developments are specified commonly and financial offers are exchanged.

**Reporting about stakeholder involvement at pilot project level (Workshops held, relevant feedback obtained from stakeholders)**



Provider consultations meetings and meetings with its respective NRA on a regular basis.
<b>Cross Border capacity reservation experience</b> N/A
<b>Other comments.</b>

### g) Extensibility and cooperation

<p><b>Extensibility Q1: Identify any potential extensions of this project towards other pilots or other areas in general</b></p> <p>The extension of this project to other interested TSOs remains a long term goal. To this end, the Austrian, German, Dutch and Swiss TSOs are participating in the common auctions. Elia and RTE showed interests in joining the cooperation. Discussions started mid-2015.</p>
<p><b>Extensibility Q2: Please provide details about potential harmonisation of balancing products of the same process or justify any possible barriers</b></p> <p>The cost optimization function used for the market clearing is able to accommodate for different products. Therefore there is no need for product harmonisation from a technical point of view. It cannot be excluded that stakeholders will request harmonisation in future.</p>
<p><b>Extensibility Q3: Under which conditions can the cooperation be extended? (Reciprocity for BRPs and BSPs is guaranteed, specific regulatory/legal framework required?)</b></p> <p>The prequalification conditions have to present a deep degree of harmonisation between participating countries. The parties have to agree on the terms of the cooperation.</p>
<p><b>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)</b></p> <p>It will be needed to make sure that technical requirements (e.g. prequalification criteria) are harmonised for all participating TSOs.</p>

## 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><b>A. Proposal of regional implementation framework:</b> N/A</p>
<p><b>B. Implementation of the regional integration model:</b> N/A</p>
<p><b>C. Proposal of modification of the European integration model:</b> N/A</p>
<p><b>D. Proposal of the European implementation framework:</b> N/A</p>
<p><b>E. Proposal of common settlement rules:</b></p>

The NC EB prescribes that “TSOs shall define a pricing method used in the procurement of balancing capacity that shall give correct price signals and right incentives to market participants”.

In addition, “the procurement of Balancing Capacity bids has to be performed by the Capacity procurement Optimization Function and shall aim to minimize the overall procurement costs for all commonly procuring TSOs respecting Operational Security constraints”.

Both stipulations are followed by the settlement principle implemented in Pilot project 2.

**F. Proposal of settlement harmonisation**

The aforementioned settlement scheme was agreed by all TSOs.

**G. Proposal of standard products definition**

The FCR is not linked to the set of standard products as these have been defined by the respective subgroup of ENTSO-E. The FCR products in the participating countries had mainly differences in the market characteristics (non-divisible and conditional bids in Switzerland, divisible bids in the other countries). The optimization setup of the project was able to accommodate these different schemes without the need of harmonizing them.

**H. Proposal of standard products pricing**

Pricing is based on the “pay-as-bid” scheme.

**I. Proposal of standard products algorithms**

The market clearing algorithm is based on a mixed-integer linear program and considers all necessary constraints (e.g. covering the demand, limit of exchanged reserves, etc.).

**J. Proposal for common settlement rules of intended exchanges of energy associated to the Frequency Containment Process**

Not applicable. Only the exchange of reserves is remunerated.

**Other expected contributions? (if yes, explain contribution and indicate both NC road map and pilot project road map)**

N/A

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

Process	E	F	G	H	I	J
FCR						
Deadline from NC EB (EIF+)	2y	3y	1y	1y	1y	2y
Pilot Project 2	2013	2013	2013	2013	2013	N/A

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

No mismatches identified.

**Describe the reasons behind these mismatches.**

N/A

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

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N/A
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## 5. Additional relevant information of the pilot project

## Appendix 1: Project road map Summary

	2012				2013				2014				2015				2016				2017				2018			
	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 (under a CBA)</i>																												
<i>IT Implementation</i>		■	■	■	■	■						■	■	■														
<i>Testing</i>					■									■														
<i>Go Live</i>							◆								◆													
<i>Monitoring of economic variables (costs, volumes, social welfare)</i>						■	■	■	■	■	■	■	■	■	■													
<i>NC EB proposal of modification of target model</i>																												