Regional coordination of short-term operations

Integrating balancing markets

Expert Workshop V, REGIONAL RESOURCE ADEQUACY
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Marie Montigny
Electricity transmission Department
(CRE, French Energy Regulatory Commission)
Summary

1. The context of electricity balancing markets
   - Hugh diversity in system operations and balancing markets designs
   - Issues in European balancing markets
   - The need to integrate national balancing projects

2. NC Electricity Balancing: a necessary binding regulatory framework
   - The process to develop a Network Code
   - Where do we stand now?
   - ACER’s opinion regarding well-functioning balancing markets

3. Early implementation through Balancing Pilot Projects
   - The need for voluntary initiatives across the EU
   - Overview of the balancing pilot projects
   - Case study: exchanges using the Processes for Replacement Reserves
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Managing generation units in Europe: coexistence of very different models

Two main market models for scheduling processes

Central Dispatch Systems (CDS)
- TSOs responsible for unit commitment and dispatching of majority of prequalified generating units
- Integrated Scheduling Process: TSOs solve the global optimisation problem of the generation costs given technical constraints (generation units & transmission system).

Self Dispatch System (SDS)
- Generation unit’s owners perform unit commitment process.
- Individual decisions, with possible local optimisation for units groups under a portfolio (e.g. BRP).
- Depending on network constraints, TSOs may have to apply redispatching to ensure system security.

Coexistence of very different models to operate systems in Europe, Hugh diversity in balancing markets designs
- Balancing historically entrusted to individual TSOs
- Designs based on historical national specificities
- Access to resources is mostly limited to national markets
Issues in European balancing markets

Challenges in ensuring security of supply

- Need for **enhanced system flexibility** with massive penetration of non programmable RES (increase in system requirements and products, decrease in short-term availability of traditional balancing units)

Developing EU-wide competition

- **High levels of concentration** in many Member States
- In spite of on-going efforts, still a **very limited participation** of demand response.
The need to integrate balancing markets

- Balancing market concentration could be decreased through higher cross-border integration, **reduction in entry barriers and improvement in market efficiency**. More competition between BSPs and increased liquidity in balancing energy trading.

- **Relevant price signals** will allow to enhance the efficiency of balancing markets as they have a direct impact on the volume of residual imbalances to be balanced by TSOs.

- Developing cross-border balancing can be considered essential in **accommodating an increasing amount of intermittent generation** without jeopardising the European system and inducing high additional balancing costs.

Necessity to integrate balancing markets
What are the main integration tools?

**Formal process: establishing a legal framework**
- Develop Framework Guidelines and Network codes
- Establish methodologies and/or term and conditions for balancing

**Informal process: early implementation**
- Use ACER Electricity Regional Initiatives
- Develop balancing pilot project(s)
- Ensure strong pan-European dimension: cross-regional roadmaps
- Ensure strong stakeholders’ involvement: Florence Forum, AESAG, BPPSAG ...
- Provide close and transparent follow-up (regular reports, status reviews)
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General process to elaborate a Network Code

- The network codes, which were introduced by the Third Energy Package, involve several stakeholders (ACER, ENTSOs, European Commission, Member States).
- They specify the principles established in the ACER framework guidelines.

**Annual priority list**

Every year, the European Commission draws up a list of priority topics to be addressed within a network code.

**Framework Guidelines**

ACER establishes clear objectives and principles related to these topics.

**Network Code**

ENTSO-E clarifies the principles from the framework guidelines.

**Annex to the Regulation**

On the basis of recommendation from ACER, the European Commission may submit the network code to a comitology process to make it binding.
NC on Electricity Balancing

Roles and responsibilities
Procurement
Activation
Interconnection capacity
Imbalance settlement

TSO
DSO
BSP, BRP, Scheduling Agent
Reserves
Energy
Standard and specific products
CMO
Products
Use
Allocation
Costs
TSO – BSP
TSO – TSO
TSO – BRP
Balancing Target Model
the pillars at a glance

- **Strong coordination between TSOs** to optimise the activation of energy from balancing resources:
  - On the basis of a *Common Merit Order* for the manually-activated reserves (*mFRR and RR*);
  - On the basis of an **equivalent concept** for the automatically-activated reserves (*aFRR*);

- **Well-designed market incentives** for market participants:
  - On **BSPs**, with the harmonisation of the pricing method to procure balancing energy and requirements on terms and conditions to facilitate the participation of RES and demand response;
  - On **BRPs**, with the definition of common features for an efficient settlement of energy imbalances.
How would the target be reached?

Concept of a Coordinated Balancing Area

- TSOs are obliged to cooperate in a **Coordinated Balancing Area (CoBAs)** with two or more TSOs.
- Each CoBA includes the exchange of Standard Product(s) for a given process.
- Regional Implementation Models allow to gain experience before implementing targets at EU level.
- Sharing and exchange of Balancing Reserves is not mandatory but encouraged.
- Functions are performing central tasks (CMO lists activation processes, common procurement,...)
Activation Optimisation Function within a CoBA

How should it work?

Rules for updating the ISP bids:
- Update of RR BE bids no longer permitted
- Update of mFRR BE bids no longer permitted

Intraday timeframe:
- ISP GCT
- ID CZ GCT
- RR BE GCT
- mFRR BE GCT

Last BE GCT
TSO Energy bid submission GCT

Real time

Up to 8 hours [...] Up to 1 hour before RT

BE: Balancing Energy
AOF: Activation Optimisation Function
FAT: Full Activation Time
Activation Optimisation Function within a CoBA

How should it work?

Rules for updating the ISP bids

Update of RR BE bids no longer permitted

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TSOs submit all BE bids received from BSP to AOF

TSOs submit their activation requests for BE bids to AOF

ISP GCT

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How should it work?

Rules for updating the ISP bids

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<th>ID CZ GCT</th>
<th>RR BE GCT</th>
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<th>TSO Energy bid submission GCT</th>
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<tbody>
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<td>Last BE GCT</td>
<td>TSO Energy bid submission GCT</td>
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</table>

Time for common processing of BE bids

- TSOs submit all BE bids received from BSP to AOF
- TSOs submit their activation requests for BE bids to AOF
- AOF selects BE bids & requests the activation of selected BE bids
- AOF establishes at least 1 CMO list for upward and downward bids

Up to 8 hours [...] Up to 1 hour before RT

Intraday timeframe

BE:Balancing Energy
AOF: Activation Optimisation Function
FAT: Full Activation Time
Activation Optimisation Function within a CoBA

How should it work?

- **TSO** energy bid submission GCT
- **ID CZ** GCT
- **RR BE** GCT
- **mFRR** BE GCT
- TSO Energy bid submission GCT

**Rules for updating the ISP bids**

- Up to 8 hours [...]
- Up to 1 hour before RT

**Intraday timeframe**

- Time for common processing of BE bids
- Time to perform all processes linked to activation of BE bids

**TSOs submit all BE bids received from BSP to AOF**

**TSOs submit their activation requests for BE bids to AOF**

**AOF** selects BE bids & requests the activation of selected BE bids

**AOF submits confirmation of the activated BE bid**

**Connecting TSO ensures the activation of the firm BE bid selected by AOF**

**BE** : Balancing Energy

**AOF** : Activation Optimisation Function

**FAT** : Full Activation Time

**AOF** establishes at least 1 CMO list for upward and downward bids

- Last BE GCT
- TSO Energy bid submission GCT
- >= max FAT of activation BE bid?
- Real time

**Update of RR BE bids no longer permitted**

**Update of mFRR BE bids no longer permitted**

**ISP**

**GCT**
ACER’s expectations delivered through its Reasoned opinion on the Network Code (March 2014)

Integration of balancing markets is a very challenging goal (difficulties in drafting the FG and NC, scarce experience). The NC must therefore define a new standard.

MAIN PRINCIPLES

1. Reduce balancing needs with adequate incentives on BRPs
2. Efficient balancing actions to be performed by TSOs
3. Foster competition between BSPs
**ACER’s expectations**
Where do we start?

- Integration of balancing markets is a very challenging goal (difficulties in drafting the FG and NC, scarce experience). The NC must therefore **define a new standard**.

**FIRST STEPS**

- Proposals for Standard Products and pricing methodology
- Activation purposes of Balancing Energy bids from the CMO Lists
- High-level principles for the different algorithms and optimisation processes
- Early definition and configuration of the first CoBAs and their interaction with the Pilot Projects.
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The need to **develop balancing projects**

- In spite of some past and on-going initiatives (CMO for Manual Reserves in the Nordic region, limited exchanges of surpluses between some MS, or extension of imbalance netting process...)

- **Few initiatives have emerged so far** to develop cross-border balancing, with a relatively limited geographical scope and low coordination to ensure compatibility of different practices...

- ...providing **very limited experience** on the integration of electricity balancing markets.

With the on-going market integration process involving timeframes prior to balancing timeframe (e.g. day ahead and intraday), implementation of cross-border balancing markets constitutes a necessary next step.
Objectives of the Pilot Projects

- ACER initially requested ENTSO-E to **promote coordination between TSOs** regarding cross-border balancing mechanisms as a necessary step towards the integration of balancing markets in the EU.

- ENTSO-E launched **pilot projects** with the aim to:
  - Gain bottom-up experience in terms of implementation of inter TSO regional balancing mechanisms;
  - Acquire experience about product definitions and pricing mechanisms;
  - Analyse governance issues (roles and responsibilities);
  - Test and enhance the balancing target model identified in the Framework Guidelines.
Overview of the Pilot Projects

**FCR**: Frequency Containment Reserves
**FRR**: Frequency Replacement Reserves
### Focus on RR Pilot Project

The TERRE initiative

**Replacement Reserves**

<table>
<thead>
<tr>
<th>WHAT?</th>
<th>Design and test the feasibility of a multi-TSO coordinated cross-border exchange of Balancing Energy from RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO?</td>
<td>Terna, RTE, National Grid, National Grid Interconnectors Limited, REN, Swissgrid, REE and ADMIE.</td>
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</tbody>
</table>
| HOW? | Design phase (started in 2014) – H1 2015  
Implementation phase – *possibly beginning in Q1 2016* |
| STATUS? | Design ongoing for:  
- Definition of standard products  
- Matching process: algorithm process and quantitative simulations |
## What potential savings? The TERRE project

<table>
<thead>
<tr>
<th>MODEL</th>
<th>EXAMPLE</th>
<th>POTENTIAL</th>
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<tr>
<td><strong>BSP-TSO</strong></td>
<td>Swiss BSPs bidding in the French balancing market</td>
<td>&lt; €10 M / year</td>
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<td><em>Source: CRE</em></td>
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<td><strong>TSO-TSO without CMO</strong></td>
<td>BALIT mechanism between RTE and National Grid</td>
<td>approx. €10-20 M / year</td>
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<td><em>Source: CRE</em></td>
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<tr>
<td><strong>TSO-TSO with CMO</strong></td>
<td>Coordination between 4 Nordic TSOs</td>
<td>approx. €200 M / year</td>
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<td><em>Source: EC</em></td>
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<td><strong>TERRE PROJECT</strong></td>
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Thank you for your attention!
The process to elaborate the **NC Electricity Balancing**

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<td><strong>EC</strong></td>
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<td>Official request</td>
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<td><strong>ENTSO-E</strong></td>
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<td>Drafting of NCEB</td>
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<td><strong>Stakeholders</strong></td>
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<td>Public Consultation</td>
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<td><strong>Member states</strong></td>
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<td>Comitology process: adoption of the text (qualified majority)</td>
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**ACER**
- Publishing the Framework Guidelines
- **ACER** Reasoned Opinion (consistency with FGEB)
- **ACER** recommendation
- Approving the NCEB
- **ACER** recommendation

**ACER Drafting**
- NCEB ACER Reasoned Opinion
- NCEB ACER recommendation

**September 2012**
- **ACER**
Annex: FG roadmap for the integration of balancing markets

**Year 1**
- **Target:** Replacement reserve
- **Model:** TSO – TSO with CMO
- **Flexibility:** Geographical scope & Unshared bids

**Year 2**
- **Target:** Automatic Frequency restoration reserve
- **Model:** Imbalance netting
- **Flexibility:** When economically efficient

**Year 3**
- **Target:** Manual Frequency restoration reserve & Replacement reserve
- **Model:** TSO – TSO with CMO
- **Flexibility:** Geographical scope & Unshared bids

**Year 4**
- **Target:** Automatic Frequency restoration reserve
- **Model:** Coordination between TSOs to optimise activations
- **Flexibility:** When economically efficient

**Year 5**
- **Target:** Manual Frequency restoration reserve & Replacement reserve
- **Model:** European wide TSO – TSO with CMO
- **Flexibility:** Geographical scope & Unshared bids

**Year 6**
- **Target:** Automatic Frequency restoration reserve
- **Model:** Target model
- **Flexibility:** Unless otherwise decided by ACER or all NRAs

**Transition period to meet NC standards and requirements**
(duration to be determined after PC, maximum 2 years)

**Publication of the Network Code in the Official Journal of the European Commission**

**Annual reports from ENTSO-E**
(progress on integration)
A flexible merging process

Cooperation

TSO 1

TSO 2

TSO 3

TSO 4

TSO 5

TSO 6

TSO 7

CoBA

CoBA

CoBA

Wider cooperation

Merging process

One single EU CoBA

(All types of products concerned, per type of process)

e.g. manual reserves

e.g. automatic reserves

form
ACER’s proposal for COBA governance

**AESAG (chair: ACER)**
Scope: High level update on the development of projects
Participants: ACER, ENTSO-E, Stakeholders
Meetings: 4 per year

**Balancing Expert Group (BEG, chair: ENTSO-E/ACER)**
Scope: Target Model design (chair ACER) and inter-CoBA issues (chair ENTSO-E)
Participants: ACER, ENTSO-E, Stakeholders
Meetings: 4 per year

**CoBA Stakeholder Group (CSG, Chair: lead NRA & TSO)**
Scope: Information and exchanges on key arrangements of the Project
Participants: NRAs, TSOs, Stakeholders
Meetings: 3 per year (can be set back-to-back with IG meetings every other time)

**CoBA Implementation Group (CIG, Chair: lead NRA)**
Scope: Decisions on key arrangements of the Project; roadmap monitoring
Participants: NRAs, TSOs
Meetings: 4-6 per year

**CoBA National Workshop (CNW, Chair: TSO)**
Scope: Information and focus on impact on national regimes
Participants: TSO, NRA, stakeholders
Meetings: 3 per year
1. Reduce balancing needs with adequate incentives on BRPs

- Only imbalances remaining after intraday to be balanced by TSOs;

- Adequate and timely information to BRPs for them to be balanced or help the power system to be balanced;

- Implementation of Imbalance netting - when efficient - by all TSOs.
2. Efficient balancing actions to be performed by TSOs

- Clear **common principles for activation** and commitment to optimise the use of different processes;

- Necessary harmonisation of relevant requirements to ensure efficient **balancing exchanges between self & central dispatch systems.**
3. Foster competition between BSPs

- Guarantee a **higher standardisation** of products, CMOs and GCTs;

- Adapt some arrangements to **facilitate participation of demand flexibility & intermittent generation**;

- Stepwise implementation of a **common pricing method** (pay-as-cleared based);

- Transparent and detailed common principles for the establishment of the methodologies and the terms and conditions.