Market Coupling: A Case Study on CZ-SK-HU Market Coupling Project

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AGENDA

Introduction
- Market coupling essentials
- Regional context

CZ-SK-HU market coupling project
- Basic information
- Workings of CZ-SK-HU MC
- Project experience

Lessons learned
- Operational data
- Future developments

Conclusions
Market Coupling in a nutshell - Why market coupling?

- With explicit allocation transmission capacity is not utilized optimally
- Market coupling simultaneously solves the market for electrical power and allocates available cross-border capacities => capacity is fully utilized
  - Adverse flows are eliminated by definition => closer-to-optimal dispatch
  - The extent of this is measured by price convergence, i.e. when prices in several markets are identical
- Day-ahead cross-border trade only possible through PXs => more transparency and liquidity (due to higher volumes)
- Coupled PXs pool liquidity to the extend that cross-border capacity is better utilized => less price volatility and more reliable price formation

Background – Capacity Allocation Region

- CZ, SK, and HU are part of CEE capacity allocation region as set out in regulation 714/2009
- CEE region further comprises Germany, Poland, Austria, and Slovenia
- CEE was supposed to develop a flow-based (FB) capacity calculation method to be used for explicit allocation – implicit allocation to be implemented later
  - FB is fully coordinated method that allows for better utilization of existing transmission infrastructure
- CEE FB has seen slow progress and faced many problematic issues (AT-DE bidding zone, Loop flow, Pre-congestion)
- CZ, SK, and HU were the only countries in CEE not coupled elsewhere
  - Austria – one bidding zone with Germany, Germany – CWE MC, Slovenia – MC with Italy, Poland – coupled with Sweden (SwePol link)
- Experience from other member states (CWE, Scandinavia) proved benefits of MC (implicit allocation) => There was a strong desire (bottom-up) to bypass the deadlock situation with FB and bring benefits to the market
CZ-SK-HU MC – The Beginning

- CZ-SK MC – was launched in Sep 2009
- CZ-SK-HU MC constituted a significant change to CZ-SK MC as it was conceived with view to moving closer to the European Target Model
  - CZ-SK-HU MC was designed so as to join the European pilot project – PCR/NWE, as soon as possible

Important milestones
- MoU signed in May 2011
  - Original planning envisaged Go Live in Summer 2012
- Go Live on 11 Sep 2012
  - Only slight delay against the original planning

Market coupling and roles of the various actors*

<table>
<thead>
<tr>
<th>TSOs</th>
<th>NRAs</th>
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<tbody>
<tr>
<td>- Obliged to optimally allocate transmission capacity</td>
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<tr>
<td>- Risk of lower congestion rents</td>
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<tr>
<td>- Higher interconnector utilization =&gt; more operational challenge</td>
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<tr>
<td>Enforce optimal capacity allocation</td>
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<tr>
<td>Must ensure that congestion rent maximization is not a driver</td>
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<tr>
<td>- Obliged to promote market integration</td>
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<tr>
<td>- Understand the economic rationale</td>
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<td>- Approve cost recovery</td>
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<table>
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<tr>
<th>PXs</th>
<th>Ministries</th>
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<tbody>
<tr>
<td>- Potential to create more stable and liquid markets =&gt; more attractive for market participants</td>
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<tr>
<td>- Potential for higher revenues</td>
<td></td>
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<tr>
<td>Have political goal to achieve full market integration by 2014</td>
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<tr>
<td>Often have shareholder rights in TSOs</td>
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*) at least in theory
1) TSOs calculate available transmission capacity which is then submitted to MCF and published for market participants

2) PXs accept bids and offers from their local market participants and submit anonymized aggregated curves to MCF

3) MCF runs matching algorithm and returns prices and net positions for each market => market results announced to market participants

4) Cross-border flows are shipped from PX to PX and resulting congestion revenue is distributed; nomination and scheduling is carried out by TSOs
Market coupling in detail – MCF and capacity calculation

**Capacity calculation**
- Pre-coupling function
- TSOs responsible for this function
- With serial setting of countries (they form a line) NTC capacity calculation was the pragmatic option – one value per border

**Market coupling function**
- PXs responsible for this function
- Strong regulatory preference for a European market coupling solution with a view to facilitating joining the integration core
  - The solution to be used in the pilot project – PCR/NWE was therefore selected for market coupling function

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Market coupling in detail – Shipping, congestion revenue, and nominations

- Post-coupling functions
- TSOs responsible for these functions

**Energy shipping**
- Transporting electricity from cheaper PXs to more expensive PXs – buy on cheaper PX and sell on more expensive
  - Shipper earns congestion rent – price difference x volume
  - Shipper has to perform nominations of cross-border exchanges \( \rightarrow \) for scheduling purposes
  - Shipper doesn’t perform trading per se, so it is a technical function within the market coupling process

- A number of shipping arrangements possible
- TSOs acting as shipping agents was chosen at last \( \rightarrow \) TSOs do not trade in electricity, that it prohibited
Project structure

Governance
- The project is led by the Steering Committee (SC) as the decision-making body – consensual decision-making.
- Most work was done by the PXs and TSOs in their respective working groups as they possess the necessary expertise.
- The Governance Working Group tackled higher-level issues and topics with both PX and TSO elements. It also prepared documents for decisions by the SC.
- A light-handed approach was followed – most technical issues were left for the PXs and TSOs to resolve.
- Only where project parties were unable to reach an agreement, regulators had to make decisions to unlock the situation.
- Most participation was informal and went beyond the powers conferred by directive 2009/72/ES (art. 36).
- Overall, regulators' decisions were followed and helped the project move forward.

Regulators
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CZ-SK-HU MC’s performance – price convergence

- Graph to the right displays level of price convergence in 2012 after MC Go Live, clearly the level for CZ-SK is exceptionally high yet CZ-SK-HU price convergence is still very high too – over 76%.
- This graph shows how price convergence between the SK and HU markets skyrocketed from virtually 0% to over 77% after the launch of MC.
- Average price difference between HU and SK went down from 10.88 Eur/MWh to 3.54 Eur/MWh.

Price convergence SK-HU in 2012

Price convergence monthly averages

Graph to the right displays level of price convergence in 2012 after MC Go Live, clearly the level for CZ-SK is exceptionally high yet CZ-SK-HU price convergence is still very high too – over 76%.
CZ-SK-HU MC’s performance – price volatility

Above graph shows that rather high price volatility of HU market (σ = 26,49 Eur/MWh) went down after the launch of MC (σ = 18,48 Eur/MWh)

Future developments

- CZ-SK-HU MC proved a successful project
- Project to extent to PL and RO
  - MoU signed 11 July 2013 with tentative planning to go live end 2013 to early 2014
- The extension project is managed so that it doesn’t delay regional and pan-European coupling
- CEE region decided to implement flow-base capacity calculation and market coupling in a single step
  - Thanks to its design CZ-SK-HU MC is ready to quickly become part of a regional and pan-European market coupling
  - Issues related to capacity calculation need to be resolved first
Conclusions

• Voluntary participation (bottom-up) approach is good
  • A MC project is likely to take at least one year to materialize
    – Communication towards stakeholders should be very careful in order not to lose credibility by constant postponing
  • CZ-SK-HU MC has proven the main benefits of MC (implicit allocation)
    – Better utilization of interconnectors (elimination of adverse flows) => more economic dispatch – confirmed by high levels of price convergence
    – Less market volatility

• Suppliers can better optimize their portfolio serving the interest of end-users
• Successful projects are attractive – Poland and Romania want to join
  – Project architecture can be extended to other marketplaces
• Continuous regulatory support and monitoring help the project partners keep going
  – Direct participation of regulators is necessary only when project parties run into a deadlock, otherwise light-handed approach is preferable
• Different rules for tendering (minimum limit) proved to be a hot spot as far as cross-border nature of the project

Thank you for your attention!
References and Recommended Reading

- ACER/CEER (2012): Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2011
**List of abbreviations**

- PX – power exchange
- TSO – transmission system operator
- NRA – national regulatory authority
- MC – market coupling
- NTC – net transfer capacity
- FB – flow-based capacity calculation
- MCF – market coupling function
- PCR – price coupling of regions
- MoU memorandum of understanding
- CZ – Czech Republic
- HU – Hungary
- SK – Slovakia
- AT – Austria
- DE – Germany
- SI – Slovenia
- PL – Poland
- RO - Romania
- CWE – Central Western Europe
- NE – Northern Europe
- CEE – Central Eastern Europe
- NWE – North-west Europe

**Background – EU Internal Energy Market in Electricity**

- 2014 as a goal for EU electricity market integration
- Implicit allocation via market coupling chosen as **Target Model** for day-ahead market => **European Price Coupling (EPC)** which simultaneously determines volumes and prices in all coupled zones, based on the marginal pricing principle

**Pilot project – PCR/NWE**

- **Price Coupling of Regions** (PCR) which entails mainly development of IT solutions by PXs
- Capacity allocation by TSOs from CWE, NE, and France-UK-Ireland capacity allocation regions => **North West Europe (NWE)**
Market coupling in detail – Shipping options

- Direct shipping by PXs – cheaper PXs purchases its surplus electricity and sells it to the expensive PX which then sells it to its market participants.
- Decentralized arrangements – one entity buys in cheaper zone, transfers electricity to another entity which sell in more expensive zone.
  - CZ-SK-HU MC performed by TSOs
- Central entity – one entity is the buyer and seller of surplus/deficit electricity for all PXs.

Market coupling in detail – other practical issues

- **Harmonization**
  - Price limits => preferably high (effectively no price limit) for both positive and negative values (to reflect RES influence)
  - Gate closure times => local market participants can have preferences for particular times – link to other markets (esp. DE market)
  - Rounding, settlement and matching rules, etc. – technical issues for matching algorithm to run smoothly
- **Fall back procedures** for contingencies – in case implicit allocation cannot be performed
  - Shadow auction => explicit allocation
  - Clearing is done locally
  - Back-up market coupling between CZ and SK
  - So far extremely rare