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# 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**



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## Market Coupling in a nut shell - Why market coupling?

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- 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 extent that cross-border capacity is better utilized => less price volatility and more reliable price formation




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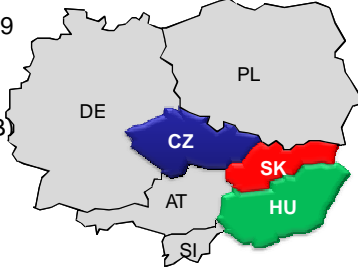



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## Background – Capacity Allocation Region

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- 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







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## CZ-SK-HU MC – The Beginning

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- 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



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## Market coupling and roles of the various actors\*

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<p style="text-align: center;"><b><u>TSOs</u></b></p> <ul style="list-style-type: none"> <li>• Obligated to optimally allocate transmission capacity</li> <li>• Risk of lower congestion rents</li> <li>• Higher interconnector utilization =&gt; more operational challenge</li> </ul>	<p style="text-align: center;"><b><u>NRAs</u></b></p> <ul style="list-style-type: none"> <li>• Enforce optimal capacity allocation</li> <li>• Must ensure that congestion rent maximization is not a driver</li> <li>• Obligated to promote market integration</li> <li>• Understand the economic rationale</li> <li>• Approve cost recovery</li> </ul>
<p style="text-align: center;"><b><u>PXs</u></b></p> <ul style="list-style-type: none"> <li>• Potential to create more stable and liquid markets =&gt; more attractive for market participants</li> <li>• Potential for higher revenues</li> </ul>	<p style="text-align: center;"><b><u>Ministries</u></b></p> <ul style="list-style-type: none"> <li>• Have political goal to achieve full market integration by 2014</li> <li>• Often have shareholder rights in TSOs</li> </ul>

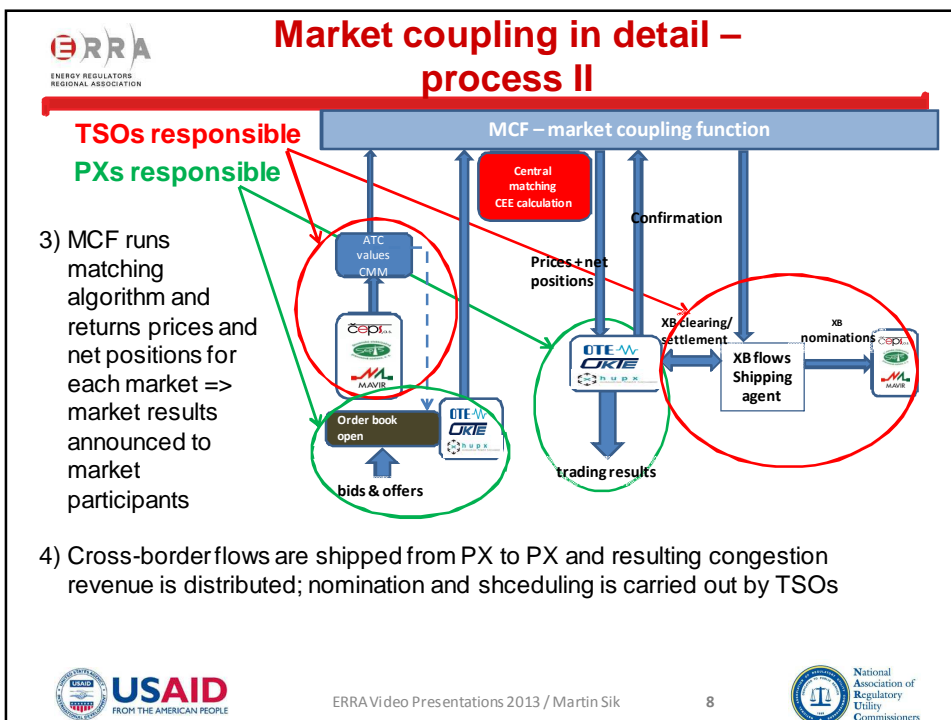
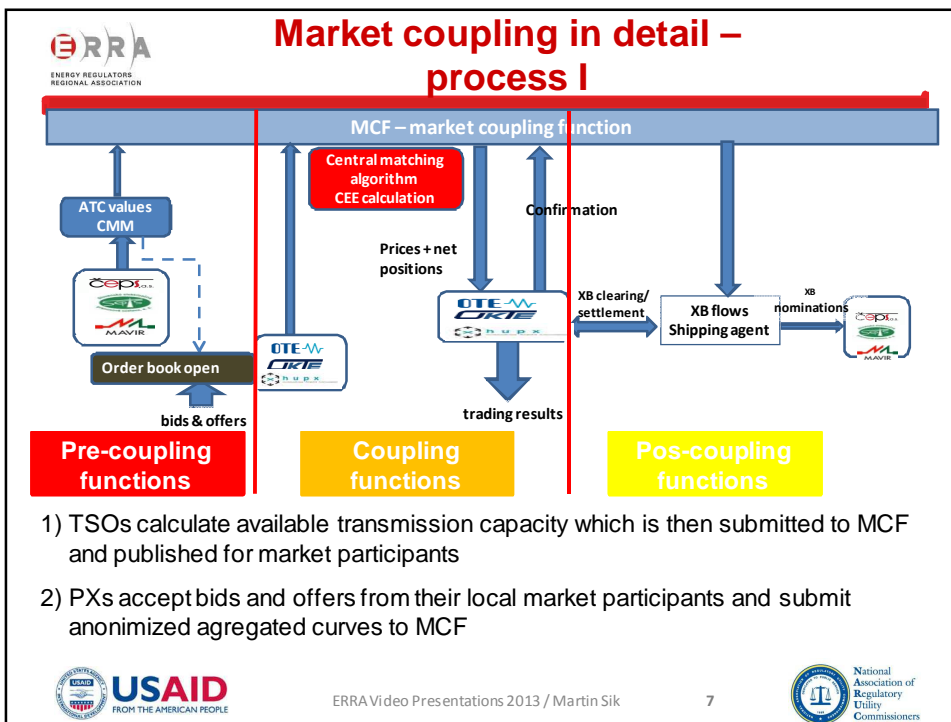
\*) at least in theory




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## Market coupling in detail – MCF and capacity calculation

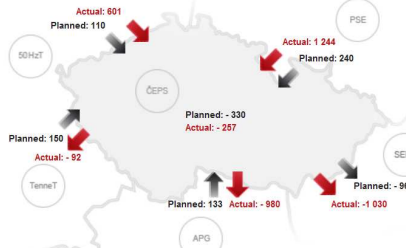
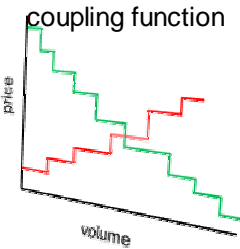
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### Capacity calculation

- 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

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- 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 => for scheduling purposes
  - Shipper doesn't perform trading per se, it is a technical function within the market coupling process

Shipping agent „A“

PX „A“

Country A


↔

Shipping agent „B“

PX „B“


Country B


- A number of shipping arrangements possible
- TSOs acting as shipping agents was chosen at last => TSOs do not trade in electricity, that it prohibited



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## Project structure

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Steering Committee

Governance WG

TSO WG


PX WG

**Regulators**

- Light-handed approach was followed – most technical issues were left for PXs and TSOs to resolve
- Only where project parties were unable to reach an agreement, regulators had to make decisions in order 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

**Governance**


- The project is lead by Steering committee (SC) as 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
- Governance working group tackled higher level issues and topics with both PX and TSO elements, it also prepared documents for decisions by SC




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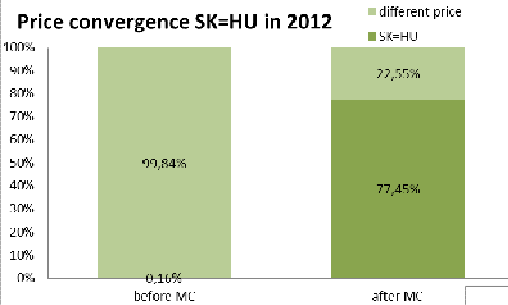


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## CZ-SK-HU MC's performance – price convergence

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**Price convergence SK=HU in 2012**

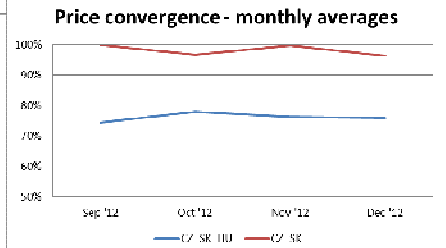



Category	Percentage
different price (before MC)	99.84%
SK=HU (before MC)	0.16%
different price (after MC)	77.45%
SK=HU (after MC)	22.55%

- 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

➤ 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%

**Price convergence - monthly averages**






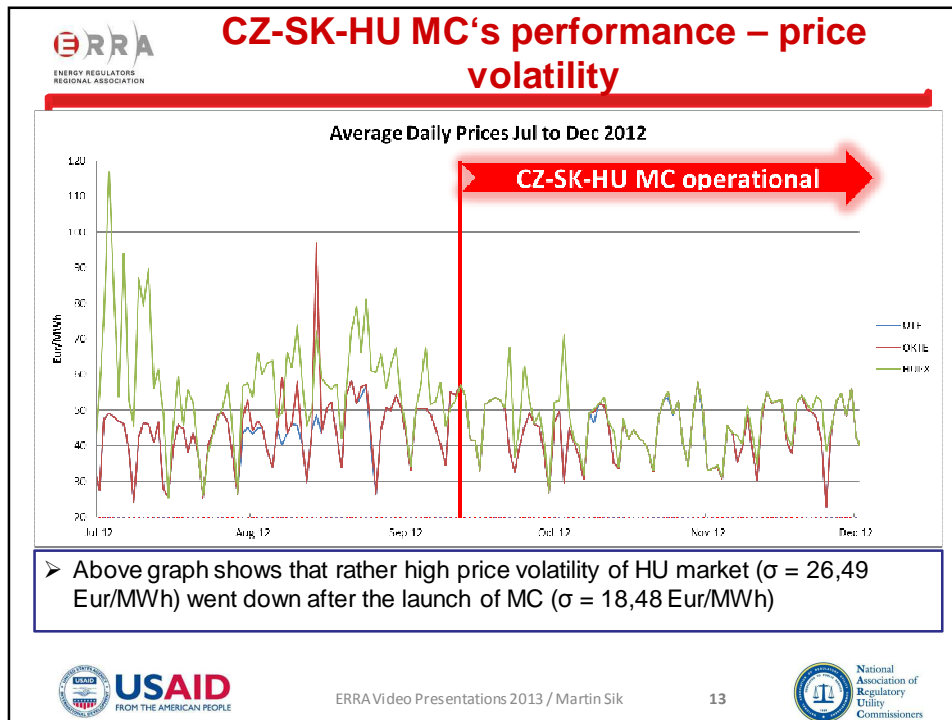
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## Future developments


- 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

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## Conclusions


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- 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



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# Thank you for your attention!




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# BACKUP SLIDES

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## References and Recommended Reading


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- [ACER/CEER \(2012\); Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2011](#)
- [Supponen M. \(2011\); Influence of National and Company Interests on European Electricity Transmission Investments](#)
- [EC \(2004\): Analysis of Cross-Border Congestion Management Methods for the EU Internal Electricity Market](#)
- [ETSO/EuroPEX \(2004\): Flow-based Market Coupling](#)
- [Krause T. \(2005\): Congestion Management in Liberalized Electricity Markets – Theoretical Concepts and International Application](#)
- [Ehrenmann A. and Smeers Y. \(2004\): Inefficiencies in European Congestion Management Proposals](#)

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## List of abbreviations

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- 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




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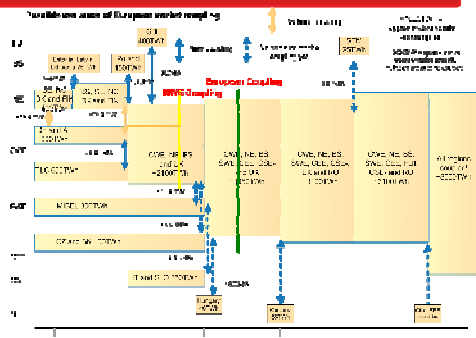


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## Background – EU Internal Energy Market in Electricity


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- 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)**



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### Market coupling in detail – Shipping options

The diagram illustrates three shipping options between Country A and Country B:

- Option 1 (Direct shipping):** Shows two boxes, 'Country A' and 'Country B'. Inside 'Country A' is a red box labeled 'PX „A“'. Inside 'Country B' is a red box labeled 'PX „B“'. A double-headed grey arrow connects the two PX boxes.
- Option 2 (Decentralized arrangements):** Shows two boxes, 'Country A' and 'Country B'. Inside 'Country A' are a green box 'Shipping agent „A“' and a red box 'PX „A“'. Inside 'Country B' are a green box 'Shipping agent „B“' and a red box 'PX „B“'. Double-headed grey arrows connect the shipping agents, and single-headed grey arrows connect each shipping agent to its respective PX.
- Option 3 (Central entity):** Shows two boxes, 'Country A' and 'Country B'. Inside 'Country A' is a red box 'PX „A“'. Inside 'Country B' is a red box 'PX „B“'. A blue box labeled 'Central shipping agent' is positioned below the two countries, with double-headed grey arrows connecting it to both PX boxes.

- 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

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### 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

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