Flow-Based Market Coupling
First lessons
TSOs in Central Western Europe have set a new benchmark
Market integration 2010 > 2014

Extension of the geographic area for market DA allocation
A long road to Flow Based ....

Memorandum of Understanding 6 June 2007 (PLEF)

- Set as an objective the analysis, design and implementation of a flow based market coupling between the five countries of the CWE region with January 2009 as a target date...

- The first Flow Based Market Coupling for the CWE region took place the 20\textsuperscript{th} of May 2015 (delivery date 21\textsuperscript{st} of June)
CWE Trading Region

*Germany, Luxembourg and Austria are the same bidding zone.*
Simulations in 2014 compared the previous ATC-method and the new Flow-Based method electricity prices (€/MWh) and the spread between countries. On average, a decrease in prices and spread has been observed.
FLOW-BASED METHODOLOGY
For FB allocation, every import/export bid must be translated in a physical flow on the electrical branches.
CWE FB CAPACITY CALCULATION METHOD

For the allocation, each import/export bid must be translated in physical flows on electrical branches.

Individual bid

+100 MW

Impact on Nodes using GSK (Generation Shift Keys)

Impact on Flows, using D2CF and DC load flow

Impact on each Critical Branch

The “PTDF matrix” gives the impact of a change of import/export of each hub on each CB.
# FB CAPACITY DOMAIN

<table>
<thead>
<tr>
<th>ID</th>
<th>BE-hub</th>
<th>DE-hub</th>
<th>FR-hub</th>
<th>NL-hub</th>
<th>RAM (MW)</th>
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</thead>
<tbody>
<tr>
<td>CB1</td>
<td>0.0084</td>
<td>0.0710</td>
<td>0.0344</td>
<td>0.2252</td>
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<td>0.0964</td>
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<td>0.3201</td>
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<td>-0.3201</td>
<td>-0.1387</td>
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The diagram illustrates the constraints and active constraints for the security of supply domain.
FB MARKET COUPLING RESULTS
Market results

Flow-Based behaved as expected:

- Increased trades in the most valuable directions
- Increased price convergence (significant reduction of the price spreads)
- Significant reduction of the spreads

The current variant is “FBI” (Intuitive) but CWE parties are continuously monitoring the comparison between FB and FBI results to assess if the patch still performs as expected.

Following graphs are based on hourly data from 21st of May to 31st of October.
Full CWE Price Convergence (per week)
Maximum CWE Price Spreads

Max CWE price spread = difference between the highest and lowest CWE price
CWE Cross Border Spreads

**BE-FR**

**BE-NL**

**DE/AT/LUX-FR**

**DE/AT/LUX-NL**
Net positions (DA only)
Net positions (DA + LT)

FB go-live

[CWE DA+LT] Net positions

Export

Import

01. avr. 08. avr. 15. avr. 22. avr. 29. avr. 06. mai 13. mai 20. mai 27. mai 03. juin 10. juin 17. juin 24. juin 01. juil. 08. juil. 15. juil. 22. juil. 29. juil. 05. aout 12. aout 19. aout 26. aout 02. sept. 09. sept. 16. sept. 23. sept. 30. sept. 07. oct. 14. oct. 21. oct. 28. oct.

Net positions (DA + LT)

NL
FR
DE/AT/LUX
BE
First Operational Feedback and next steps
Summary of first months

As foreseen, the price convergence in CWE has significantly increased since the go-live.

As foreseen, physical flows induced by market exchanges are better forecasted with Flow-Based Market Coupling, however, physical flows are more variable/volatile and are regularly loading the grid elements closer to their limits.

Net positions are different that what was observed with ATC MC:

- NL imports more;
- DE exports more;
- FR can export more;
- BE can import more.

Please remind that with Flow-Based, capacity is not allocated per border anymore => only the net positions have a physical sense. The commercial flows (“bilateral exchanges”) have no physical meaning and should not be used as a reference.
Next steps within CWE

- Continuous dialogue with stakeholders (CWE Consultative Group meetings)
- Implement the actions listed in NRAs approval decisions
- APG Integration (new Austrian GSK used since December 4th)
- Implement FTRs on Belgian borders
- Interconnector BeDeLux project
Many thanks for your attention!

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