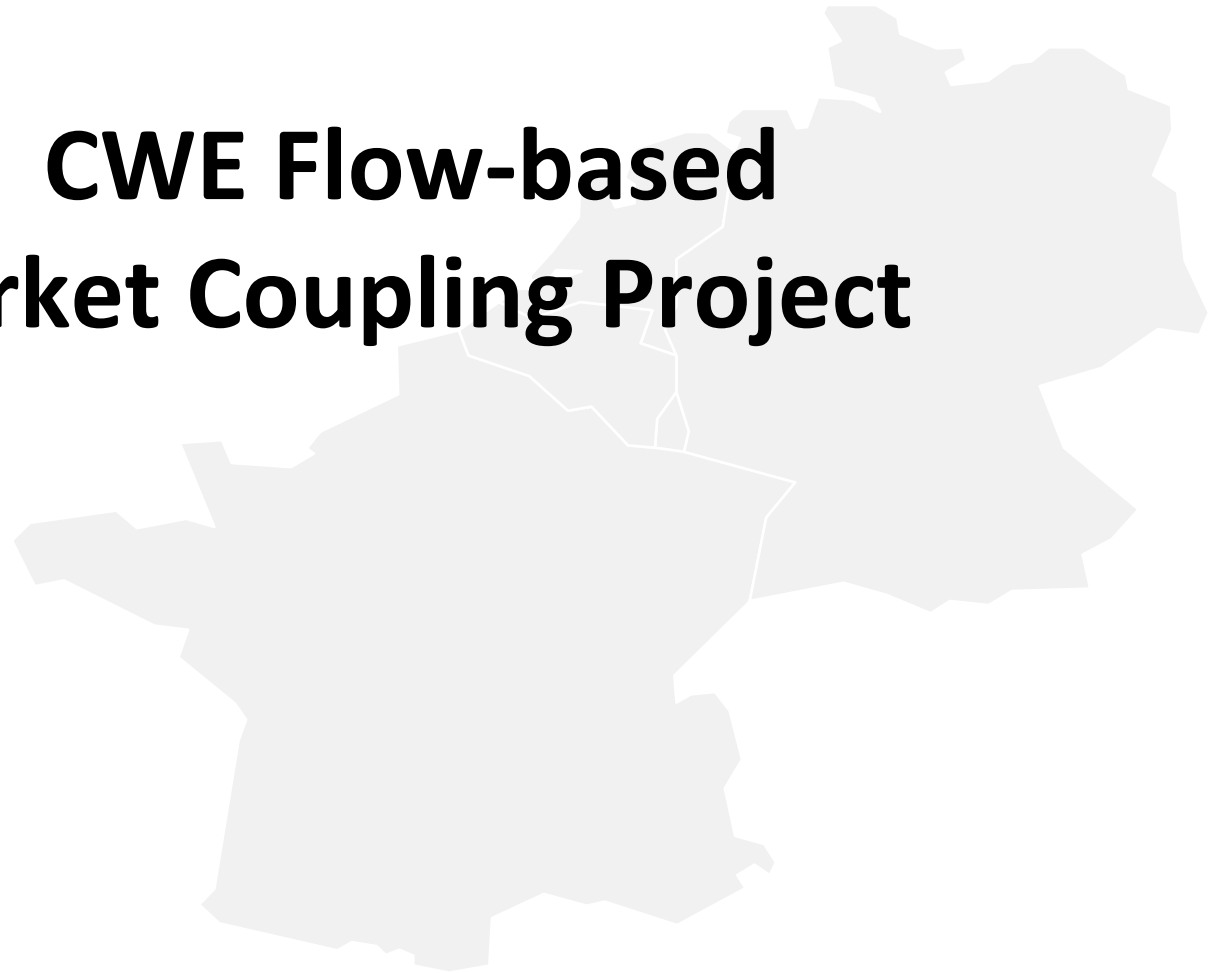




CWE Flow-based Market Coupling Project

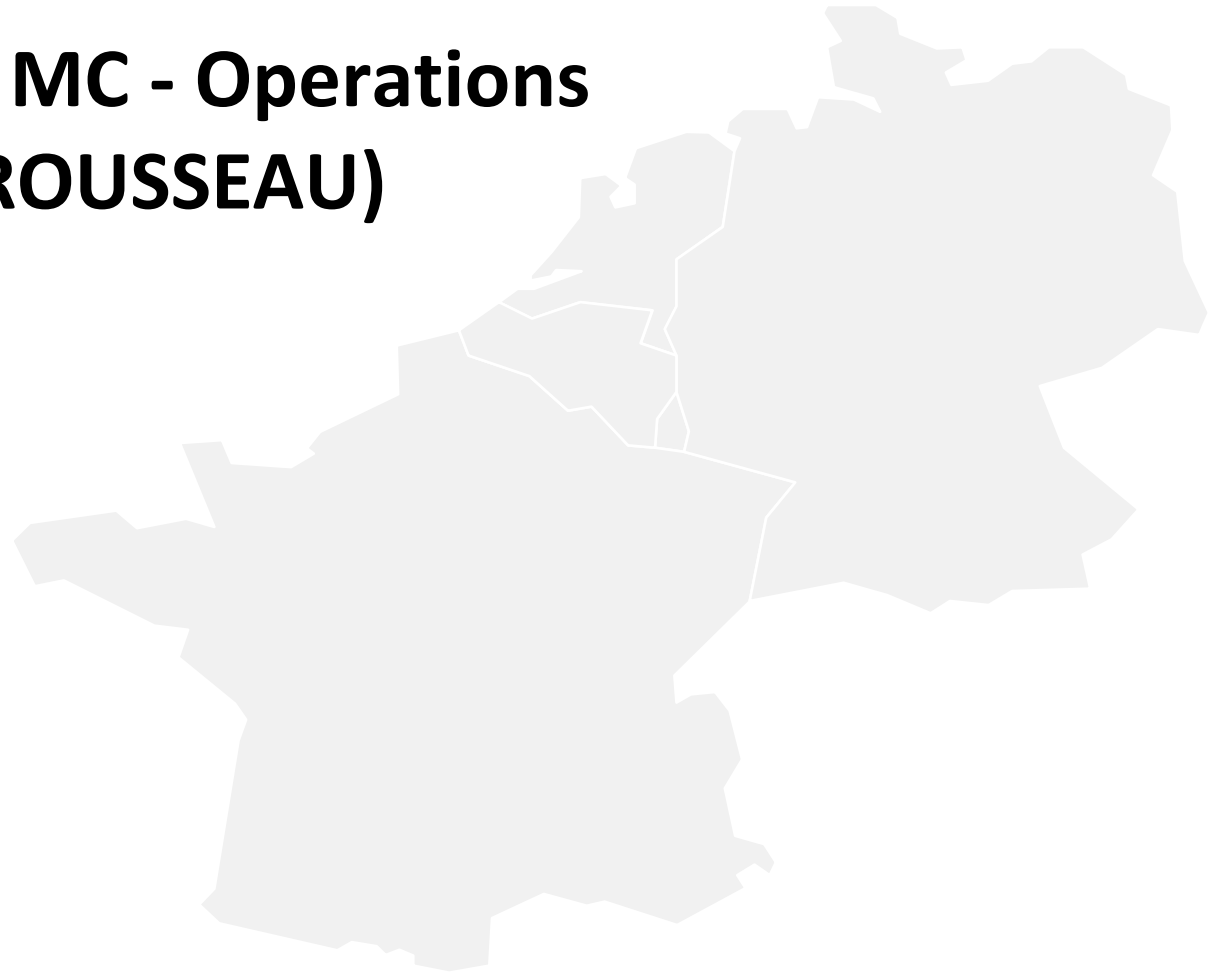


Agenda

- ▶ ATC CWE MC – Operations
- ▶ CWE FB MC – Project
- ▶ FB implementation status
- ▶ FB theoretical basics
- ▶ Market communication during the external parallel run



ATC CWE MC - Operations (R.ROUSSEAU)



ATC CWE MC - Operations

New common CWE website



- ▶ CWE Project launched a new **common website** where actual flow data and prices as well as ATC data are available on a daily basis:

- You can visit this website at the following address:
<https://www.europeanpricecoupling.eu/>

CWE CENTRAL WESTERN EUROPE MARKET COUPLING

AMPRION APX-ENDEX BELPEX CREOS ELIA EPEX SPOT RTE TENNET TRANSNET BW

CWE MARKET COUPLING

On 9 November 2010 the Central Western Europe Market Coupling (CWE) was launched. CWE is a cooperation of Transmission System Operators (TSOs) and power exchanges (PXs) coupling the Belgian, Dutch, French and German electricity markets. Market coupling provides for the implicit cross-border capacity allocation and matching of orders of the involved PXs, resulting in the optimal allocation of available day ahead cross-border capacity and price convergence between day ahead wholesale electricity markets across this region. On this website the results of the most recent market coupling are published each day. Historical price data is available on the websites of the individual PXs. This website is an initiative of the CWE PXs.

LATEST ANNOUNCEMENTS

No latest announcements.

HOURL	BE	DE	FR	NL
1	45.55	45.55	45.55	69.50
2	45.20	40.54	40.54	45.20
3	45.00	37.09	37.10	45.00
4	40.00	36.16	36.16	40.00
5	37.25	37.25	37.25	37.25
6	37.06	37.06	37.06	37.06
7	40.01	40.01	40.01	40.01
8	44.60	44.60	44.60	44.60
9	48.40	48.40	48.40	48.40
10	54.35	54.35	54.35	54.96
11	53.76	53.76	53.76	67.63

HOURL	↔ NL - BE	↔ DE - NL	↔ FR - DE	↔ FR - BE
1	↔ 1305.0/n/a	↔ 2329.0/n/a	↔ 2580.0/n/a	↔ 2428.0/n/a
2	↔ 1250.2/n/a	↔ 2329.0/n/a	↔ 2318.0/n/a	↔ 2510.0/n/a
3	↔ 809.1/n/a	↔ 2329.0/n/a	↔ 637.0/n/a	↔ 2510.0/n/a
4	↔ 777.1/n/a	↔ 2329.0/n/a	↔ 824.0/n/a	↔ 2510.0/n/a
5	↔ 766.5/n/a	↔ 2298.0/n/a	↔ 911.0/n/a	↔ 2443.0/n/a
6	↔ 810.7/n/a	↔ 2132.8/n/a	↔ 775.0/n/a	↔ 2097.0/n/a
7	↔ 965.5/n/a	↔ 2257.4/n/a	↔ 442.0/n/a	↔ 1735.0/n/a
8	↔ 1203.4/n/a	↔ 2312.0/n/a	↔ 705.0/n/a	↔ 1813.0/n/a
9	↔ 1275.7/n/a	↔ 2229.2/n/a	↔ 1161.0/n/a	↔ 2114.0/n/a
10	↔ 1305.0/n/a	↔ 2329.0/n/a	↔ 355.0/n/a	↔ 2279.0/n/a
11	↔ 1305.0/n/a	↔ 2329.0/n/a	↔ 1012.0/n/a	↔ 2238.0/n/a

Logos: amprion, apxendex, BELPEX, creos, elia, EPEX SPOT, RTE, tennet, TRANSNET BW

ATC CWE MC - Operations

Long Clock Change (LCC)



- ▶ The functioning of Long Clock Change within the different systems has been changed:

2011

- Due to different market rules and some technical constraints, ATC values for hours 3a and 3b had to be set to zero on hub borders (FR-DE, FR-BE, DE-NL)
- For EPEX SPOT, participants had to submit the same order for the hours 3a and 3b
- For APX and Belpex, participants had to submit orders for 25 hours instead of 24



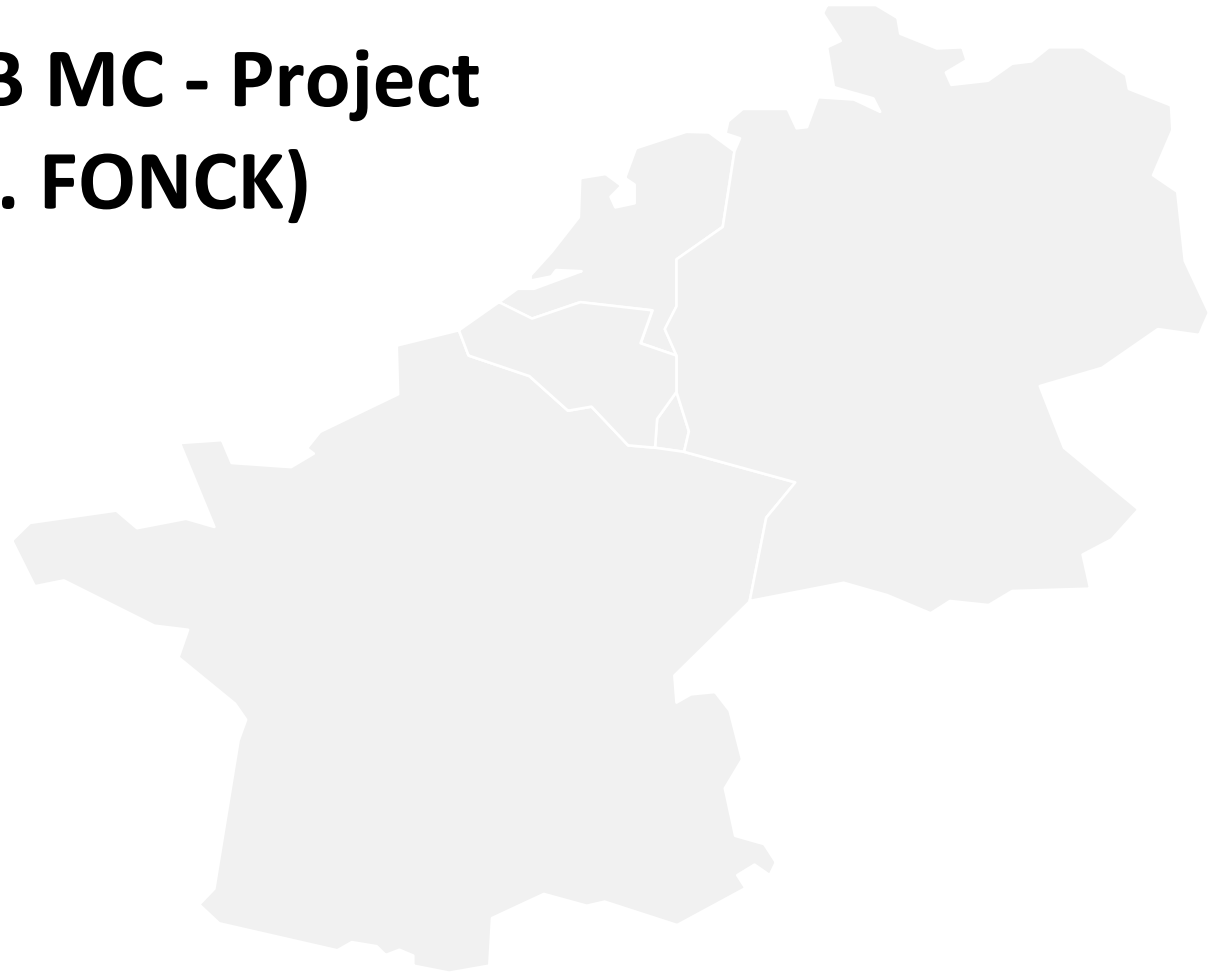
2012

- Today both exchanges have the same market rules regarding LCC
- As a consequence, 25 hours ATC will be published and all participants will submit 25 hours order books
- Please note that for Nordic countries (included in ITVC coupling) the rule does not change this year and only 24 hours bidding will be possible (hour 3A and 3B are doubled automatically). EMCC was updated to accommodate both rules

- ▶ **Satisfying tests** to simulate the dealing with 25 hours were organized:

- LCC day and the day after were tested
- Tests run smoothly

CWE FB MC - Project (P. FONCK)

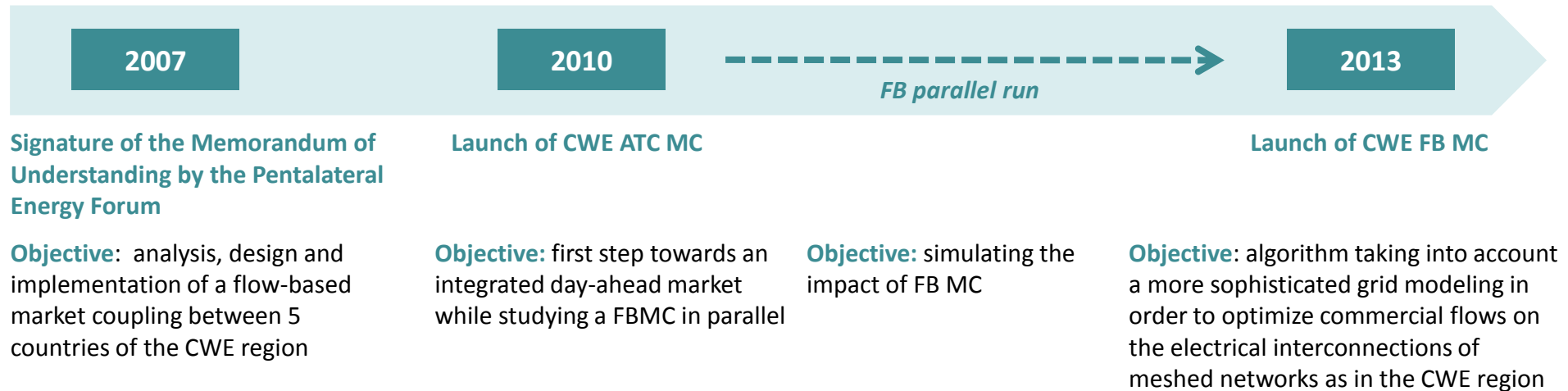


CWE FB MC - Project Context



► CWE-Region roadmap and objectives:

- Harmonization and improvement of long-term explicit auction rules
- Implementation of a day-ahead Flow Based market coupling
- Implementation of harmonized continuous cross-border intraday trade
- Maximization of the amount and the utilization of cross-border capacities
- Increase of market Transparency
- Guarantee regarding Security of Supply (SoS)



- **Objective:** A CWE FB MC providing more trading opportunities for the market and maximizing the CWE Day-Ahead market

CWE FB MC - Project

Project Planning

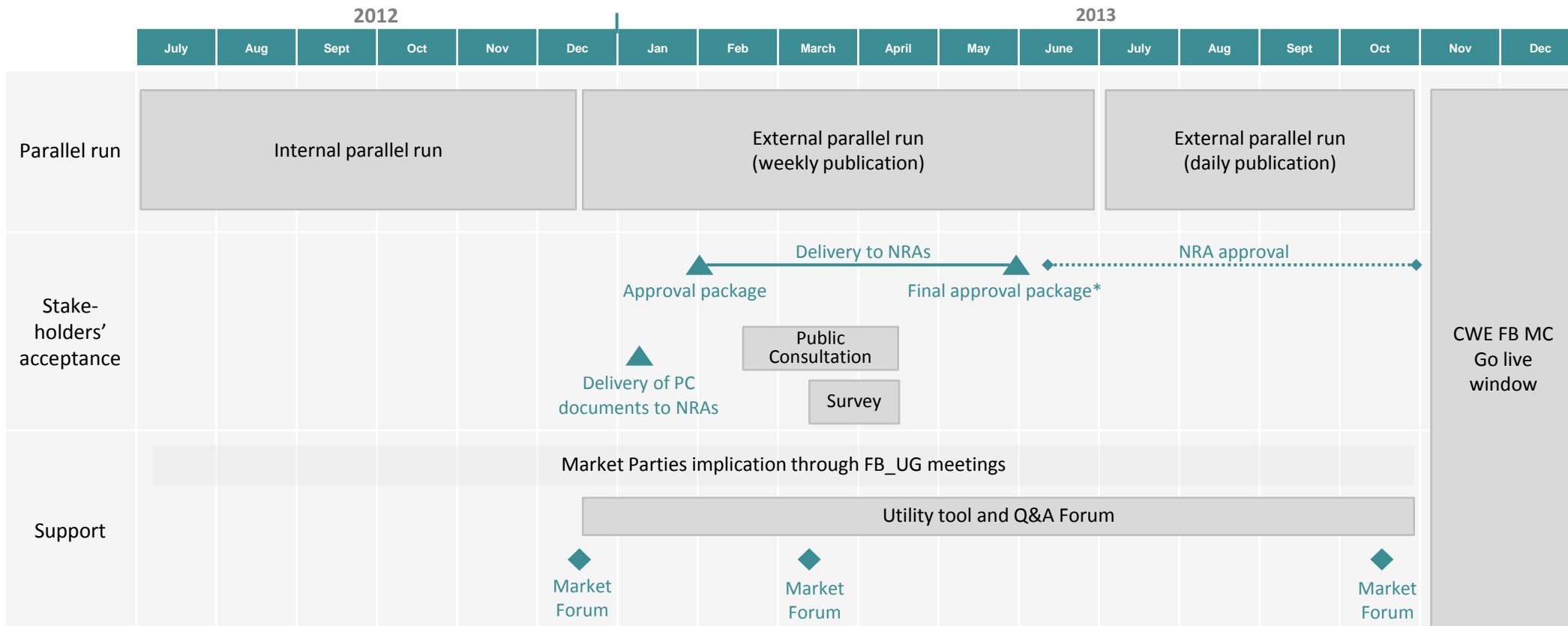


Dependencies:

- Stabilization of FB computation before end of 2012
- Duration of external parallel run (one full year vs. 10 months including seasonality)
- Duration of simulations and testing with NWE
- Regulatory approval

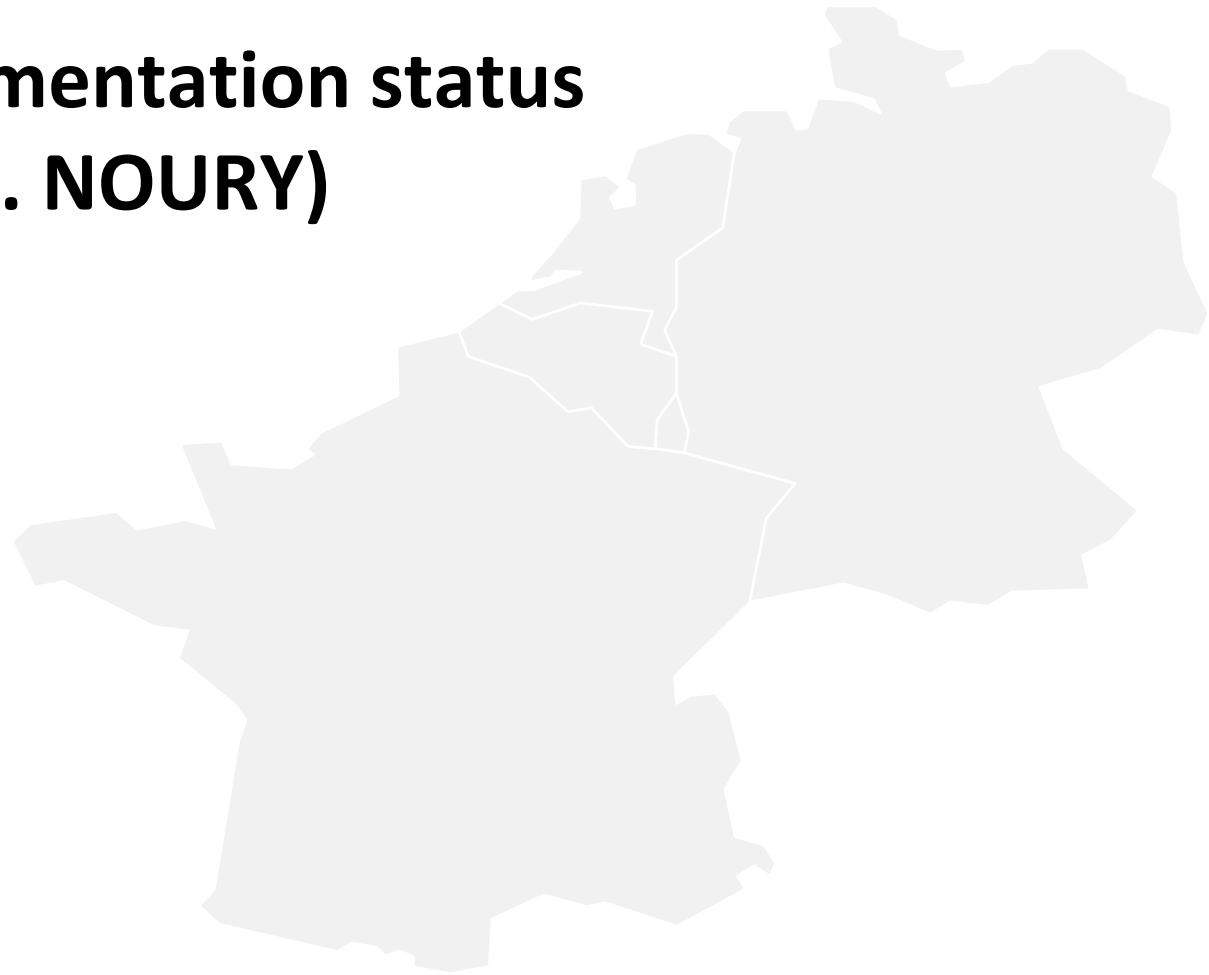
Predictability of LT auctions:

As FB MC Go Live is foreseen for the end of 2013, the impact of this market design change on LT capacity auctions is minimized for 2013



* Including answers to public consultation's outputs

FB implementation status (P. NOURY)



FB implementation status

Methodology stabilization



- ▶ All TSOs have been steadily working on a **detailed action plan** in order to stabilize the FB methodology in terms of:

Generation Shift Keys (GSK)	Flow Reliability Margins (FRM)	Critical Branches (CB) selection	Remedial Actions (RA)
Experimentation of new methodologies in order to overcome the main limitations of the current approach	Finalization of operational FRM values thanks to the learning of the internal parallel run currently performed by TSOs	Implementation of objective selection process in order to foster the usage of an adequate “Critical Branches” set	Implementation of coordinated usage of RA under Flow based in order to optimize the capacity domain

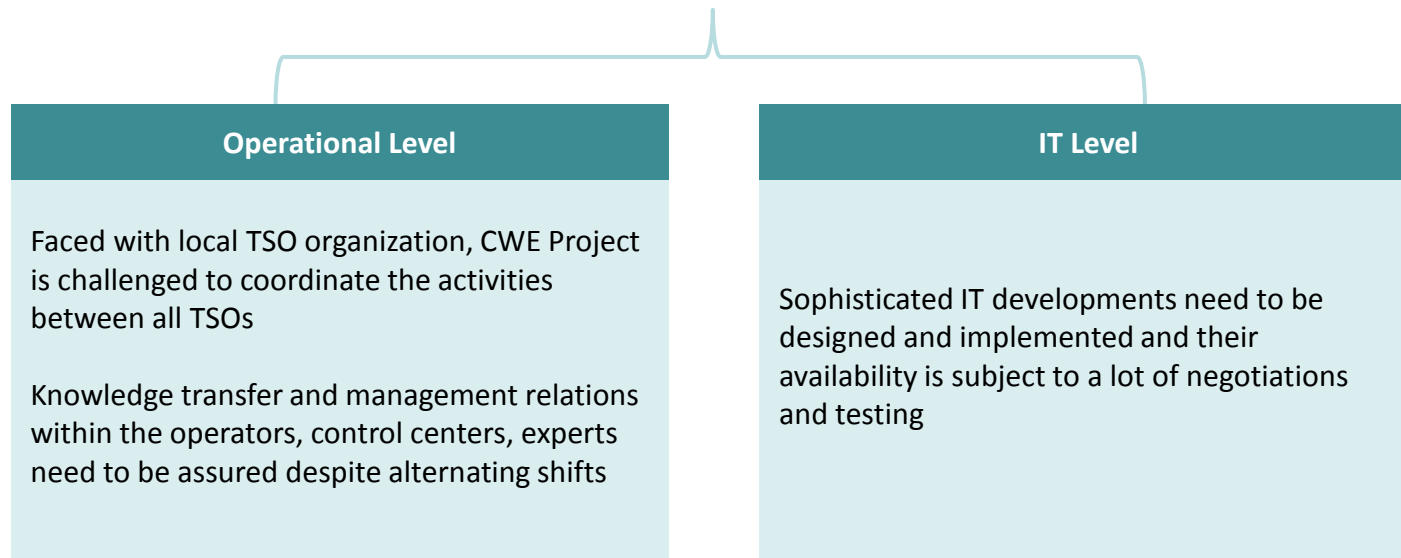
- ▶ All TSOs are confident that the provided work on these actions will be reflected in the parallel run results
- ▶ The FB principles will be described in detail in the **“CWE consultation package”** and will be submitted to Regulatory approval in the course of 2013

FB implementation status

Operational deployment



- ▶ In implementing a complete new methodology, CWE Project had to recognize the **complexity of the process** at different levels:



- ▶ All TSOs have been permanently **improving their operational and decision making process** and are confident that a stabilized and coordinated process will be implemented for the parallel run

FB implementation status

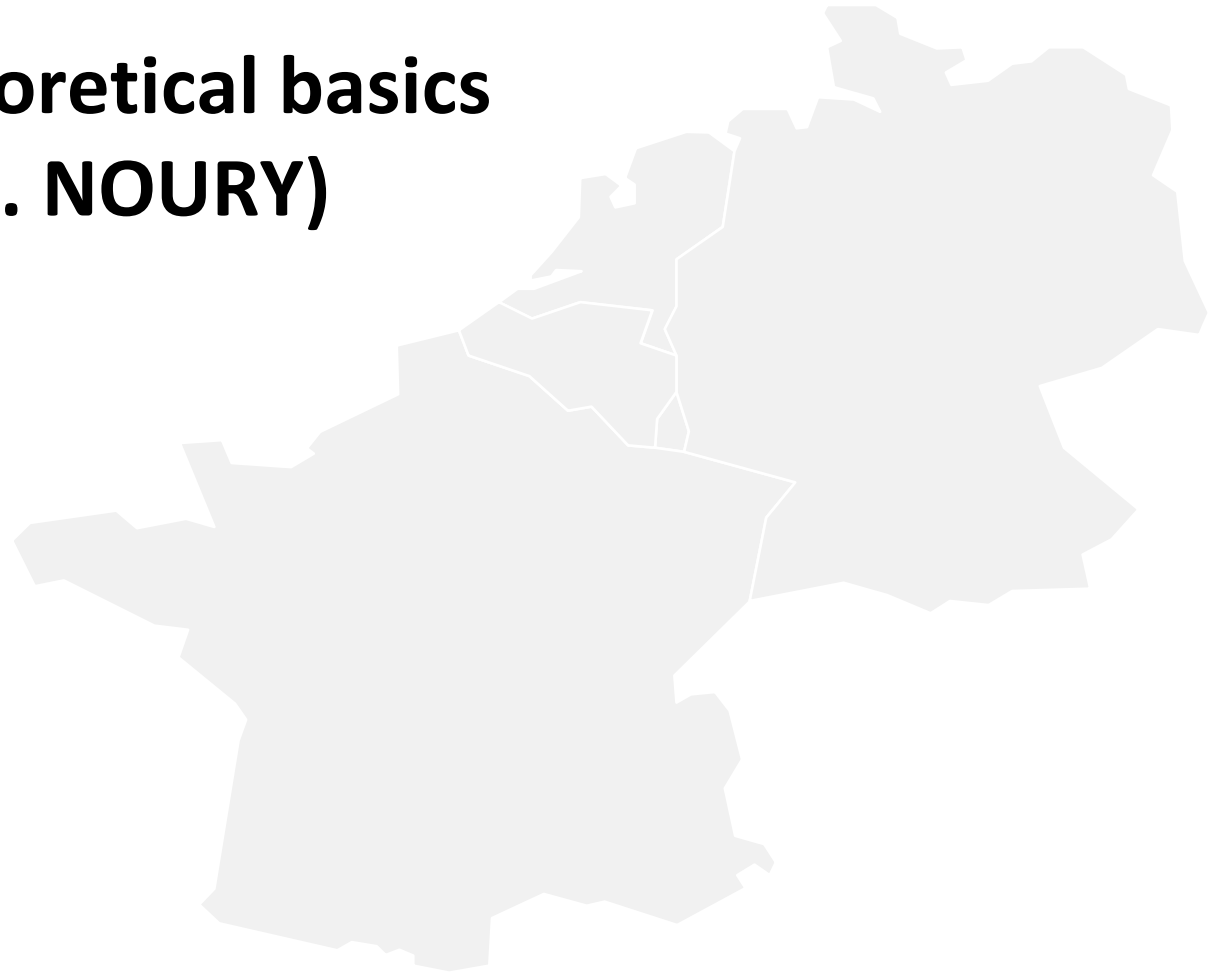
Experimentation results



- ▶ Current experimentation results show a gap between theoretical studies, detailed in the Feasibility Report, and practical results in terms of welfare gain, convergence rate, etc
- ▶ This “gap”, which shows that the potential of FB is not yet reached at an operational level, is linked to the notions introduced in the 2 previous slides:
 - **In terms of methodology:** TSOs are finalizing the adjustment of the model to operational reality
 - **In terms of operational implementation:** Transfer of expertise to operators and ad hoc tools development are also being finalized
- ▶ TSOs are putting all their **effort in the stabilization of an efficient and effective process** so as to reach the potential of FB when the parallel run is launched and to provide the most relevant results to Market Parties during the external parallel run

FB theoretical basics

(P. NOURY)

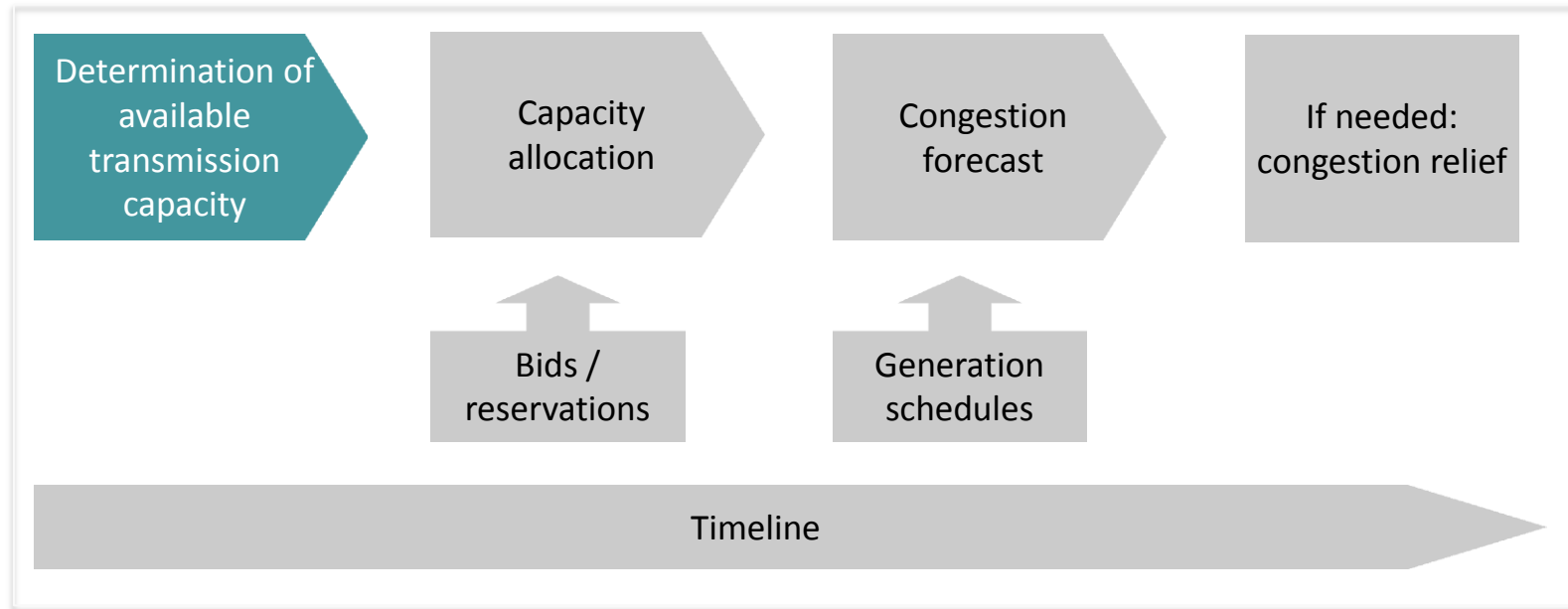




- ▶ Main concepts of CWE FB
- ▶ FB plain and intuitive
- ▶ FB experimental results
- ▶ FB in CWE and ATCs outside the CWE region

Main concepts of CWE FB

Congestion management in the broadest sense

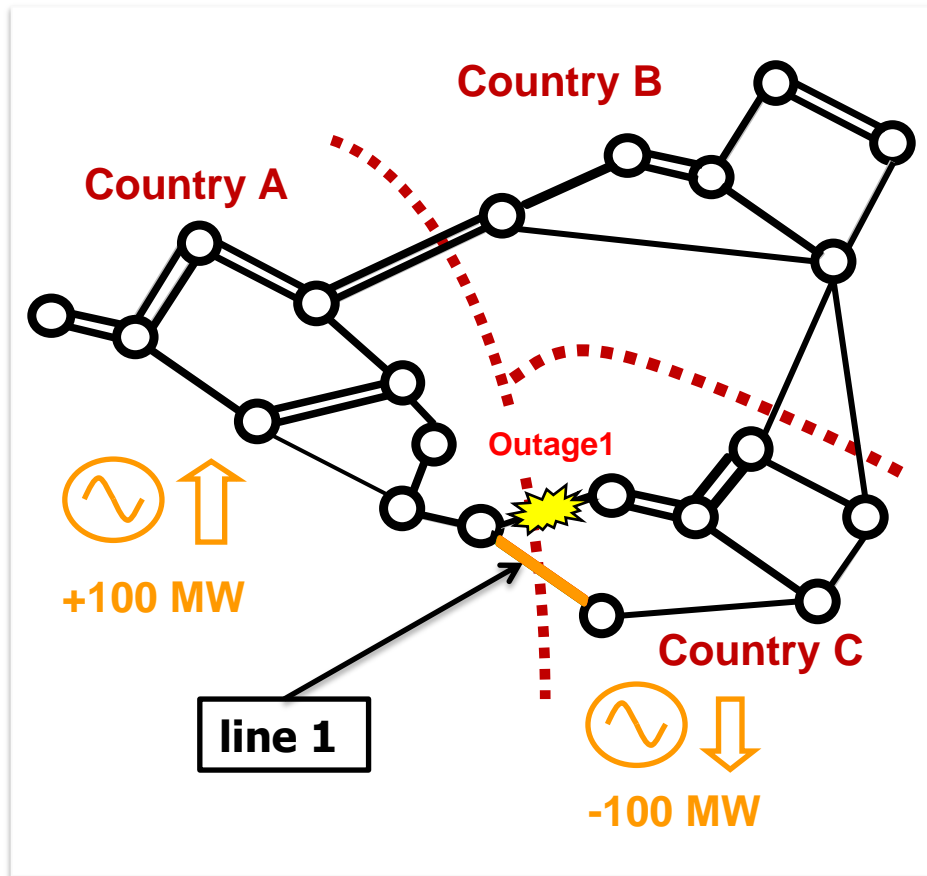


Main concepts of CWE FB

Approximation of the security of supply domain



► Example with 3 countries



Monitored lines	Outage scenario	Margin left (MW)	Influence of exchange on lines (PTDF)		
			A→B	A→C	B→C
Line 1	No outage	150		10%	
	Outage 1	120		20%	
	...				
Line 2	...				
	...				
Line 3	...				
	...				

Main concepts of CWE FB

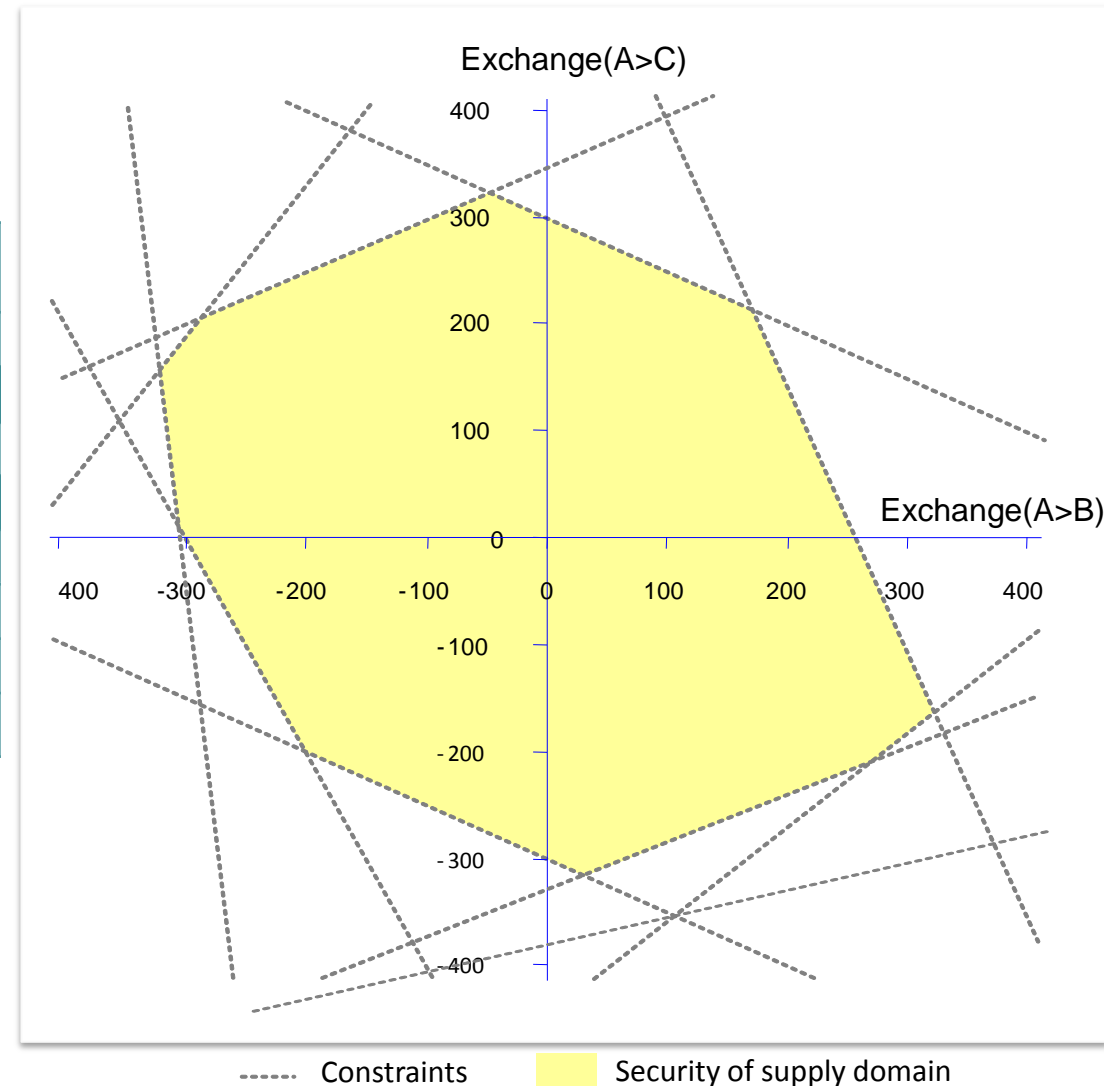
The security of supply domain



Monitored Lines	Outage scenario	Margin left (MW)	Influence of exchange on lines (PTDF)		
			A→B	A→C	B→C
Line 1	No outage	150	1%	10%	3%
	Outage 1	120	5%	20%	1%
	Outage 2	100	6%	25%	1%
Line 2	No outage	150	-2%	0	5%
	Outage 3	100	-12%	0	10%
Line 3	No outage				
	Outage 4				



Numbers are for illustration only

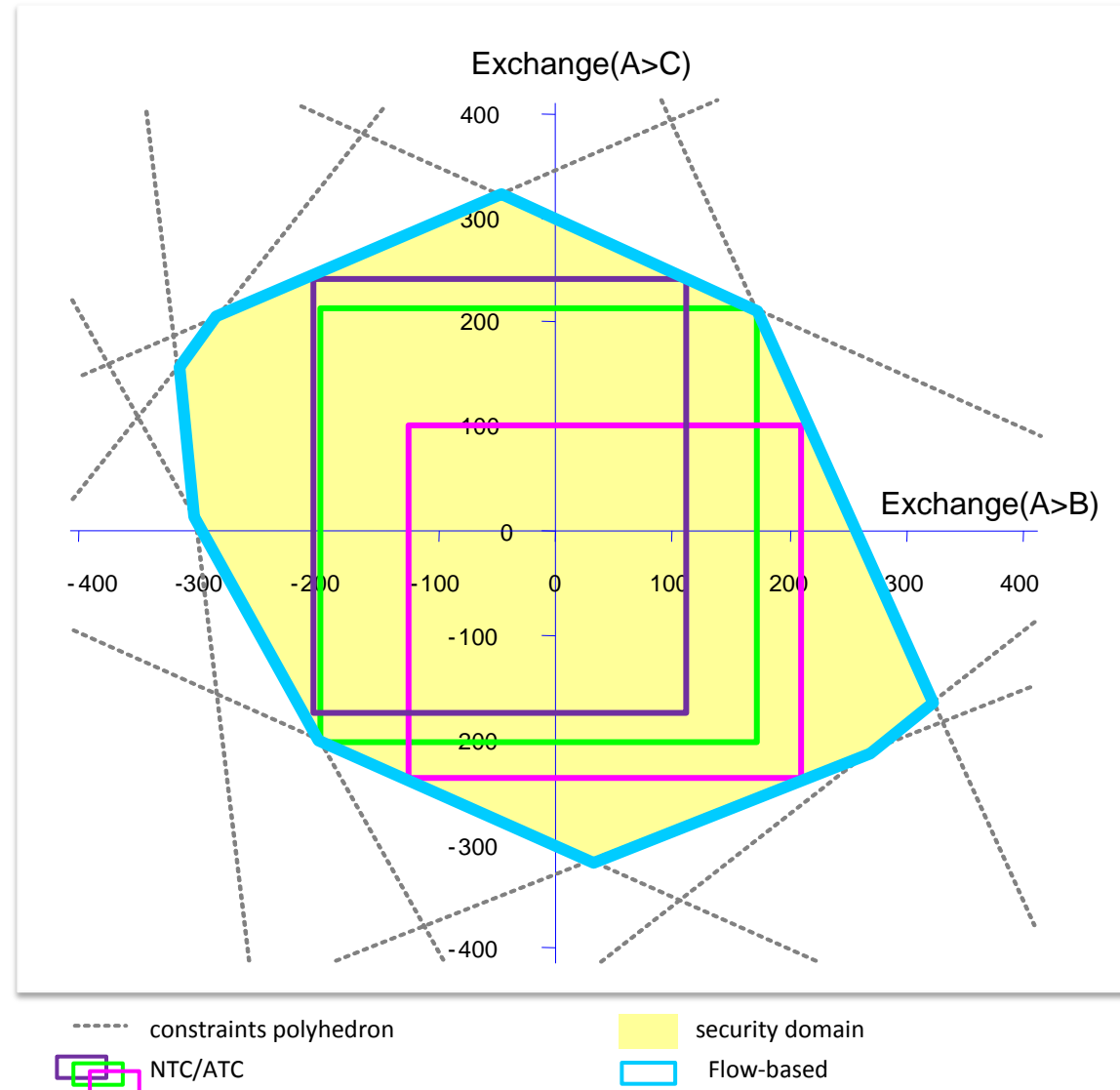


Main concepts of CWE FB

ATC & FB constraints – theory



- ▶ Security domain is obtained by taking into account all the relevant physical constraints of the grid
- ▶ Given the security domain, NTC/ATC constraints and the corresponding NTC/ATC domain are a choice made by the TSO
- ▶ The FB domain is the security domain itself

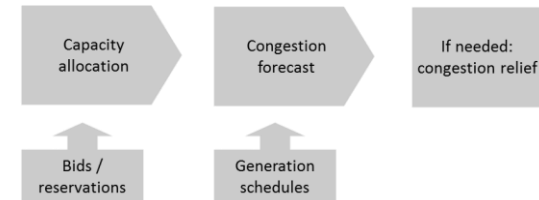
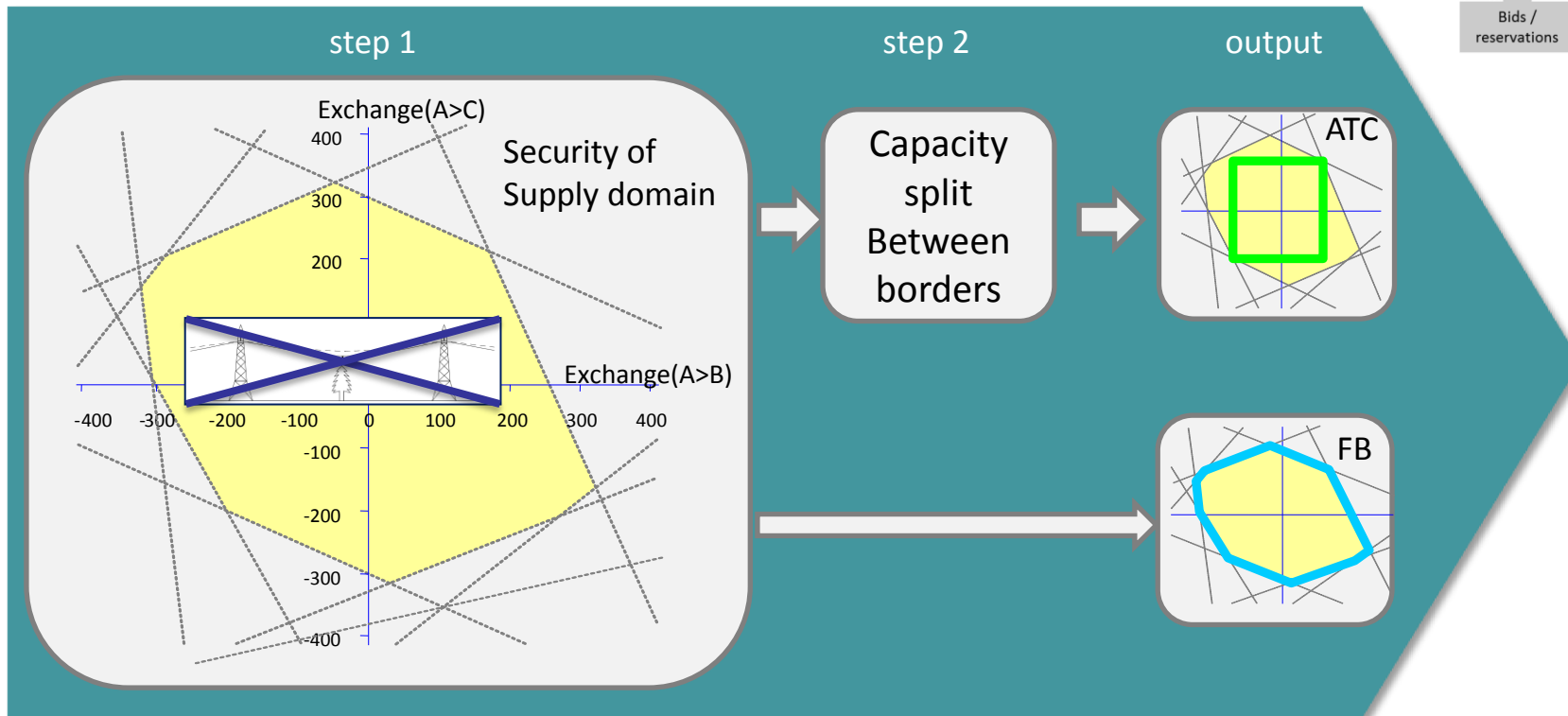


Main concepts of CWE FB

ATC and FB domain



Determination of available transmission capacity

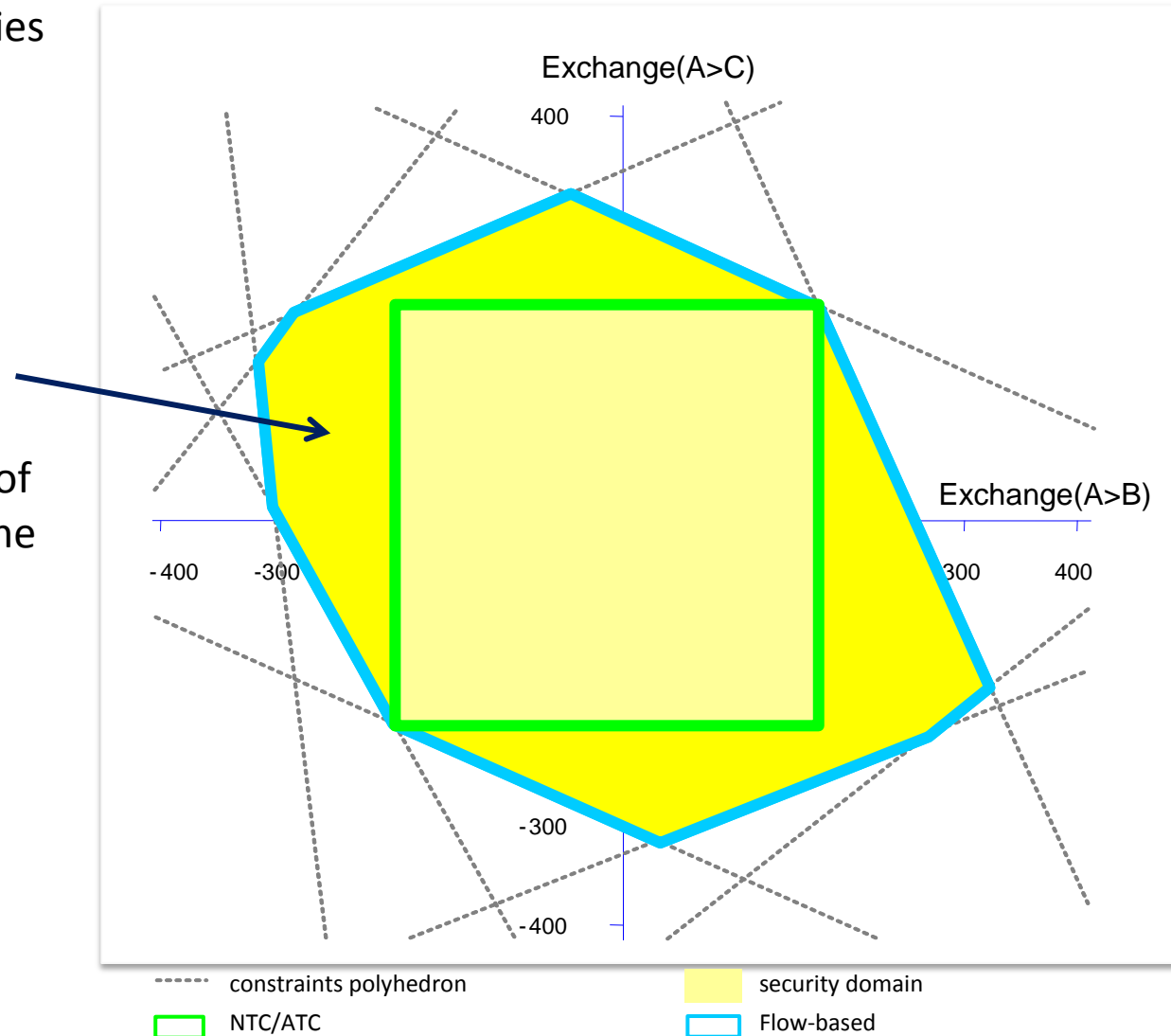


Main concepts of CWE FB

ATC vs FB constraints – theory



- ▶ FB offers more trading opportunities with the same level of security of supply
- ▶ In FB capacity split is not a choice of the TSO, but is market driven (at the time of allocation)

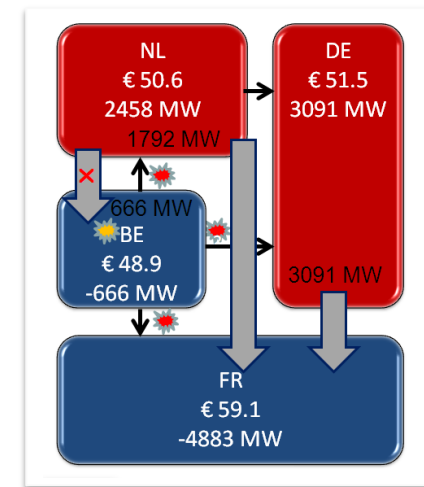
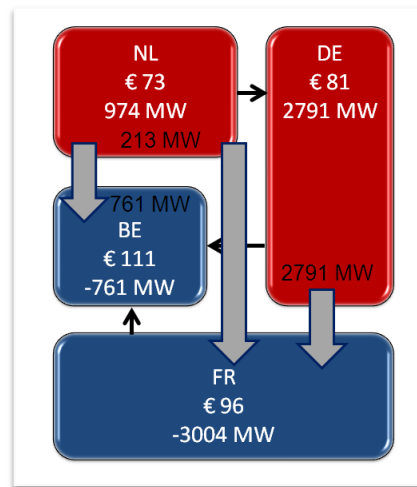


FB plain and intuitive

Intuitiveness



- As a result of the optimization process within the allocation system, the outcome of market-coupling can on some occasions be qualified as “**counter-intuitive**” which may lead to situations with some bilateral exchanges “against the spread” where an area with the cheapest (most expensive) price is importing (exporting). These results were partly based on some normative assumptions to be further assessed during the parallel run



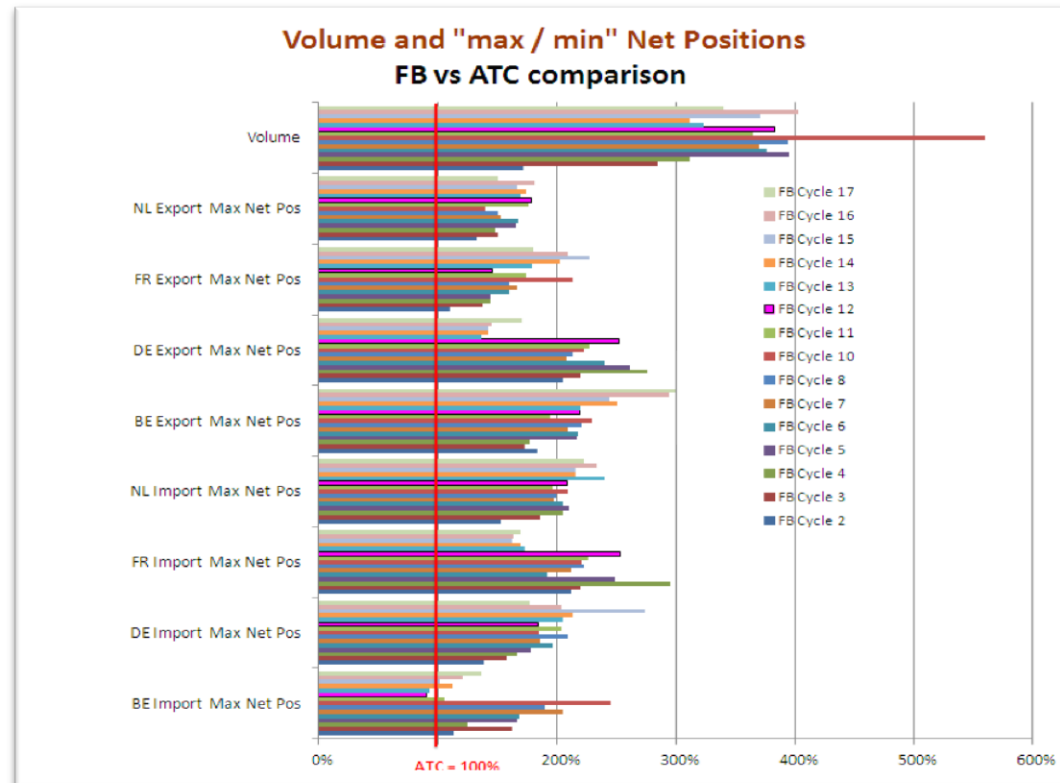
- This non-intuitive feature has a physical explanation: the counter-intuitive exchange releases a constraint somewhere in the grid, hence allowing other exchanges bringing more welfare
- The market coupling system can cope with such situation through the applying of the “intuitive-patch”. Counter-intuitive exchanges can then be forbidden, however this is at the cost of welfare since it is equivalent to adding additional constraints in the system
- Today, the **2 options are open : plain FB or intuitive FB**. This topic will be specifically addressed during the public consultation, and this will be supported by detailed documentation. Moreover, the external parallel run will provide simulations under the 2 models

FB experimental results

FB domain



- ▶ CWE reported in Oct 2011 on their experimental findings with FBMC, based on 9 weeks of data (“CWE Enhanced Flow-Based MC feasibility report”)
- ▶ FB offers more trading opportunities with the same level of SoS as the current coordinated ATC

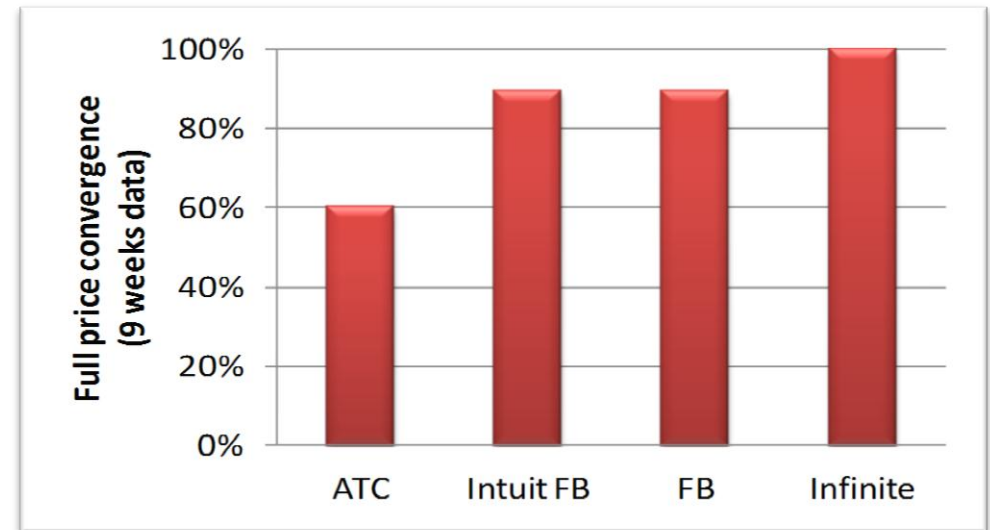
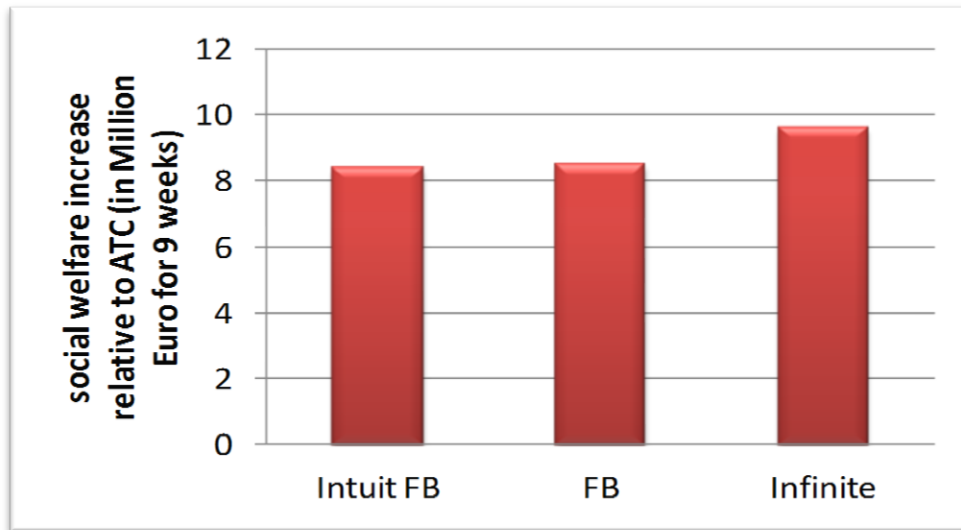


FB experimental results

FB market impact



- ▶ FB market coupling results in higher welfare and better price convergence compared to the current ATC MC ones

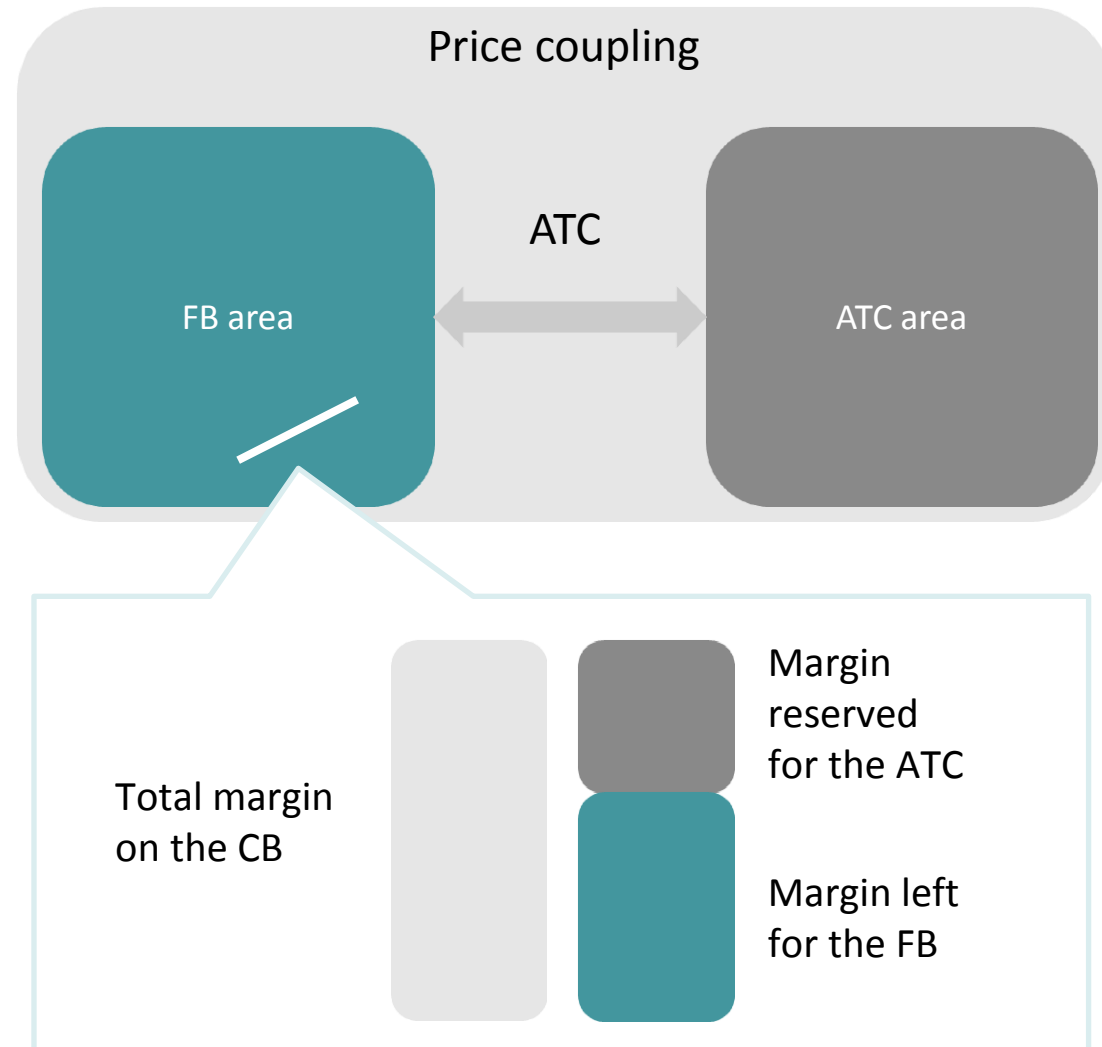


FB in CWE and ATCs outside the CWE region

“Hybrid Coupling” (1/2)



- ▶ For Hybrid coupling two variants exist:
- 1. **Standard:** realized ATC transactions are not taken into account in the margin of the CBs → TSOs need to reserve margins (worst-case) on their CBs for the possible usage by the ATC area
- ▶ Just like today
- ▶ No competition for the use of the scarce capacity in the allocation mechanism due to the ex-ante split
- ▶ Not optimal: scarce capacity not always fully used

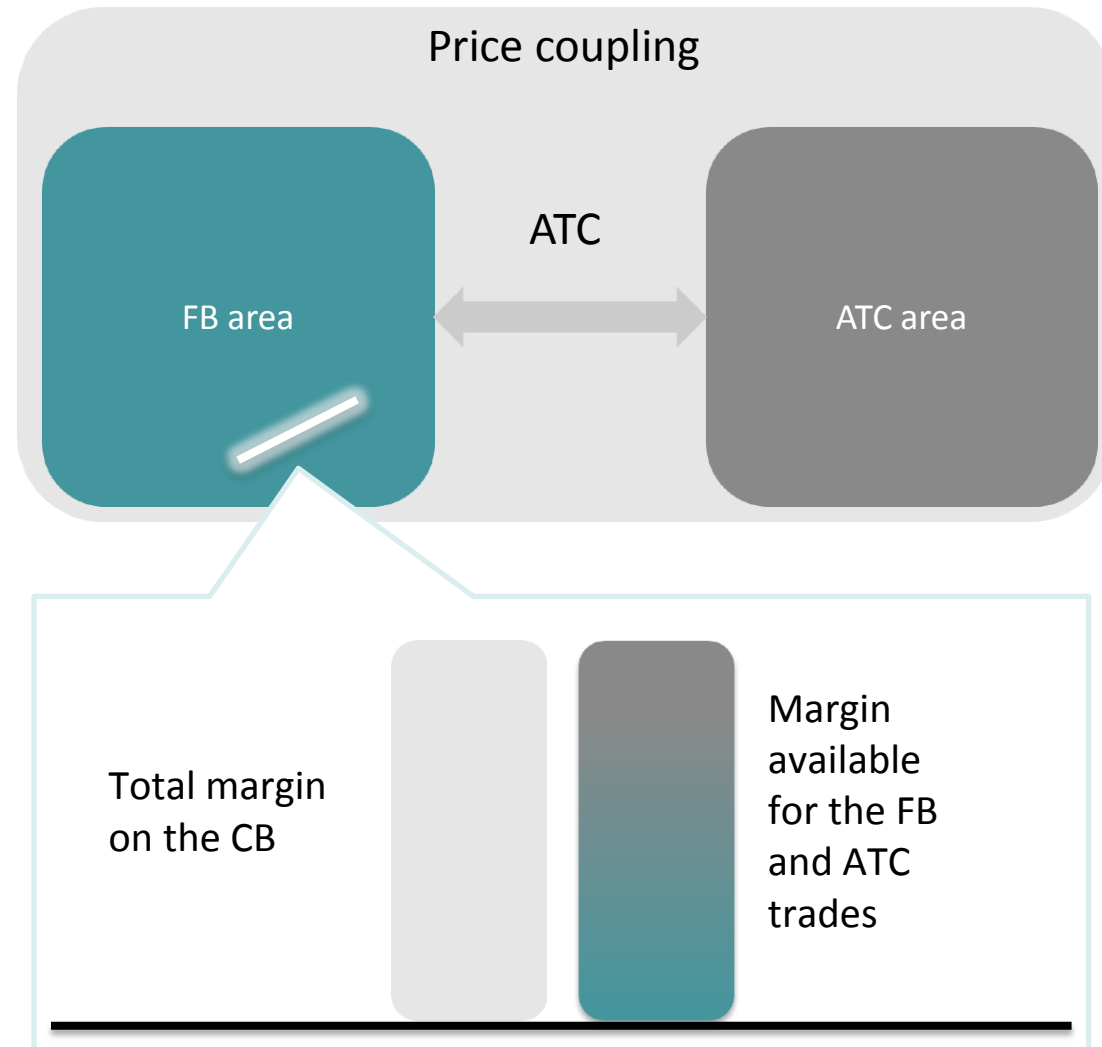


FB in CWE and ATCs outside the CWE region

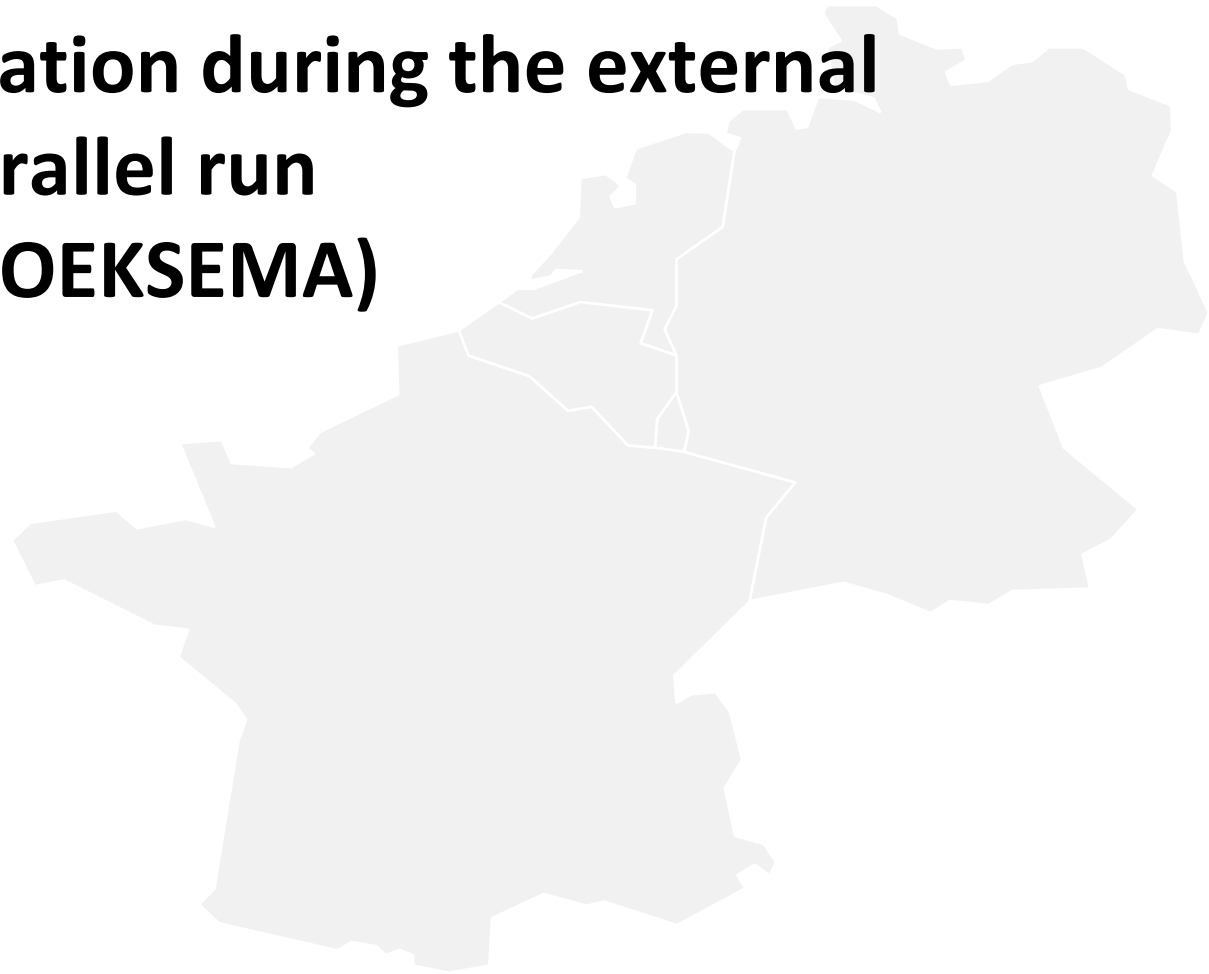
“Hybrid Coupling” (2/2)



2. **Advanced:** realized ATC transactions are taken into account in the margin of the CBs
→ TSOs do not need to reserve margins on their CBs → use of margin is market driven
- ▶ Competition for the use of the scarce capacity in the allocation mechanism
 - ▶ Optimal use of scarce capacity
 - ▶ Maximum social welfare
 - ▶ Interconnection is subject to FB price properties (typically: “counter-intuitive” exchanges on CWE – Non CWE borders, price spread on both ends of the line while its capacity is not fully used)
- ▶ CWE FB Market coupling will **go live with a standard hybrid coupling** while keeping open the possibility to evolve towards an **advanced hybrid coupling in a later stage**



**Market communication during the external
parallel run
(J. HOEKSEMA)**

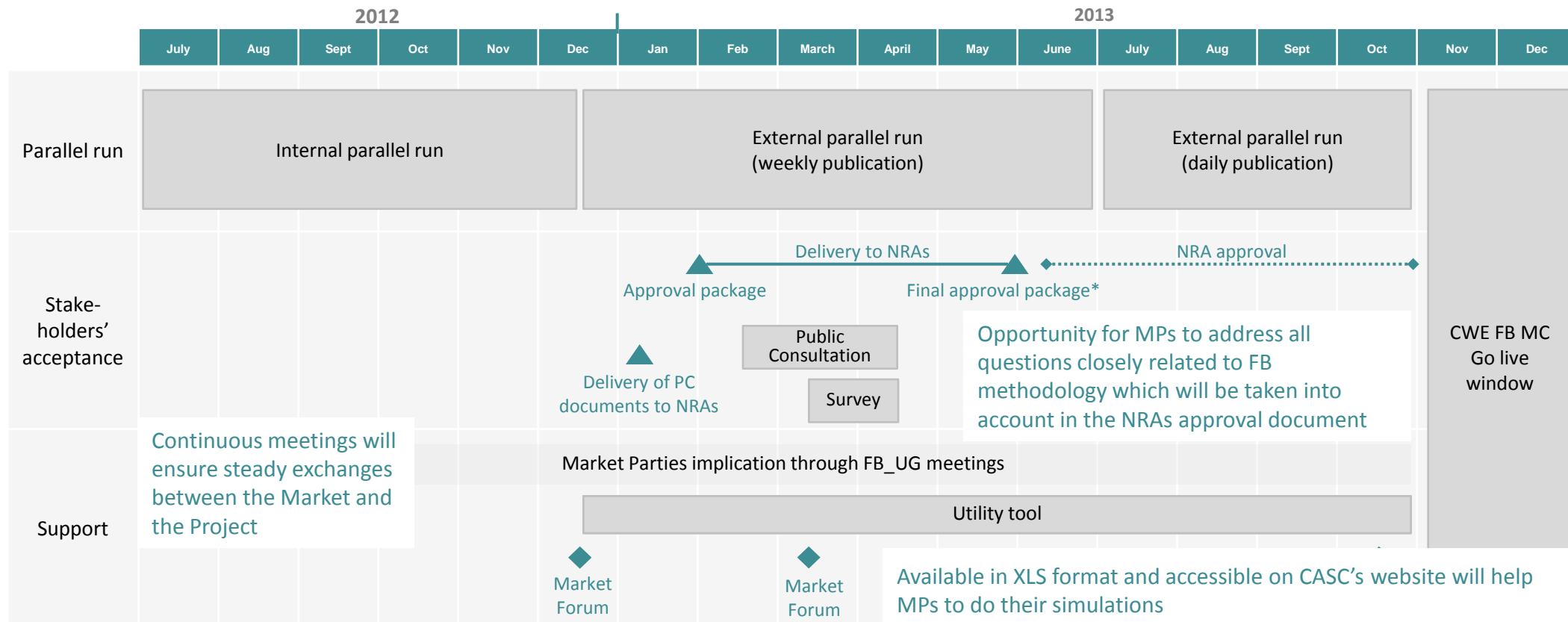


Market communication during the external parallel run

MP support



- ▶ CWE Project proposes different forums to ensure a **clear and transparent communication** between all Market Parties and the Project during the external parallel run:



A Kickoff Market Forum before the start of the external parallel run end of 2012 to explain the functioning of the parallel run and the functionalities of the utility tool

A second Market Forum during the public consultation process where MPs' questions will be answered

Market communication during the external parallel run

Focus on Utility tool (1/2)




- The following interface allows **simulations for trading volumes** of CWE MC Markets for each hour:

Maximum exchange from
DE to BE assuming no other
exchanges

(Non simultaneous values!)

Maximum DE export

(other areas are importing to
ensure the balance)



CWE Flow Based Utility Tool

Reference time:

07.09.2011 hour:

13

1) Check volume (interactive module)

Here you can check the simultaneous execution of trading volumes of the markets involved in the CWE Market Coupling

2) Max volume (information module)

Here you can find the maximal trade volumes (MWh/h) which can be physically transported between two Hubs under the condition that no other trade is executed between other Hubs.

HUB TO HUB EXCHANGES

Hub-to-Hub trade in MWh/h (please insert values)

DE=>BE	0
DE=>NL	0
DE=>FR	0
NL=>BE	0
NL=>FR	0
BE=>FR	0

Test 1: hub to hub inside FB space

Trades feasible

	direction →	direction ←
DE=>BE	4407	4318
DE=>NL	4028	5306
DE=>FR	3384	3426
NL=>BE	4407	3755
NL=>FR	5238	4253
BE=>FR	4366	4295

HUB POSITION

Hub Positions trade in MWh/h (please insert values)

DE	4000
BE	-1000
FR	-1000
NL	-2000

Test 1: sum hub positions = 0

OK

Test 2: hub positions inside FB space

Trades feasible

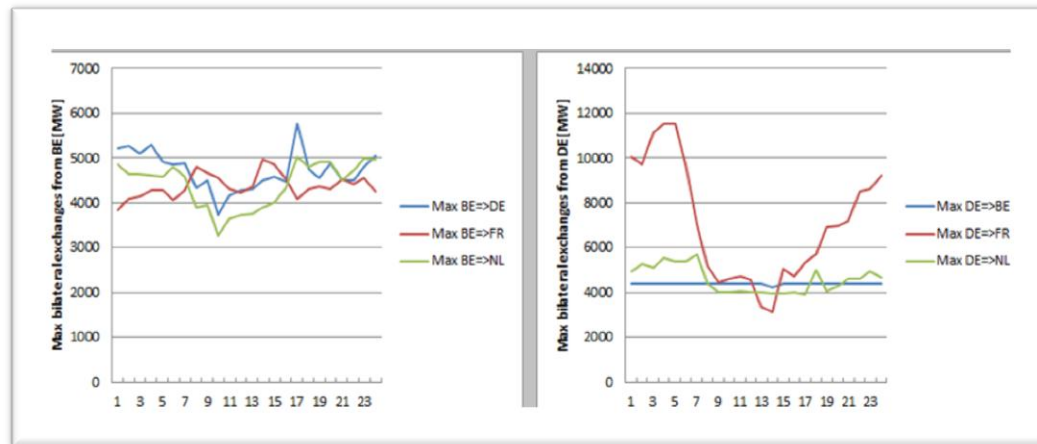
	export	import
DE	5448	-8121
BE	6179	-4407
FR	6281	-5521
NL	6781	-6199

Market communication during the external parallel run

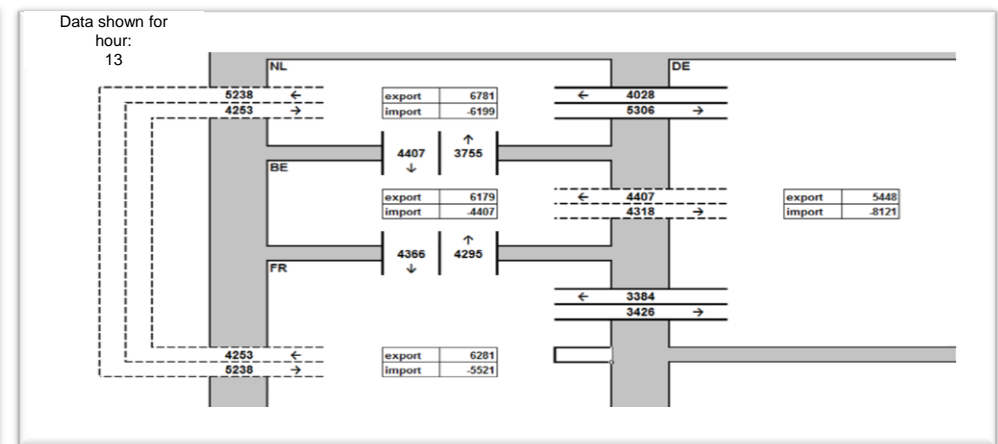
Focus on Utility tool (2/2)

- ▶ **Market graphs and a CWE map** facilitate the understanding of impacts of trade volumes for hub to hub exchanges:

Maximum bilateral exchanges



CWE max net positions and bilateral exchanges



- ▶ For a **live demonstration** of the utility tool simulation facilities:

