ENTSO-E Balancing Pilot Project Report

Pilot projects learning points

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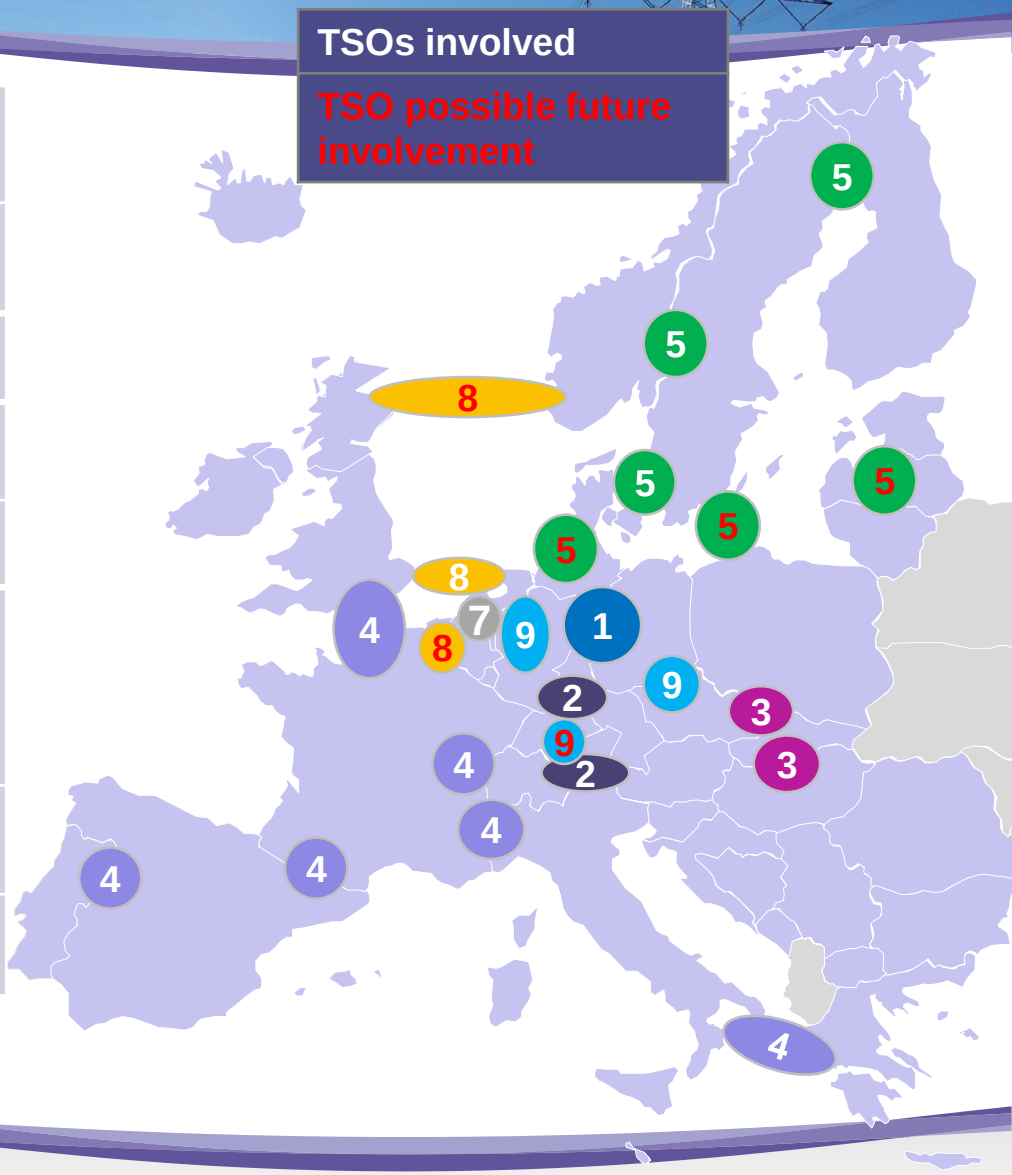
The current 8 Cross Border Pilot Projects on Electricity Balancing

1	CMOs for mFRR and aFRR with real time flow based congestion management
2	Cross-border market for FCR based on TSO-TSO model
3	E-GCC (**project on hold**)
4	TERRE: Trans-European Replacement Reserves Exchange
5	Development of the Nordic RPM
7	Design and evaluation of a harmonised reactive balancing market with XB optimisation of Frequency Restoration while keeping control areas, bid zones, and Regulatory oversight
8	BritNed / TenneT / National Grid Balancing Services (**project on hold**)
9	IGCC Imbalance Netting, aFRR-Assistance and Flow-Based Congestion Management.



*Pilot 8 has been put on hold for the time being

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Learning points towards other pilot projects (i)

	Pilot CoBA extension/product harmonization	Pricing method	CMO	XB capacity management	Good trend of go-live indicators (both economic & technical)	Other learnings (CBA, renewable/demand. IT issues)
Pilot 1	Feasibility Studies with pilot 5 and 7 completed The technical principles of IN are harmonised with IGCC and eGCC.	pay as bid	already implemented	Flow based applied since July 2014 for IN, aFRR and mFRR (at cross TSO border)		Pilot 1 CoBA interchanges several NC processes: Imbalance netting, aFRR & mFRR & join dimensioning
Pilot 2	Implementation phase towards German TSO´s, Tennet and Denmark	Pay as bid	already implemented	Independent ATC	Yes, win-win scheme	
Pilot 3	e-GCC and IGCC use the same loop – 4s. Merging of IN processes could be possible (previous pricing harmonization) or extension of existing INP	fixed agreed price		Independent ATC	Reduction of the cost of the balancing activity, higher available aFRR capacity	
Pilot 4	Recently incorporated REE, Swissgrid and ADMIE	Marginal price at TSO-TSO level	currently in the design phase (possibility of pre-netting under consideration)	Independent ATC (s.t. future XB Intraday market)		

Learning points towards other pilot projects (ii)

	Pilot CoBA extension/product harmonization	Pricing	CMO	XB capacity management	Good trend of go-live indicators (both economic & technical)	Other learnings (CBA, renewable/demand. IT issues)
Pilot 5	Feas. Studies with pilot 1 (mFRR/IN), Baltics and Poland (mFRR) Nordic CoBA extension 3 feas. studies are bringing experience for the transition from NC mid term towards NC target model	RPM applies marginal pricing and market split (different prices) if congestions arise.	already implemented	Independent ATC	Adequate trend	changes to promote renewab./demand (reduce min. Bid size, resting time mark, …) Imbalance netting through non synchr. Areas Nordic CoBA uses 2 processes: Imbalance netting & mFRR
Pilot 7	Feas. Studies with pilot 1 (sch mFRR through virtual tie line) aFRR=7.5 min. Ramping already agreed	Marginal price Designed pricing scheme will ensure local balancing incentives towards BRPs to be balanced per LFC Block. TSO´s agree that settlement should be based on a single pricing scheme	CMO: design phase finished No other pilot projects (apart from pilot 1) are having the exchange of standard aFRR products, without unshared bids, via merit order list in scope. aFRR: move from pro-rata to Merit order activation	Independent ATC available after ID		Gaining experience on CBA analysis (2015) Design already allows renewable and demand to participate Design promotes BRP´s self balancing incentives Exchange of aFRR and mFRR between 2 different Bidding Zones & LFC blocks.
Pilot 9	Adequate CoBA experience (10 TSOs, 6 countries)	Yes (oportunity price)		Flow based yet to be discussed		MLA for IGCC

Barriers and pilot road map delays (i)

	Pilot CoBA extension	Product definition & settlement issues	Internal regulatory changes & national law	Regulatory confort & cost recognition	Negative CBA analysis	Others
Pilot 1			Pay as bid changes towards marginal price is s.t. national law change			
Pilot 2			Participation of Denmark not yet supported by German NRA due to concerns about lack of cross-border capacity			
Pilot 3	The difference between implementations can be resolution of the optimization loop – it strongly depends on the SCADA implementation.					
Pilot 4	Increase number of TSO´s brings difficulties due to different TSO needs so design phase has beeen delayed	Some delays in the product definition due to different TSO needs (in principle P-SCH-30-15 will be used)				

Barriers and pilot road map delays (ii)

	Pilot CoBA extension	Product definition & settlement issues	Internal regulatory changes & national law	Regulatory confort & cost recognition	Negative CBA analysis	Others
Pilot 5	Self dispatch condition of nordic TSOs versus central dispatch condition of Poland & high expected IT/communication costs complex setup to integrate markets and need for market harmonisation in both areas and as a minimum need for NRA approval.	Some difficulties for extension due to direct activated & energy condition of product at pilot 5 versus scheduled activated & reserve/energy condition of product at pilot 1	Development of Baltic CMO prerequisite for integration of mFFR	Polish system: approval from NRA to be investigated		
Pilot 7	With pilot 1: market designs diverge considerable between the three countries (mFRR)					
Pilot 8		Difficulties arise at product definition due to proactive/reactive conditions of NG/Tennet systems Pricing exante in NG and expost in Tennet				Quite different settlement schemes of NG/Tennet systems Also implies a barrier for pilot 8
Pilot 9						

Current set of estándar manual products (mFRR & RR) versus pilot projects products

	Standard products	Direct Activated/ scheduled	Full activation time	Minimum delivery period	Pilot projects	On-going Feasibility studies
1	P-DA-15-15	DA	15	15	Pilot 5 (mFRR)	Nordics & Baltics
2	P-DA-20-10	DA	20	10		
3	P-DA-10-10	DA	10	10		
4	P-DA- 5- 5	DA	5	5		
5	P-DA- 3- 3	DA	3	3		
6	P-SCH-15-0	SCH	15	0		
7	P-SCH-30-15	SCH	30	15	Pilot 4 (RR)	
8	P-SCH-15-15	SCH	15	15	≈Pilot 1 Pilot 7 (mFRR)	P1 & P5 Poland & P5
9	P-SCH-X-Y	SCH	X	Y		

Current set of estándar manual products (mFRR & RR) versus pilot projects products

	Standard products	Pilot projects	TSO-TSO Pricing method	TSO-BSP settlement Pricing method	Ramps treatment (blocks, standard ramp or BSP particular ramp)
1	P-DA-15-15	Pilot 5 (Nordics)	Marginal pricing		
2	P-DA-20-10				
3	P-DA-10- 10				
4	P-DA- 5 - 5				
5	P- DA- 3- 3				
6	P-SCH-15-0				
7	P-SCH-30-15	Pilot 4	Marginal pricing	Depend on each TSO (marginal pricing/ pay as bid)	blocks
8	P-SCH-15-15	Pilot 1 and 7	P1: pay as bid P7: marginal		
9	P-SCH-X-Y				

Partial contribution of pilots towards NC Balancing: imbalance netting and RR

A.	Proposal of regional implementation framework:
B.	Implementation of the regional integration model:
C.	Proposal of modification of the European integration model
D.	Proposal of the European implementation framework
E.	Proposal of common settlement rules
F.	Proposal of settlement harmonisation
G.	Proposal of standard products definition
H.	Proposal of standard products pricing
I.	Proposal of standard products algorithms
J.	Proposal for common settlement rules of intended exchanges of energy associated to the Frequency Containment Process

EIF NC ≈ Q4 2015

Partial contribution of pilots towards NC Balancing: Imbalance netting & RR

Imbalance netting partial contribution	A	B	C	D	E	F	G	H	I	J
Deadline from NC EB (EiF+)	6 m	2y	3y	4y	2y	3y	1y	1y	1y	
Pilot Project 1	12/2008	12/2008	12/2008	12/2008	12/2008	12/2008	12/2008	12/2008	12/2008	
Pilot 3		Partly completed								
Pilot Project 9	10/2011	10/2011		10/2011					10/2011	

RR Partial contribution	A	B	C	D	E	F	G	H	I
Deadline from NC EB (EiF+)	6m	2.5y	4y	5y	2y	3y	1y	1y	1y
Pilot Project 4		Q2 2017	Q4 2018	Q2 2019	Q2 2018	Q2 2018	Q3 2015	Q3 2015	Q3 2015

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Partial contribution of pilots towards NC Balancing: mFRR

A.	Proposal of regional implementation framework:
B.	Implementation of the regional integration model:
C.	Proposal of modification of the European integration model
D.	Proposal of the European implementation framework
E.	Proposal of common settlement rules
F.	Proposal of settlement harmonisation
G.	Proposal of standard products definition
H.	Proposal of standard products pricing
I.	Proposal of standard products algorithms
J.	Proposal for common settlement rules of intended exchanges of energy associated to the Frequency Containment Process

Partial contribution of pilots towards NC Balancing: mFRR

Manual FRR Partial contribution	A	B	C	D	E	F	G	H	I	J
Deadline from NC EB (EiF+)	2 y	4 y	4 y	5 y	2 y	3 y	1 y	1 y	1 y	
Pilot 1	05/2010	05/2010	05/2010	05/2010	05/2010	05/2010	05/2010	05/2010	05/2010	
Pilot Project 5	Partially completed	Partially Completed	June 2015	December 2015	June 2015	December 2015	June 2015	June 2015	December 2015	
Pilot 7	To be assessed in CBA	To be assessed in CBA	17/10/2014	To be assessed in CBA	17/10/2014	17/10/2014	17/10/2014	17/10/2014	17/10/2014	N/A

Partial contribution of pilots towards NC Balancing: aFRR

A.	Proposal of regional implementation framework:
B.	Implementation of the regional integration model:
C.	Proposal of modification of the European integration model
D.	Proposal of the European implementation framework
E.	Proposal of common settlement rules
F.	Proposal of settlement harmonisation
G.	Proposal of standard products definition
H.	Proposal of standard products pricing
I.	Proposal of standard products algorithms
J.	Proposal for common settlement rules of intended exchanges of energy associated to the Frequency Containment Process

Partial contribution of pilots towards NC Balancing: aFRR

aFRR Partial contribution	A	B	C	D	E	F	G	H	I	J
Deadline from NC EB (EiF+)	3 y	4 y	4 y	5 y	2 y	3 y	1 y	1 y	1 y	
Pilot Project 7	To be assessed in CBA	To be assessed in CBA	17/10/2014	To be assessed in CBA	17/10/2014	17/10/2014	17/10/2014	17/10/2014	17/10/2014	N/A
Pilot 1	09/2009	09/2009	09/2009	09/2009	09/2009	09/2009	09/2009	09/2009	09/2009	