

REgions

Ancillary service provision by renewable virtual power plants



“How can RES support the stabilisation of the energy system by improving traditional Virtual Power Plants (VPPs) to include also regional and inter-regional services and further improve their participation on the markets?”

Chapter 1: Fraunhofer IEE's virtual power plant Energy Connect

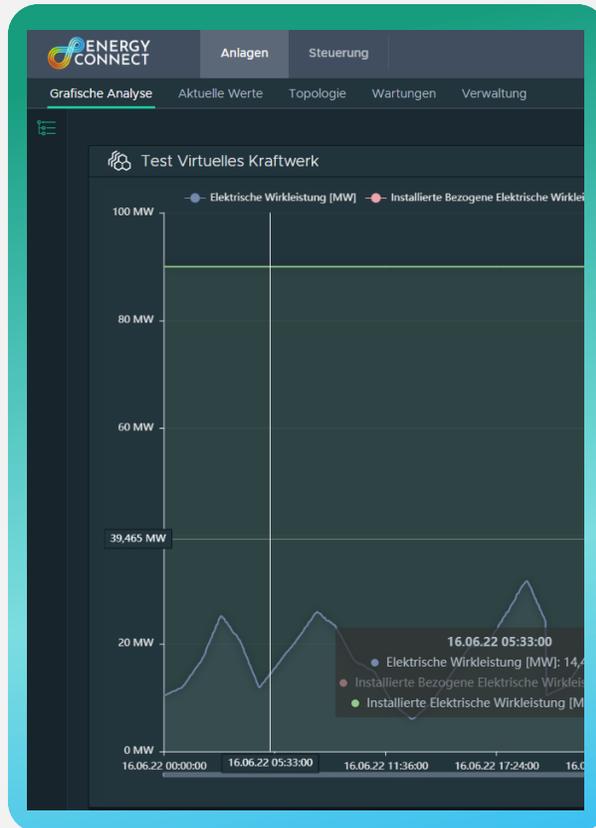


Aggregate, monitor and
control energy assets

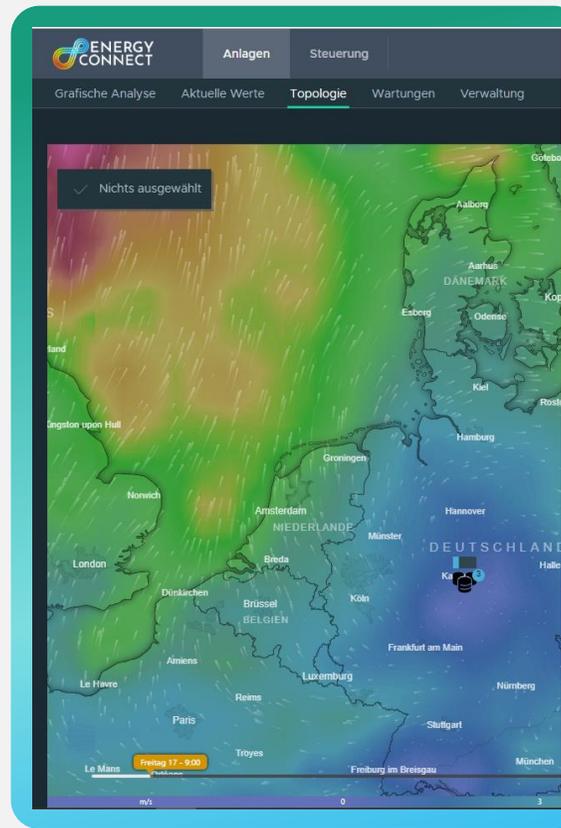


VPP Energy Connect of Fraunhofer IEE

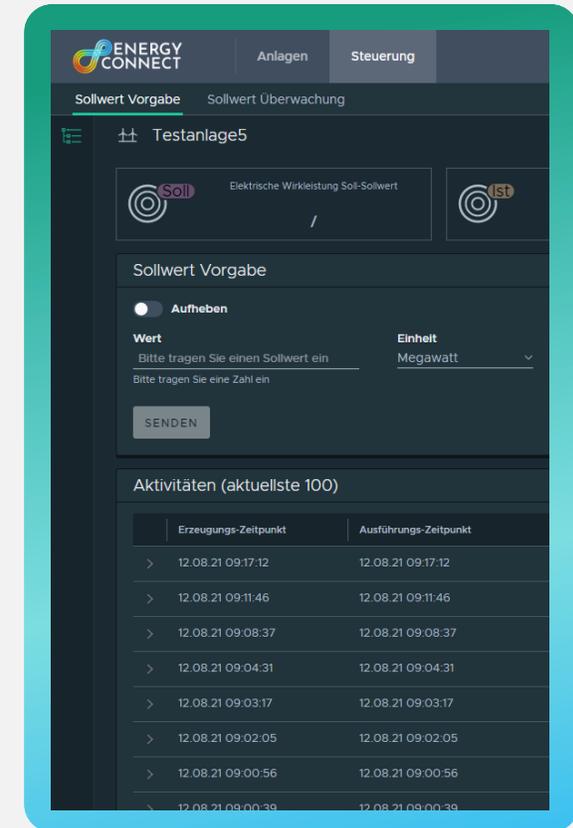
Modern Web-UI for easy access



Time series visualization



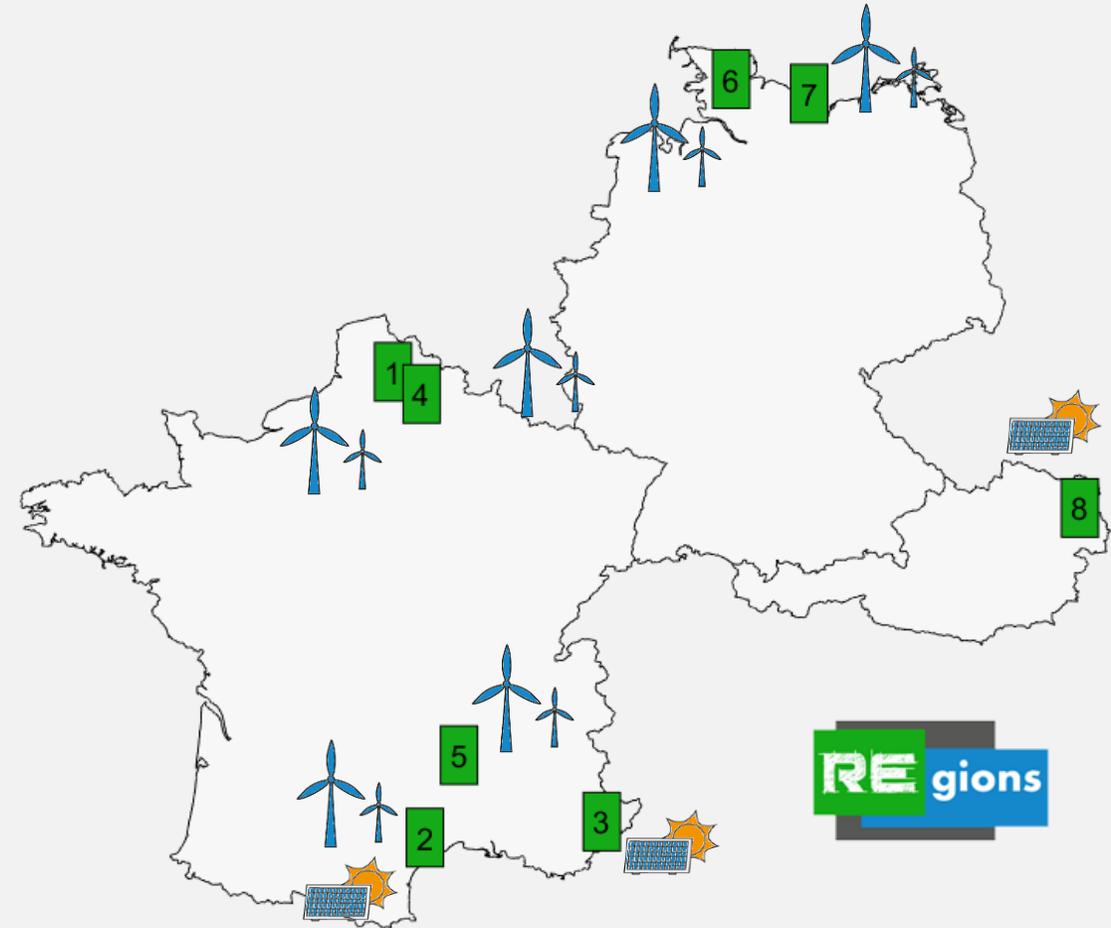
Topology view



Setting Set-Points

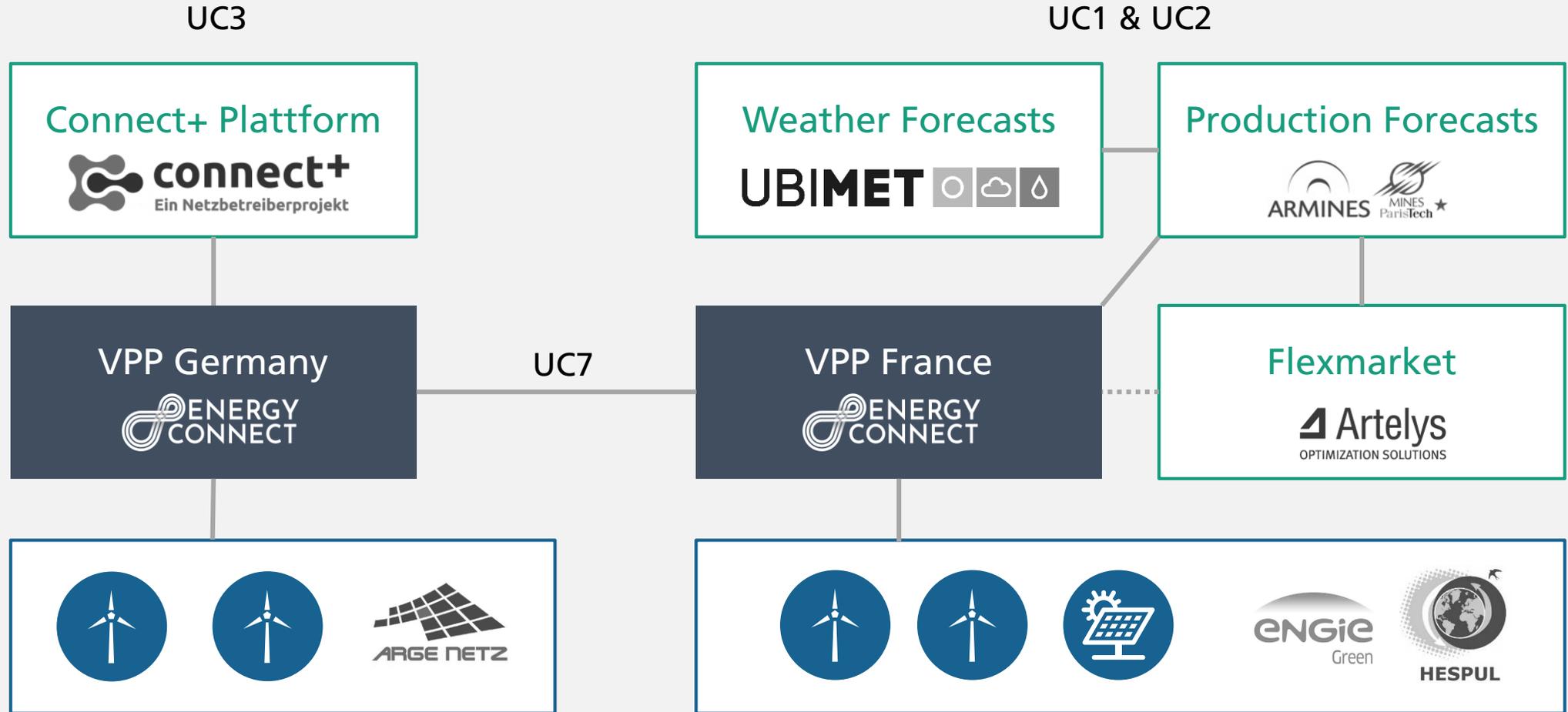
Key figures of the REgions VPPs

No.	Region	Number of parks/farms		Installed capacity [MW]		Use Case
		Wind	PV	Wind	PV	
1	Hauts-de-France	2		20		1
2	Occitanie	3	3	30	20	1, 2, 7
3	Provence-Alpes-Côte d'Azur		2		14.4	2
4	Hauts-de-France	2		22		1
5	Auvergne-Rhône-Alpes	5		48		2
6	Schleswig-Holstein (West)	2		5.6		3, 7
7	Schleswig-Holstein (East)	1		4.7		3
8	Vienna					4, 5, 6
Sum		15	5	130.3	34.4	



Proof-concepts in France and Germany

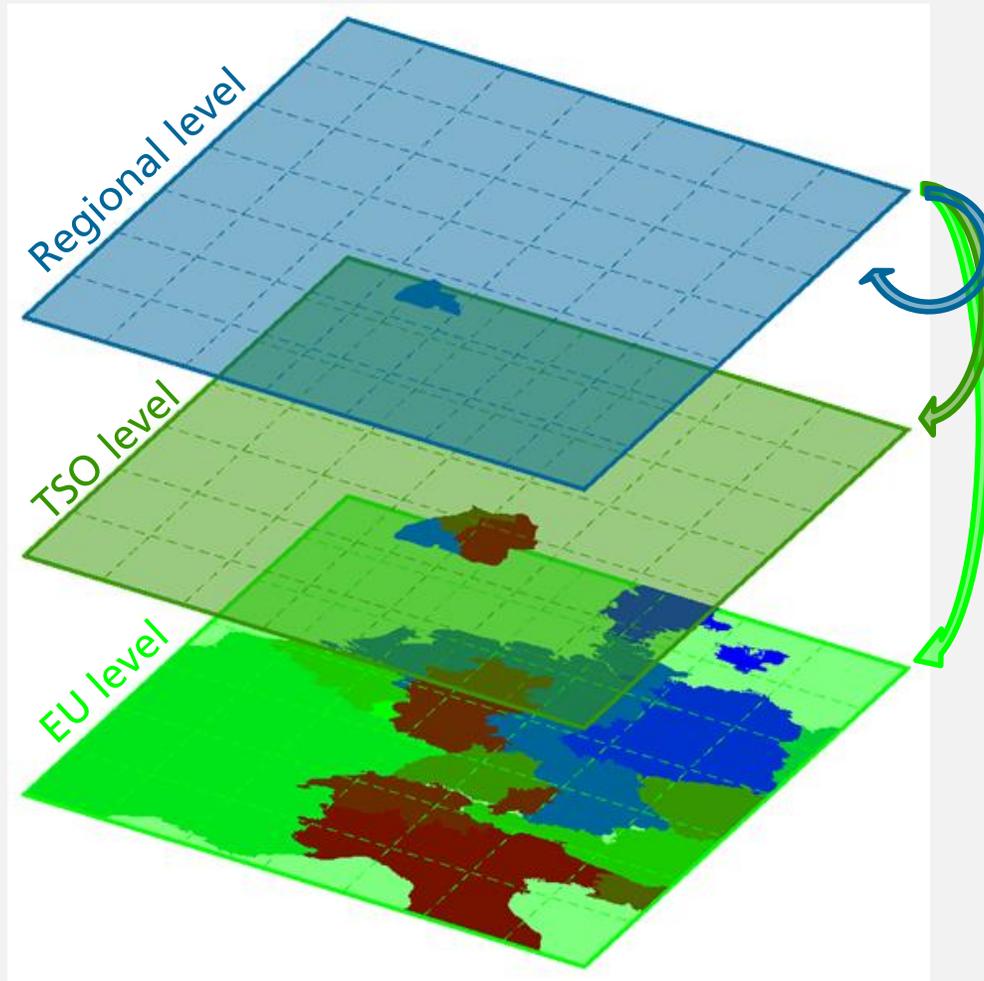
Macro System Architecture of the VPP used for tests in France & Germany



Chapter 2: Use cases of the REgions project

Ancillary services by regional level

Focus on Use Case 1, 2, 3 and 7



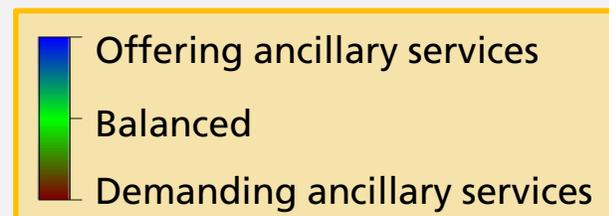
Regional: • Congestion management UC1

• Voltage control UC2

Interregional: • Redispatch UC3

• Constrained balancing reserve UC7

European: • Balancing reserve UC7



Chapter 2.1 : UC1 - regional congestion management

Statistics:



Partners:



Regional congestion management UC1

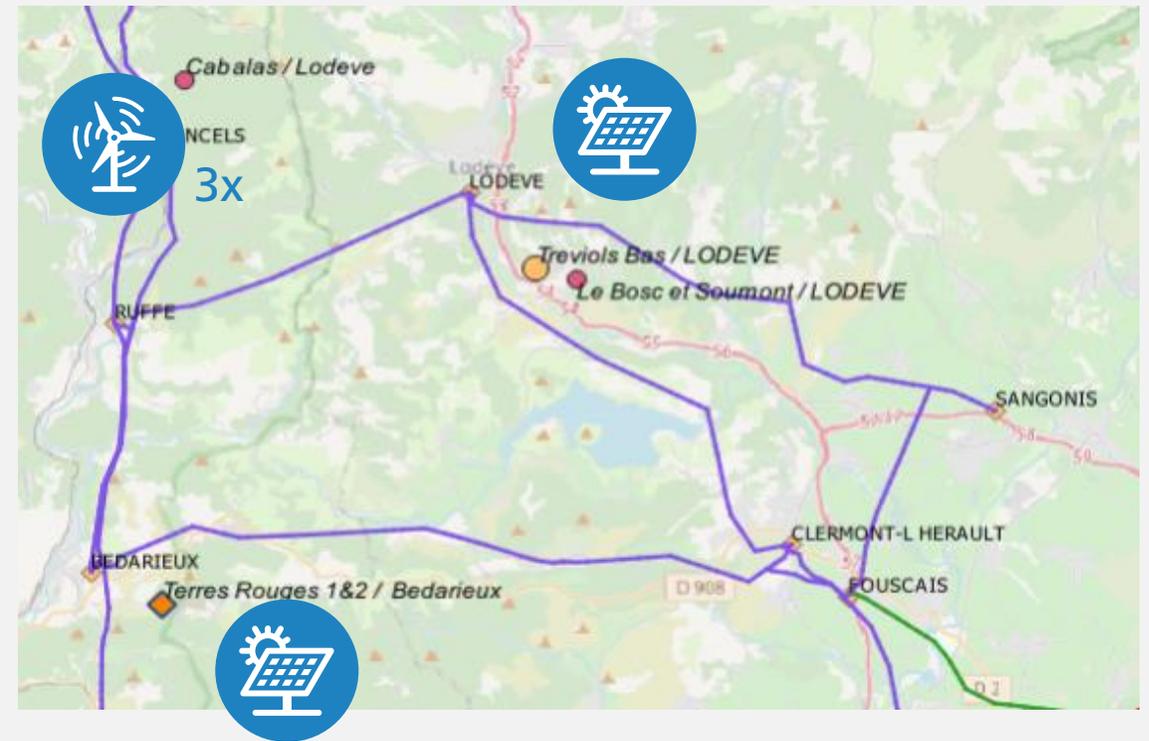
Smart Dispatch

- Addressing regional and interregional grid constraints with « regional RES cluster »

Smart Dispatch guarantees Set-Point fulfillment of a pool of Decentralized Energy Sources (DER) within a region provided by a Virtual Power Plant

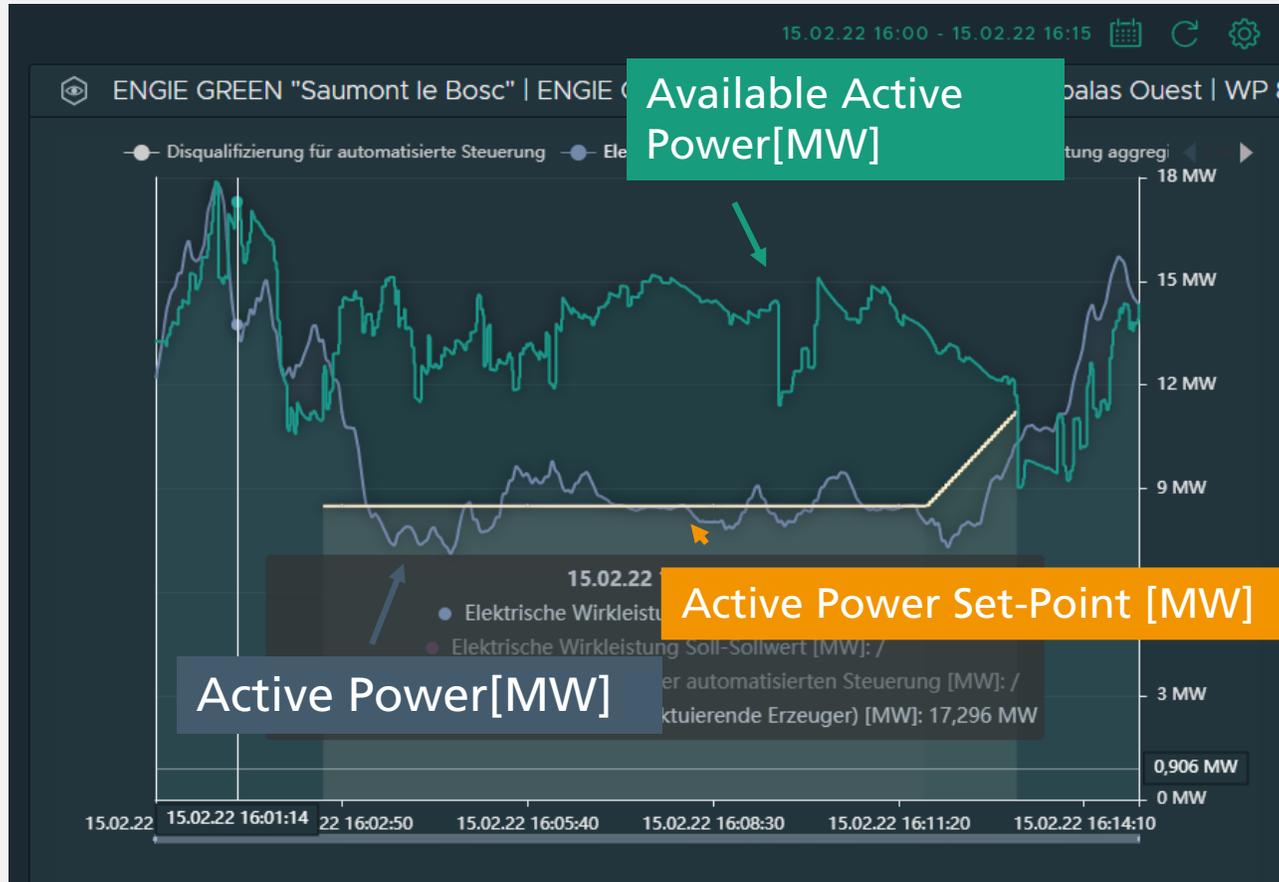
Even in case of

- Communication failure
- Non-accepted set-point
- High set-point deviation by single DER



UC1 - Regional congestion management

Sub-Use Case 1: Preventive Curtailment with Smart Dispatch



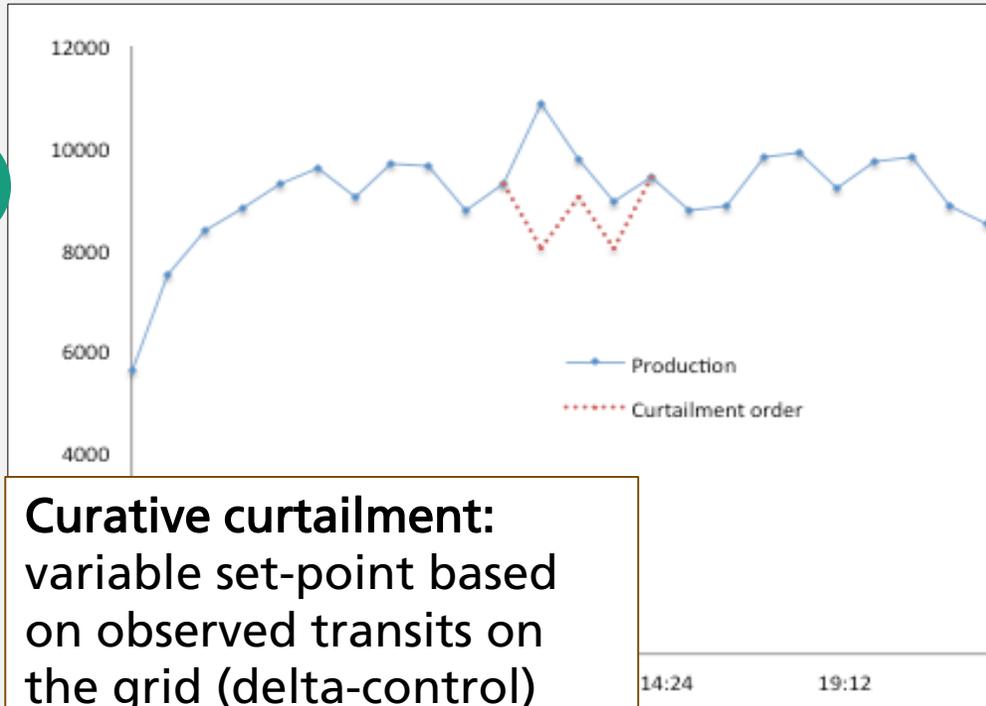
Got dropped due to Non-accepted set-point



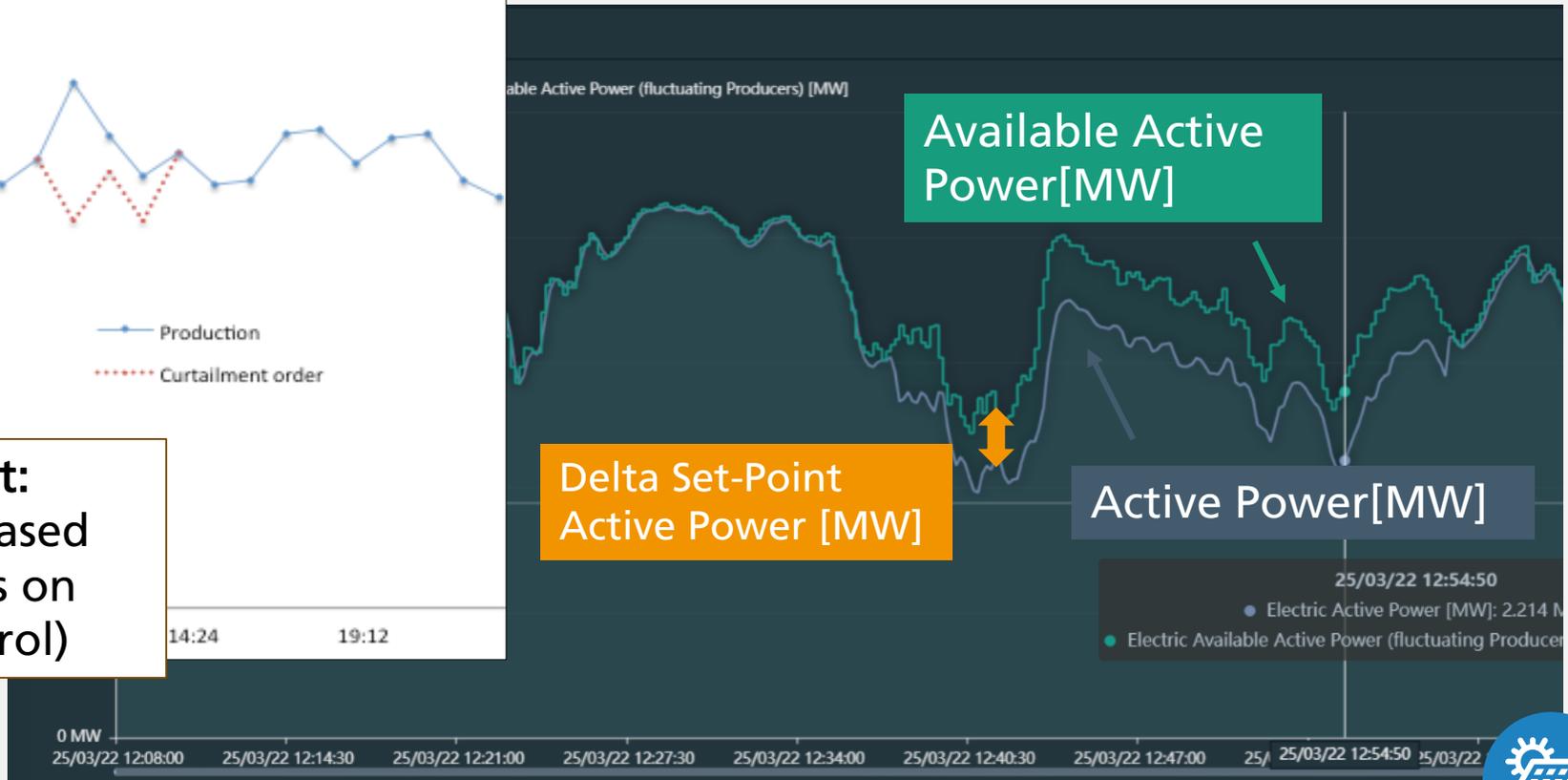
UC1 - Regional congestion management

Sub-Use Case 2: Curative curtailment

2



Curative curtailment:
variable set-point based
on observed transits on
the grid (delta-control)



1x

Chapter 2.2 : UC2 - regional reactive power provision

Statistics:

6
tests

6
Wind &
PV assets

Partners:



UC2 – Reactive Power Provision for voltage support

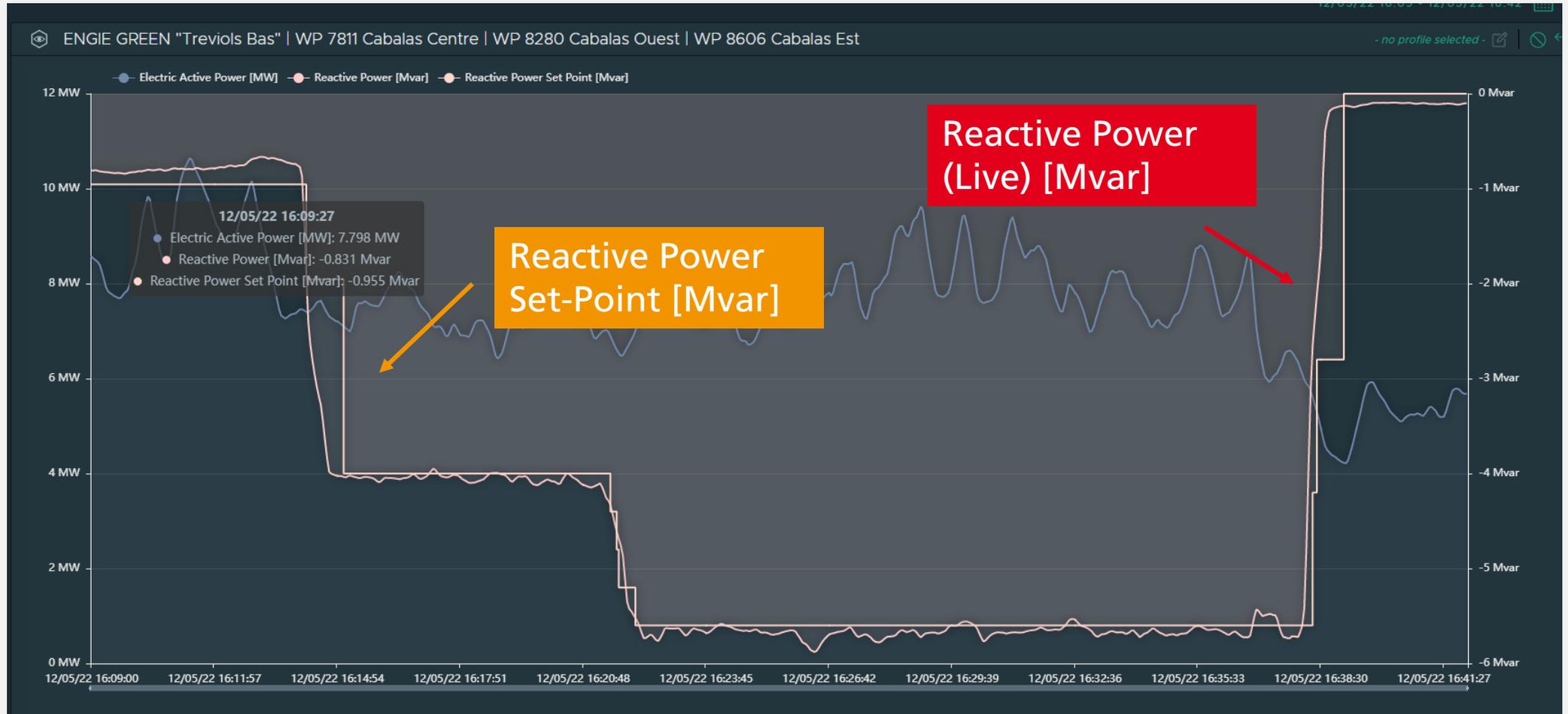
Follow fixed Q set-point for a pool of Wind- and PV parks

Asset Pool

3x



1x



Chapter 2.3 : UC3 - Antimetric REdispatch

Statistics:

2
test

3
Wind &
PV assets

Partners:

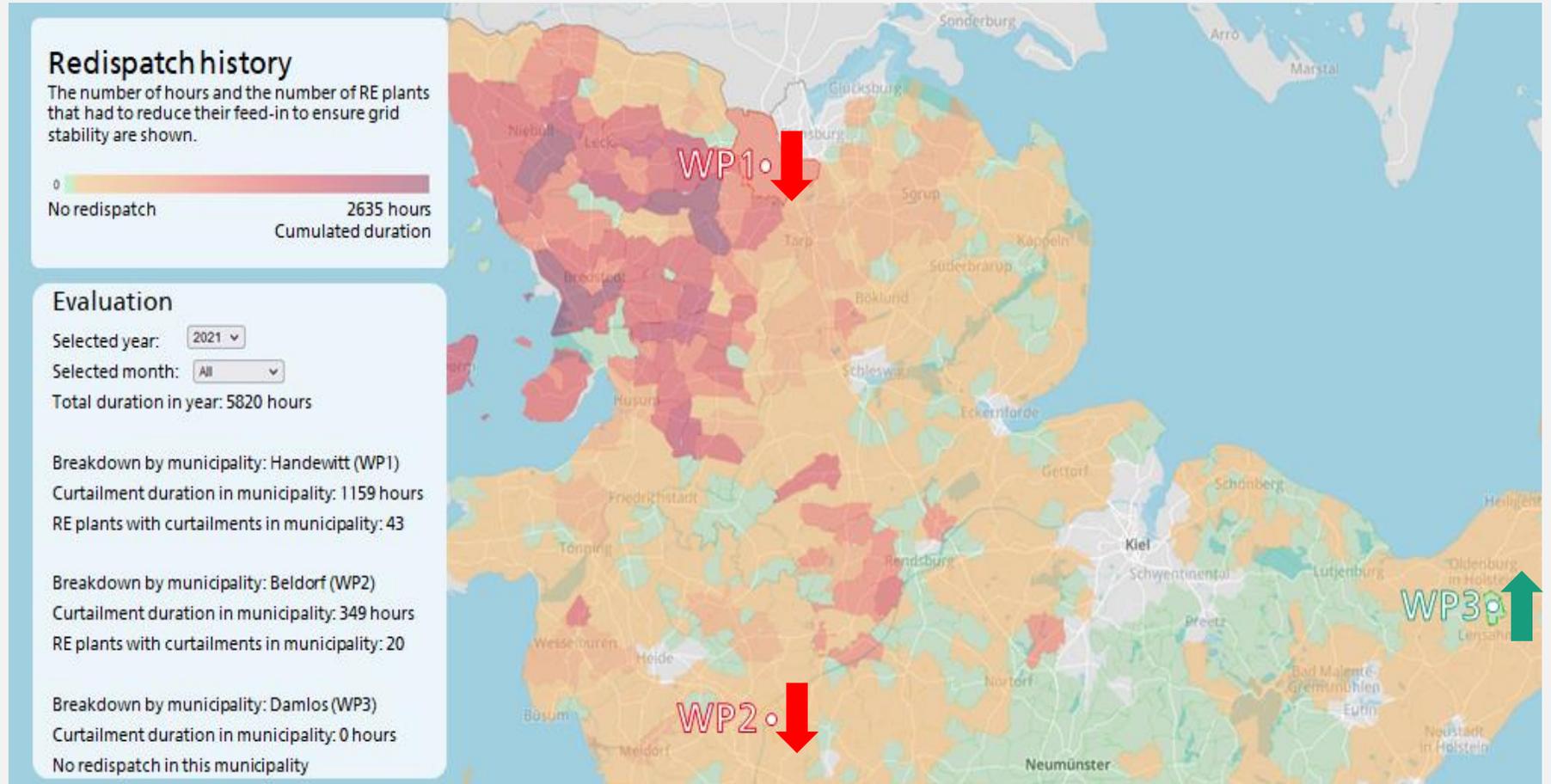


UC3 - Antimetric REdispatch

Test sites

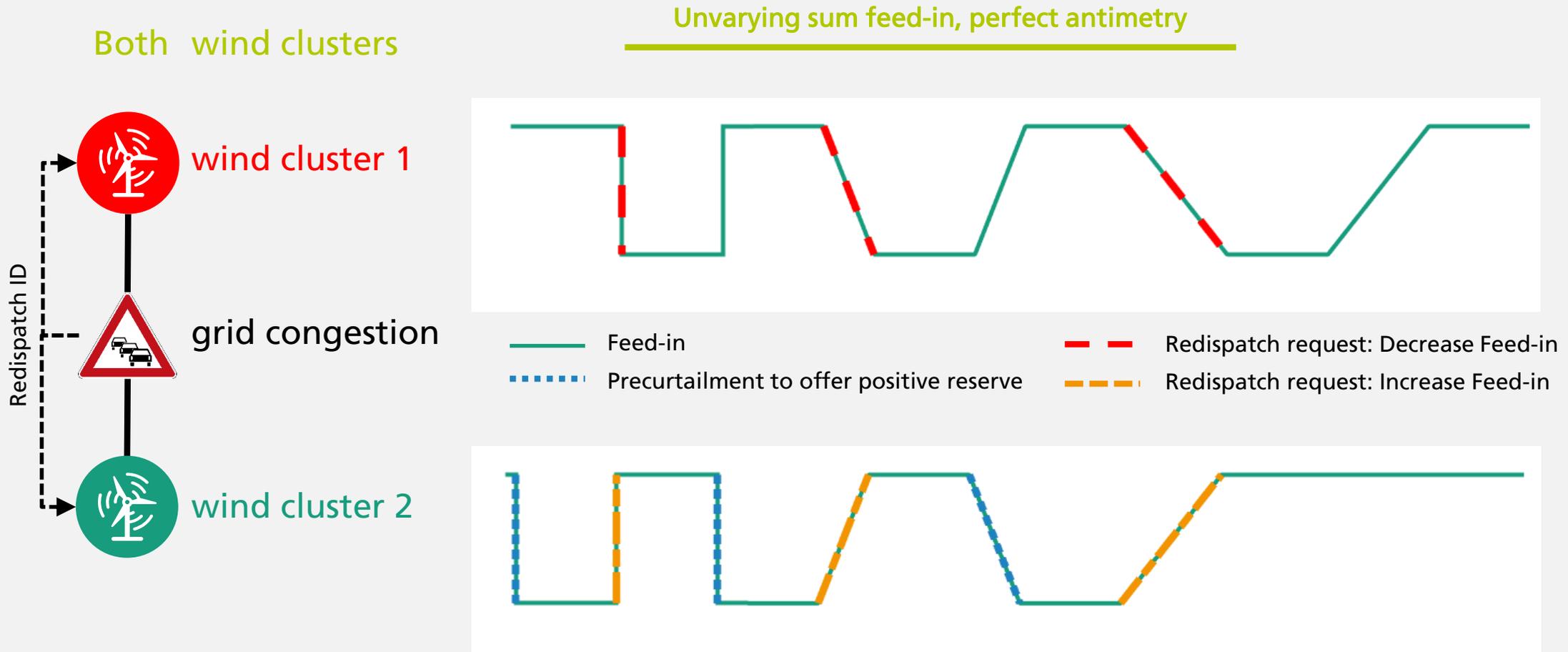
2x  wind cluster 1
WP1 & WP2

1x  wind cluster 2
WP3



UC3 - Antimetric REdispatch

Demonstration procedure



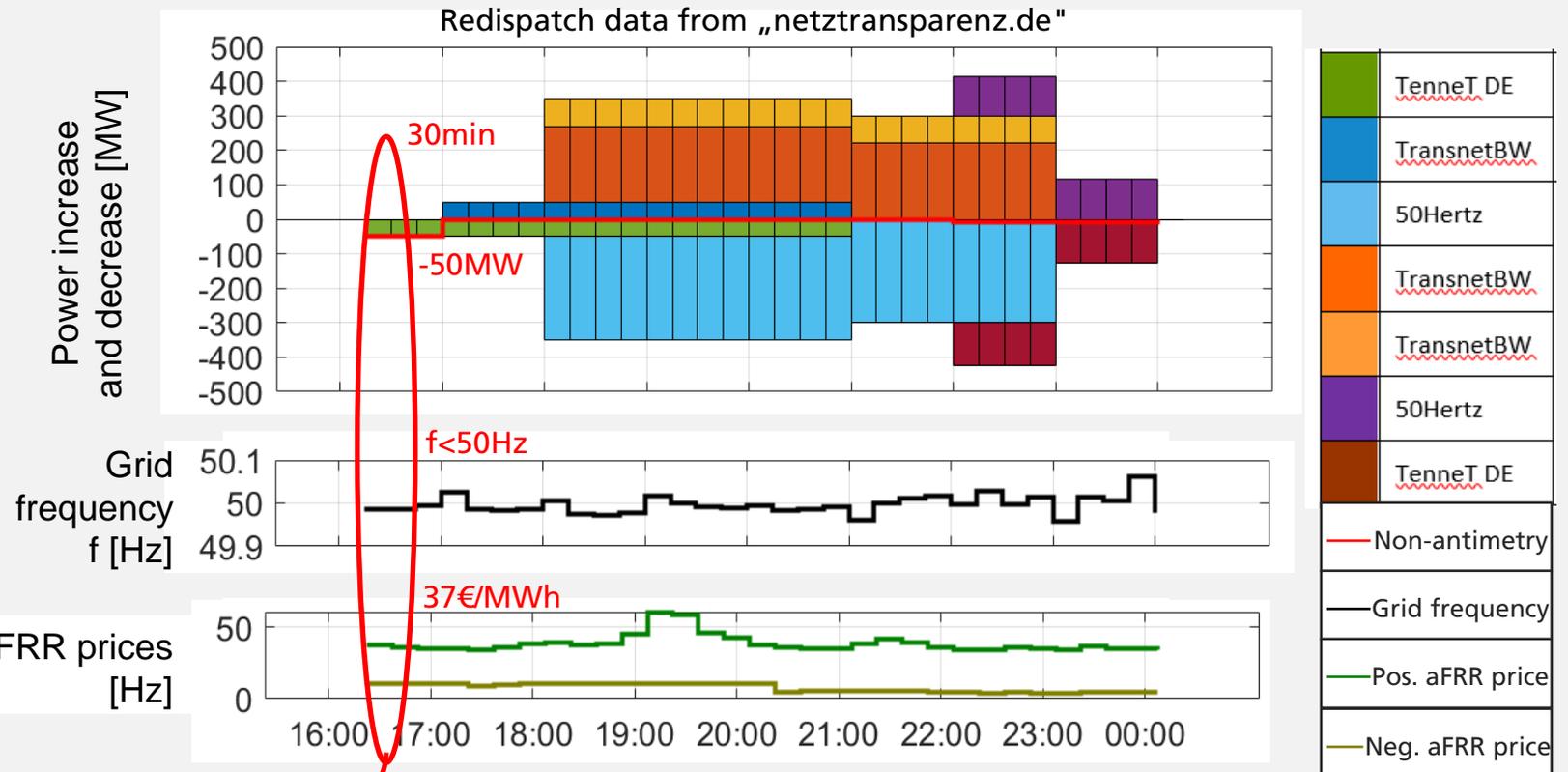
UC3 - Antimetric REdispatch

Evaluation approach using the example of conventional redispatch

- Difficulty in data analysis: no distinct connection of the redispatch activities is given, missing "redispatch ID"
- Taking into account the grid frequency
- Taking into account aFRR prices

Interpretation:

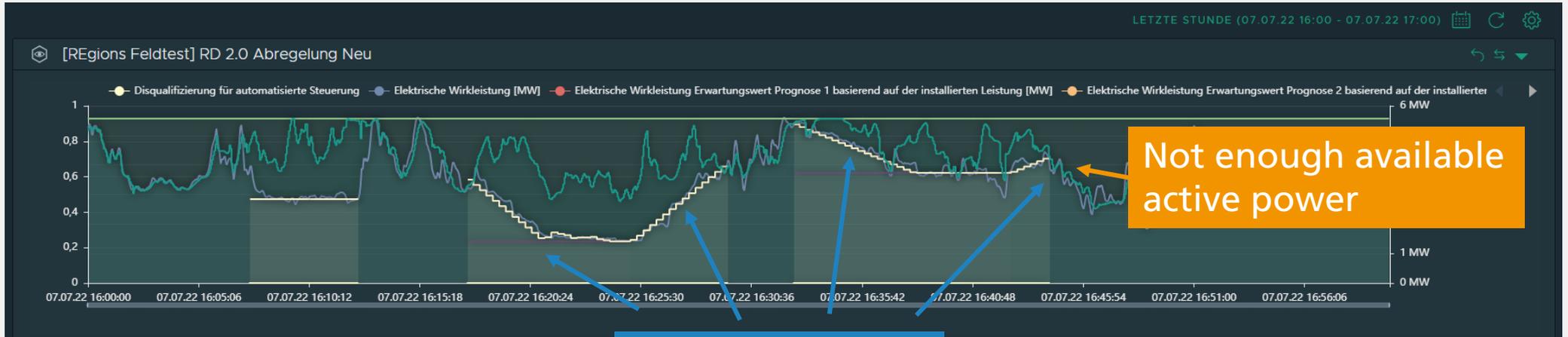
This redispatch period caused a positive balancing demand of 25MWh and 925 €



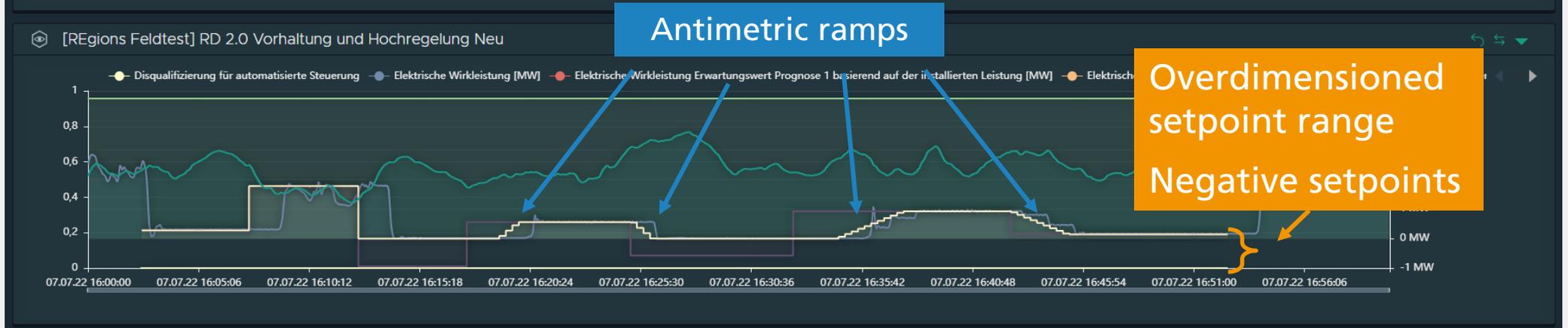
UC3 - Antimetric REdispatch

Second field test

2x



1x



Chapter 2.4 : International collateralisation of balancing reserve during congestions

Statistics:



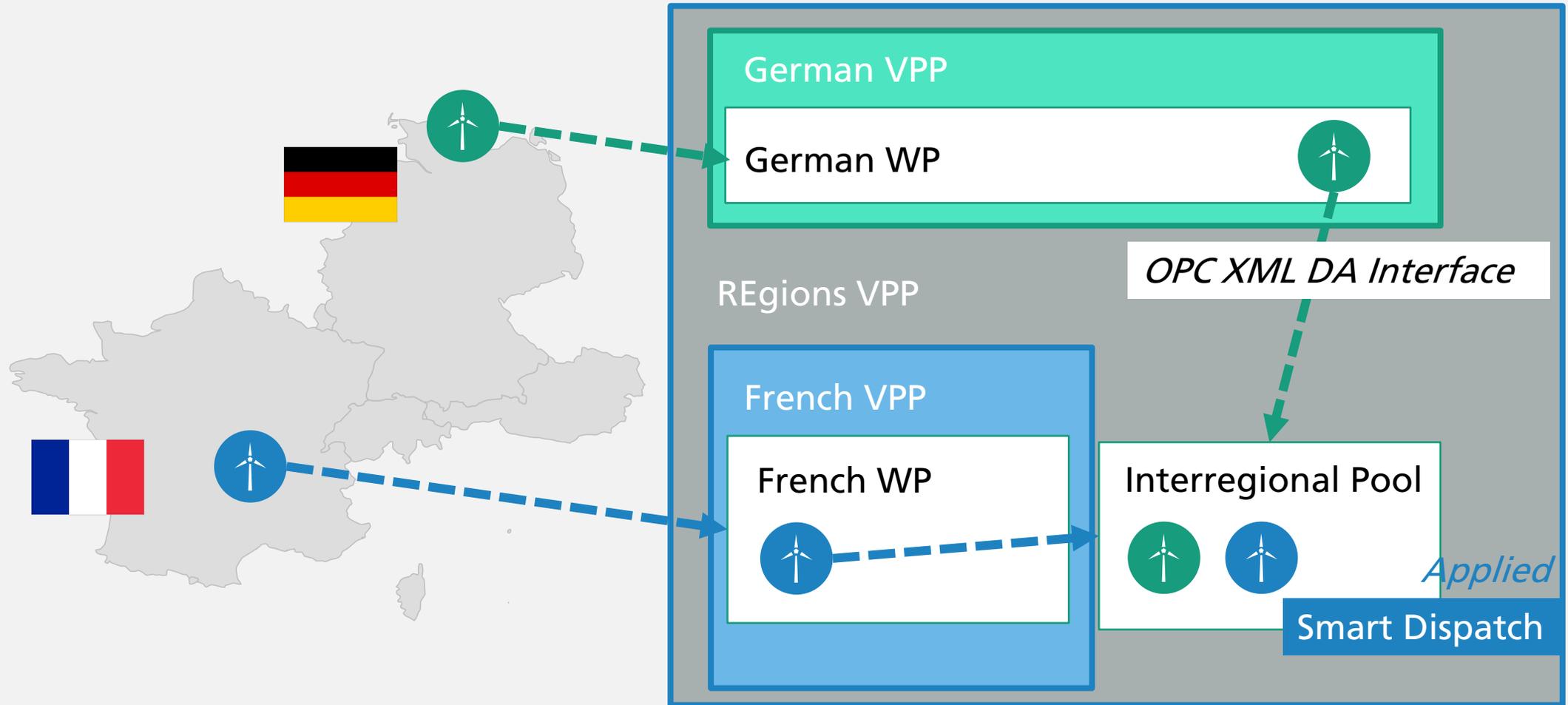
Partners:



Pending ...

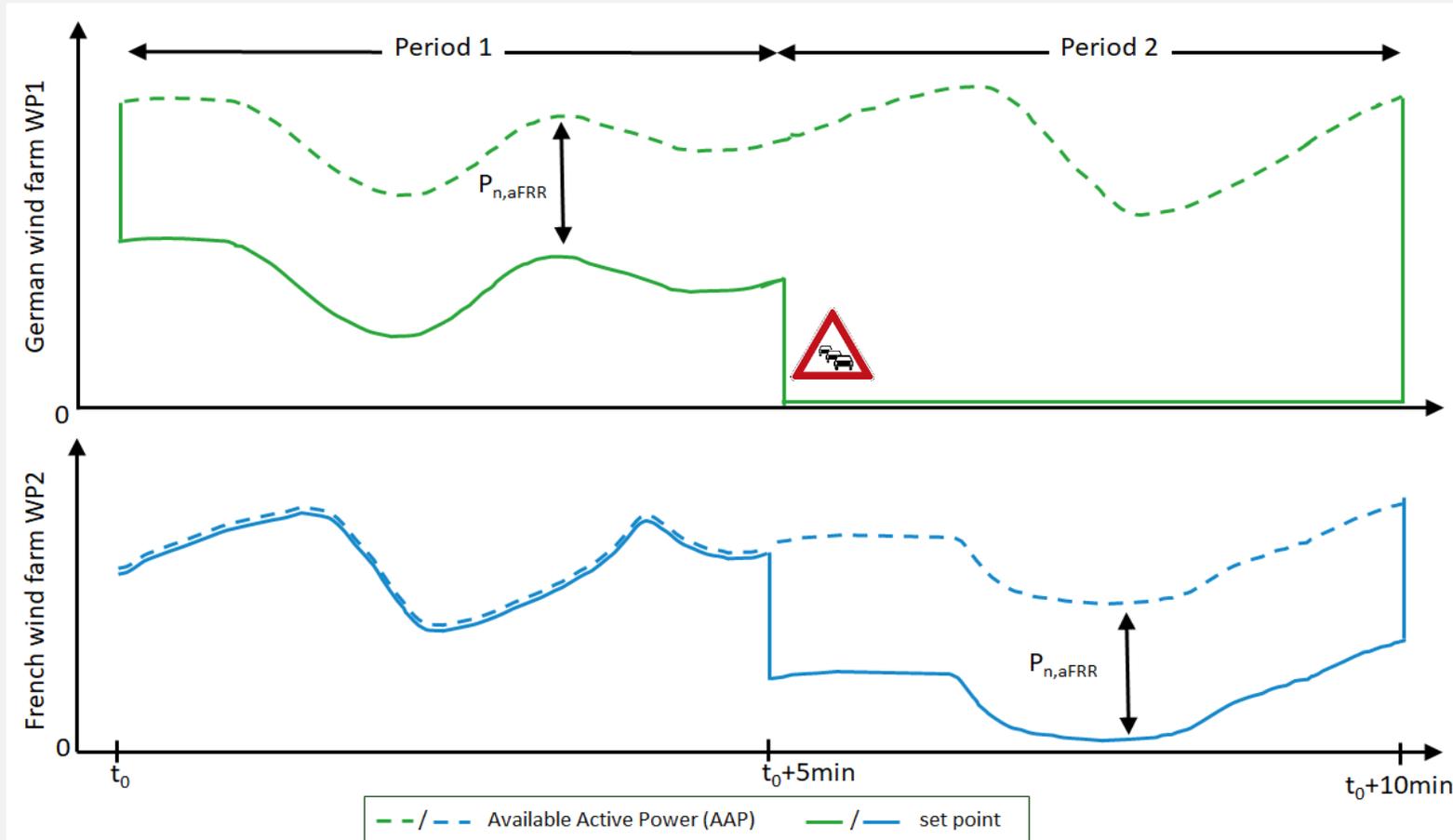
UC7 Collateralisation of balancing reserve during congestion

Implementation Interregional Controller: Approach & Set-Up



UC7 Collateralisation of balancing reserve during congestion

Demonstration process



Regulatory aspects/barriers (in change):

- Balance requirement of control areas
- Limitation of cross-border capacities
- Limitation of cross-border flows to financial flows
- Need for cross-border FRR capacities

Thank you for your attention!