

Meeting on Coordinated Balancing

View on EXPLORE initiative countries

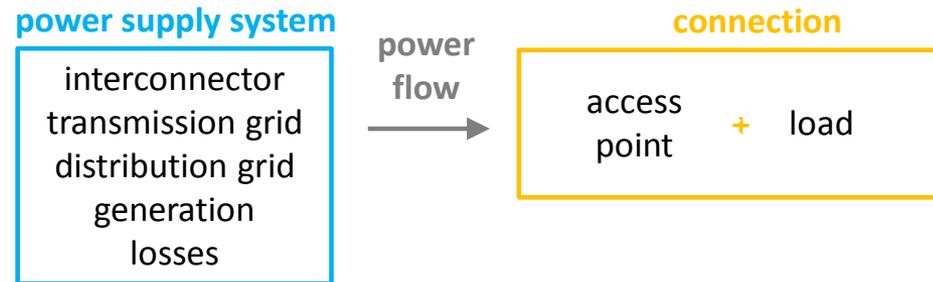
April-14-2016

Frank Nobel

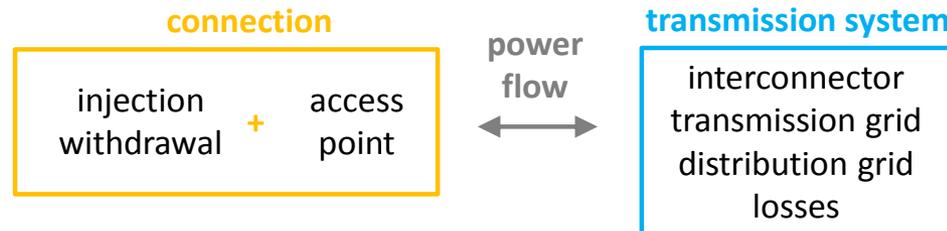
Energy only market



power supply system configuration Electricity Act 1989



transmission system configuration Electricity Act 1998



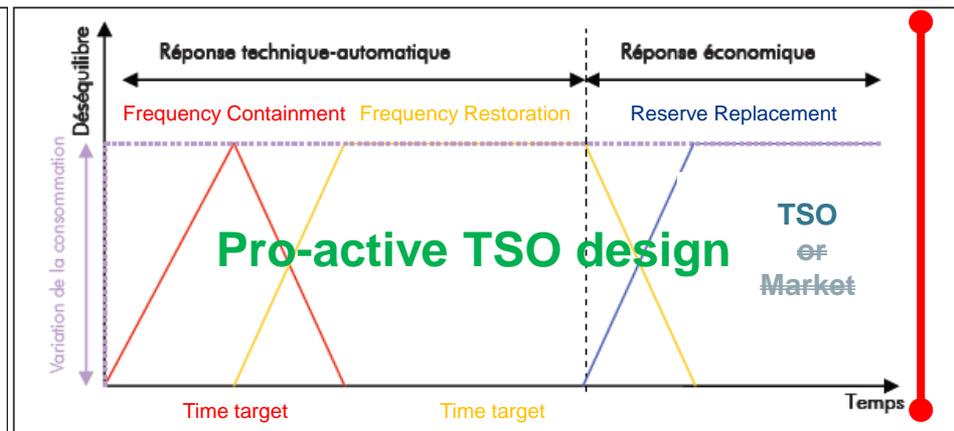
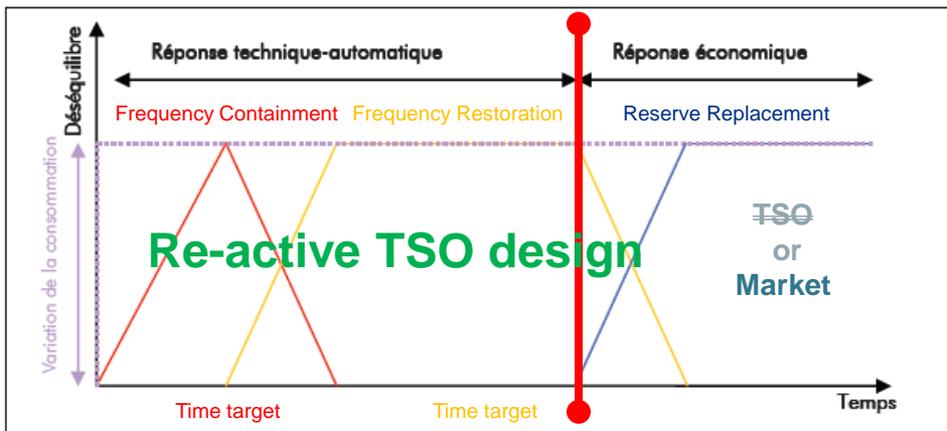
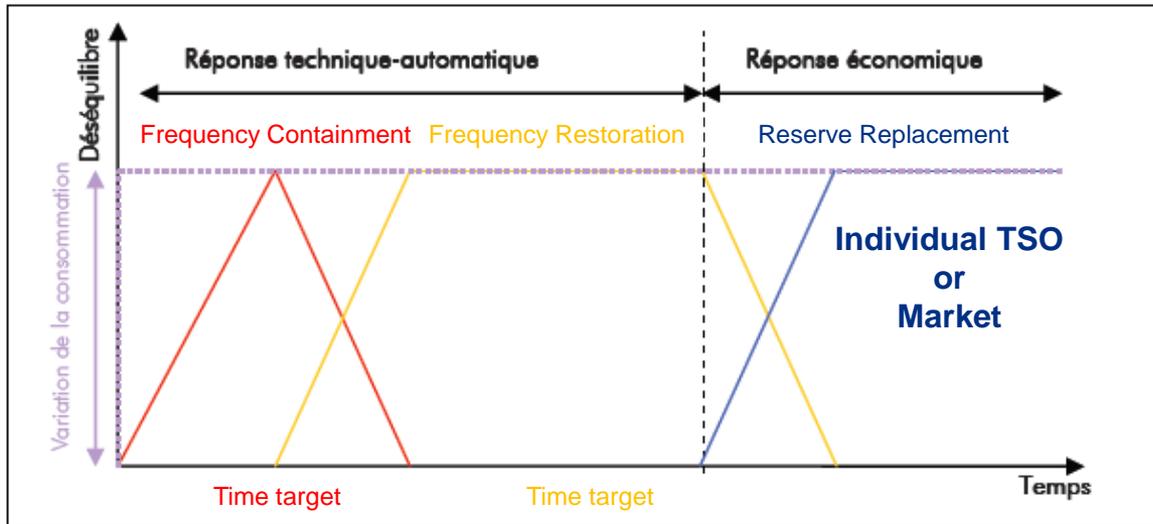


Balance Responsibility is financial: **energy**, not power.

Balance Responsibility enforces each user (no exceptions) to match its notified energy trades in **one or more** of **only** the following ways:

- transactional: notified buy equals notified sell,
- physical: net allocated dispatch equals notified trade,
- allocated injection equals sell and allocated withdrawal equals buy,
- financial: Imbalance settlement with TSO.

Process times GL SO





Balancing responsibility TSO (GL SO, EB):

- Compliancy to capacity and **power** (not energy) requirements
 - Balancing Energy is the *result* of activation of aFRR
 - Balancing Energy is the *objective* of activation of RR
- Compliancy to reserve dimensioning volume (MW)
- Settlements BRP/BSP/TSO

Financial neutrality TSO over sum of all settlements BRP/BSP/TSO:

- Imbalance
- Balancing Energy
- TSO-TSO settlements
- **Secure remuneration of deficit**
- **Dedicated allotment of surplus**



Balancing concepts

Reactive

- **All** TSO's
- **Curative** Objectives
 - Contain Frequency Deviation
 - Return to Control Program/Frequency
 - Release Activated FCR
- Input
 - Actual Frequency deviation, ACE
- Means
 - Frequency Containment Reserves
 - Frequency Restoration Reserves
 - Incentives to market

Proactive

- **Some** TSO's
- **Preventive** Objectives
 - Non-activation FRR
 - Create Margin
 - Optimization
- Input
 - TSO *Expected* System Imbalance
- Means
 - Replacement Reserves
 - *Eliminate* Market Incentives



EXPLORE

Participating countries

Austria

Belgium

Germany

Netherlands

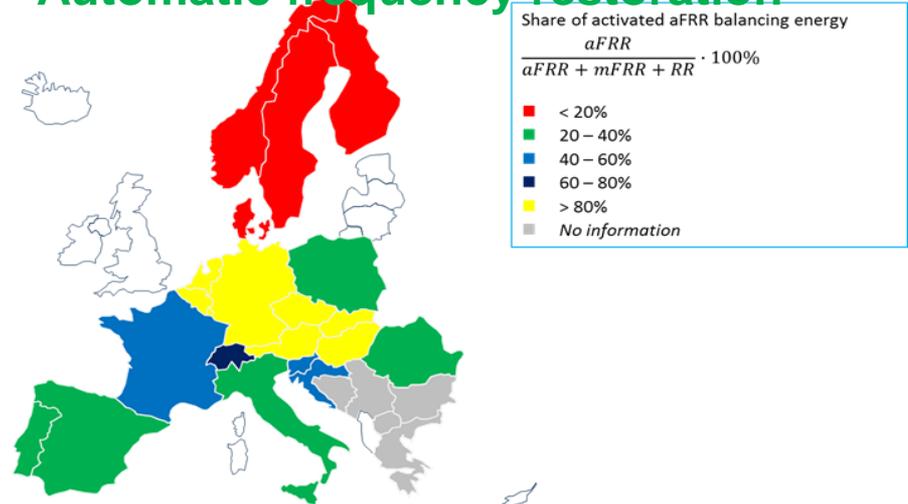
European (dis)similarities



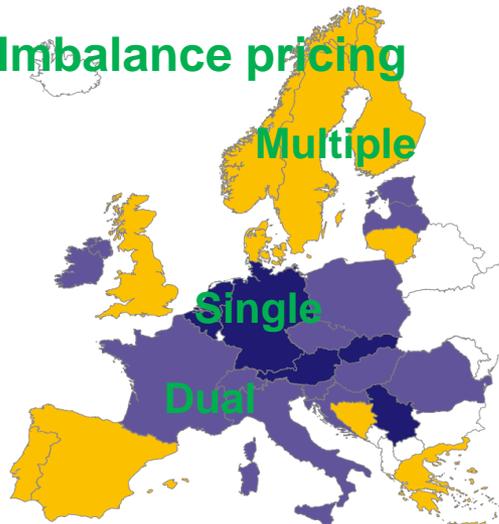
Reserve replacement



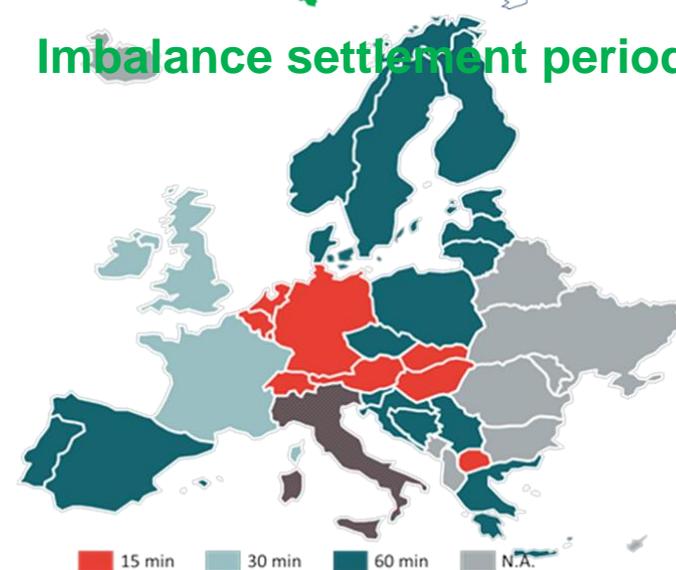
Automatic frequency restoration



Imbalance pricing



Imbalance settlement period





Incentives approach

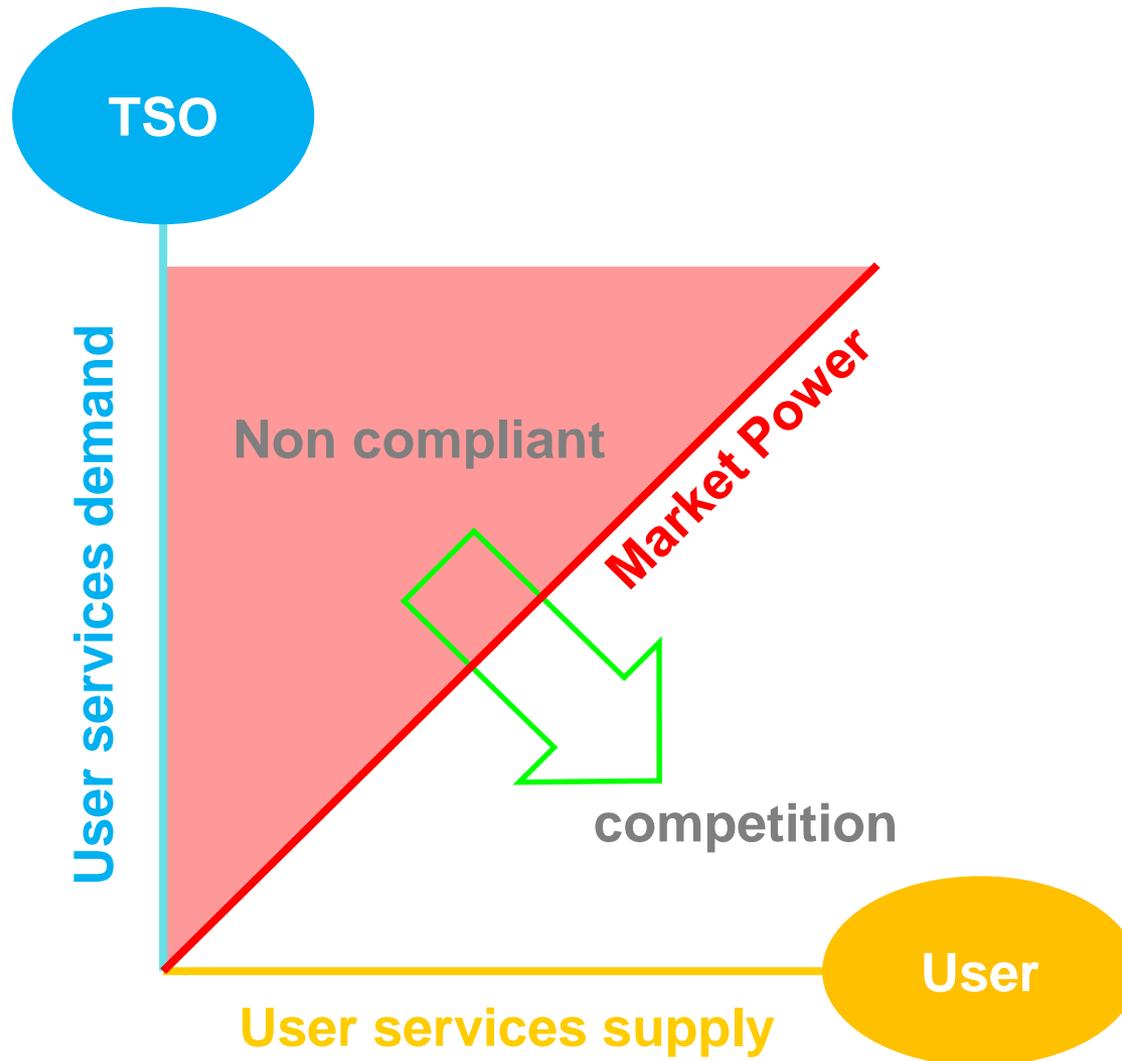
Price based

- **Some** TSO's
- Objectives
 - Limit balancing energy **volumes**
- Means
 - GCTs close to delivery
 - ISP = 15 mins
 - Single imbalance pricing
 - Marginal pricing

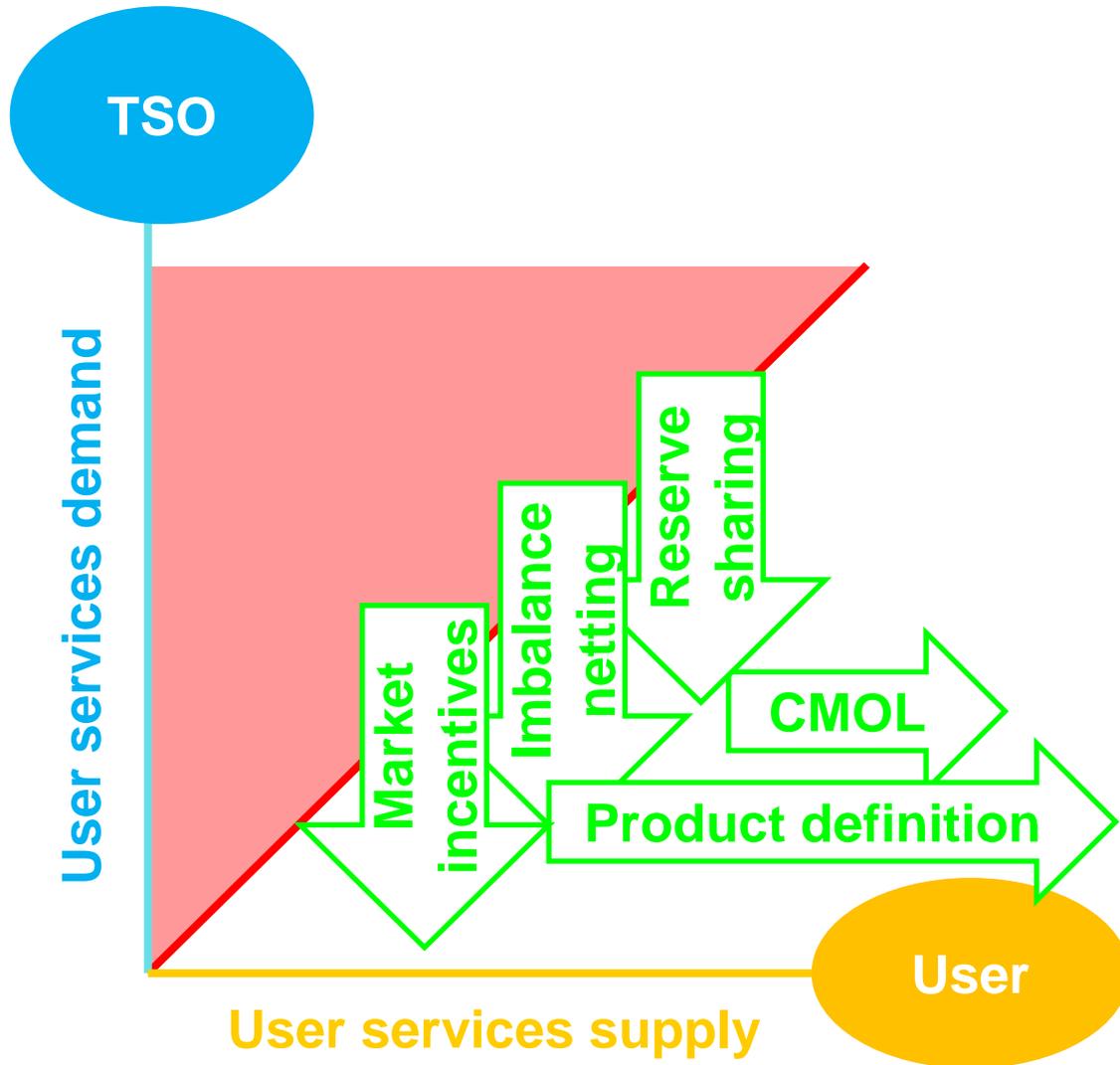
Cost based

- **Some** TSO's
- Objectives
 - Limit balancing energy **prices**
- Means
 - Early GCT Balancing
 - ISP \geq 15 mins
 - Dual imbalance pricing
 - Pay-as-bid
 - Replacement reserves

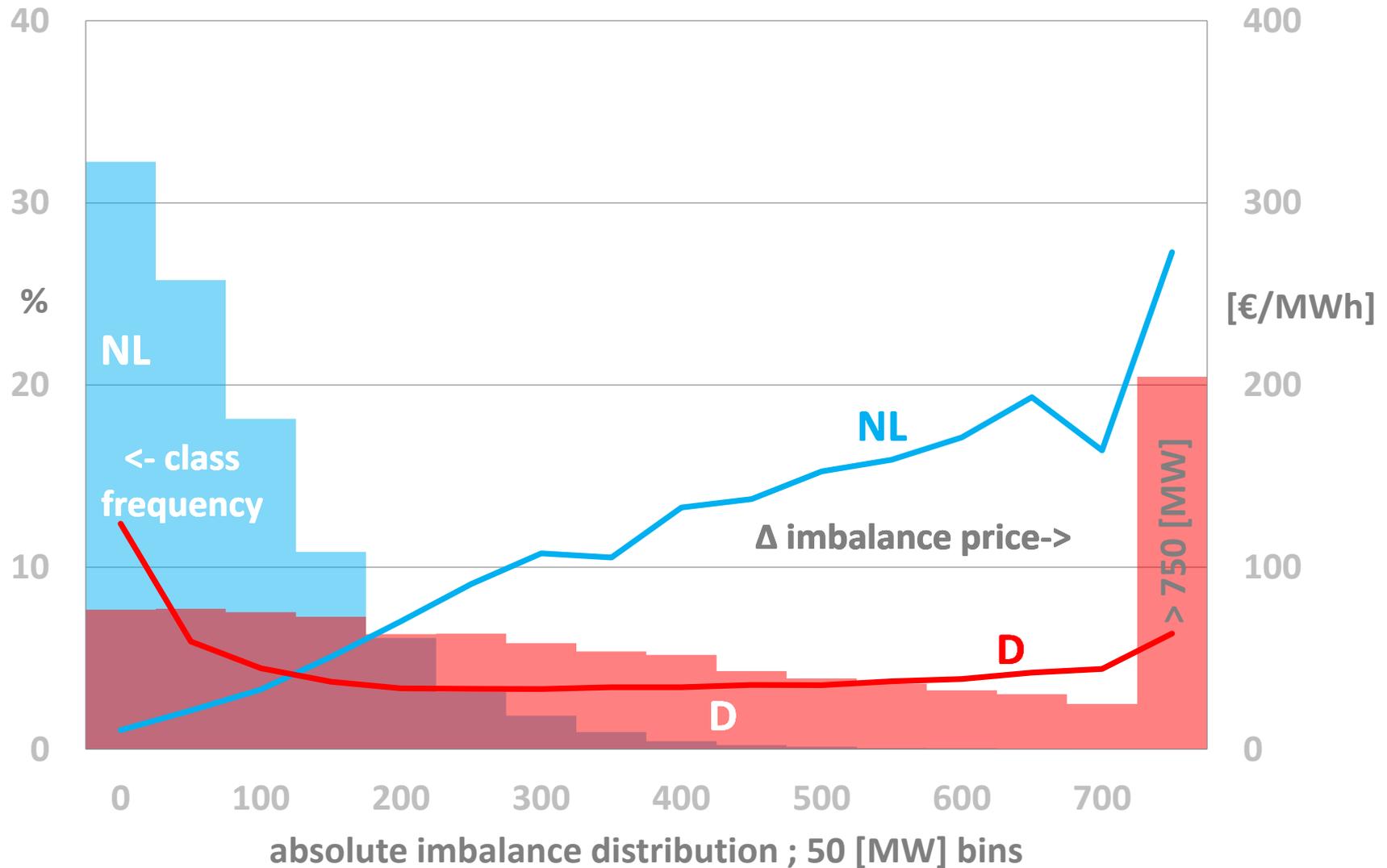
Inadequacy & Competition



Different ways to go there



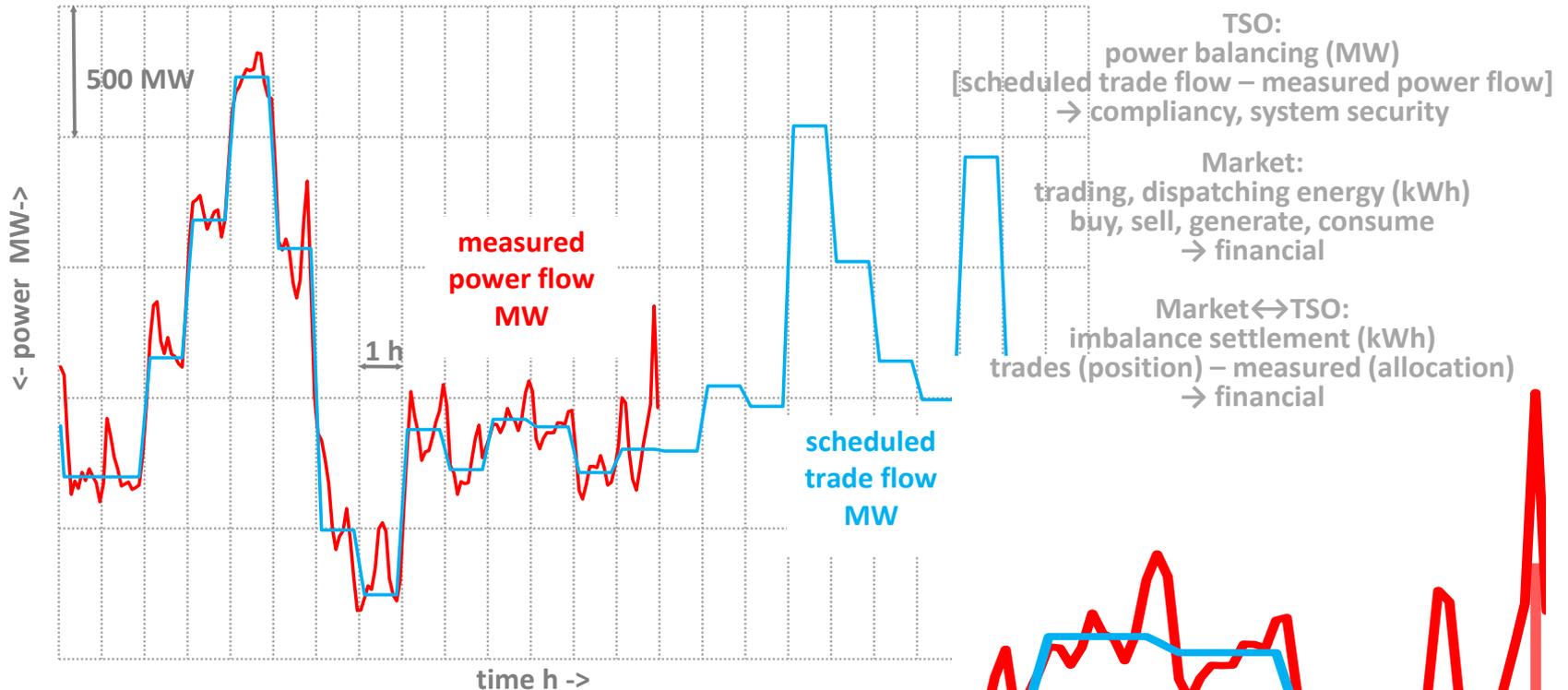
Comparison price/cost based



Back up material



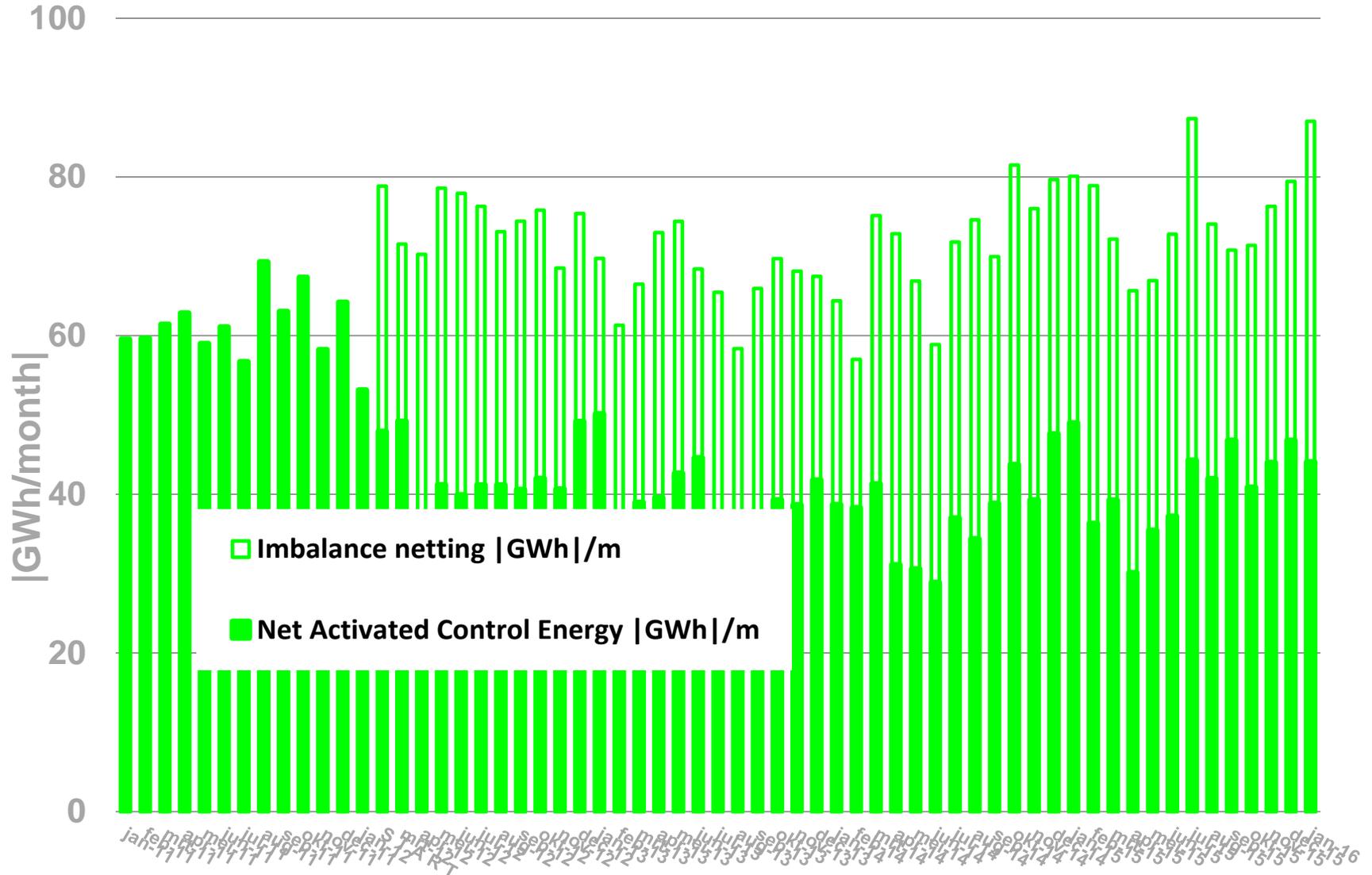
Power balancing compliance



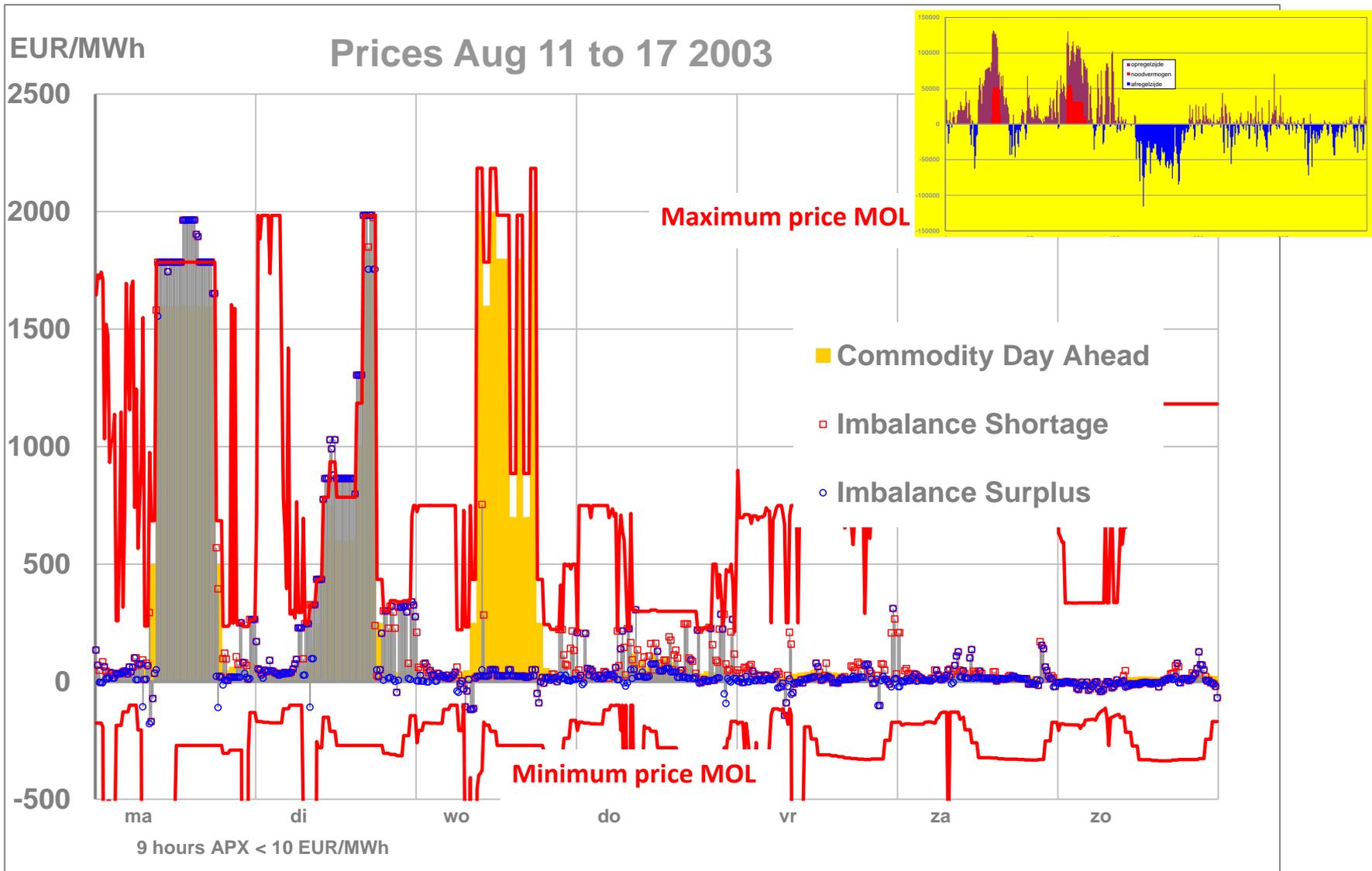
**TSO must get the red line
back to the blue line
within 15 minutes**



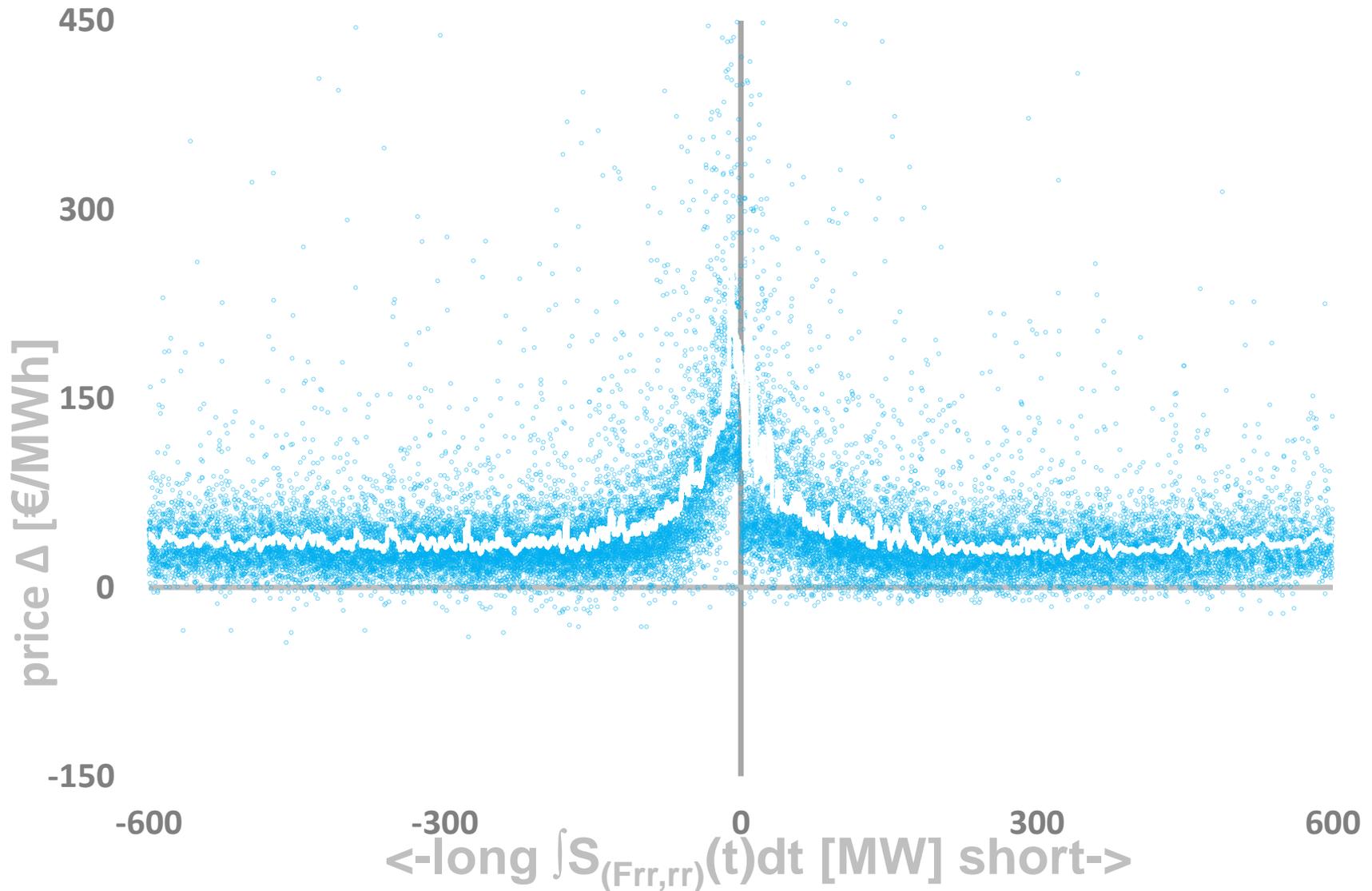
Imbalance netting



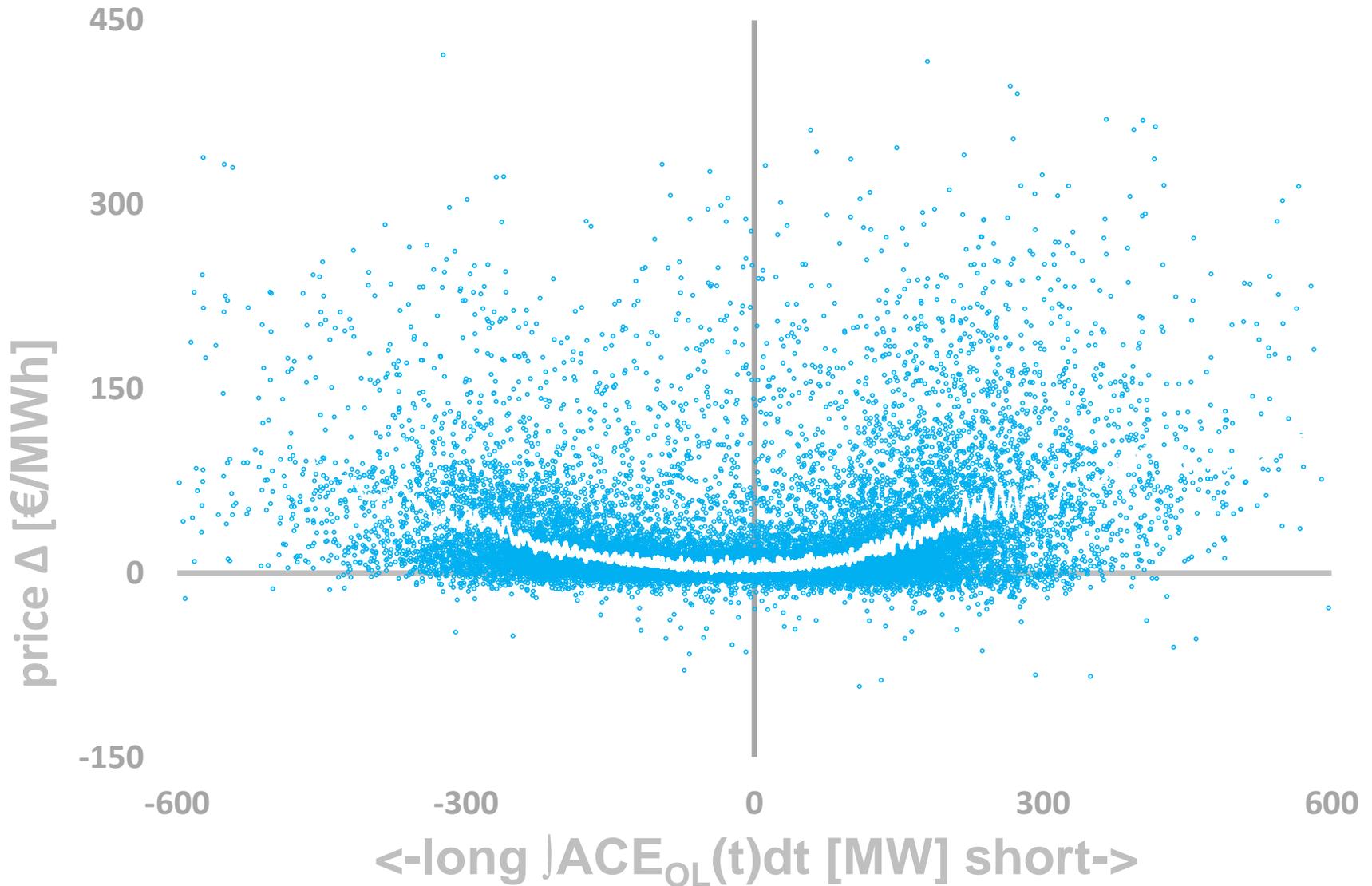
Scarcity pricing imbalance NL



Cost based scarcity pricing

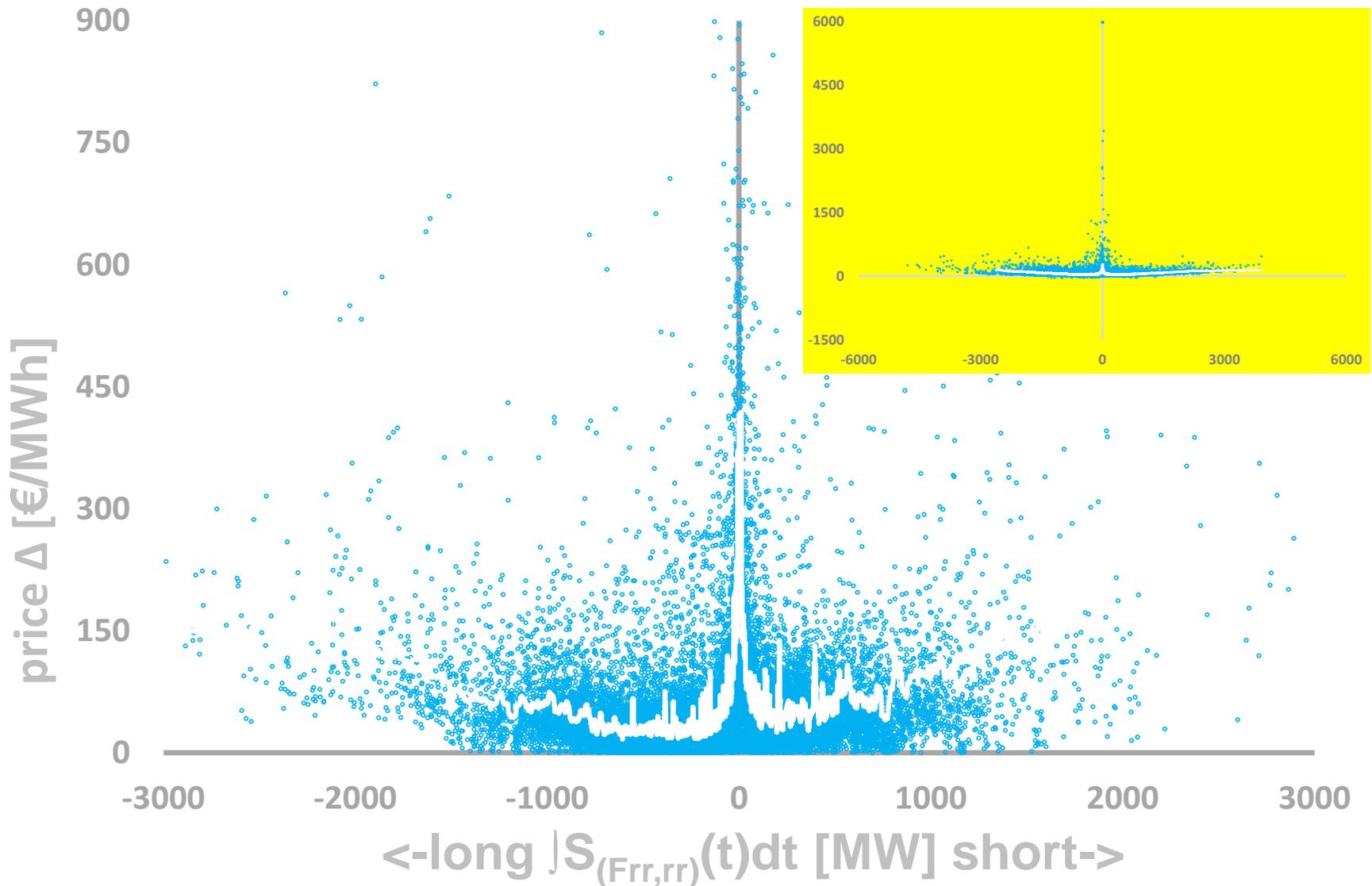


Price based scarcity pricing





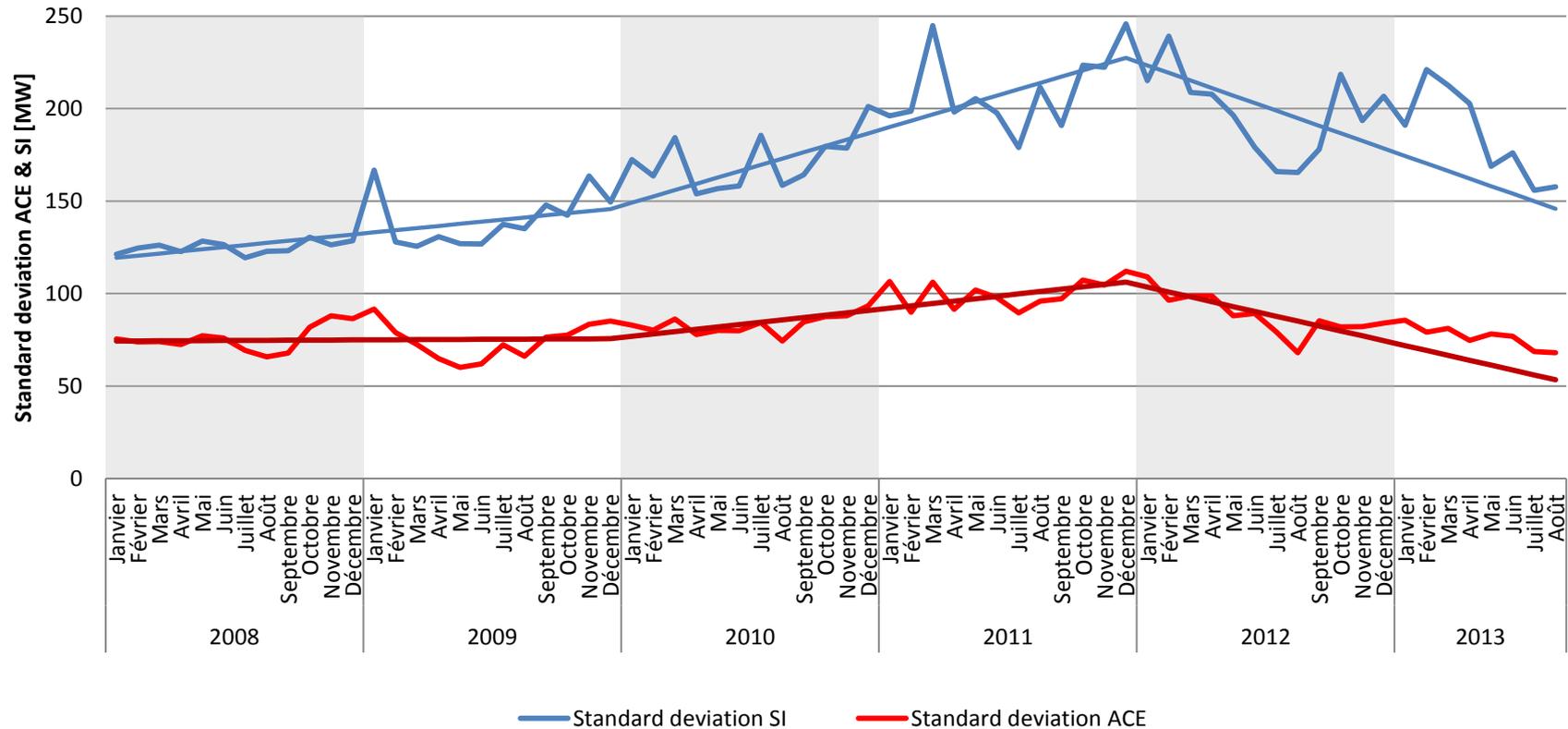
Increased scarcity signal



System imbalance BE



Evolution of the SI et ACE standard deviation 2008-2013



01/01/2012: start single marginal pricing and real time publications

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