1 Motivation: How can coordination foster security of supply?

Starting point: Power market transformation in the EU

- Intermittent renewable energy sources are changing the daily and seasonal price profiles on spot exchanges
- Uncertainty on future investment, plus, phase-out of nuclear
- Discussion in the EU on Capacity Remuneration Mechanisms for ensuring security of supply

How can regional coordination foster security of supply?

→ Focus: coordination of strategic reserves (SR)

→ „Plattform Stommarkt“ envisages SR for the German market

→ Neighboring countries such as Belgium or Poland have SR

→ Findings from DIW report Neuhoff et al. (2014)

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OUTLINE

1. Motivation: How can coordination foster security of supply?
2. Coordination and security of supply in the EU
3. International coordination via strategic reserves: Design
4. International coordination via strategic reserves: Welfare
5. Conclusion

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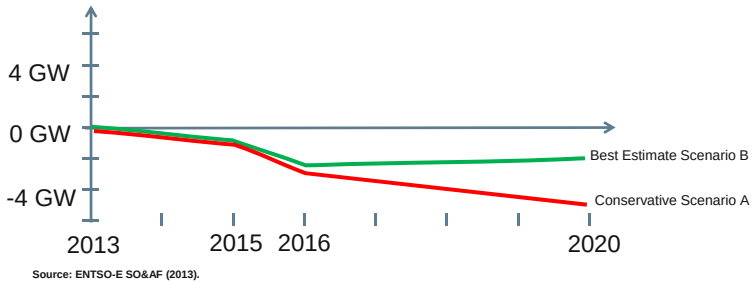
2 Gains from international coordination?

Example Germany-Poland

- Today **in Germany**, large overcapacity
- Additional market exit of several units announced for the years to come
- Discussion on regulatory response (CRM?)



Source: ENTSO-E SO&AF (2013).

- **In Poland**, expected plant closure in 2016, too few capacity
- Additional closure expected following IPPC
- Significant investment in generation technologies needed

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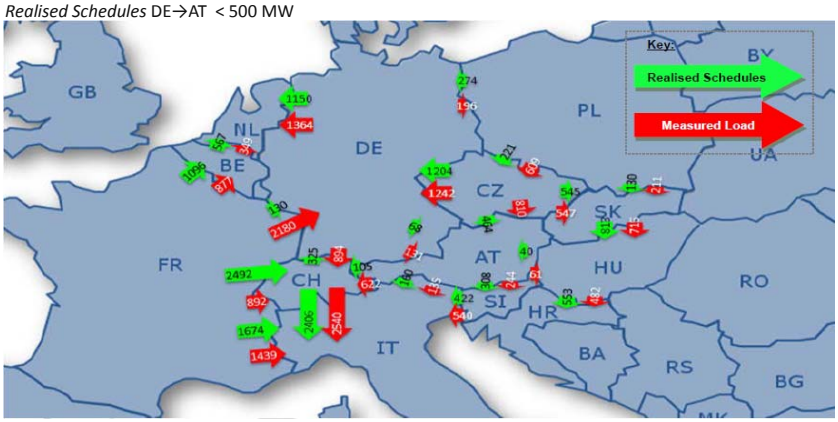
2 Coordination among TSOs needed…

- Uncertainty in RE generation →uncertainty on what conventional stations run in real-time, this holds cross-border:

Realised Schedules DE→AT < 500 MW



Source: Joint study by ČEPS, MAVIR, PSE and SEPS, January 2013

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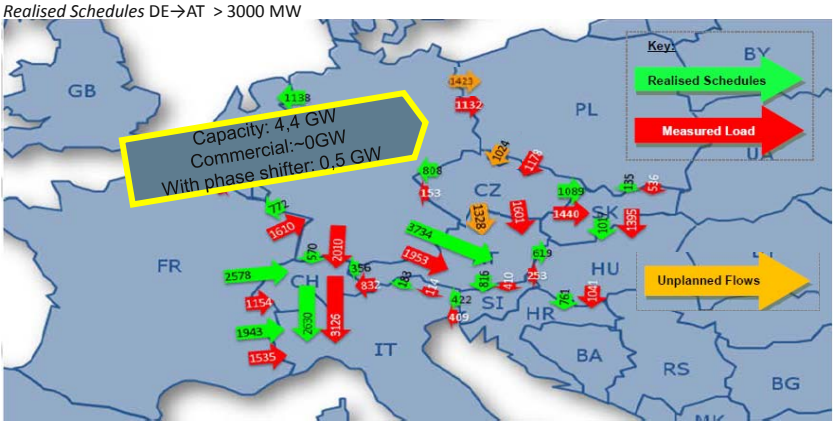
2 … to allow for cross-border synergies

- TSO coordination needed for grid operation with more RE; FB approach helps in cross-border capacity allocation

Realised Schedules DE→AT > 3000 MW



Source: Joint study by ČEPS, MAVIR, PSE and SEPS, January 2013

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2 Gains from international cooperation exist

Win-win for both Poland and Germany via

- Joint use of available installed capacity (2016, 2023)
- Pooling of intermittent sources
- Joint use of flexible sources

Requirements

→Ensuring available X-border capacity available for trade (also with SR!)

→Phaseshifter not sufficient; only 500 MW of 4,5 GW

→Flow-based allocation will offer improvements

How can CRMs be implemented/ added in a similarly coordinated fashion?

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3 Coordination in CRMs: Strategic Reserve

„If generation inadequacy is identified as a serious problem […] Member States are invited to assess the alternative measures […]. These are the promotion […] of demand response […] and expansion of interconnection capacity." **EU-COM C(2013) 7243 final, November 2013**

Source: DIW Berlin (2014).

- However: NRAs respond differently and not always exploit cross-border synergies first (as in UK capacity market)
- Leads to divergence in market design and possibly less synergies across all systems
- Coordinated SR has to take account of country specifics

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3 Strategic Reserve in Germany… and cross-border

Political / technical / economic requirements for a SR

1. Ensure supply, during emergency, without biasing market decisions
2. Design in line with climate policy and goals for coal power plants
3. Create flexibility both in energy market and SR
4. Allow for cross-border use

Having coal-fired plants in the SR addresses points 2 and 3

- Reduces emissions relative to gas-fired SR and coal-fired market
- Offers (political) perspective to coal plants (for employment etc.)
- Establishes economic viability for currently out-of-merit gas units
- Brings more flexible (gas) generation units into the market
- Coal easy to store relative to gas (PJM case with CRM and high gas prices)

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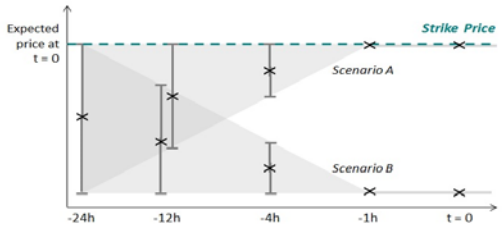
3 Flexibility in coal-based strategic reserve

Hard coal alone might not be flexible enough for timely SR activation:

→ **Flexible mechanism needed for activation of SR**

- In case of possible use of SR (scenaria A below), hard coal will be started, partially and several hours ahead of real-time
- A corresponding amount of flexible, say gas, units will be reduced and compensated revenue neutral
- Both hard coal and flexible stations can now be employed for SR



Source: DIW Berlin (2014).

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3 Designing strategic reserves for cross-border use

Design of national and coordinated X-border SR not necessarily identical:

Design Element	National SR	Coordinated SR	Difference
Procurement	National	National, potential for coordinated amount of SR	Coordination allows for pooling effects and potentially less SR
Trigger	Fixed strike price or last commercial bid	Coordination on fixed price advantageous	Adjacent SRs starting at single-zone-last-commercial-bid can crowd out market based solutions
Activation	Early activation advantageous	Coordinated early activation needed	Need for adjacent TSOs to forecast flows
Cost allocation	Simple	International cost allocation necessary	Both variable and fixed costs of SR can be passed on in shares to country A and B

Source: based on DIW Berlin (2014).

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3 Advantages / an example design of a coordinated strategic reserve

1. Amount of reserve capacity will be optimized internationally (procurement of shares can still be done nationally)
   - SR can be smaller / cheaper with joint calculation of SR
2. SR triggered at internationally coordinated strike price
   - strengthens credibility and lock-in of SR design
3. SR triggered simultanously in adjacent systems if prices equally high
   - Costs need to be allocated (possibly proportional to SR size)
4. Flexible activation mechanims, especially if inflexible (coal) units part of one national SR
   - Coordination for early activation / substitution with gas units increases overall flexibility

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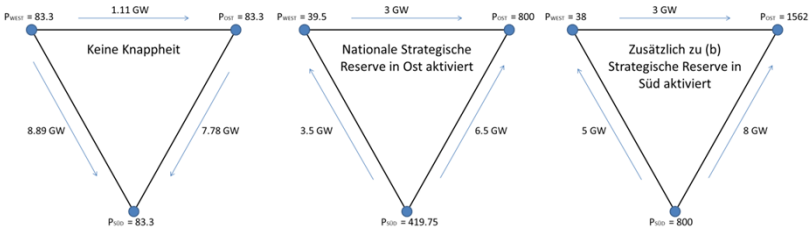
4 Welfare with X-border use of strategic reserves – a stylized example

- Three countries EAST, SOUTH, WEST with demand of 3 GW each
- Capacity of 4 GW in each system plus 10% SR
- Demand in EAST increases up to 5.5 GW
- Transmission constraint WEST <-> EAST of 3 GW
- Strike price of SR of 800



→ With FB approach, SR in SOUTH can help during scarcity in EAST even though transmission constrains partly bind

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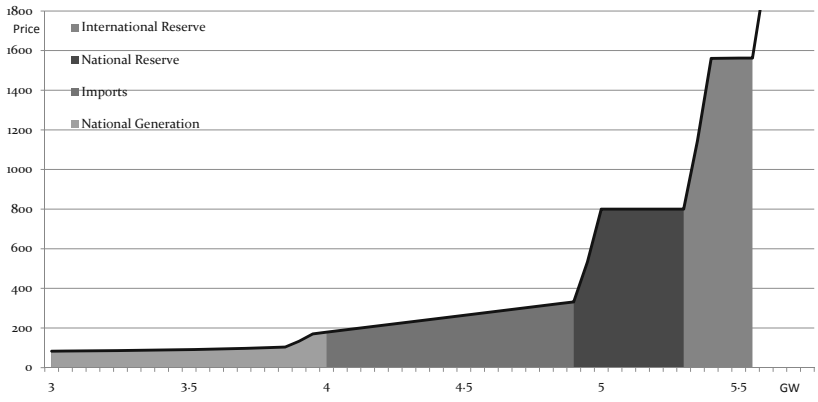
4 Welfare with X-border use of strategic reserves – first results

Coordinated SR increases supply security / welfare in scarcity region:



Source: based on DIW Berlin (2014).

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5 Conclusion

- Coordination in EU power markets enhances security of supply both
  - via TSO coordination for allocation x-border capacity and
  - via coordination of CRMs
- For the SR, we argue that it is possible to implement such mechanisms across borders, for instance between Germany, Belgium (currently having to deal with heavy generation loss) or Poland (exit of coal units)
- In the German context, the SR could include coal units to also address climate strategies; a flexible activation mechanism for coal units guarantees effectiveness of SR
- First ideas, many implementation details still TBD…

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