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Cross-Border Balancing Cooperation in the Alpine Region: Benefits and Challenges

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Agenda

1. Motivation

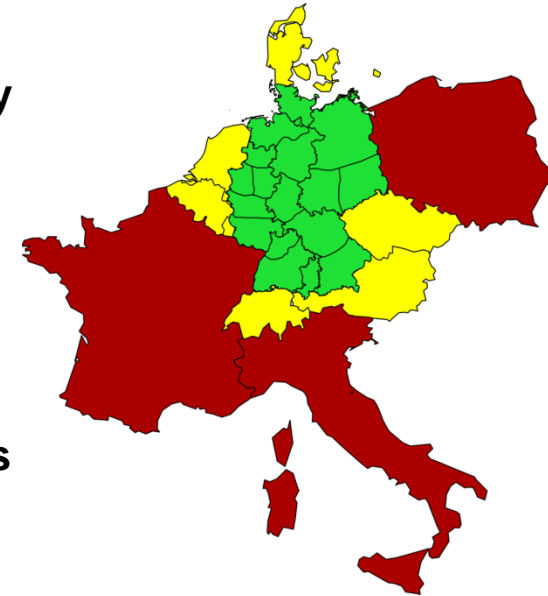
2. Setting

3. Model Structure

4. Results

Motivation

- **Balancing capacity/energy** is used by TSOs to **balance the electricity system** when **positive or negative deviations** from the scheduled production or consumption are occurring
- **Increasing share of fluctuating renewable energy sources could lead to an increasing amount of necessary balancing capacity**
- **Continuous growth of intermittent share requires further actions as auction timing is limited**



The International grid control cooperation

- **The new Network Code on Electricity Balancing by the ENTSO-E fosters cross-border exchange of balancing services with the objective to lower overall costs**
 - Harmonization of electricity balancing rules
 - Cooperation by imbalance netting, joint activation and joint reservation of reserves
- **IGCC allows for imbalance netting between German TSOs and different neighboring TSOs**

→ **We want to quantify the benefits of cooperation on balancing markets**

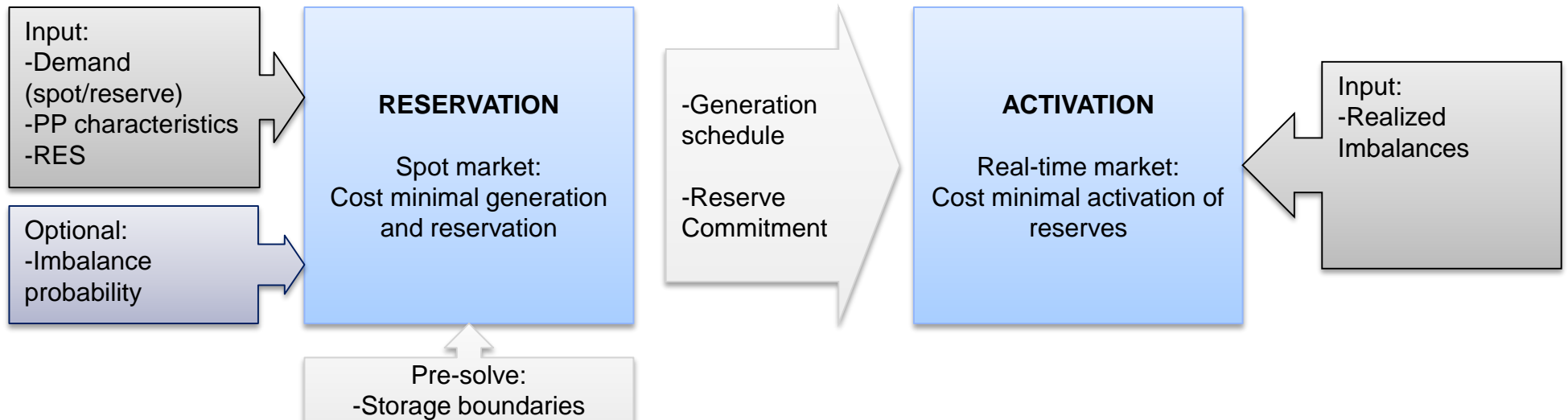
Setting

- **We want to quantify the benefits of cooperation on balancing markets**
 - Regarding the influence of balancing services on total system cost
 - Distributional effects of increased international cooperation
- **Our case: Cooperation between Austria, Germany, and Switzerland**
 - Different generation portfolios (Hydro in AT & CH, fossil in DE)
 - Good interconnection
- **Scenario dimensions:**
 - Different levels of cooperation
 - No Cooperation
 - Cooperation: Joint procurement of secondary and tertiary reserves with a common merit order list, allowing interconnector reservation to exchange balancing services
 - Anticipation of reserve activation costs



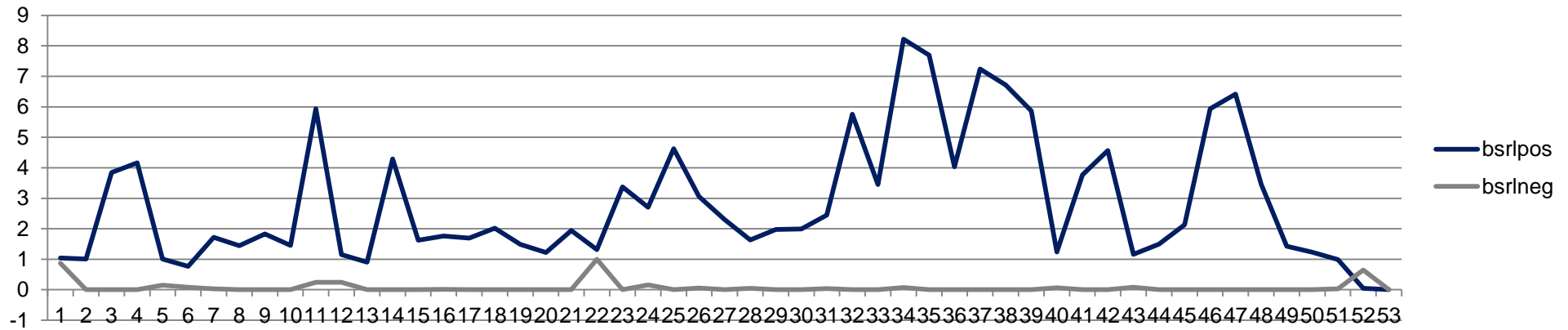
Model Structure

- **Cost minimization unit-commitment model with hourly resolution, 53 x 168 hours**
- **Block sharp representation of power plant portfolios**
- **NTC transmission constraints between AT,CH,DE**
- **Fixed import and exports for other neighboring countries' cross border interaction**
- **Two-step model: 1) reservation and 2) reserve activation**
- **Optional: Anticipating the cost of activated reserve volumes**

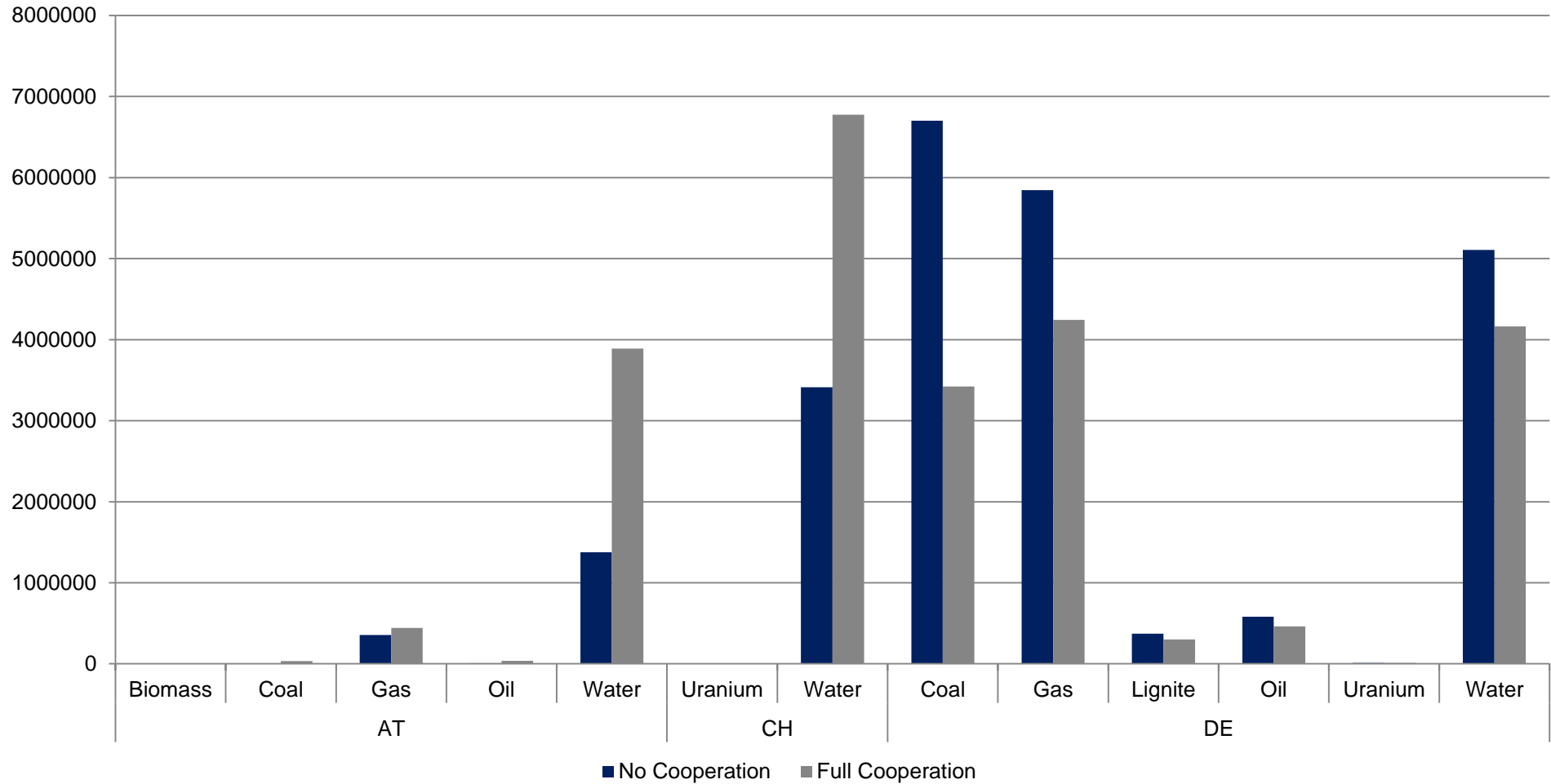


Results 1:

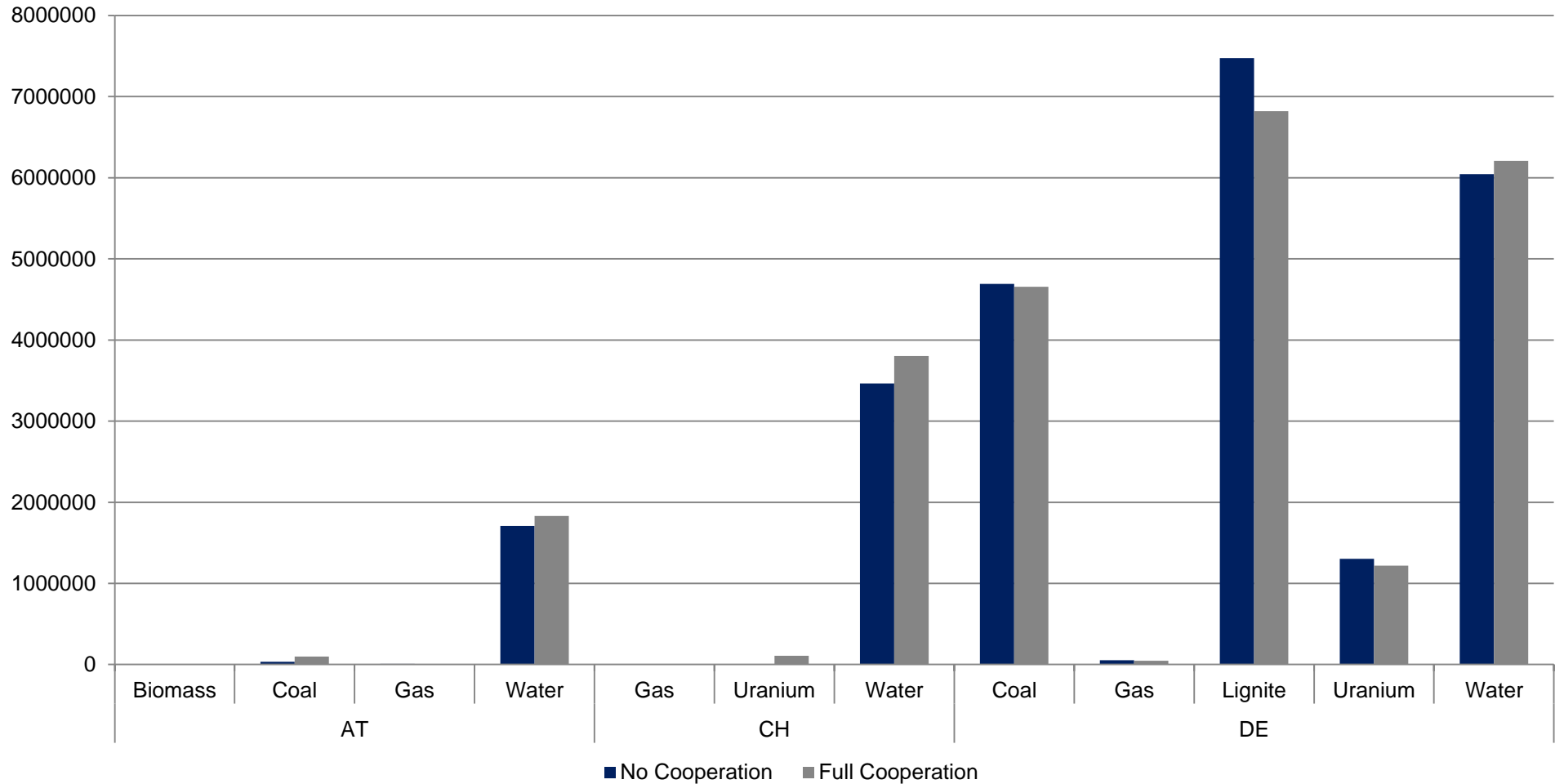
- Reserve provision cost for the Alpine Region can be reduced by 32 % from 119 million € to 79 million € by a joint reserve procurement
- These costs are much lower than current real balancing cost due to:
 - No strategic behavior included
 - Pessimistic assumptions on CHP must run constrains
 - Optimistic assumptions on CHP power plant flexibility
 - No block biddings and no portfolios
 - Hourly resolution
- Prices for SRL in Germany [€/MW]:



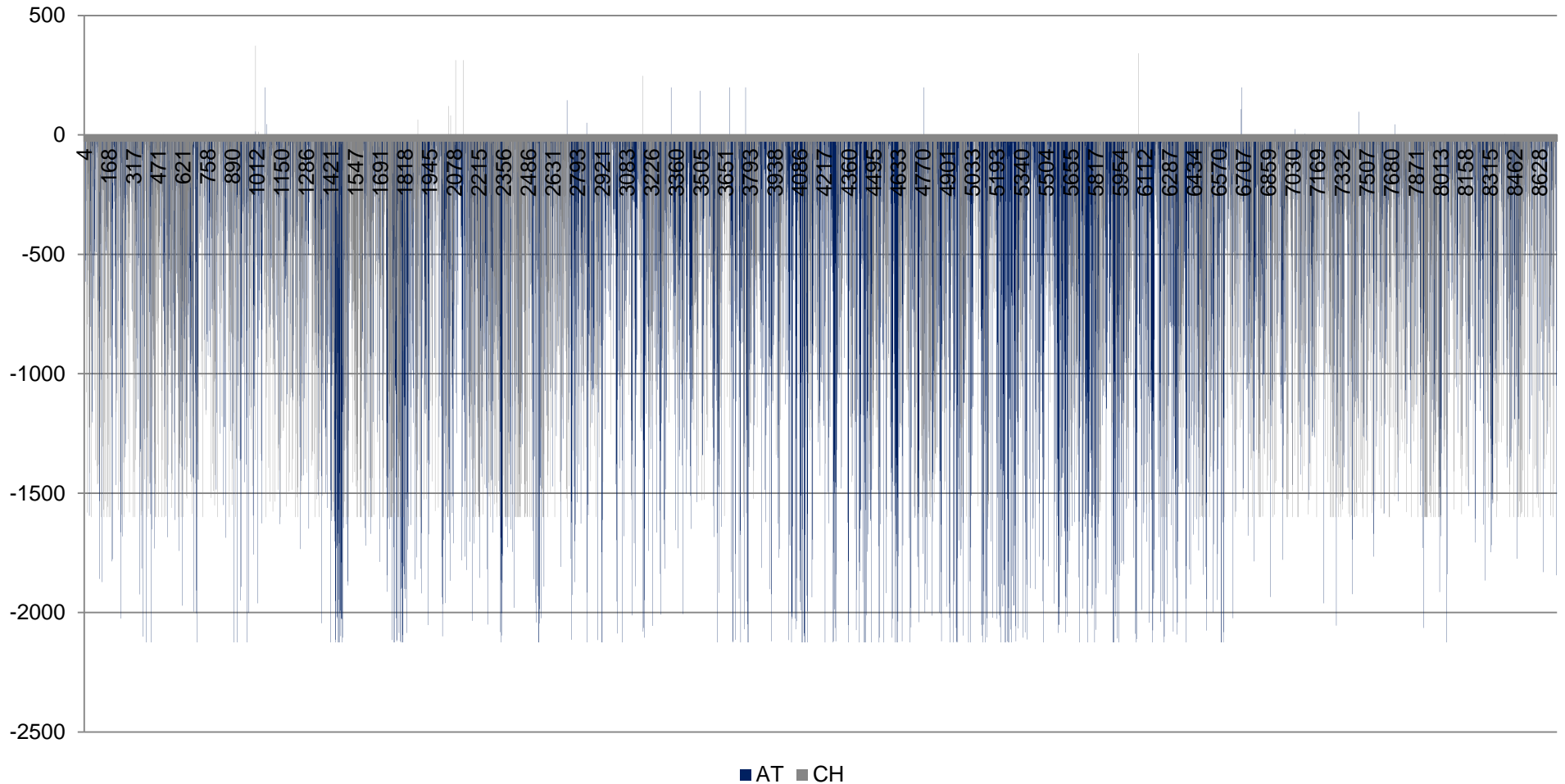
Results 2: Contracted Positive Secondary Reserves [MW*h]



Results 2: Contracted Negative Secondary Reserves [MW*h]

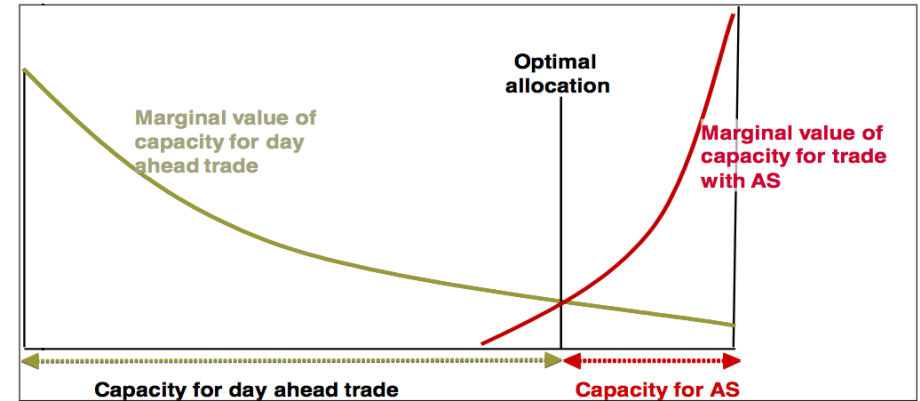


Results 3: Cross-Border Balancing Exchanges with DE [MW]



Conclusion

- **Cross-border exchanges of balancing capacity leads to significant cost reductions**
- **Cost reductions are dependent on the generation portfolios of the participating countries**
- **Austria and Switzerland seem to be able to provide relatively cheap balancing capacity**
- **→ Despite the currently very high prices in Austria**
- **Assumptions regarding future market design are crucial**
 - Bidding periods / Interconnector reservation
- **Hypothesis: Cross-border exchanges are only beneficial with flexible interconnector reservation**



Source: ENTSO-E (07/2011) Position Paper on Balancing Services

Thank You for Your Attention!

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