



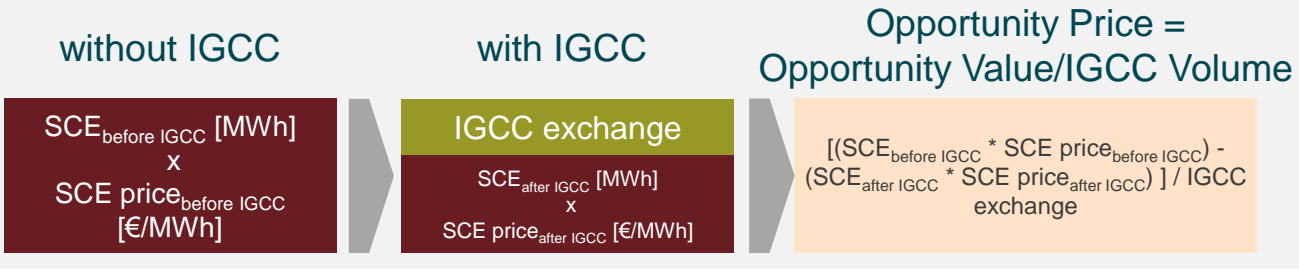
IGCC REGULAR REPORT ON SOCIAL WELFARE

Q4 / 2016

IGCC-Settlement – Basic Principle

(Methodology applied from 01/02/2016)

Opportunity Prices for Imbalance Netting



IGCC Initial Settlement Price

- IGCC Initial Settlement Price (P_{IGCC}): **Energy weighted average** of the **opportunity prices** ($C_{Imp,i}$ and $C_{Exp,i}$)
 - Symmetric price for IGCC imports and exports
- $$P_{IGCC} = \frac{\sum_{i=1}^n (C_{Imp,i} E_{Imp,i} + C_{Exp,i} E_{Exp,i})}{\sum_{i=1}^n (E_{Imp,i} + E_{Exp,i})}$$

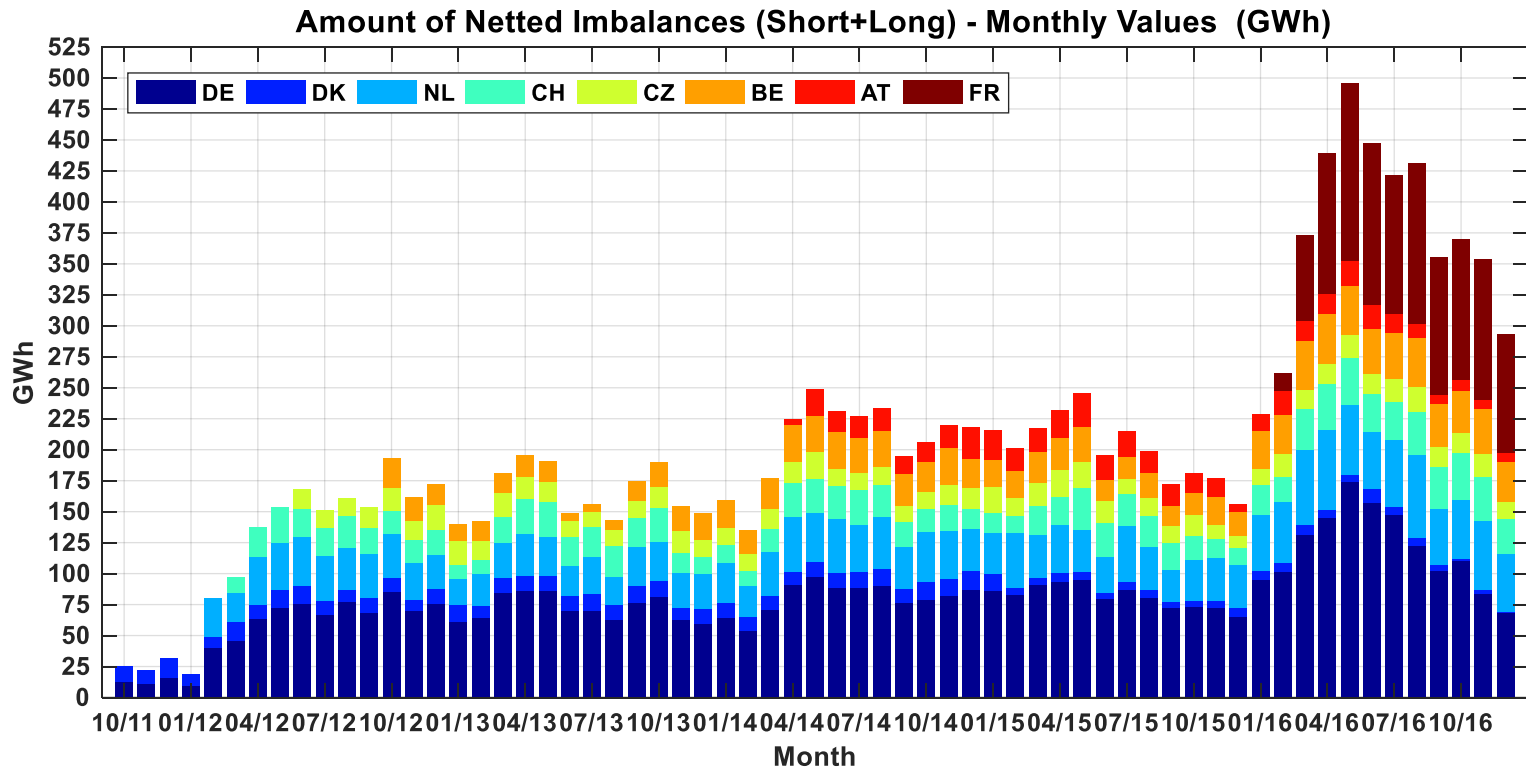
IGCC Settlement Ex-post Adjustment

- In case of negative individual benefits for one or more IGCC Members but positive overall benefit of the IGCC, an ex-post adjustment of settlement is performed in order to guarantee TSO neutrality.
- IGCC adjusted settlement prices (P'_{IGCC}) which may vary from member to member depending on their benefit before the adjustment

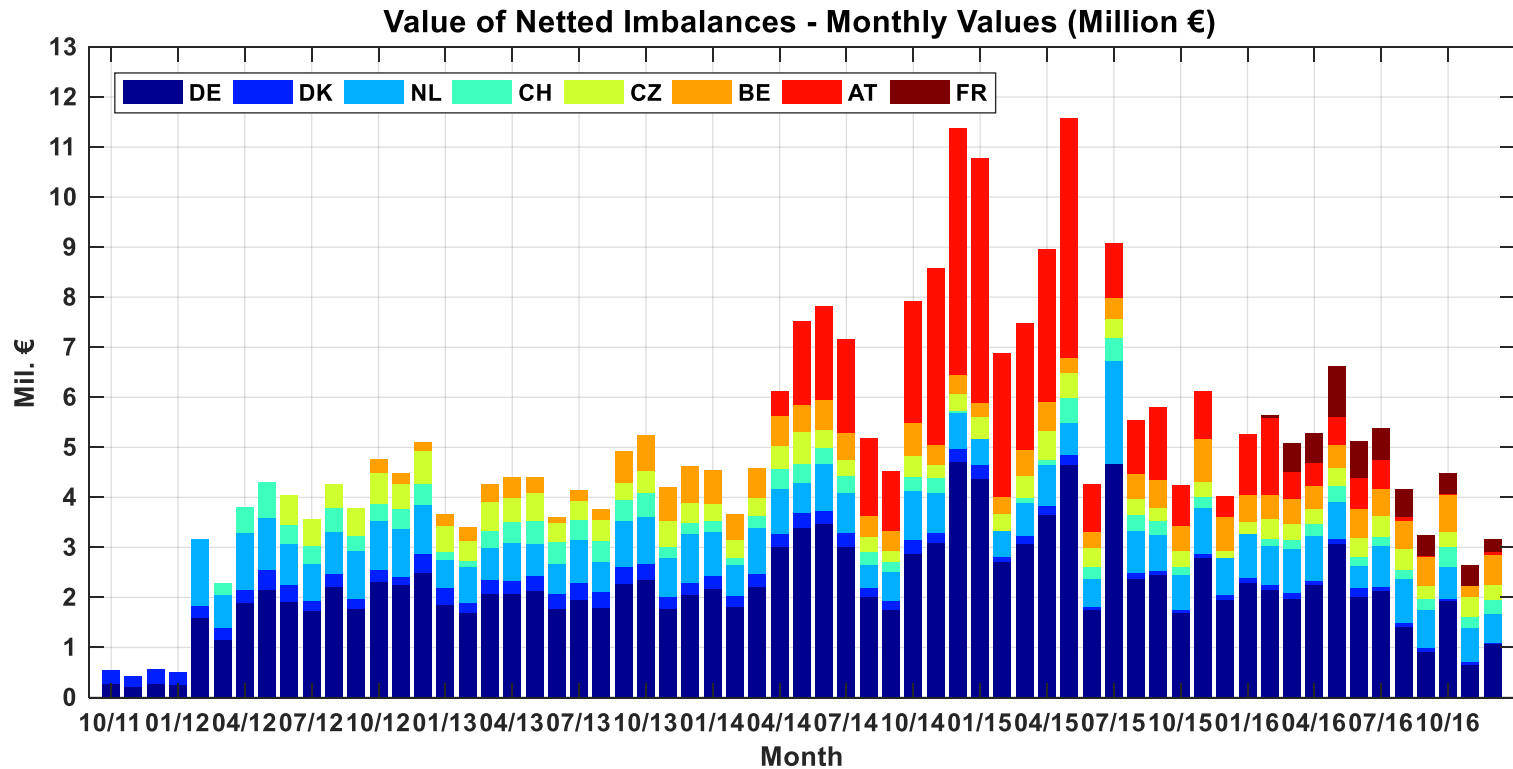
Calculation of Cost Reduction

- Cost reduction for a participant is driven by the spread between the opportunity price and the IGCC adjusted settlement price
- $$B'_i = \sum_{t=1}^T (C_{Imp,i,t} - P'_{IGCC,i,t}) \cdot E_{Imp,i,t} + \sum_{t=1}^T (P'_{IGCC,i,t} - C_{Exp,i,t}) \cdot E_{Exp,i,t}$$

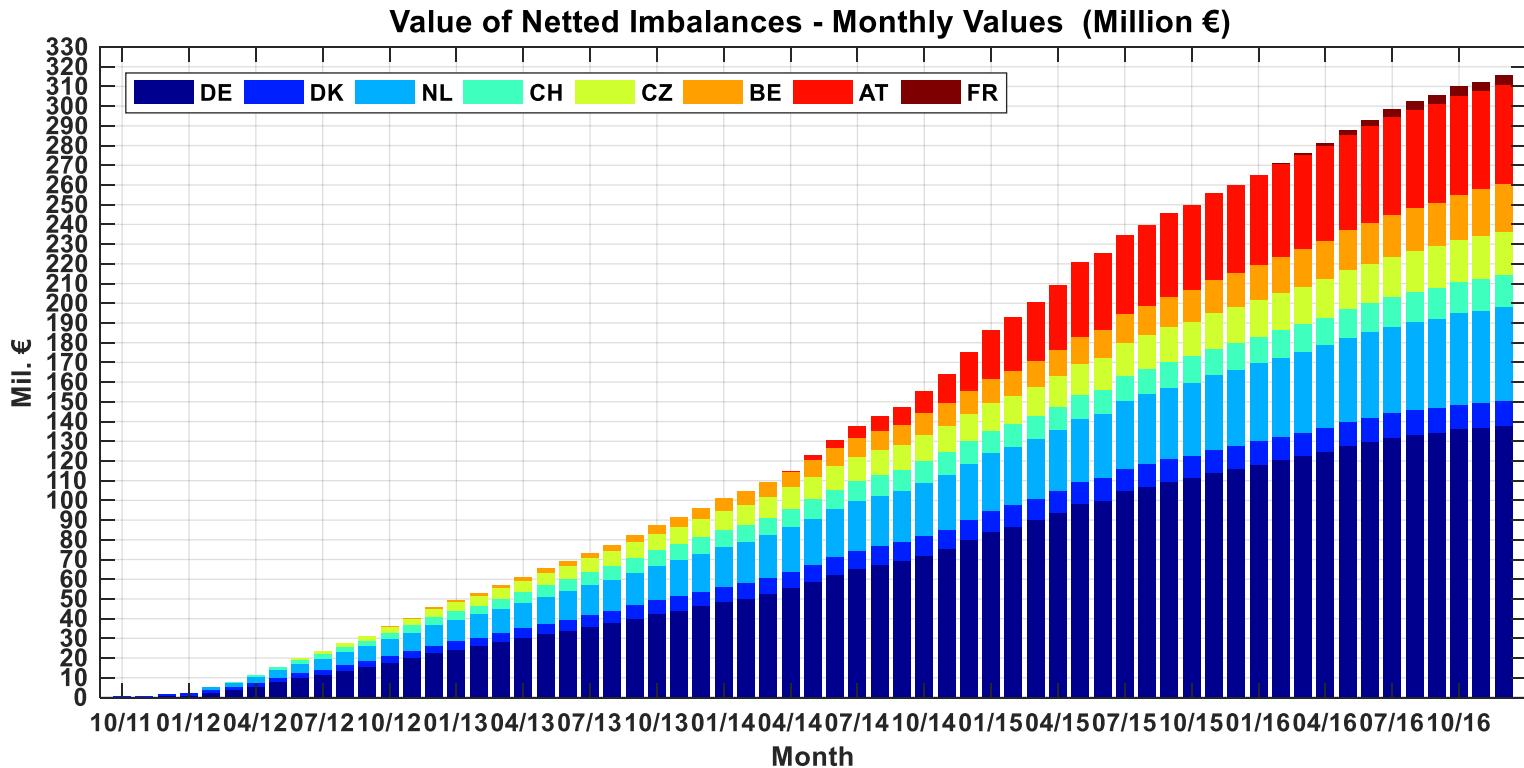
Monthly Volumes of Netted Imbalances



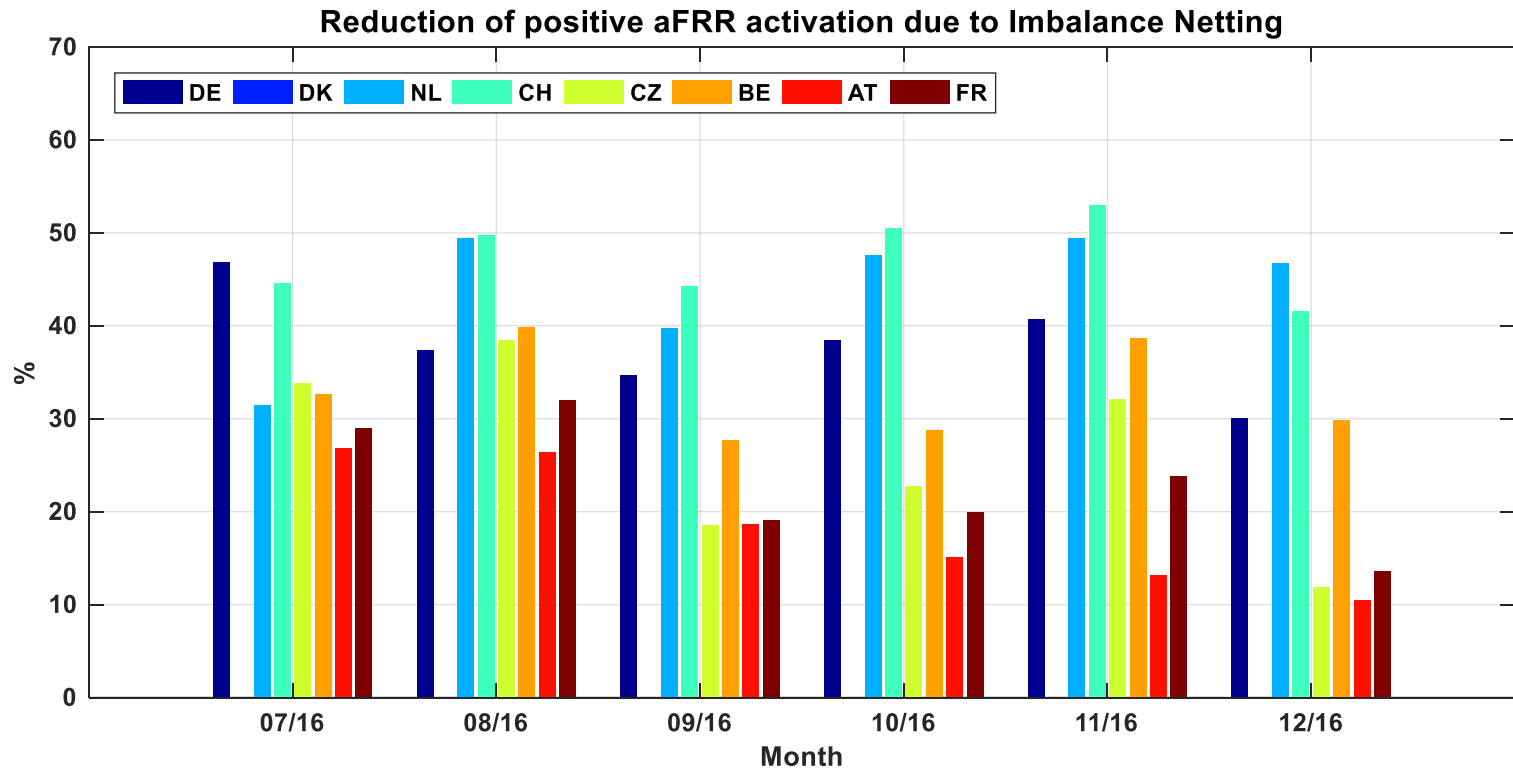
Monthly Value of Netted Imbalances



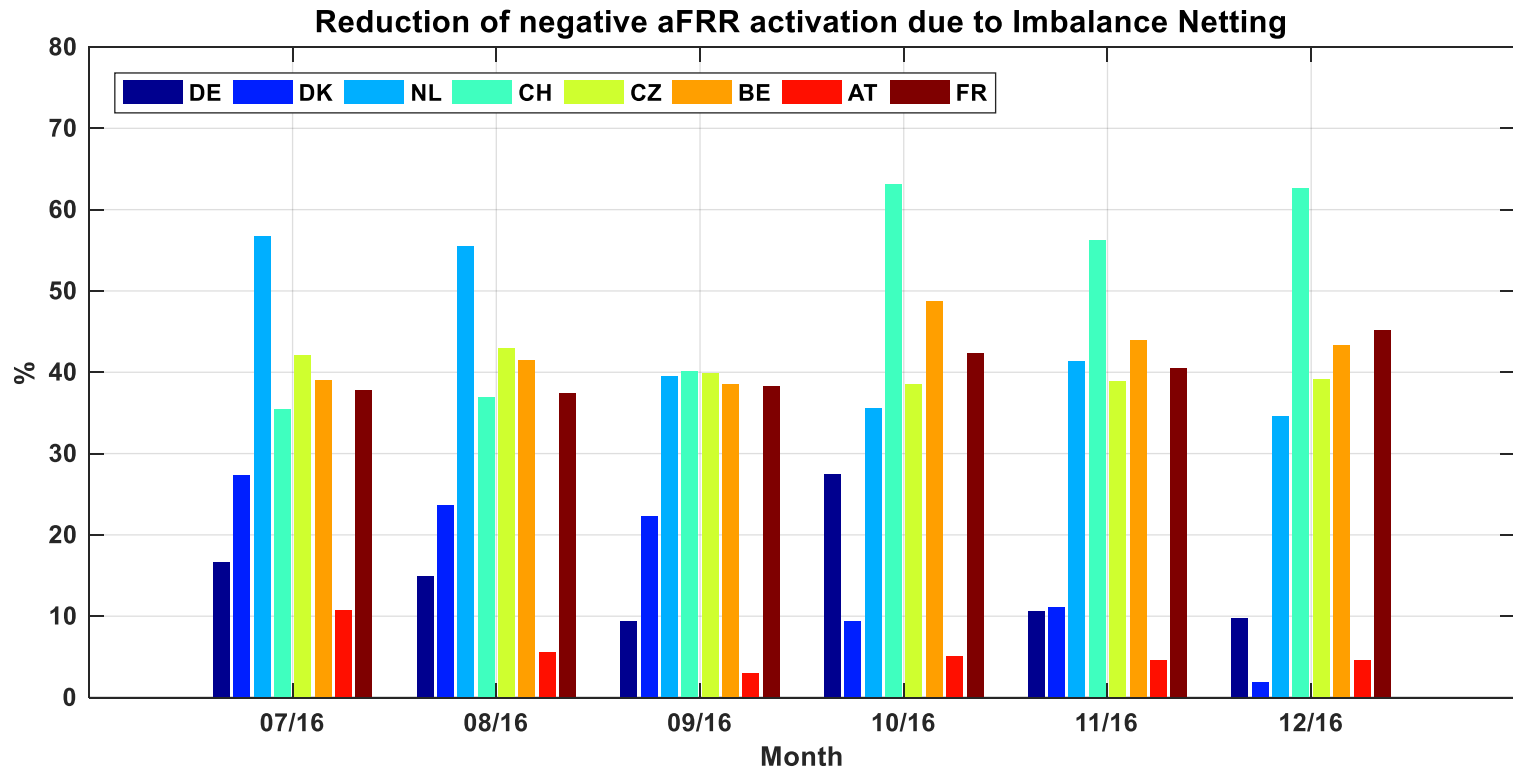
Value of Netted Imbalances - Development



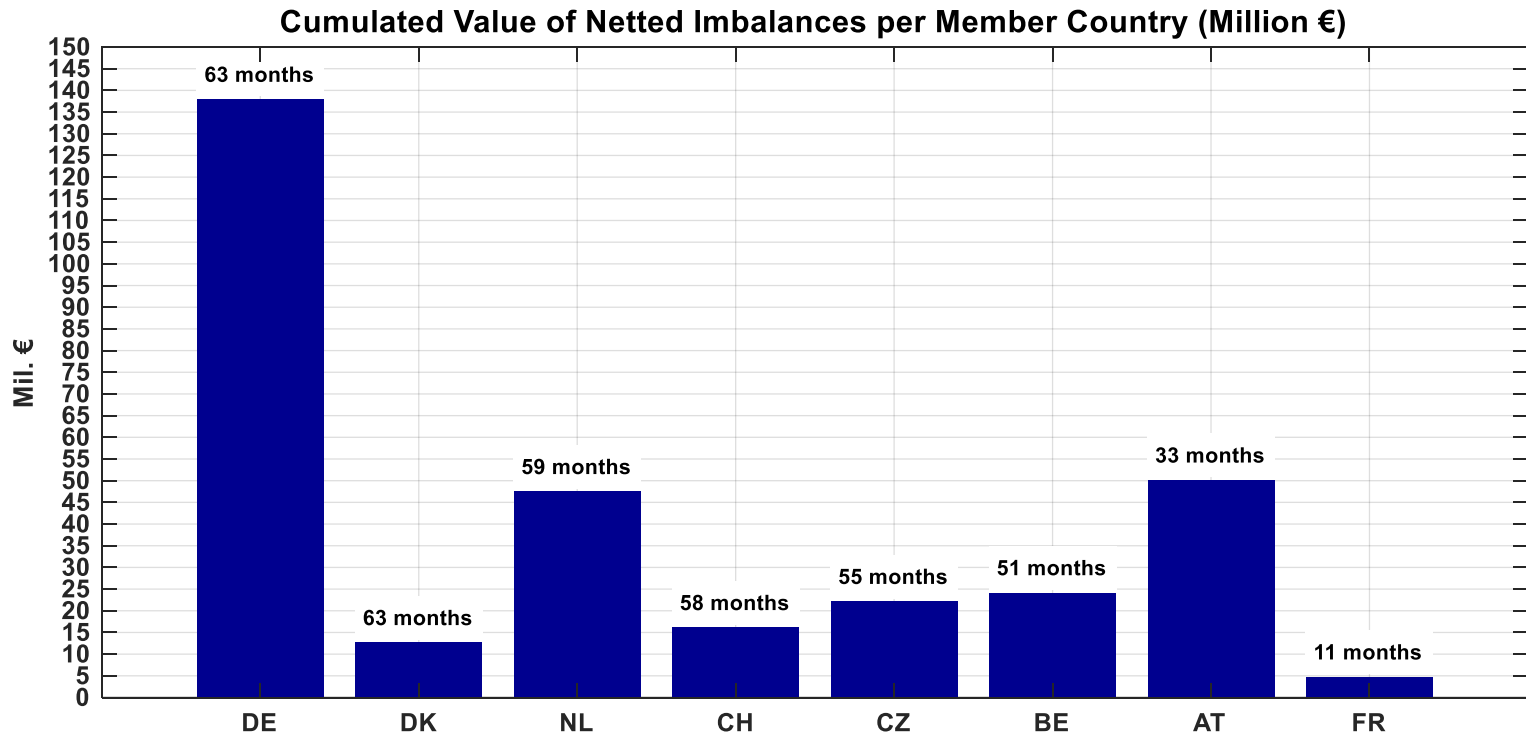
Monthly Percentage of Avoided pos. aFRR-Activations (last 6 Months)



Monthly Percentage of Avoided neg. aFRR-Activations (last 6 Months)

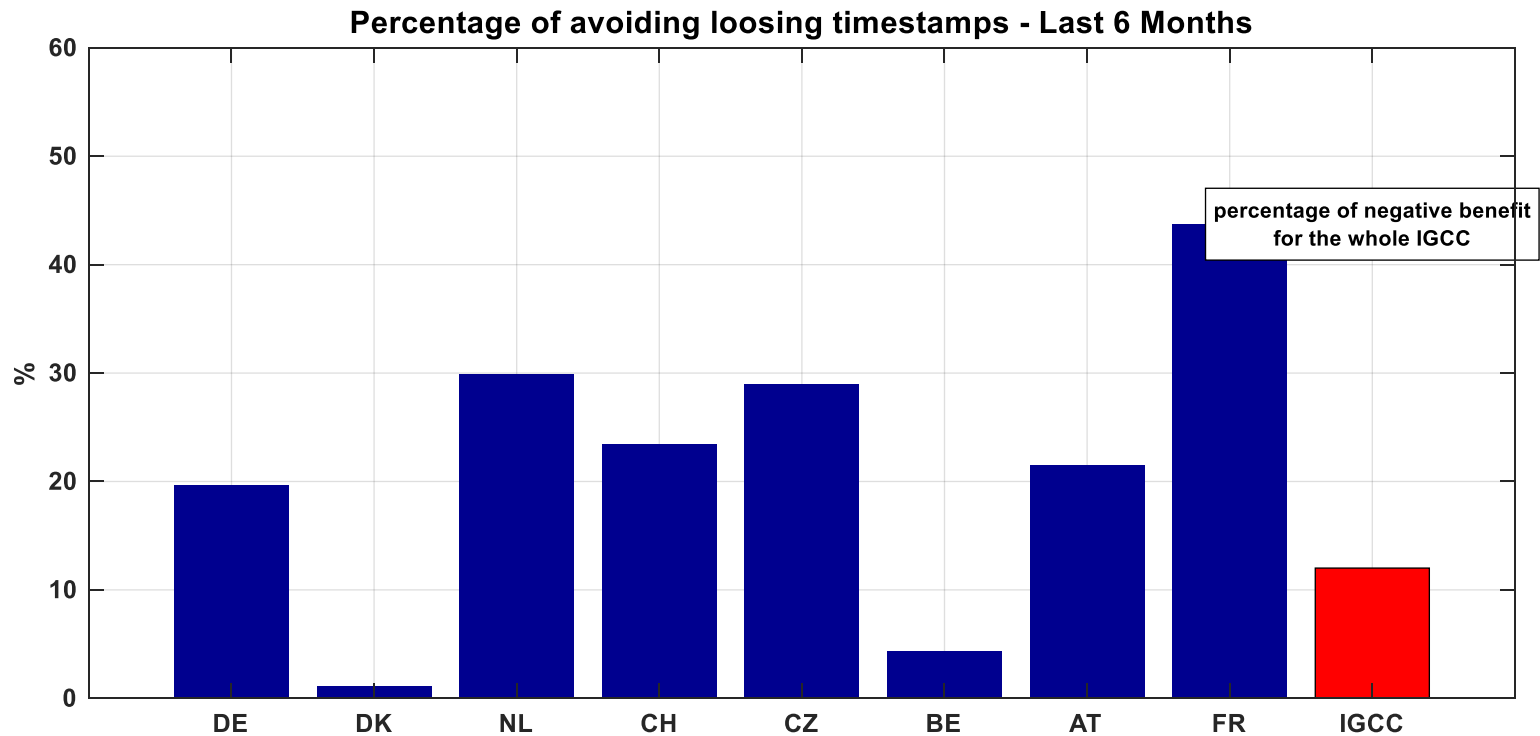


Cumulated Value of Avoided Activations

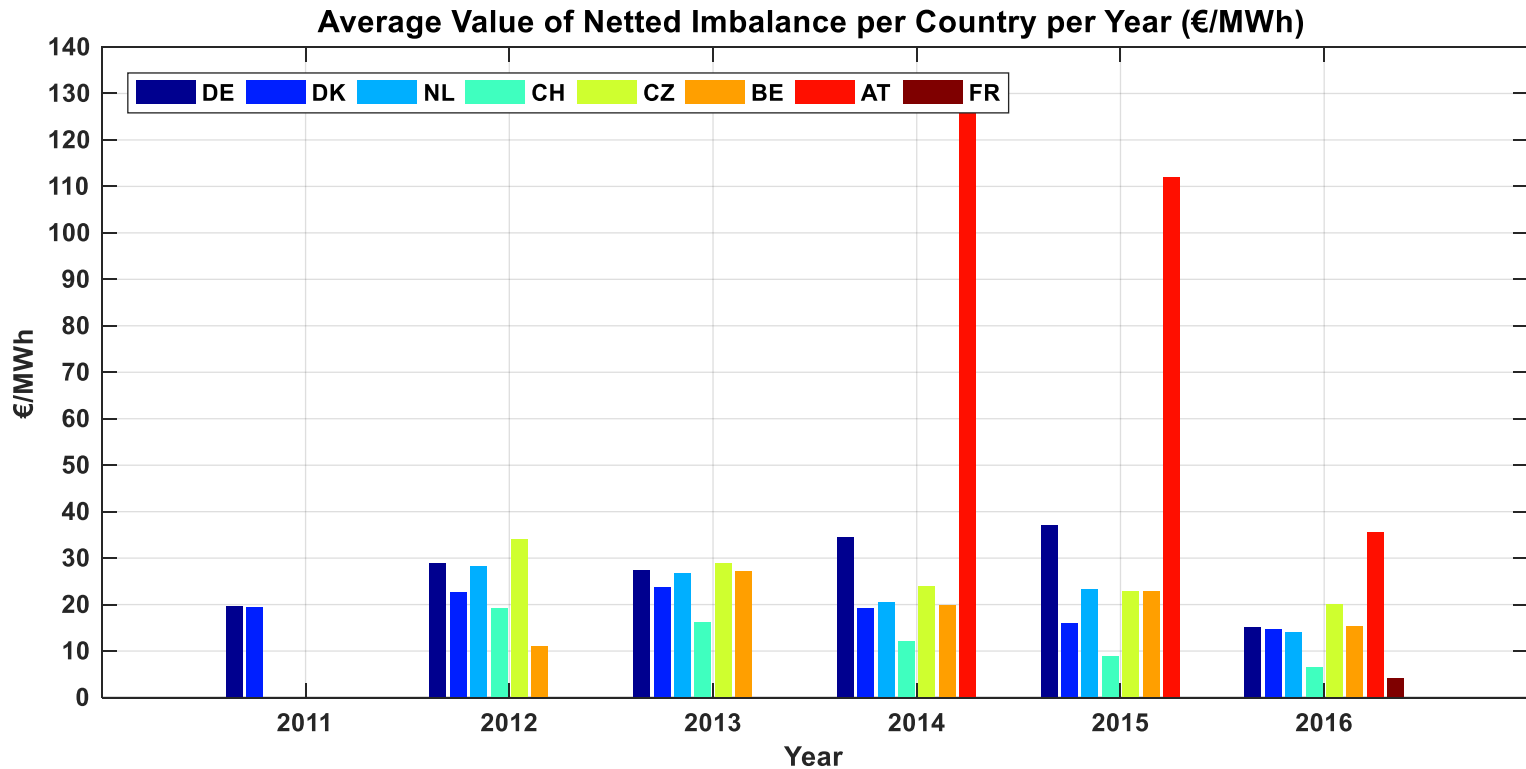


Percentage of avoiding losing timestamps due to the second step of settlement method

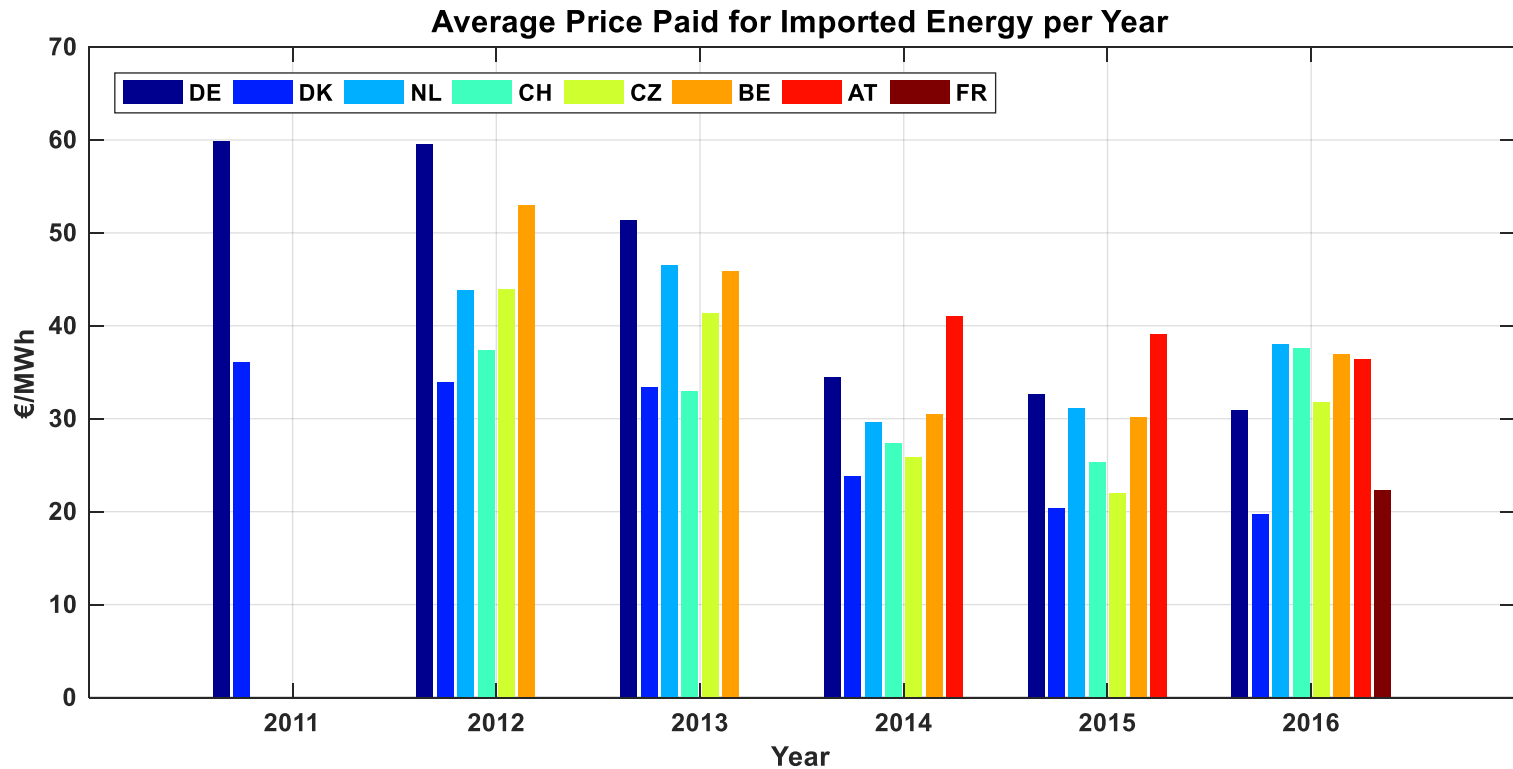
This slide compares the share of negative individual benefits after IGCC Initial Settlement Price calculation in comparison to the share of negative benefit of the overall IGCC for the months 07/2016 to 12/2016. In this respect an “avoided losing time stamp” is defined as a negative individual benefit in the interim calculation which is neutralized by the IGCC settlement ex-post adjustment



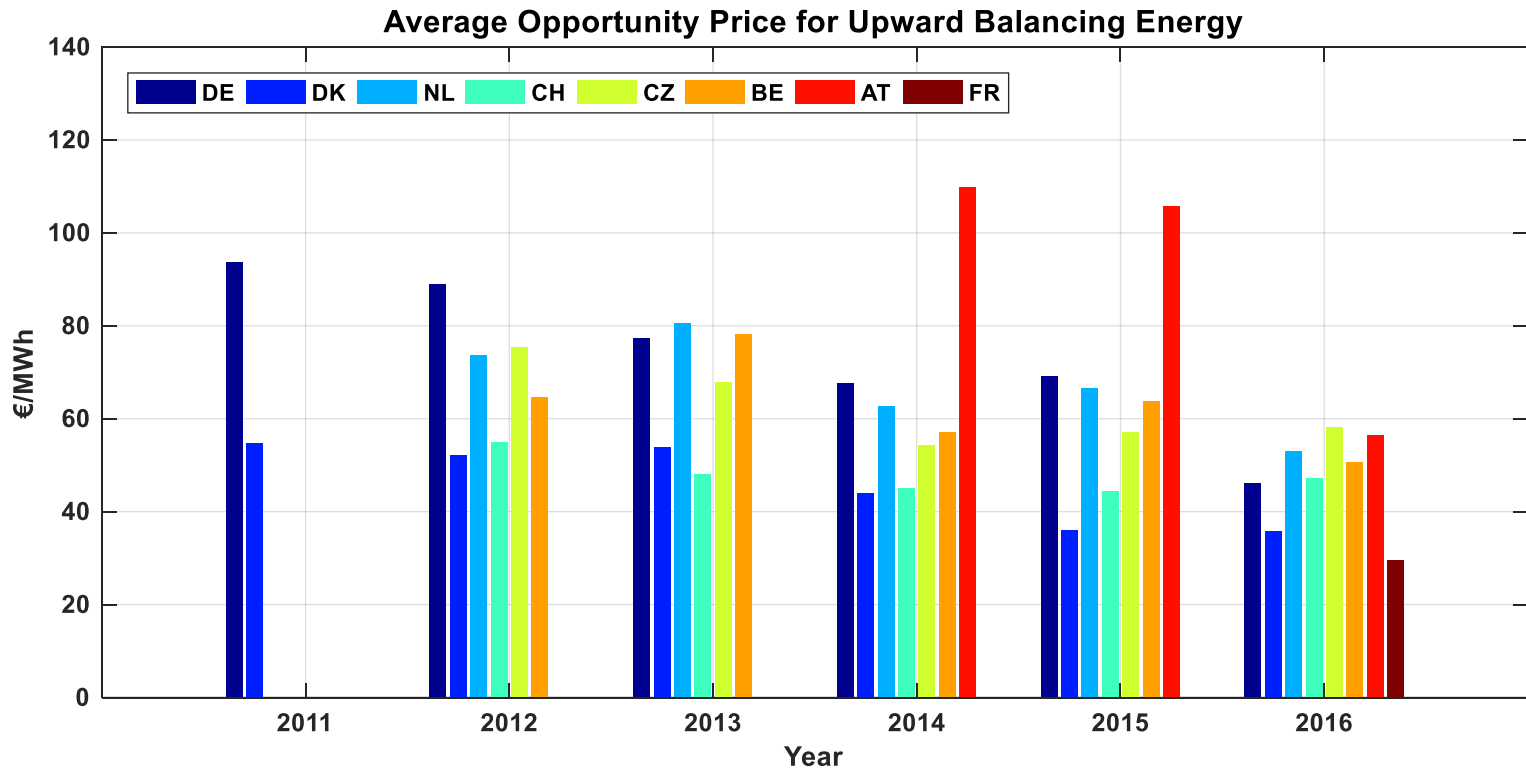
Average Value of Netted Imbalance per Country per Year in €/MWh



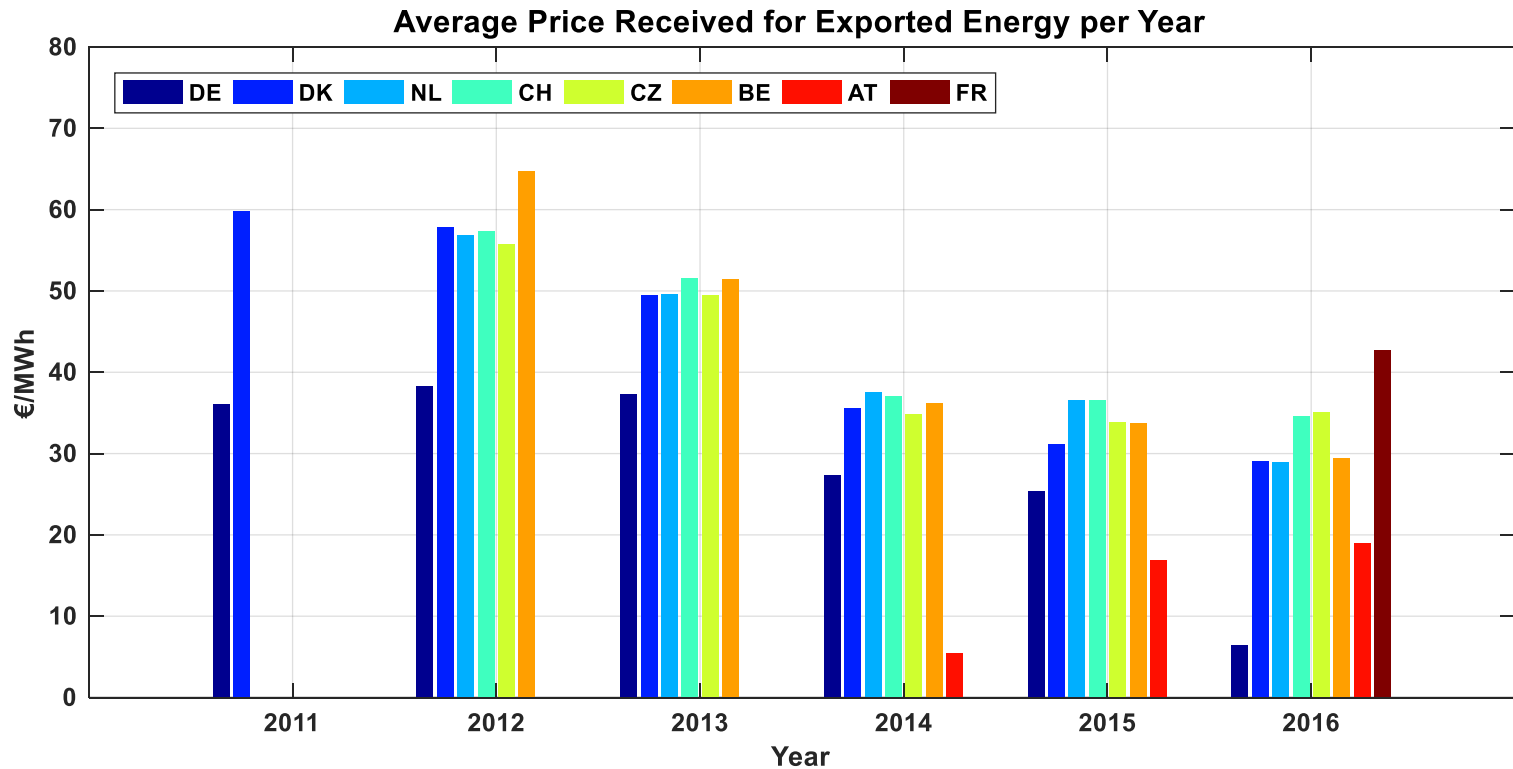
Average Price Paid for Imported Energy per Year



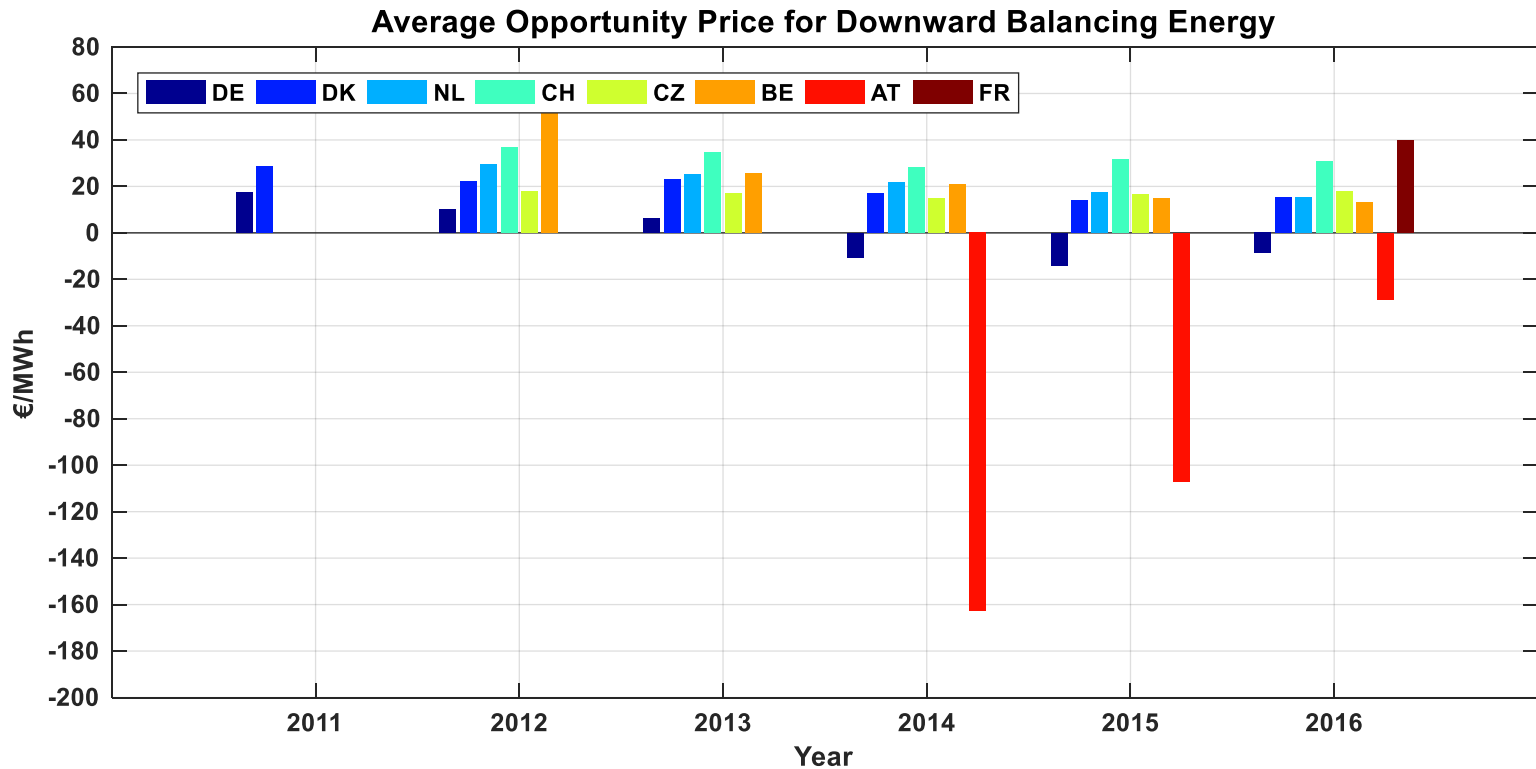
Average Opportunity Price for Upward Balancing Energy



Average Price Received for Exported Energy per Year



Average Opportunity Price for Downward Balancing Energy



Appendix - Mathematical formulas of figures

— Volume of netted imbalances per country i :

$$E_{short+long,i} = \sum_{t=1}^T E_{Exp,i,t} + E_{Imp,i,t}$$

— Value of netted imbalances per country i :

$$B'_i = \sum_{t=1}^T (C_{Imp,i,t} - P'_{IGCC,i,t}) \cdot E_{Imp,i,t} + \sum_{t=1}^T (P'_{IGCC,i,t} - C_{Exp,i,t}) \cdot E_{Exp,i,t}$$

Appendix - Mathematical formulas of figures

- Percentage of the avoided activated positive aFRR energy (imported by IGCC) per country i :

$$PE_{pos,i} = \sum_{t=1}^T E_{Imp,i,t} / \sum_{t=1}^T E_{demand,pos,i,t}$$

- Percentage of the avoided activated negative aFRR energy (exported to IGCC) per country i :

$$PE_{neg,i} = \sum_{t=1}^T E_{Exp,i,t} / \sum_{t=1}^T E_{demand,neg,i,t}$$

Appendix - Mathematical formulas of figures

— Average value of netted imbalances per country i :

$$B'_{rel,i} = \frac{B'_i}{E_{short+long,i}} = \frac{\sum_{t=1}^T (C_{Imp,i,t} - P'_{IGCC,i,t}) \cdot E_{Imp,i,t} + \sum_{t=1}^T (P'_{IGCC,i,t} - C_{Exp,i,t}) \cdot E_{Exp,i,t}}{\sum_{t=1}^T E_{Imp,i,t} + E_{Exp,i,t}}$$

Appendix - Mathematical formulas of figures

- Average price paid for imported energy per country i :

$$C_{paid,i} = \frac{\sum_{t=1}^T P'_{IGCC,i,t} \cdot E_{Imp,i,t}}{\sum_{t=1}^T E_{Imp,i,t}}$$

- Average price received for exported energy per country i :

$$C_{received,i} = \frac{\sum_{t=1}^T P'_{IGCC,i,t} \cdot E_{Exp,i,t}}{\sum_{t=1}^T E_{Exp,i,t}}$$

Appendix - Mathematical formulas of figures

- Average opportunity prices for upward balancing energy for country for each per country i :

$$C_{upward,i} = \frac{\sum_{t=1}^T C_{Imp,i,t} \cdot E_{Imp,i,t}}{\sum_{t=1}^T E_{Imp,i,t}}$$

- Average opportunity prices for downward balancing energy for each per country i :

$$C_{downward,i} = \frac{\sum_{t=1}^T C_{Exp,i,t} \cdot E_{Exp,i,t}}{\sum_{t=1}^T E_{Exp,i,t}}$$