

Minimum Offered Volumes in Flow-based Allocation of Long-Term Transmission Rights

An N-SIDE Study Commissioned by Eurelectric and Energy Traders

Mehdi Madani and Yves Langer, May 2024

Public data

Challenges with LT FBA Auctions



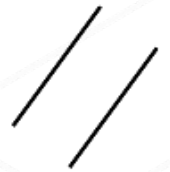
Long-Term Flow-based Allocation (LT FBA) is being designed following ACER decision 05/2023. The objective is improve Long-Term Transmission Rights (LTTRs) allocation, by modifying the way long-term transmission capacity is calculated to better reflect the physical reality (i.e. Kirchoff's laws).



In a flow-based setup, the volume of capacity that is allocated on a given border directly depends on the volume of capacity allocated on the other borders, because of the so-called PTDF coefficients. This is referred to as “flow factor competition”.



Consequence 1: borders compete with each others for the same transmission resources
This may imply that no LTTRs are allocated at all on some borders (despite their high volatility)



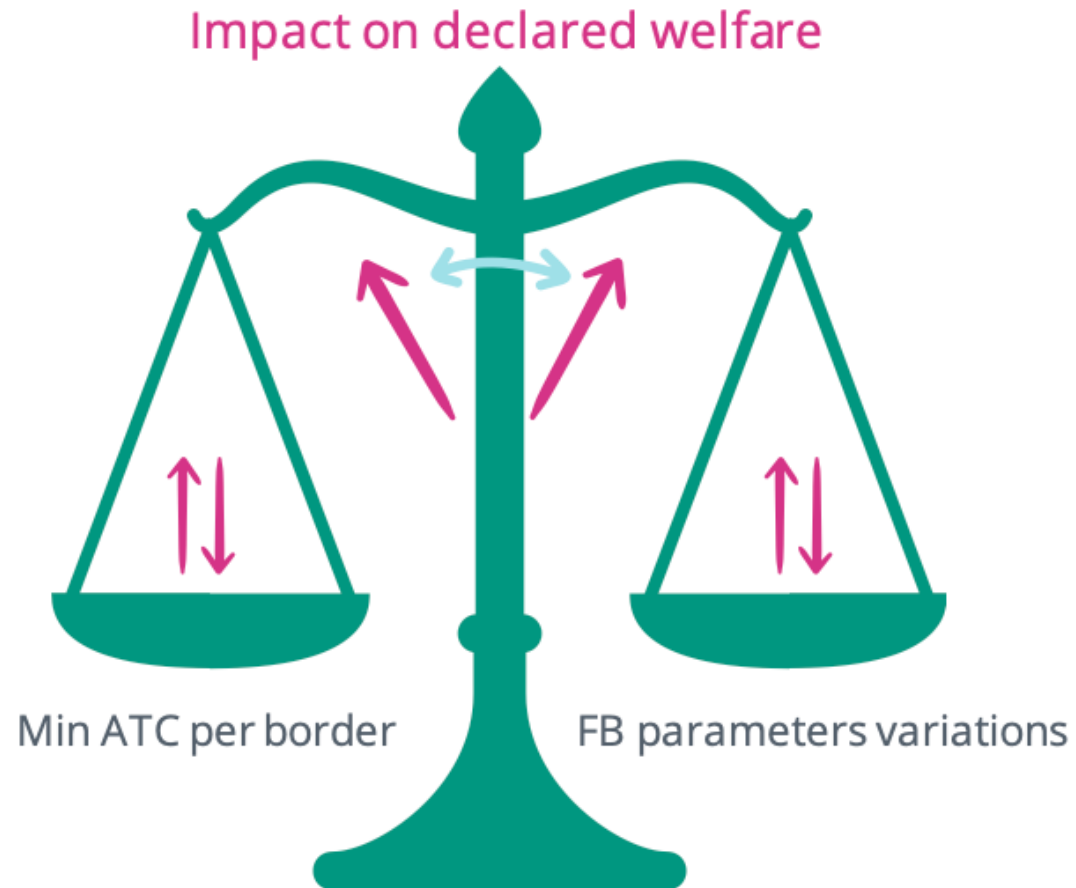
A key design elements of LT FBA is that it leads to simultaneous auctions of all CCR borders:



Consequence 2: collateral requirements (not discussed here)

Context and Objectives

In a study commissioned by Eurelectric and Energy Traders, we have compared the welfare impact of “Min ATCs” vs. flow-based parameters variations



Data used for the simulations are historical data



Market Data

- Historical LTTR yearly bids for all CORE borders (extracted from the European Joint Allocation Office at JAO.eu)

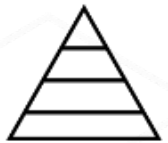


Grid Data (flow-based capacities)

- In absence of publicly available dry-run data at the time of the study, “*synthetic yearly flow-based domains*” are built (in a similar way than the approach followed in earlier LT FBA simulations from ACER or TSOs)
 - 1 peak period timestamp is selected in July 22, October 22, January 23 and April 23.
 - The corresponding 4 CORE Day-Ahead Flow-Based domains are retrieved from JAO.eu
 - The intersection of these 4 domains is retained
 - A “MinRAM approach” is applied to this intersection, possibly increasing the size of the domain, with the objective to ensure that 100% of the (average over the 2020-23) allocated ATC volumes become feasible in this newly created domain.
 - The result is a flow-based domain of “reasonable size”
- NB: the focus of this study has not been to “define realistic flow-based domains”
the chosen approach is a reasonable compromise to easily define relatively realistic flow-based domains



The simulated auctions maximize the auction surplus (“auction welfare”) under the flow-based constraints.

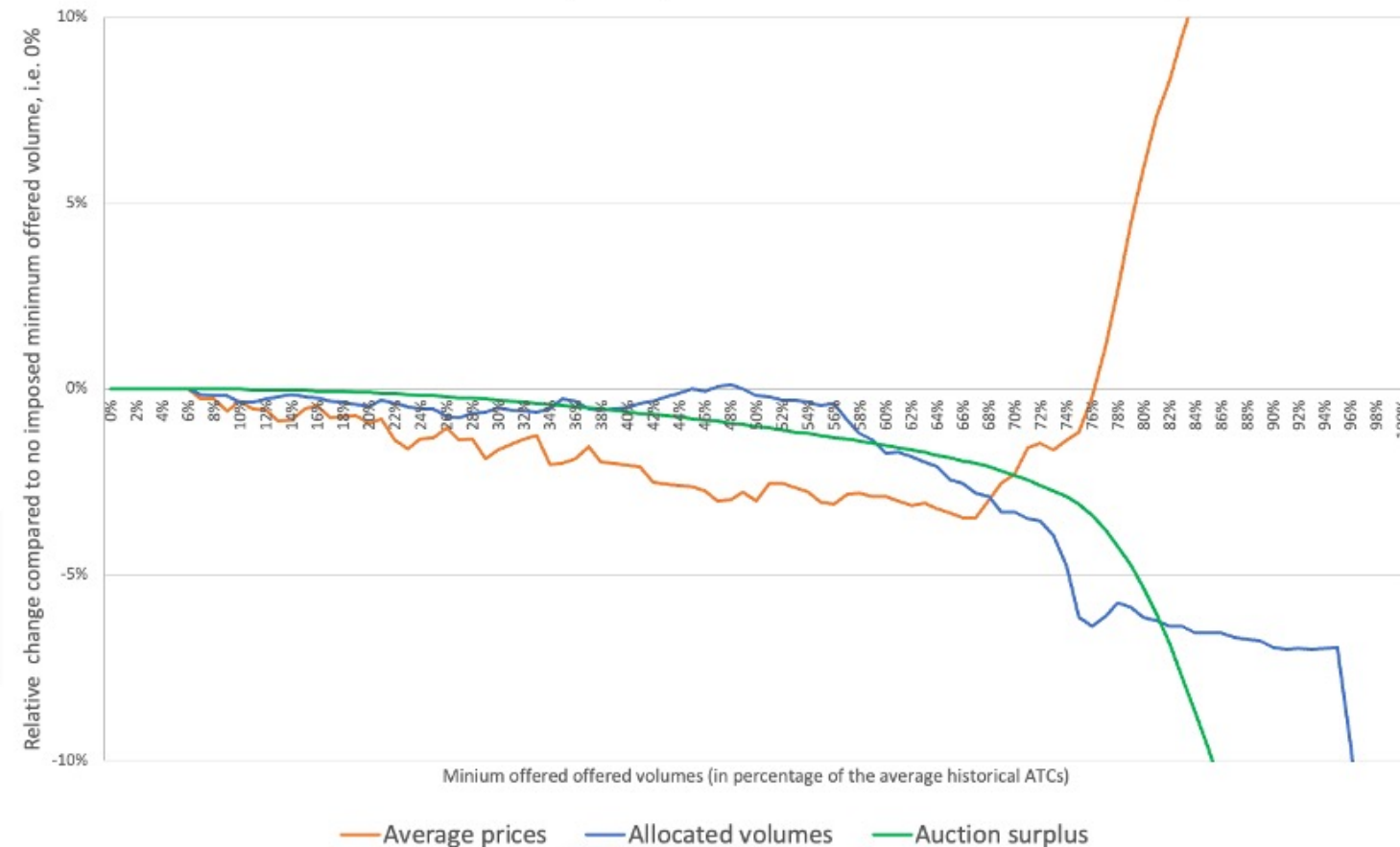


Additional constraints are added to ensure that at least $x\%$ of the average allocated volumes over the past 3 years are *offered* to the market (similar concept as imposing a ‘Minimum ATC’ if offered on each border).

100 simulations are run, with $x = [0\%, 1\%, \dots, 99\%, 100\%]$

Applying even sizeable Min ATC values has little impact on auction surplus, total volumes allocated and prices

Relative differences (compared to LT FBA without minRAM)



Were at least 50% of historical ATCs guaranteed at all Core borders, our simulations show that:



The average prices decrease by $\pm 3\%$



The total allocated volume is stable



The auction surplus decreases by $\pm 1\%$
(degradation mostly paid by market participants, while TSOs see congestion income increases)

What guaranteeing 50% of historical ATCs means for some CORE borders in practice

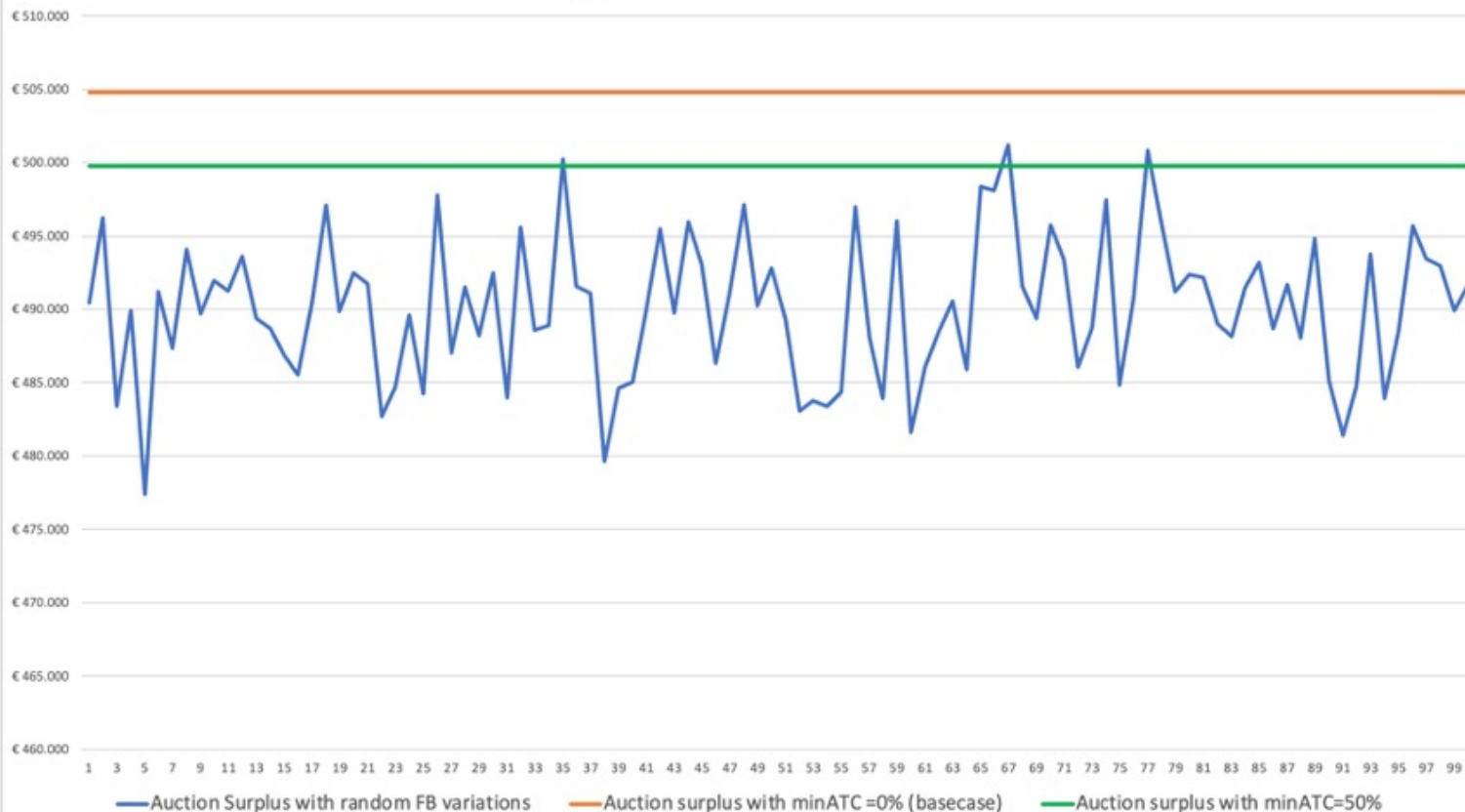
	Auction surplus	Volumes	Prices	
Belgium>Netherlands	431%	688%	-40%	the 5 borders most <i>positively</i> affected
Austria>Germany	166%	382%	-52%	
Germany>Belgium	37%	51%	-19%	
Slovakia>Czechia	21%	48%	-24%	
Croatia>Slovenia	16%	28%	-14%	
Weighted average all Core borders	-1%	-0,19%	-3%	
Austria>Hungary	-8%	-11%	4%	the 5 borders most <i>negatively</i> affected
Czechia>Germany	-9%	-23%	51%	
Netherlands>Belgium	-12%	-18%	6%	
Germany>Netherlands	-12%	-18%	10%	
France>Germany	-29%	-45%	76%	

Volume, price and auction surplus changes compared to no guaranteed minimum capacity, using bids from the 2023 auction, modelled on sample DA flow-based domains.

The additional optimization constraint mechanically leads to an overall degradation of the indicators, but in limited proportions

Small variations in FB parameters have a more significant effect on auction surplus than applying relatively large minimum offered ATCs

Impact of random FB Parameter variations between -10% and + 10%
for 100 randomly generated auction runs with no minATC



- Simulation of 100 auction runs, with each time random FB parameter variations between - 10% and + 10% for each FB parameter (PTDF & RAM)
- The impact of such variations is an average **decrease of 2.9% of the auction surplus** (maximum decrease of 5.4%)
- Imposing minATC = 50% is less impacting the results than small variations of the FB domain

Concluding observations

- By construction, the auction surplus decreases when constraints are added.
- However, when minimal volumes of LTTRs are imposed to be offered on each border in the LT FBA context, the auction surplus degradation appears limited
- This impact is less significant than having small variations in the LT Flow-based parameters, suggesting that a properly implemented solution to impose minimum offered LTTR volumes will have negligible impacts over the auction surplus
- Although more elaborate rules need to be defined in practice, this study thus shows that it is realistic to impose that a minimum volume of LTTRs are allocated on every border.
- Doing so would enable market parties to capture LTTR's hedging value across all borders, including the once where the price spreads are relatively lower (although possibly volatile), and/or borders where the flow-factors are particularly detrimental



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