
ACER
European Union Agency for the Cooperation of Energy Regulators
entsoe
6th WORKSHOP
Electricity long-term flow-based allocation
Friday, 22.03.2024
09:00 - 12:00 CET
Online
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# Housekeeping rules

Questions shall be posed using the Slido tool within Microsoft Teams

Use the direct link:
https://app.sli.do/event/4JrQofwANvNgPD3RuNu6gw

Keep your microphone muted unless the chair gives you the floor

Questions from other participants can be 'liked' to increase their visibility

Slides from this webinar will be uploaded to ACER website

Substance-related questions will be addressed during the relevant Q&A/discussion session; although they can be posed at any point

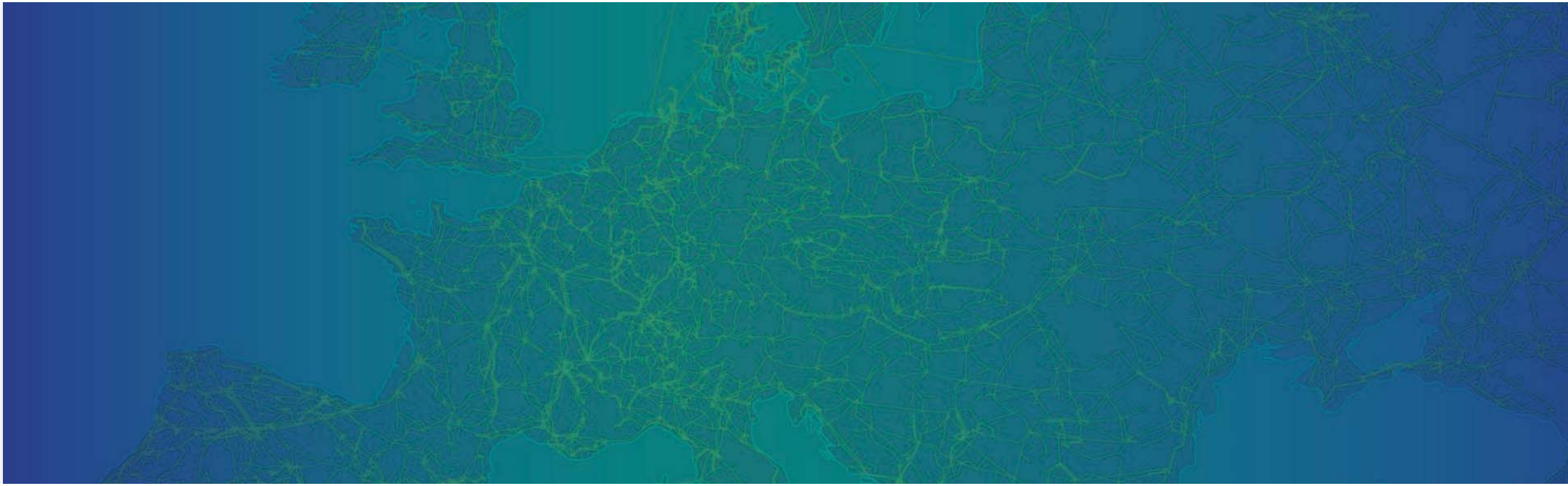
**The meeting is being recorded**

# AGENDA

| Indicative time | Webinar items | |
|---|---|---|
| 08:50 - 09:00 | Webinar open for log-in | Starts promptly at 09:00 |
| 09:00 - 09:10 | **Introductory Remarks**<br>Zoran VUJASINOVIC, ACER | |
| 09:10 - 09:20 | Long-term flow-based allocation: implementation - timeline and basic information<br>Jim VILSSON, ENTSO-E | |
| 09:20 - 09:50 | Long-term flow-based allocation: Simulation of results<br>Cyriac DE VILLENFAGNE, ENTSO-E | |
| 09:50 - 10:10 | ACER's views<br>Martin POVH, ACER | |
| 10:10 - 10:35 | Market participants' views<br>Jerome LE PAGE, EFET | |
| 10:35 - 10:45 | Ways forward<br>Martin POVH, ACER | |
| 10:45 - 11:50 | Discussion<br>all | |
| 11:50 - 12:00 | **Closing Remarks**<br>Christophe GENCE-CREUX, ACER | |

# LTFBA Workshop with ACER and MPs

22 March 2024



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# Agenda

1. Project implementation and next steps
2. Simulation results

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# 1. Project implementation and next steps

## Introduction

- Through the process of implementation, the LTFBA scope has been extended multiple times.
- Requirements have changed significantly (driven by requests from TSOs and ACER).
- LTFBA competes with other strategic projects (such as the launch of IDAs or 15 min MTU) for the same TSO, JAO and vendor resources.

**The current go-live date for LTFBA project in November 2024 is not feasible**

- November 2025 would be the earliest date possible for the new go-live date of the project (Assuming no significant additions to the project scope).

# 1. Project implementation and next steps

## Next steps

The current go-live date for LTFBA project in November 2024 is not feasible

+

Upcoming EMDR discussions & EC assessment (Volume determination)

Simulation results - (Lower capacity allocation & low allocation in some BZBs)

Market Participants' strong opposition (concerns shared by some TSOs)

→ Conceptual assessment triggered by TSOs

# 1. Potential further discussion on alternative models

## Potential forward market models

| | Primary Market | | |
|---|---|---|---|
| | Improving the current framework at JAO | Moving to Obligations (=Zonal futures spreads) | Virtual Hub |
| Features | Model 1.0 | Model 2.0 | Model 3.0 |
| A: Increasing the frequency of LTTRs auctions (simplified) | x | x | x – co-opt. |
| B: Increasing LTTRs' maturities to at least 2 years (simplified) | x (for a secondary market to work properly maintenance periods should be kept unchanged between different auctions for same product) | x | x – co-opt. |
| C: Switching from Options to Obligations | | x | x |
| D: Adapting full firmness | x (optional – no full support) | x | x |
| Implementation effort | + | ++ | +++ |

*On top of these models, fundamentals and conceptual discussions are also needed to assess if the objectives of FCA can be achieved. This includes, but is not limited to, volume determination, due to dependencies on the objectives.*

# 2.- LTFBA project update – Simulation results

## LTFBA simulations

### Background

- Based on the request from ACER, LT FBA in cooperation witch Core LTCC has prepared a new round of allocation simulations to provide results based on robust tooling for both capacity calculation (CCCt v4.0.0) and allocations (allocation algorithm v2 and v3)
- The presentation of these results aims to provide clear insights on representative outputs of the current LT FBA + Core LTCC process.

### Conclusions

- Multiple simulations have been performed enhancing each time the model and providing results for different inputs (Variable MinRAM capacity, Different order books, Adapted and normalized bid prices & Different FB Domains)
- All precedent and new simulations however lead to the same conclusion:
  - **Overall capacity allocated in FB is lower than in NTC**
  - **FB results in low/zero capacity allocation on some borders in both directions**
  - **Increasing the MinRAM increases the overall volume of allocated capacity but does not mitigate the effect of low/zero allocation on some borders.**
  - **This low/zero allocated volume on some borders can be explained by the design of the allocation algorithm. Its objective function is to maximize welfare, whereby welfare is defined as congestion revenue (bid price * accepted volume). Hence the borders are put in competition.**

# 2.- LTFBA project update – Simulation results

## LTFBA simulations

### Overview of 2nd round of allocation simulations in the next slides

- 2023 year (results from this year should be considered as most representative)
  - FB domains: 2023 12 TS 20% 30% 40% (from INT// run dry run inputs)
  - 2023 Historical bids, Normalised bids (Normalisation to neglect price of bids).
  - Weighted Normalised (Normalisation also neglects volume of orders).
- 2022 year
  - FB domains: 2023 12 TS 20% 30% 40% (from 1st round simulations) – Historical bids
  - Disclaimer: 2023 FB domains were used as the 2022 domains were too preliminary

### General Disclaimers

- The order books used for simulations were the ones used for NTC historical auctions
- For 2022 there were no yearly allocation on Slovenia-Hungary border (as there was no interconnector) and on 2022 & 2023 there were no yearly allocations for Core Polish borders (as there was no yearly capacity offered)
- The bids provided by MPs did not consider direct competition between borders (eg. bids did not consider geographical sensitivity on CNECs and 'flow factor competition' based on PTDF-factors)
- The FB domains provided by Core LTCC include a splitting factor (80%) as is defined in Core LTSRM (Long Term Splitting Rule Methodology)

### Reminder of previous allocations simulations run & presented

- In March 2023 TSOs prepared & presented a first round of simulations to regulators & MPs computed with (provided in Annex)
  - Preliminary FB domain from Core LTCC 4TS run on prototype CCCt wo splitting
  - A prototype of the allocation algorithm
  - Incomplete set of Bids : bids from the 50Hz – CZ Border were not included in the simulation for the DE –CZ border and only the TenneT bids were used

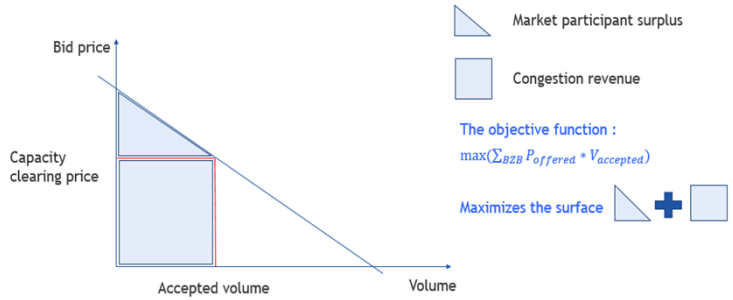
# 2.- LTFBA project update – Simulation results

Reminder: Currently 20% MinRAM is required by the Core LTCCM. Increasing the MinRAM to a higher value would need to be agreed upon by all Core TSOs and there is currently no consensus on this point.

## Overview of simulations for 2022 & 2023 and comparison with historical NTC auctions

| | Formulation | Yearly Auction 2023 (NTC) | FB Auction Bids 23 – MinRAM 20% | NTC vs FB | FB Auction Bids 23 – MinRAM 30% | NTC vs FB | FB Auction Bids 23 – MinRAM 40% | NTC vs FB | Yearly Auction 2022 (NTC) | FB Auction Bids 22 – MinRAM20 % | NTC vs FB | FB Auction Bids 22 – MinRAM 30% | NTC vs FB | FB Auction Bids 22 – MinRAM 40% | NTC vs FB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Allocated capacity (MW) | Sum Allocated Capacity per BZB | 18,139 | 8,510 | -53% | 11,816 | -35% | 14,141 | -22% | 20,840 | 8,093 | -61% | 11,180 | -46% | 14,051 | -33% |
| Congestion Revenue (EUR/MTU) | Sum Allocated Capacity * Clearing Price | 202,904 | 170,091 | -16% | 197,040 | -3% | 223,519 | +10% | 76,175 | 65,409 | -14% | 72,546 | -5% | 82,342 | +9% |
| Total welfare (EUR/MTU) | Objective function optimize the (accepted volume)*(Bid price). | 273,890 | 221,830 | -19% | 271,106 | -1% | 323,911 | +18% | 98,848 | 81,802 | -17% | 101,328 | +3% | 120,621 | +22% |
| Market participants' Surplus (EUR/MTU) | Total welfare - Congestion Revenue | 70,986 | 51,739 | -27% | 74,066 | +4% | 100,391 | +40% | 22,673 | 16,393 | -28% | 28,781 | +27% | 38,278 | +68% |

- TSOs conclude that with the current allocation algorithm, results will lead to 0MW or low values on certain borders regardless of the bids or MinRAM levels provided. Possible reasons could be:
  - The objective function;
  - The competition among borders
- TSOs highlight that in all cases there is lower allocated capacity with FB than with NTC
- TSOs highlight that with 20% Min RAM we have lower social welfare than in NTC.
- TSOs highlight that increasing MinRAM levels results with better social welfare and congestion revenue
  - See annex 2 with additional simulation results including Polish bids



# Overview of results of 2023 simulations* with historical bids & comparison with ATC historical bids

| 20RAMHistorical23 | | | 30RAMHistorical23 | | | 40RAMHistorical23 | | |
|---|---|---|---|---|---|---|---|---|
| BZ to BZ | TotalAccepted Volume | auction_price | BZ to BZ | TotalAccepted Volume | auction_price | BZ to BZ | TotalAccepted Volume | auction_price |
| AT_to_CZ | 5,00 | **6,85** | AT_to_CZ | 5,00 | **6,11** | AT_to_CZ | 36,00 | 3,48 |
| AT_to_DE | 0,00 | **7,70** | AT_to_DE | 0,00 | **6,72** | AT_to_DE | 41,00 | 4,79 |
| AT_to_HU | 104,54 | **13,67** | AT_to_HU | 171,84 | **12,31** | AT_to_HU | 222,31 | 11,41 |
| AT_to_SI | 48,00 | **14,14** | AT_to_SI | 133,52 | **12,50** | AT_to_SI | 182,57 | 11,33 |
| BE_to_DE | 20,00 | **37,11** | BE_to_DE | 25,00 | **35,84** | BE_to_DE | 110,00 | 32,39 |
| BE_to_FR | 313,00 | **92,35** | BE_to_FR | 330,79 | **91,03** | BE_to_FR | 457,00 | 82,17 |
| **BE_to_NL** | 30,00 | **31,86** | BE_to_NL | 30,00 | **32,12** | BE_to_NL | 100,00 | 25,42 |
| CZ_to_AT | 120,80 | **16,41** | CZ_to_AT | 128,00 | **16,19** | CZ_to_AT | 217,00 | 14,79 |
| CZ_to_DE | 422,00 | **3,47** | CZ_to_DE | 595,88 | **2,88** | CZ_to_DE | 1213,57 | 1,80 |
| CZ_to_SK | 389,00 | **9,31** | CZ_to_SK | 449,00 | **8,45** | CZ_to_SK | 430,00 | 8,67 |
| DE_to_AT | 586,97 | **25,00** | DE_to_AT | 836,31 | **23,07** | DE_to_AT | 762,92 | 23,23 |
| DE_to_BE | 215,00 | **13,20** | DE_to_BE | 216,56 | **13,16** | DE_to_BE | 325,00 | 10,80 |
| DE_to_CZ | 31,00 | **11,22** | DE_to_CZ | 63,00 | **9,15** | DE_to_CZ | 71,00 | 8,93 |
| DE_to_FR | 1388,75 | **63,00** | DE_to_FR | 1734,00 | **55,34** | DE_to_FR | 2135,36 | 47,25 |
| DE_to_NL | 219,06 | **16,67** | DE_to_NL | 434,49 | **13,15** | DE_to_NL | 656,07 | 10,12 |
| FR_to_BE | 150,00 | **14,20** | FR_to_BE | 458,54 | **8,45** | FR_to_BE | 301,56 | 9,89 |
| FR_to_DE | 1371,07 | **5,76** | FR_to_DE | 1966,21 | **4,58** | FR_to_DE | 2056,02 | 4,26 |
| HR_to_HU | 92,16 | **10,00** | HR_to_HU | 168,00 | **6,19** | HR_to_HU | 183,51 | 5,71 |
| HR_to_SI | 10,00 | **9,09** | HR_to_SI | 23,00 | **4,67** | HR_to_SI | 36,00 | 3,96 |
| HU_to_AT | 25,00 | **7,57** | HU_to_AT | 25,00 | **7,86** | HU_to_AT | 25,00 | 7,92 |
| HU_to_HR | 312,78 | **7,11** | HU_to_HR | 358,00 | **6,89** | HU_to_HR | 400,00 | 6,13 |
| HU_to_RO | 337,61 | **2,59** | HU_to_RO | 522,94 | **2,11** | HU_to_RO | 746,28 | 1,69 |
| **HU_to_SI** | 2,00 | **12,07** | HU_to_SI | 2,00 | **10,57** | HU_to_SI | 3,00 | 9,55 |
| HU_to_SK | 904,00 | **0,59** | HU_to_SK | 1277,31 | **0,39** | HU_to_SK | 953,95 | 0,56 |
| **NL_to_BE** | 11,52 | **38,57** | NL_to_BE | 65,00 | **23,15** | NL_to_BE | 138,00 | 15,45 |
| NL_to_DE | 0,00 | **44,29** | NL_to_DE | 72,95 | **36,00** | NL_to_DE | 320,81 | 29,44 |
| RO_to_HU | 295,71 | **7,56** | RO_to_HU | 459,05 | **5,61** | RO_to_HU | 630,71 | 4,84 |
| SI_to_AT | 106,00 | **3,67** | SI_to_AT | 87,00 | **4,24** | SI_to_AT | 69,00 | 5,17 |
| SI_to_HR | 583,00 | **1,83** | SI_to_HR | 690,00 | **1,56** | SI_to_HR | 605,00 | 1,72 |
| **SI_to_HU** | 18,00 | **7,70** | SI_to_HU | 38,00 | **6,76** | SI_to_HU | 35,00 | 6,88 |
| SK_to_CZ | 135,00 | **0,74** | SK_to_CZ | 113,71 | **0,85** | SK_to_CZ | 318,97 | 0,51 |
| SK_to_HU | 263,00 | **7,68** | SK_to_HU | 336,25 | **7,32** | SK_to_HU | 358,00 | 7,21 |
| TotalAcceptedVolume | 8.510 | | TotalAcceptedVolume | 11.816 | | TotalAcceptedVolume | 14.141 | |
| Congestion revenue | 170.090,79 | | Congestion revenue | 197.040,39 | | Congestion revenue | 223.519,69 | |
| Social Welfare | 221.830,00 | | Social Welfare | 271.106,00 | | Social Welfare | 323.911,00 | |

| BasisATCHistorical23 | | |
|---|---|---|
| BZ to BZ | Accepted Volume (MW) | Auction Price (€) |
| AT_to_CZ | 200,0 | 2,11 |
| AT_to_DE | 1960,0 | 0,97 |
| AT_to_HU | 250,0 | 10,82 |
| AT_to_SI | 300,0 | 9,22 |
| BE_to_DE | 260,0 | 27,40 |
| BE_to_FR | 250,0 | 98,00 |
| BE_to_NL | 473,0 | 13,24 |
| CZ_to_AT | 200,0 | 15,11 |
| CZ_to_DE | 600,0 | 3,12 |
| CZ_to_SK | 600,0 | 7,38 |
| DE_to_AT | 1960,0 | 18,44 |
| DE_to_BE | 260,0 | 12,26 |
| DE_to_CZ | 300,0 | 7,77 |
| DE_to_FR | 600,0 | 80,01 |
| DE_to_NL | 827,0 | 8,99 |
| FR_to_BE | 1450,0 | 4,43 |
| FR_to_DE | 1000,0 | 6,95 |
| HR_to_HU | 400,0 | 3,50 |
| HR_to_SI | 500,0 | 1,66 |
| HU_to_AT | 250,0 | 3,58 |
| HU_to_HR | 500,0 | 4,27 |
| HU_to_RO | 350,0 | 2,56 |
| HU_to_SI | 150,0 | 4,55 |
| HU_to_SK | 800,0 | 0,67 |
| NL_to_BE | 473,0 | 10,33 |
| NL_to_DE | 827,0 | 19,27 |
| RO_to_HU | 350,0 | 7,37 |
| SI_to_AT | 300,0 | 2,23 |
| SI_to_HR | 500,0 | 2,32 |
| SI_to_HU | 150,0 | 5,05 |
| SK_to_CZ | 400,0 | 0,41 |
| SK_to_HU | 699,0 | 5,91 |
| TotalAcceptedVolume | 18.139 | |
| Congestion revenue | 202.904,92 | |
| Social Welfare | 273.890,00 | |

## Observations

Border having low capacity :

- The results of simulations in FB show 9 borders where one direction has an allocated capacity under the 100MW
- 2 borders (BE – NL & HU – SI) where both directions have an allocated capacity under the 100MW.
- As comparison, the smallest value allocated in NTC is 150MW.

**Increasing the MinRAM does not affect bidding zone borders equally, but does not solve the low allocation on some BZBs either**

Disclaimer: Polish borders were not included in this overview as there were no allocations on polish borders in 2023

Borders with <100MW allocated

Borders with FB values >> Historical ATC allocations

* 2022 Simulation results & 2023 Normalised results are available in annex

# Overview of results of 2022 simulations with historical bids & comparison with ATC historical bids

| 20RAMHistorical22 | | | 30RAMHistorical22 | | | 40RAMHistorical22 | | | BasisATCHistorical22 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BZ to BZ | TotalAccepted Volume | auction_price | BZ to BZ | TotalAccepted Volume | auction_price | BZ to BZ | TotalAccepted Volume | auction_price | BZ to BZ | Accepted Volume (MW) | Auction Price (€) |
| AT_to_CZ | 0,00 | **4,55** | AT_to_CZ | 0,00 | **3,90** | AT_to_CZ | 40,00 | 2,08 | AT_to_CZ | 250,0 | 1,38 |
| AT_to_DE | 1,00 | **4,56** | AT_to_DE | 1,00 | **3,97** | AT_to_DE | 1,00 | 2,78 | AT_to_DE | 2940,0 | 0,35 |
| AT_to_HU | 2,00 | **9,55** | AT_to_HU | 77,28 | **8,15** | AT_to_HU | 140,86 | 7,55 | AT_to_HU | 300,0 | 6,80 |
| AT_to_SI | 80,80 | **6,80** | AT_to_SI | 180,15 | **6,26** | AT_to_SI | 246,79 | 5,85 | AT_to_SI | 350,0 | 5,55 |
| BE_to_DE | 0,00 | **11,95** | BE_to_DE | 0,00 | **12,03** | BE_to_DE | 0,00 | 10,92 | BE_to_DE | 260,0 | 5,16 |
| BE_to_FR | 191,83 | **29,70** | BE_to_FR | 134,62 | **30,32** | BE_to_FR | 372,20 | 27,89 | BE_to_FR | 250,0 | 29,23 |
| **BE_to_NL** | 0,00 | **11,89** | BE_to_NL | 0,00 | **11,88** | BE_to_NL | 0,00 | 9,72 | BE_to_NL | 473,0 | 4,79 |
| CZ_to_AT | 75,16 | **5,18** | CZ_to_AT | 76,00 | **5,06** | CZ_to_AT | 231,00 | 4,23 | CZ_to_AT | 200,0 | 4,51 |
| CZ_to_DE | 301,95 | **1,51** | CZ_to_DE | 456,67 | **1,21** | CZ_to_DE | 1144,44 | 0,84 | CZ_to_DE | 400,0 | 1,03 |
| CZ_to_SK | 485,00 | **4,08** | CZ_to_SK | 720,00 | **3,44** | CZ_to_SK | 596,00 | 3,71 | CZ_to_SK | 700,0 | 3,44 |
| DE_to_AT | 483,00 | **6,97** | DE_to_AT | 675,45 | **6,73** | DE_to_AT | 563,46 | 6,78 | DE_to_AT | 2940,0 | 5,05 |
| DE_to_BE | 48,44 | **6,45** | DE_to_BE | 287,03 | **4,07** | DE_to_BE | 202,00 | 4,81 | DE_to_BE | 260,0 | 4,26 |
| DE_to_CZ | 210,00 | **3,29** | DE_to_CZ | 480,00 | **2,81** | DE_to_CZ | 512,00 | 2,69 | DE _to_CZ | 120,0 | 3,29 |
| DE_to_FR | 1659,00 | **23,69** | DE_to_FR | 2189,00 | **18,83** | DE_to_FR | 2608,76 | 15,89 | DE_to_FR | 600,0 | 30,26 |
| DE_to_NL | 214,52 | **6,82** | DE_to_NL | 338,91 | **6,07** | DE_to_NL | 638,97 | 5,28 | DE_to_NL | 827,0 | 4,83 |
| FR_to_BE | 14,49 | **8,11** | FR_to_BE | 197,37 | **3,57** | FR_to_BE | 46,73 | 5,07 | FR_to_BE | 1400,0 | 1,75 |
| FR_to_DE | 1482,11 | **3,65** | FR_to_DE | 2146,25 | **2,97** | FR_to_DE | 2684,32 | 2,60 | FR_to_DE | 1000,0 | 4,34 |
| HR_to_HU | 0,00 | **4,41** | HR_to_HU | 0,00 | **3,70** | HR_to_HU | 0,00 | 3,60 | HR_to_HU | 500,0 | 0,55 |
| HR_to_SI | 55,00 | **1,41** | HR_to_SI | 55,00 | **1,34** | HR_to_SI | 55,00 | 1,42 | HR_to_SI | 600,0 | 0,07 |
| HU_to_AT | 75,00 | **2,02** | HU_to_AT | 10,00 | **2,46** | HU_to_AT | 20,00 | 2,19 | HU_to_AT | 300,0 | 0,88 |
| HU_to_HR | 208,00 | **2,82** | HU_to_HR | 208,00 | **2,97** | HU_to_HR | 223,00 | 2,44 | HU_to_HR | 600,0 | 0,67 |
| HU_to_RO | 393,19 | **1,21** | HU_to_RO | 557,07 | **1,00** | HU_to_RO | 754,31 | 0,77 | HU_to_RO | 350,0 | 1,28 |
| HU_to_SK | 447,00 | **0,17** | HU_to_SK | 723,00 | **0,11** | HU_to_SK | 924,00 | 0,08 | HU_to_SI | 0,0 | 0,00 |
| **NL_to_BE** | 0,00 | **22,66** | NL_to_BE | 0,00 | **6,96** | NL_to_BE | 219,00 | 4,29 | HU_to_SK | 800,0 | 0,09 |
| NL_to_DE | 0,00 | **19,15** | NL_to_DE | 0,00 | **12,04** | NL_to_DE | 5,00 | 9,38 | NL_to_BE | 473,0 | 3,11 |
| RO_to_HU | 310,02 | **2,53** | RO_to_HU | 482,18 | **2,08** | RO_to_HU | 506,00 | 1,95 | NL_to_DE | 827,0 | 3,51 |
| SI_to_AT | 65,00 | **0,71** | SI_to_AT | 19,00 | **0,99** | SI_to_AT | 15,00 | 1,38 | RO_to_HU | 350,0 | 2,27 |
| SI_to_HR | 410,00 | **1,26** | SI_to_HR | 461,00 | **1,03** | SI_to_HR | 425,00 | 1,15 | SI_to_AT | 350,0 | 0,23 |
| SK_to_CZ | 224,00 | **0,18** | SK_to_CZ | 1,00 | **0,78** | SK_to_CZ | 111,40 | 0,28 | SI_to_HR | 600,0 | 0,62 |
| SK_to_HU | 656,18 | **4,42** | SK_to_HU | 704,16 | **4,30** | SK_to_HU | 765,00 | 4,16 | SI_to_HU | 0,0 | 0,00 |
| TotalAcceptedVolume | 8.093 | | TotalAcceptedVolume | 11.180 | | TotalAcceptedVolume | 14.051 | | TotalAcceptedVolume | 20.840 | |
| Congestion revenue Social Welfare | 65.409,18<br>81.802,00 | | Congestion revenue Social Welfare | 72.546,69<br>101.328,00 | | Congestion revenue Social Welfare | 82.342,61<br>120.621,00 | | Congestion revenue Social Welfare | 76.175,48<br>98.848,00 | |
| | | | | | | | | | SK_to_CZ | 600,0 | 0,07 |
| | | | | | | | | | SK_to_HU | 700,0 | 4,31 |

## Observations

Border having low capacity :

- The results of simulations in FB show 9 borders where one direction has an allocated capacity under the 100MW
- 2 borders (BE – NL & HU – SI) where both directions have an allocated capacity under the 100MW.
- As comparison, the smallest value allocated in NTC is 150MW.

**Increasing the MinRAM does not affect bidding zone borders equally, but does not solve the low allocation on some BZBs either**

Disclaimer: Polish borders were not included in this overview as there were no allocations on polish borders in 2023

Borders with <100MW allocated

Borders with FB values >> Historical ATC allocations

# Annexes

# Annex 1 – Simulation results

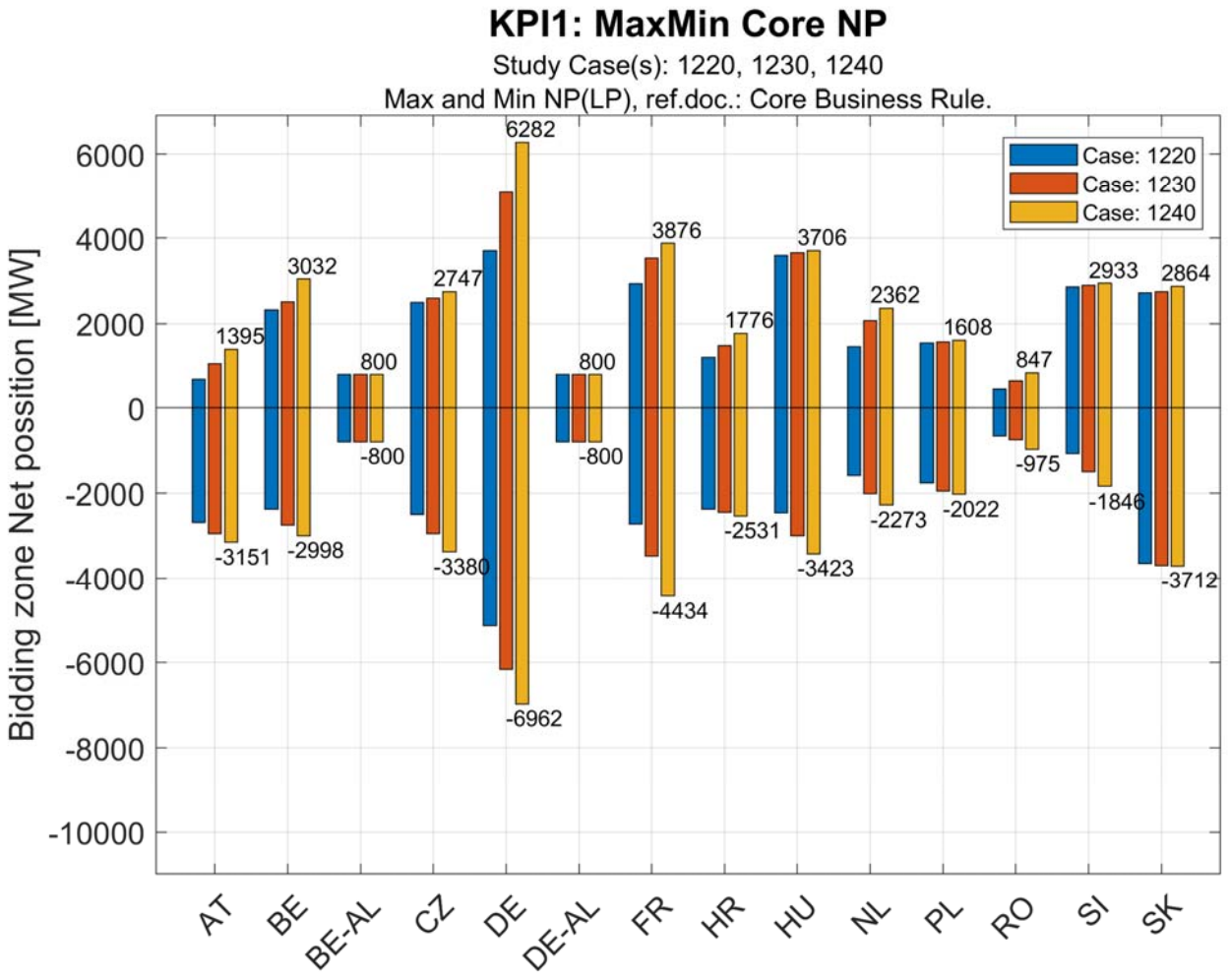
# Overview of results of 2023 simulations with normalised bids & weighted normalised bids

| 20RAMNormalised23 | | | 30RAMNormalised23 | | | 40RAMNormalised23 | | |
|---|---|---|---|---|---|---|---|---|
| BZ to BZ | TotalAcceptedV | auction_price | BZ to BZ | TotalAcceptedV | auction_pric | BZ to BZ | TotalAcceptedV | auction_price |
| AT_to_CZ | 26 | 3,79 | AT_to_CZ | 86 | 2,74 | AT_to_CZ | 140 | 2,30 |
| AT_to_DE | 191 | 4,77 | AT_to_DE | 449 | 2,78 | AT_to_DE | 561 | 2,70 |
| AT_to_HU | 0 | 5,20 | AT_to_HU | 20 | 4,08 | AT_to_HU | 20 | 3,41 |
| AT_to_SI | 1 | 5,96 | AT_to_SI | 50 | 2,94 | AT_to_SI | 112 | 2,68 |
| BE_to_DE | 625 | 1,63 | BE_to_DE | 346 | 2,27 | BE_to_DE | 378 | 2,05 |
| BE_to_FR | 633 | 1,86 | BE_to_FR | 720 | 1,80 | BE_to_FR | 819 | 1,70 |
| BE_to_NL | 360 | 2,73 | BE_to_NL | 379 | 2,69 | BE_to_NL | 570 | 1,96 |
| CZ_to_AT | 141 | 2,51 | CZ_to_AT | 183 | 2,42 | CZ_to_AT | 275 | 2,17 |
| CZ_to_DE | 680 | 2,05 | CZ_to_DE | 854 | 1,84 | CZ_to_DE | 1.223 | 1,36 |
| CZ_to_PL | 0 | 1,43 | CZ_to_PL | 0 | 2,07 | CZ_to_PL | 0 | 1,59 |
| CZ_to_SK | 346 | 1,88 | CZ_to_SK | 438 | 1,65 | CZ_to_SK | 465 | 1,57 |
| DE_to_AT | 25 | 3,16 | DE_to_AT | 271 | 2,04 | DE_to_AT | 82 | 2,38 |
| DE_to_BE | 276 | 2,14 | DE_to_BE | 125 | 2,95 | DE_to_BE | 222 | 2,34 |
| DE_to_CZ | 552 | 1,71 | DE_to_CZ | 905 | 1,43 | DE_to_CZ | 1.229 | 1,17 |
| DE_to_FR | 0 | 3,54 | DE_to_FR | 53 | 2,21 | DE_to_FR | 652 | 1,75 |
| DE_to_NL | 279 | 2,85 | DE_to_NL | 649 | 1,83 | DE_to_NL | 732 | 1,74 |
| DE_to_PL | 0 | 1,71 | DE_to_PL | 0 | 1,66 | DE_to_PL | 0 | 1,81 |
| FR_to_BE | 1.163 | 2,59 | FR_to_BE | 988 | 2,97 | FR_to_BE | 900 | 2,97 |
| FR_to_DE | 663 | 2,13 | FR_to_DE | 806 | 2,02 | FR_to_DE | 726 | 2,11 |
| HR_to_HU | 21 | 5,41 | HR_to_HU | 128 | 3,85 | HR_to_HU | 133 | 3,36 |
| HR_to_SI | 10 | 6,03 | HR_to_SI | 46 | 2,78 | HR_to_SI | 61 | 2,78 |
| HU_to_AT | 320 | 2,03 | HU_to_AT | 220 | 2,33 | HU_to_AT | 225 | 2,28 |
| HU_to_HR | 487 | 2,05 | HU_to_HR | 477 | 2,06 | HU_to_HR | 492 | 1,98 |
| HU_to_RO | 242 | 2,33 | HU_to_RO | 516 | 1,64 | HU_to_RO | 579 | 1,58 |
| HU_to_SI | 3 | 4,45 | HU_to_SI | 11 | 3,03 | HU_to_SI | 17 | 2,78 |
| HU_to_SK | 1.324 | 0,77 | HU_to_SK | 988 | 1,07 | HU_to_SK | 858 | 1,27 |
| NL_to_BE | 65 | 5,05 | NL_to_BE | 65 | 4,02 | NL_to_BE | 195 | 2,98 |
| NL_to_DE | 250 | 3,03 | NL_to_DE | 925 | 1,80 | NL_to_DE | 888 | 1,85 |
| PL_to_CZ | 0 | 0,87 | PL_to_CZ | 0 | 1,21 | PL_to_CZ | 0 | 0,69 |
| PL_to_DE | 0 | 1,49 | PL_to_DE | 0 | 1,21 | PL_to_DE | 0 | 1,09 |
| PL_to_SK | 0 | 1,15 | PL_to_SK | 0 | 0,86 | PL_to_SK | 0 | 0,77 |
| RO_to_HU | 261 | 2,54 | RO_to_HU | 443 | 1,60 | RO_to_HU | 614 | 1,36 |
| SI_to_AT | 885 | 0,96 | SI_to_AT | 811 | 1,07 | SI_to_AT | 765 | 1,08 |
| SI_to_HR | 974 | 0,85 | SI_to_HR | 938 | 0,85 | SI_to_HR | 895 | 0,92 |
| SI_to_HU | 39 | 2,62 | SI_to_HU | 39 | 2,90 | SI_to_HU | 113 | 2,30 |
| SK_to_CZ | 497 | 1,17 | SK_to_CZ | 346 | 1,63 | SK_to_CZ | 557 | 1,15 |
| SK_to_HU | 289 | 1,96 | SK_to_HU | 169 | 2,49 | SK_to_HU | 369 | 1,84 |
| SK_to_PL | 0 | 0,99 | SK_to_PL | 0 | 1,70 | SK_to_PL | 0 | 1,25 |
| SummedAcceptedAcVolume | 10.727 | | SummedAcceptedAcVolume | 13.444 | | SummedAcceptedAcVolume | 15.268 | |
| SummedAcceptedHvdcVolume | 901 | | SummedAcceptedHvdcVolume | 0 | | SummedAcceptedHvdcVolume | 599 | |
| TotalAcceptedVolume | 11.629 | | TotalAcceptedVolume | 83 | | TotalAcceptedVolume | 15.868 | |
| Congestion revenue | 21.524,64 | | Congestion revenue | 15.268,32 | | Congestion revenue | 27.696,60 | |
| Social Welfare | 36.982,00 | | Social Welfare | 42.344,00 | | Social Welfare | 47.097,00 | |

| 20RAMWNormalised23 | | | 30RAMWNormalised23 | | | 40RAMWNormalised23 | | |
|---|---|---|---|---|---|---|---|---|
| BZ to BZ | TotalAcceptedV | auction_price | BZ to BZ | TotalAcceptedV | auction_pric | BZ to BZ | TotalAcceptedV | auction_price |
| AT_to_CZ | 140 | 11,46 | AT_to_CZ | 304 | 9,69 | AT_to_CZ | 550 | 6,67 |
| AT_to_DE | 0 | 11,61 | AT_to_DE | 0 | 9,43 | AT_to_DE | 5 | 7,12 |
| AT_to_HU | 0 | 20,11 | AT_to_HU | 0 | 16,73 | AT_to_HU | 20 | 12,43 |
| AT_to_SI | 15 | 20,06 | AT_to_SI | 30 | 14,58 | AT_to_SI | 40 | 10,96 |
| BE_to_DE | 601 | 6,02 | BE_to_DE | 380 | 7,47 | BE_to_DE | 443 | 7,08 |
| BE_to_FR | 616 | 6,66 | BE_to_FR | 738 | 6,26 | BE_to_FR | 992 | 5,25 |
| BE_to_NL | 415 | 6,23 | BE_to_NL | 313 | 7,14 | BE_to_NL | 464 | 5,48 |
| CZ_to_AT | 372 | 8,69 | CZ_to_AT | 537 | 7,36 | CZ_to_AT | 561 | 7,10 |
| CZ_to_DE | 384 | 5,16 | CZ_to_DE | 349 | 5,30 | CZ_to_DE | 714 | 3,88 |
| CZ_to_PL | 0 | 5,38 | CZ_to_PL | 0 | 6,39 | CZ_to_PL | 0 | 5,40 |
| CZ_to_SK | 407 | 7,13 | CZ_to_SK | 666 | 5,65 | CZ_to_SK | 689 | 5,61 |
| DE_to_AT | 0 | 9,26 | DE_to_AT | 0 | 6,14 | DE_to_AT | 0 | 7,69 |
| DE_to_BE | 245 | 6,40 | DE_to_BE | 251 | 6,28 | DE_to_BE | 365 | 5,19 |
| DE_to_CZ | 389 | 5,58 | DE_to_CZ | 858 | 4,33 | DE_to_CZ | 970 | 4,02 |
| DE_to_FR | 0 | 7,10 | DE_to_FR | 31 | 6,08 | DE_to_FR | 320 | 4,73 |
| DE_to_NL | 280 | 4,42 | DE_to_NL | 688 | 2,82 | DE_to_NL | 858 | 2,50 |
| DE_to_PL | 0 | 5,66 | DE_to_PL | 0 | 5,40 | DE_to_PL | 0 | 5,80 |
| FR_to_BE | 973 | 2,57 | FR_to_BE | 879 | 2,70 | FR_to_BE | 912 | 2,57 |
| FR_to_DE | 715 | 3,29 | FR_to_DE | 806 | 3,15 | FR_to_DE | 614 | 3,34 |
| HR_to_HU | 24 | 19,76 | HR_to_HU | 114 | 16,62 | HR_to_HU | 118 | 14,07 |
| HR_to_SI | 23 | 18,63 | HR_to_SI | 106 | 13,06 | HR_to_SI | 146 | 11,73 |
| HU_to_AT | 243 | 7,22 | HU_to_AT | 208 | 8,01 | HU_to_AT | 173 | 8,27 |
| HU_to_HR | 400 | 7,47 | HU_to_HR | 361 | 7,89 | HU_to_HR | 416 | 6,68 |
| HU_to_RO | 260 | 7,86 | HU_to_RO | 524 | 5,72 | HU_to_RO | 616 | 5,45 |
| HU_to_SI | 88 | 15,57 | HU_to_SI | 196 | 13,54 | HU_to_SI | 235 | 11,54 |
| HU_to_SK | 1.371 | 2,27 | HU_to_SK | 952 | 3,26 | HU_to_SK | 758 | 4,29 |
| NL_to_BE | 98 | 7,18 | NL_to_BE | 101 | 7,12 | NL_to_BE | 288 | 5,27 |
| NL_to_DE | 310 | 5,65 | NL_to_DE | 927 | 3,42 | NL_to_DE | 863 | 3,59 |
| PL_to_CZ | 0 | 3,88 | PL_to_CZ | 0 | 4,06 | PL_to_CZ | 0 | 2,95 |
| PL_to_DE | 0 | 3,75 | PL_to_DE | 0 | 4,03 | PL_to_DE | 0 | 3,22 |
| PL_to_SK | 0 | 3,90 | PL_to_SK | 0 | 2,84 | PL_to_SK | 0 | 2,91 |
| RO_to_HU | 269 | 7,40 | RO_to_HU | 449 | 5,16 | RO_to_HU | 612 | 4,39 |
| SI_to_AT | 757 | 4,02 | SI_to_AT | 687 | 4,56 | SI_to_AT | 585 | 4,94 |
| SI_to_HR | 764 | 3,17 | SI_to_HR | 780 | 3,03 | SI_to_HR | 911 | 2,48 |
| SI_to_HU | 245 | 12,41 | SI_to_HU | 262 | 12,24 | SI_to_HU | 342 | 9,68 |
| SK_to_CZ | 728 | 4,26 | SK_to_CZ | 418 | 5,79 | SK_to_CZ | 729 | 4,19 |
| SK_to_HU | 40 | 9,52 | SK_to_HU | 40 | 9,78 | SK_to_HU | 90 | 7,45 |
| SK_to_PL | 0 | 2,52 | SK_to_PL | 0 | 5,30 | SK_to_PL | 0 | 3,94 |
| SummedAcceptedAcVolume | 10.326 | | SummedAcceptedAcVolume | 12.955 | | SummedAcceptedAcVolume | 14.592 | |
| SummedAcceptedHvdcVolume | 846 | | SummedAcceptedHvdcVolume | 0 | | SummedAcceptedHvdcVolume | 808 | |
| TotalAcceptedVolume | 11.172 | | TotalAcceptedVolume | 268 | | TotalAcceptedVolume | 15.400 | |
| Congestion revenue | 58.757,32 | | Congestion revenue | 14.592,29 | | Congestion revenue | 76.148,77 | |
| Social Welfare | 97.519,00 | | Social Welfare | 111.767,00 | | Social Welfare | 126.877,00 | |

## 5. LTCC Implementation

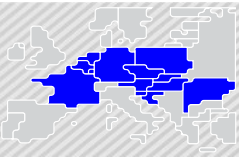
KPI1 LTCC Domain after minRAM adjustment (**after** the splitting), //Run, 1220, 1230 and 1240

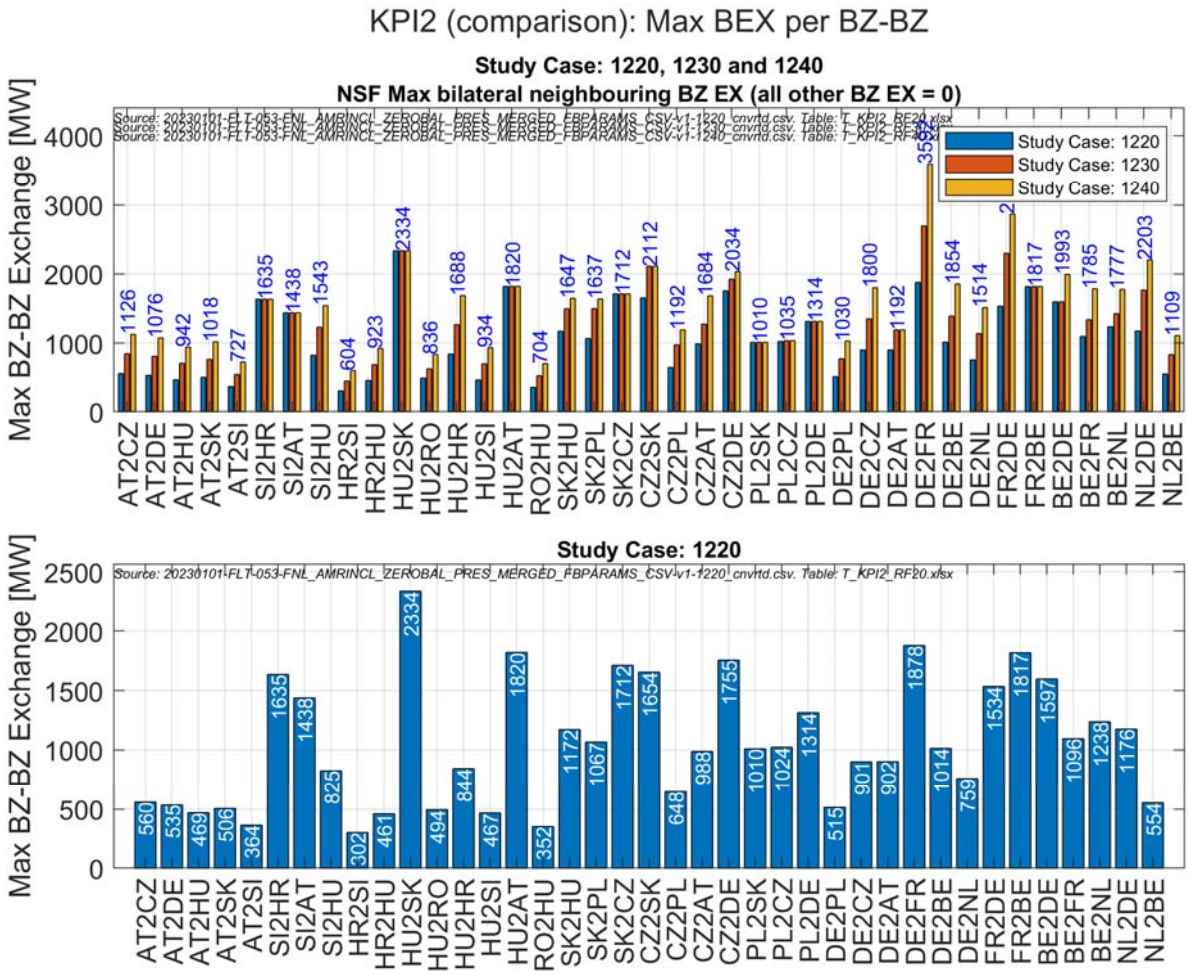


## 5. LTCC Implementation

KPI2 Comparison of the KPI2 for LTCC domains after minRAM, 1240, **after** splitting

Core TSOs





# LTFBA project update – Simulation results

## 2nd Round: simulations 2022 for 20, 30, 40% MinRAM – list of all limiting elements

### 20%MinRAM

| | criticalBranch_id | monitoredBranch_name | RAM | RAM0Core | fMax | amr | ShadowPrice | AwardedCapacity | conti_name |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D2_CBCO_00134_S11 | [D2-D2] Altheim - Simbach 234/230 [DIR] | 64 | 77 | 398 | 3 | 9,751414094 | 64 | N-1 St. Peter - Pleinting 258 |
| 15 | NL_CBCO_00366_S04 | [NL-D2] Meeden-Diele 380 Z [OPP] [NL] | 169 | -39 | 1053 | 250 | 30,36747304 | 169 | N-1 Diele - Meeden WEISS/W |
| 19 | AT_CBCO_00383_S06 | [AT-HU] Wien Suedost - Gyoer 245 [DIR] [AT] | 38 | 22 | 234 | 25 | 115,6283327 | 38 | N-1 Gyor - Neusiedl |
| 28 | D7_CBCO_02406_S06 | [FR-D7] Vigy - Ensdorf VIGY2 S [DIR] [D7] | 302 | -47 | 1884 | 424 | 18,32046037 | 302 | N-1 Ensdorf - Vigy VIGY1 N |
| 38 | RO_CBCO_00268_S06 | [RO-RO] PST Arad 400/220 3 [DIR] | 64 | 70 | 400 | 9 | 5,710934903 | 64 | N-1 Mintia - Arad |
| 51 | FR_CBCO_00039_S01 | [BE-FR] Avelgem - Avelin 80 [DIR] [FR] | 354 | 442 | 1801 | 0 | 91,63682213 | 354 | N-1 Avelgem - Mastaing 380.79 |
| 67 | AT_CBCO_00415_S07 | [AT-SI] Obersielach - Podlog 247 [DIR] [AT] | 58 | -28 | 359 | 100 | 17,13143803 | 58 | N-1 Cirkovce-Podlog |
| 85 | AT_CBCO_00900_S09 | [AT-CZ] Duernrohr 1 - Slavetice 437 [OPP] [AT] | 290 | 363 | 1559 | 0 | 8,715308233 | 290 | N-1 Slavetice - Durnrohr 2 |
| 100 | NL_CBCO_00037_S09 | [NL-BE] Rilland-Zandvliet 380 G [DIR] [NL] | 277 | 50 | 1732 | 296 | 41,09612016 | 277 | N-1 Van Eyck - Maasbracht 380 Black/27 |
| 101 | NL_CBCO_00038_S09 | [NL-BE] Rilland-Zandvliet 380 G [DIR] [NL] | 277 | 97 | 1732 | 249 | 6,065932249 | 277 | N-1 Van Eyck - Maasbracht 380 White/28 |
| 104 | RO_CBCO_00262_S09 | [RO-RO] TR Portile de Fier 400/220 2 [OPP] | 80 | -48 | 500 | 148 | 4,205549404 | 80 | N-1 TR Portile de Fier 400/220 3 |

### 30%MinRAM

| | criticalBranch_id | monitoredBranch_name | RAM | RAM0Core | fMax | amr | ShadowPrice | AwardedCapacity | conti_name |
|---|---|---|---|---|---|---|---|---|---|
| 6 | NL_CBCO_00366_S04 | [NL-D2] Meeden-Diele 380 Z [OPP] [NL] | 253 | -39 | 1053 | 355 | 26,54208842 | 253 | N-1 Diele - Meeden WEISS/W |
| 37 | FR_CBCO_00039_S01 | [BE-FR] Avelgem - Avelin 80 [DIR] [FR] | 432 | 442 | 1801 | 98 | 92,30374908 | 432 | N-1 Avelgem - Mastaing 380.79 |
| 39 | AT_CBCO_00415_S07 | [AT-SI] Obersielach - Podlog 247 [DIR] [AT] | 86 | -28 | 359 | 136 | 17,00243346 | 86 | N-1 Cirkovce-Podlog |
| 40 | AT_CBCO_00481_S07 | [AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT] | 168 | 210 | 526 | 0 | 13,19338956 | 168 | N-1 Pleinting - Pirach 257 |
| 44 | HU_CBCO_00360_S07 | [HU-HU] Gonyu - Gyor [DIR] | 335 | 419 | 1385 | 0 | 3,991703228 | 335 | N-1 Gabcikovo - Gyor |
| 61 | AT_CBCO_00383_S06 | [AT-HU] Wien Suedost - Gyoer 245 [DIR] [AT] | 56 | 22 | 234 | 48 | 97,64177964 | 56 | N-1 Gyor - Neusiedl |
| 70 | BE_CBCO_01693_S06 | [NL-BE] Maasbracht - Van Eyck 380 White/28 [OPP] [BE] | 355 | 444 | 1385 | 0 | 3,608368894 | 355 | N-1 PST Van Eyck 1 |
| 74 | D7_CBCO_02406_S06 | [FR-D7] Vigy - Ensdorf VIGY2 S [DIR] [D7] | 452 | -47 | 1884 | 612 | 12,79192155 | 452 | N-1 Ensdorf - Vigy VIGY1 N |
| 85 | RO_CBCO_00271_S06 | [RO-RO] PST Arad 400/220 3 [DIR] | 96 | 105 | 400 | 15 | 2,359053471 | 96 | N-1 Portile de Fier - Djerdap |
| 98 | AT_CBCO_00900_S09 | [AT-CZ] Duernrohr 1 - Slavetice 437 [OPP] [AT] | 374 | 363 | 1559 | 105 | 4,759042284 | 374 | N-1 Slavetice - Durnrohr 2 |
| 116 | NL_CBCO_00037_S09 | [NL-BE] Rilland-Zandvliet 380 G [DIR] [NL] | 416 | 50 | 1732 | 470 | 14,45349448 | 416 | N-1 Van Eyck - Maasbracht 380 Black/27 |
| 120 | RO_CBCO_00262_S09 | [RO-RO] TR Portile de Fier 400/220 2 [OPP] | 120 | -48 | 500 | 198 | 3,254462128 | 120 | N-1 TR Portile de Fier 400/220 3 |

### 40%MinRAM

| | criticalBranch_id | monitoredBranch_name | RAM | RAM0Core | fMax | amr | ShadowPrice | AwardedCapacity | conti_name |
|---|---|---|---|---|---|---|---|---|---|
| 4 | NL_CBCO_00366_S04 | [NL-D2] Meeden-Diele 380 Z [OPP] [NL] | 337 | -39 | 1053 | 460 | 17,09304715 | 337 | N-1 Diele - Meeden WEISS/W |
| 23 | FR_CBCO_00039_S01 | [BE-FR] Avelgem - Avelin 80 [DIR] [FR] | 576 | 442 | 1801 | 278 | 83,7778491 | 576 | N-1 Avelgem - Mastaing 380.79 |
| 24 | AT_CBCO_00381_S10 | [AT-HU] Wien Suedost - Gyoer 245 [DIR] [AT] | 75 | 90 | 234 | 4 | 93,36630055 | 75 | N-1 Neusiedl - Wien Suedost 246A |
| 49 | BE_CBCO_01693_S06 | [NL-BE] Maasbracht - Van Eyck 380 White/28 [OPP] [BE] | 443 | 444 | 1385 | 110 | 6,567086684 | 443 | N-1 PST Van Eyck 1 |
| 52 | CZ_CBCO_00005_S06 | [CZ-CZ] TR Sokolnice 220/400 [DIR] | 160 | 198 | 500 | 2 | 1,170336968 | 160 | N-1 Slavetice - Durnrohr 2 |
| 55 | FR_CBCO_00040_S06 | [BE-FR] Avelgem - Avelin 80 [OPP] [FR] | 609 | 761 | 1609 | 0 | 10,92463067 | 609 | N-1 Avelgem - Mastaing 380.79 |
| 66 | RO_CBCO_00271_S06 | [RO-RO] PST Arad 400/220 3 [DIR] | 128 | 105 | 400 | 55 | 1,642073394 | 128 | N-1 Portile de Fier - Djerdap |
| 84 | AT_CBCO_00415_S07 | [AT-SI] Obersielach - Podlog 247 [DIR] [AT] | 115 | -28 | 359 | 172 | 20,93133121 | 115 | N-1 Cirkovce-Podlog |
| 85 | AT_CBCO_00481_S07 | [AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT] | 168 | 210 | 526 | 0 | 25,13285257 | 168 | N-1 Pleinting - Pirach 257 |
| 89 | HU_CBCO_00360_S07 | [HU-HU] Gonyu - Gyor [DIR] | 443 | 419 | 1385 | 135 | 1,149731912 | 443 | N-1 Gabcikovo - Gyor |
| 131 | NL_CBCO_00037_S09 | [NL-BE] Rilland-Zandvliet 380 G [DIR] [NL] | 554 | 50 | 1732 | 643 | 7,62676987 | 554 | N-1 Van Eyck - Maasbracht 380 Black/27 |

# LTFBA project update – Simulation results

## 2nd Round: simulations 2023 for 20, 30, 40% MinRAM – list of all limiting elements

### 20%MinRAM

| | criticalBranch_id | monitoredBranch_name | RAM | RAM0Core | fMax | amr | ShadowPrice | AwardedCapacity | conti_name |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D2_CBCO_00134_S11 | [D2-D2] Altheim - Simbach 234/230 [DIR] | 64 | 77 | 398 | 3 | 139,410185 | 64 | N-1 St. Peter - Pleinting 258 |
| 15 | NL_CBCO_00366_S04 | [NL-D2] Meeden-Diele 380 Z [OPP] [NL] | 169 | -39 | 1053 | 250 | 73,87737051 | 169 | N-1 Diele - Meeden WEISS/W |
| 19 | AT_CBCO_00383_S06 | [AT-HU] Wien Suedost - Gyoer 245 [DIR] [AT] | 38 | 22 | 234 | 25 | 156,6659409 | 38 | N-1 Gyor - Neusiedl |
| 28 | D7_CBCO_02406_S06 | [FR-D7] Vigy - Ensdorf VIGY2 S [DIR] [D7] | 302 | -47 | 1884 | 424 | 28,96632569 | 302 | N-1 Ensdorf - Vigy VIGY1 N |
| 38 | RO_CBCO_00268_S06 | [RO-RO] PST Arad 400/220 3 [DIR] | 64 | 70 | 400 | 9 | 10,70379387 | 64 | N-1 Mintia - Arad |
| 51 | FR_CBCO_00039_S01 | [BE-FR] Avelgem - Avelin 80 [DIR] [FR] | 354 | 442 | 1801 | 0 | 283,921367 | 354 | N-1 Avelgem - Mastaing 380.79 |
| 67 | AT_CBCO_00415_S07 | [AT-SI] Obersielach - Podlog 247 [DIR] [AT] | 58 | -28 | 359 | 100 | 43,13070468 | 58 | N-1 Cirkovce-Podlog |
| 76 | HR_CBCO_00019_S08 | [HR-SI] 220kV Pehlin - Divaca [DIR] [HR] | 60 | -36 | 374 | 111 | 29,90087849 | 60 | N-1 Melina - Divaca |
| 85 | AT_CBCO_00900_S09 | [AT-CZ] Duernrohr 1 - Slavetice 437 [OPP] [AT] | 290 | 363 | 1559 | 0 | 15,95448279 | 290 | N-1 Slavetice - Durnrohr 2 |
| 100 | NL_CBCO_00037_S09 | [NL-BE] Rilland-Zandvliet 380 G [DIR] [NL] | 277 | 50 | 1732 | 296 | 80,30560013 | 277 | N-1 Van Eyck - Maasbracht 380 Black/27 |
| 104 | RO_CBCO_00262_S09 | [RO-RO] TR Portile de Fier 400/220 2 [OPP] | 80 | -48 | 500 | 148 | 20,27292823 | 80 | N-1 TR Portile de Fier 400/220 3 |

### 30%MinRAM

| | criticalBranch_id | monitoredBranch_name | RAM | RAM0Core | fMax | amr | ShadowPrice | AwardedCapacity | conti_name |
|---|---|---|---|---|---|---|---|---|---|
| 6 | NL_CBCO_00366_S04 | [NL-D2] Meeden-Diele 380 Z [OPP] [NL] | 253 | -39 | 1053 | 355 | 55,96163579 | 253 | N-1 Diele - Meeden WEISS/W |
| 37 | FR_CBCO_00039_S01 | [BE-FR] Avelgem - Avelin 80 [DIR] [FR] | 432 | 442 | 1801 | 98 | 274,4677853 | 432 | N-1 Avelgem - Mastaing 380.79 |
| 39 | AT_CBCO_00415_S07 | [AT-SI] Obersielach - Podlog 247 [DIR] [AT] | 86 | -28 | 359 | 136 | 41,78559865 | 86 | N-1 Cirkovce-Podlog |
| 40 | AT_CBCO_00481_S07 | [AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT] | 168 | 210 | 526 | 0 | 70,44583485 | 168 | N-1 Pleinting - Pirach 257 |
| 44 | HU_CBCO_00360_S07 | [HU-HU] Gonyu - Gyor [DIR] | 335 | 419 | 1385 | 0 | 3,249822828 | 335 | N-1 Gabcikovo - Gyor |
| 51 | HR_CBCO_00019_S08 | [HR-SI] 220kV Pehlin - Divaca [DIR] [HR] | 90 | -36 | 374 | 148 | 6,945801322 | 90 | N-1 Melina - Divaca |
| 61 | AT_CBCO_00383_S06 | [AT-HU] Wien Suedost - Gyoer 245 [DIR] [AT] | 56 | 22 | 234 | 48 | 139,8827091 | 56 | N-1 Gyor - Neusiedl |
| 70 | BE_CBCO_01693_S06 | [NL-BE] Maasbracht - Van Eyck 380 White/28 [OPP] [BE] | 355 | 444 | 1385 | 0 | 18,6412212 | 355 | N-1 PST Van Eyck 1 |
| 74 | D7_CBCO_02406_S06 | [FR-D7] Vigy - Ensdorf VIGY2 S [DIR] [D7] | 452 | -47 | 1884 | 612 | 12,10367323 | 452 | N-1 Ensdorf - Vigy VIGY1 N |
| 78 | HU_CBCO_00621_S06 | [HU-UA] Kisvarda - Mukachevo [DIR] [HU] | 97 | 121 | 249 | 0 | 3,362342764 | 97 | N-1 Szabolcsbaka - Mukachevo |
| 85 | RO_CBCO_00271_S06 | [RO-RO] PST Arad 400/220 3 [DIR] | 96 | 105 | 400 | 15 | 4,246934585 | 96 | N-1 Portile de Fier - Djerdap |
| 98 | AT_CBCO_00900_S09 | [AT-CZ] Duernrohr 1 - Slavetice 437 [OPP] [AT] | 374 | 363 | 1559 | 105 | 12,3955708 | 374 | N-1 Slavetice - Durnrohr 2 |
| 99 | BE_CBCO_01737_S09 | [NL-BE] Maasbracht - Van Eyck 380 White/28 [DIR] [BE] | 352 | 440 | 1468 | 0 | 0,349271998 | 352 | N-1 Rilland - Zandvliet 380 Grey/29 |
| 116 | NL_CBCO_00037_S09 | [NL-BE] Rilland-Zandvliet 380 G [DIR] [NL] | 416 | 50 | 1732 | 470 | 47,94266211 | 416 | N-1 Van Eyck - Maasbracht 380 Black/27 |
| 120 | RO_CBCO_00262_S09 | [RO-RO] TR Portile de Fier 400/220 2 [OPP] | 120 | -48 | 500 | 198 | 15,09106523 | 120 | N-1 TR Portile de Fier 400/220 3 |

### 40%MinRAM

| | criticalBranch_id | monitoredBranch_name | RAM | RAM0Core | fMax | amr | ShadowPrice | AwardedCapacity | conti_name |
|---|---|---|---|---|---|---|---|---|---|
| 4 | NL_CBCO_00366_S04 | [NL-D2] Meeden-Diele 380 Z [OPP] [NL] | 337 | -39 | 1053 | 460 | 35,05690589 | 337 | N-1 Diele - Meeden WEISS/W |
| 23 | FR_CBCO_00039_S01 | [BE-FR] Avelgem - Avelin 80 [DIR] [FR] | 576 | 442 | 1801 | 278 | 248,5445039 | 576 | N-1 Avelgem - Mastaing 380.79 |
| 24 | AT_CBCO_00381_S10 | [AT-HU] Wien Suedost - Gyoer 245 [DIR] [AT] | 75 | 90 | 234 | 4 | 134,7604049 | 75 | N-1 Neusiedl - Wien Suedost 246A |
| 49 | BE_CBCO_01693_S06 | [NL-BE] Maasbracht - Van Eyck 380 White/28 [OPP] [BE] | 443 | 444 | 1385 | 110 | 14,08022091 | 443 | N-1 PST Van Eyck 1 |
| 52 | CZ_CBCO_00005_S06 | [CZ-CZ] TR Sokolnice 220/400 [DIR] | 160 | 198 | 500 | 2 | 6,369094481 | 160 | N-1 Slavetice - Durnrohr 2 |
| 55 | FR_CBCO_00040_S06 | [BE-FR] Avelgem - Avelin 80 [OPP] [FR] | 609 | 761 | 1609 | 0 | 15,60596577 | 609 | N-1 Avelgem - Mastaing 380.79 |
| 58 | HU_CBCO_00621_S06 | [HU-UA] Kisvarda - Mukachevo [DIR] [HU] | 97 | 121 | 249 | 0 | 9,754404262 | 97 | N-1 Szabolcsbaka - Mukachevo |
| 66 | RO_CBCO_00271_S06 | [RO-RO] PST Arad 400/220 3 [DIR] | 128 | 105 | 400 | 55 | 0,029040281 | 128 | N-1 Portile de Fier - Djerdap |
| 84 | AT_CBCO_00415_S07 | [AT-SI] Obersielach - Podlog 247 [DIR] [AT] | 115 | -28 | 359 | 172 | 44,13807334 | 115 | N-1 Cirkovce-Podlog |
| 85 | AT_CBCO_00481_S07 | [AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT] | 168 | 210 | 526 | 0 | 97,36560884 | 168 | N-1 Pleinting - Pirach 257 |
| 89 | HU_CBCO_00360_S07 | [HU-HU] Gonyu - Gyor [DIR] | 443 | 419 | 1385 | 135 | 1,742051349 | 443 | N-1 Gabcikovo - Gyor |
| 96 | HR_CBCO_00019_S08 | [HR-SI] 220kV Pehlin - Divaca [DIR] [HR] | 120 | -36 | 374 | 186 | 3,848633455 | 120 | N-1 Melina - Divaca |
| 131 | NL_CBCO_00037_S09 | [NL-BE] Rilland-Zandvliet 380 G [DIR] [NL] | 554 | 50 | 1732 | 643 | 30,29500075 | 554 | N-1 Van Eyck - Maasbracht 380 Black/27 |
| 135 | RO_CBCO_00262_S09 | [RO-RO] TR Portile de Fier 400/220 2 [OPP] | 160 | -48 | 500 | 248 | 7,975219384 | 160 | N-1 TR Portile de Fier 400/220 3 |

# LTFBA project update

## Example of bids on 2 BZ-borders for ‘Normalization 1’ by averaging price per BZB to ‘1’ (current understanding)

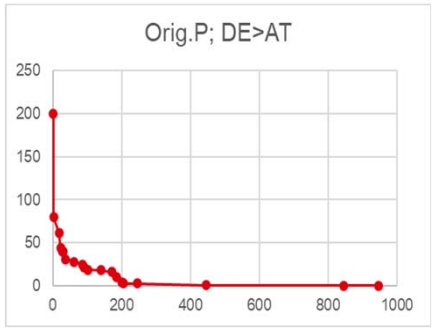
| Original bids | | | | |
|---|---|---|---|---|
| Bid Nr. | Border | Amount | Price | A*P |
| 1 | DE>AT | 15 | 4 | 60 |
| 2 | DE>AT | 5 | 3.22 | 16.1 |
| 3 | DE>AT | 40 | 2.8 | 112 |
| 4 | DE>AT | 200 | 0.82 | 164 |
| 5 | DE>AT | 100 | 0.45 | 45 |
| 6 | DE>AT | 3 | 40 | 120 |
| 7 | DE>AT | 25 | 25 | 625 |
| 8 | DE>AT | 25 | 28 | 700 |
| 9 | DE>AT | 30 | 16.5 | 495 |
| 10 | DE>AT | 5 | 44 | 220 |
| 11 | DE>AT | 10 | 19 | 190 |
| 12 | DE>AT | 5 | 40.5 | 202.5 |
| 13 | DE>AT | 15 | 62 | 930 |
| 14 | DE>AT | 400 | 0.5 | 200 |
| 15 | DE>AT | 6 | 31 | 186 |
| 16 | DE>AT | 4 | 22 | 88 |
| 17 | DE>AT | 2 | 80 | 160 |
| 18 | DE>AT | 1 | 200 | 200 |
| 19 | DE>AT | 40 | 18.5 | 740 |
| 20 | DE>AT | 15 | 10 | 150 |
| **Total** | | 946 | 648.29 | 5603.6 |
| **average** | | 47.3 | 32.4145 | 280.18 |

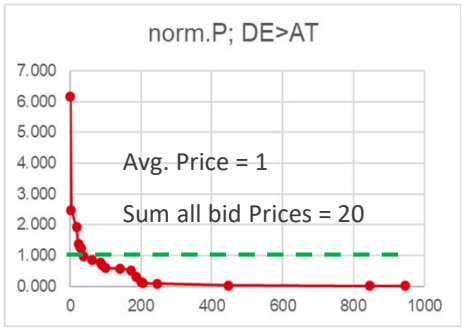
| Bid Nr. | Border | Amount | Price | A*P |
|---|---|---|---|---|
| 22 | DE>CZ | 200 | 2.9 | 580 |
| 23 | DE>CZ | 40 | 6.55 | 262 |
| 24 | DE>CZ | 45 | 2.85 | 128.25 |
| 25 | DE>CZ | 3 | 11 | 33 |
| 26 | DE>CZ | 50 | 4.3 | 215 |
| 27 | DE>CZ | 1 | 25 | 25 |
| 28 | DE>CZ | 22 | 1.05 | 23.1 |
| 29 | DE>CZ | 10 | 10 | 100 |
| 30 | DE>CZ | 10 | 5 | 50 |
| **Total** | | 381 | 68.65 | 1416.35 |
| **average** | | 42.33 | 7.63 | 157.37 |

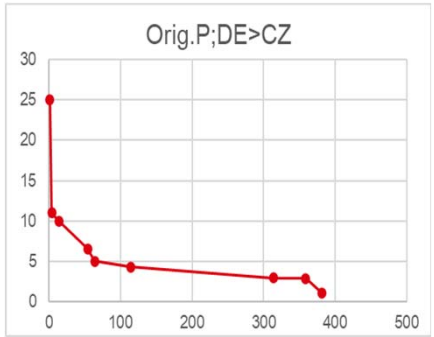
There is no valid bid 21 in this example

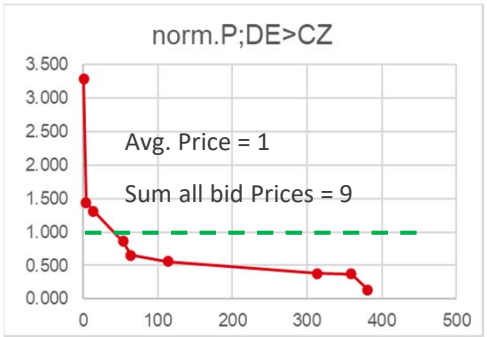
| DE>AT | | | |
|---|---|---|---|
| Bid Nr. | Amount | Orig.P | norm.P |
| 18 | 1 | 200 | 6.170 |
| 17 | 2 | 80 | 2.468 |
| 13 | 15 | 62 | 1.913 |
| 10 | 5 | 44 | 1.357 |
| 12 | 5 | 40.5 | 1.249 |
| 6 | 3 | 40 | 1.234 |
| 15 | 6 | 31 | 0.956 |
| 8 | 25 | 28 | 0.864 |
| 7 | 25 | 25 | 0.771 |
| 16 | 4 | 22 | 0.679 |
| 11 | 10 | 19 | 0.586 |
| 19 | 40 | 18.5 | 0.571 |
| 9 | 30 | 16.5 | 0.509 |
| 20 | 15 | 10 | 0.309 |
| 1 | 15 | 4 | 0.123 |
| 2 | 5 | 3.22 | 0.099 |
| 3 | 40 | 2.8 | 0.086 |
| 4 | 200 | 0.82 | 0.025 |
| 14 | 400 | 0.5 | 0.015 |
| 5 | 100 | 0.45 | 0.014 |
| | | | **20.000** |
| | | **Avg. Price** | **1.000** |

| DE>CZ | | | |
|---|---|---|---|
| Bid Nr. | Amount | Orig.P | norm.P |
| 27 | 1.000 | 25.00 | 3.277 |
| 25 | 3.000 | 11.00 | 1.442 |
| 29 | 10.000 | 10.00 | 1.311 |
| 23 | 40.000 | 6.55 | 0.859 |
| 30 | 10.000 | 5.00 | 0.655 |
| 26 | 50.000 | 4.30 | 0.564 |
| 22 | 200.000 | 2.90 | 0.380 |
| 24 | 45.000 | 2.85 | 0.374 |
| 28 | 22.000 | 1.05 | 0.138 |
| | | | **9.000** |
| | | **Avg. Price** | **1.000** |




**Calculation:** Divide each original price by the average price calculated from all prices (32,4145 for DE>AT in this example)

# LTFBA project update

## Example of bids on 2 BZ-borders for ‘Weighted Normalization ’ by averaging prices by total value of bids per bid to ‘1’

| Original bids | | | | | Avg. by total value per bid to '1' | |
|---|---|---|---|---|---|---|
| Bid Nr. | Border | Amount | Price | A*P | new Price | N_A*P/bid |
| 1 | DE>AT | 15 | 4 | 60 | 0.00071 | 0.011 |
| 2 | DE>AT | 5 | 3.22 | 16.1 | 0.00057 | 0.003 |
| 3 | DE>AT | 40 | 2.8 | 112 | 0.00050 | 0.020 |
| 4 | DE>AT | 200 | 0.82 | 164 | 0.00015 | 0.029 |
| 5 | DE>AT | 100 | 0.45 | 45 | 0.00008 | 0.008 |
| 6 | DE>AT | 3 | 40 | 120 | 0.00714 | 0.021 |
| 7 | DE>AT | 25 | 25 | 625 | 0.00446 | 0.112 |
| 8 | DE>AT | 25 | 28 | 700 | 0.00500 | 0.125 |
| 9 | DE>AT | 30 | 16.5 | 495 | 0.00294 | 0.088 |
| 10 | DE>AT | 5 | 44 | 220 | 0.00785 | 0.039 |
| 11 | DE>AT | 10 | 19 | 190 | 0.00339 | 0.034 |
| 12 | DE>AT | 5 | 40.5 | 202.5 | 0.00723 | 0.036 |
| 13 | DE>AT | 15 | 62 | 930 | 0.01106 | 0.166 |
| 14 | DE>AT | 400 | 0.5 | 200 | 0.00009 | 0.036 |
| 15 | DE>AT | 6 | 31 | 186 | 0.00553 | 0.033 |
| 16 | DE>AT | 4 | 22 | 88 | 0.00393 | 0.016 |
| 17 | DE>AT | 2 | 80 | 160 | 0.01428 | 0.029 |
| 18 | DE>AT | 1 | 200 | 200 | 0.03569 | 0.036 |
| 19 | DE>AT | 40 | 18.5 | 740 | 0.00330 | 0.132 |
| 20 | DE>AT | 15 | 10 | 150 | 0.00178 | 0.027 |
| **Total** | | 946 | | 5603.6 | | 1.000 |

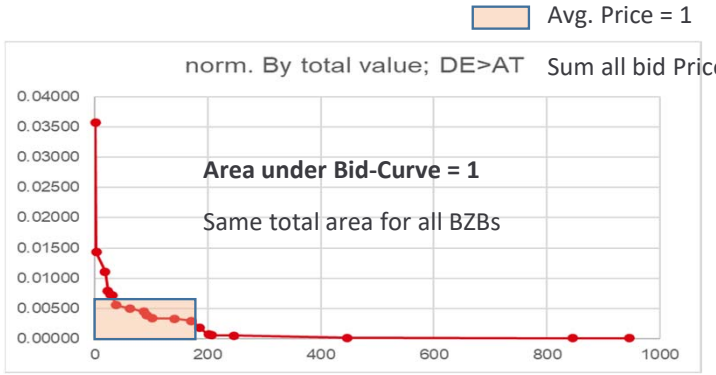
| Bid Nr. | Border | Amount | Price | A*P | new Price | N_A*P/bid |
|---|---|---|---|---|---|---|
| 22 | DE>CZ | 200 | 2.9 | 580 | 0.0020 | 0.410 |
| 23 | DE>CZ | 40 | 6.55 | 262 | 0.0046 | 0.185 |
| 24 | DE>CZ | 45 | 2.85 | 128.25 | 0.0020 | 0.091 |
| 25 | DE>CZ | 3 | 11 | 33 | 0.0078 | 0.023 |
| 26 | DE>CZ | 50 | 4.3 | 215 | 0.0030 | 0.152 |
| 27 | DE>CZ | 1 | 25 | 25 | 0.0177 | 0.018 |
| 28 | DE>CZ | 22 | 1.05 | 23.1 | 0.0007 | 0.016 |
| 29 | DE>CZ | 10 | 10 | 100 | 0.0071 | 0.071 |
| 30 | DE>CZ | 10 | 5 | 50 | 0.0035 | 0.035 |
| **Total** | | 381 | | 1416.35 | | 1.000 |

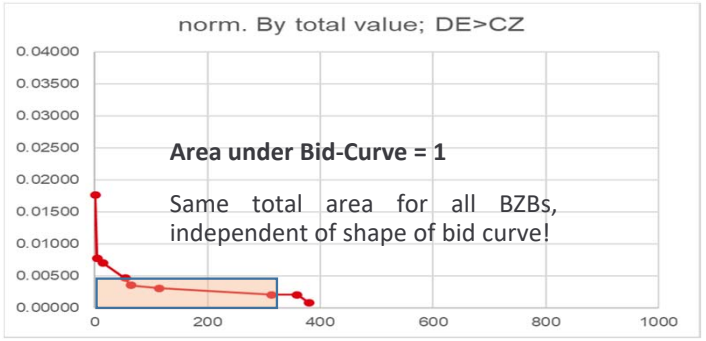
DE>AT

| Bid Nr. | Amount | Orig.P | norm. Price by total value |
|---|---|---|---|
| 18 | 1 | 200 | 0.0357 |
| 17 | 2 | 80 | 0.0143 |
| 13 | 15 | 62 | 0.0111 |
| 10 | 5 | 44 | 0.0079 |
| 12 | 5 | 40.5 | 0.0072 |
| 6 | 3 | 40 | 0.0071 |
| 15 | 6 | 31 | 0.0055 |
| 8 | 25 | 28 | 0.0050 |
| 7 | 25 | 25 | 0.0045 |
| 16 | 4 | 22 | 0.0039 |
| 11 | 10 | 19 | 0.0034 |
| 19 | 40 | 18.5 | 0.0033 |
| 9 | 30 | 16.5 | 0.0029 |
| 20 | 15 | 10 | 0.0018 |
| 1 | 15 | 4 | 0.0007 |
| 2 | 5 | 3.22 | 0.0006 |
| 3 | 40 | 2.8 | 0.0005 |
| 4 | 200 | 0.82 | 0.0001 |
| 14 | 400 | 0.5 | 0.0001 |
| 5 | 100 | 0.45 | 0.0001 |
| | **946** | | |

DE>CZ

| Bid Nr. | Amount | Orig.P | norm. Price by total value |
|---|---|---|---|
| 27 | 1 | 25 | 0.01765 |
| 25 | 3 | 11 | 0.00777 |
| 29 | 10 | 10 | 0.00706 |
| 23 | 40 | 6.55 | 0.00462 |
| 30 | 10 | 5 | 0.00353 |
| 26 | 50 | 4.3 | 0.00304 |
| 22 | 200 | 2.9 | 0.00205 |
| 24 | 45 | 2.85 | 0.00201 |
| 28 | 22 | 1.05 | 0.00074 |
| | **381** | | |



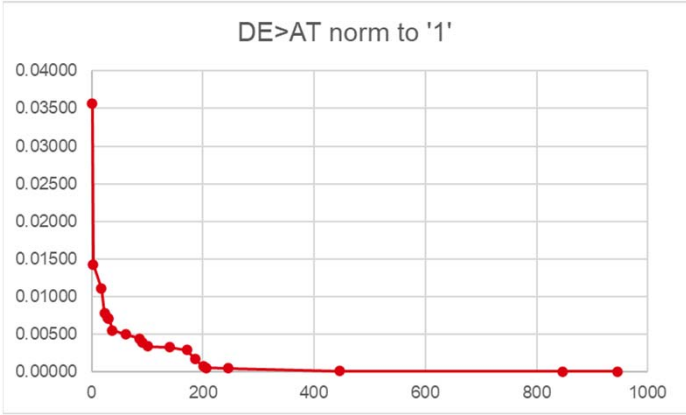

**Calculation:** Divide each original price by the sum over all bids for price times amount per bid (5603,6 for DE>AT in this example) for normalization to ‘1’ (normalization e.g. to ’higher values’ is also possible to have more realistic prices).

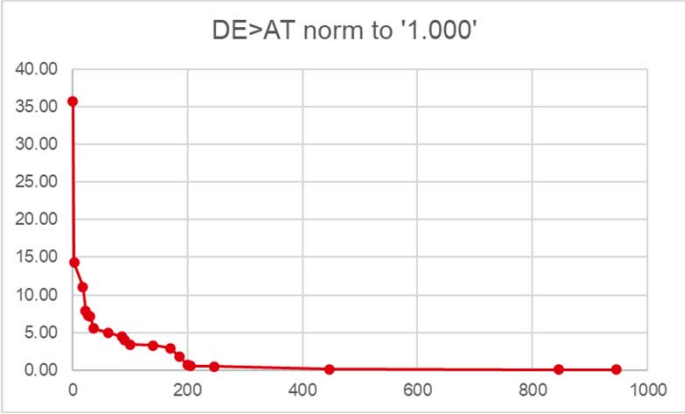
# LTFBA project update

## Normalization to higher total value than ‘1’ to get more realistic prices

| Sum Amount | DE>AT norm to '1' |
|---|---|
| 1 | 0.03569 |
| 3 | 0.01428 |
| 18 | 0.01106 |
| 23 | 0.00785 |
| 28 | 0.00723 |
| 31 | 0.00714 |
| 37 | 0.00553 |
| 62 | 0.00500 |
| 87 | 0.00446 |
| 91 | 0.00393 |
| 101 | 0.00339 |
| 141 | 0.00330 |
| 171 | 0.00294 |
| 186 | 0.00178 |
| 201 | 0.00071 |
| 206 | 0.00057 |
| 246 | 0.00050 |
| 446 | 0.00015 |
| 846 | 0.00009 |
| 946 | 0.00008 |

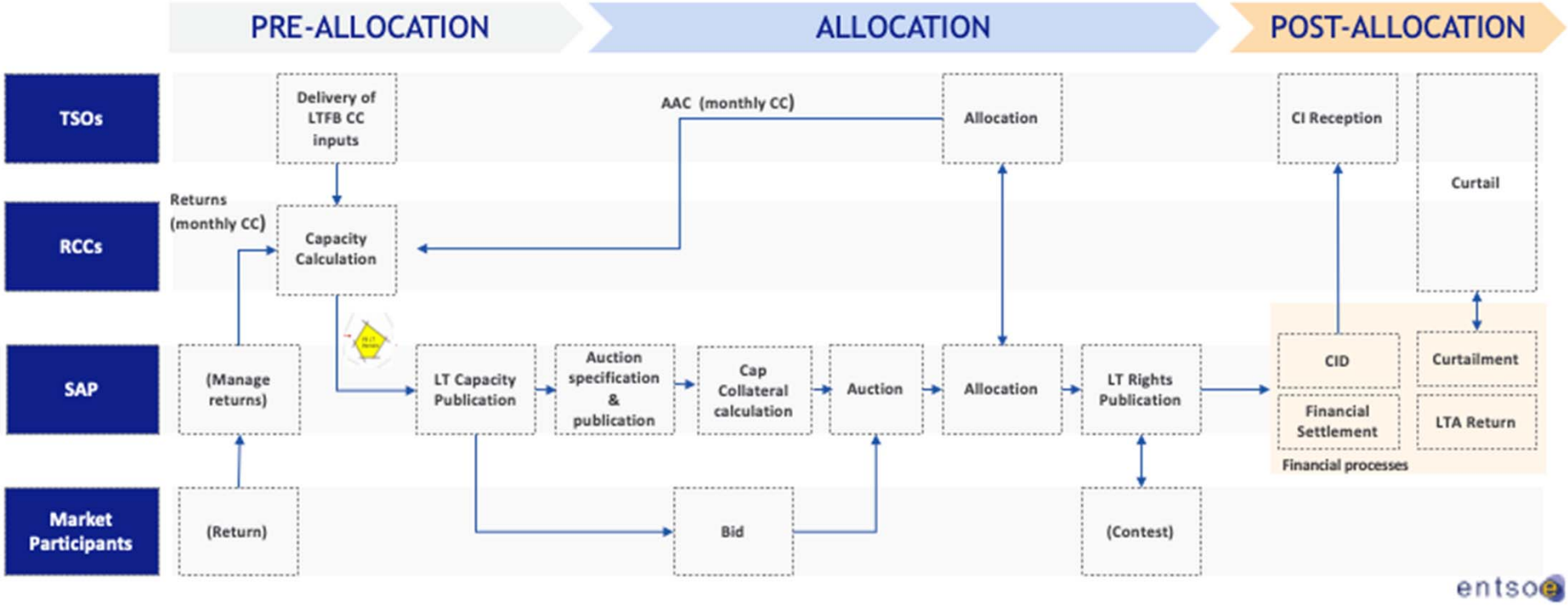
| Sum Amount | DE>AT norm to '1.000' |
|---|---|
| 1 | 35.691 |
| 3 | 14.277 |
| 18 | 11.064 |
| 23 | 7.852 |
| 28 | 7.227 |
| 31 | 7.138 |
| 37 | 5.532 |
| 62 | 4.997 |
| 87 | 4.461 |
| 91 | 3.926 |
| 101 | 3.391 |
| 141 | 3.301 |
| 171 | 2.945 |
| 186 | 1.785 |
| 201 | 0.714 |
| 206 | 0.575 |
| 246 | 0.500 |
| 446 | 0.146 |
| 846 | 0.089 |
| 946 | 0.080 |



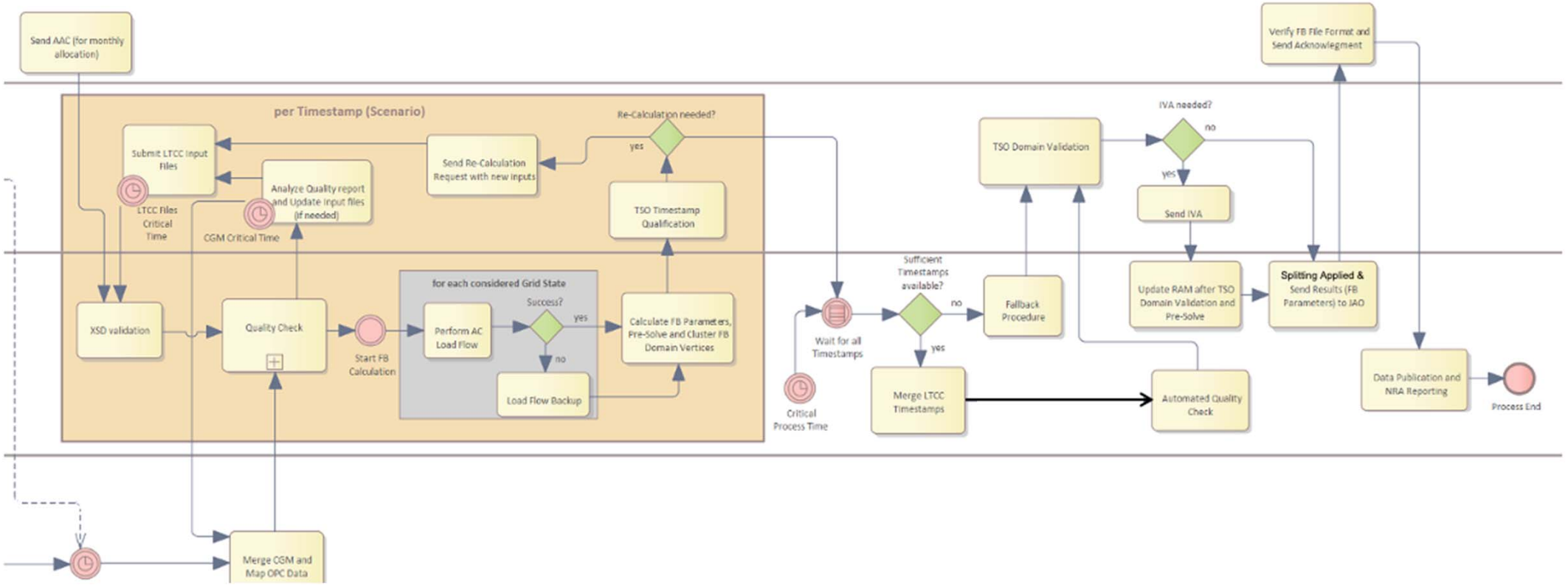
# Other annexes

## High Level Presentation of Long-Term Flow Based Allocation Process



# 5. LTCC Implementation

## Explanation of Core LTCC Process



# Annex 2 – Simulation results - Additional assessment with Polish bids

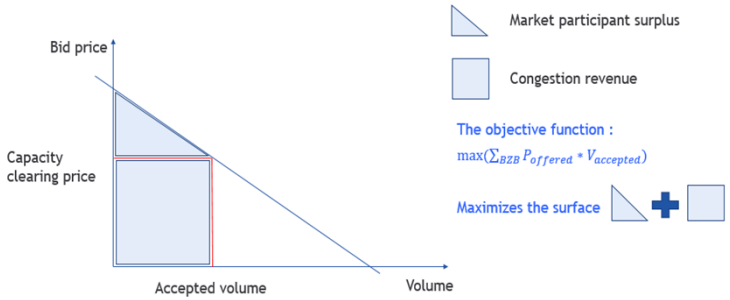
# LTFBA project update – Simulation results -

Reminder: Currently 20% MinRAM is required by the Core LTCCM. Increasing the MinRAM to a higher value would need to be agreed upon by all Core TSOs and there is currently no consensus on this point.

## Overview of simulations for 2023 with Polish bids (11 TS) & 2023 without PL bids (11 TS) and comparison with historical NTC

| | Formulation | Yearly Auction 2023 (NTC) | FB Auction w PL Bids 23 – MinRAM 20% | NTC vs FB | FB Auction w PL Bids 23 – MinRAM 30% | NTC vs FB | FB Auction w PL Bids 23 – MinRAM 40% | NTC vs FB | Yearly Auction 2023 (NTC) | FB Auction Bids 23 – MinRAM 20% | NTC vs FB | FB Auction Bids 23 – MinRAM 30% | NTC vs FB | FB Auction Bids 23 – MinRAM 40% | NTC vs FB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Allocated capacity (MW) | Sum Allocated Capacity per BZB | 18,139 | 8,966 | -50,5% | 12,257 | -32,4% | 14,549 | -19,7% | 18,139 | 8,510 | -53,0% | 11,816 | -34,8% | 14,141 | -22,05% |
| Congestion Revenue (EUR/MTU) | Sum Allocated Capacity * Clearing Price | 202,904 | 170,173 | -16,1% | 197,416 | -2,7% | 224,195 | +10,5% | 202,904 | 170,091 | -16,2% | 197,040 | -2,9% | 223,519 | +10,15% |
| Total welfare (EUR/MTU) | Objective function optimize the (accepted volume)*(Bid price). | 273,888 | 222,995 | -18,5% | 272,533 | -0,5% | 325,336 | +18,7% | 273,888 | 221,830 | -18,9% | 271,106 | -1,0% | 323,911 | +18,25% |
| Market participants ' Surplus (EUR/MTU) | Total welfare - Congestion Revenue | 70,984 | 52,822 | -25,4% | 75,117 | +5,8% | 101,141 | +42,5% | 70,984 | 51,739 | -27,1% | 74,066 | +4,3% | 100,391 | +41,5% |

- Yearly historical bids are not available for Polish borders because PSE was not able to offer Y capacities due to the lack of coordination in capacity calculation process.
- Therefore, July 2022 import and December 2023 export monthly bids submitted for PL Core borders were extrapolated to fit Yearly bids and used for additional simulation round to be shown as an extended information.



# LTFBA project update – Simulation results -

## Overview of simulations for 2023 with Polish bids (12 TS) & 2023 without PL bids (12 TS) and comparison with historical NTC

| Y2023 (11TS) PL Bids 20 minRAM | | |
|---|---|---|
| Oriented BZB FB | TotalAccepted Volume FB | TotalAccepted Volume NTC |
| AT_to_CZ | 5 | 200 |
| AT_to_DE | 0 | 1960 |
| AT_to_HU | 100 | 250 |
| AT_to_SI | 48 | 300 |
| BE_to_DE | 20 | 260 |
| BE_to_FR | 313 | 250 |
| BE_to_NL | 30 | 473 |
| CZ_to_AT | 128 | 200 |
| CZ_to_DE | 423 | 599 |
| CZ_to_PL | 0 | 0 |
| CZ_to_SK | 389 | 600 |
| DE_to_AT | 535 | 1960 |
| DE_to_BE | 215 | 260 |
| DE_to_CZ | 31 | 300 |
| DE_to_FR | 1388 | 600 |
| DE_to_NL | 214 | 827 |
| DE_to_PL | 0 | 0 |
| FR_to_BE | 150 | 1450 |
| FR_to_DE | 1364 | 1000 |
| HR_to_HU | 57 | 400 |
| HR_to_SI | 10 | 500 |
| HU_to_AT | 25 | 250 |
| HU_to_HR | 302 | 500 |
| HU_to_RO | 337 | 350 |
| HU_to_SI | 2 | 150 |
| HU_to_SK | 904 | 800 |
| NL_to_BE | 10 | 473 |
| NL_to_DE | 0 | 827 |
| PL_to_CZ | 177 | 0 |
| PL_to_DE | 123 | 0 |
| PL_to_SK | 166 | 0 |
| RO_to_HU | 293 | 350 |
| SI_to_AT | 106 | 300 |
| SI_to_HR | 575 | 500 |
| SI_to_HU | 18 | 150 |
| SK_to_CZ | 135 | 400 |
| SK_to_HU | 288 | 699 |
| SK_to_PL | 78 | 0 |
| SUM | 8959 | 18138 |

| Y2023 (11TS) PL Bids 30 minRAM | | |
|---|---|---|
| Oriented BZB FB | TotalAccepted Volume FB | TotalAccepted Volume NTC |
| AT_to_CZ | 5 | 200 |
| AT_to_DE | 0 | 1960 |
| AT_to_HU | 179 | 250 |
| AT_to_SI | 134 | 300 |
| BE_to_DE | 25 | 260 |
| BE_to_FR | 327 | 250 |
| BE_to_NL | 30 | 473 |
| CZ_to_AT | 131 | 200 |
| CZ_to_DE | 632 | 599 |
| CZ_to_PL | 0 | 0 |
| CZ_to_SK | 462 | 600 |
| DE_to_AT | 786 | 1960 |
| DE_to_BE | 208 | 260 |
| DE_to_CZ | 55 | 300 |
| DE_to_FR | 1734 | 600 |
| DE_to_NL | 430 | 827 |
| DE_to_PL | 0 | 0 |
| FR_to_BE | 448 | 1450 |
| FR_to_DE | 1966 | 1000 |
| HR_to_HU | 140 | 400 |
| HR_to_SI | 22 | 500 |
| HU_to_AT | 25 | 250 |
| HU_to_HR | 343 | 500 |
| HU_to_RO | 522 | 350 |
| HU_to_SI | 2 | 150 |
| HU_to_SK | 1267 | 800 |
| NL_to_BE | 65 | 473 |
| NL_to_DE | 79 | 827 |
| PL_to_CZ | 195 | 0 |
| PL_to_DE | 122 | 0 |
| PL_to_SK | 265 | 0 |
| RO_to_HU | 457 | 350 |
| SI_to_AT | 87 | 300 |
| SI_to_HR | 690 | 500 |
| SI_to_HU | 38 | 150 |
| SK_to_CZ | 29 | 400 |
| SK_to_HU | 288 | 699 |
| SK_to_PL | 63 | 0 |
| SUM | 12251 | 18138 |

| Y2023 (11TS) PL Bids 40 minRAM | | |
|---|---|---|
| Oriented BZB FB | TotalAccepted Volume FB | TotalAccepted Volume NTC |
| AT_to_CZ | 36 | 200 |
| AT_to_DE | 41 | 1960 |
| AT_to_HU | 218 | 250 |
| AT_to_SI | 181 | 300 |
| BE_to_DE | 110 | 260 |
| BE_to_FR | 458 | 250 |
| BE_to_NL | 100 | 473 |
| CZ_to_AT | 213 | 200 |
| CZ_to_DE | 1210 | 599 |
| CZ_to_PL | 0 | 0 |
| CZ_to_SK | 430 | 600 |
| DE_to_AT | 725 | 1960 |
| DE_to_BE | 325 | 260 |
| DE_to_CZ | 71 | 300 |
| DE_to_FR | 2130 | 600 |
| DE_to_NL | 648 | 827 |
| DE_to_PL | 0 | 0 |
| FR_to_BE | 306 | 1450 |
| FR_to_DE | 2033 | 1000 |
| HR_to_HU | 168 | 400 |
| HR_to_SI | 27 | 500 |
| HU_to_AT | 25 | 250 |
| HU_to_HR | 400 | 500 |
| HU_to_RO | 746 | 350 |
| HU_to_SI | 3 | 150 |
| HU_to_SK | 937 | 800 |
| NL_to_BE | 138 | 473 |
| NL_to_DE | 315 | 827 |
| PL_to_CZ | 243 | 0 |
| PL_to_DE | 192 | 0 |
| PL_to_SK | 226 | 0 |
| RO_to_HU | 628 | 350 |
| SI_to_AT | 69 | 300 |
| SI_to_HR | 605 | 500 |
| SI_to_HU | 34 | 150 |
| SK_to_CZ | 159 | 400 |
| SK_to_HU | 325 | 699 |
| SK_to_PL | 67 | 0 |
| SUM | 14542 | 18138 |

*In the DE_to_PL, SK_to_PL and CZ_to_PL oriented BZB, none of the bids were accepted by the allocation algorithm*

Borders with <100MW allocated

Borders with FB values >> Historical ATC allocations

# Annex 3

# Conceptual challenges – Market participants' concerns

## The following concerns were received by Market Participants*

a) **Objective of FCA is to provide hedging opportunities for all market participants**
   a) 'Economic efficiency' does not necessarily mean 'social welfare' (see FCA Art. 10.5) – while not deteriorating long term visibility for the TSOs (operational security).

b) **Flow-based allocation is not appropriate for forward markets**
   a) Flow-Based works in Day-Ahead. Forward markets work differently.

c) **Implementing a FB methodology on the LT timeframe assumes that the global aim of LTTRs is to provide maximum social welfare, leading to higher allocated volumes on the borders with the highest spreads.**
   a) This implicitly leads to very low (or close to 0) volumes on some other BZ borders.
   b) Market Participants have proposed several alternatives:
      a) To assess having minimum volumes at each border
      b) To use forward market spread between two borders as input data to consider the market risk premium
      c) To use ex-post DA price spreads as input data to consider the market risk premium

d) **Gathering all bids in a single auction leads to important negative consequences on the collaterals to be provided.**

***Market Participants views & different concerns do not necessarily correctly reflect the positions from all TSOs***

# Conceptual challenges – EMDR impact

## Discussions on forward market models and the upcoming FCA 2.0 could introduce several changes

### Uncertain market design

- The EMDR latest wording proposes an assessment of possible improvements of the forward market design;
- It is foreseen that FCA 2.0 would include these improvements;
- While some are more “evolutionary” (e.g. multiple release of yearly capacities, longer maturities such as Y+2 and Y+3), some others are more "revolutionary" (e.g. Virtual Hubs);

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# Assessment of long-term flow-based allocation

## 6th ACER - ENTSO-E workshop on electricity long term flow-based allocation

## 22 March 2024

| Indicative time | Webinar items |
|---|---|
| 08:50 - 09:00 | Webinar open for log-in |
| 09:00 - 09:10 | **Introductory Remarks**<br>Zoran VUJASINOVIC, ACER |
| 09:10 - 09:20 | Long-term flow-based allocation: implementation - timeline and basic info<br>Jim VILSSON, ENTSO-E |
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| 10:45 - 11:50 | Discussion<br>all |
| 11:50 - 12:00 | **Closing Remarks**<br>Christophe GENCE-CREUX, ACER |

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# Part 1

# Assessment of simulation results

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# Decomposition of results

**When analysing the results it's important to distinguish**

1. Which effect comes from the volume of offered capacity
2. Which effect comes from the flow-based allocation (optimisation)

Only when the offered flow-based domain is of a similar size as NTC domain we can be sure that the results are a pure effect of the flow-based optimisation

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# The effect of offered capacities

## Benchmarking the offered flow-based domain

- We do not have the information how offered flow-based domain compares with existing NTC domain
- This does not mean that flow-based domain must be equal or higher than NTC domain, but…
  - … flow-based domain should not be significantly smaller
- ACER proposes to benchmark flow-based domain against existing NTC domain, and…
  - … adjust flow-based domain where significantly smaller than NTC domain

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# Policy purpose of transmission rights

## Purpose of transmission rights:

***Article 9 Regulation 2019/943:*** *"Transmission system operators shall issue long-term transmission rights…, …unless an assessment of the forward market on the bidding zone borders performed by the competent regulatory authorities shows that there are sufficient hedging* ***opportunities in the concerned bidding zones.****"*

1. Transmission rights are indirect mean to increase hedging opportunities within bidding zones. Cross-zonal price risks are a derivation/combination of price risks within zones.
2. Transmission rights are regulatory support to increase hedging opportunities for physical players (consumers, producers, suppliers)
3. Hedging price risks within bidding zones for consumers and producers is buying and selling energy in forward timeframe
4. Hedging opportunity is both **accessibility (liquidity) and competitiveness (good price)** of hedging products
5. Transmission rights should improve both

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# Policy purpose of transmission rights

**Forward capacity allocation is also about optimising electricity flows in LT timeframe**

1. For physical players hedging is mostly buying and selling forward
2. It is important at what price consumers/producers can buy/sell futures - this determines their actual costs/revenues.
3. Optimising electricity flows in forward timeframe allows consumers to buy cheaper and producers to sell more expensive

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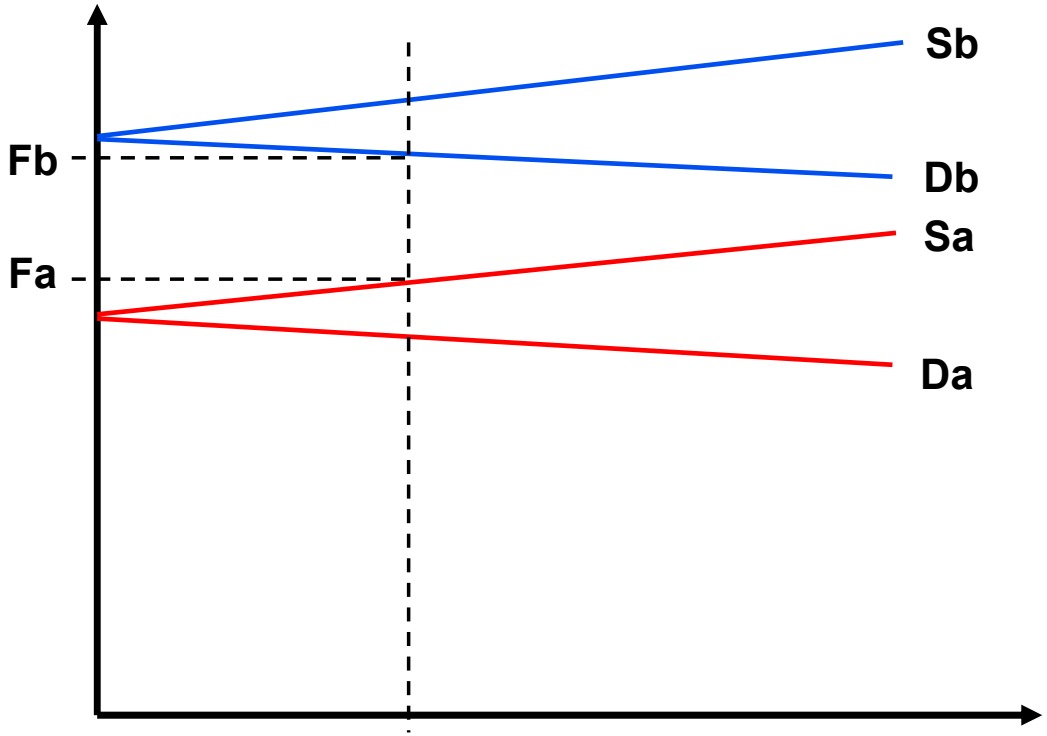
# TRs bring forward prices together

## Arbitrage between forward markets

1. Each bidding zone has price increasing/decreasing supply/demand for futures – different expectations about spot price and risk premiums
2. Transmission rights enable to meet supply in cheaper markets with demand in more expensive markets
3. Efficient arbitrage implies that more TRs will bring forward markets closer together
4. More TRs leads to higher forward price convergence
5. Infinite TRs would lead to full forward price convergence



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# Deeper look at the results

## Competition between the borders

| | | BIDS 2023 | NTC 2023 | | Flow-Based 2023 | |
|---|---|---|---|---|---|---|
| From | To | Requested capacity / MW | Clearing price €/MWh | Allocated capacity / MW | Clearing price €/MWh | Allocated capacity / MW |
| DE | FR | 5,629 | 80.01 | 600 | 46.67 | 2,213 ↑ |
| DE | AT | 17,433 | 18.44 | 1,960 | 30.00 | 249 ↓ |
| DE | NL | 10,982 | 8.99 | 827 | 7.55 | 1,297 ↑ |
| BE | FR | 3,603 | 98.00 | 250 | 99.00 | 232 = |
| DE | CZ | 4,139 | 7.77 | 150 | 12.00 | 27 ↓ |

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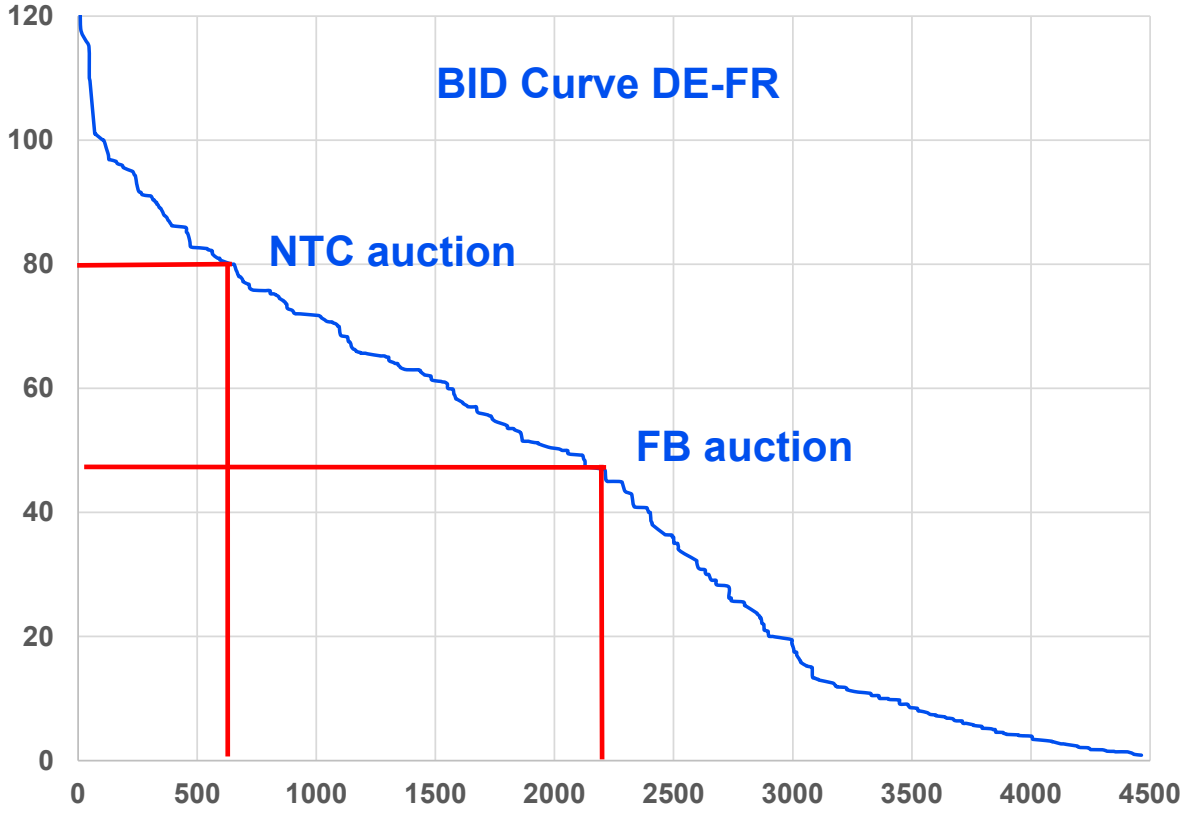
# Deeper look at the DE-FR border

## Analysing DE – FR auction results

- Auction gate closure time: **23 Nov 2022, 14:00**
- Latest trade in DE (EEX futures baseload 2023): **350** €/MWh
- Latest trade in FR (EEX futures baseload 2023): **424.5** €/MWh
- Forward price spread DE-FR: **74.5** €/MWh
- LTTR NTC auction price: **80.01** €/MWh
- LTTR FB auction price: **46.7** €/MWh



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# Observations

## Observations

**Flow-based allocation (compared to NTC) would lead to better forward market price convergence:**

- Efficient arbitrage: Forward spreads and LTTR prices must be in equilibrium – deviations lead to arbitrage trades and back to equilibrium
- FB allocation reduced LTTR prices from 80 €/MWh to 46.7 €/MWh - this does not mean LTTR undervaluation
- Efficient arbitrage implies forward spread will stabilise around that price (~ 46.7 €/MWh)
- This would happen mostly before the auction (based on forecast) and partly after the auction (to correct for forecast error)
- Assuming DE forward market has much more depth, most of the difference will result in lower price in FR forward market – French consumers/suppliers can buy futures ~33.3 €/MWh cheaper

**The volume of LTTRs affect prices or costs for those consumers/producers who want to buy/sell forward.**

# Observations

## Observations

3. **The overall impact on forward market integration is positive**
   - assuming equal level of capacity being offered
   - forward markets on average closer together (increase of economic surplus)
4. **The redistribution effects between borders depend on:**
   - Prices offered on specific borders
   - The impact on specific borders on CNECs (i.e. PTDF)
   - The location of most binding CNECs (and their shadow prices)

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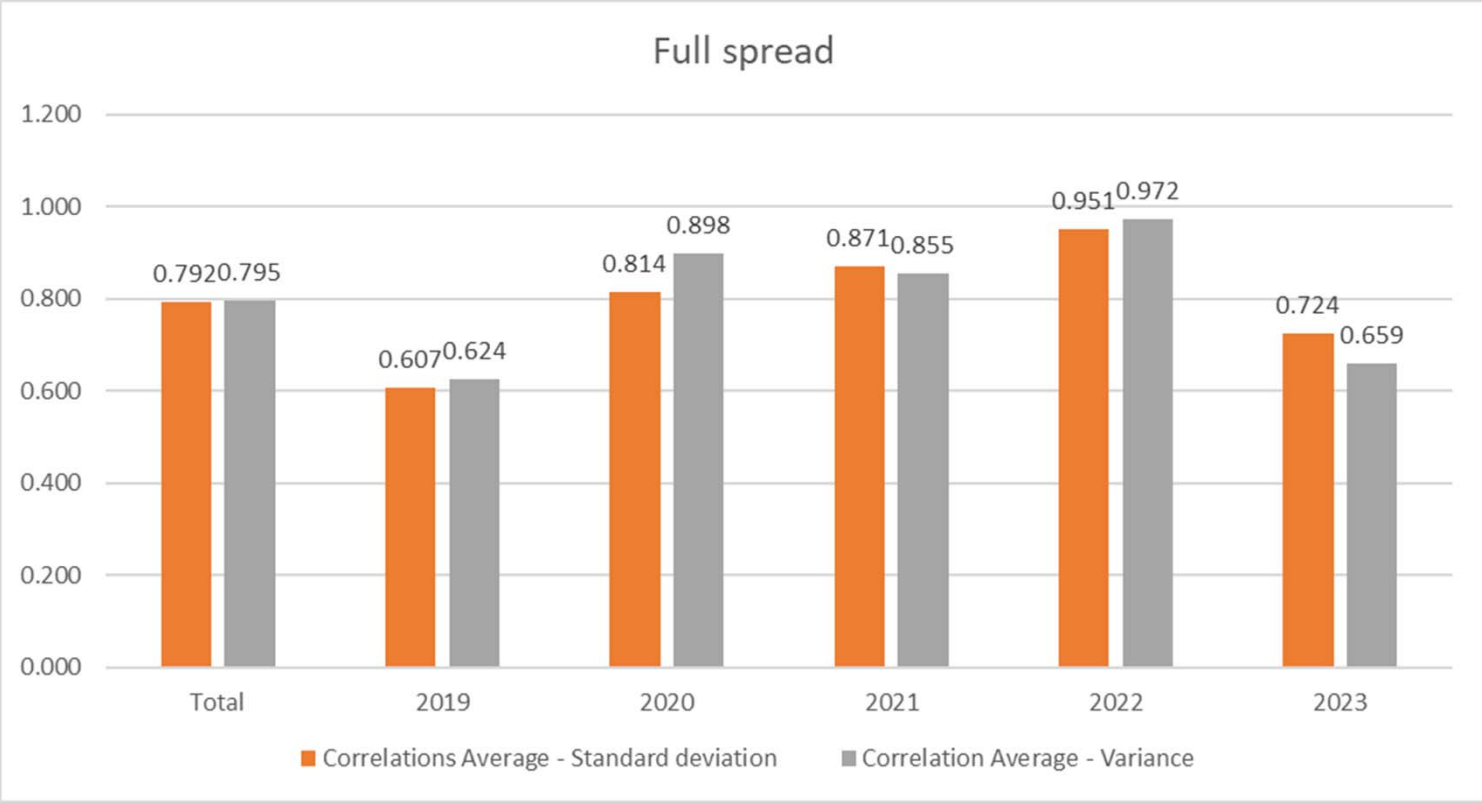
# Spreads and volatility covary

## Corelations between annual spreads and volatility across all Core borders 2019-2023



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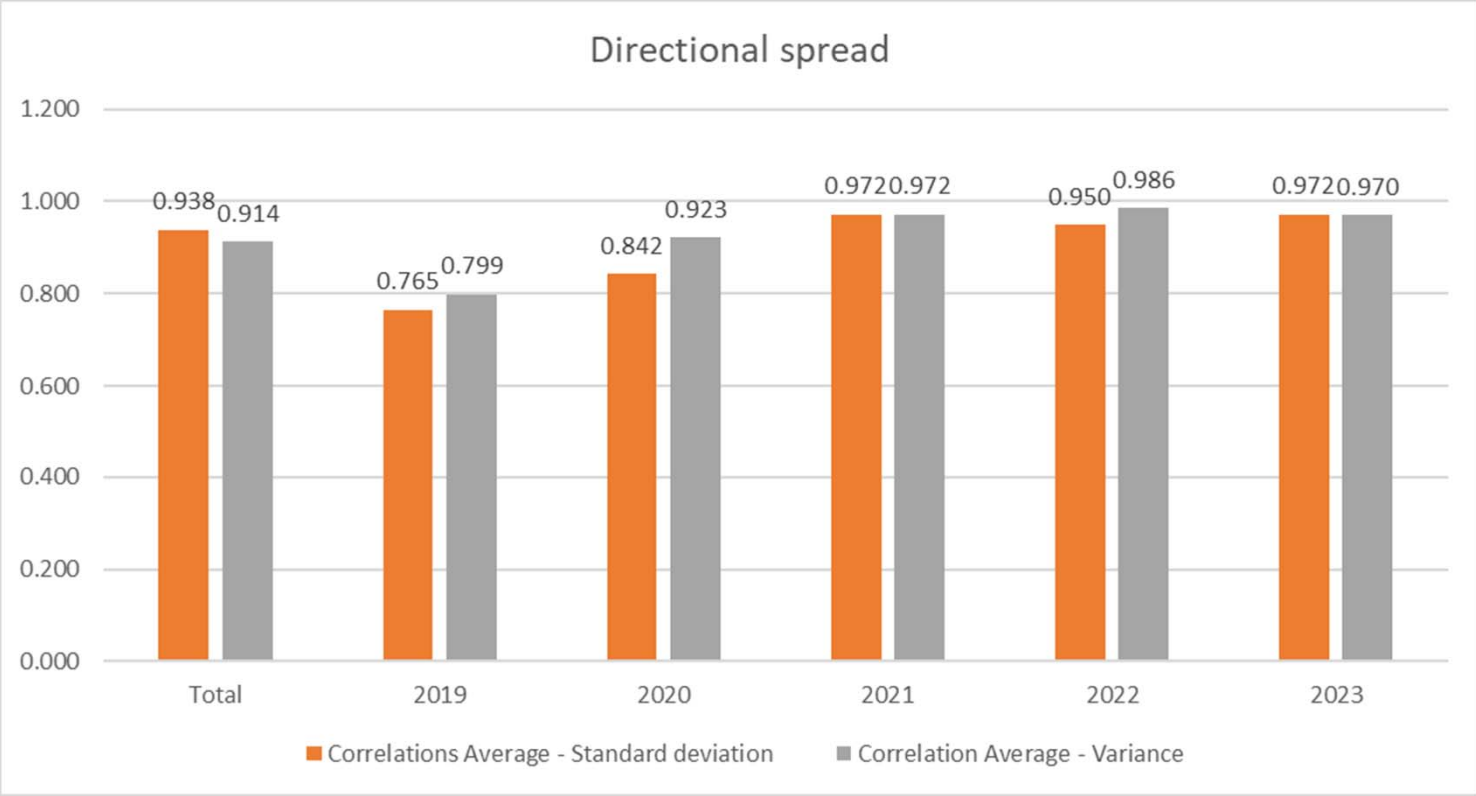
## Corelations between annual spreads and volatility across all Core borders 2019-2023



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# Part 2

# Where we stand

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# History of the project

| | |
|---|---|
| 26.03.2016 | FCA Regulation |
| 21.02.2019 | Core DA CCM approval |
| 21.08.2019 | Core LT CCM proposal deadline (as per FCA10: 6m after DA CCM) |
| 29.08.2019 | Core TSOs: informed Core NRAs on deadline breach |
| 05.12.2019 | agreed to provide LT experimentation, by 17.12.2019 (Core TSOs, NRAs, EC, ACER) |
| 27.01.2020 | Core TSOs provided interim experimentation report |
| 11.02.2020 | agreed to explore 3 alternatives, by 20.03.2020 (Core TSOs, NRAs, EC, ACER) |
| | - cNTC statistical approach |
| | - FB scenario-based approach |
| | - FB statistical approach |
| 15.04.2020 | Core TSOs: no agreement on the approach |
| | ACER: proposed FB scenario-based approach |
| 25.05.2020 | Core NRAs: supported FB scenario-based approach |
| 02.09.2020 | Core TSOs: agreed on FB scenario-based approach* |
| 23.12.2020 | Core TSOs submitted the proposal to Core NRAs (started 26.11) |
| 29.04.2021 | Core NRAs referred the proposal to ACER |
| 03.11.2021 | ACER's Decision 14/2021 on Core LT CCM |
| 18.01.2022 | ACER's Decision 03/2022 on Core LT CCM (upon PSE appeal) |
| 11.2024 | Implementation deadline |

- 16 months delay in submitting the proposal
- FB scenario-based approach has been agreed by all parties
- Before that, the cNTC-based approach had been intensively discussed and analysed, without applicable outcome; finally abandoned

- FCA 10(5)(a) requirement has been proven by ACER: *the flow-based approach leads to an increase of economic efficiency in the capacity calculation region with the same level of system security*

*ACER Decision 03/2022, recital (12): *By email of 3 September 2020, the Core TSOs communicated that at their Steering Group meeting of 2 September 2020, they had agreed to focus on the targeted methodology for the implementation, i.e. with flow-based calculation and allocation, consequently to leave aside coordinated NTC extraction including the ideas of min-max bounds or variable minimum RAM calibrated on historical capacities that would have been included in the methodology, and to continue the discussion on the implementation timeline.*

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# What have we learned from the past

## Conclusions

1. **Agreeing on coordinated NTCs in Core CCR was not possible**
   - Difficult discussions on who should get more capacity and why
2. **ACER proposed to go for statistical approach, but this was clearly rejected by majority of TSOs**
3. **Coordinated long-term capacity calculation is significantly delayed**
   - The implementation would normally need to be done by Feb 2022 (6 months for approval and 2 years for implementation)

# Ensuring that long-term transmission rights meet the market's hedging needs

ACER/ENTSO-E workshop – 22 March 2024

| Indicative time | Webinar items |
|---|---|
| 08:50 - 09:00 | Webinar open for log-in |
| 09:00 - 09:10 | **Introductory Remarks**<br>Zoran VUJASINOVIC, ACER |
| 09:10 - 09:20 | Long-term flow-based allocation: implementation - timeline and basic info<br>Jim VILSSON, ENTSO-E |
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# 1. Reminder of what we are collectively working on improving

# What market participants look for when hedging on forward electricity markets (irrespective of LTTRs)

## Why hedge?

- Forward hedging allows buyers and sellers to **fix a price and volume** of electricity
- It is vital to **manage the fluctuation of prices and production** of electricity in real time
- **Hedging protects *consumers*** and retail suppliers, usually **a few months to 1>3 years before delivery**
- **Hedging protects *producers*** and their asset investments, ideally **many years before delivery**

## Market conditions necessary for easy and low-cost hedging:

**Liquid**

Where market participants are active on a continuous basis and in large numbers

→ **you can easily find a counterparty to trade with, at the price you want**

**Deep**

Where energy (and its derivative) is traded in sufficiently large volumes to absorb any new order

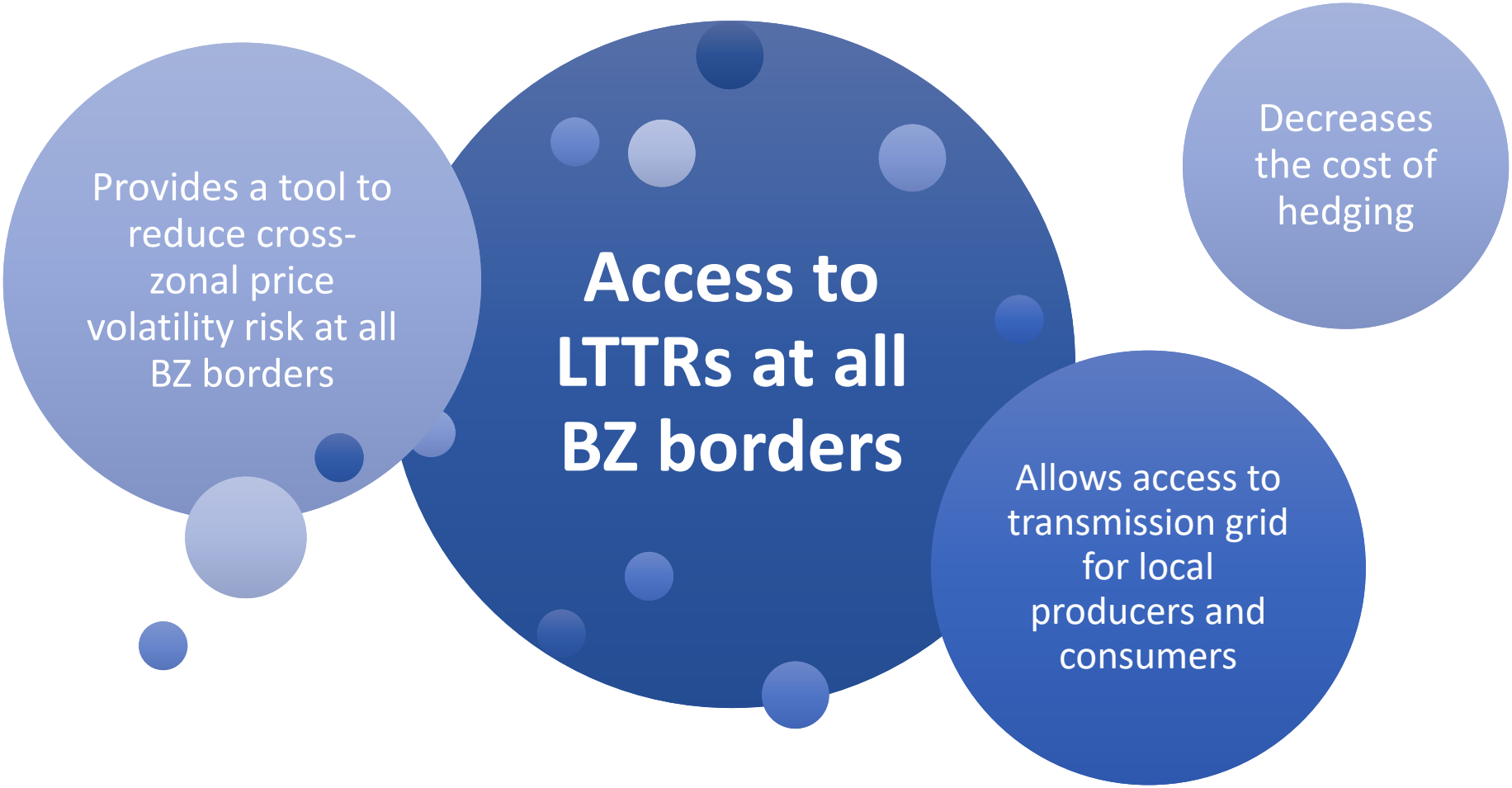
→ **prices are predictable, volatility is only influenced by strong fundamentals (economy, demand /supply)**

**Long-maturity**

Where trading happens years ahead of delivery

→ **you can hedge a position for the period that you need**

# Why getting the allocation of LTTRs right is important

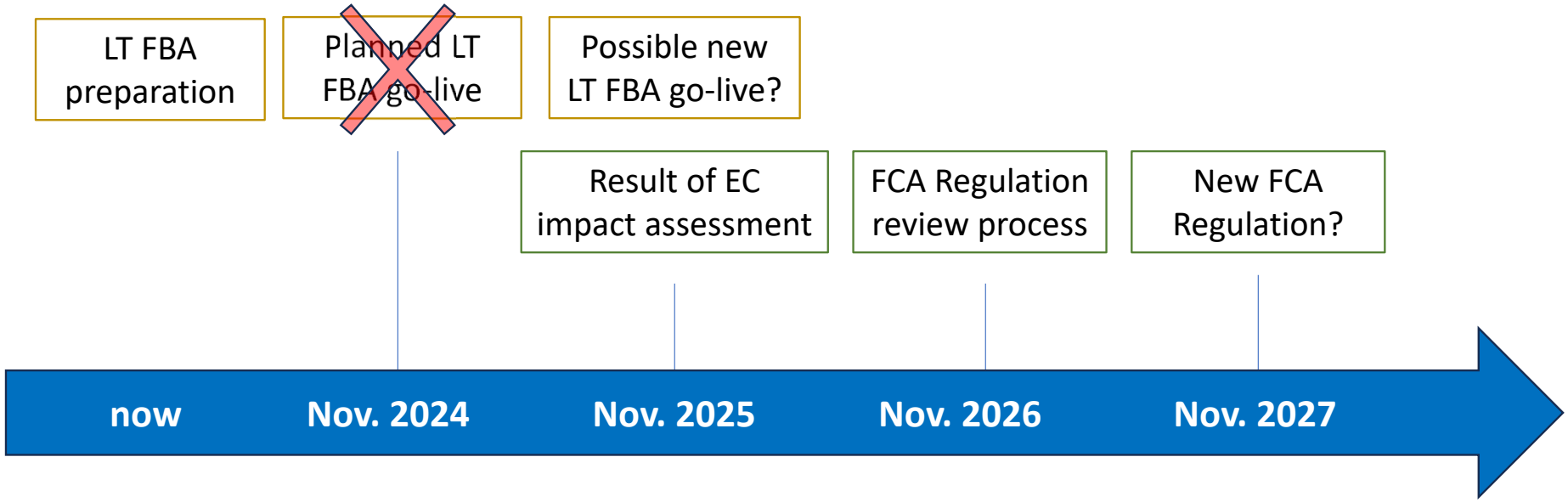


# What the legislation provides for forward electricity markets as such & the allocation of LTTRs

| | Regulation 2019/943 + FCA GL | 2024 EMD reform |
|---|---|---|
| **Forward electricity markets** | • No specific provisions<br>• Standard market rules for competition and transparency apply | • Forward markets (as such) to allow effective hedging of price risks (whereas 20)<br>• Impact assessment by the EC (whereas 20) |
| **Cross-zonal capacity calculation** | • Mandates common coordinated capacity calculation between EU borders<br>• Coordinated NTC unless the economic efficiency of flow-based is greater | • No change so far<br>• EC impact assessment to study (art. 9.4/5):<br>- multi-year capacity calculation<br>- options for zone-to-hub capacity calculation |
| **LTTR allocation** | • Fair, orderly, transparent and reliable allocation<br>• Allocation of LTTRs by all TSOs at all BZ borders unless alternative hedging XB hedging opportunities exist<br>• At least annual and monthly LTTR allocation<br>• Single allocation platform | • No change so far<br>• EC impact assessment to study (art. 9.4/5):<br>- more frequent allocation of LTTRs<br>- multi-year LTTR allocation of LTTRs<br>- value-added of LTTR (FTR) obligations<br>- strengthening of secondary LTTR market<br>- options for zone-to-hub LTTR allocation |

# 2. Current status and how to address market participants’ concerns

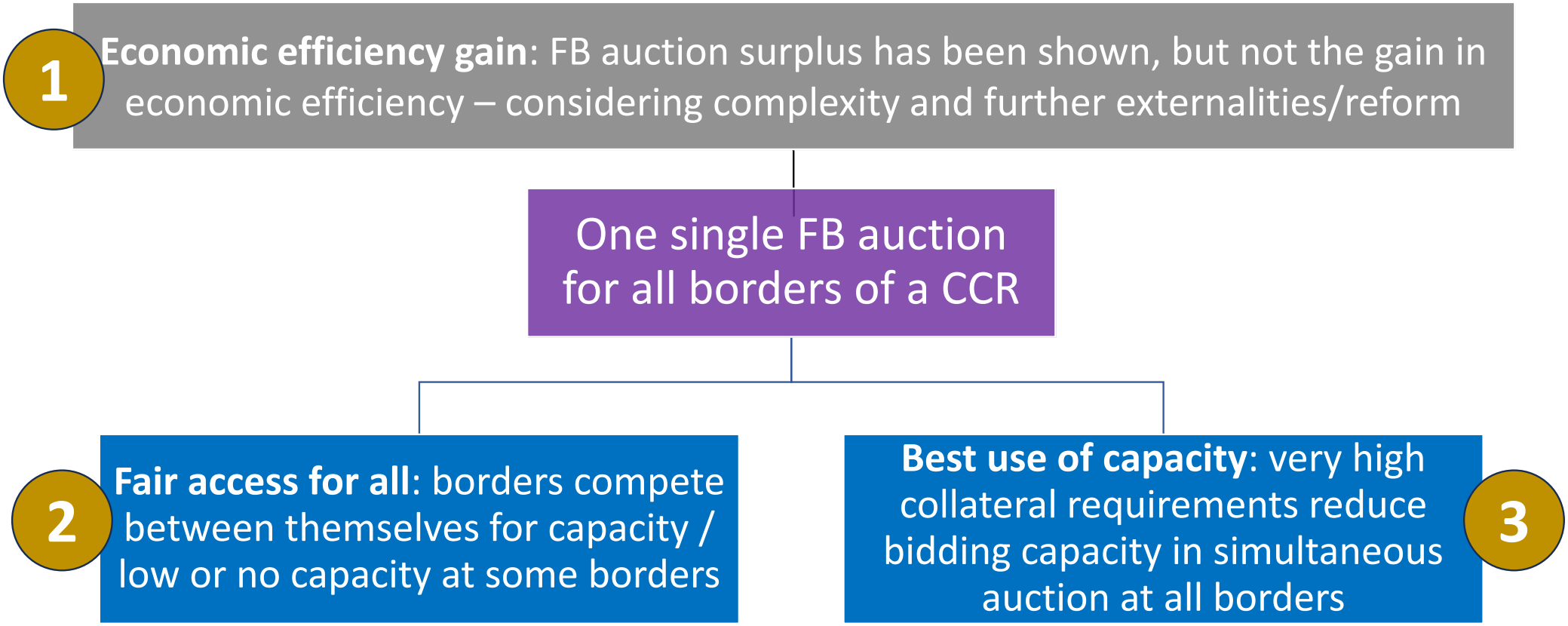
# Parallel processes for the future of forward markets and LTTR allocation




How to make the most of a new context?

(considering the postponement of LT FBA go-live and EC impact assessment)

# Main concerns of market participants with flow-based allocation of LTTRs



# Concern 1 : is the flow-based auction of LTTRs really increasing economic efficiency, now and for the future?

**Reminder**: allocating LTTRs is not allocating flows (like in DA/ID); the choice to go for flow-based allocation was largely guided by difficulties in implementing coordinated NTC

This creates continuous doubt in the market as to the added value of LT FBA

**ACER** simulated in 2021 the auction surplus of LT FBA with min RAM vs. NTC (as is, without min RAM)

**Objectives:**

- analysing the benefits of a common coordinated calculation
- Analysing the benefits of a flow-based auction for LTTR allocation

- All things equal, it is logical that flow-based allocation creates auction surplus
- This does not indicate that it leads to a higher economic efficiency because of:
  - FB parameters fluctuations far from real time
  - risk of empty FB domains
  - large redistributions from one border to the other
  - value of accessing capacity at all borders overlooked
- Adaptability of LT FBA to possible evolutions is uncertain (mutli-year LTTRs, more frequent auctions)

# Our proposals to address concern 1 on the economic efficiency of the flow-based allocation of LTTRs

## Use the EC impact assessment to:

- analyse overall economic efficiency of LTFBA, beyond the creation of auction surplus
- analyse the compatibility of LT FBA with possible future evolutions of LTTR allocation

# Concern 2: how can we guarantee fair access to LTTRs at all Core borders?

**Reminder**: in a flow-based auction, all borders compete simultaneously for cross-zonal capacity allocated through LTTRs

This creates situations of low or 0 LTTRs allocated at some borders

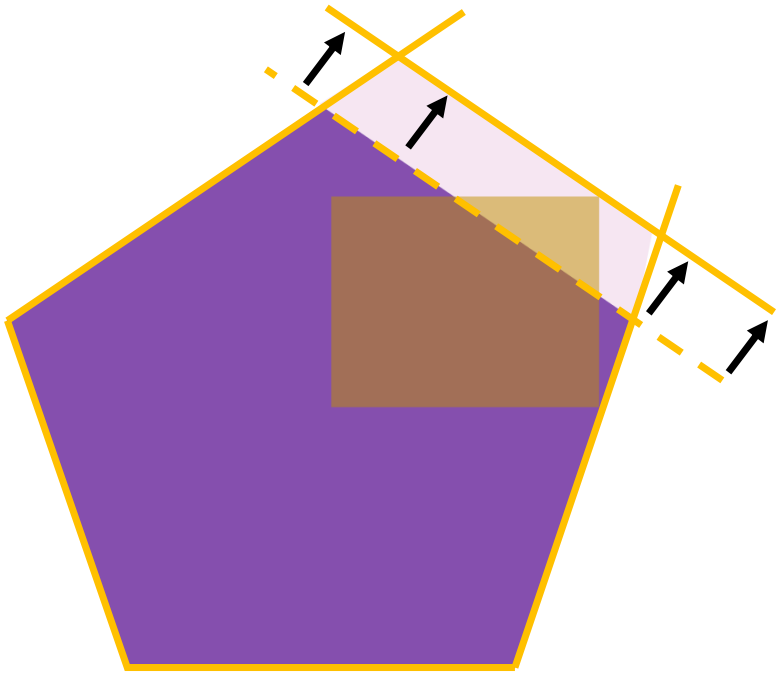
**Eurelectric & Energy Traders Europe** commissioned simulations by N-SIDE

**Objectives:**

- guaranteeing mandatory minimum volumes at all borders
- observing the effect of that on the auction surplus

- We looked at ensuring minimum that at least 50% of historic capacities were allocated at all borders
- We looked at the impact of this mitigation measure on the auction surplus
- We compared that to the effects of small variations in flow-based parameters

# Which LT FB domains have been used for the simulations?



- In absence of publicly available *LT* FB data, 4 Core *DA* FB domains of 4 timestamps across the year have been retrieved
- Whenever necessary, the RAM values are increased to ensure that no CNEC is violated when ensuring that 50% of the average allocated volume over the last three years are made available to the market (MinRAM approach)
- For the flow-based domains considered in the study, only a few CNEC RAM's have been impacted by the process
- The optimisation function remains unchanged

# What guaranteeing 50% of historical ATCs means for some Core borders in practice in the simulation

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

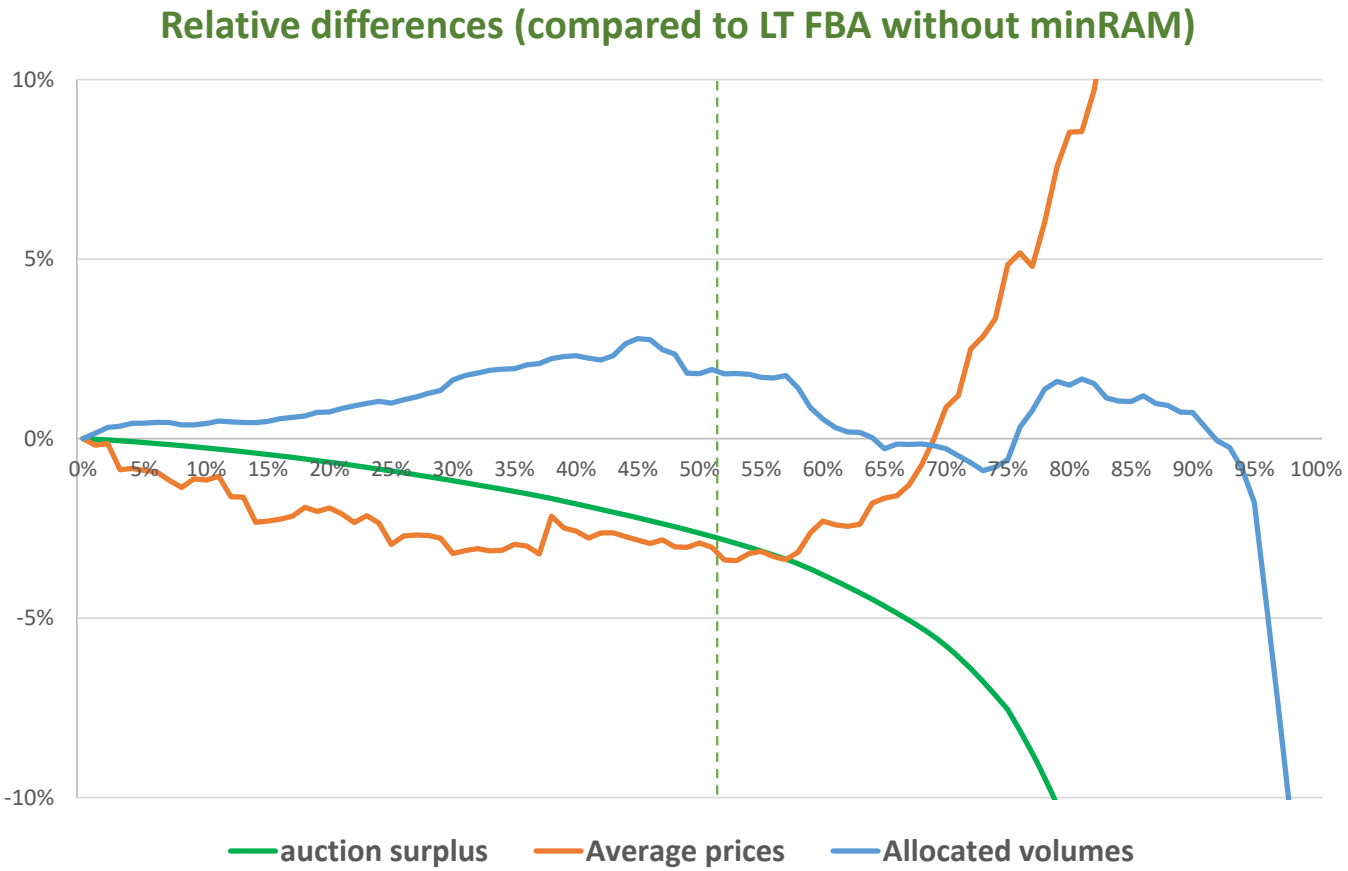
the 5 borders most *positively* affected

the 5 borders most *negatively* affected

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**

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



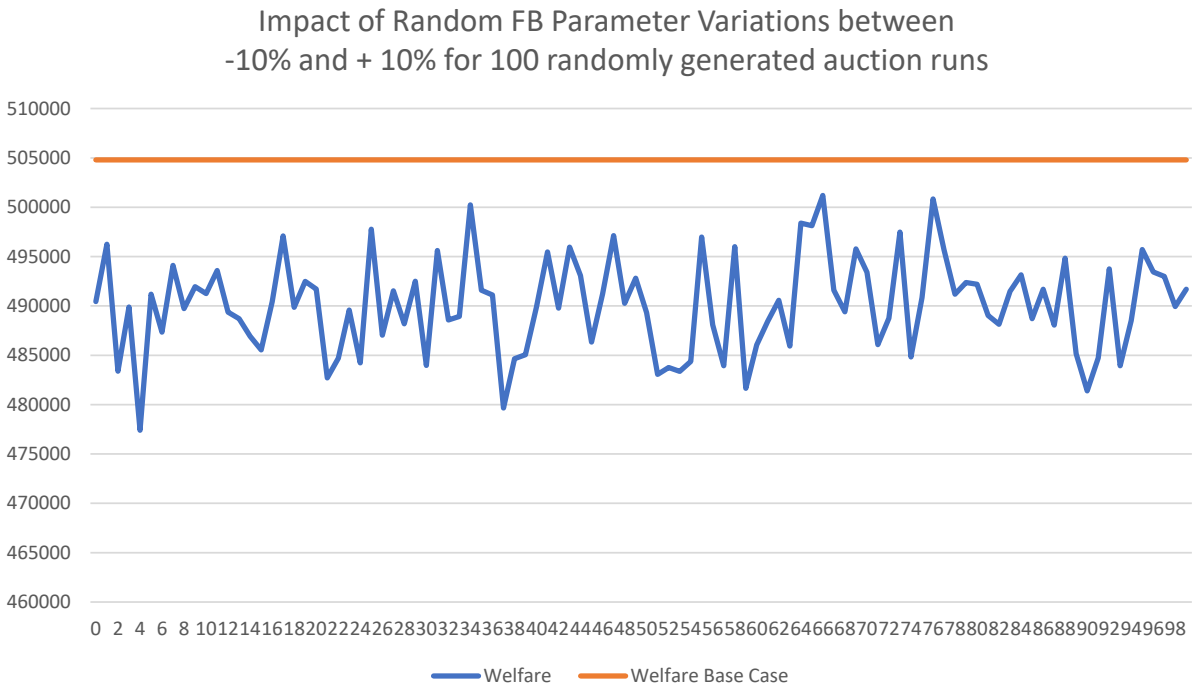

**Were at least 50% of historical ATCs guaranteed at all Core borders, our simulations show that:**

the average prices decrease by 3%

the total allocated volume decreases by less than 1%

**<u>the auction surplus decreases by 1%</u>**
(degradation paid by market participants, while TSOs see congestion income increase)

# Small variations in FB parameters have a more significant effect on auction surplus than applying large minRAMs




- Simulation of 100 auction runs, with each time a random FB parameter variation 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 decreases of 5.4)

## Our proposals to address concern 2 and guarantee fair access to LTTRs at all Core borders

### Use the time needed for the Commission's IA and the extra time given anyway by LT FBA go-live delay to:

- agree on the merits of min capacity at all borders
- propose a methodology and metrics
- test the solution & implement it before go-live

# Concern 3: how can we avoid that collateral requirements distort the best use possible of capacity?

**Reminder**: in a flow-based auction, all capacity bids for all borders need to be collateralised (financially guaranteed) at the same time

This creates a financial limitation to place capacity bids at some borders

**Core TSOs** studied the possibility to reduce collateral requirements

**Objectives:**

- reducing the limits to bid strictly linked to financial guarantees
- maintaining financial security for the TSOs

- TSOs proposed a cap on collateral requirements, based on what was achievable by November 2024
- ACER approved the TSOs proposal as provisional and gave directions for the ultimate solutions
- Market participants are still pushing for a collateral solution that includes:
  - a cap on collateral requirements calculated on forward electricity market spreads (rather than DA)
  - bid filtering performed during the auction process (rather than before the auction)

# Our proposals to address concern 3 and limit the undue effects of collateral requirements on LTTR allocation

## Use the time needed for the Commission's IA and the extra time given anyway by LT FBA go-live delay to:

- include the final solution in the TSOs pipeline
- test the solution & implement it before go-live

# 2. Proposals for a way forward

# Let's remember what we all agree on

- **Forward electricity markets are vital for the supply of electricity:**
  - they represent 90% of trades (volume) in electricity markets
  - they help shield consumers of short-term price volatility
  - they contribute to securing the future of producers' assets
- **LTTRs are a useful complement to forward electricity markets:**
  - to protect against price fluctuations in case of cross-border trades
  - to facilitate proxy hedging in more liquid forward electricity markets
- **The EU legislators asked for options to protect consumers better:**
  - we need to find solutions that work in practice for the benefit of all
  - we should use the time and opportunities we have efficiently

# Proposal to use our time and resources efficiently

## EC

includes in impact assessment a study on the full benefits of LT FBA & compatibility with future design options

April → Nov. 2025

## ACER

shares data and hypothesis from original 2021 simulations on auction surplus

now

sets new deadline for LT FBA go-live, considering EC's IA potential outcomes and necessary progress on mitigation measures

now + check in 2025

## TSOs

shares data and hypothesis from 2023 and 2024 simulations on allocated volumes

now

works on mitigation measures for:

- ensure better availability of LT capacity
- access to min LTTR volumes at all borders
- collateral easing

now → Nov. 2025

## MPs

shares data and hypothesis from 2024 simulations on minRAMs

now

inputs on:

- EC work on LT FBA value
- TSOs work on min mitigation measures

now → Nov. 2025

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# Part 3

# Ways forward

| Indicative time | Webinar items |
|---|---|
| 08:50 - 09:00 | Webinar open for log-in |
| 09:00 - 09:10 | **Introductory Remarks**<br>Zoran VUJASINOVIC, ACER |
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| 10:10 - 10:35 | Market participants' views<br>Jerome LE PAGE, EFET |
| 10:35 - 10:45 | Ways forward<br>Martin POVH, ACER |
| 10:45 - 11:50 | Discussion<br>all |
| 11:50 - 12:00 | **Closing Remarks**<br>Christophe GENCE-CREUX, ACER |

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# Alternatives

**The proposal of minATC**

**ACER is open to discuss this solution, some immediate concerns arise:**

1. **How to agree on min ATCs (given that similar process failed in the past)**
   - Difficult discussions on who should get more capacity and why
2. **What if minATC domain is not feasible (corners outside FB domain)?**
3. **How much economic efficiency we lose and how do we measure the economic gain?**
4. **Legality would require proposal and approval of amendments of 6 methodologies* - at least 2 years additional delay**

**Article 16(6) of Electricity Regulation:** *In the case of congestion, the valid highest value bids for network capacity, whether implicit or explicit, offering the highest value for the scarce transmission capacity in a given timeframe, shall be successful.*

*Scarce transmission capacity is RAM on CNECs*

* Nordic LT CCM (2019) | Core LT CCM (2021/22) | SAP (2023) | CID FCA (2023) | FRC (2023) | HAR (2023)

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# Looking at the future

1. **Statistical approach**
   - Longer maturities (up to 3 years ahead) require statistical approach to capacity calculation (no CGM for 3 years ahead)
   - In Core CCR there will be no statistics on NTCs or min ATCs
   - In core CCR, statistical approach can only be based on flow-based parameters
2. **During EMD, two main options were discussed: Zone-to-Zone or Zone-to-Hub FTRs**
   - Any-zone-to-any-zone FTRs require competition among borders
   - Zone-to-Hub FTRs require competition among borders

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# Proposed way forward

- FCA 2.0 will not result in any implementation before 2030 (~2.5 years for FCA EIF, ~4 years for implementation)
- We cannot afford no coordinated capacity calculation and allocation until 2030
- latest TSO simulations did not show different patterns from the ACER ones (made during the Core LT CCM referral)

  Economic surplus increases | allocated capacities decrease | redistribution between borders

- TSOs can still improve the level of offered capacities – ACER propose historical NTCs as benchmark
- TSOs/JAO should still work on better solutions for collateral requirements

- ACER invites TSOs to continue testing, fine-tuning and improving the capacity calculation and test allocation
- In parallel to implementation, ACER invites all parties to continue discussing possible further adjustments …

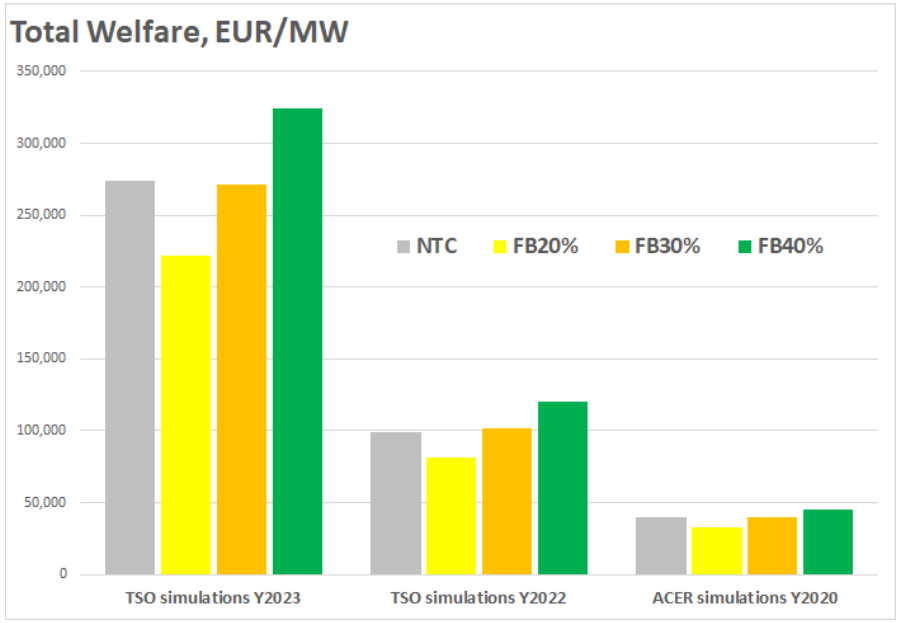
  …yet, we don't see justified reasons to affect the implementation timeline.
- Existing legal obligations **<u>are applicable</u>**

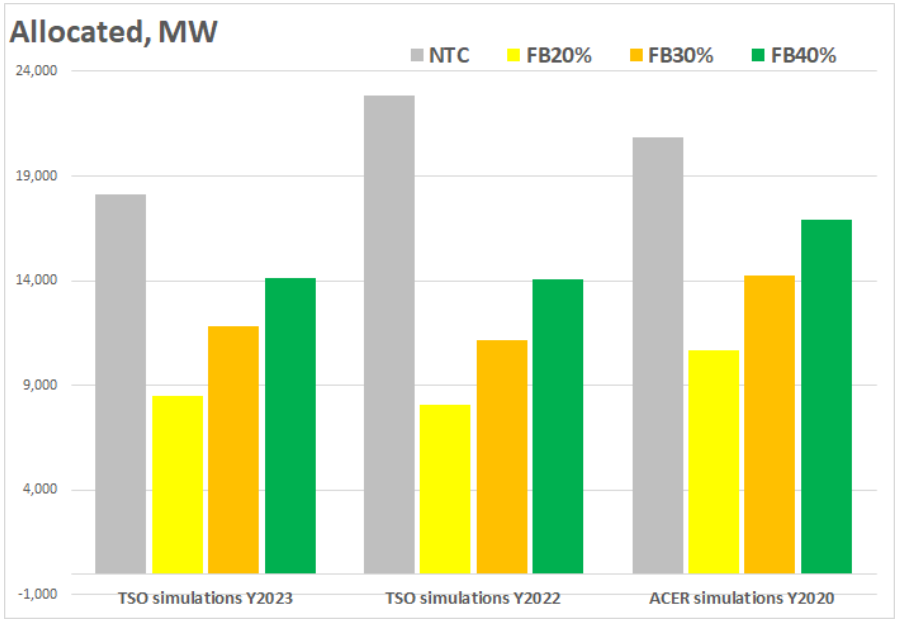
# Results

## Core LTFBA simulations of yearly auctions

Very similar behaviour in ACER's and TSOs' analyses

| TSO simulations Y2023 | NTC2023 | FB20% | | FB30% | | FB40% | | FBbyNTC | |
|---|---|---|---|---|---|---|---|---|---|
| CONG.REVENUE [EUR] | **202,905** | **170,091** | -16% | **197,040** | -3% | **223,520** | 10% | | |
| MPs SURPLUS [EUR] | **70,985** | **51,739** | -27% | **74,066** | 4% | **100,391** | 41% | | |
| SOC.WELFARE [EUR] | **273,890** | **221,830** | -19% | **271,106** | -1% | **323,911** | 18% | | |
| ALLOCATED [MW] | **18,139** | **8,509** | -53% | **11,816** | -35% | **14,141** | -22% | | |
| | | | | | | | | | |
| **TSO simulations Y2022** | NTC2022 | FB20% | | FB30% | | FB40% | | FBbyNTC | |
| CONG.REVENUE [EUR] | **76,175** | **65,409** | -14% | **72,546** | -5% | **82,342** | 8% | | |
| MPs SURPLUS [EUR] | **22,673** | **16,393** | -28% | **28,782** | 27% | **38,279** | 69% | | |
| SOC.WELFARE [EUR] | **98,848** | **81,802** | -17% | **101,328** | 3% | **120,621** | 22% | | |
| ALLOCATED [MW] | **22,840** | **8,093** | -65% | **11,180** | -51% | **14,051** | -38% | | |
| | | | | | | | | | |
| **ACER simulations Y2020** | NTC2020 | FB20% | | FB30% | | FB40% | | FBbyNTC | |
| CONG.REVENUE [EUR] | **30,549** | **26,022** | -15% | **31,353** | 3% | **35,495** | 16% | **39,600** | 30% |
| MPs SURPLUS [EUR] | **9,391** | **6,604** | -30% | **8,605** | -8% | **10,038** | 7% | **11,316** | 21% |
| SOC.WELFARE [EUR] | **39,940** | **32,626** | -18% | **39,958** | 0% | **45,533** | 14% | **50,916** | 27% |
| ALLOCATED [MW] | **20,842** | **10,697** | -49% | **14,247** | -32% | **16,937** | -19% | **16,385** | -21% |




Level of minRAM applied:
20%, 30%, 40%, "FBbyNTC": minRAM per CNECs defined by converting the NTCs to FB (≡ same level of system security NTC<->FB)

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# Discussion

**Connect to Slido**

- **Directly in MS Teams**
- Through www.slido.com #ACER-ENTSO-E
- Scan the QR code
- Use direct link:
  https://app.sli.do/event/4JrQofwANvNgPD3RuNu6gw