

# Long-Term Flow-Based Allocation Stakeholder Workshop

1 December 2025, 11:00 – 12:45



# Agenda

1. Introduction - **5 min**
2. LTFBA recap
  - a. ACER recap on LTFBA - **5 min**
  - b. Implementation progress (past milestones reached + upcoming milestones) - **5 min**
3. LTFBA Stakeholder involvement going forward – **10 min**
4. HAR amendment (what has changed) - **5 min**
5. Collateral improvements – **10 min**
6. Core Capacity calculation – **30 min**
  - a. Outline and roadmap
  - b. Summary of LT CCM request for amendment (+ responses to PC)
  - c. Objectives and planning of external parallel run
7. Nordic Capacity Calculation - **5 min**
  - a. Roadmap
8. Core simulation results (yearly, monthly) - **5 min**
9. Nordics implementation (year ahead results for 2026) - **5 min**



# LTFBA Recap

- 2019/2021: Decisions on long-term capacity calculation methodology in Core and Nordic CCR
- 2022: three workshops with stakeholders presenting the first simulation results in Core
- The first results from Core CCR were **not satisfactory** (too low capacities on many borders). Two reasons were identified:
  - *Offered capacity domain in flow-based was significantly smaller than in current ATC allocation*
  - *Competition between borders in flow-based allocation*
- The scenario-based approach to coordinated long-term capacity calculation has limitations → too conservative estimate of the future network situation → low capacities
- Subsequently Core NRAs/ACER asked Core TSOs to improve long-term capacity calculation and increase the size of capacity domain to be of **similar size** as current ATC domain

- Core TSOs made a proposal to adjust the flow-based domain to be of similar size as current ATC
  - NRA approval is pending
- The preliminary testing of the improved method shows much better results than those in 2022
- The proposed capacity calculation method seems a pragmatic first step...
- ... yet further improvements will be needed in the coming years to gradually move towards a statistical approach (based on day-ahead capacities)
- Similarly, improvements in collateral requirements are expected to be done one year after the go-live

# LTFBA Status Overview

## Executive Summary

Overall project is running on programme, and we anticipate successful regulatory go-live in November 2026. There are of course a number of developments still in progress/due and risks are being dynamically managed to maintain quality and timely delivery.

## Key Headlines/Milestones

- Algorithm Rev I Design - Completed and Approved (Completed)
- Simulation Platform - Updates completed (Completed)
- eCAT Development (Completed)
- CID Algorithm Development (Completed)
- CRDS – Initiated (On Track)
- Website – Initiated (On Track)
- Publication Tool Development for Core (Completed)
- Publication Tool Development for Nordic (On Track)
- Financial System SAP – Implementation Guide under Approval (On Track)
- Other JAO Tools – In Progress (On Track)
- Legal and Contractual Procedures – SAPCA Procedure in Progress (On Track)
- Go-Live – Anticipated On Programme (On Track)

# LTFBA Status Overview Continued

## Highlights

- **eCAT:**
  - eCAT 8.0 Cycle 6 Completed – internal testing underway.
- **Publication Tool:**
  - Development for Core Completed as per approved scope. Nordics in progress.
- **External Parallel Run:**
  - LTFBA and LTCC combined parallel run due to commence on 24 November 2025.
- **CRDS:**
  - Development initiated as per scope and deliverables agreed.

# LTFBA stakeholder involvement going forward

# LTFBA Market Participants Involvement in Testing

Activity	Aug 25	Sep 25	Oct 25	Nov 25	Dec 25	Jan 26	Feb 26	Mar 26	Apr 26	May 26	Jun 26	Jul 26	Aug 26	Sep 26	Oct 26	Nov 26	
Simulation Platform	Test w. MPs	Test w. MPs						Simulation platform available for MPs									
eCAT 8.0									SIT – RCCs, TSOs & MPs								
Website & Publication Tool									Website SIT – RCCs, TSOs & MPs								
					LTCC and LTFBA Publication Tool Ext Parallel Run												
Go Live																	▲

**Note:** Ahead of each activity, JAO will formally issue communication to Market Participants with more information regarding their involvement via the messaging board on the JAO website and email. Dates are to be confirmed but will include timings and details of workshops and alignments, engagement forums and format.

# HAR Amendment – what has changed

# HAR Amendment 2025

- **27 March 2025:** All TSOs submitted to ACER a proposal for amendment of the harmonised allocation rules (HAR – Article 51 of FCA Regulation).
- **19 September 2025:** ACER published Decision 8/2025 on HAR proposed amendments.
- HAR amendments included:
  1. MTU-related changes;
  2. Changes related to registration;
  3. Refusal of application, suspension, termination;
  4. Clarification on prices;
  5. Price cap publication;
  6. Financial-related changes; and
  7. Additional clarifications and corrections.

# Collateral Improvements

# Collateral Improvements

## Background of Collaterals in LT-Market

- According to **FCA Article 41(2)**, MPs must deposit **financial collateral prior to the auctions**
- According to **HAR Article 23**, SAP must calculate the **credit limit of MPs** before each auction and report it:

$$\text{Credit limit} = \text{collateral} - \text{outstanding payment obligations}$$

- When a bid is submitted by an MP, the so-called **credit limit verification** must be carried out in accordance with **HAR Article 34**:

$$\text{Credit limit} \geq 0, \text{ with outstanding payment obligation} = \text{maximum payment obligation (MPO)}$$



**Increase in collateral requirements due to LTFBA, as auctions are held simultaneously for all BZBs.  
Filter bids intelligently, but how?**

- **Discussions** on this topic already took place **when amending HAR in 2023**.  
→ Outcome was to use a **price cap based on DA and forward prices** to limit the MPO (see HAR article 34(6) and (7)).
- This approach can lead to an **over-/underestimation of the market clearing price**.
- Late in the process **N-SIDE proposed alternative approach to “filter bids”** (see next slide), but **LTFBA go-live should not be jeopardised** due to additional workload on collateral improvements.

# Collateral Improvements

Concept: Exact market-based bid filtering based on the actual market prices

Optimization function

$$\max Welfare := \sum_{bid \in Bids} BidPrice_{bid} \times AcceptedVolume_{bid}$$

Boundary conditions

- $0 \leq AcceptedVolume_{bid} \leq BidQuantity \times BidActivation_{bid}$  for all  $bid \in Bids$
- $VolumeAccpetedOnBorder_{A \rightarrow B} = (\sum_{bid \in Bids \text{ for border } A \rightarrow B} AcceptedVolume_{bid})$
- $\sum_{borders A \rightarrow B} PTDF_{A,B,cnec}^+ VolumeAccpetedOnBorder_{A \rightarrow B} \leq RAM_{cnec}$
- **Marginal Pricing Principle with:**  $MCP_{Border A \rightarrow B} = \sum_{cnec} PTDF_{A,B,cnec}^+ \times ShadowPrice_{cnec}$

Binary decision

*BidActivation determines if the bid is selected or not. If it is selected by the auction clearing, the variable AcceptedVolume then determines which volume is accepted.*

→ Only activated bids are in scope for the price calculations  
Marginal pricing principles still apply.

New boundary condition for collateral check

for each MarketParticipant:

$$\sum_{bid \in Activated Bids \text{ of Market Participant}} AcceptedVolume_{bid} \times MCP_{Border(bid)} \leq Posted Collaterals$$



By using the actual Market Clearing Price (MCP) the problem of over-/underestimation of collaterals is solved

# Collateral Improvements


## Current Status and Way Forward


- **Based on TSOs' request, JAO has initiated the PoC outside the scope of LTFBA** in order to not jeopardise LTFBA go-live in November 2026.

- **Proof-of-Concept (JAO and N-SIDE)**

§ Open legal questions have been clarified

 Kick-off meeting between JAO and N-SIDE took place

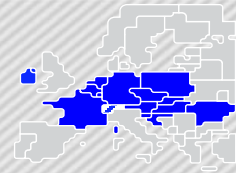
 First required data has been gathered by TSOs and JAO and made available to N-SIDE.

 PoC is expected to be ready by Q1 2026.

- If Proof-of-Concept results are positive:

 SAP and HAR methodologies will be amended by TSOs accordingly (typical amendment duration 6 months)

# Core Capacity Calculation



### Core TSOs provide the following updates regarding the Long-term capacity calculation project

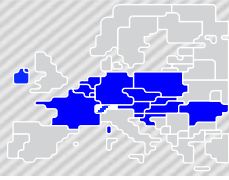
1. Summary of the LTCCM amendment and responses to the public consultation/shadow opinion
2. Objectives and planning of the LTCC EXT//RUN
3. LTCC simulation results with the ATC benchmark application and RAM adjustment on CNEC level

### Core TSOs completed a critical phase of the LTCC project with the launch of the EXT//RUN on Nov 24th 2025, a key milestone ahead of the November 2026 go-live.

- All technical, procedural, and organizational preparations for the EXT//RUN have been completed. INT//RUN exit criteria, EXT//RUN entry criteria, and JAO readiness have been closely monitored and fulfilled.
- The LT CCM 1st amendment is submitted for approval to Core NRAs on 21/11, incorporating regulatory and market feedback, and introducing the benchmark-based approach for capacity calculation.
- The removal of LTA inclusion in DA and IDCC\_A CCM amendments capacity calculation is an enable to capture the improvement of the LT FB domain through the benchmark. The related amendments to the Core DA CCM and ID CCM are planned to be submitted to NRAs for approval beginning of Dec.
- Market parties and NRAs have been actively consulted; feedback has shaped the amendment and the EXT//RUN setup.

### The EXT// run is executed with the benchmark approach. The LTCC go-live target remains November 2026, conditional to regulatory approval of the LT CCM amendment and successful EXT//RUN. Additionally:

- The criteria to review the benchmark after go-live is subject to further alignment between TSOs and NRAs
- As the LTCC EXT//RUN progresses, Core TSOs will continuously monitor the EXT//RUN KPIs, address any operational or IT issues, and maintain close alignment with JAO and all stakeholders.



## LT CCM amendment: rationale

Following Core NRAs and ACER request, Core TSOs worked on measures to improve the LTCC flow-based domain as input for the flow-based allocation.

- Improvement package: increase FB domain through benchmark + removal of LTA inclusion

Adjustment the FB domain to reach a benchmark is **largely** based on historical offered capacities – *form of “historical ATC inclusion”*

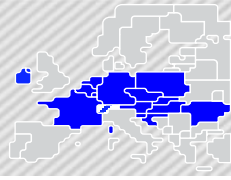
- Provide stability in the offered volumes for hedging whilst transitioning to a flow-based allocation
- Benchmark aligned with NRAs and ACER
- Benchmark also contains a maximum cap to mitigate unwanted financial exposure.

Removal of LTA inclusion from the day-ahead capacity calculation and the intraday capacity calculation (IDCC\_A) processes

- Purpose: decouple LTCC process from operational security and shift to financial products.
- Foreseen in the 4th proposal for amendment of the DA CCM and the 5th proposal for amendment of the ID CCM
  - LTA inclusion was introduced in a context without minimum capacity requirements in day-ahead capacity allocation. This context changed completely with the implementation of the min. 70% requirement.

### Paradigm shift

- **Old paradigm:** maximize “capacities” subject to operational security
- **New paradigm:** financial forward market → Trade-off how much DA congestion income to use to enable hedging



## LT CCM amendment: stakeholder feedback

### Market participant feedback received during the public consultation:

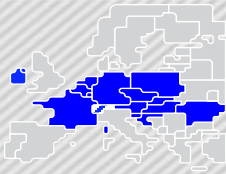
- Broad support for introducing ATC benchmarks as a safeguard for minimum capacity, but concerns about:
  - Using only one reference year (2025) for benchmarks and rationale for treatment of certain borders (DE-AT, PL, SEM-FR).
  - The introduction of MaxATC as a cap, which some see as unnecessarily restrictive.
  - The need for more transparent, robust review and update processes for benchmarks; Desire for more cost-benefit analysis on the impact of changes.
- Positive reception to annual review of benchmarks, improved fallback procedures, and inclusion of SEM-FR.
- Some stakeholders remain unconvinced about the overall benefits of flow-based allocation and request further analysis.

### Key NRA Shadow Opinion feedback:

- Majority support for the ATC benchmark concept, with key requests:
  - Raise minATC to 100% of historical values (from 90%) and set maxATC = minATC
  - Clarify and simplify the application of the splitting factor in the methodology and annex.
  - Ensure transparent, and regulated review and update of benchmark values, with NRA involvement.
  - Specify fallback values for the first year (external parallel run results).
- Some NRAs express reservations about using only historical LT values and call for future improvements.

### Resulting changes for the LTCCM amendment submission:

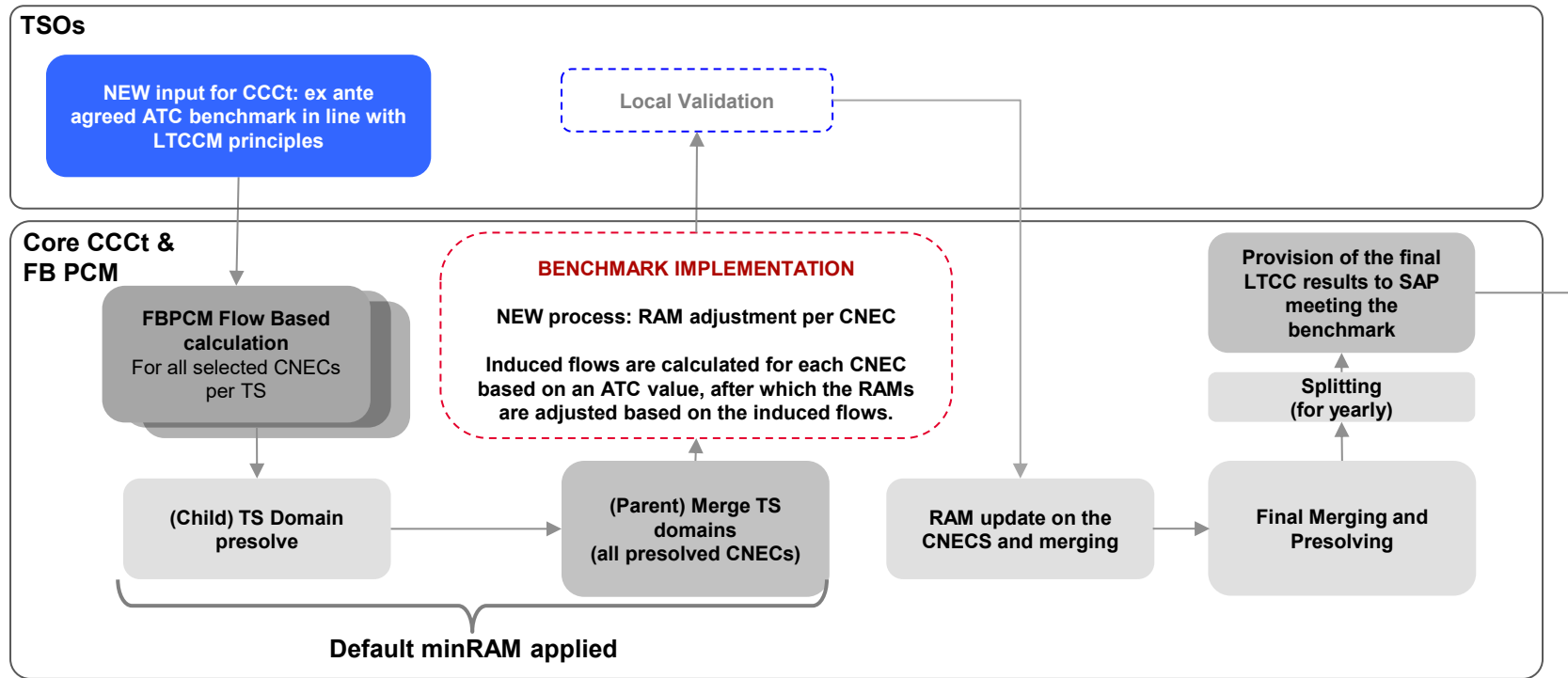
- TSOs raised minATC to 100% and aligned maxATC, clarified splitting factor, and modified benchmark review process.
- Fallback and publication requirements improved; Annex values updated for transparency.
- Special border treatments clarified following alignments between TSOs, NRAs and ACER
  - For the DE-AT border these values are set to 50% of the historical offered capacities
  - For the HR-SI border these values are set to 500 MW for the yearly and 150 MW for the monthly calculations.
- ATC benchmark values for Polish borders were kept at zero in Annex 1, reflecting the historical absence of offered long-term cross-zonal capacities on these borders and PSE aims to further align with NRAs what the final values should be.



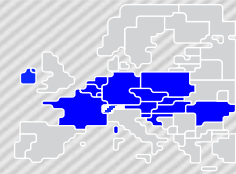
LT CCM amendment: technical concept to implement benchmark

In the LTCC technical concept, RAMs are modified during the capacity calculation to produce a resulting domain that accommodates the benchmark values.

- Induced flows are calculated for each CNEC based on an ATC value per border (**2025 historic yearly and 2025 seasonal average of historic monthly ATCs**) after which the RAMs are adjusted based on the induced flows.
- The output of the FB CC (after splitting) then results in capacities within the range of historical ATC values.



At the same time, Core TSOs note that the rest of the LTCC process remains unchanged – use of CGM, outage mapping, timestamp selection and merging. These steps are aligned with the original LTCCM.

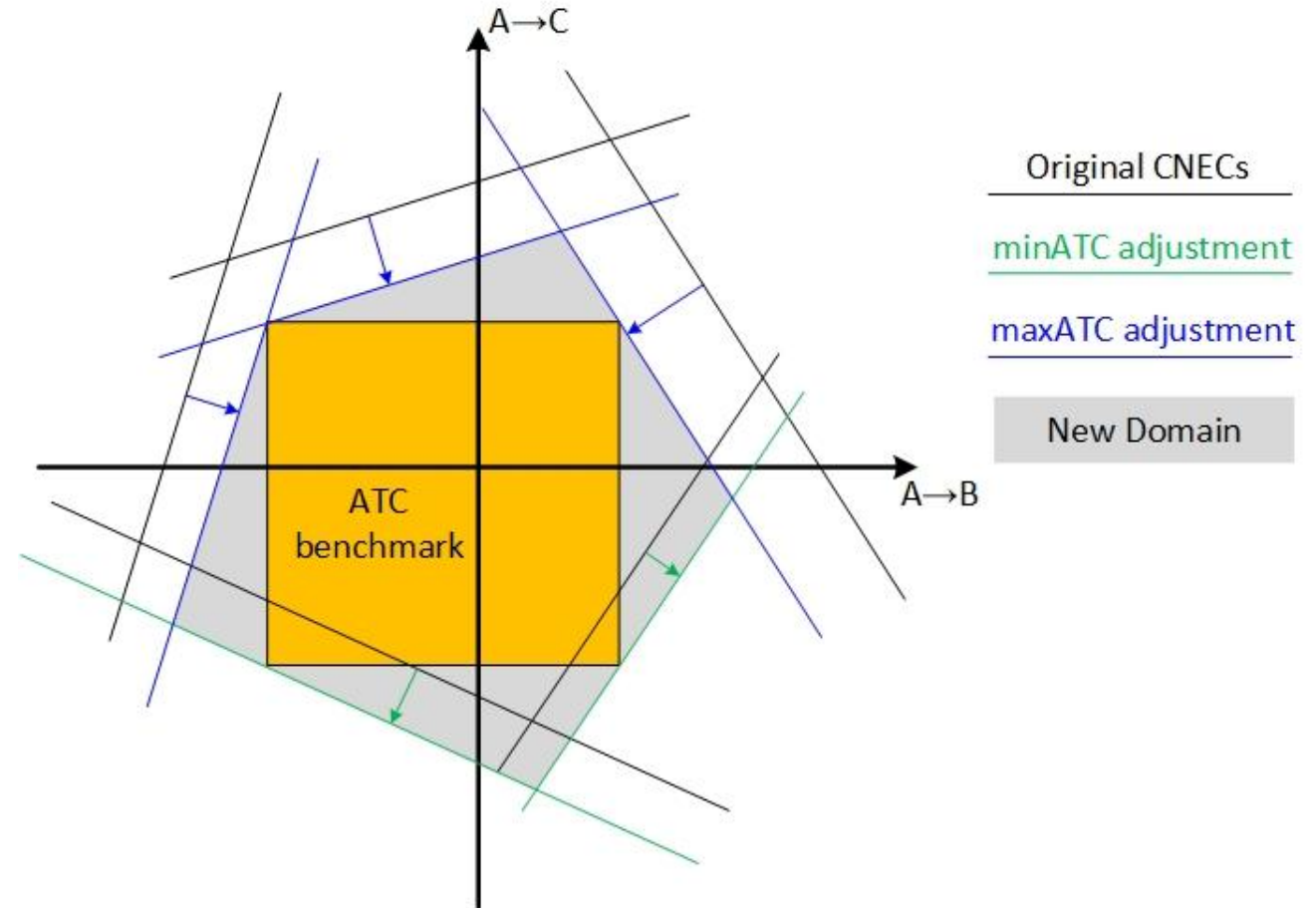


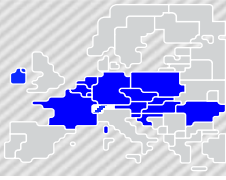
LTCCM amendment: technical concept to implement benchmark

**Benchmark adjustment principle:**

- In the final LTCCM amendment  $\text{MinATC} = \text{Max}$ 
  - In MinATC:
    - $\text{RAM}_{\text{new}} = \max(\text{RAM}, \text{flow\_by\_ATC})$
  - FB Domain gets increased
  - In MinMaxATC:
    - $\text{RAM}_{\text{new}} = \text{flow\_by\_ATC}$
  - → FB Domain gets in- and decreased

The KPIs, criteria and process to review the benchmark after the go-live is subject to further alignment between TSOs and NRAs.



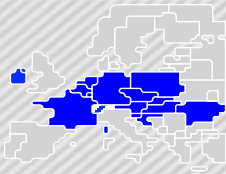


Core TSOs will perform 1 yearly and 11 monthly runs incl publication and allocation process supported by JAO. The EXT//RUN will be monitored with RCC support and focuses on proving readiness for the go-live.

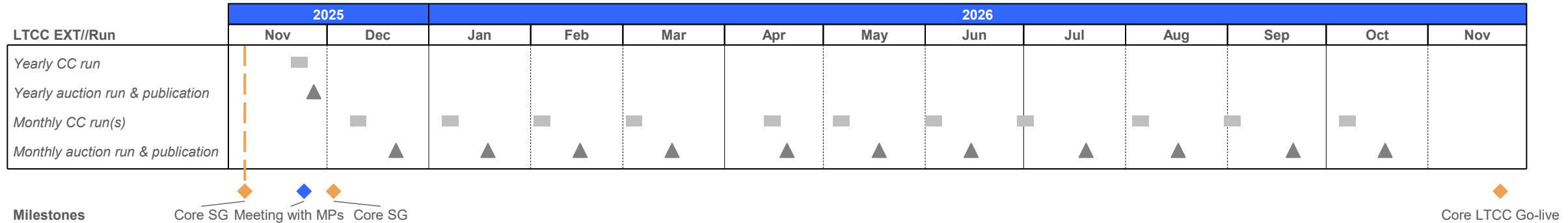
- Core **LTCCM Art. 22** defines the timescale and steps for implementation:
  - *An External // run during which the Core TSOs and the Core CCC shall continue testing their internal processes and IT tools and infrastructure. In addition, the Core TSOs shall involve the SAP to test the implementation of this methodology, and market participants to test the effects of applying this methodology to the market and allow them to adapt their processes. Following Article 10(5)(c) of the FCA Regulation, this phase shall not be shorter than 6 months.*
- Through the LTCC EXT//RUN, **Core TSOs aim to show that they can perform the capacity calculation process for Core CCR on a regular basis** according to the LTCC methodology and provide an opportunity to MPs to test and adjust their processes ahead of the November 2026 go-live.
  - As part of the scope of the External // run, **a flow-based allocation process will be performed by JAO using historical bids** to mimic a full chain scenario.
- Following alignment with MPs and Core NRAs/ACER the proposal is to ensure sufficient time for the EXT//RUN to cover the longest possible period - **November 2025 – October 2026.**

Core TSOs aim to achieve the following objectives during the LTCC EXT//RUN:

- Successful process completion of predefined yearly and monthly including publication
- Successful implementation of all back-up and fallback procedures
- TSOs & RCCs prove operational readiness for Go-Live
- Execution by operators, according to HLBP timings
- Report on External // run stability and results publication
- Finalised HLBP timings and procedures.
- JAO readiness for integration of JAO systems with Core TSOs and central IT tooling



The following planning illustrates the LTCC EXT//run phases and activities until November 2026.



Similar to DA and ID parallel run performed by Core TSOs, market participants will be provided with capacity calculation and allocation results on a regular basis.

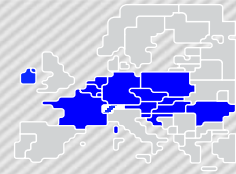
- **Data provided:** JAO will publish on [\[LINK\]](#) **results of coordinated capacity calculation runs** and the **results of running the allocation algorithm** [\[LINK\]](#) after each coordinated capacity calculation run based on **2025 historical bids**.
- Market participants will have access to these datasets and will be invited to analyse provided results to adjust their processes ahead of the LT FBA and LTCC go-live.
  - **Capacity calculation results** will allow MPs to analyze cross-border capacity for hedging, validate assumptions and forecast impacts.
  - **Allocation results** will allow MPs to evaluate bidding strategies and adjust their processes.

The CC and allocation results of the 2026 yearly run was performed by Core TSOs from 24/11 to 28/11 are available to market participants via the Publication Tool [\[LINK\]](#) and JAO’s website [\[LINK\]](#).

- **Calculated results high-level description:**
  - Yearly Core LTCC domain based on 2026 CGMs and with applied outages and minRAM requirement defined in LTCC applied.
    - Benchmark applied in line with the LTCCM amendment Annex 1 (see Annex of this document for values).
  - Yearly allocation results are based on the NTC based historical bids from 2025.

# ANNEX: 2024 FBA Simulation results – allocated capacity values

P. BRHLIKOVA

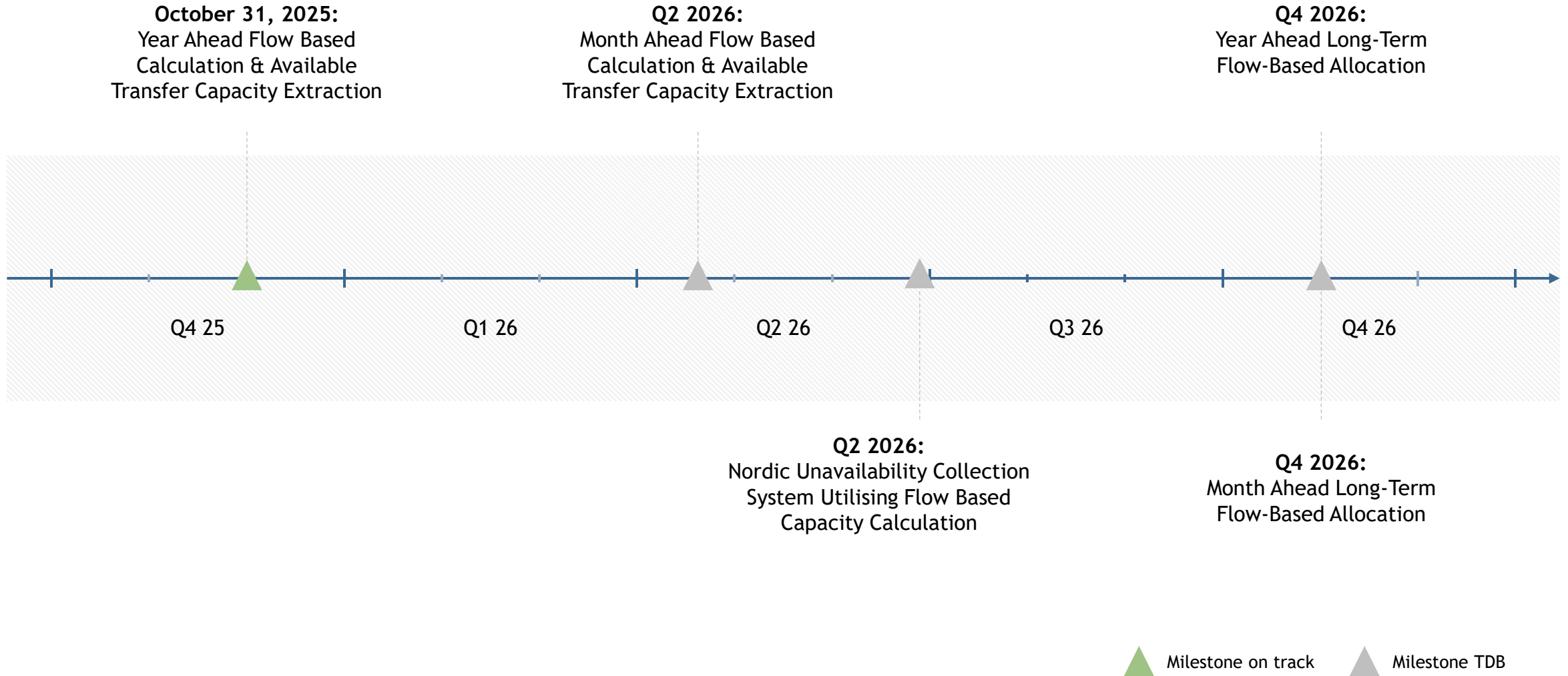


Rounded to the nearest integer

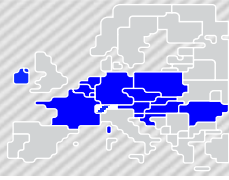
Oriented Bidding Zone Borders	Y2024	Y2024 and average M2024	Oriented Bidding Zone Borders	Y2024	Y2024 and average M2024
AT_to_CZ	218	367	HR_to_HU	198	232
AT_to_DE	900	1421	HR_to_SI	562	671
AT_to_HU	160	339	HU_to_AT	125	166
AT_to_SI	436	803	HU_to_HR	317	337
BE_to_DE	259	439	HU_to_RO	377	580
BE_to_FR	304	672	HU_to_SI	90	119
BE_to_NL	254	323	HU_to_SK	61	79
CZ_to_AT	689	836	NL_to_BE	455	500
CZ_to_DE	105	264	NL_to_DE	829	1171
CZ_to_PL	389	508	PL_to_CZ	0	57
CZ_to_SK	152	330	PL_to_DE	111	168
DE_to_AT	474	1294	PL_to_SK	0	48
DE_to_BE	260	398	RO_to_HU	392	587
DE_to_CZ	61	147	SI_to_AT	430	476
DE_to_FR	740	1074	SI_to_HR	601	732
DE_to_NL	987	1235	SI_to_HU	23	46
DE_to_PL	0	32	SK_to_CZ	1	188
FR_to_BE	1449	1894	SK_to_HU	822	925
FR_to_DE	1205	1489	SK_to_PL	152	264
	<b>Y2024</b>	<b>Y2024 and average M2024</b>		<b>Y2024 and average M2024</b>	
<b>Total</b>	14587			21211	

# Nordic Capacity Calculation

# NORDIC LONG-TERM CAPACITY CALCULATION GO-LIVE ROADMAP



# Simulation Results Core



## 2024 Simulation Results

TSOs simulated coordinated capacity calculation and allocation results using the adapted process with benchmarks for CC. The simulations were performed to understand effects of the benchmark and its efficiency.

### KPI1: Minimum and Maximum Net Position (MinMax)

- This KPI shows the minimum and maximum net position for each bidding zone (country) and case. It reflects the limits on how much electricity a zone can import or export overall.
- Input: Data from the LT-053 final merged Flow-Based (FB) Domain report, including PTDF, RAM, and Presolved merged constraints.

### KPI2: Maximum Bidding Zone Exchanges (MaxBex)

- This KPI shows the maximum possible exchange across each bidding zone border (per direction), assuming zero exchanges on all other borders.
- Input: Data from the LT-053 final merged Flow-Based (FB) Domain report, including PTDF, RAM, and Presolved merged constraints.

### LT FBA simulations

- Input: Shifted domain to MinATC=MaxATC, bid files for 2024.
  - For Polish border created bids are added and Technical Profile PO/CZ/DE is no longer used
  - To account for split auctions on Belgian-French and German-French borders, which will no longer be possible with long term flow-based, bids from the 2nd Y-auction for 2025 were multiplied with a factor (Total Y1+Y2 auction volume/Y1 auction volume).

### Disclaimer:

- MinATC values in KPIs 1-2 to be disregarded from the graphs, based on Core NRA Shadow Opinion and preference for MinATC=MaxATC approach.

### Key benchmark effect can be observed in encompassing the pre-set benchmark in the final domains (also after splitting)

- The result show stable performance of all borders/BZs in line with the benchmark setting based on LTCCM.
- MaxATC benchmark also limits the parts of the domain that would normally get “inflated” by minATC benchmark
- From the simulations it is visible that the domains are less sensitive to changes in input parameters such as CGMs (number/base case quality), outages or minRAM following the benchmark application.

MinMax ATC scenario provides stability of offered capacities to allocation and ensures revenue adequacy by tackling extreme high capacities and volatile CC results.

# Simulation Results Nordics

# NORDICS IMPLEMENTATION (YEAR-AHEAD RESULTS FOR 2026)

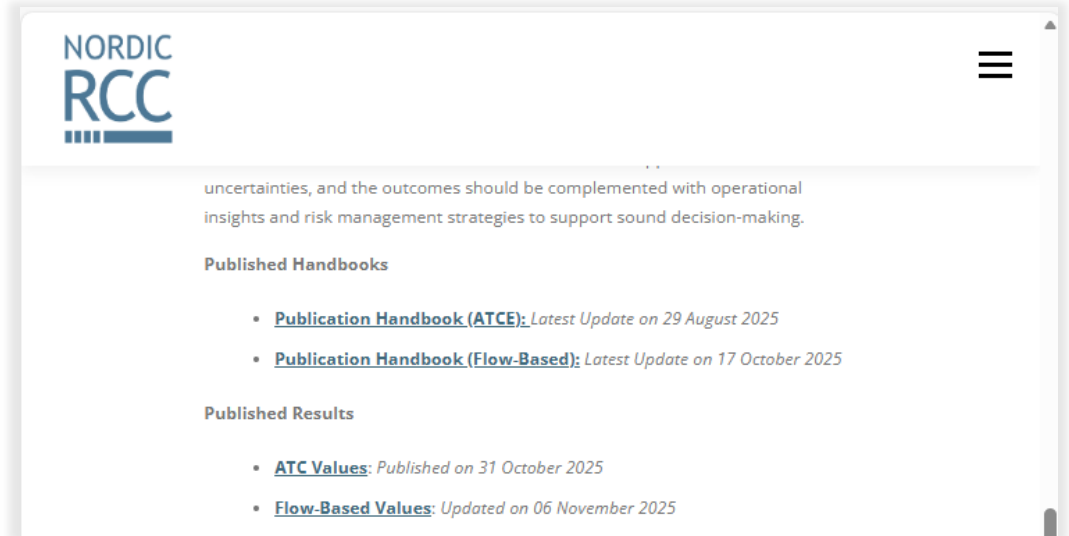
## Nordics Live with Y-1 Capacity Calculations

- On **October 31**, the Nordics went live with the Y-1 Long-term Capacity Calculation results
- These results was published as part of the **Transitional Solution**, applying the ATC extraction on the calculated flow-based domains:
  - Peak and Valley flow based domains
  - ATC extraction based on the Peak and Valley FB Domains

## Nordic Parties conducted extensive testing ahead of Go-Live

- Local and regional readiness for Go-live have been validated through **extensive and structured testing**
- **Two Internal parallel runs** have been completed successfully, which started in June 2025 and ended in September 2025
- During these runs **actual Y-1 data from 2025 and 2026** was used and sensitivity analysis performed for selected parameters, demonstrating system stability and process robustness under varying conditions.

## Y-1 Publication results on Nordic RCC Website



The screenshot shows the Nordic RCC website interface. At the top left is the 'NORDIC RCC' logo. Below the logo, there is a section titled 'Published Handbooks' with two entries: 'Publication Handbook (ATCE): Latest Update on 29 August 2025' and 'Publication Handbook (Flow-Based): Latest Update on 17 October 2025'. Below that is a section titled 'Published Results' with two entries: 'ATC Values: Published on 31 October 2025' and 'Flow-Based Values: Updated on 06 November 2025'. The website has a clean, professional layout with a blue header and a white main content area.

For each scenario considered in the process, the published results include:

- **Available Transmission Capacity (ATC)** values for the DK1-DK2 bidding zone border
- **Flow-Based (FB)** calculation parameters for the Nordic Capacity Calculation Region (CCR)

[Link to results](#)

Our values define who we are, what we stand for and how we behave.  
We all play a part in bringing them to life.



## EXCELLENCE

We deliver to the highest standards. We provide an environment in which people can develop to their full potential.



## TRUST

We trust each other, we are transparent and we empower people. We respect diversity.



## INTEGRITY

We act in the interest of ENTSO-E



## TEAM

We care about people. We work transversal and we support each other. We celebrate success.

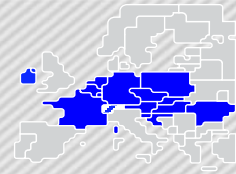


## FUTURE THINKING

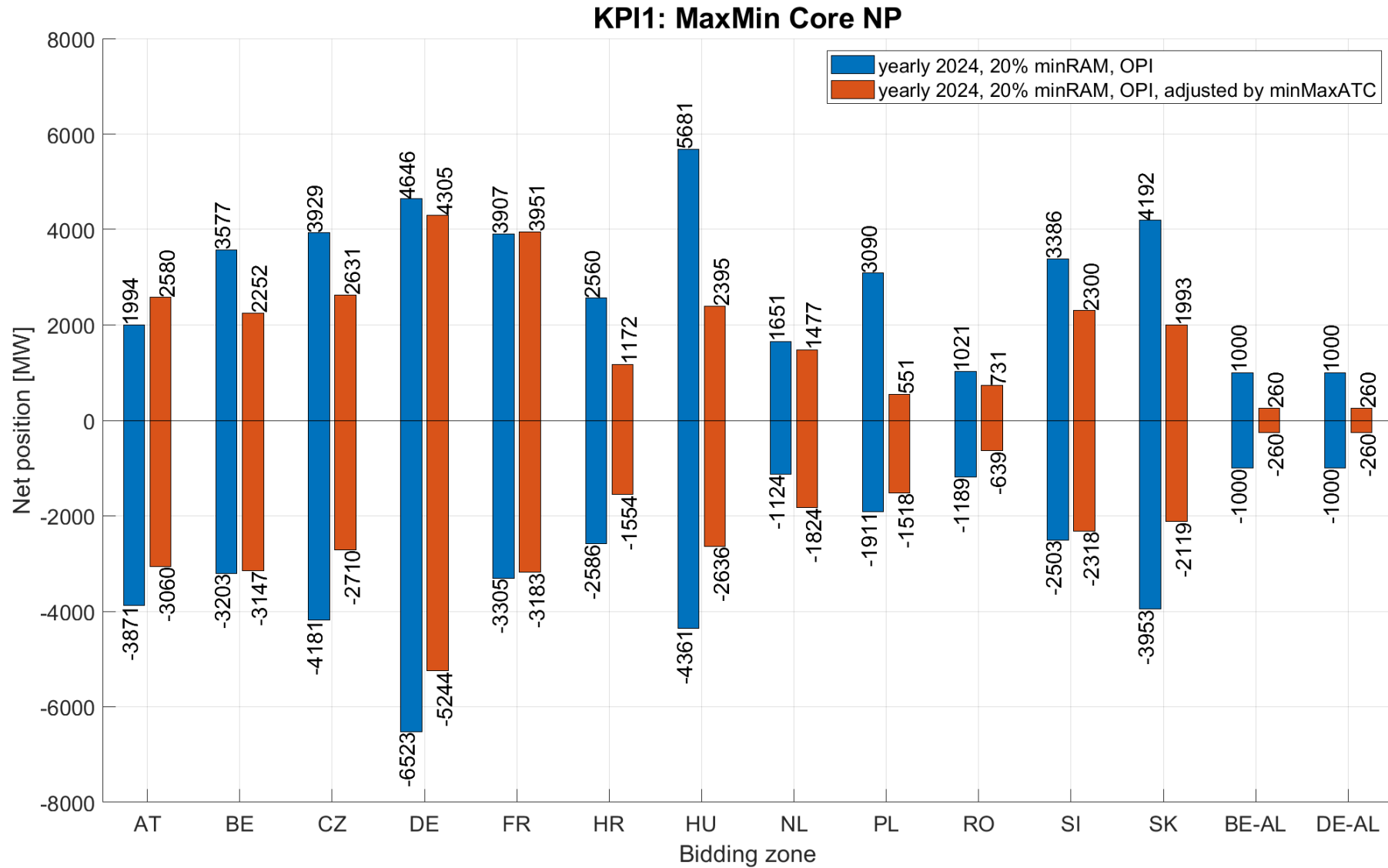
We are a learning organisation. We explore new paths and solutions.

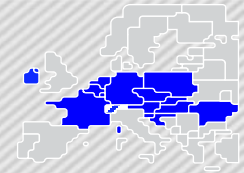
**We are ENTSO-E**





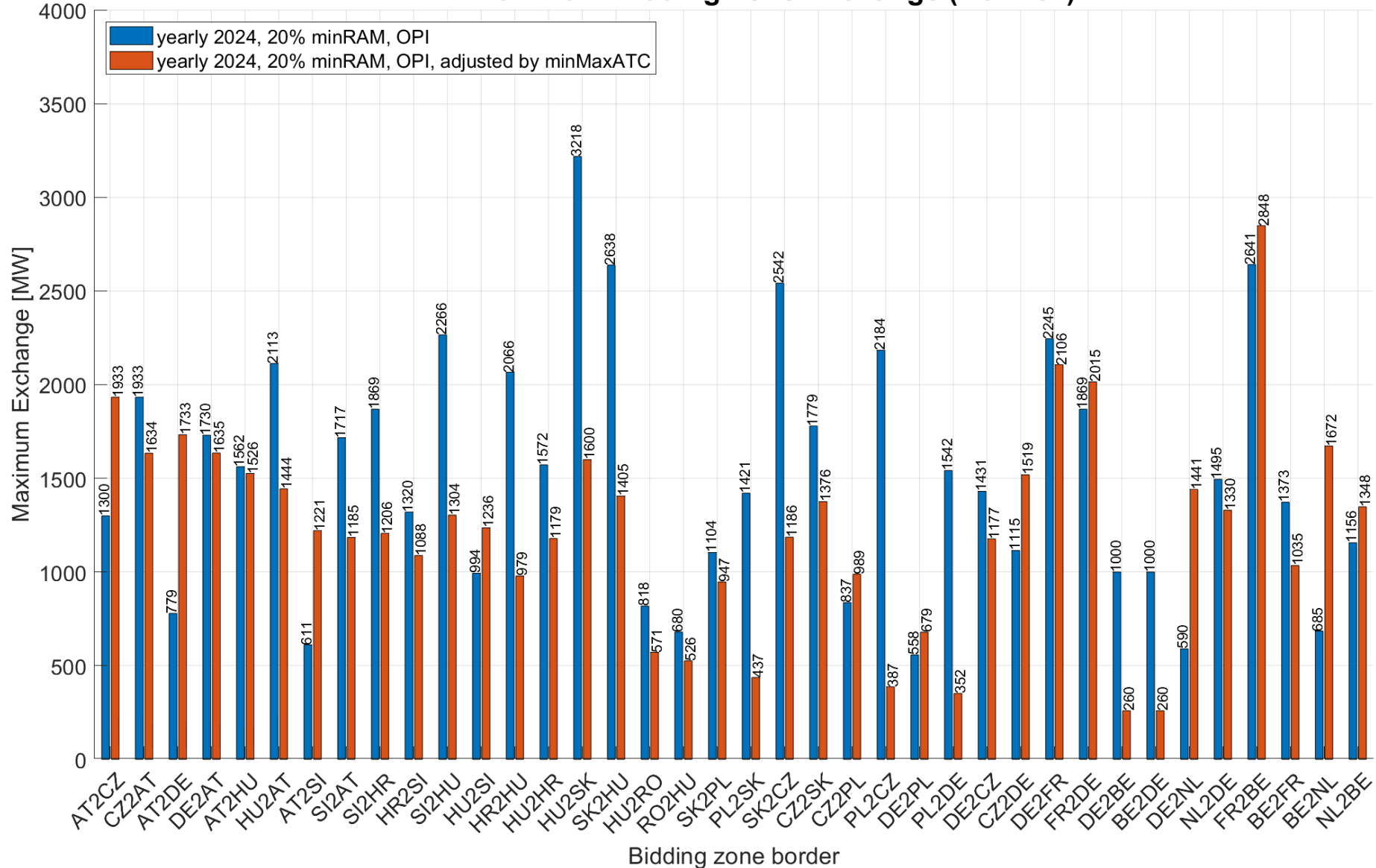
KPI1 – minimum and maximum NP, comparison no benchmark vs. MinMaxATC



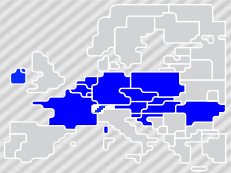


KPI2 – maximum bilateral exchanges

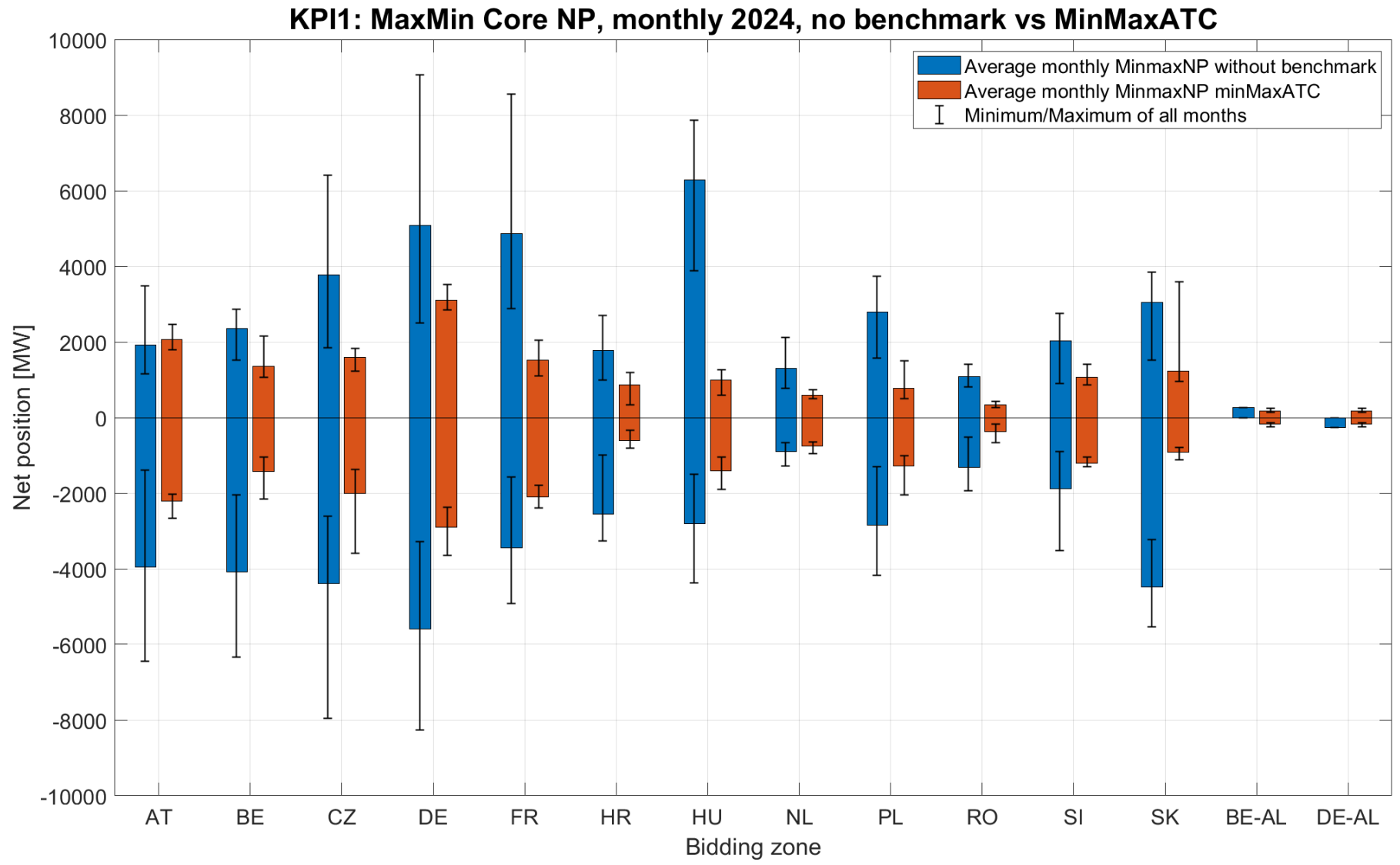
KPI2: Maximum Bidding Zone Exchange (MaxBex)



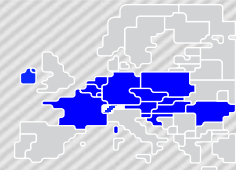




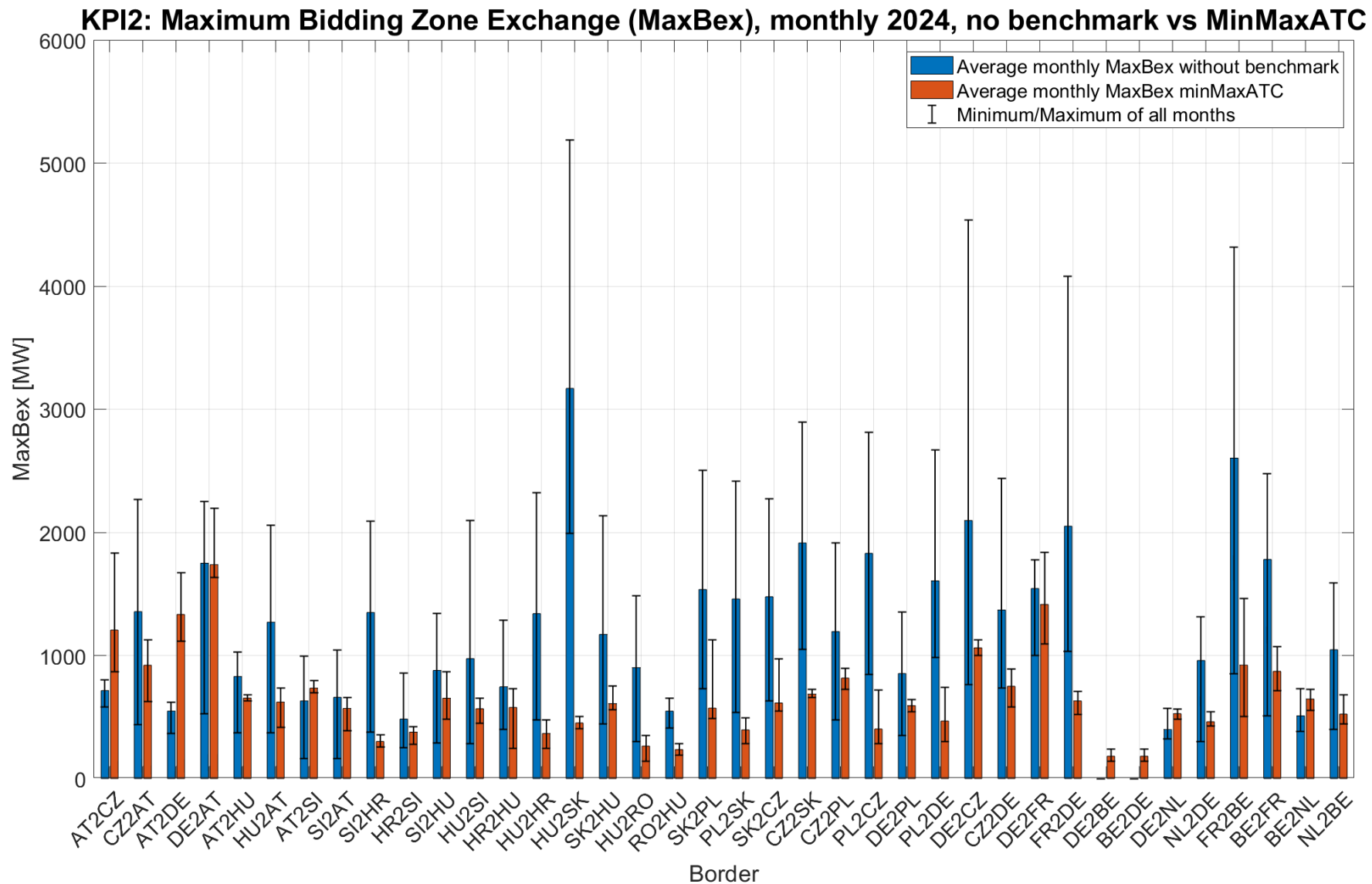
KPI1 – minimum and maximum NP, comparison no benchmark vs. MinMaxATC

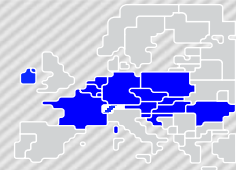






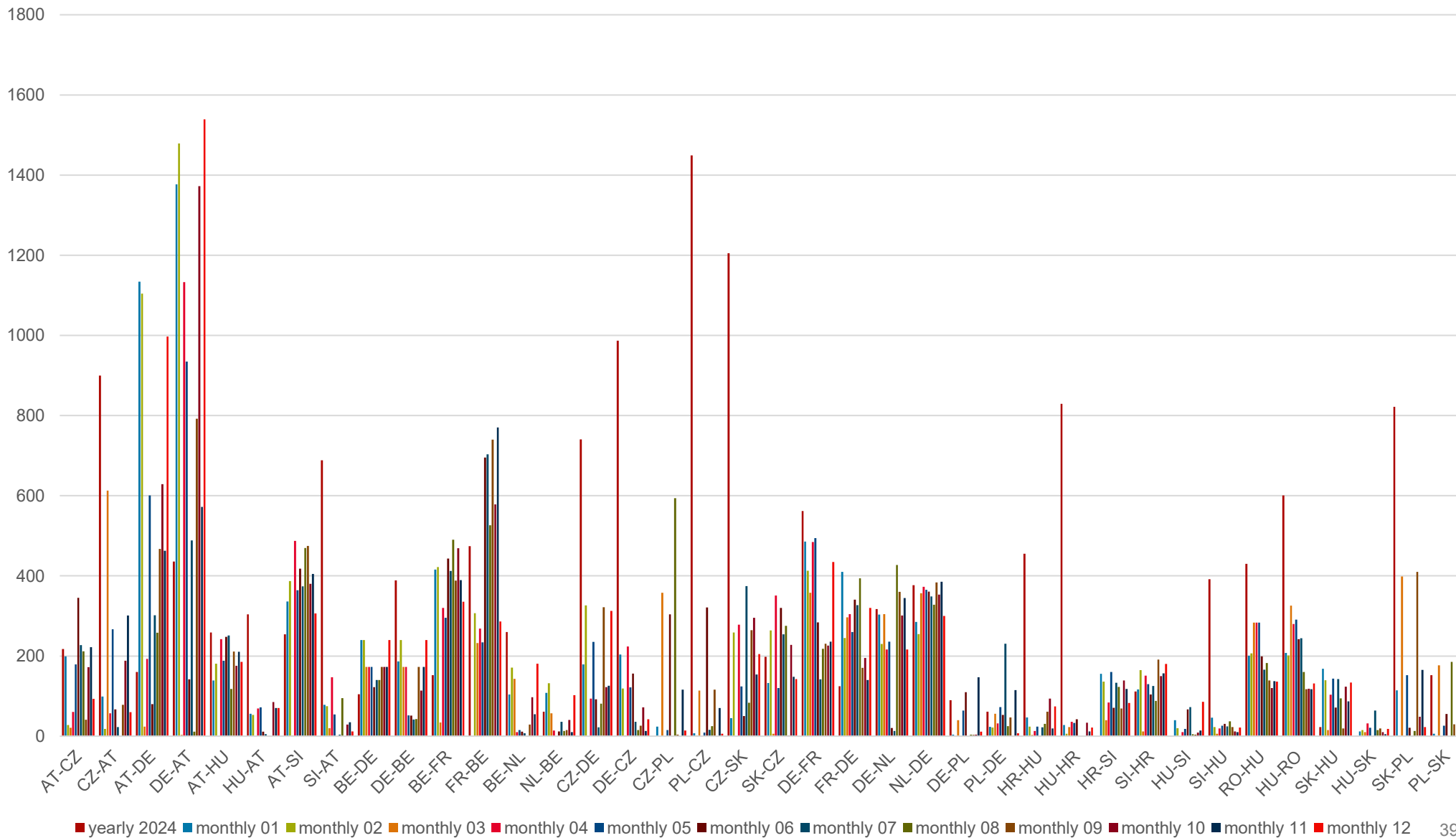
KPI2 – MaxBex, comparison without benchmark vs. MinMaxATC





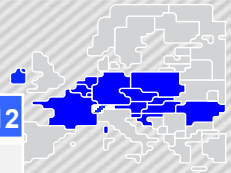
2024 FBA Simulation results – MinMaxATC – Volumes

FBA Simulation results 2024 – MinMaxATC adjusted – Volumes [MW]



# ANNEX: 2024 FBA Simulation results – MinMaxATC – Volumes

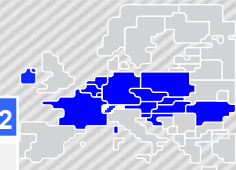
P. BRHLIKOVA



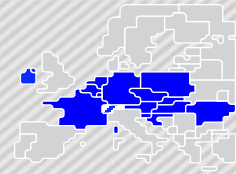
Border	yearly 2024	monthly 01	monthly 02	monthly 03	monthly 04	monthly 05	monthly 06	monthly 07	monthly 08	monthly 09	monthly 10	monthly 11	monthly 12
AT to CZ	218	199	28	21	60	179	345	227	212	41	172	222	93
AT to DE	900	1134	1104	24	193	601	80	302	258	467	629	462	997
AT to HU	160	139	181	1	242	188	248	251	118	211	176	211	185
AT to SI	436	336	387	2	487	364	418	374	470	475	380	405	306
BE to DE	259	240	240	173	173	173	123	140	140	173	173	173	240
BE to FR	304	416	422	34	320	295	443	412	490	388	469	389	336
BE to NL	254	104	171	143	10	15	11	7	1	29	97	55	181
CZ to AT	689	99	18	613	57	267	67	23	0	78	188	301	60
CZ to DE	105	179	326	0	94	235	92	22	81	322	122	126	313
CZ to PL	389	24	0	358	0	15	304	0	594	4	0	116	14
CZ to SK	152	45	259	0	278	124	50	374	84	265	295	154	205
DE to AT	474	1377	1479	3	1133	934	142	489	11	792	1372	572	1539
DE to BE	260	186	240	173	173	52	52	41	43	173	114	173	240
DE to CZ	61	204	119	2	224	122	156	36	15	26	72	13	42
DE to FR	740	486	413	358	484	494	284	142	218	230	226	236	435
DE to NL	987	303	230	305	217	236	20	13	427	360	301	345	216
DE to PL	0	4	0	40	0	64	110	0	4	3	4	147	11
FR to BE	1449	0	307	232	269	234	695	703	526	740	578	770	286
FR to DE	1205	410	245	296	305	260	341	327	394	171	195	140	320
HR to HU	198	47	24	3	13	24	1	22	31	61	94	19	74
HR to SI	562	156	136	40	84	160	71	133	123	69	139	118	83
HU to AT	125	56	53	0	69	72	11	5	0	0	85	70	70
HU to HR	317	28	6	23	36	33	42	0	0	0	34	12	22
HU to RO	377	208	202	326	280	291	242	244	160	117	118	117	132
HU to SI	90	40	20	0	10	18	67	72	5	4	9	14	86
HU to SK	61	12	15	10	32	21	0	64	15	19	10	5	18
NL to BE	455	108	132	57	14	0	12	36	13	15	40	10	102
NL to DE	829	285	255	357	373	365	361	349	328	384	353	385	300
PL to CZ	0	7	2	114	1	9	321	16	25	116	0	70	6
PL to DE	111	23	22	56	32	73	53	230	25	47	0	115	7
PL to SK	0	6	1	177	0	26	56	0	185	29	0	61	29
RO to HU	392	201	206	283	283	283	199	166	183	139	120	137	136
SI to AT	430	78	75	20	147	54	0	4	95	0	29	35	12
SI to HR	601	117	165	12	151	130	104	125	88	191	150	157	180
SI to HU	23	46	23	6	19	26	31	24	37	23	12	10	21
SK to CZ	1	133	264	6	351	120	320	254	275	2	228	148	142
SK to HU	822	168	140	15	104	144	71	143	94	19	124	87	134
SK to PL	152	114	1	398	1	152	21	1	13	410	49	166	22

# ANNEX: 2024 FBA Simulation results – MinMaxATC – Prices [€/MWh]

P. BRHLIKOVA



Border	yearly 2024	monthly 01	monthly 02	monthly 03	monthly 04	monthly 05	monthly 06	monthly 07	monthly 08	monthly 09	monthly 10	monthly 11	monthly 12
AT to CZ	2,00	1,18	1,41	3,29	3,17	4,78	4,75	6,26	7,64	6,56	3,02	3,81	3,08
AT to DE	1,78	1,13	0,75	3,51	2,45	5,49	5,98	6,50	7,41	6,43	3,33	4,37	3,02
AT to HU	7,30	5,73	4,94	12,44	3,69	4,47	7,61	13,38	37,33	12,61	12,11	10,75	19,01
AT to SI	4,69	2,88	3,10	5,40	2,32	2,26	5,56	14,92	22,08	10,25	8,50	6,67	8,46
BE to DE	5,60	2,97	2,04	2,30	6,82	20,74	15,55	14,50	13,27	11,70	10,00	6,80	5,76
BE to FR	4,46	1,77	0,90	1,46	1,05	0,99	1,50	1,31	1,64	1,38	1,50	1,40	1,26
BE to NL	4,76	5,00	2,56	2,78	8,25	16,74	16,36	12,95	15,37	13,02	11,55	9,57	6,07
CZ to AT	2,53	2,36	1,98	0,25	0,83	0,28	0,86	1,44	4,04	1,35	3,99	1,12	7,35
CZ to DE	1,99	1,33	0,59	2,21	0,99	1,73	2,00	2,69	4,88	1,89	2,34	2,07	2,69
CZ to PL	18,69	11,18	0,97	44,42	0,76	6,26	10,53	4,18	31,61	14,54	16,84	19,50	17,19
CZ to SK	6,85	5,59	3,53	13,30	1,83	1,78	5,47	5,37	22,11	7,44	8,22	7,15	13,97
DE to AT	8,21	7,03	4,81	13,71	3,03	2,81	3,06	3,31	7,14	5,85	9,32	7,79	13,51
DE to BE	5,10	3,79	3,16	5,09	2,72	2,31	3,05	3,01	2,84	3,03	3,81	3,51	4,25
DE to CZ	7,89	6,05	4,08	15,44	3,92	3,55	2,96	4,32	8,20	6,52	7,36	8,18	8,92
DE to FR	6,22	3,58	2,86	3,67	1,83	2,11	3,11	2,59	2,12	3,01	3,55	3,92	4,37
DE to NL	4,09	5,66	3,44	3,51	1,97	2,50	6,16	4,34	2,13	2,61	4,44	5,00	6,75
DE to PL	25,97	15,06	1,60	59,22	0,30	7,80	12,01	2,49	33,42	17,07	22,60	25,84	21,96
FR to BE	3,18	2,16	3,38	4,50	8,63	15,35	16,41	12,08	10,53	11,41	9,50	7,98	8,40
FR to DE	6,23	4,25	3,88	4,69	16,28	32,01	28,75	24,87	25,05	22,15	19,06	14,05	10,63
HR to HU	3,56	4,67	2,78	3,75	2,20	2,88	4,77	4,01	13,92	6,59	6,50	6,08	10,59
HR to SI	1,24	2,27	0,81	1,10	0,72	0,47	1,52	3,15	3,68	2,92	1,98	1,85	2,11
HU to AT	2,08	1,45	1,02	3,73	0,66	0,87	1,85	1,59	0,90	4,22	1,78	2,04	2,58
HU to HR	1,99	1,20	1,20	1,19	1,47	1,02	3,42	4,93	4,83	6,93	4,33	2,99	2,21
HU to RO	2,11	3,75	2,36	2,05	1,93	1,85	3,90	6,00	8,89	8,97	7,05	5,60	8,20
HU to SI	2,75	1,73	1,72	2,19	1,83	1,36	4,01	7,65	8,31	8,27	4,90	4,21	1,76
HU to SK	1,77	1,79	1,47	2,86	1,76	1,93	4,62	1,80	3,83	2,15	2,65	3,58	3,14
NL to BE	4,43	2,93	2,77	3,26	5,91	5,95	6,11	4,26	3,76	5,87	3,15	3,91	3,79
NL to DE	5,05	3,88	2,19	1,97	6,50	7,25	6,64	7,16	4,56	4,57	3,55	2,89	3,59
PL to CZ	4,50	8,88	10,08	11,24	14,32	6,79	3,28	17,50	6,83	8,80	0,43	3,50	10,49
PL to DE	5,88	8,05	7,22	12,81	10,94	6,51	3,80	14,17	5,32	6,69	1,17	3,74	9,03
PL to SK	4,46	9,94	12,82	8,88	15,47	6,37	5,21	17,78	8,69	10,46	2,09	3,36	17,34
RO to HU	5,13	4,49	2,87	2,92	2,94	3,11	2,88	2,76	5,05	3,82	3,58	4,71	7,10
SI to AT	1,05	1,33	1,01	1,77	0,34	1,02	1,69	1,63	0,67	2,22	1,57	1,41	2,62
SI to HR	1,25	1,53	1,06	3,62	1,05	0,96	2,07	2,57	9,61	3,61	3,20	2,22	4,31
SI to HU	4,33	4,46	3,56	7,27	2,89	3,71	5,91	6,15	23,33	8,63	8,30	7,66	12,34
SK to CZ	1,91	0,83	0,56	8,70	0,96	2,12	1,33	1,96	1,55	13,72	1,35	2,44	2,08
SK to HU	2,58	2,50	2,99	3,93	1,58	1,37	2,36	5,36	16,10	11,61	7,08	4,90	11,93
SK to PL	13,71	7,47	0,74	37,46	1,03	6,19	8,31	1,06	12,90	22,48	11,63	14,64	12,15



ATC benchmark values from Annex 1 of the LTCCM 1<sup>st</sup> amendment

Border	2025 ATC benchmark: Yearly CC	2025 ATC benchmark: Monthly CC, Winter 1	2025 ATC benchmark: Monthly CC, Spring	2025 ATC benchmark: Monthly CC, Summer	2025 ATC benchmark: Monthly CC, Autumn	2025 ATC benchmark: Monthly CC, Winter 2
ATtoCZ	250	150	150	150	150	150
ATtoDE	1225	1030	897	897	997	1030
ATtoHU	313	152	152	152	152	152
ATtoSI	375	300	217	300	300	300
BEtoDE	325	240	173	140	173	240
BEtoFR	313	438	275	425	275	325
BEtoNL	591	146	146	146	146	146
CZtoAT	250	60	40	17	30	40
CZtoDE	750	301	301	301	301	301
CZtoPL	0	0	0	0	0	0
CZtoSK	625	300	300	300	300	300
DEtoAT	1225	1430	1430	1430	1430	1430
DEtoBE	325	240	173	140	173	240
DEtoCZ	375	200	187	180	180	180
DEtoFR	750	400	400	400	267	400
DEtoNL	1034	254	254	254	254	254
DEtoPL	0	0	0	0	0	0
FRtoBE	2000	275	200	200	200	250
FRtoDE	1250	260	290	170	173	350
HRtoHU	500	50	50	50	50	50
HRtoSI	625	150	150	150	150	150
HUtoAT	313	90	60	22	50	70
HUtoHR	625	50	33	50	50	50
HUtoRO	438	120	120	173	173	280
HUtoSI	188	50	50	50	50	50
HUtoSK	1000	50	50	50	50	50
NLtoBE	591	146	146	146	146	146
NLtoDE	1034	254	254	254	254	254
PLtoCZ	0	0	0	0	0	0
PLtoDE	0	0	0	0	0	0
PLtoSK	0	0	0	0	0	0
ROtoHU	438	120	120	173	173	280
SItoAT	375	130	83	23	67	100
SItoHR	625	150	150	150	150	150
SItoHU	188	50	50	50	50	50
SKtoCZ	500	300	300	300	300	300
SKtoHU	875	150	150	150	150	150
SKtoPL	0	0	0	0	0	0