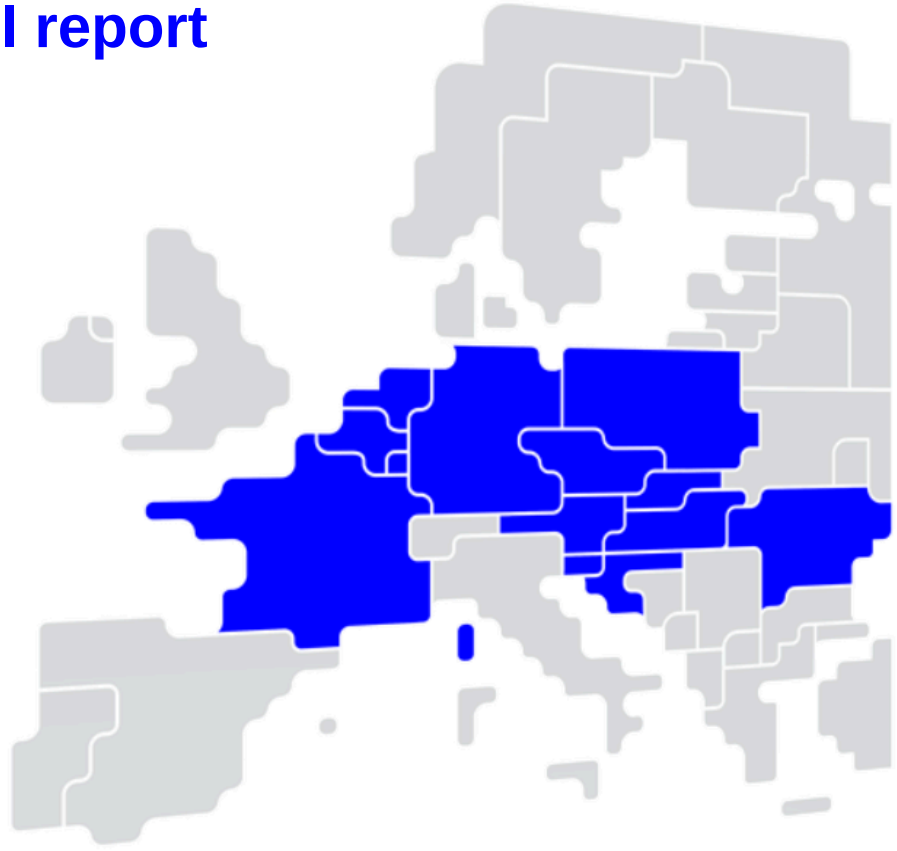
Core FB MC Operational KPI report

July 2025



Overview of Operational KPIs

Adjustment for minimum RAM Inclusion

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- KPI 2: Average maximum AMR per TSO

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- KPI 6: Virtual margins at market balance for CORE TSOs
- KPI 7: Non-Core exchanges delta flow

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- KPI 9: Most limiting CNEC per TSO (NRAO)
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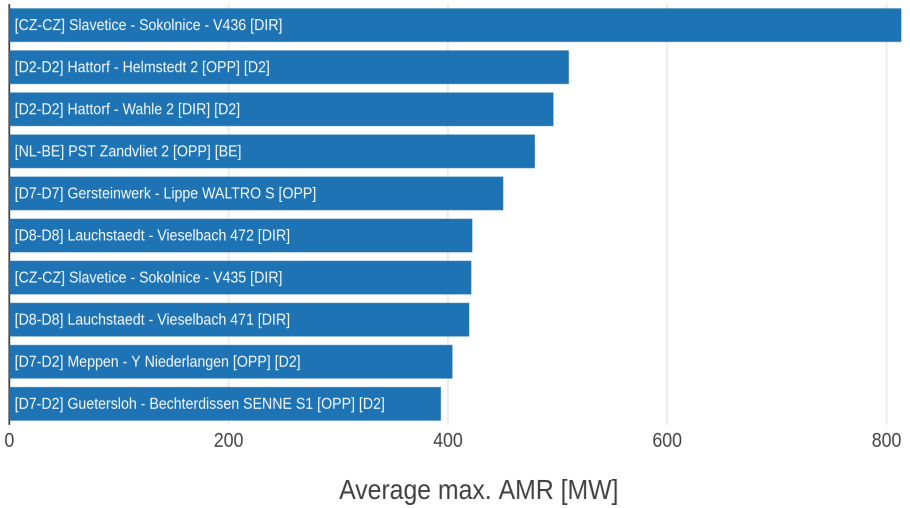
KPI 1: Average maximum AMR per CNE (Top 10)

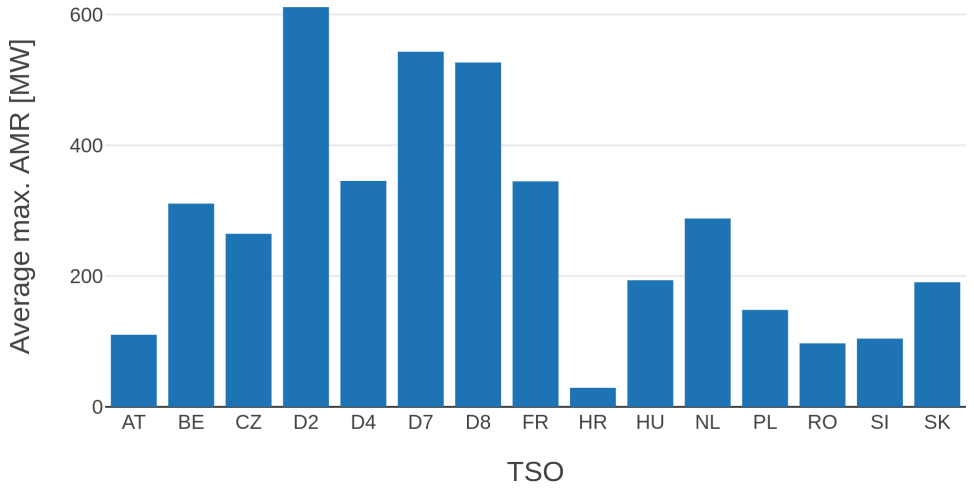
CNE	Avg. Max. AMR (MW)	AMR/Fmax% (MTUs with AMR > 0 MW)	AMR/Fmax% (all MTUs)
[CZ-CZ] Slavetice - Sokolnice - V436 [DIR]	813.50	58.69%	58.69%
[D2-D2] Hattorf - Helmstedt 2 [OPP] [D2]	510.27	28.33%	22.93%
[D2-D2] Hattorf - Wahle 2 [DIR] [D2]	496.23	27.55%	21.48%
[NL-BE] PST Zandvliet 2 [OPP] [BE]	479.27	32.88%	3.27%
[D7-D7] Gersteinwerk - Lippe WALTRO S [OPP]	450.46	23.91%	12.08%
[D8-D8] Lauchstaedt - Vieselbach 472 [DIR]	422.24	16.93%	10.10%
[CZ-CZ] Slavetice - Sokolnice - V435 [DIR]	421.33	30.40%	30.40%
[D8-D8] Lauchstaedt - Vieselbach 471 [DIR]	419.41	16.82%	9.79%
[D7-D2] Meppen - Y Niederlangen [OPP] [D2]	404.12	21.85%	13.77%
[D7-D2] Guetersloh - Bechterdissen SENNE S1 [OPP] [D2]	393.59	20.89%	6.07%



KPI 2: Average maximum AMR per TSO

TSO	Average maximum AMR per TSO
AT	110.22
BE	310.75
CZ	264.58
D2	611.14
D4	345.48
D7	542.91
D8	526.44
FR	344.78
HR	29.00
HU	193.53

TSO	Average maximum AMR per TSO
NL	287.87
PL	148.16
RO	97.09
SI	104.33
SK	190.44

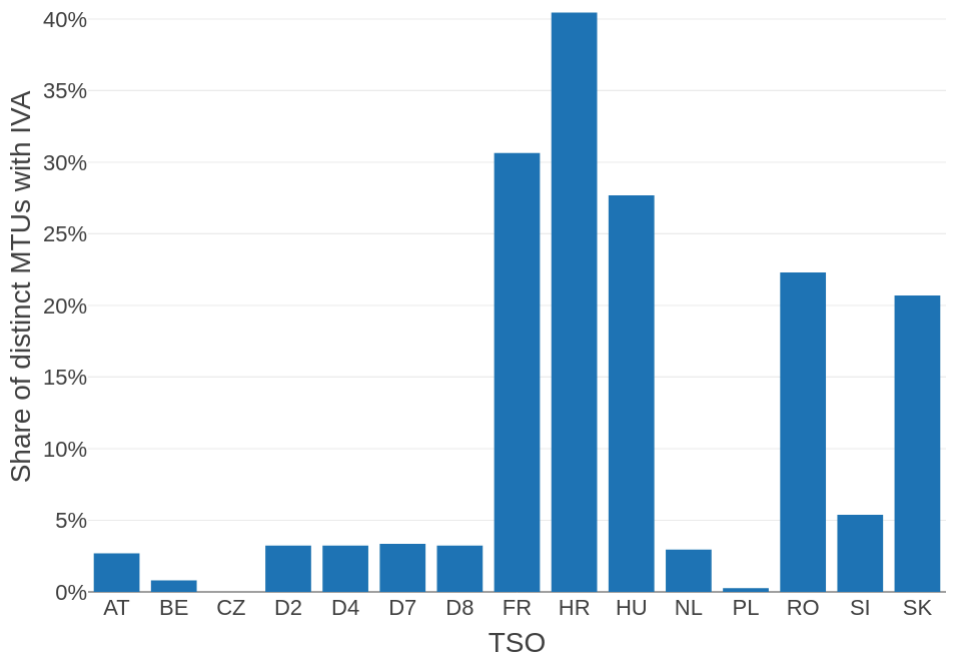


KPI 3: Share of MTUs with intervention per TSO

Total BDs	Total MTUs	MTUs without IVA	Share of distinct MTUs without IVA	MTUs with IVA	Share of distinct MTUs with IVA
31	744	142	19.09%	602	80.9%

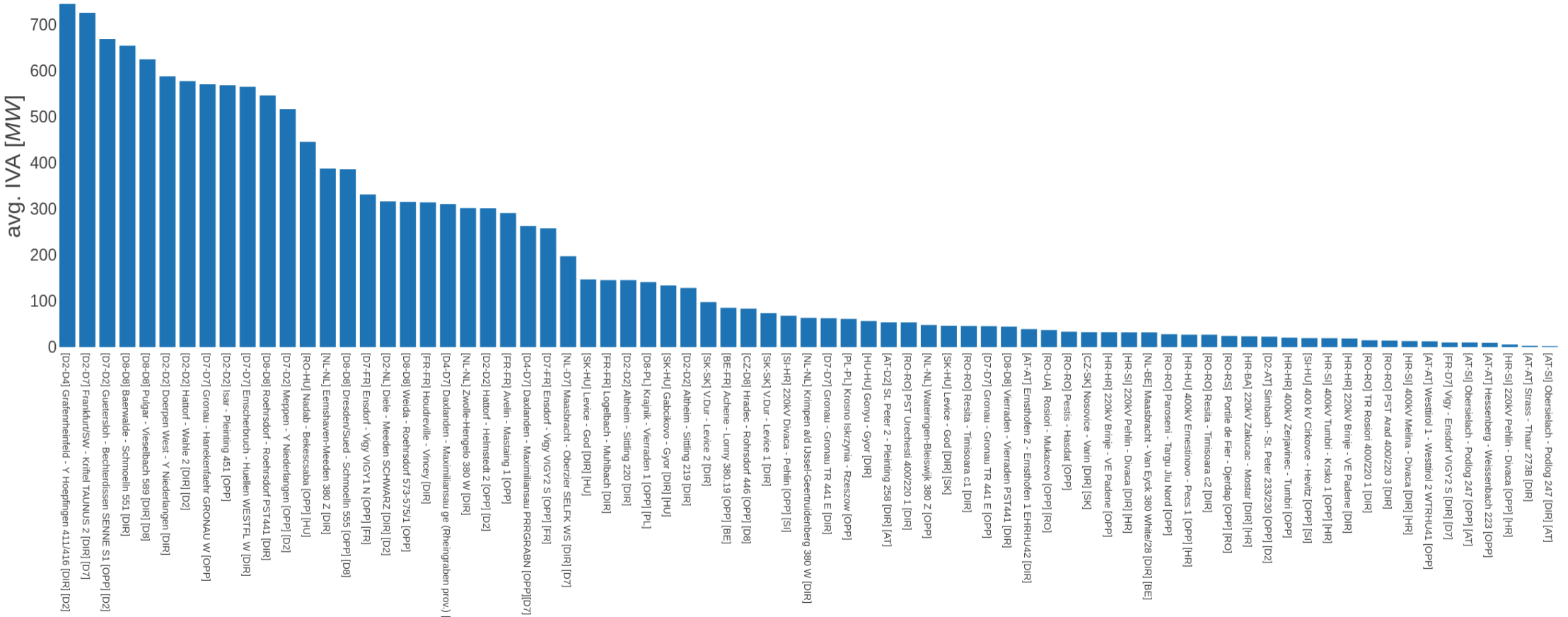
TSO	Share of distinct MTUs with IVA	Distinct MTUs with IVA
AT	2.69%	20
BE	0.81%	6
CZ	0.00%	0
D2	3.23%	24
D4	3.23%	24
D7	3.36%	25
D8	3.23%	24
FR	30.65%	228
HR	40.46%	301
HU	27.69%	206

TSO	Share of distinct MTUs with IVA	Distinct MTUs with IVA
NL	2.96%	22
PL	0.27%	2
RO	22.31%	166
SI	5.38%	40
SK	20.70%	154



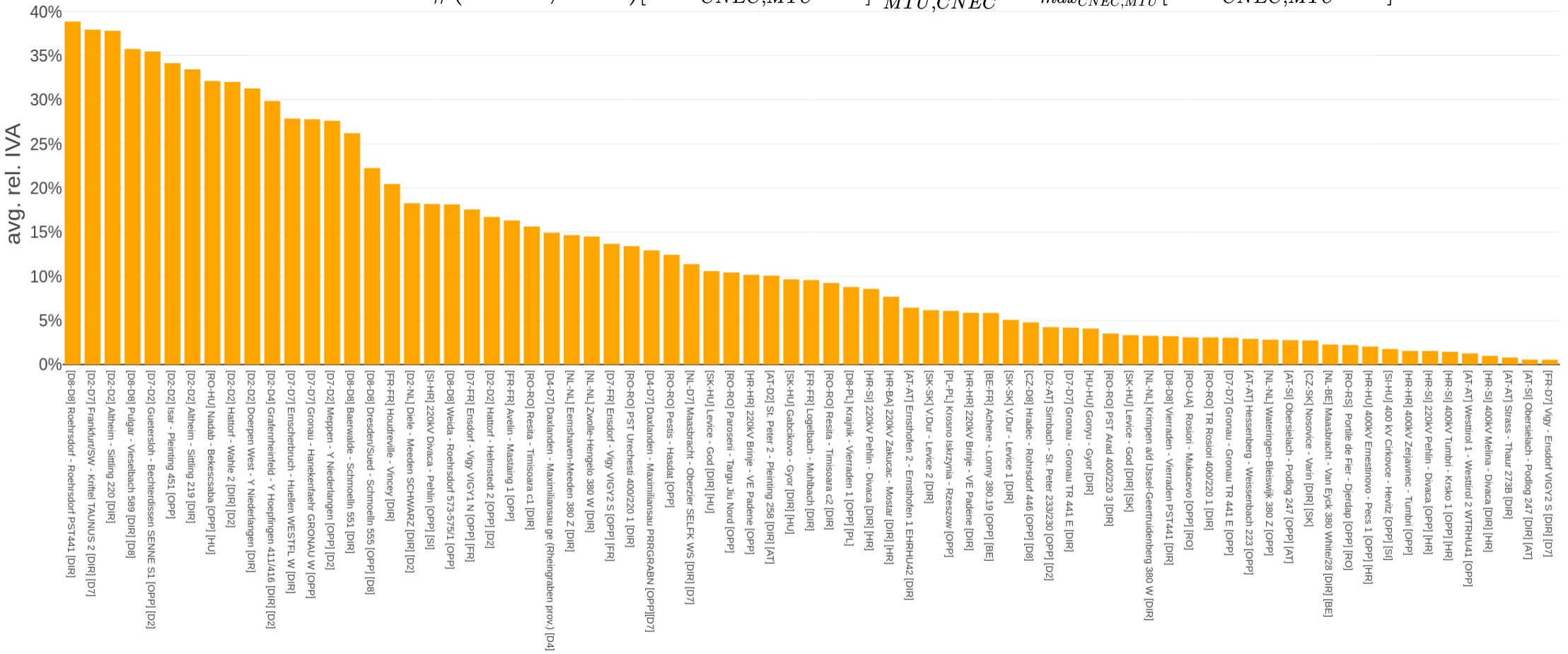
KPI 4a: Average IVA applied for each CNE affected by TSO intervention

$$\text{avg. IVA}_{CNE} = \frac{1}{\#(CNEC, MTU)[IVA_{CNEC,MTU} > 0]} \sum_{MTU,CNEC} IVA_{CNEC,MTU}[IVA_{CNEC,MTU} > 0]$$

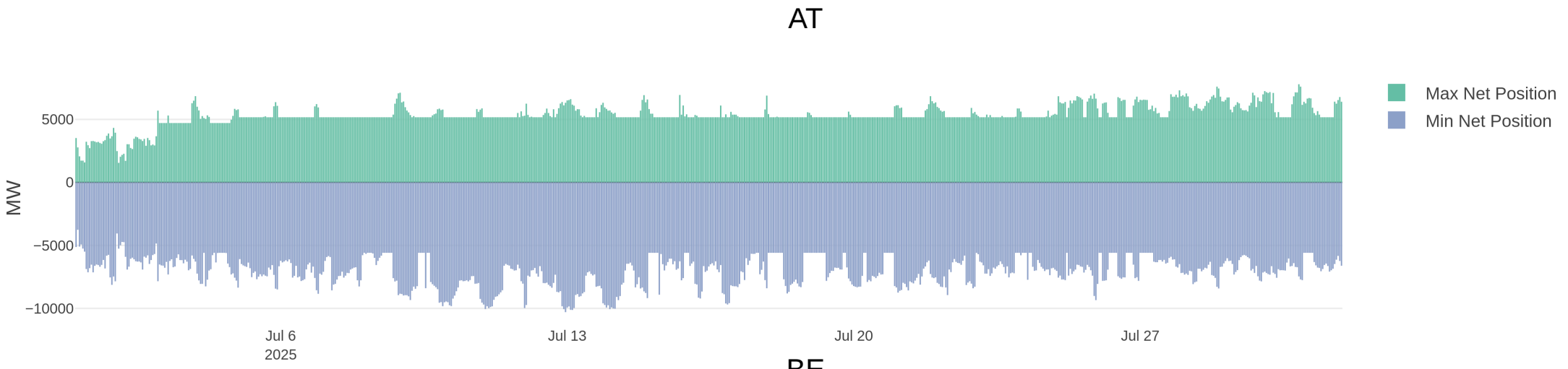


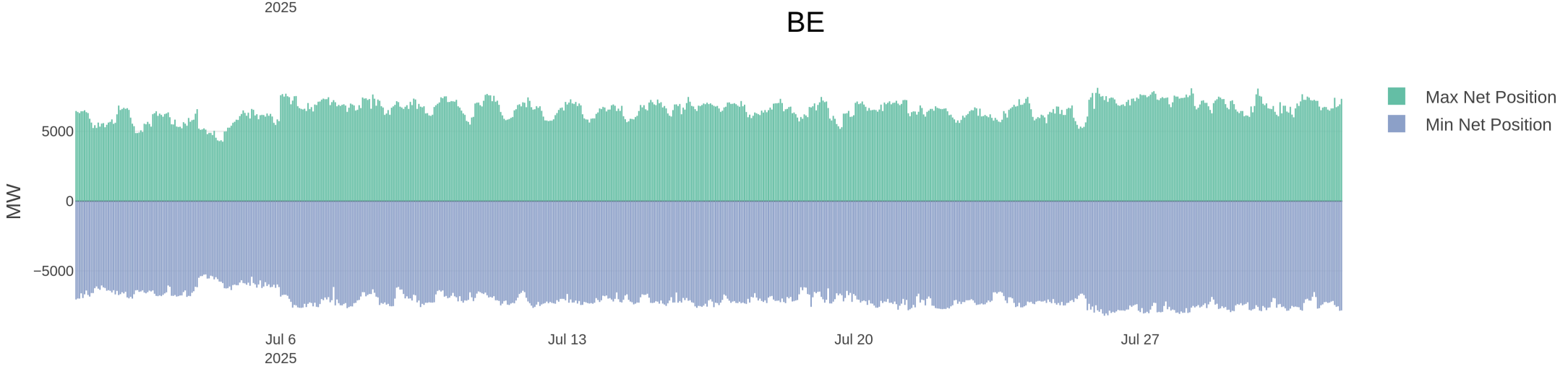
KPI 4b: Average relative IVA applied for each CNE affected by TSO intervention

$$\text{avg. rel. IVA}_{CNE} = \frac{1}{\#(CNEC, MTU)[IVA_{CNEC,MTU} > 0]} \sum_{MTU,CNEC} \frac{IVA_{CNEC,MTU}[IVA_{CNEC,MTU} > 0]}{F_{max_{CNEC,MTU}}[IVA_{CNEC,MTU} > 0]}$$



KPI 5: Min & max net positions per BZ hub





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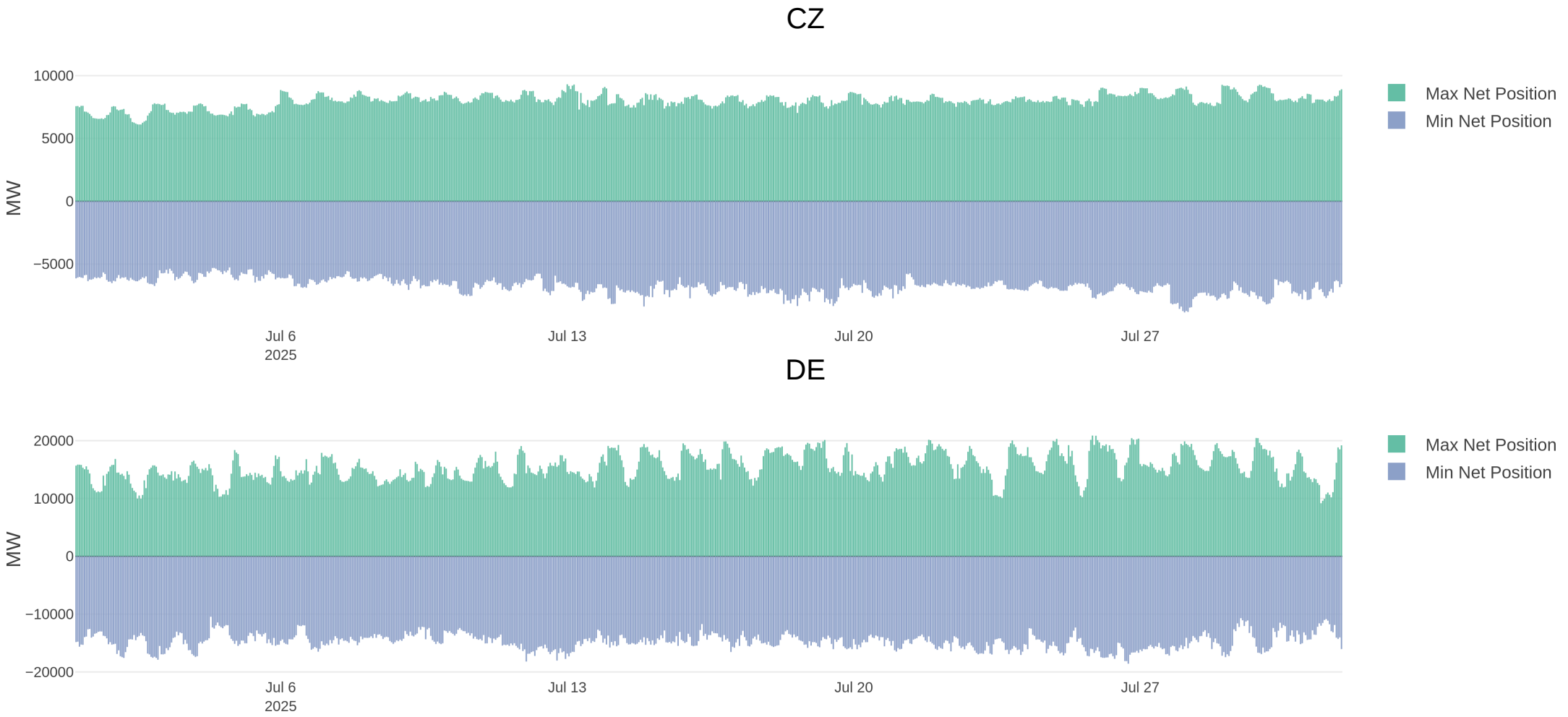

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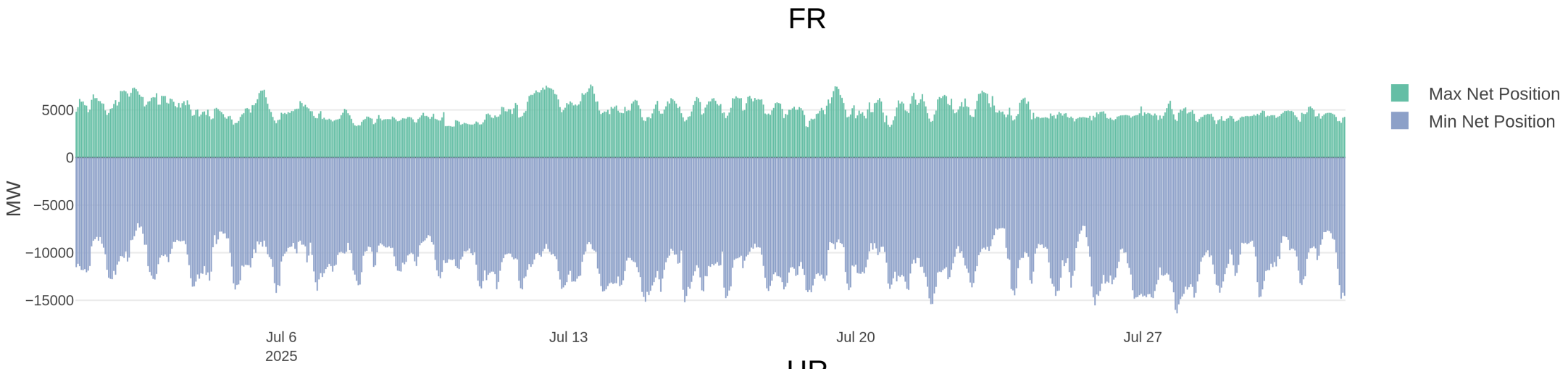

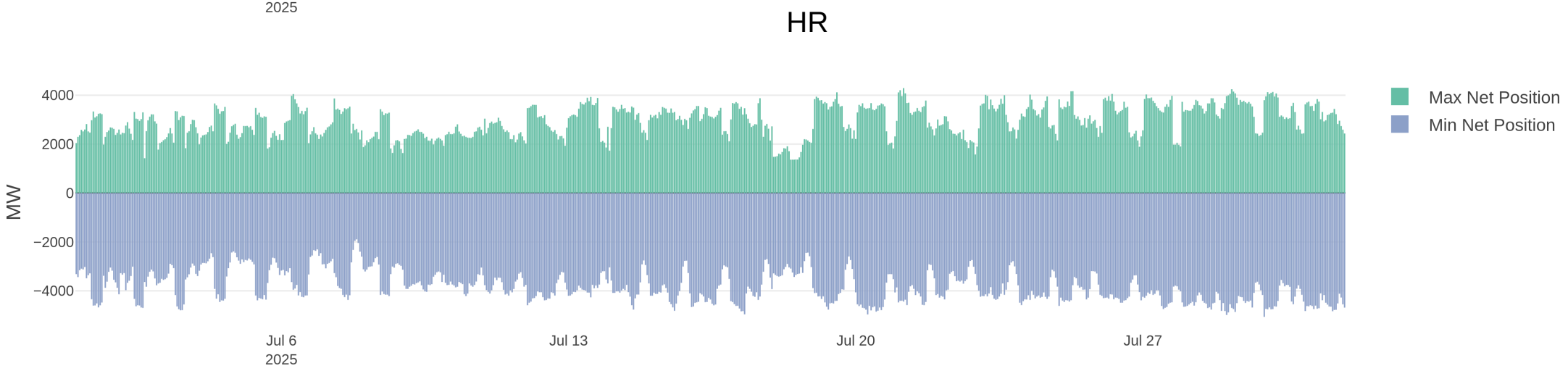

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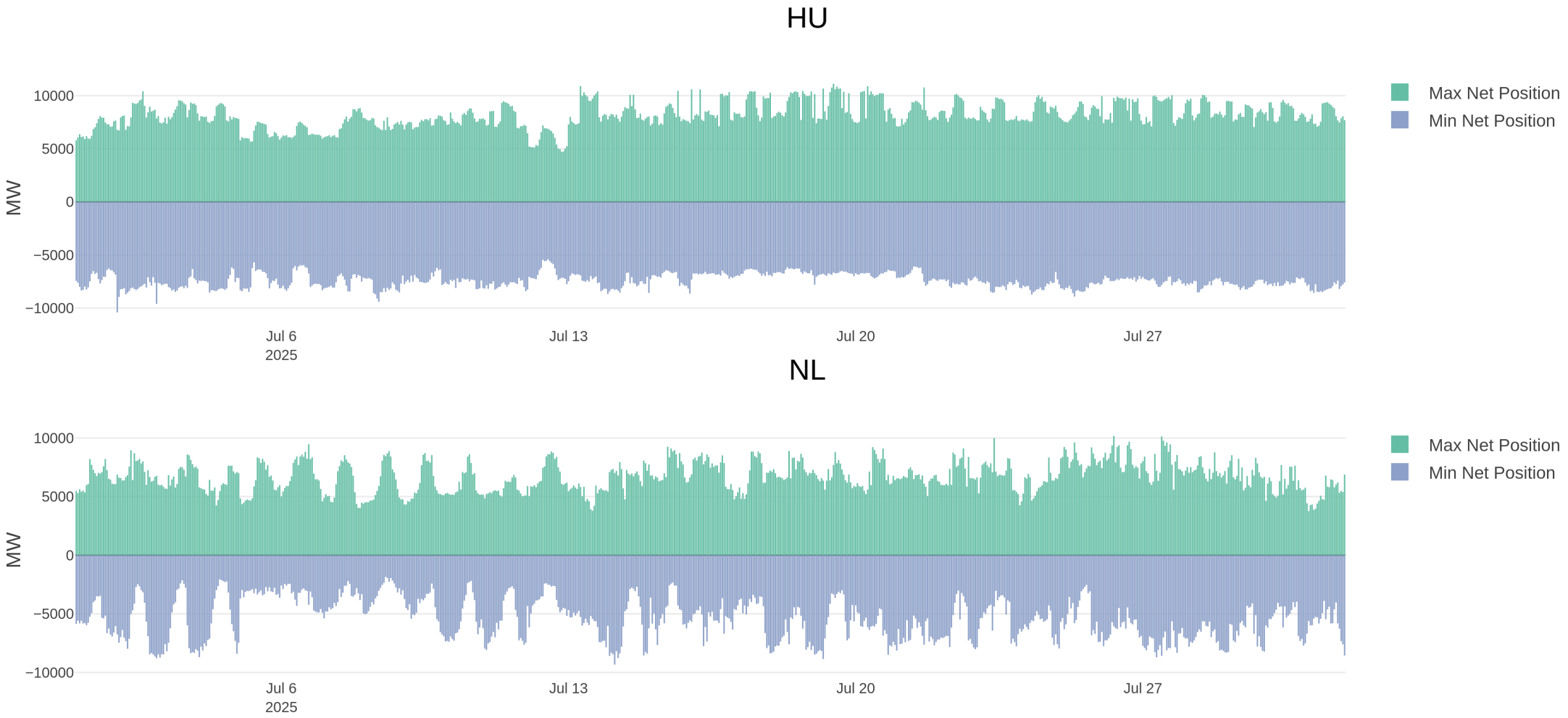

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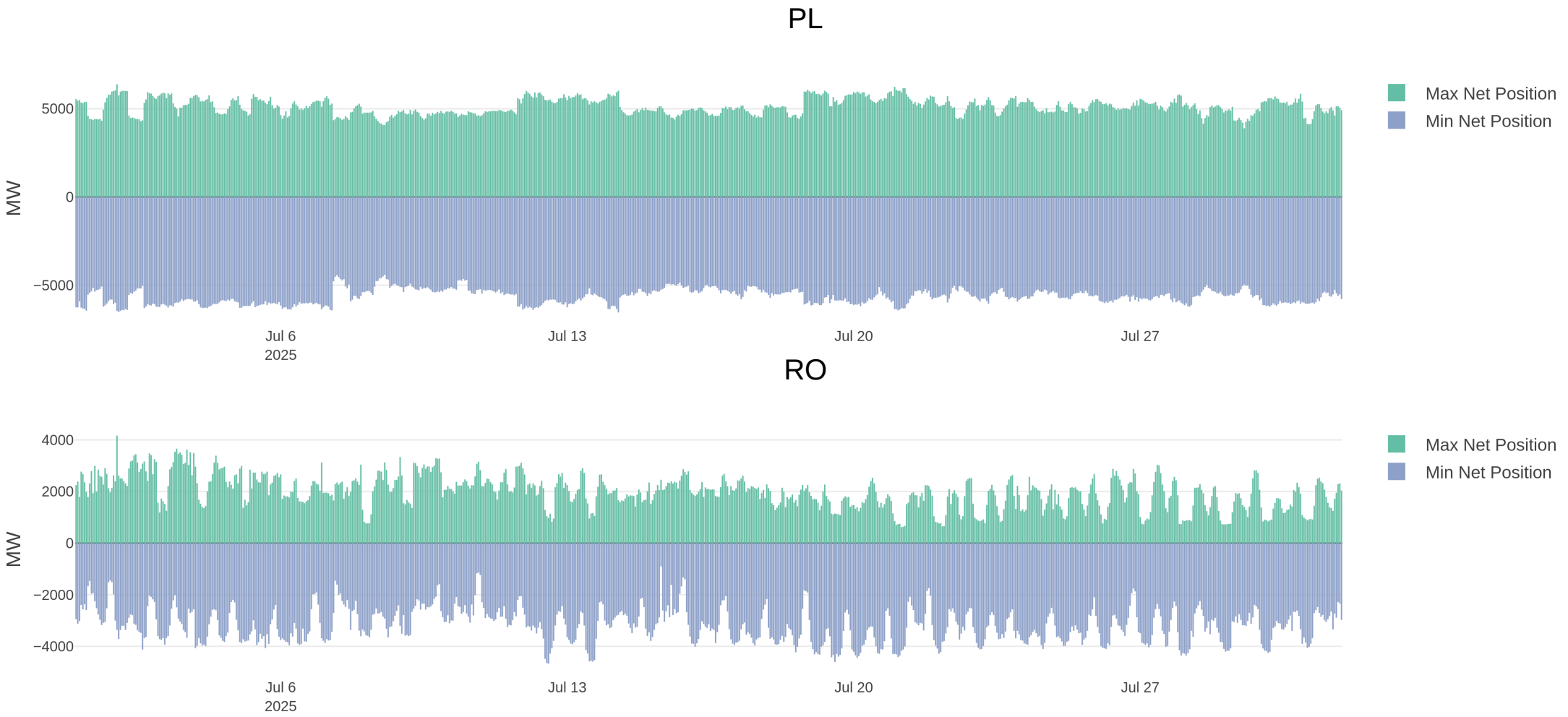
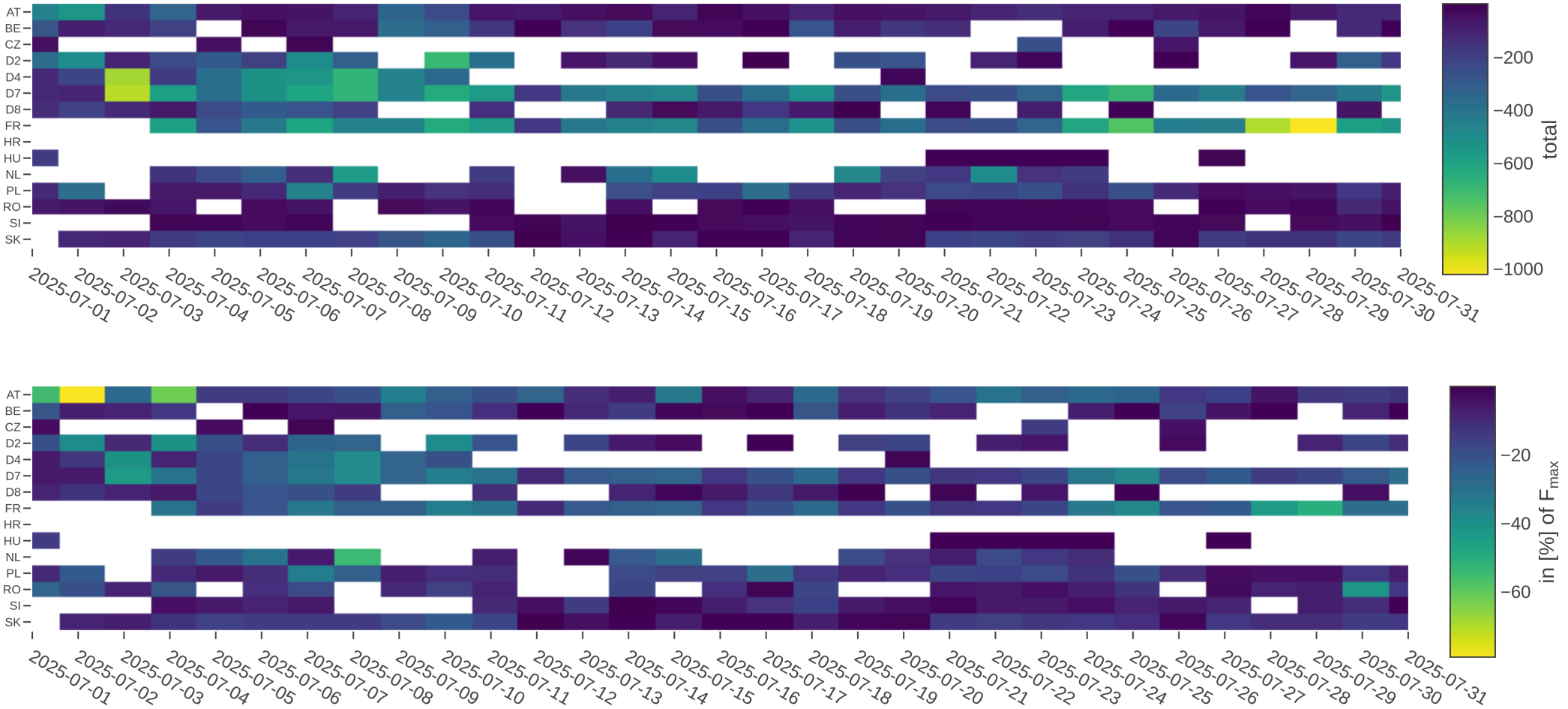
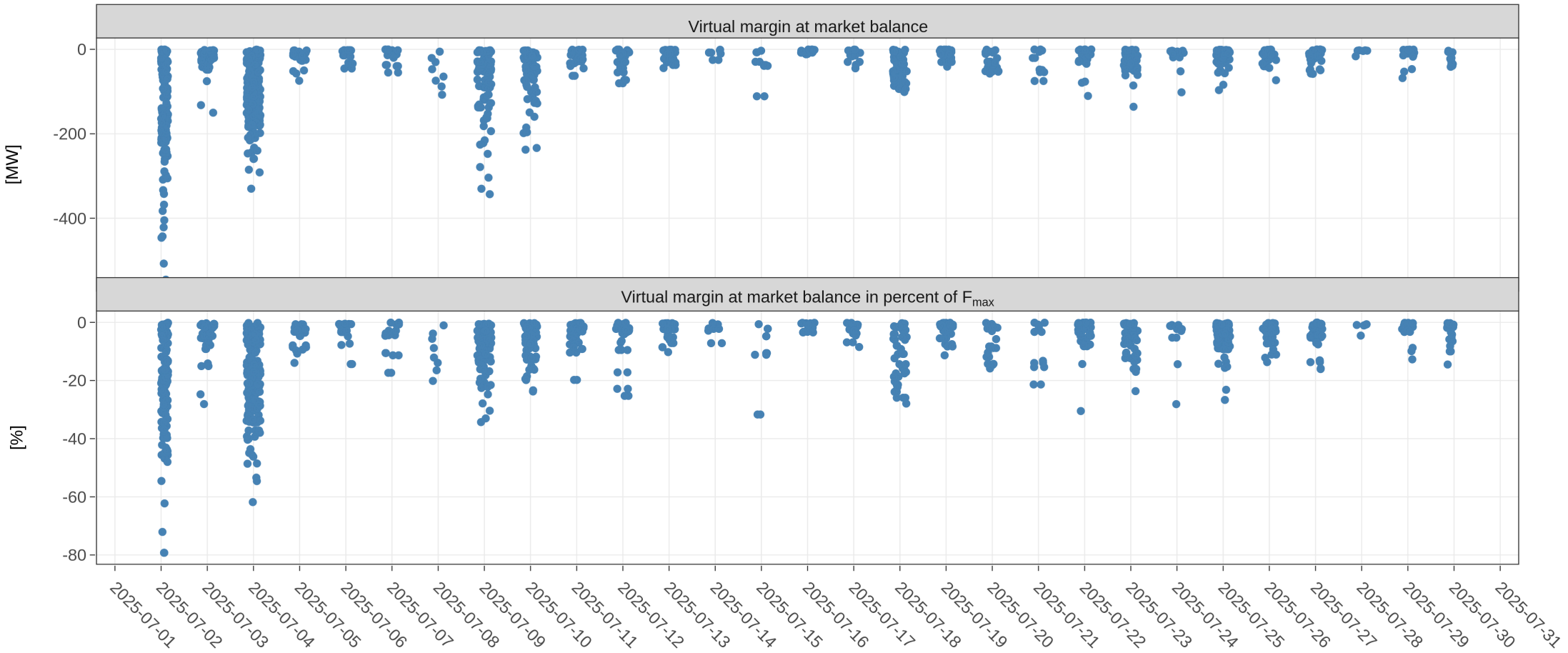


KPI 5: Min & max net positions per BZ hub

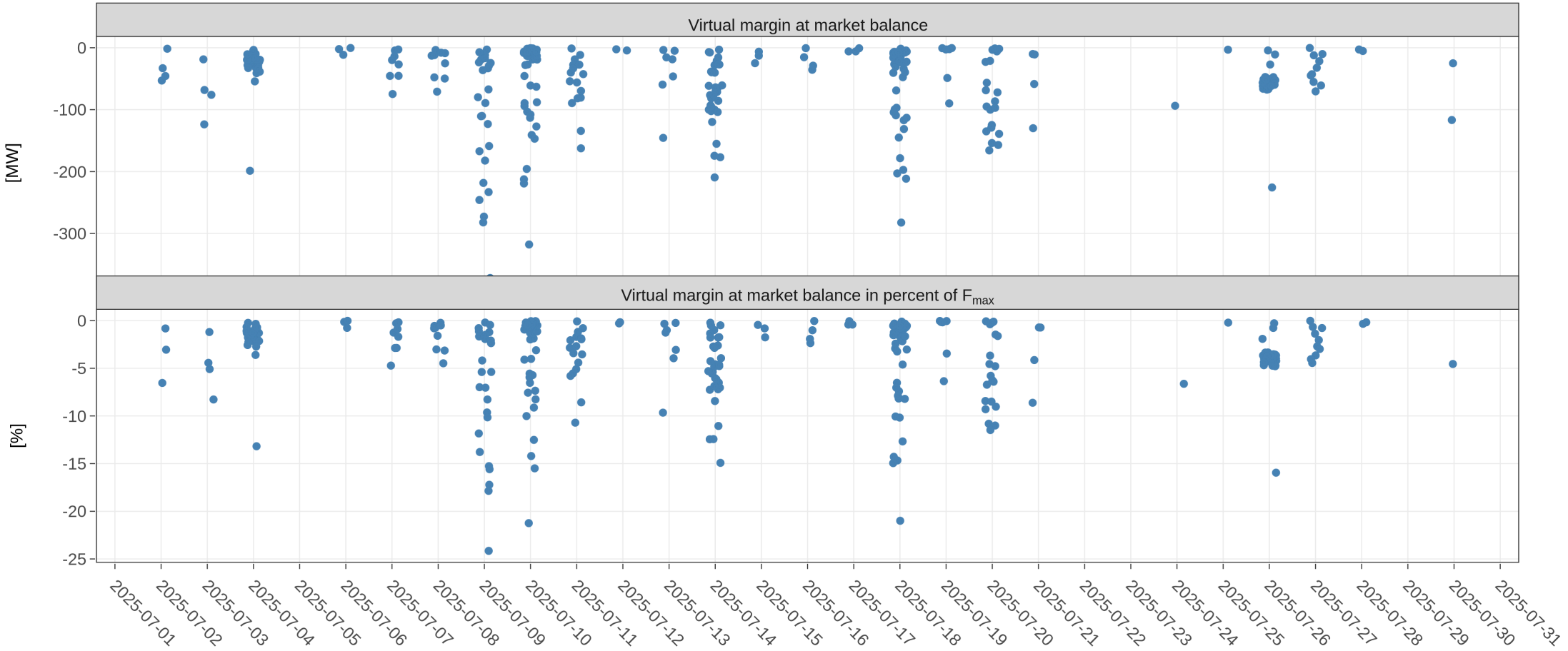
KPI 6a: Highest virtual margins at market balance for CORE TSOs



KPI 6b: Virtual margins at market balance AT

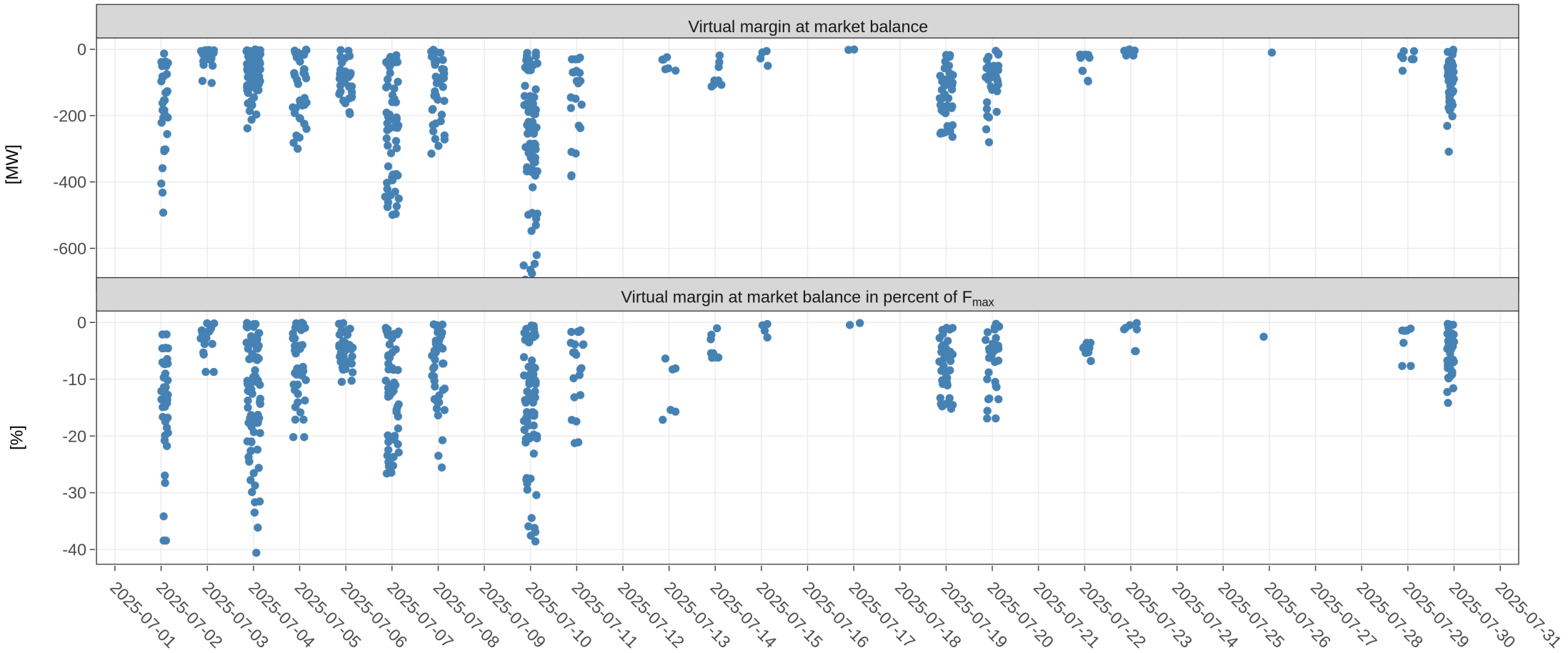


KPI 6b: Virtual margins at market balance BE

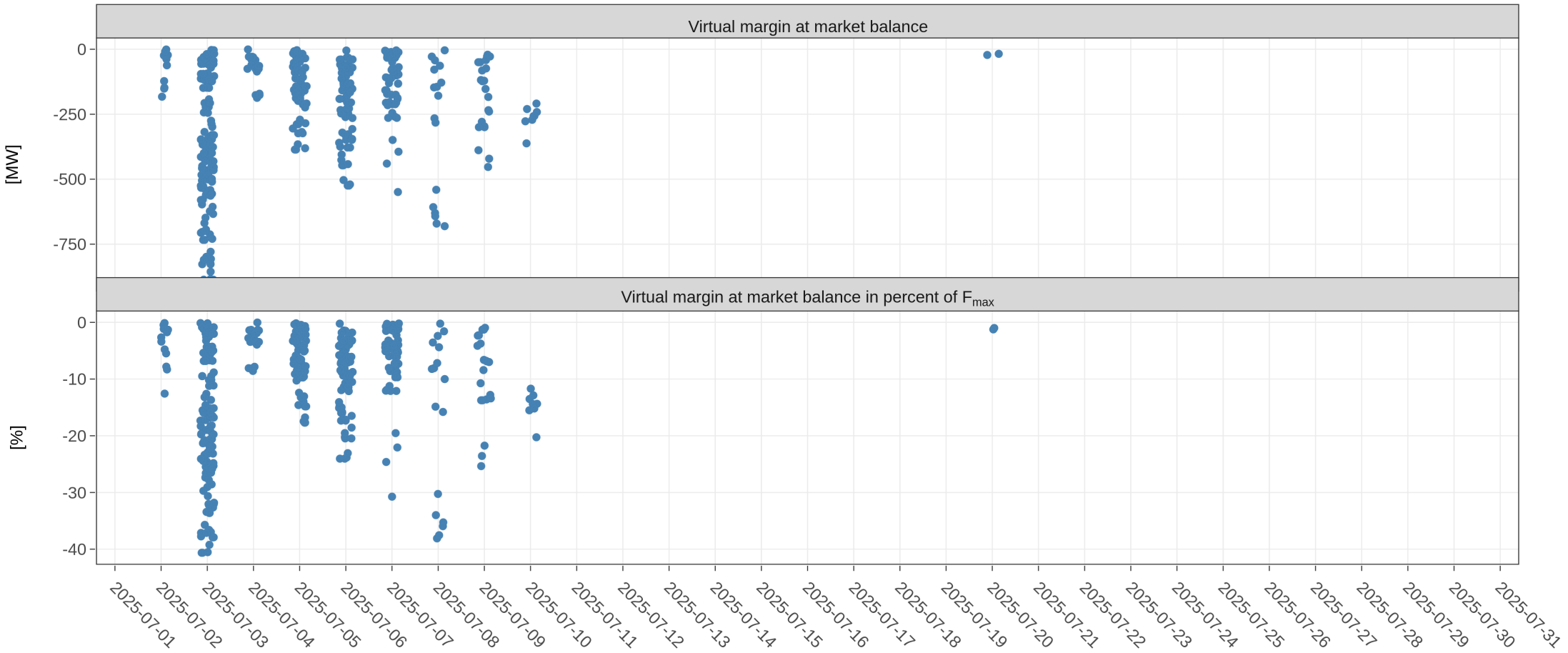


KPI 6b: Virtual margins at market balance CZ

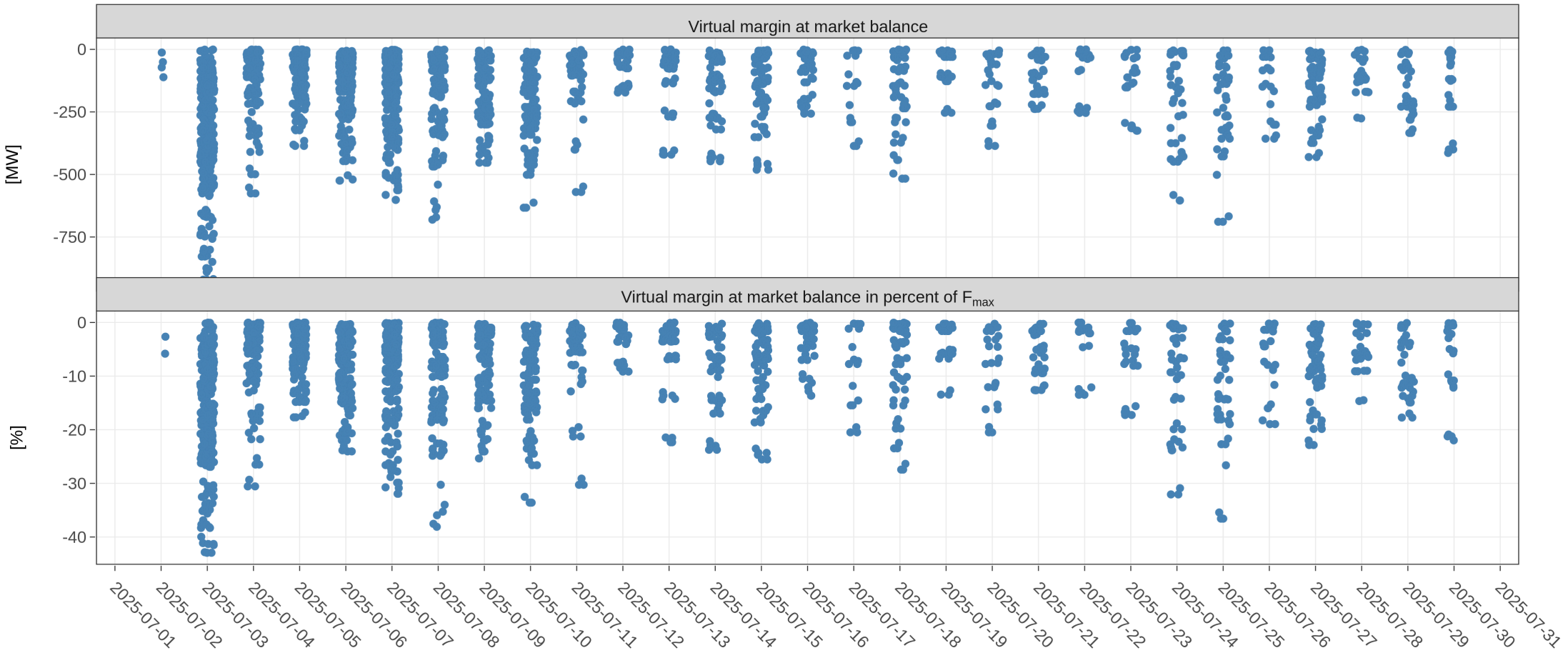
KPI 6b: Virtual margins at market balance D2



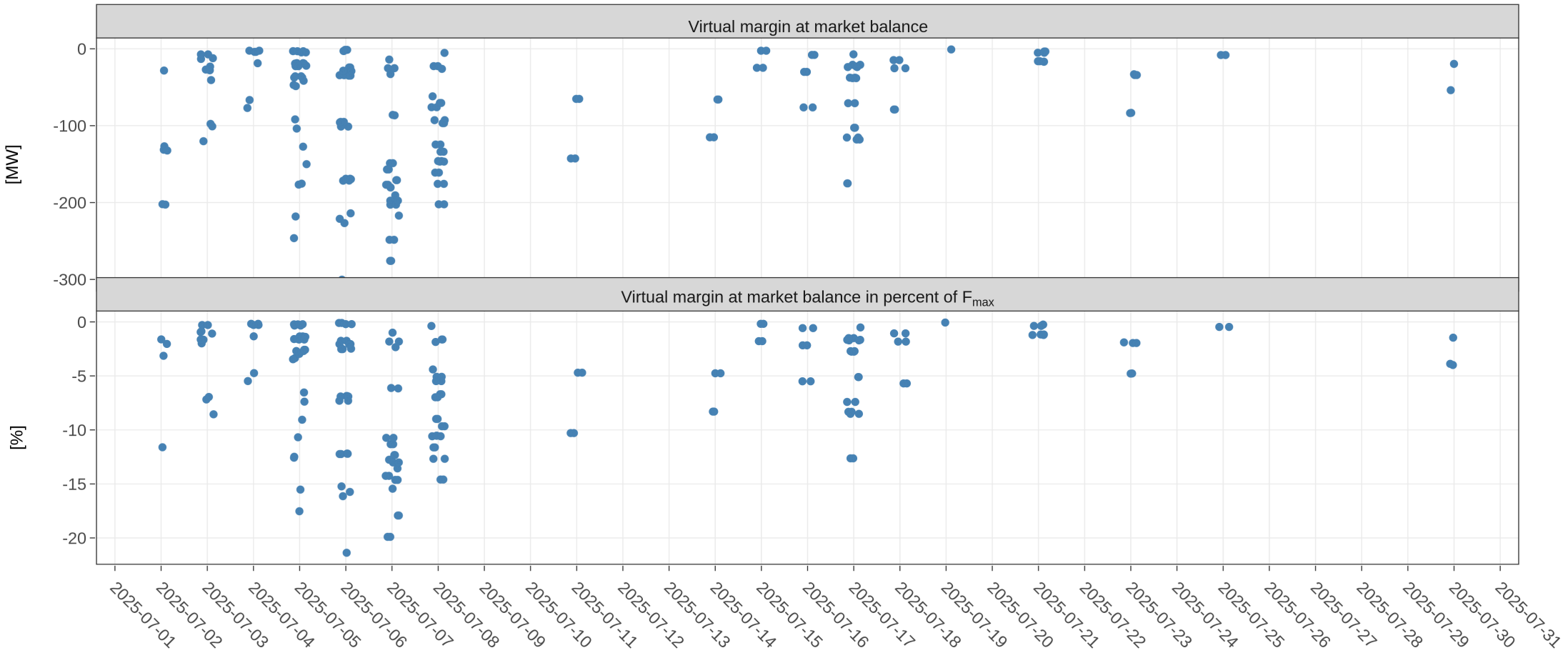
KPI 6b: Virtual margins at market balance D4



KPI 6b: Virtual margins at market balance D7

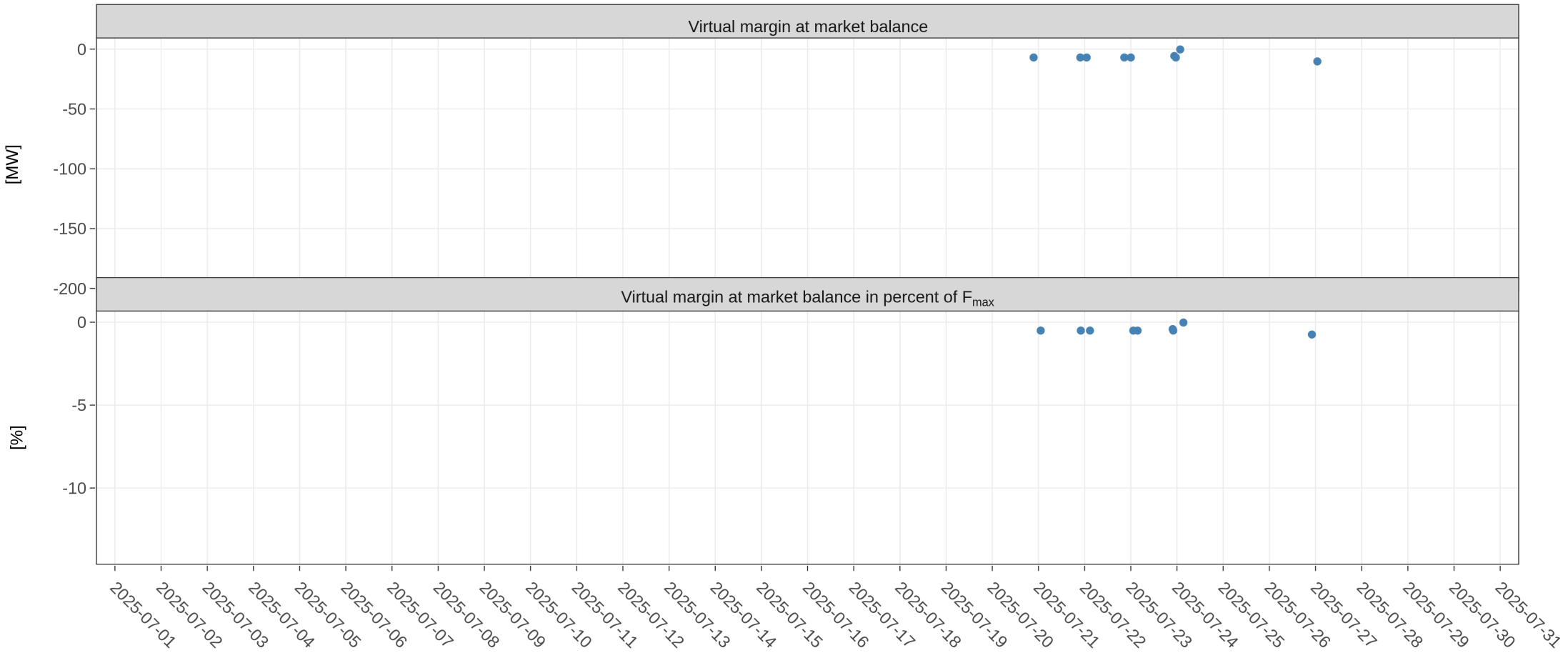


KPI 6b: Virtual margins at market balance D8

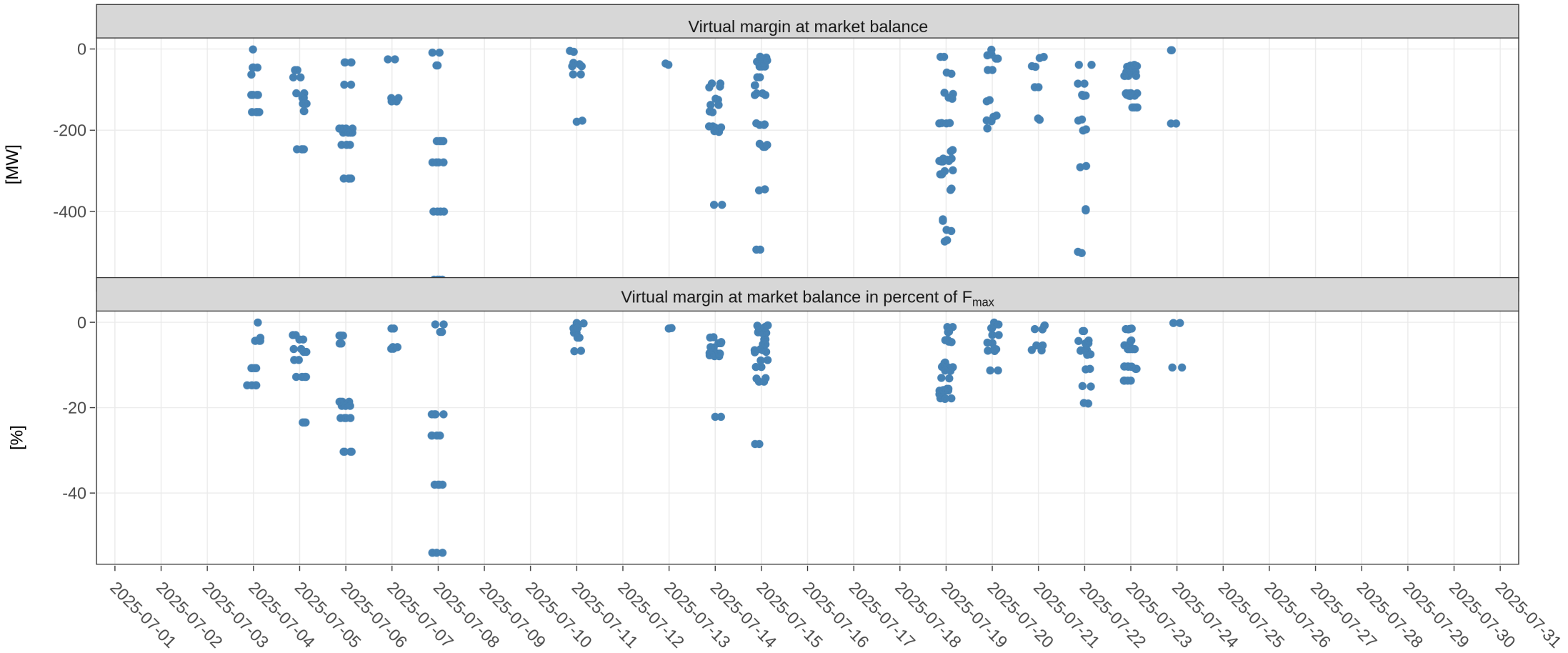


KPI 6b: Virtual margins at market balance FR

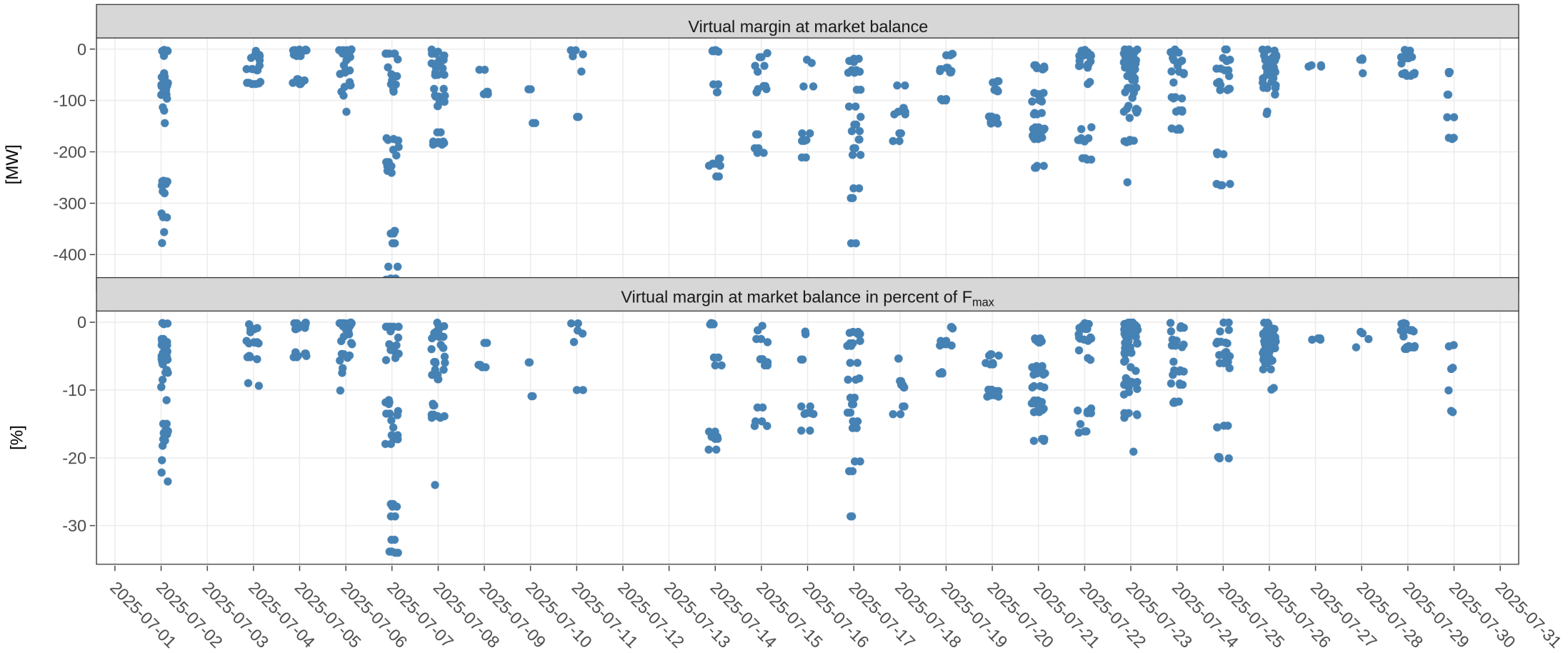
KPI 6b: Virtual margins at market balance HU



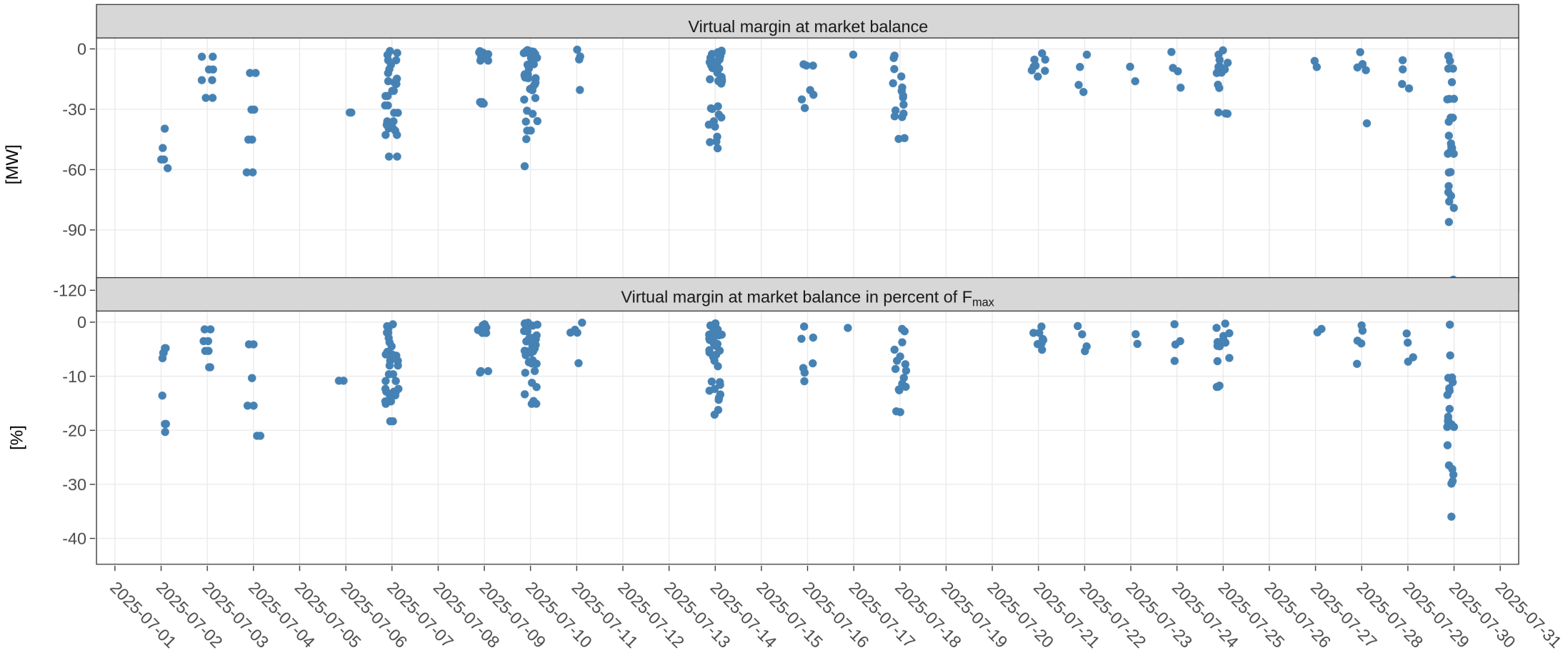
KPI 6b: Virtual margins at market balance NL



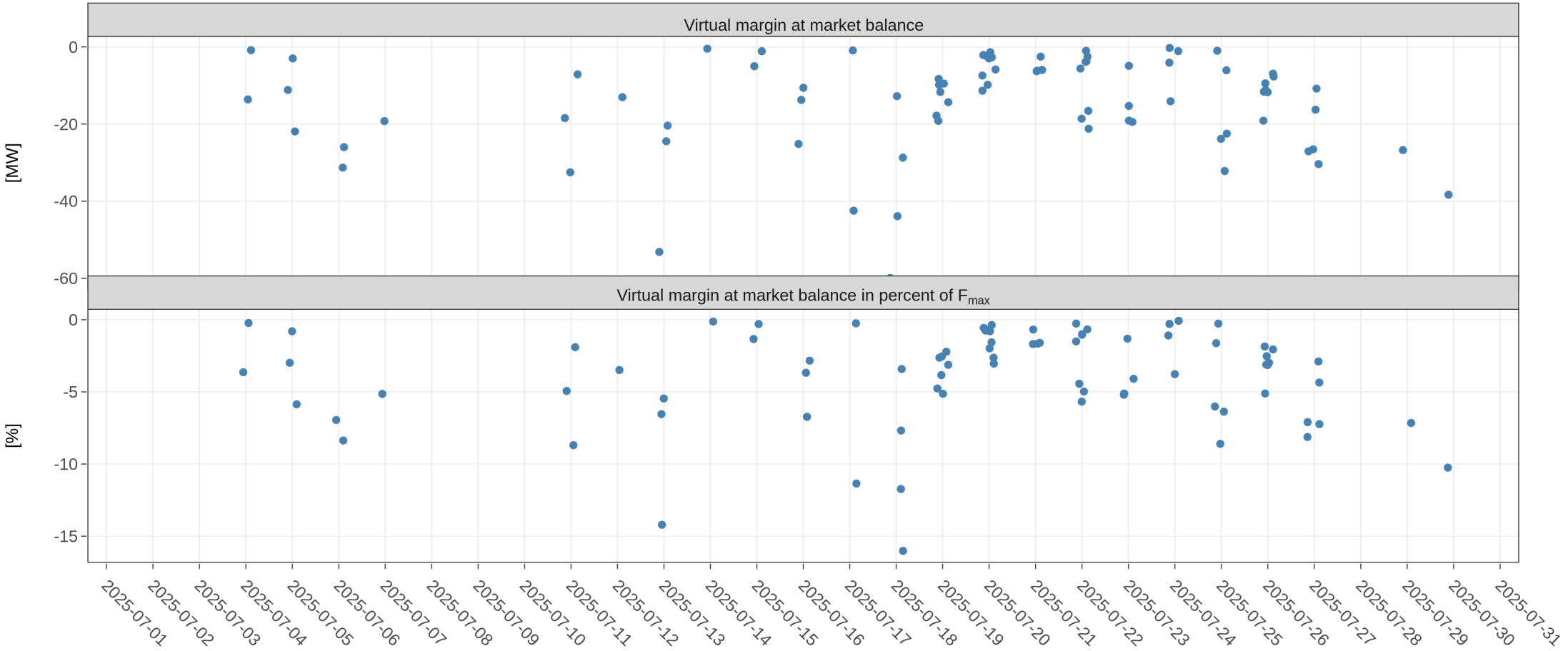
KPI 6b: Virtual margins at market balance PL



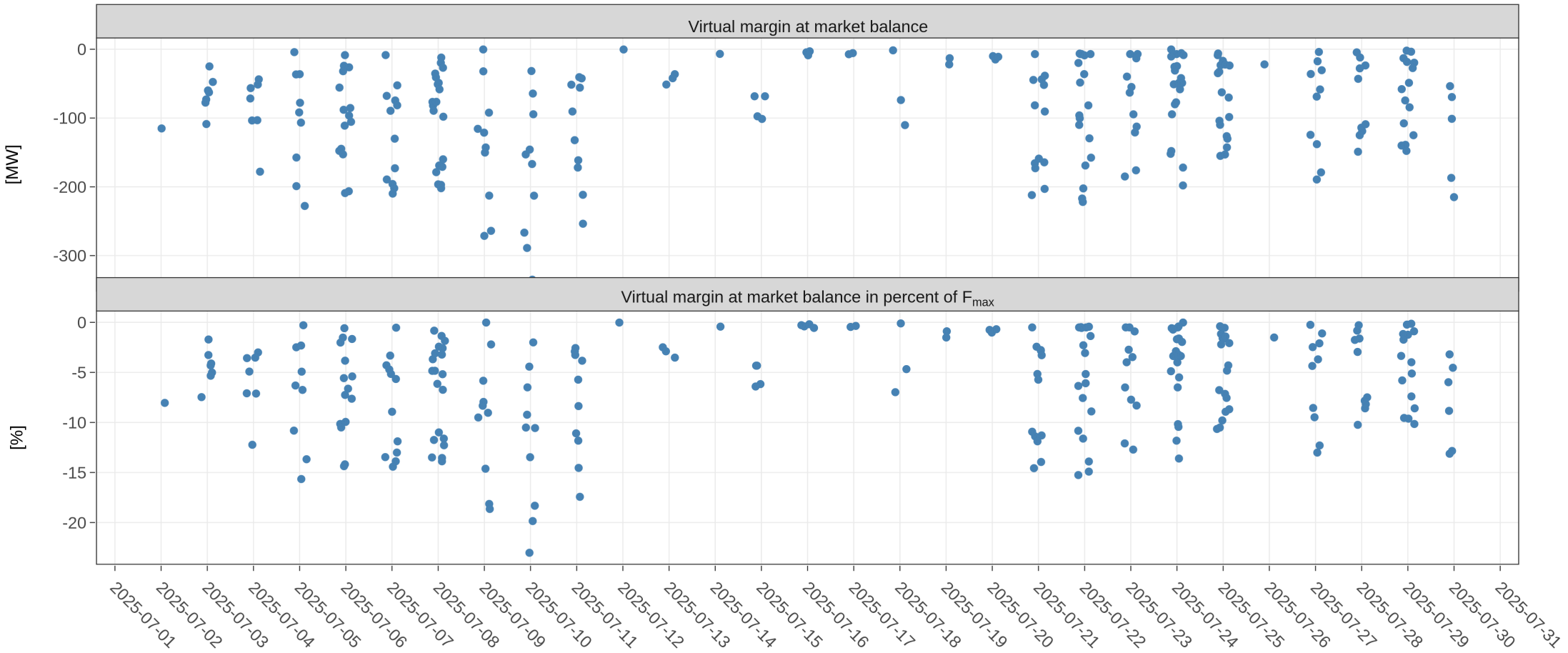
KPI 6b: Virtual margins at market balance RO



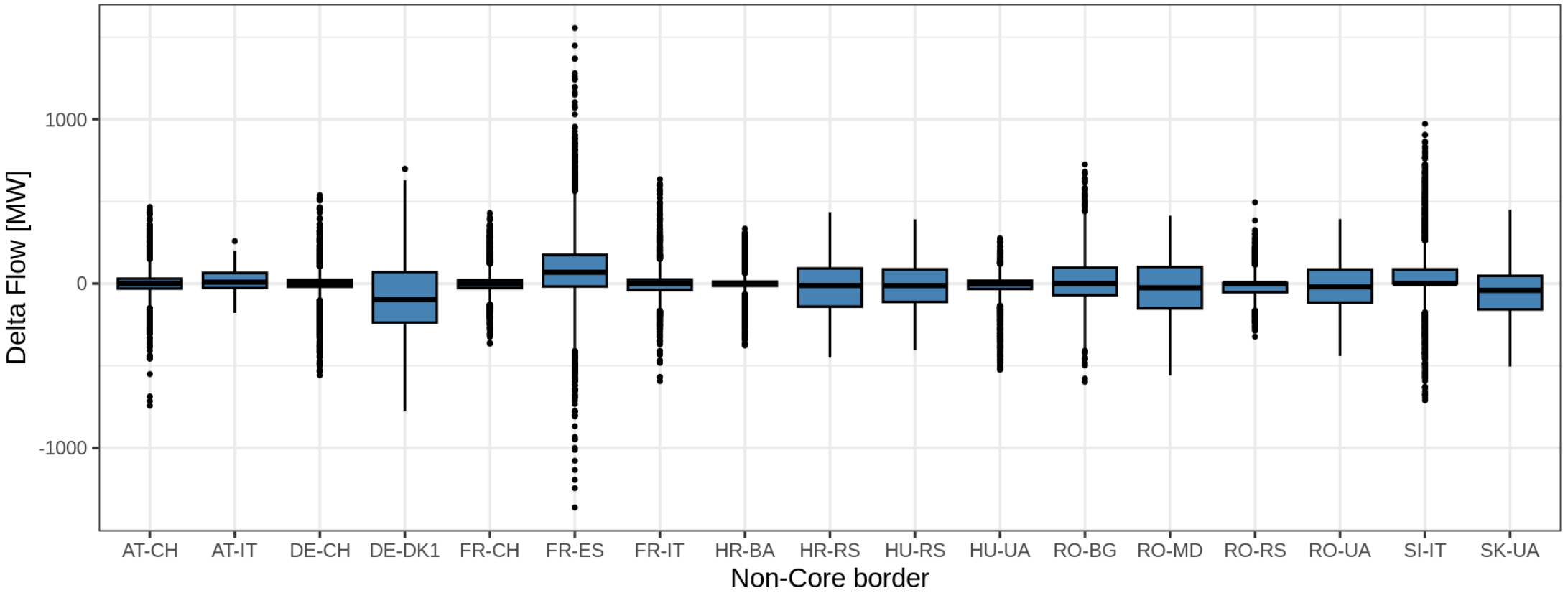
KPI 6b: Virtual margins at market balance SI



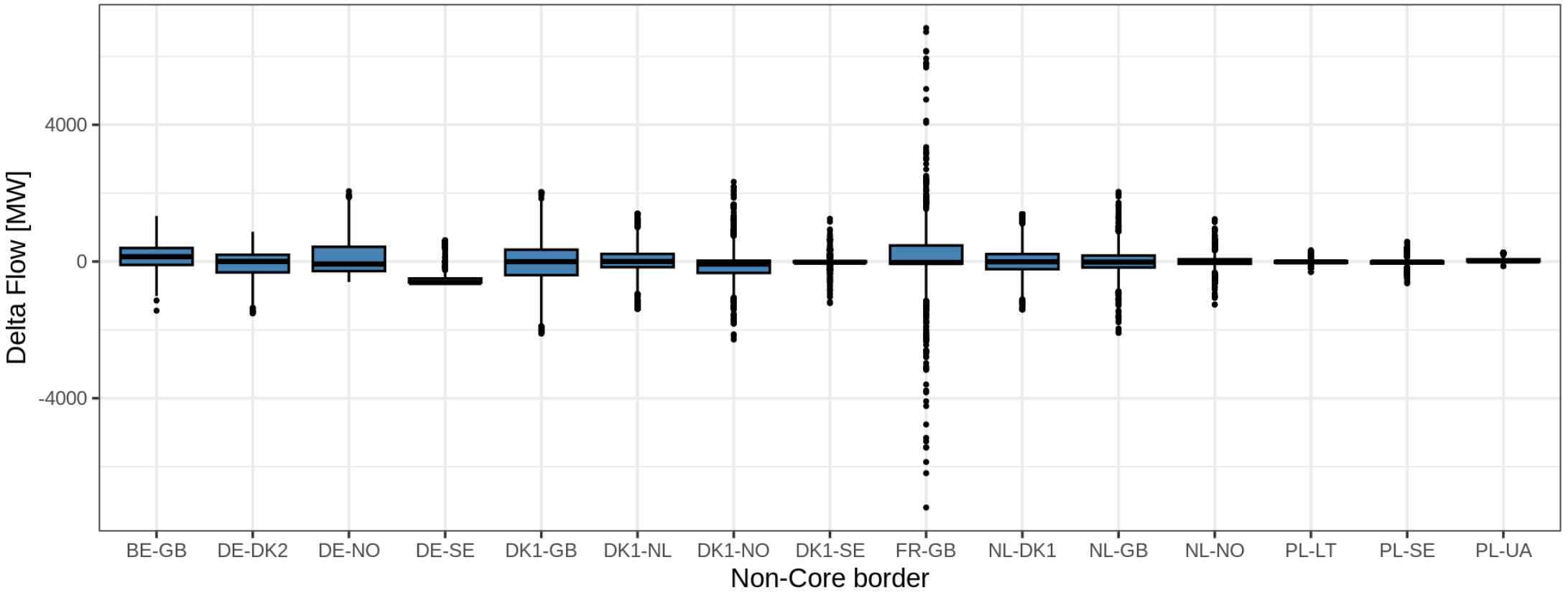
KPI 6b: Virtual margins at market balance SK



KPI 7: Non-Core exchanges AC delta flow



KPI 7: Non-Core exchanges DC delta flow

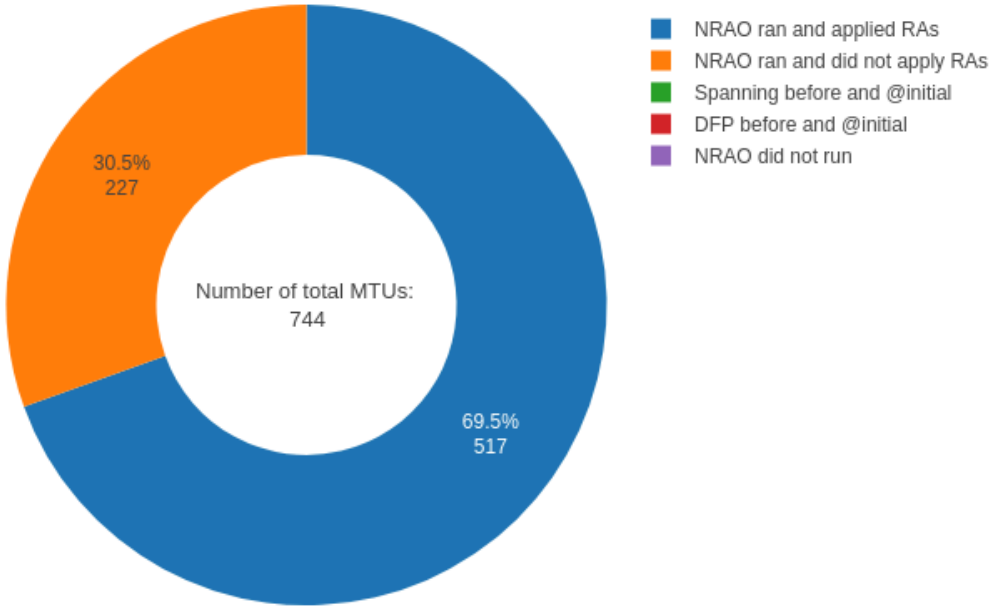


KPI 8: NRAO – Applied Remedial Action

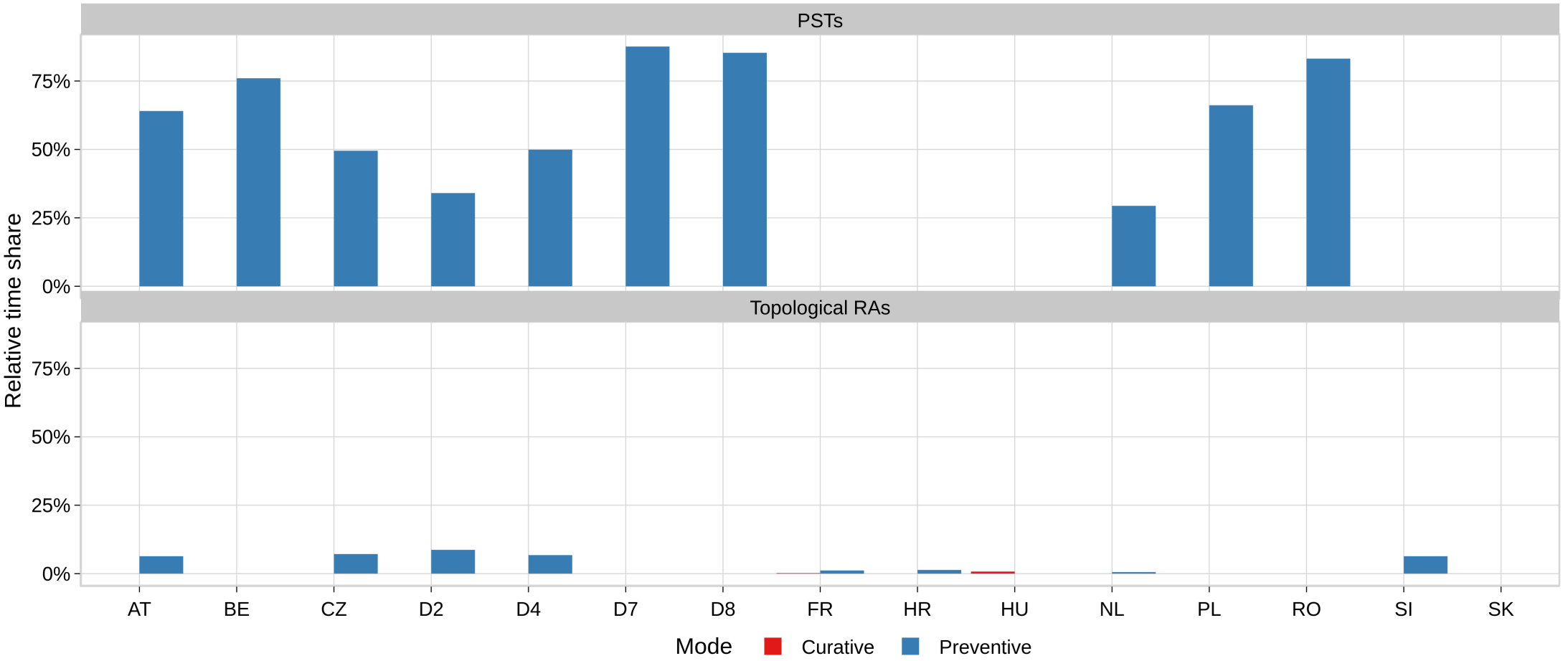
In the following plots, the relative time share relates to the hours labeled ‘NRAO Ran and Applied RAs’.

Total MTUs: 744 hours

Category	Hours (%)
NRAO ran and applied RAs	517 hours (69.5%)
NRAO ran and did not apply RAs	227 hours (30.5%)
Spanning before and @initial	0 hours (0%)
DFP before and @initial	0 hours (0%)
NRAO did not run	0 hours (0%)

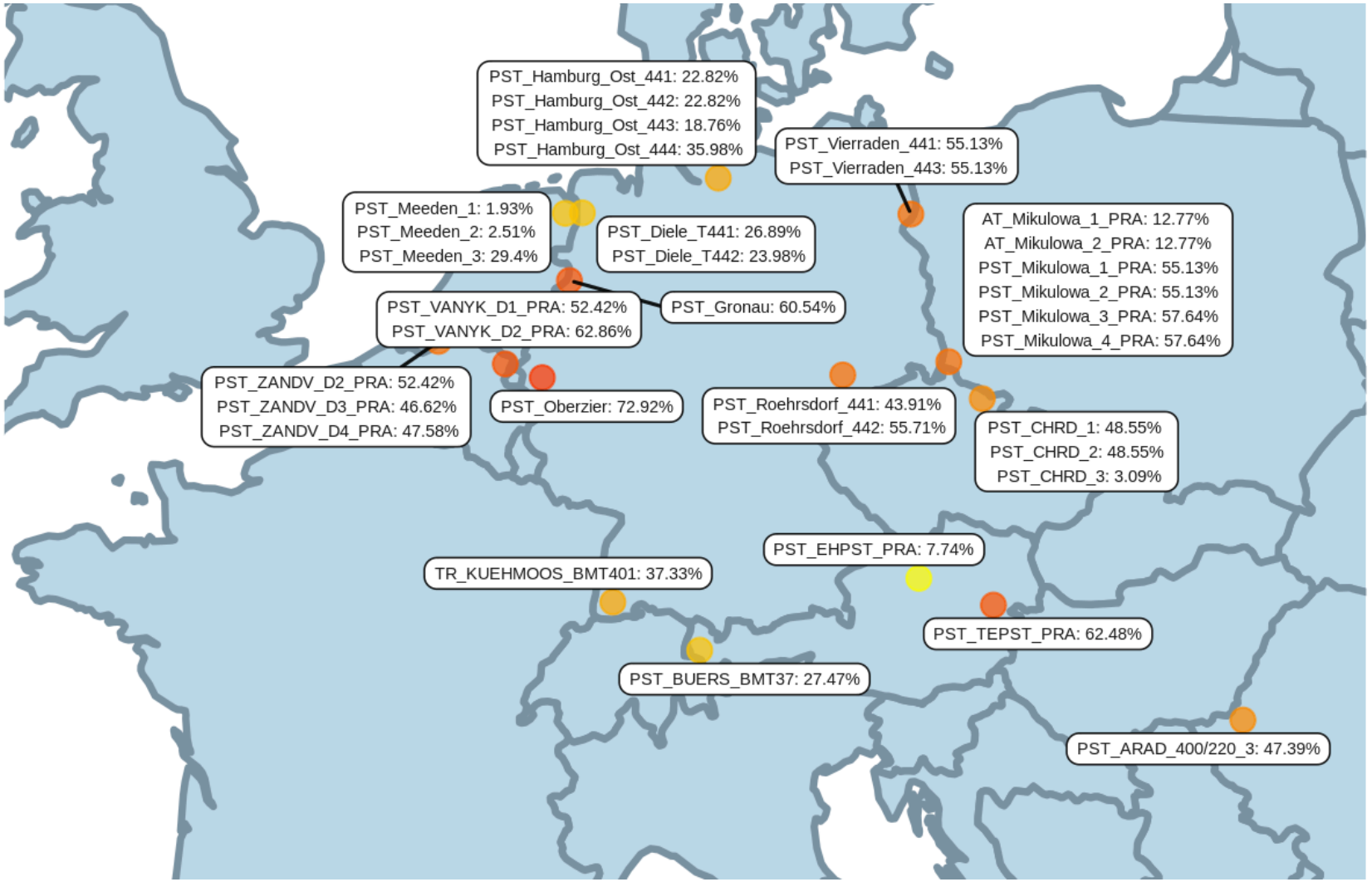


KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode



KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode

Relative Time Share of Applied PSTs in Preventive Mode



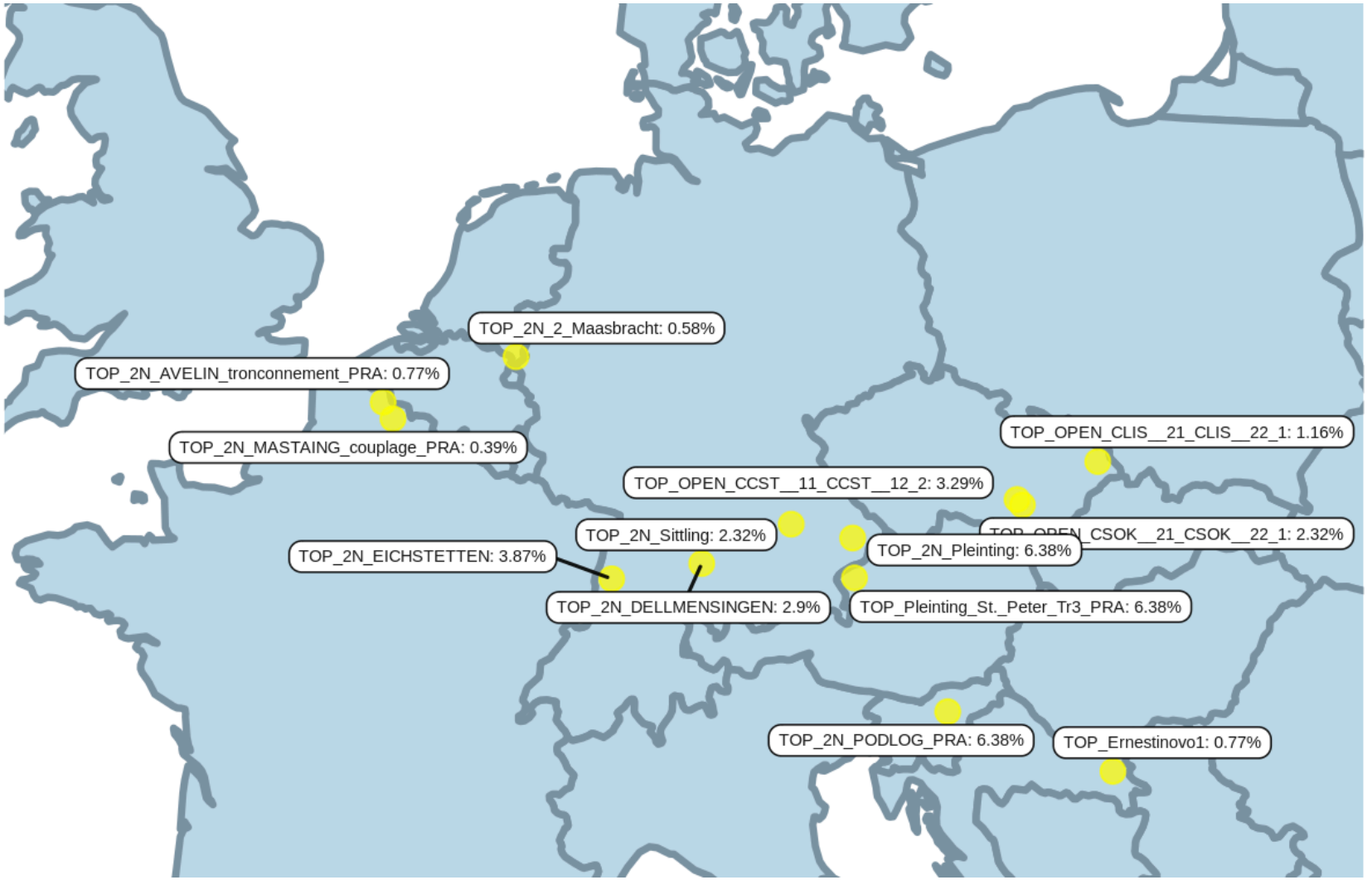
KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode

Relative Time Share of Applied PSTs in Curative Mode

- 0%-10%
- 10%-20%
- 20%-30%
- 30%-40%
- 40%-50%
- 50%-60%
- 60%-70%
- 70%-80%
- 80%-90%
- 90%-100%

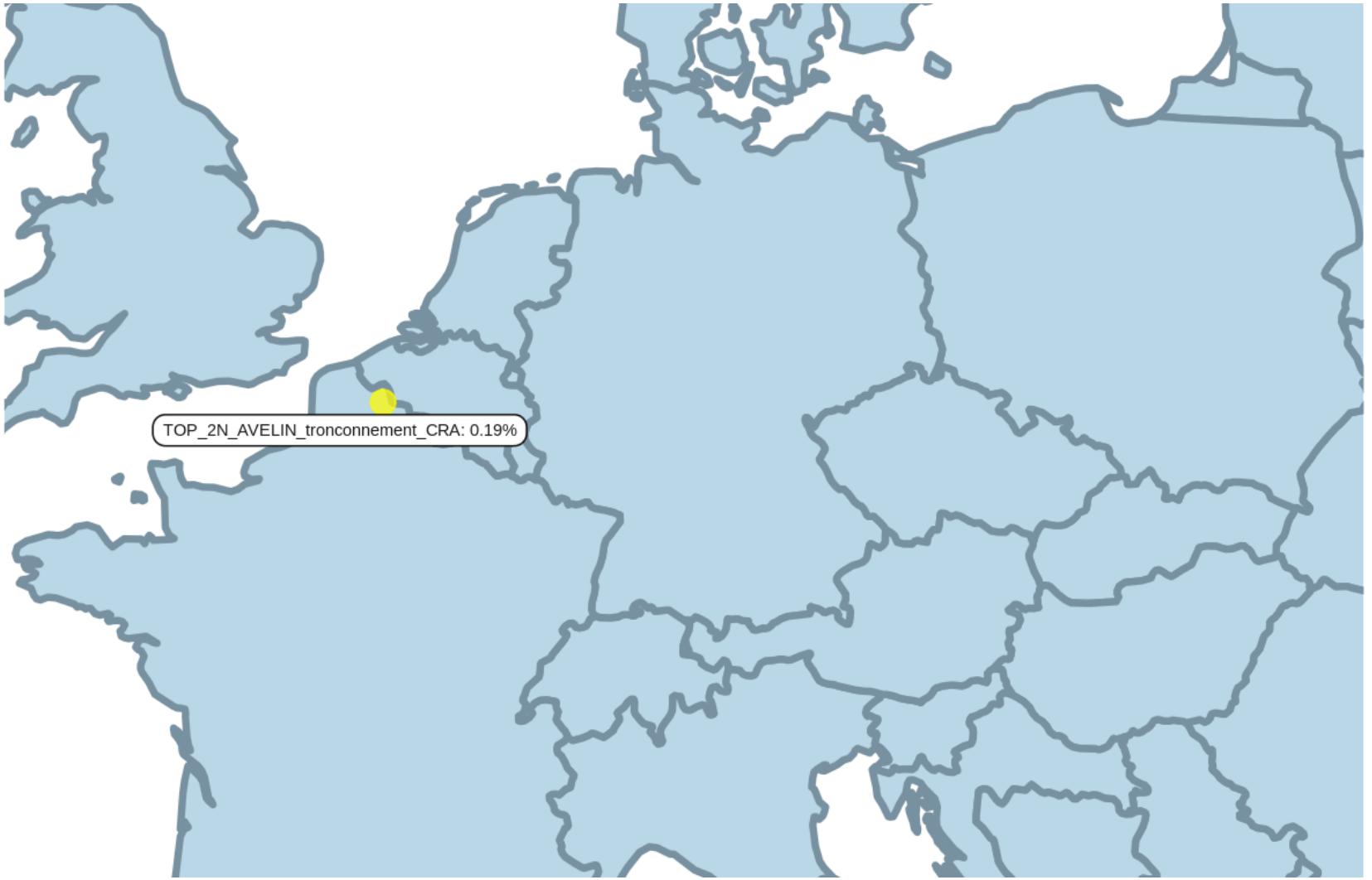
KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode

Relative Time Share of Applied Topological RAs in Preventive Mode



KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode

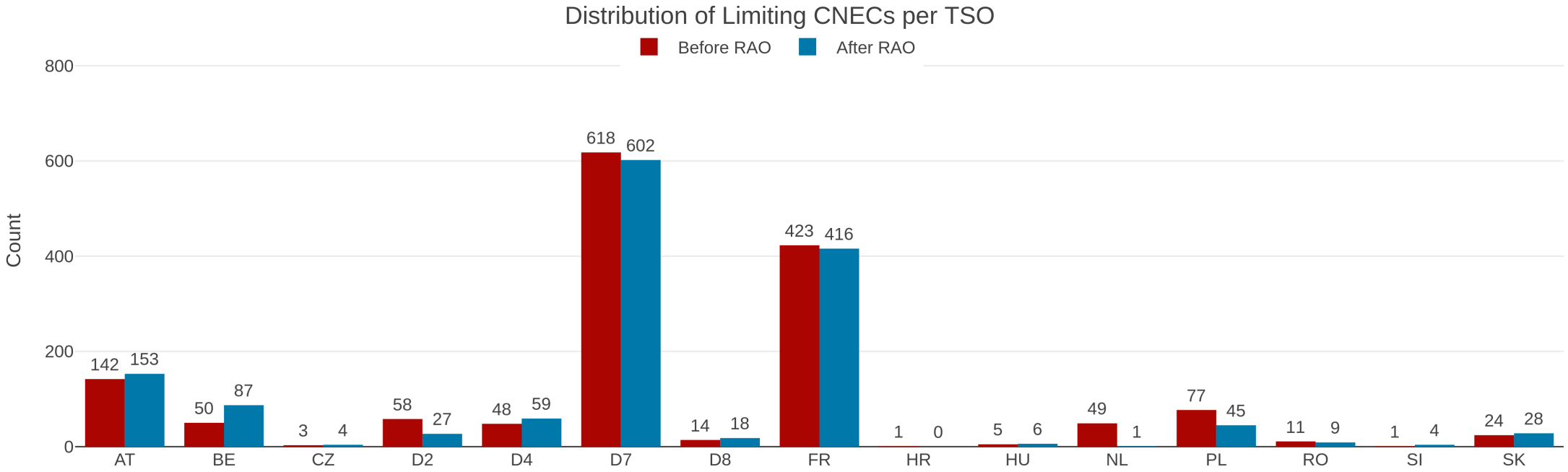
Relative Time Share of Applied Topological RAs in Curative Mode



- 0%-10%
- 10%-20%
- 20%-30%
- 30%-40%
- 40%-50%
- 50%-60%
- 60%-70%
- 70%-80%
- 80%-90%
- 90%-100%

KPI 9: Most limiting CNEC per TSO (NRAO)

The graph below shows the distribution of CNECs which are the most limiting from NRAO perspective, these are the CNECs with lowest relative RAM per MTU



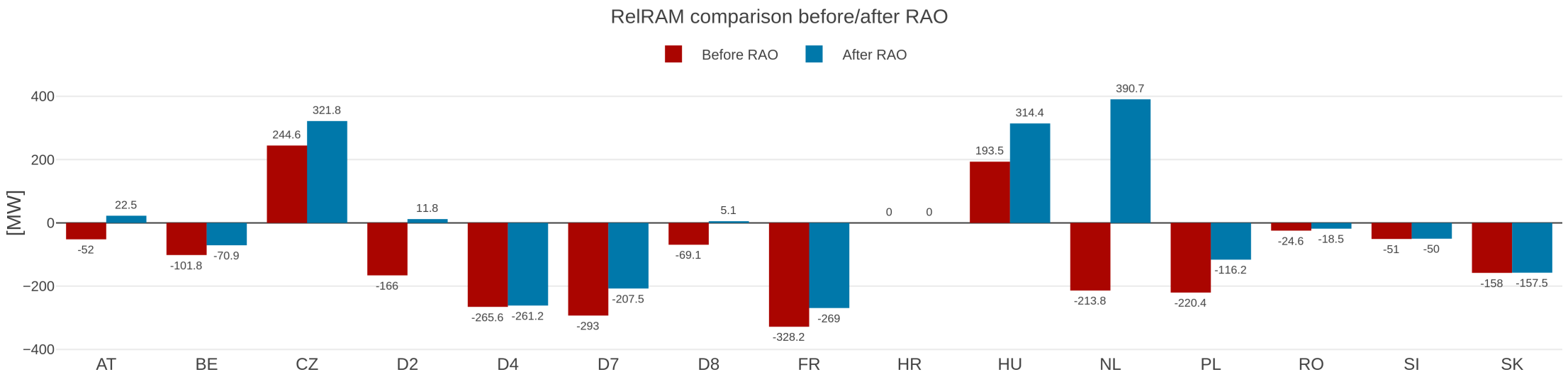
As expected, there is redistributing of the most limiting CNECs. This is because the application of Remedial Actions does not eliminate flows but re-routes, reducing the flows on some limiting CNECs and increasing the load on others, which at the end impacts also the RAM values.

KPI 10: Average variation of relative RAM before and after NRAO

The graph shows average values of relative RAM before and after NRAO, per TSO on the most limiting CNECs from NRAO perspective. Selected CNECs before RAO are the same as after RAO, and average computed for MTUs when was used further in the process.

- Most limiting element from NRAO perspective is the one which has the lowest relative RAM per MTU
- To determine value of relative RAM, the following formula was used

$$RAM_{rel} = \begin{cases} \dfrac{RAM_{nrao}}{\sum_{(A,B)\in neighbouring\ Core\ bidding\ zones\ pairs} |PTDF_{A\rightarrow B,nrao}|}, \ if\ RAM_{nrao} \geq 0 \\ RAM_{nrao}, \ if\ RAM_{nrao} < 0 \end{cases}$$



KPI 11: Most often presolved CNEs (top 20)

CNE	Distinct hours CNE was presolved	Count of presolved CNECs	Avg RAM/Fmax	Min RAM/Fmax	Max RAM/Fmax	Max z2zPTDF	Max sum z2zPTDF
[AT-AT] Westtirol 1 - Westtirol 2 WTRHU41 [OPP]	744	2244	34.32%	19.80%	103.00%	0.275	1.2223
[HU-HU] Gonyu - Gyor [DIR]	744	1496	72.44%	54.26%	101.30%	0.3	1.5462
[HR-SI] 220kV Pehlin - Divaca [OPP] [HR]	744	1487	114.78%	81.55%	162.57%	0.214	0.506
[CZ-SK] Nosovice - Varin [OPP] [CZ]	743	821	100.63%	75.42%	127.01%	0.3374	1.355
[HR-SI] 220kV Pehlin - Divaca [DIR] [HR]	743	764	55.72%	21.93%	89.57%	0.214	0.506
[SK-SK] H.Zdana - Sucany [DIR]	741	1249	74.86%	67.89%	93.80%	0.2078	0.8274
[HR-SI] 400kV Tumbri - Krsko 1 [OPP] [HR]	740	740	74.95%	65.64%	88.57%	0.3861	1.0319
[PL-PL] Krosno Iskrzynia - Rzeszow [OPP]	738	750	63.89%	45.59%	89.16%	0.3549	1.2254
[AT-CZ] Duernrohr 1 - Slavetice 437 [OPP] [AT]	737	737	54.94%	29.87%	75.87%	0.2753	1.1631
[SK-SK] Gabcikovo - P.Biskupice [DIR]	735	735	90.43%	72.22%	115.82%	0.3338	1.2487
[CZ-SK] Nosovice - Varin [DIR] [CZ]	735	1058	78.64%	54.28%	104.61%	0.3374	1.355
[CZ-SK] Nosovice - Varin [OPP] [SK]	735	2030	99.80%	73.24%	126.26%	0.3371	1.2736
[CZ-PL] Wielopole - Nosovice [DIR] [PL]	732	1705	59.52%	48.65%	83.01%	0.3186	1.333
[AT-HU] Zurndorf - Gyoer 439B [DIR] [AT]	728	1915	87.59%	58.51%	117.75%	0.3585	1.5281
[SK-HU] Gabcikovo - Gonyu [DIR] [HU]	721	933	84.66%	64.57%	126.12%	0.3222	1.1075
[NL-BE] Maasbracht - Van Eyck 380 White/28 [OPP] [BE]	711	1634	60.41%	31.78%	101.72%	0.3326	0.726
[SK-HU] Levice - God [DIR] [HU]	711	799	63.43%	35.06%	76.77%	0.243	0.8215
[AT-SI] Obersielach - Podlog 247 [DIR] [AT]	711	1723	49.75%	21.27%	118.23%	0.1892	0.5827
[NL-BE] Maasbracht - Van Eyck 380 White/28 [DIR] [BE]	706	1506	116.12%	77.87%	156.76%	0.3326	0.726
[HU-HU] Gonyu - Gyor [OPP]	702	1011	109.71%	77.56%	161.33%	0.3	1.5462

Note 1: *The shown z2zPTDF values do not correspond to the maximum zone-to-zone PTDFs according to equation 5 of the Day-ahead CCM and hence are not the ones used for the CNEC Selection. The z2zPTDFs are calculated only between neighbouring BZs. See KPI reading guide on JAO.*
Note 2: *RAM for Core exchanges can be higher than 100% due to the relieving effect of Fuaf: RAM_Core = CEP_target - Fuaf. So if Fuaf is very negative you can get above 100%.*

KPI 12: Most limiting CNEs (top 20)

CNE	Distinct hours CNE has shadow price	Count of hours CNECs have shadow price	Max shadow price [€/MW]	Avg RAM/Fmax	Min RAM/Fmax	Max RAM/Fmax	Max z2zPTDF
[FR-D7] Vigy - Ensdorf VIGY2 S [DIR] [D7]	393	393	421.76	26.04%	19.90%	52.49%	0.2433
[BE-FR] Achene - Lonny 380.19 [OPP] [BE]	376	376	637.93	61.83%	30.11%	96.88%	0.3961
[AT-SI] Obersielach - Podlog 247 [DIR] [AT]	233	234	3211.19	40.71%	21.55%	87.57%	0.1892
[SK-SK] V.Dur - Levice 1 [DIR]	136	136	1627.1	42.29%	33.26%	58.42%	0.1802
[AT-AT] Hessenberg - Weissenbach 223 [OPP]	125	125	7317.73	36.10%	20.50%	60.06%	0.0864
[FR-FR] Creys - Saint-Vulbas 2 [OPP]	118	118	711.97	22.01%	19.99%	33.27%	0.1462
[AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT]	104	104	934.09	76.51%	20.22%	109.18%	0.1507
[D8-PL] Mikulowa PST1 [DIR] [PL]	97	97	450.09	53.94%	44.70%	67.73%	0.4073
[D7-FR] Ensdorf - Vigy VIGY2 S [OPP] [FR]	63	63	490.7	23.28%	19.96%	36.94%	0.2374
[PL-PL] Krosno Iskrzynia - Rzeszow [OPP]	46	46	336.26	58.95%	45.79%	68.18%	0.3541
[D8-PL] Mikulowa PST3 [DIR] [PL]	41	41	362.71	53.97%	43.33%	67.58%	0.4244
[RO-RO] TR Rosiori 400/220 1 [DIR]	40	40	794.21	46.80%	28.54%	66.67%	0.1144
[CZ-PL] Wielopole - Nosovice [DIR] [PL]	37	37	144.93	57.34%	52.09%	65.87%	0.3186
[D8-D8] Roehrsdorf - Roehrsdorf PST442 [DIR]	31	31	100.06	56.29%	43.56%	74.16%	0.3375
[FR-FR] Creys - Saint-Vulbas 1 [OPP]	31	31	557.3	19.99%	19.99%	19.99%	0.144
[SK-HU] Levice - God [DIR] [HU]	30	30	287.05	51.57%	35.06%	58.30%	0.2174
[D2-NL] Diele - Meeden SCHWARZ [OPP] [D2]	29	29	123.1	63.45%	44.75%	95.55%	0.2625
[RO-RO] Paroseni - Targu Jiu Nord [OPP]	22	22	1903.81	40.00%	20.82%	68.40%	0.1059
[AT-AT] Westtirol 1 - Westtirol 2 WTRHU41 [OPP]	21	21	297.86	24.98%	19.90%	42.30%	0.2028
[NL-NL] MEE DRT3 [DIR] [NL]	17	17	205.32	36.36%	19.96%	84.79%	0.2536

Note 1: *The RAM values (expressed as % of Fmax) should not be interpreted as "the capacities offered by the Core TSOs to the market coupling". Indeed, since the introduction of Ext LTA inclusion Euphemia performs an optimization where it takes a portion of the FB domain and a portion of the LTA domain to maximize welfare. The RAM value shown in this KPI report correspond to the "portion of the FB domain" resulting from this optimization*
Example:

- RAM = 500MW
- Portion of FB Domain = 40%
- RAM offered by Core TSOs = 500MW/0.4 = 1250MW

KPI 13 : Allocation Constraints - Poland

	# MTUs
AC was limiting MC	199
AC < 0 MW	67
AC = 0 MW	132
AC > 0 MW	0

	PL AC Import [MW]	PL AC Export [MW]
Avg.	-1741.74	5882.22
Min.	-9743.00	755.00
Max.	0.00	13967.00