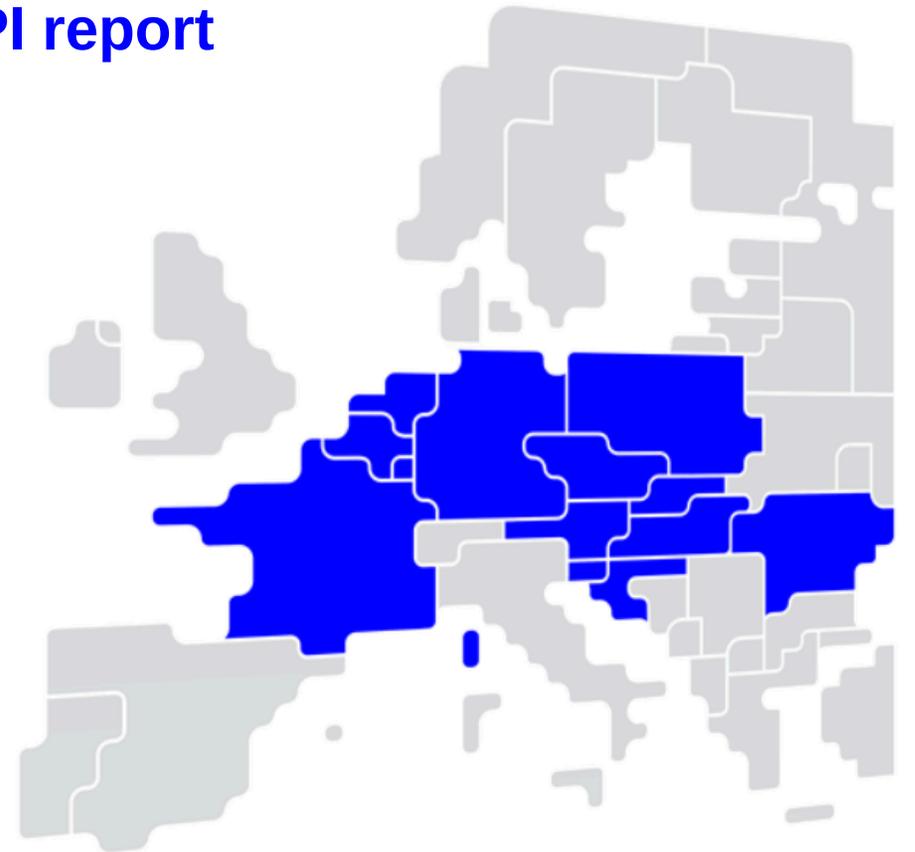


# Core FB MC Operational KPI report

January 2026



# Overview of Operational KPIs



## Adjustment for minimum RAM Inclusion

- KPI 1: Average maximum AMR per CNE
- KPI 2: Average maximum AMR per TSO

## TSOs' adjustment after validation

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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 8: Relative Time Share of Applied RAs, by TSO, Type and Mode
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## Market Impact Assessment

- KPI 11: Most often presolved CNEs (top 20)
- KPI 12: Most limiting CNEs (top 20)
- KPI 13: Allocation Constraints

# KPI 1: Average maximum AMR per CNE (Top 10)

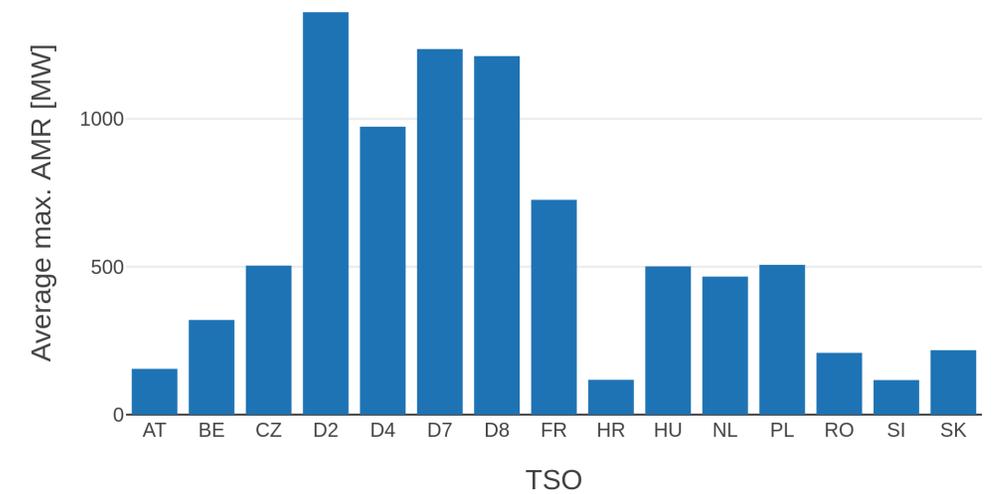
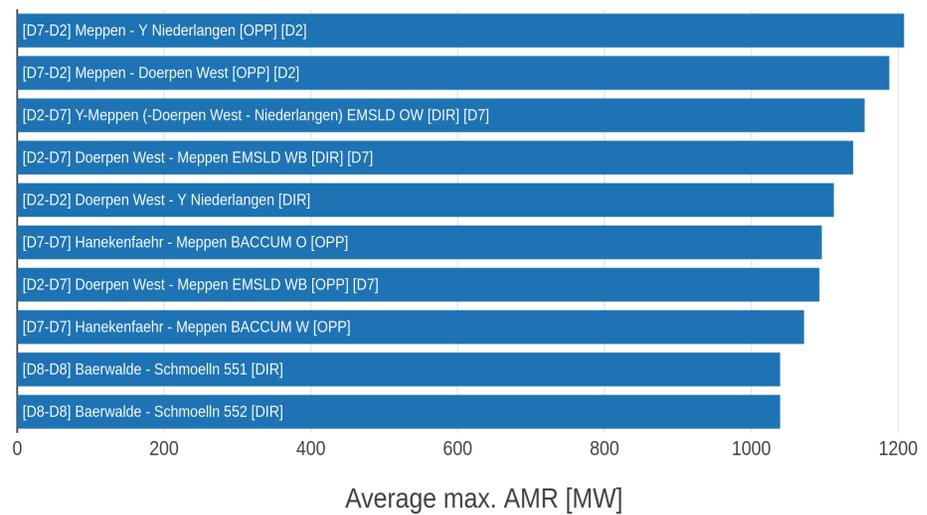
# KPI 2: Average maximum AMR per TSO



CNE	Avg. Max. AMR (MW)	AMR/Fmax%	
		(MTUs with AMR > 0 MW)	AMR/Fmax% (all MTUs)
[D7-D2] Meppen - Y Niederlangen [OPP] [D2]	1208.12	57.57%	54.47%
[D7-D2] Meppen - Doerpen West [OPP] [D2]	1188.00	56.61%	53.57%
[D2-D7] Y-Meppen (-Doerpen West - Niederlangen) EMSLD OW [DIR] [D7]	1154.32	46.28%	42.86%
[D2-D7] Doerpen West - Meppen EMSLD WB [DIR] [D7]	1138.80	45.66%	42.10%
[D2-D2] Doerpen West - Y Niederlangen [DIR]	1112.41	53.01%	49.73%
[D7-D7] Hanekenfaehr - Meppen BACCUM O [OPP]	1096.00	44.16%	40.60%
[D2-D7] Doerpen West - Meppen EMSLD WB [OPP] [D7]	1092.79	43.82%	40.11%
[D7-D7] Hanekenfaehr - Meppen BACCUM W [OPP]	1071.85	43.22%	39.67%
[D8-D8] Baerwalde - Schmoelln 552 [DIR]	1039.23	41.67%	41.67%
[D8-D8] Baerwalde - Schmoelln 551 [DIR]	1039.23	41.67%	41.67%

TSO	Average maximum AMR per TSO
AT	154.66
BE	319.90
CZ	503.76
D2	1360.51
D4	973.31
D7	1236.19
D8	1212.34
FR	726.17
HR	117.48
HU	501.12

TSO	Average maximum AMR per TSO
NL	466.80
PL	506.16
RO	209.00
SI	116.98
SK	217.86



# KPI 3: Share of MTUs with intervention per TSO



Total BDs

31

Total MTUs

744

MTUs without IVA

19

Share of distinct MTUs without IVA

2.55%

MTUs with IVA

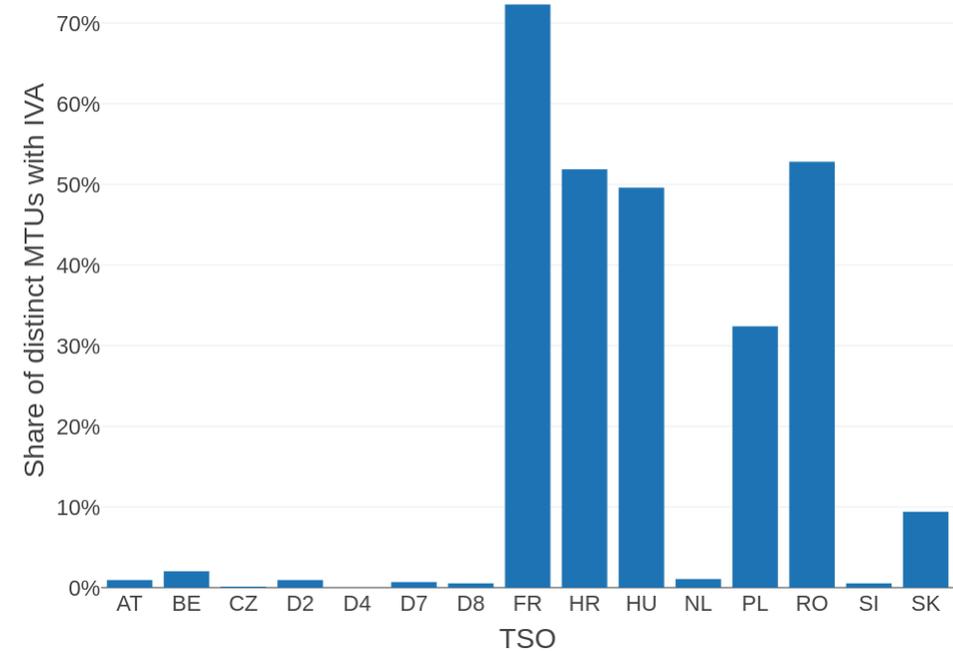
725

Share of distinct MTUs with IVA

97.5%

TSO	Share of distinct MTUs with IVA	Distinct MTUs with IVA
AT	0.94%	7
BE	2.02%	15
CZ	0.13%	1
D2	0.94%	7
D4	0.00%	0
D7	0.67%	5
D8	0.54%	4
FR	72.31%	538
HR	51.88%	386
HU	49.60%	369

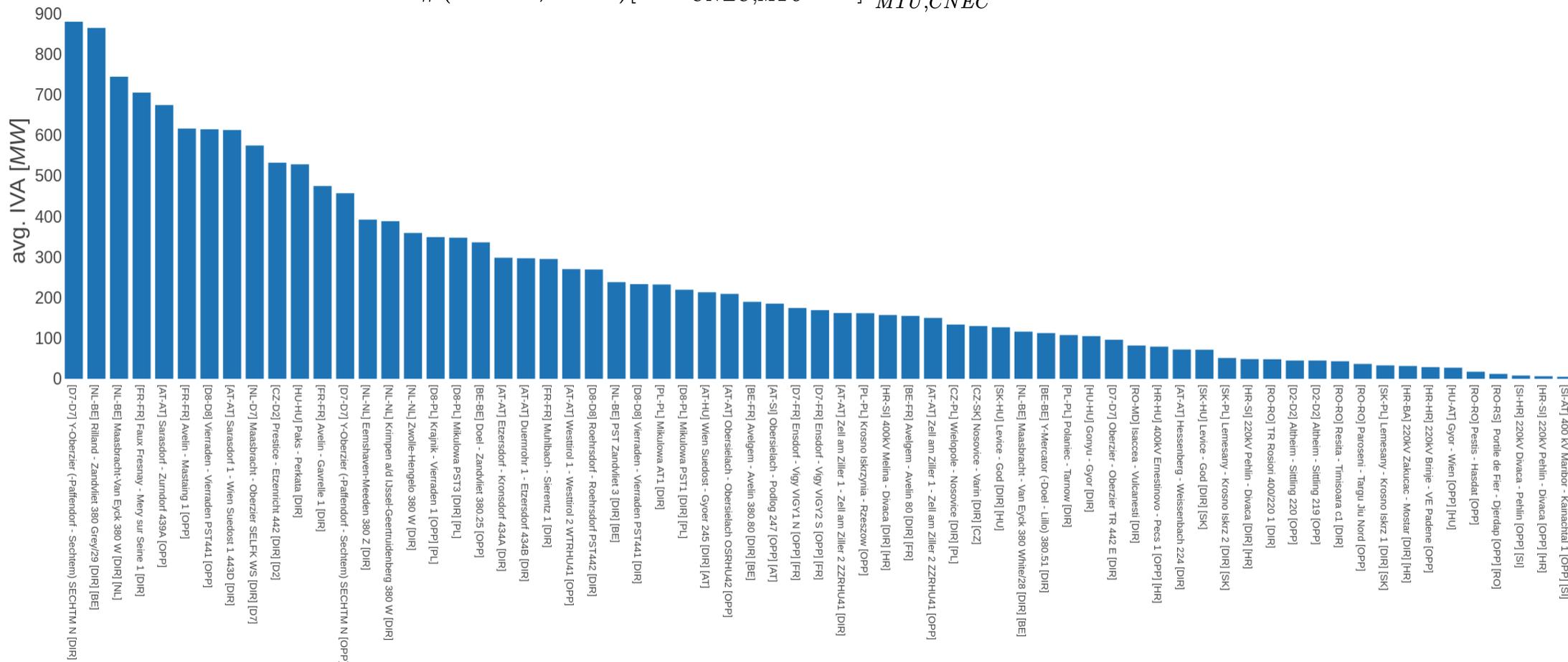
TSO	Share of distinct MTUs with IVA	Distinct MTUs with IVA
NL	1.08%	8
PL	32.39%	241
RO	52.82%	393
SI	0.54%	4
SK	9.41%	70



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



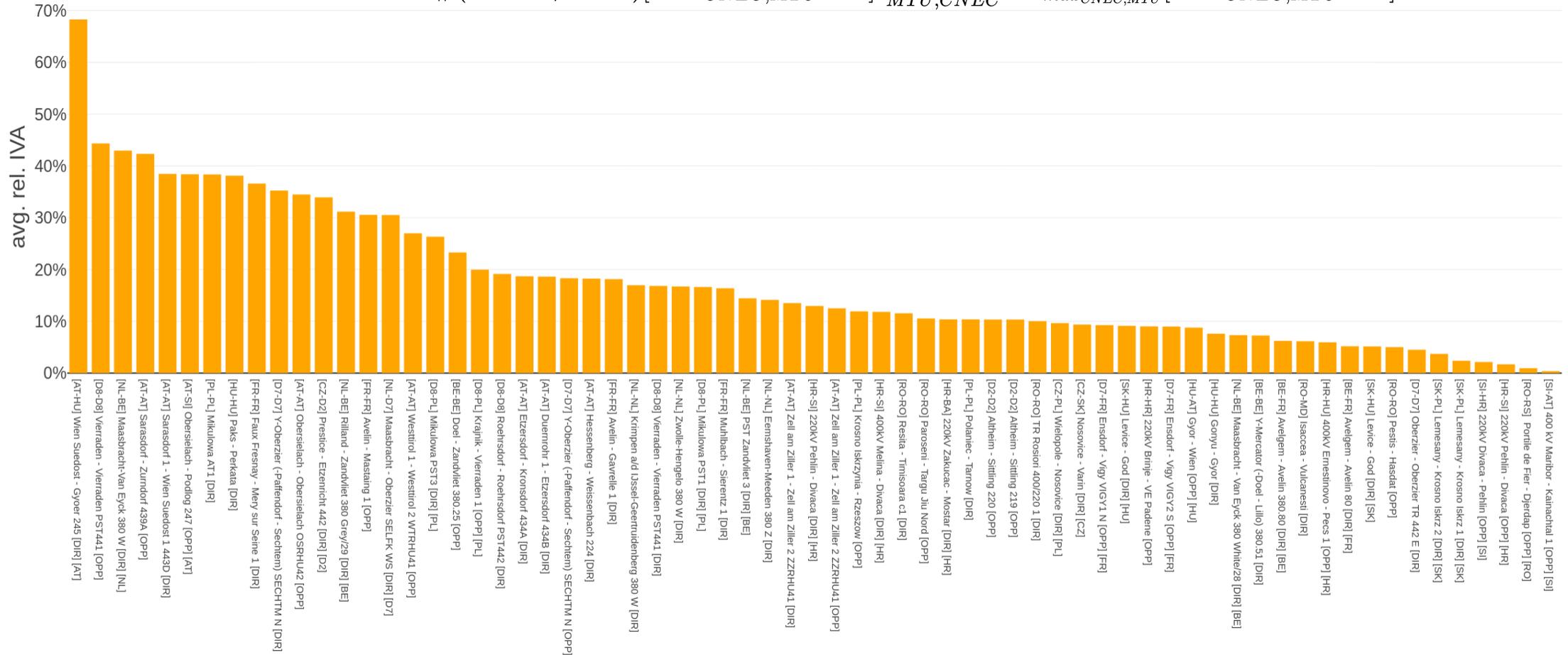
$$\text{avg. IVA}_{CNE} = \frac{1}{\#(CNEC, MTU)[IVA_{CNEC,MTU} > 0]} \sum_{MTU, CNEC} IVA_{CNEC,MTU} [IVA_{CNEC,MTU} > 0]$$



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



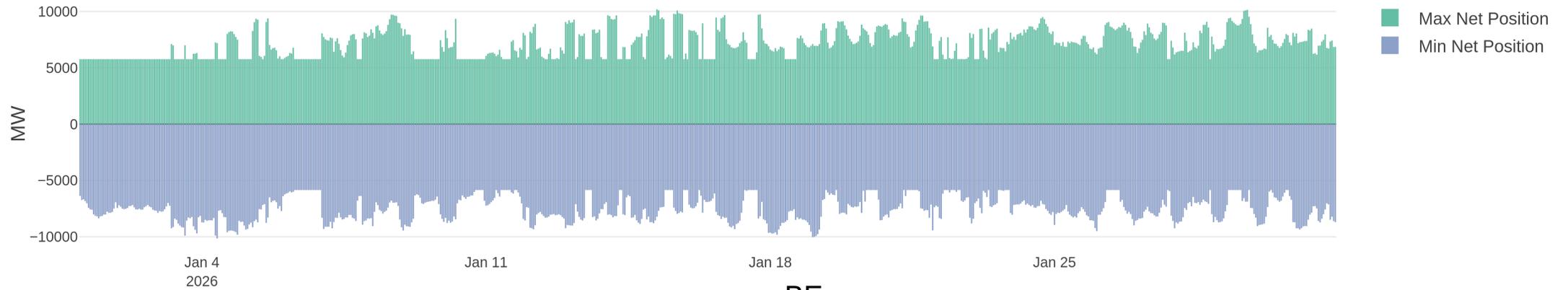
$$\text{avg. rel. IVA}_{CNE} = \frac{1}{\#(CNEC, MTU)[IVA_{CNEC, MTU} > 0]} \sum_{MTU, CNEC} \frac{IVA_{CNEC, MTU}[IVA_{CNEC, MTU} > 0]}{F_{maxCNEC, MTU}[IVA_{CNEC, MTU} > 0]}$$



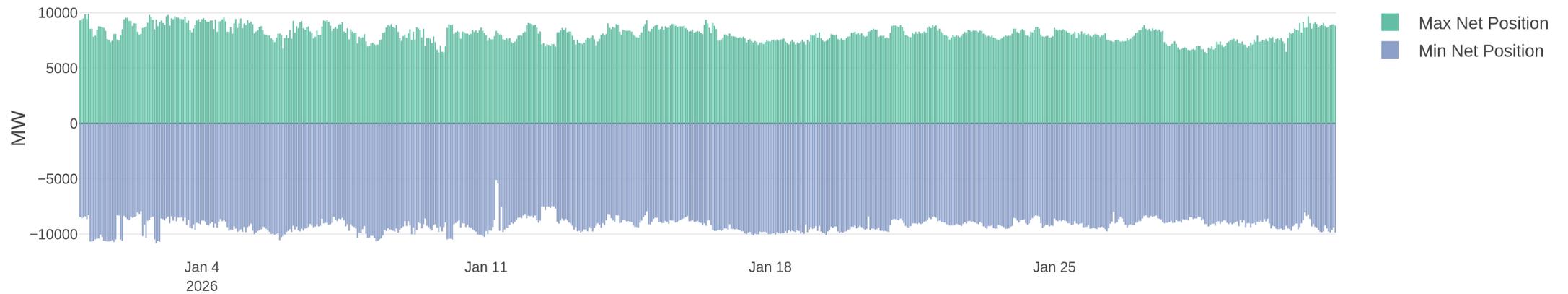
# KPI 5: Min & max net positions per BZ hub



AT



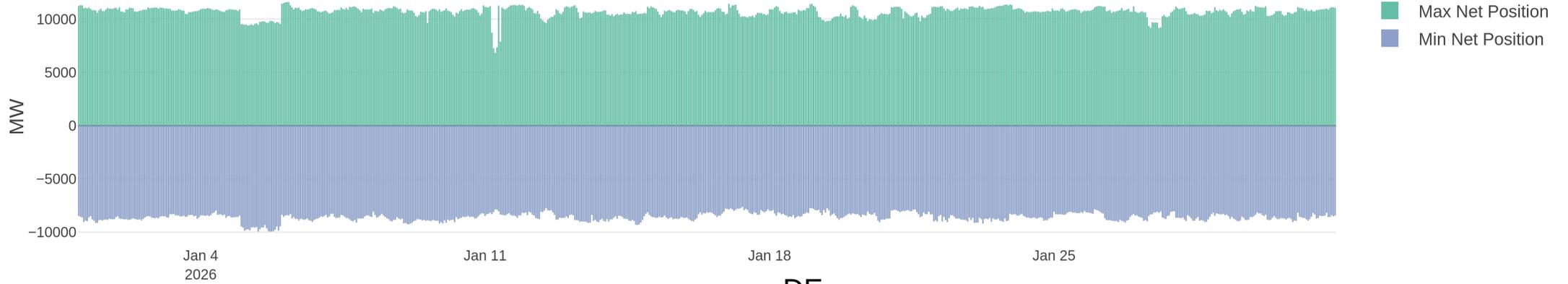
BE



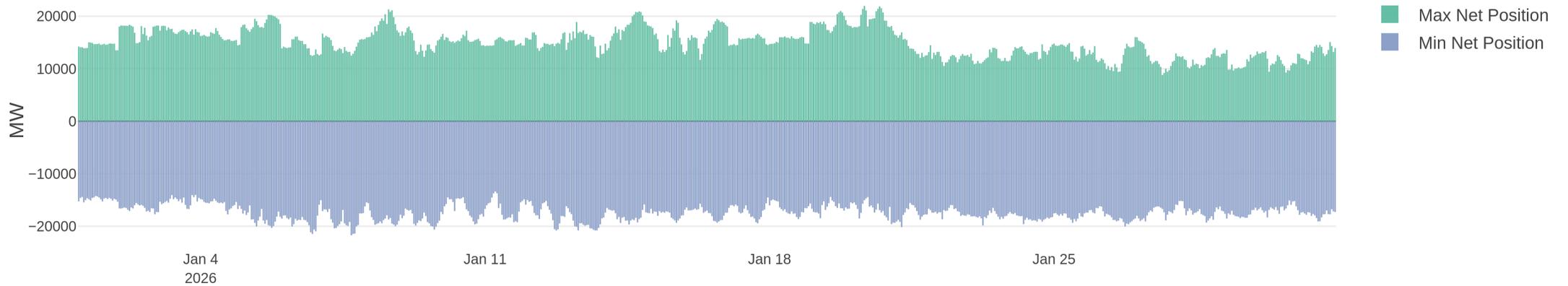
# KPI 5: Min & max net positions per BZ hub



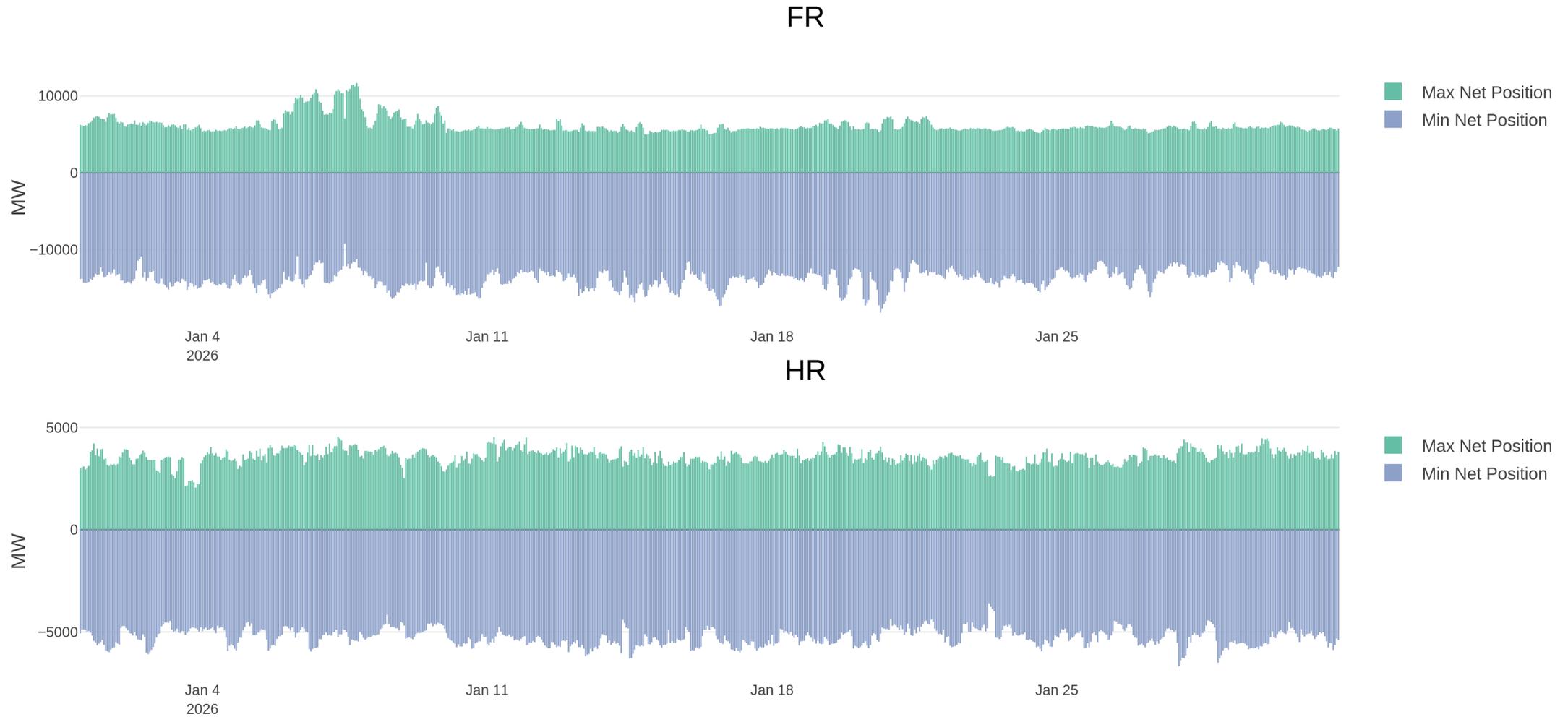
CZ



DE



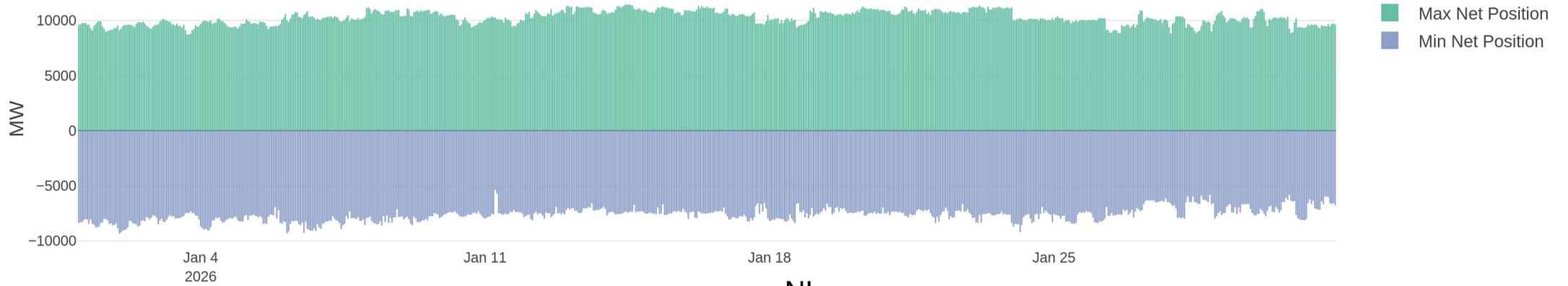
# KPI 5: Min & max net positions per BZ hub



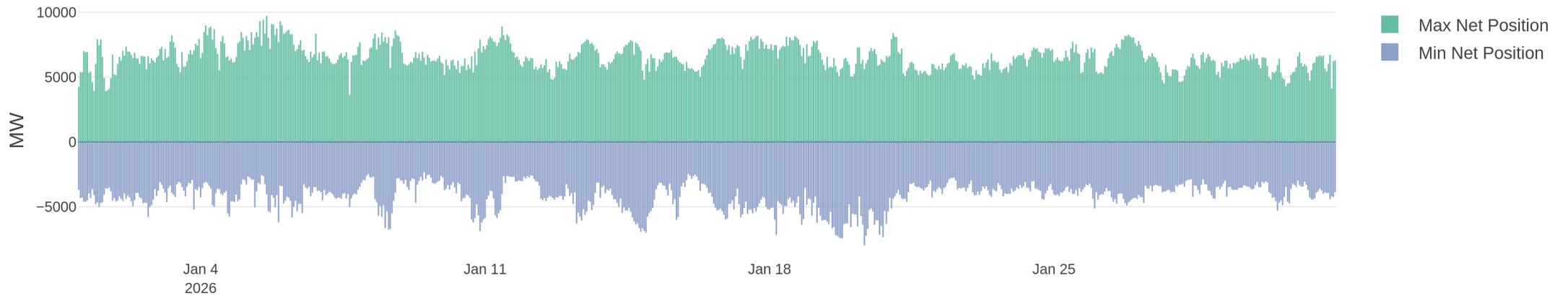
# KPI 5: Min & max net positions per BZ hub



## HU



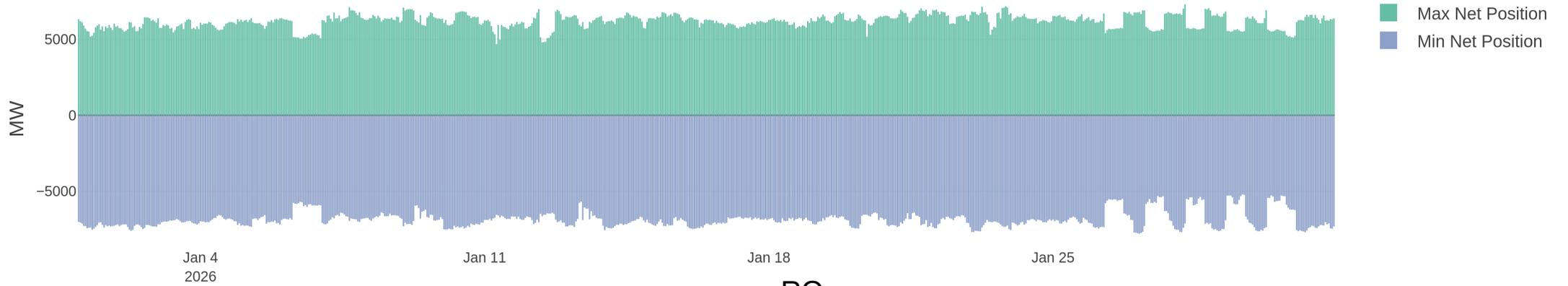
## NL



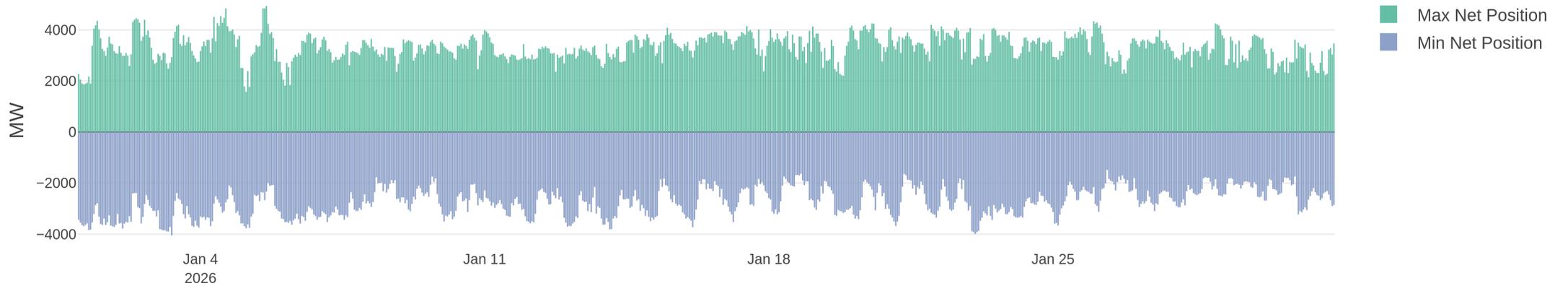
# KPI 5: Min & max net positions per BZ hub



PL



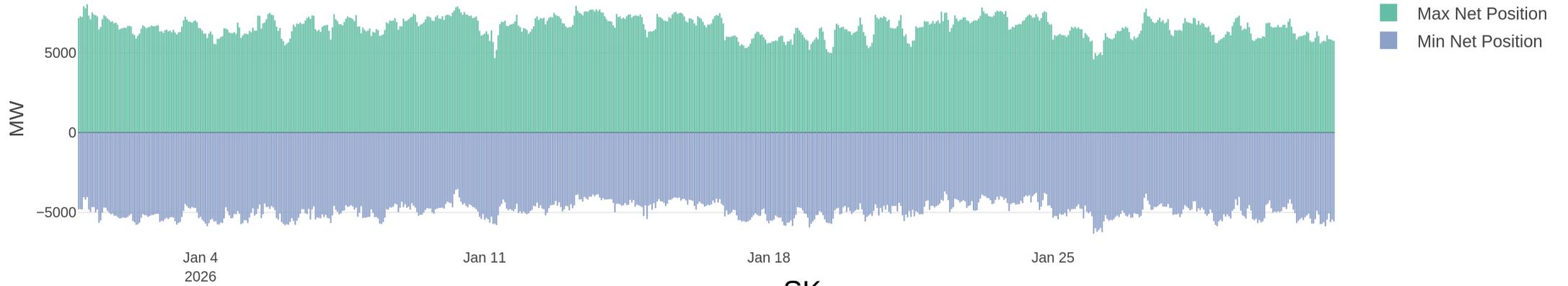
RO



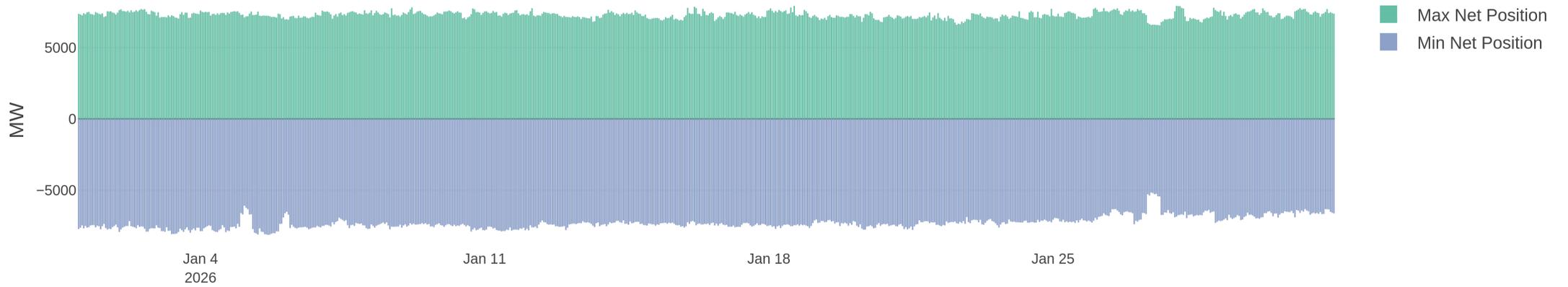
# KPI 5: Min & max net positions per BZ hub



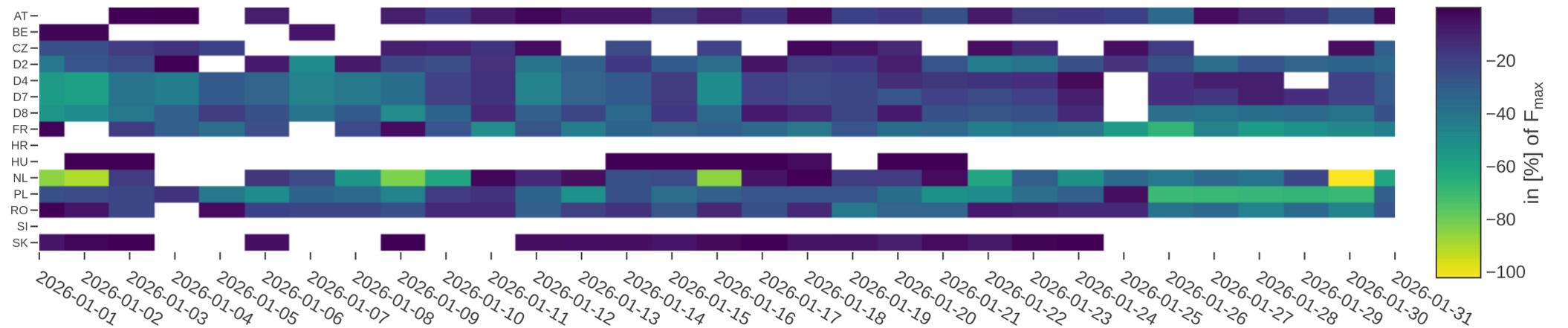
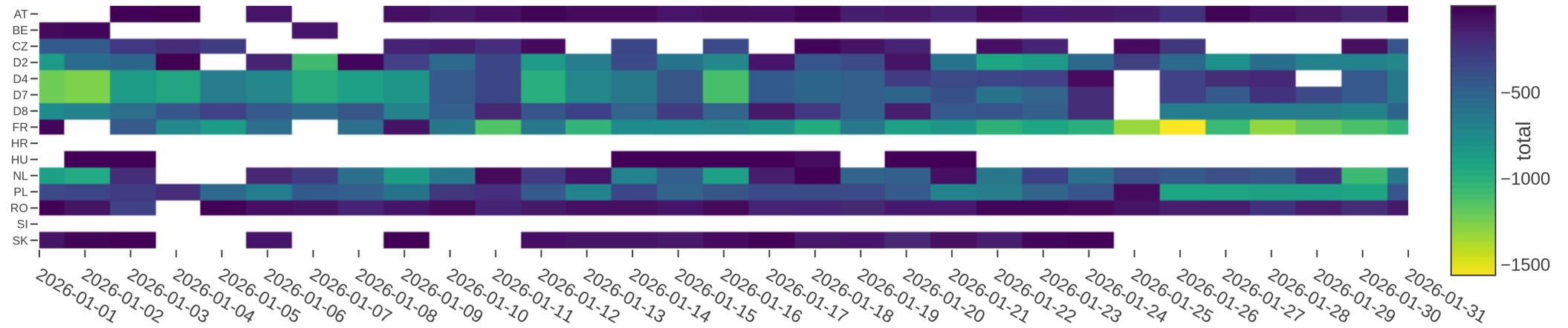
SI



SK



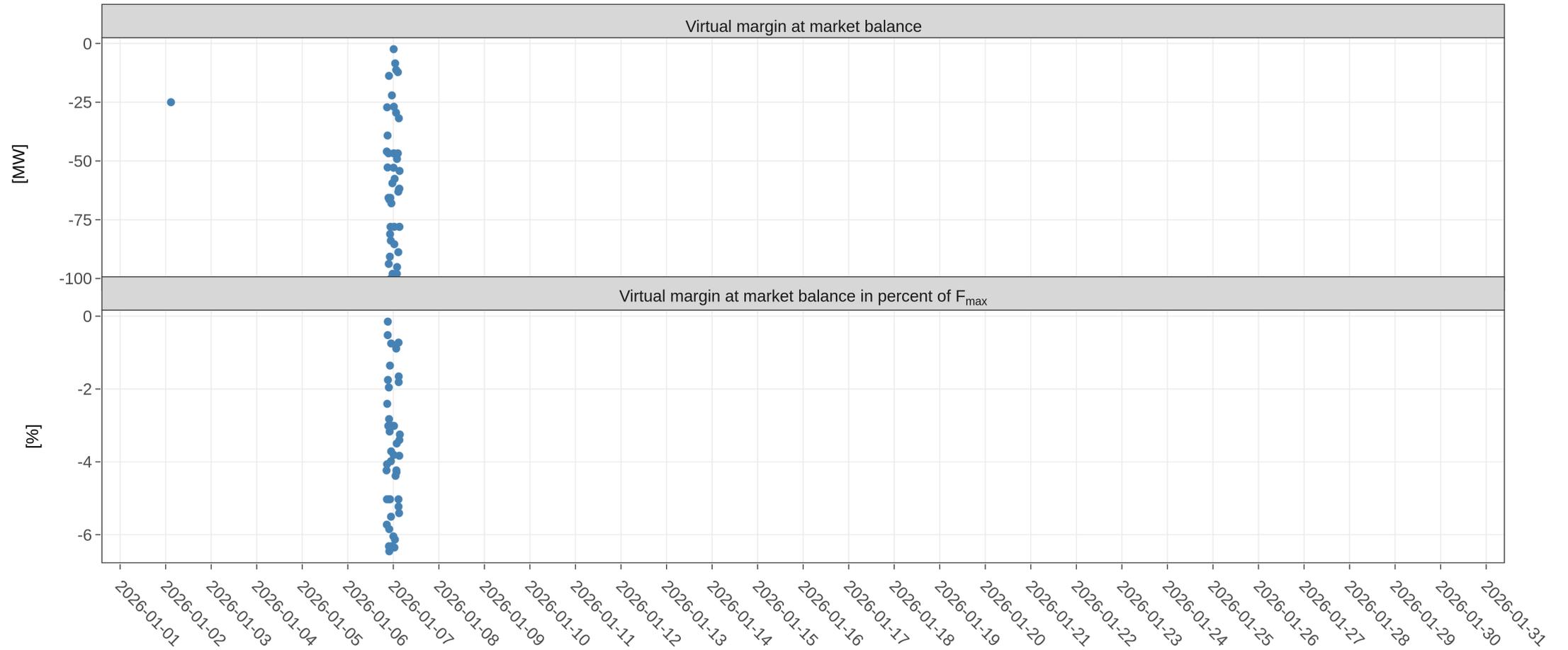
# KPI 6a: Highest virtual margins at market balance for CORE TSOs



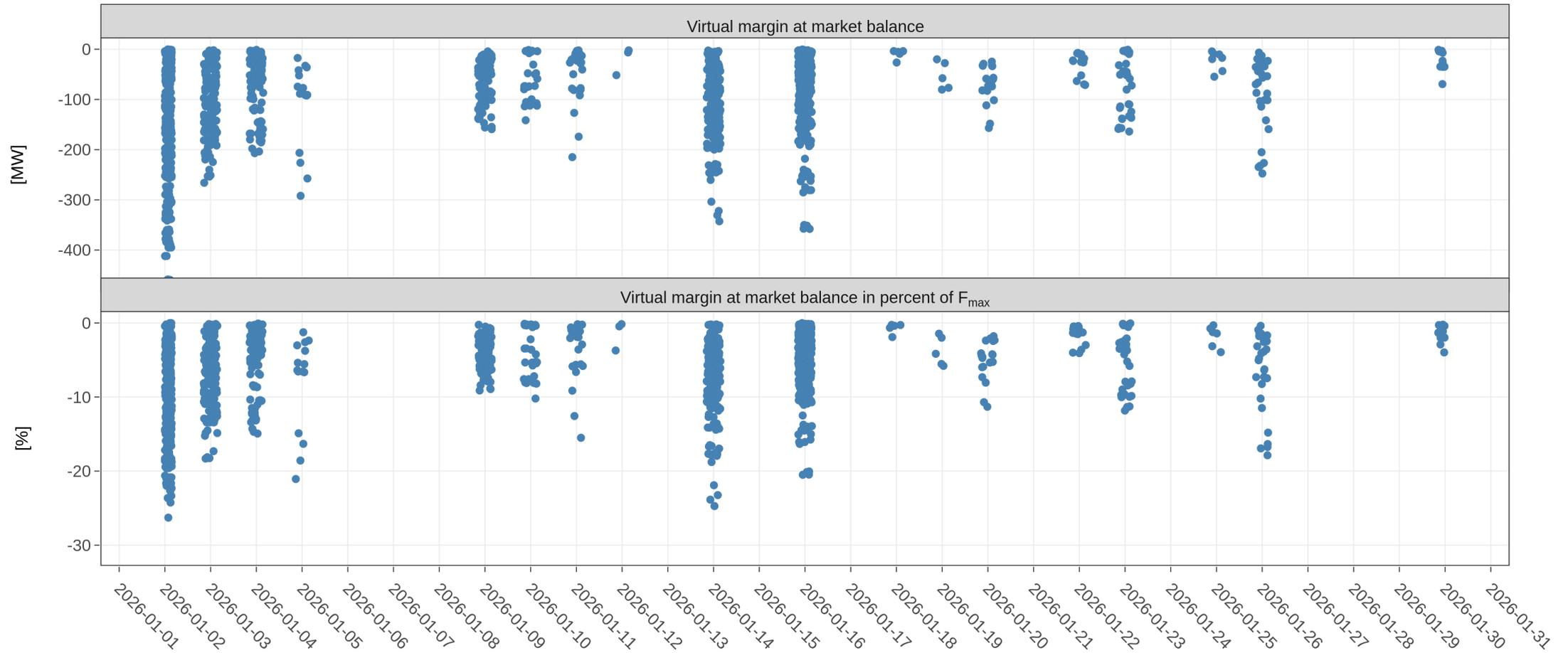
# KPI 6b: Virtual margins at market balance AT



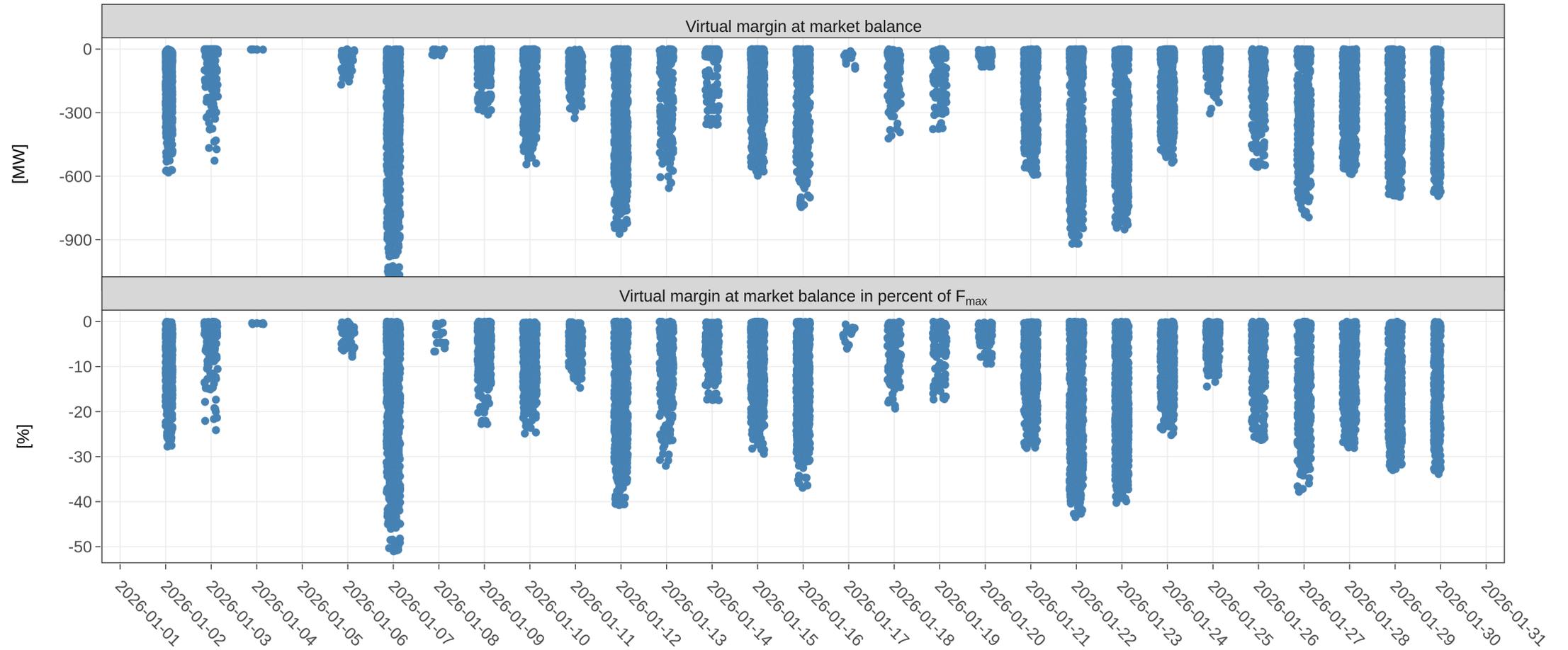
# KPI 6b: Virtual margins at market balance BE



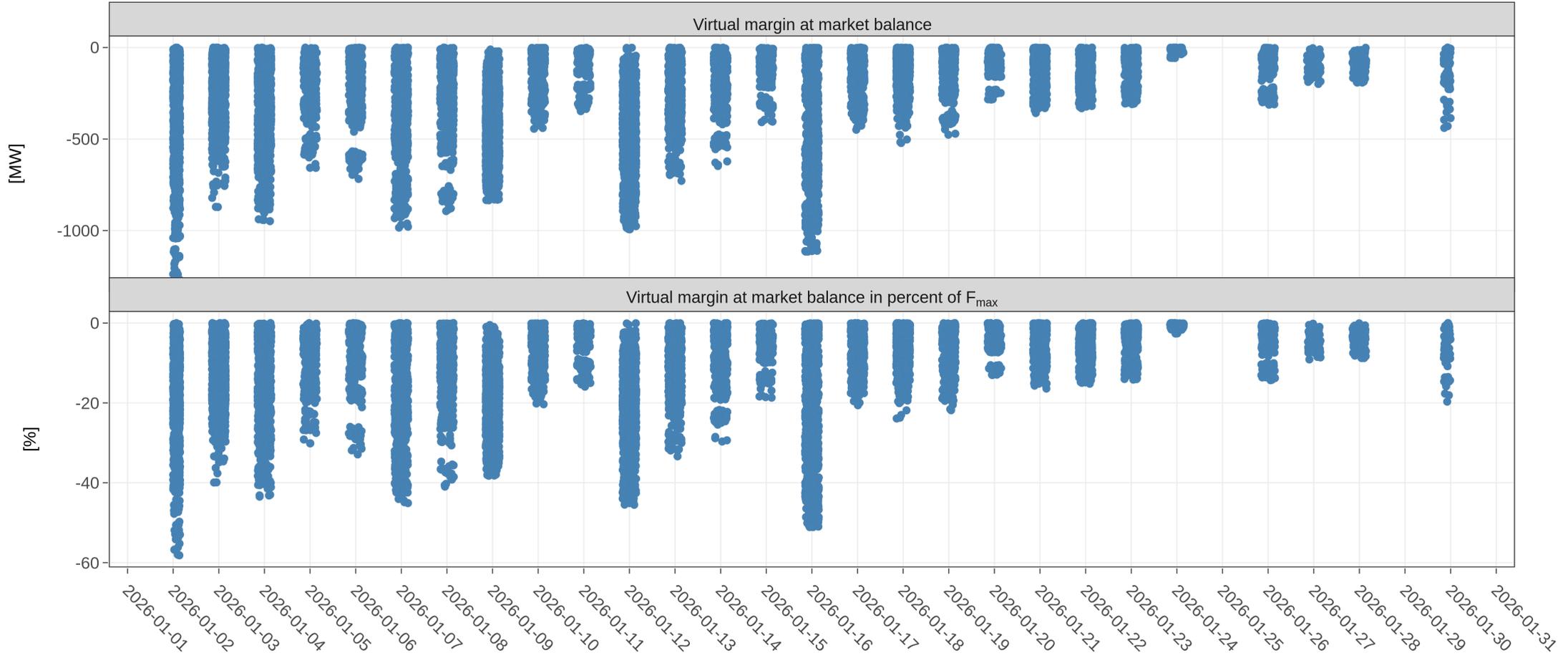
# KPI 6b: Virtual margins at market balance CZ



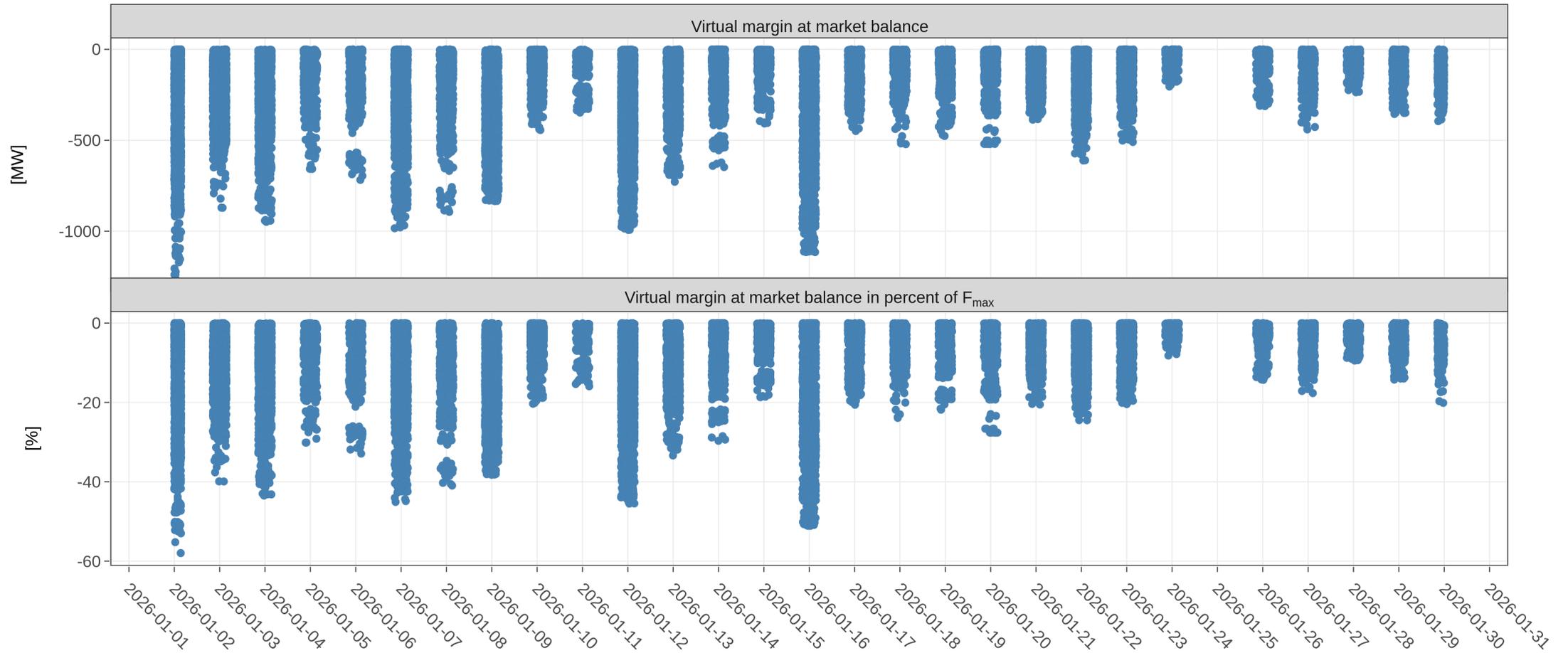
# KPI 6b: Virtual margins at market balance D2



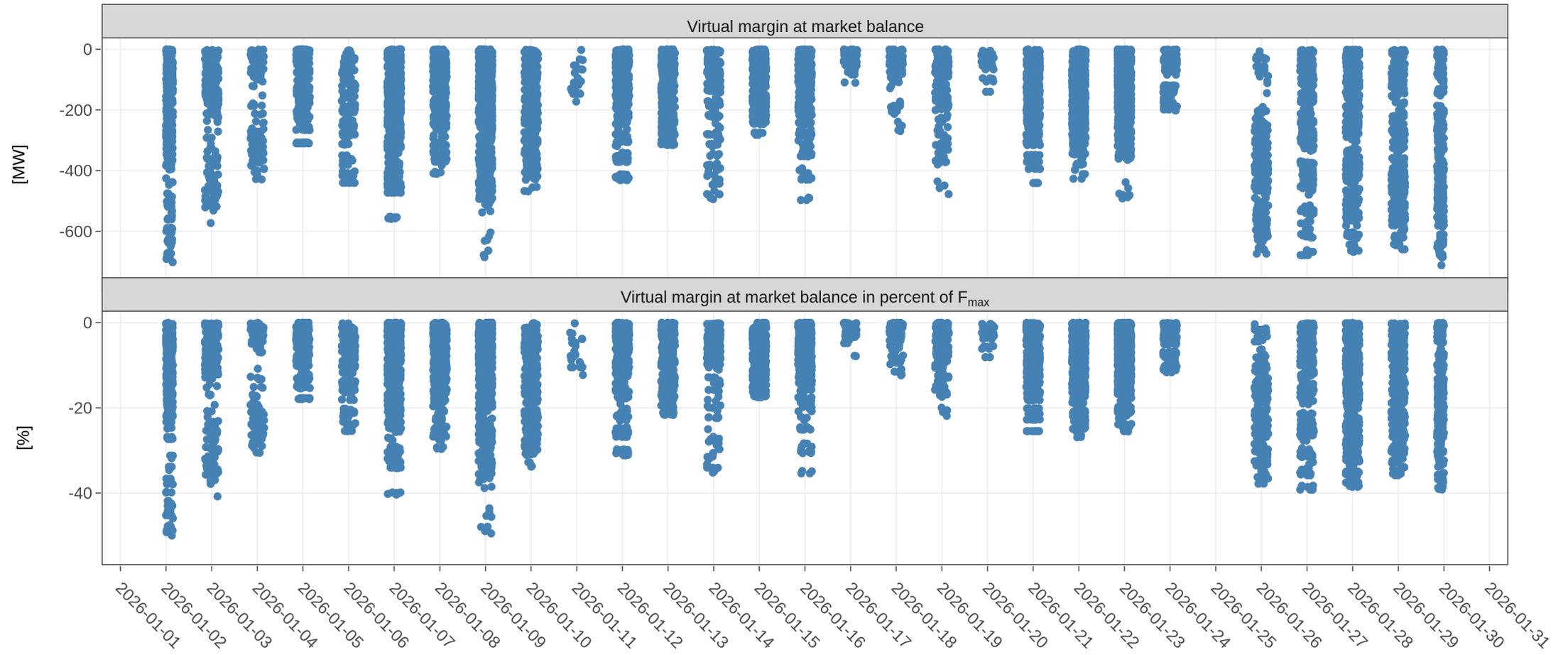
# KPI 6b: Virtual margins at market balance D4



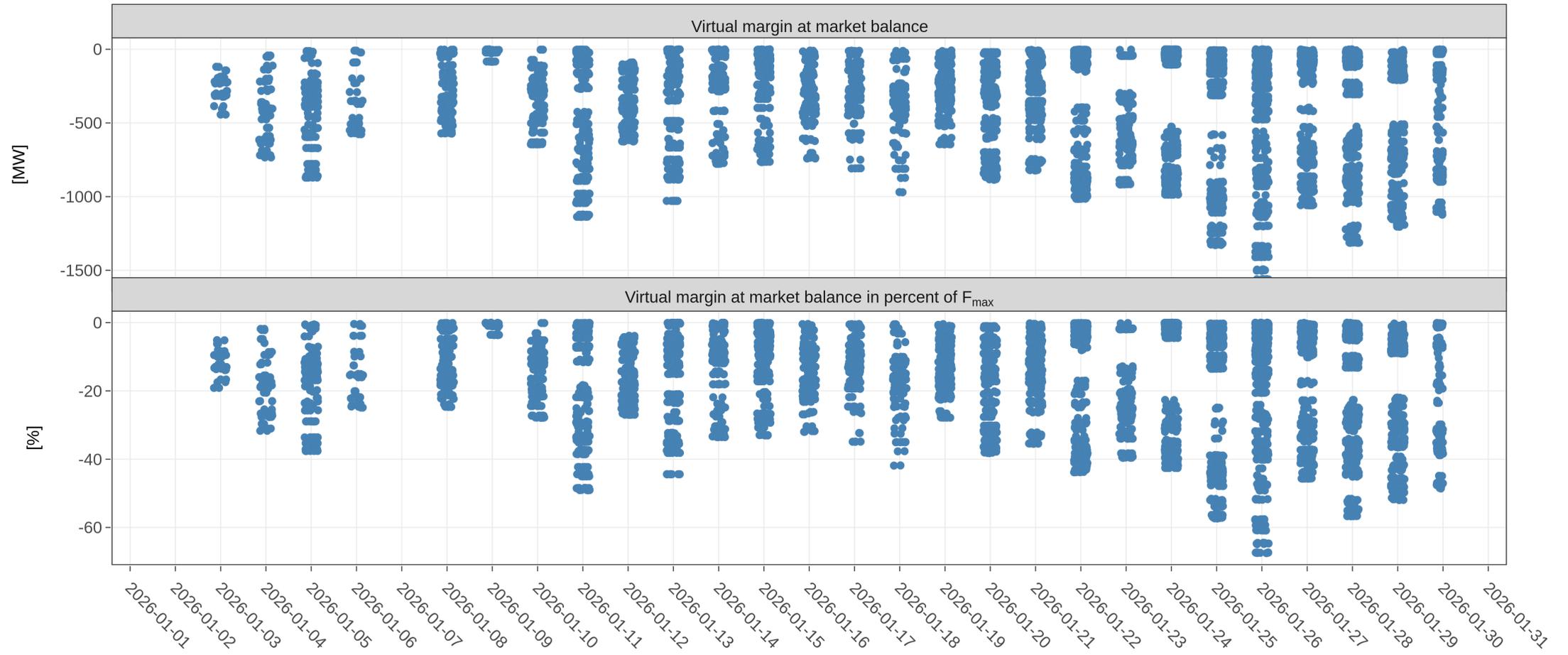
# KPI 6b: Virtual margins at market balance D7



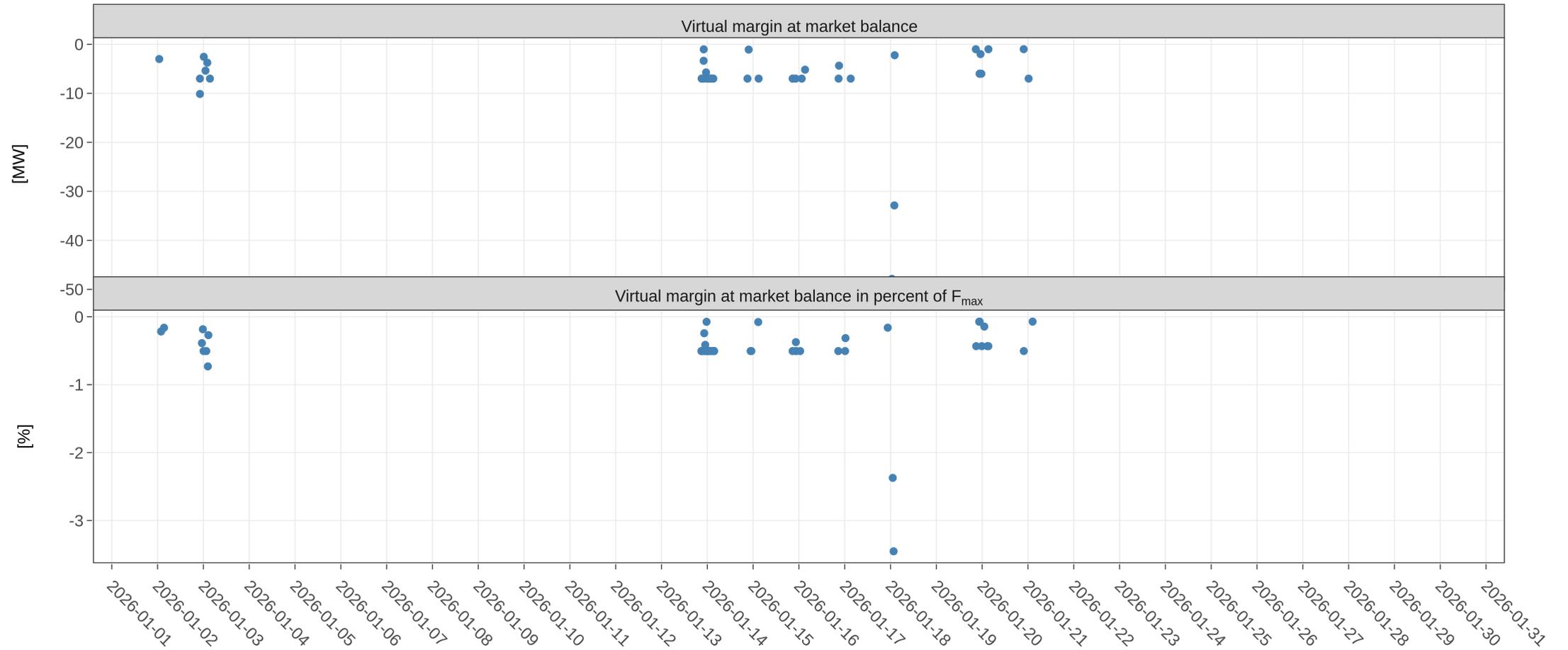
# KPI 6b: Virtual margins at market balance D8



# KPI 6b: Virtual margins at market balance FR



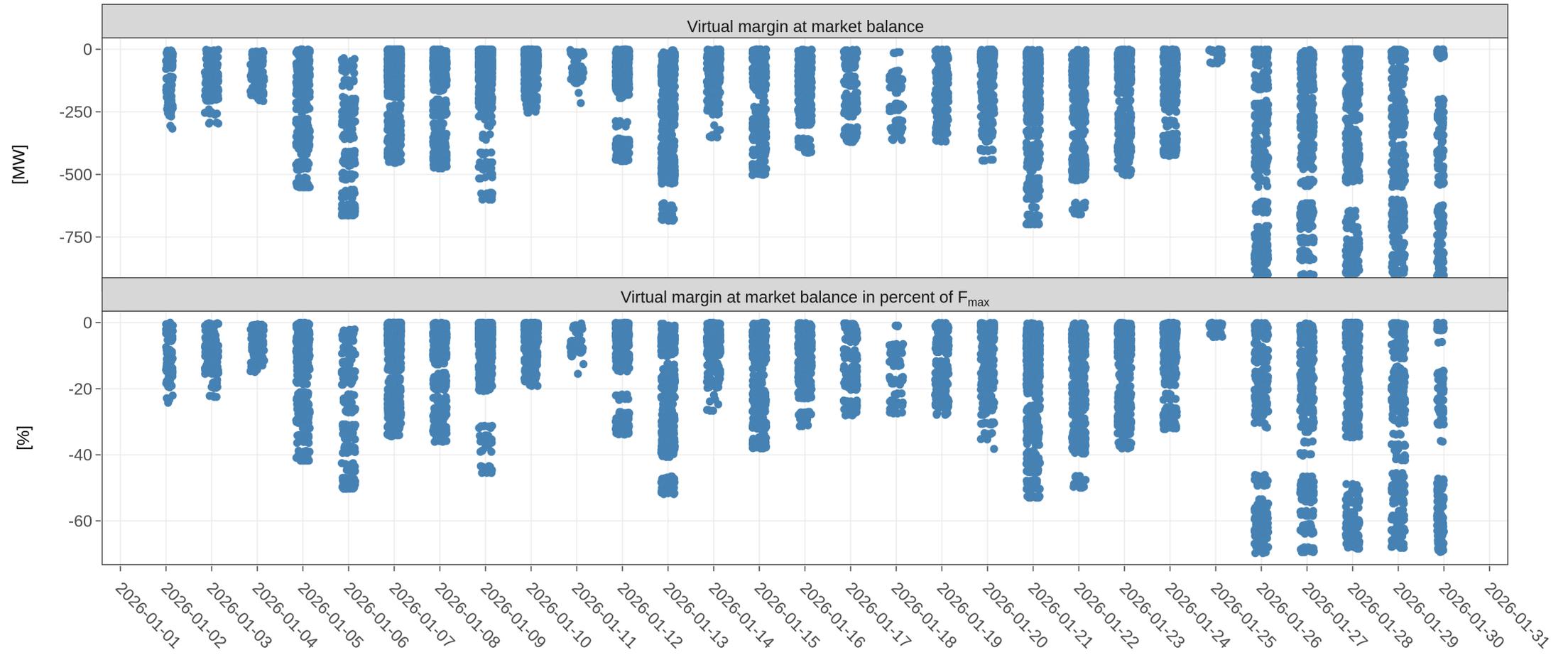
# KPI 6b: Virtual margins at market balance HU



# KPI 6b: Virtual margins at market balance NL



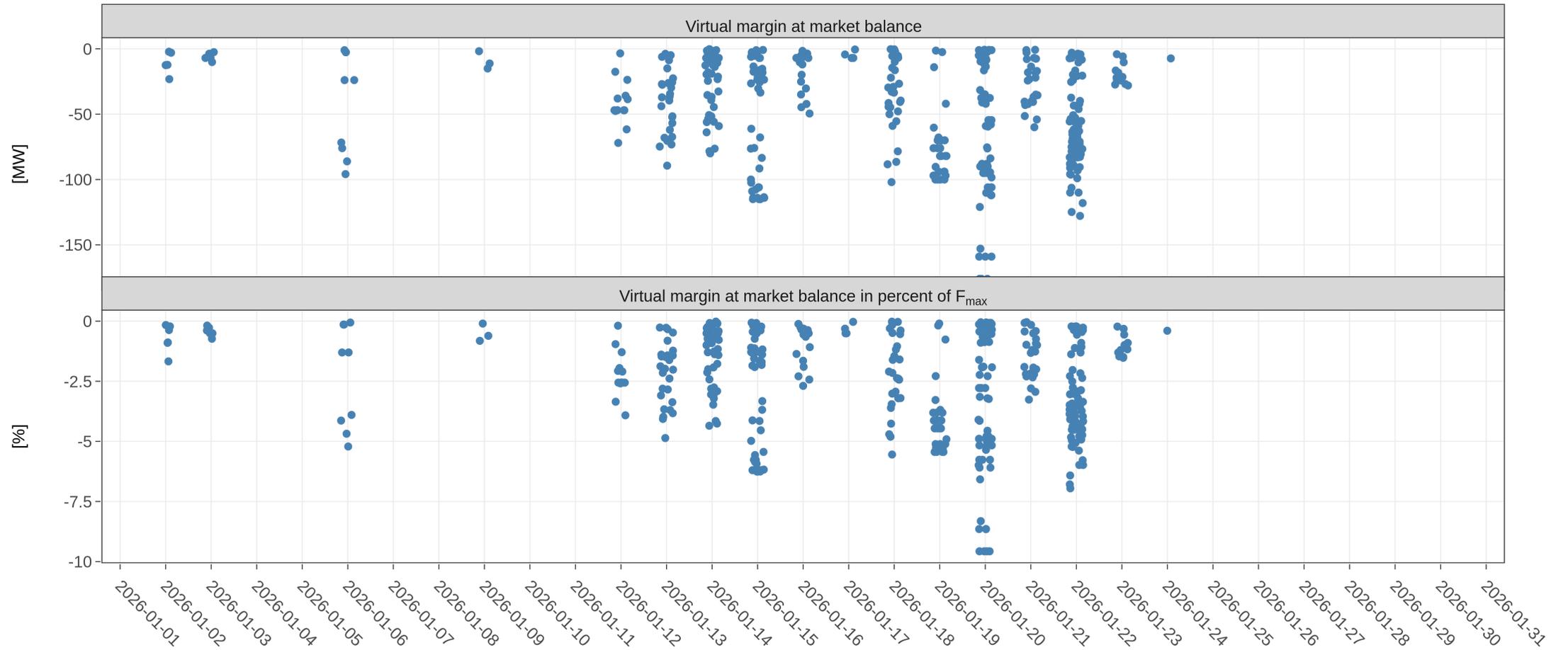
# KPI 6b: Virtual margins at market balance PL



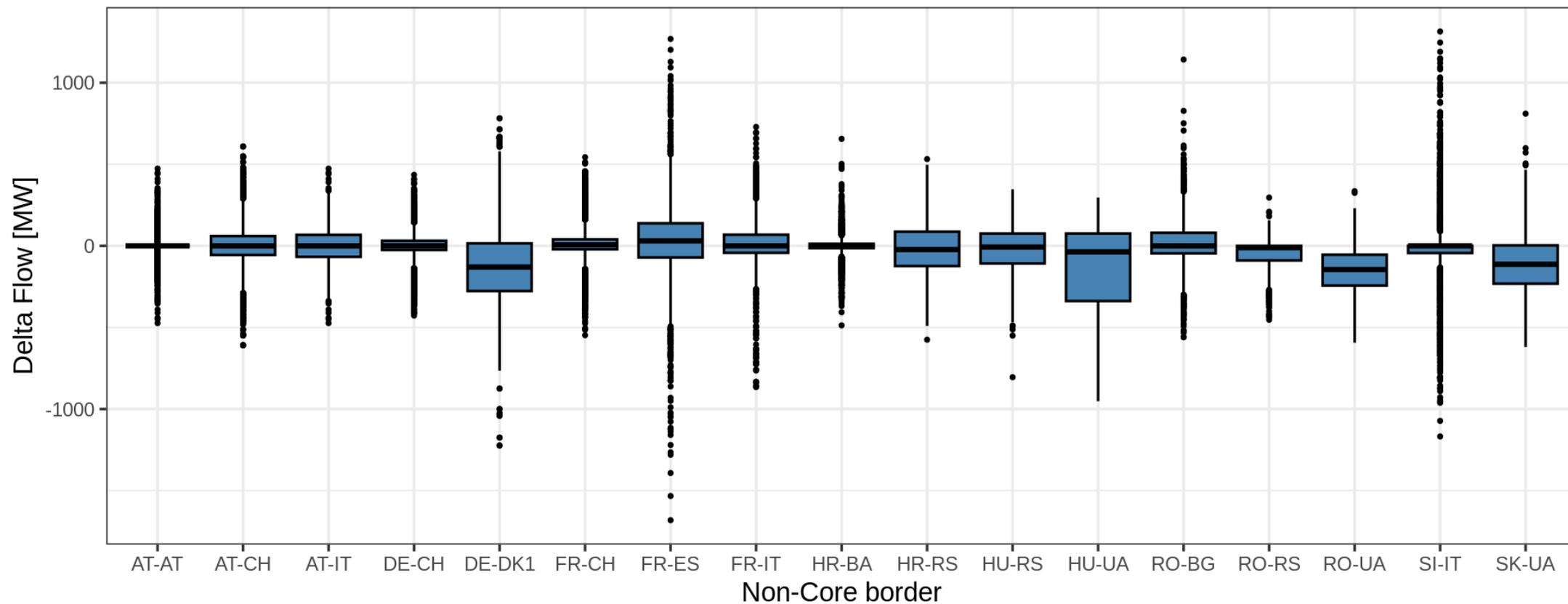
# KPI 6b: Virtual margins at market balance RO



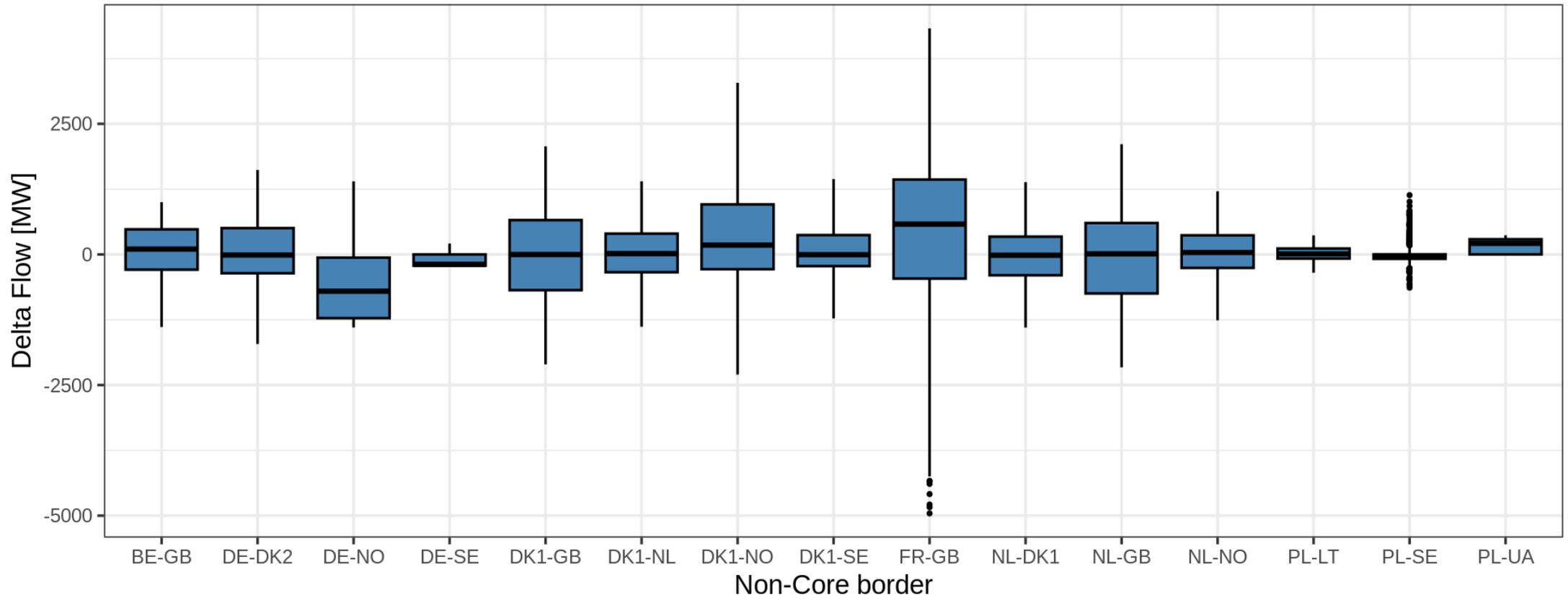
# KPI 6b: Virtual margins at market balance SK



# KPI 7: Non-Core exchanges AC delta flow



# KPI 7: Non-Core exchanges DC delta flow



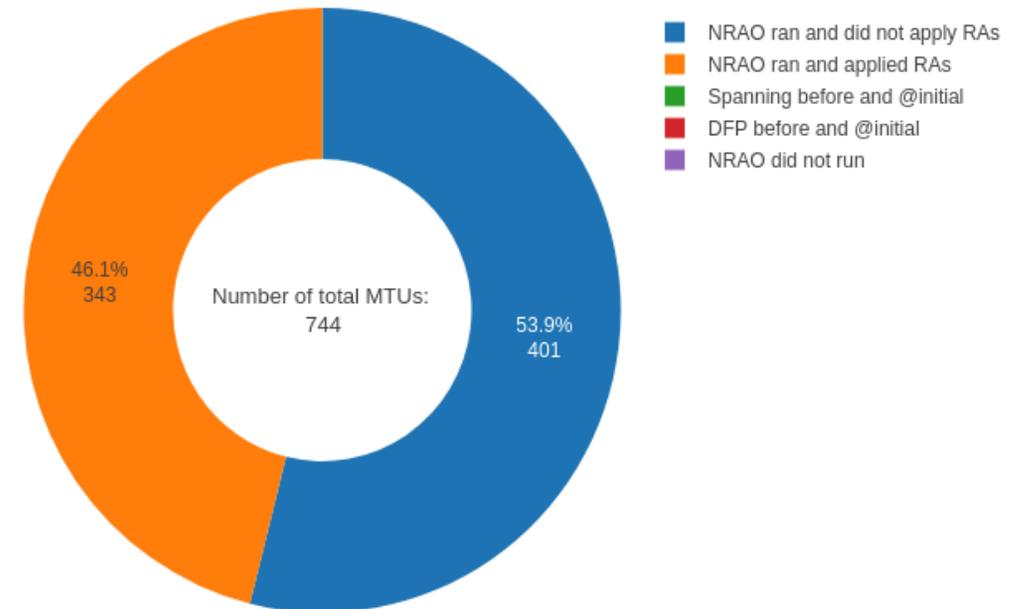
# KPI 8: NRAO – Applied Remedial Action



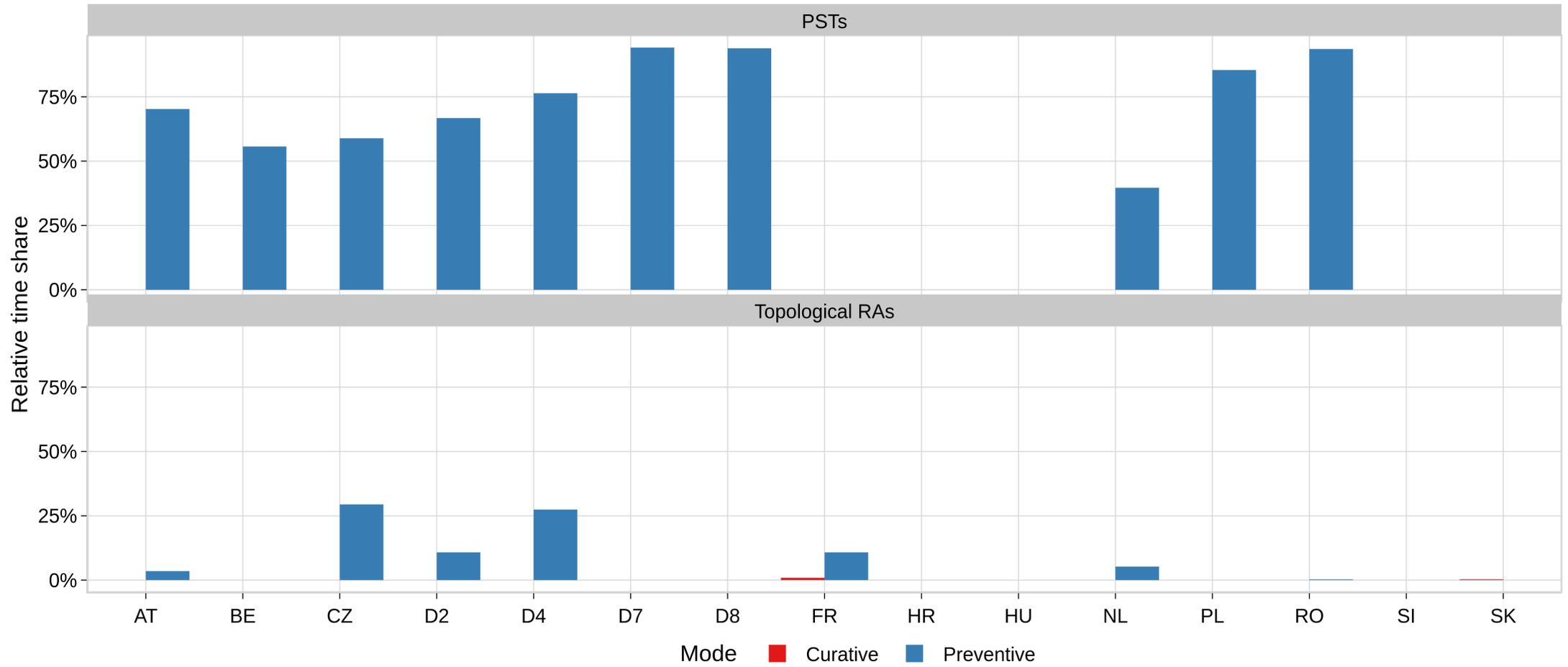
In the following plots, the relative time share relates to the hours labeled 'NRAO Ran and Applied RAs'.

Total MTUs: 744 hours

Category	Hours (%)
NRAO ran and did not apply RAs	401 hours (53.9%)
NRAO ran and applied RAs	343 hours (46.1%)
Spanning before and @initial	0 hours (0%)
DFP before and @initial	0 hours (0%)
NRAO did not run	0 hours (0%)

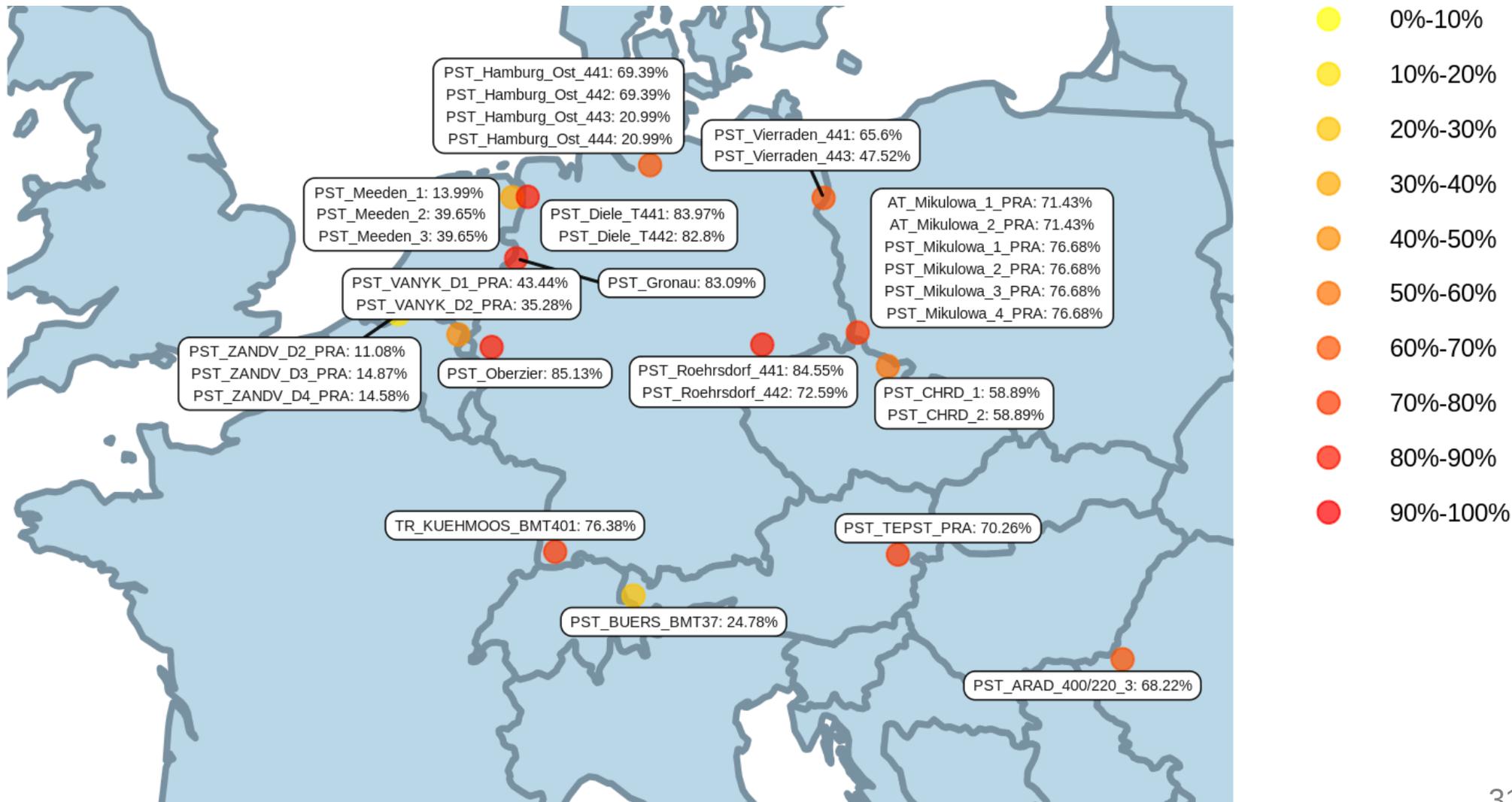


# KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode



# 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

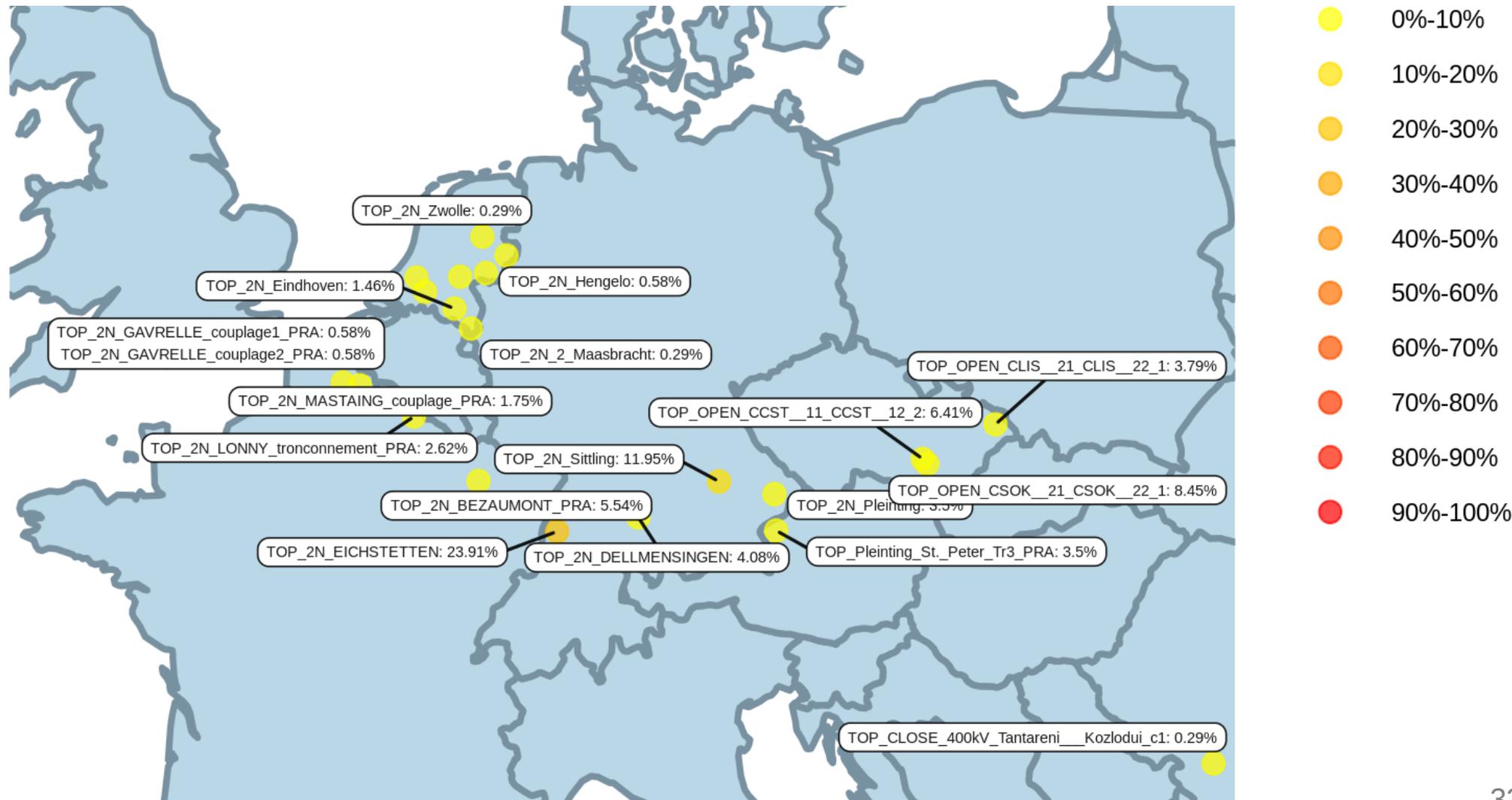


## Relative Time Share of Applied PSTs in Curative Mode



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

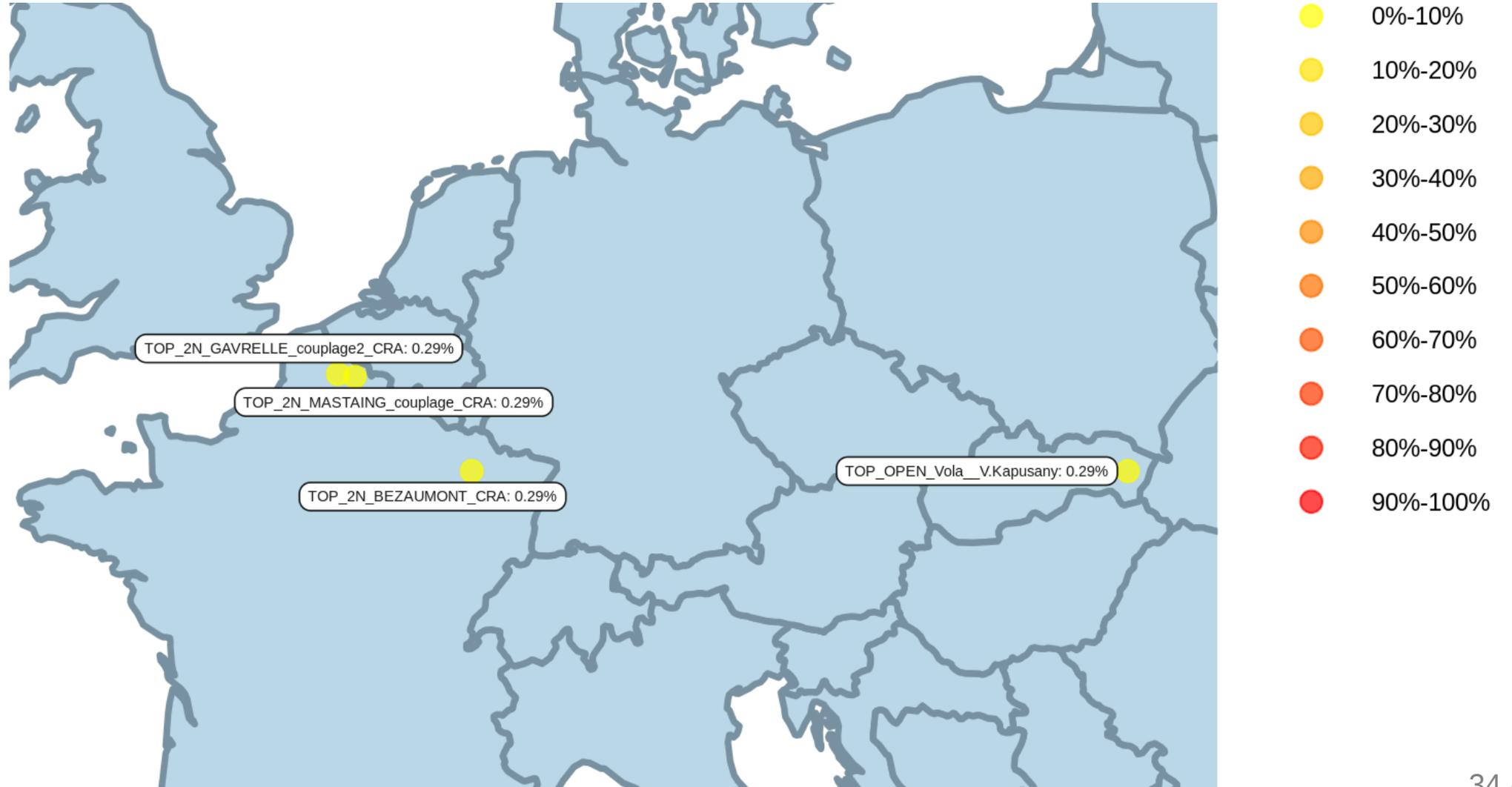
## Relative Time Share of Applied Topological RAs in Preventive Mode



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



## Relative Time Share of Applied Topological RAs in Curative Mode

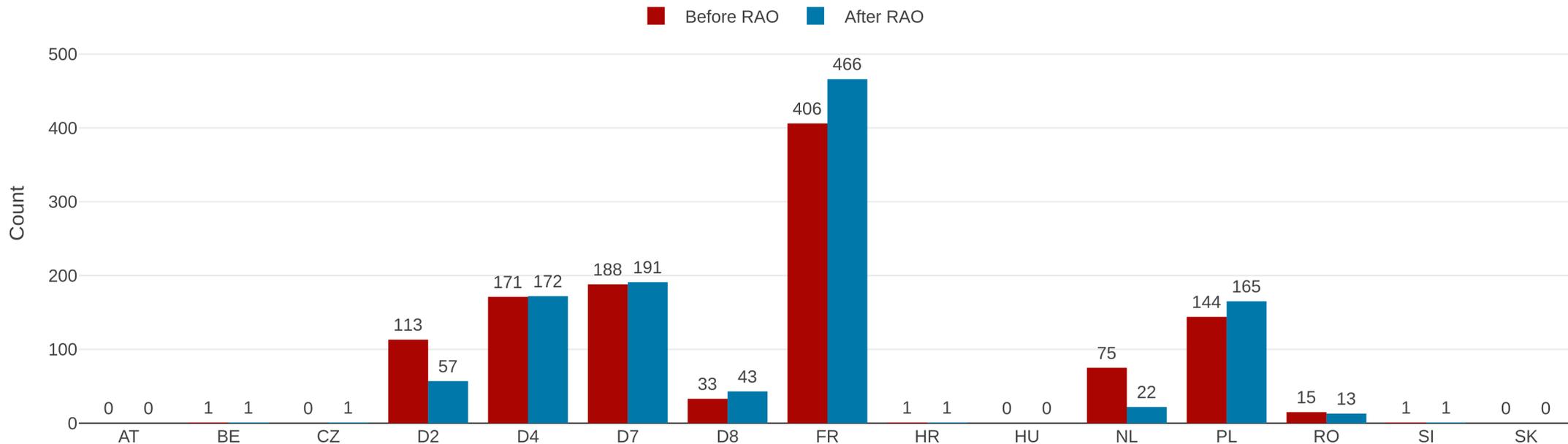


# KPI 9: Most limiting CNEC per TSO (NRAO)



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

Distribution of Limiting CNECs per TSO



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

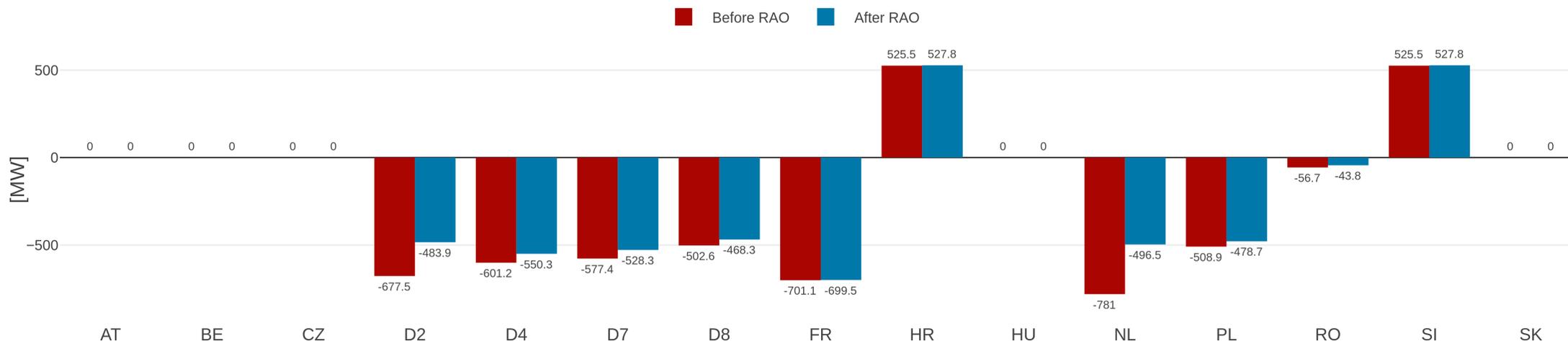


The graph shows average values of relative RAM before and after NRAO, per TSO on the most limiting CNECs from NRAO perspective. Selected CNECs before RAO are the same as after RAO, and average computed for MTUs when was used further in the process.

- 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

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

RelRAM comparison before/after RAO



# 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
[HU-HU] Gonyu - Gyor [DIR]	744	1904	73.74%	59.24%	102.31%	0.2859	1.2659
[SK-UA] V.Kapusany - Mukachevo (WPS) [DIR] [SK]	744	744	61.02%	39.36%	77.92%	0.2195	0.7802
[CZ-PL] Wielopole - Nosovice [DIR] [PL]	744	1576	68.28%	27.13%	83.62%	0.336	1.1567
[CZ-PL] Wielopole - Nosovice [OPP] [PL]	744	1382	124.54%	93.29%	154.91%	0.3313	1.1375
[CZ-SK] Nosovice - Varin [DIR] [CZ]	744	2055	78.98%	58.87%	105.34%	0.368	1.4254
[SI-HU] Cirkovce - Heviz [OPP] [HU]	744	744	77.29%	64.57%	95.45%	0.2158	1.0233
[SI-HU] 400 kV Cirkovce - Hevitz [OPP] [SI]	744	1488	76.98%	62.85%	95.67%	0.1759	0.8845
[CZ-SK] Nosovice - Varin [OPP] [CZ]	744	1498	99.87%	74.60%	118.18%	0.368	1.4254
[CZ-SK] Nosovice - Varin [OPP] [SK]	744	744	100.87%	84.05%	117.17%	0.3069	1.1973
[D8-D8] Roehrsdorf - Roehrsdorf PST442 [DIR]	744	744	57.29%	34.38%	79.29%	0.2742	1.1067
[HR-SI] 220kV Pehlin - Divaca [OPP] [HR]	744	1488	122.44%	90.37%	162.57%	0.1915	0.452
[HU-HU] Gonyu - Gyor [OPP]	744	774	114.61%	77.63%	139.90%	0.2859	1.2659
[HR-SI] 220kV Pehlin - Divaca [DIR] [HR]	743	832	52.99%	22.73%	81.02%	0.1915	0.452
[SK-SK] H.Zdana - Sucany [DIR]	743	780	74.48%	67.97%	81.46%	0.1524	0.6112
[SK-SK] V.Dur - Levice 1 [DIR]	742	742	40.98%	32.68%	53.67%	0.1727	0.7205
[SI-HU] 400 kV Cirkovce - Hevitz [DIR] [SI]	742	1493	103.53%	84.31%	125.70%	0.1759	0.8845
[RO-RO] TR Rosiori 400/220 1 [DIR]	742	742	49.25%	22.50%	79.38%	0.1267	0.2256
[AT-AT] Sarasdorf - Zurndorf 439A [OPP]	740	740	80.01%	46.96%	99.81%	0.3167	1.2866
[CZ-SK] Nosovice - Varin [DIR] [SK]	738	2067	76.38%	59.52%	95.89%	0.3036	1.1817
[AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT]	732	1023	73.19%	26.90%	117.88%	0.1334	0.5145

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-FR] Creys - Saint-Vulbas 2 [OPP]	275	275	795.17	21.09%	19.98%	34.53%	0.1447
[D2-D2] Altheim - Sittling 219 [OPP]	216	216	3364.76	57.00%	32.95%	91.07%	0.084
[SK-HU] Levice - God [DIR] [HU]	187	187	968.77	50.89%	38.74%	62.77%	0.2276
[D8-PL] Mikulowa PST1 [DIR] [PL]	185	185	1301.9	41.60%	19.70%	69.02%	0.3779
[AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT]	151	151	1383.76	70.20%	28.88%	106.25%	0.1249
[NL-NL] MEE DRT2 [DIR] [NL]	146	146	339.29	31.20%	19.96%	58.75%	0.3089
[CZ-SK] Nosovice - Varin [DIR] [CZ]	136	143	707.23	72.07%	58.87%	91.49%	0.3116
[NL-NL] Krimpen a/d IJssel-Geertruidenberg 380 W [DIR]	132	132	181.75	57.13%	33.20%	99.48%	0.5209
[D8-D8] Roehrsdorf - Roehrsdorf PST442 [DIR]	128	128	597.3	56.34%	42.85%	74.66%	0.2569
[SK-SK] V.Dur - Levice 1 [DIR]	128	128	2145.06	38.26%	33.06%	48.45%	0.1718
[D7-FR] Ensdorf - Vigy VIGY2 S [OPP] [FR]	98	98	1475.24	22.95%	19.96%	40.92%	0.2183
[FR-FR] Creys - Saint-Vulbas 1 [OPP]	94	94	779.13	20.28%	19.98%	25.25%	0.1438
[NL-BE] PST Zandvliet 3 [DIR] [BE]	93	93	145.47	79.10%	37.30%	104.58%	0.4124
[D2-D2] Altheim - Sittling 220 [OPP]	83	83	3011.26	58.43%	32.64%	91.46%	0.0797
[SK-UA] V.Kapusany - Mukachevo (WPS) [DIR] [SK]	78	78	1067.15	53.87%	39.36%	70.85%	0.2145
[AT-SI] Kainachtal - Maribor 473 [DIR] [AT]	65	65	41.03	69.24%	52.63%	93.76%	0.3914
[RO-RO] Resita - Timisoara c1 [DIR]	63	63	1289.19	28.67%	20.59%	39.30%	0.084
[RO-RO] TR Rosiori 400/220 1 [DIR]	60	60	2073.95	41.65%	22.50%	55.42%	0.1061
[D8-D8] Vierraden - Vierraden PST441 [DIR]	51	51	920.81	58.70%	42.21%	68.04%	0.3247
[NL-BE] Maasbracht - Van Eyck 380 White/28 [DIR] [BE]	45	48	205.33	96.80%	77.29%	116.32%	0.3422

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	595
AC < 0 MW	202
AC = 0 MW	355
AC > 0 MW	38

	PL AC Import [MW]	PL AC Export [MW]
Avg.	-2719.26	4389.3
Min.	-11202.00	0.0
Max.	0.00	17051.0

