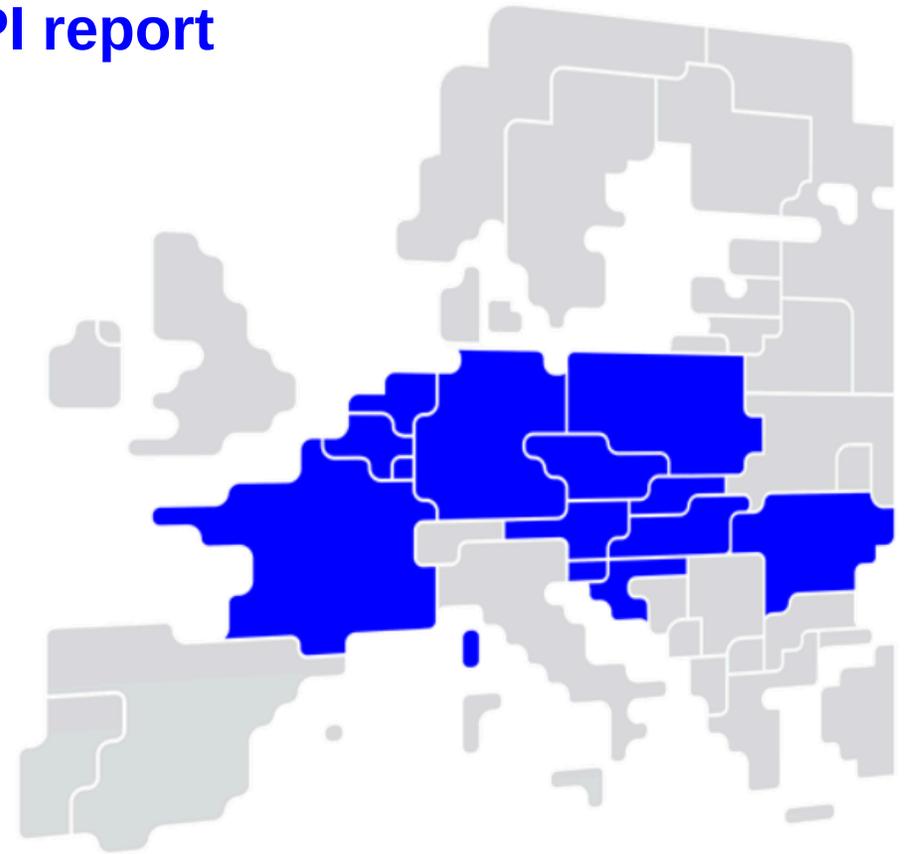


Core FB MC Operational KPI report

November 2025



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

- KPI 3: Share of MTUs with intervention per TSO
- KPI 4: Average IVA applied for each CNE affected by TSO intervention

Power System Impact Analysis

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Non-costly Remedial Action Optimization Analysis

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- 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)

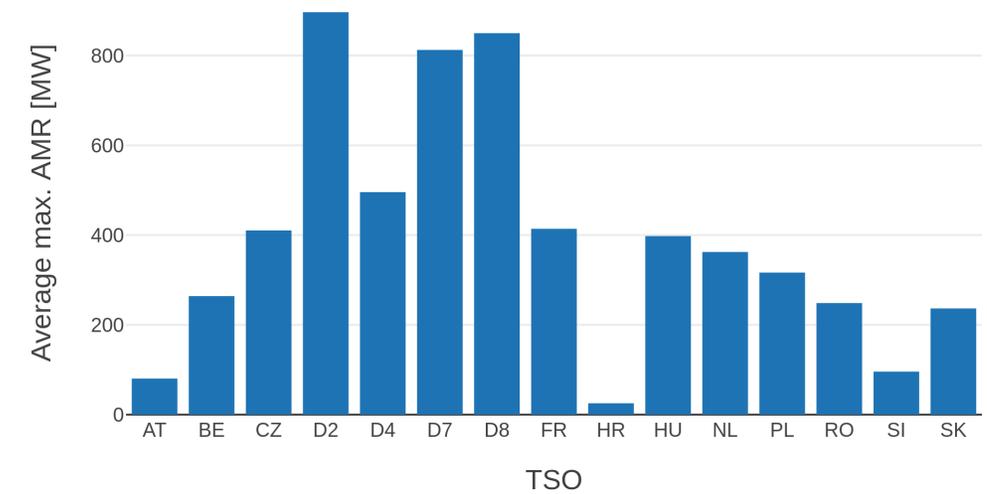
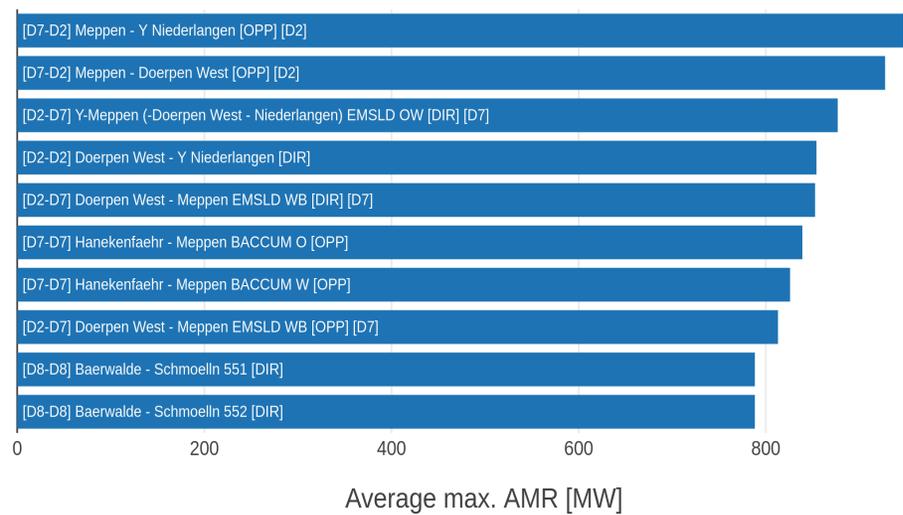
KPI 2: Average maximum AMR per TSO



CNE	Avg. Max. AMR (MW)	AMR/Fmax%	
		(MTUs with AMR > 0 MW)	AMR/Fmax% (all MTUs)
[D7-D2] Meppen - Y Niederlangen [OPP] [D2]	947.76	47.25%	34.84%
[D7-D2] Meppen - Doerpen West [OPP] [D2]	927.49	46.24%	34.10%
[D2-D7] Y-Meppen (-Doerpen West - Niederlangen) EMSLD OW [DIR] [D7]	876.83	35.16%	23.98%
[D2-D2] Doerpen West - Y Niederlangen [DIR]	854.13	42.58%	30.99%
[D2-D7] Doerpen West - Meppen EMSLD WB [DIR] [D7]	852.61	34.20%	23.42%
[D7-D7] Hanekenfaehr - Meppen BACCUM O [OPP]	839.03	35.21%	23.92%
[D7-D7] Hanekenfaehr - Meppen BACCUM W [OPP]	825.89	34.85%	23.38%
[D2-D7] Doerpen West - Meppen EMSLD WB [OPP] [D7]	812.99	32.61%	21.92%
[D8-D8] Baerwalde - Schmoelln 552 [DIR]	788.29	31.61%	31.08%
[D8-D8] Baerwalde - Schmoelln 551 [DIR]	788.29	31.61%	31.08%

TSO	Average maximum AMR per TSO
AT	80.21
BE	263.89
CZ	410.27
D2	896.62
D4	495.79
D7	812.68
D8	849.93
FR	413.99
HR	25.19
HU	397.66

TSO	Average maximum AMR per TSO
NL	362.43
PL	316.59
RO	248.58
SI	95.91
SK	236.60



KPI 3: Share of MTUs with intervention per TSO



Total BDs

30

Total MTUs

720

MTUs without IVA

169

Share of distinct MTUs without IVA

23.47%

MTUs with IVA

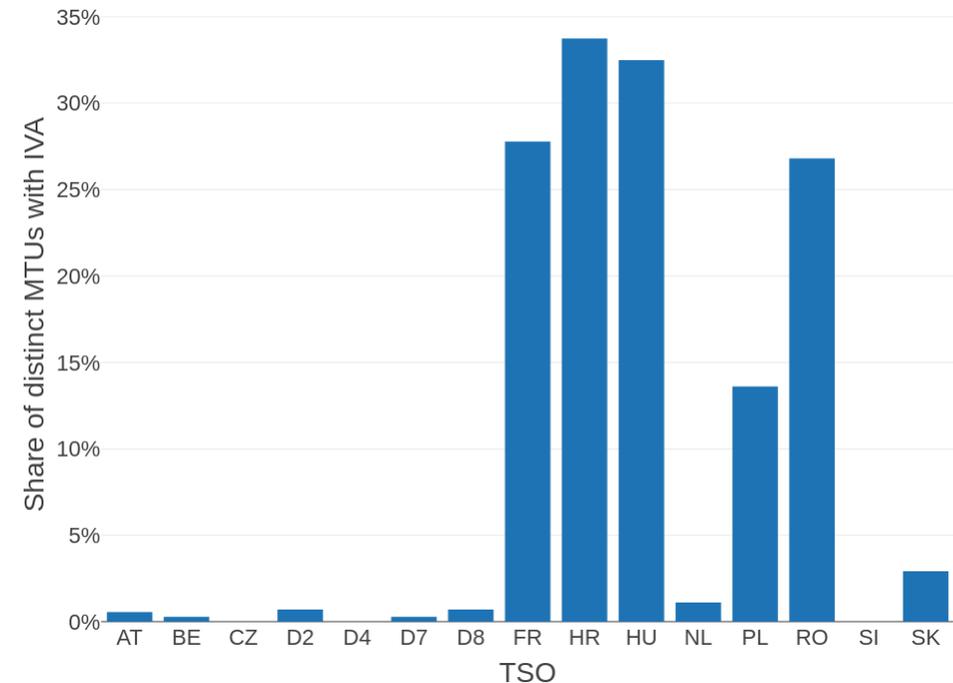
551

Share of distinct MTUs with IVA

76.5%

TSO	Share of distinct MTUs with IVA	Distinct MTUs with IVA
AT	0.56%	4
BE	0.28%	2
CZ	0.00%	0
D2	0.69%	5
D4	0.00%	0
D7	0.28%	2
D8	0.69%	5
FR	27.78%	200
HR	33.75%	243
HU	32.50%	234

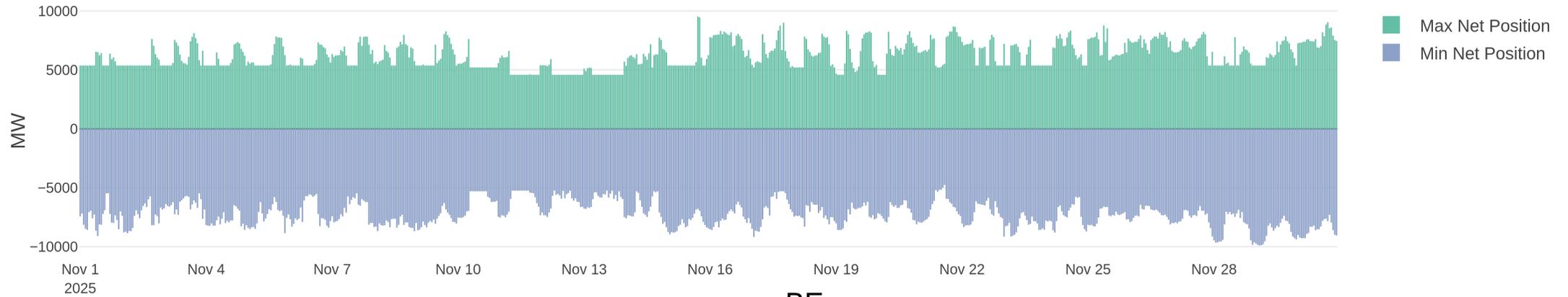
TSO	Share of distinct MTUs with IVA	Distinct MTUs with IVA
NL	1.11%	8
PL	13.61%	98
RO	26.81%	193
SI	0.00%	0
SK	2.92%	21



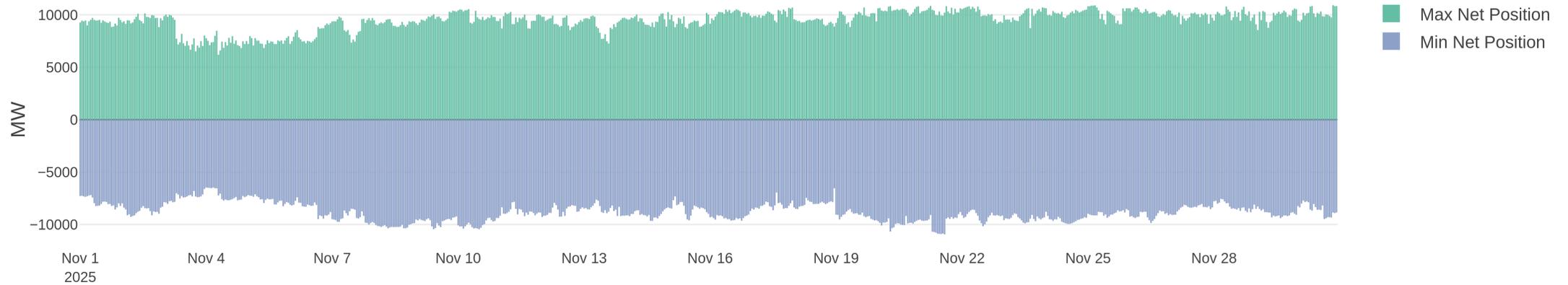
KPI 5: Min & max net positions per BZ hub



AT



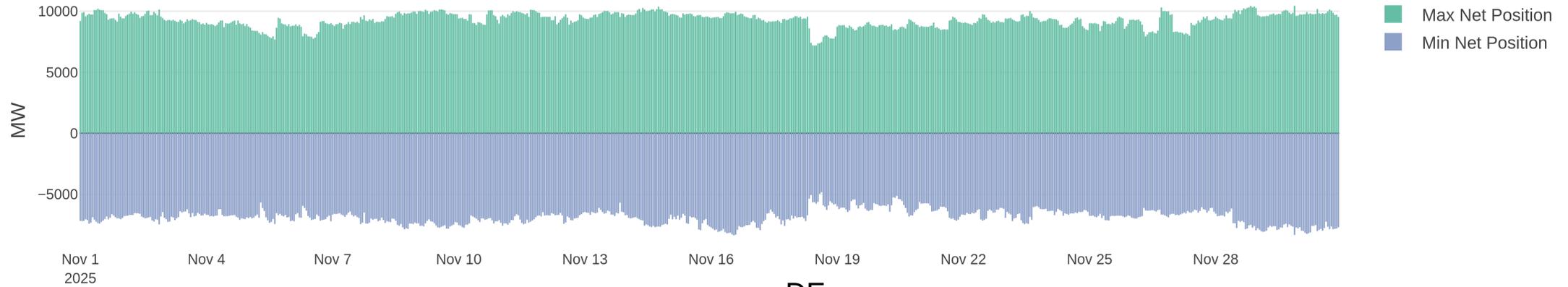
BE



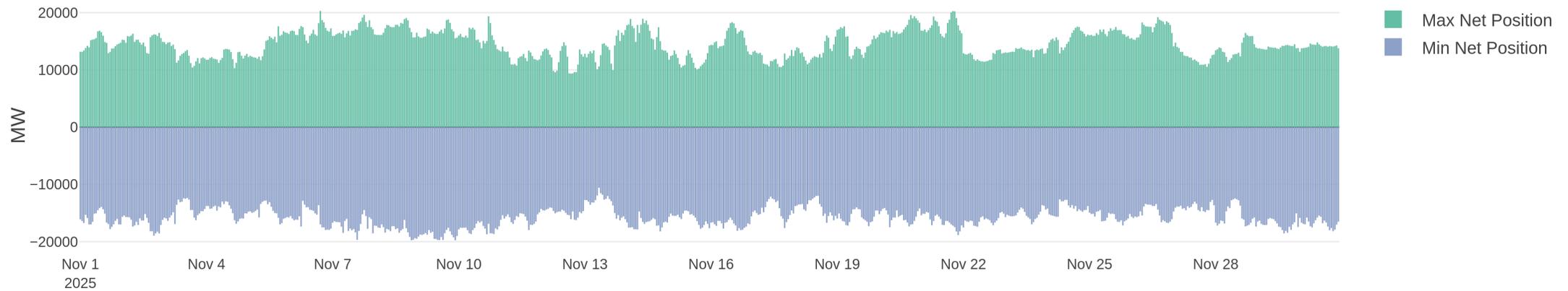
KPI 5: Min & max net positions per BZ hub



CZ



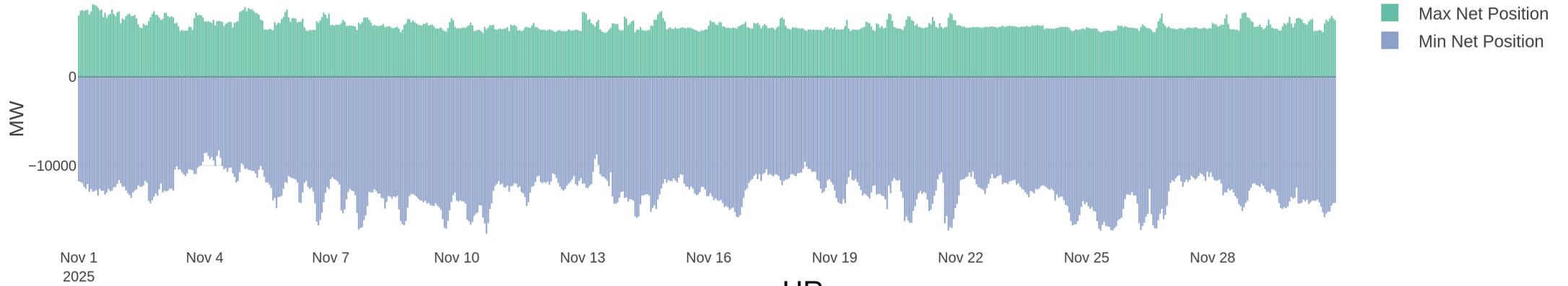
DE



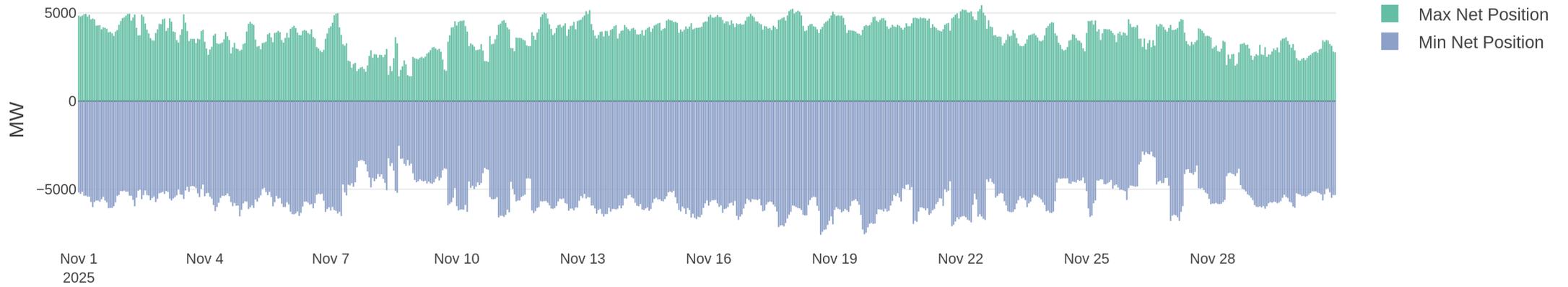
KPI 5: Min & max net positions per BZ hub



FR



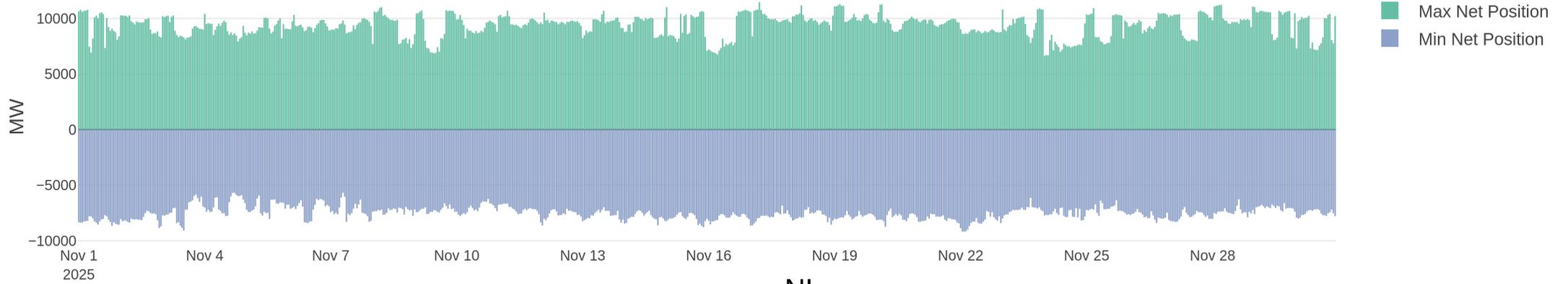
HR



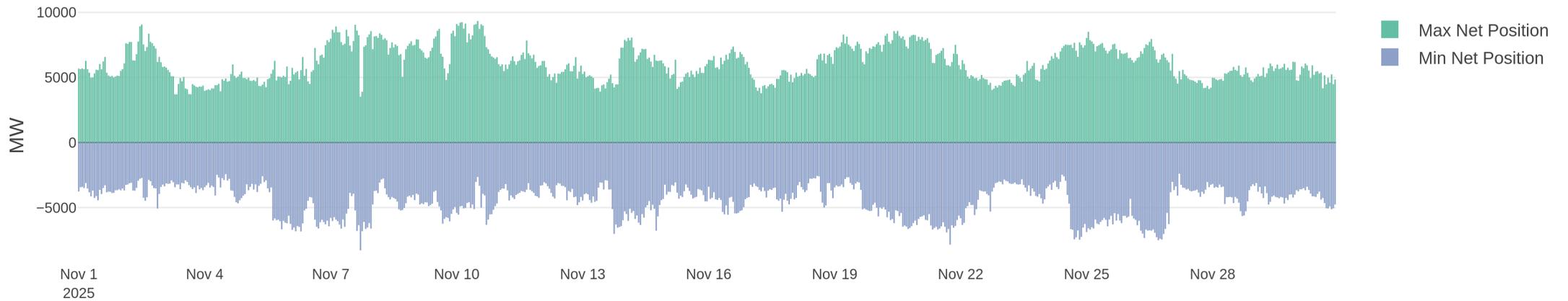
KPI 5: Min & max net positions per BZ hub



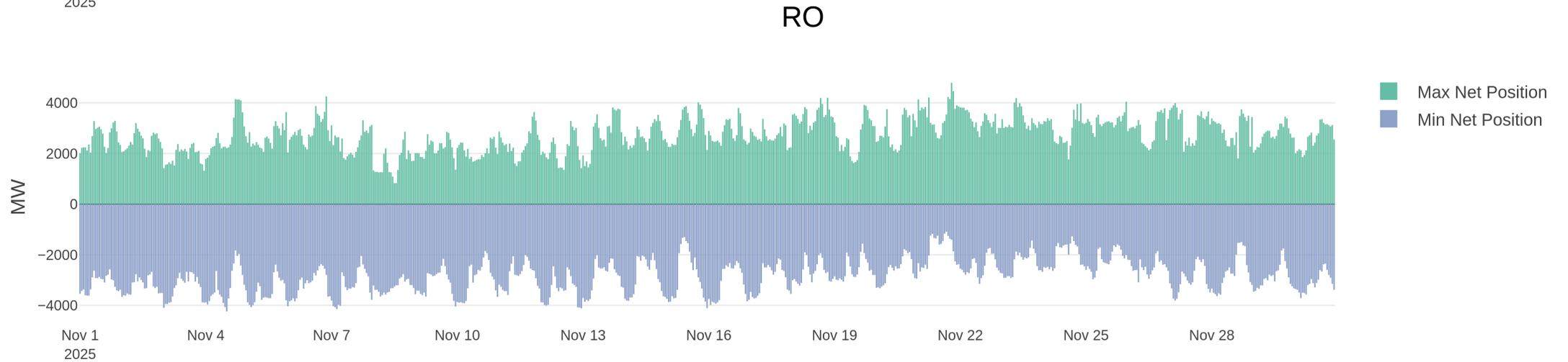
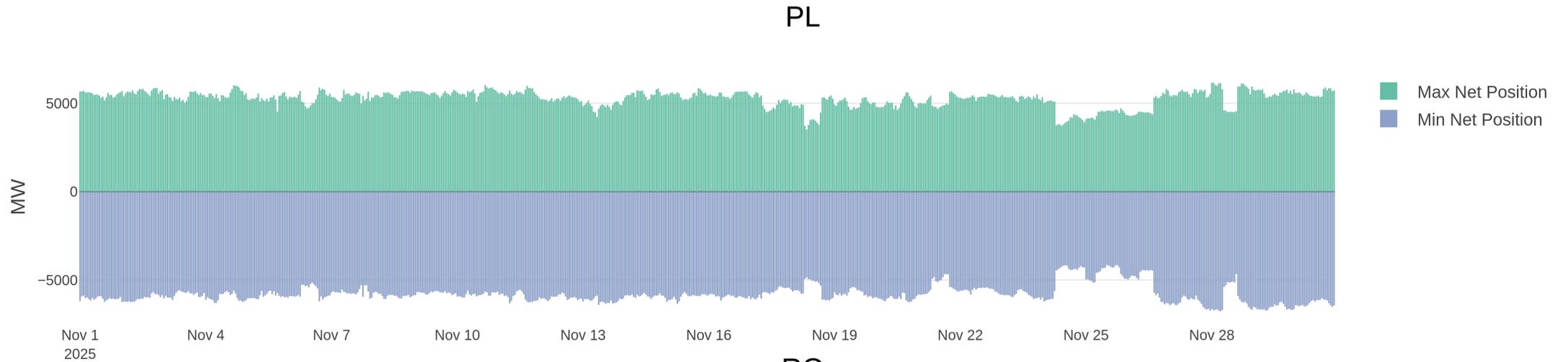
HU



NL



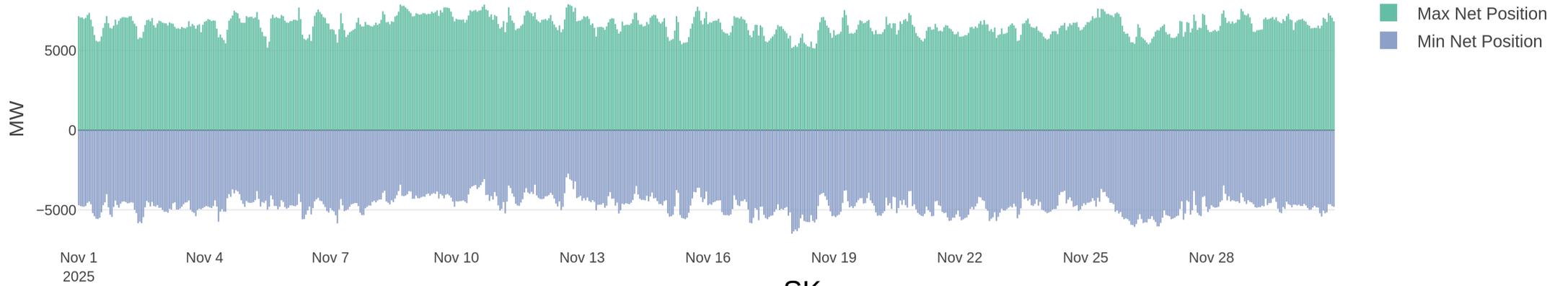
KPI 5: Min & max net positions per BZ hub



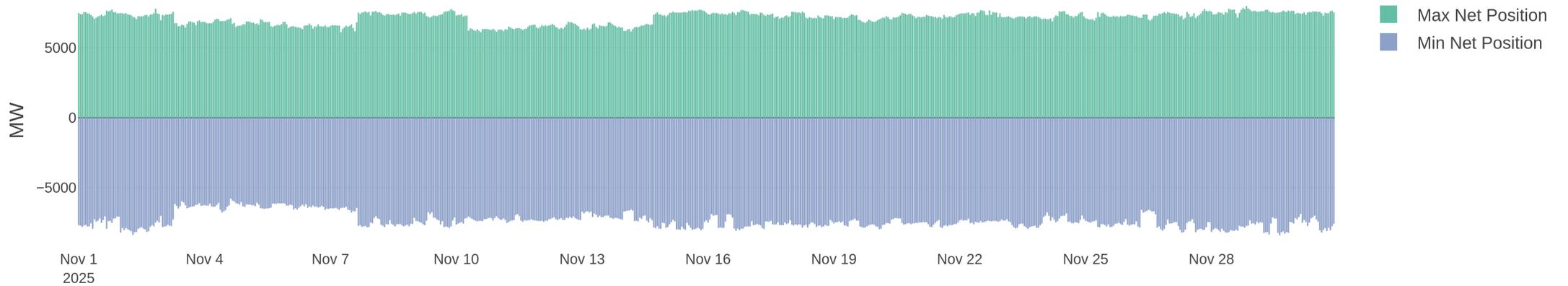
KPI 5: Min & max net positions per BZ hub



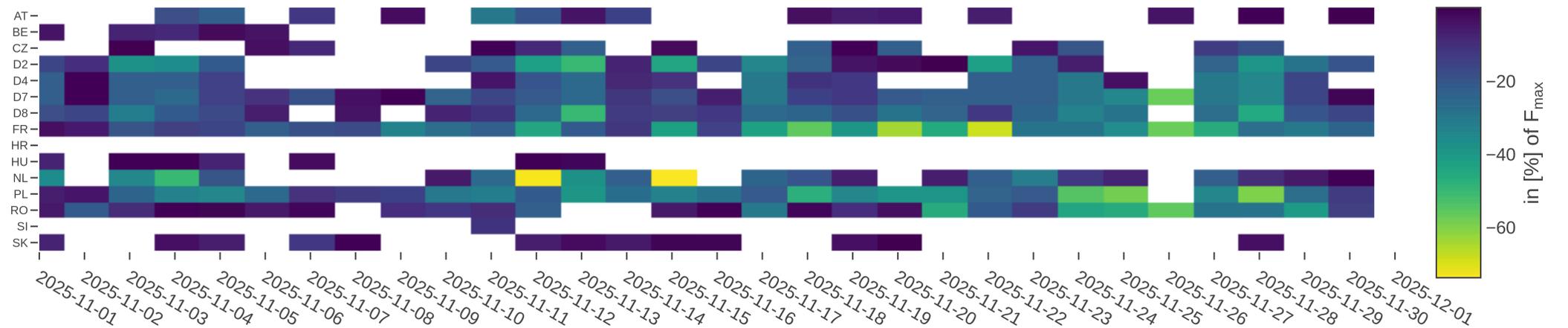
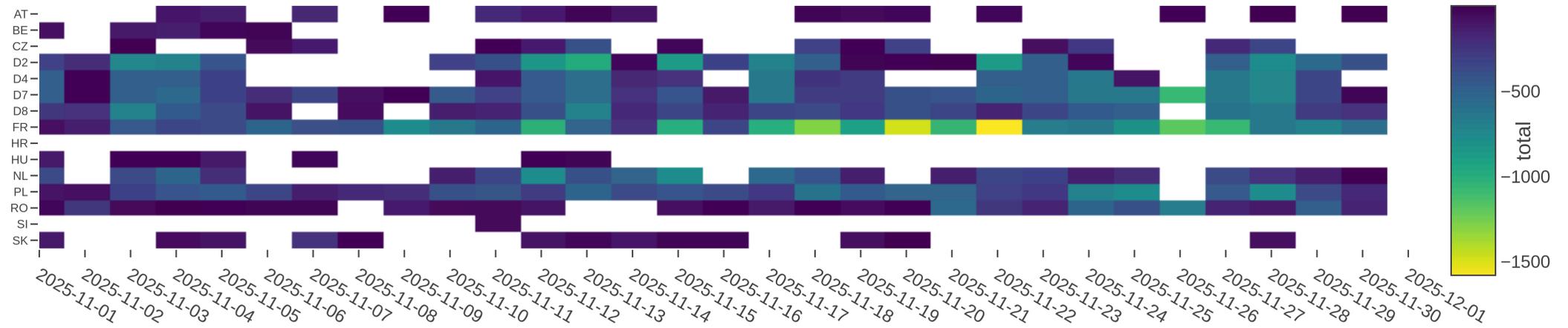
SI



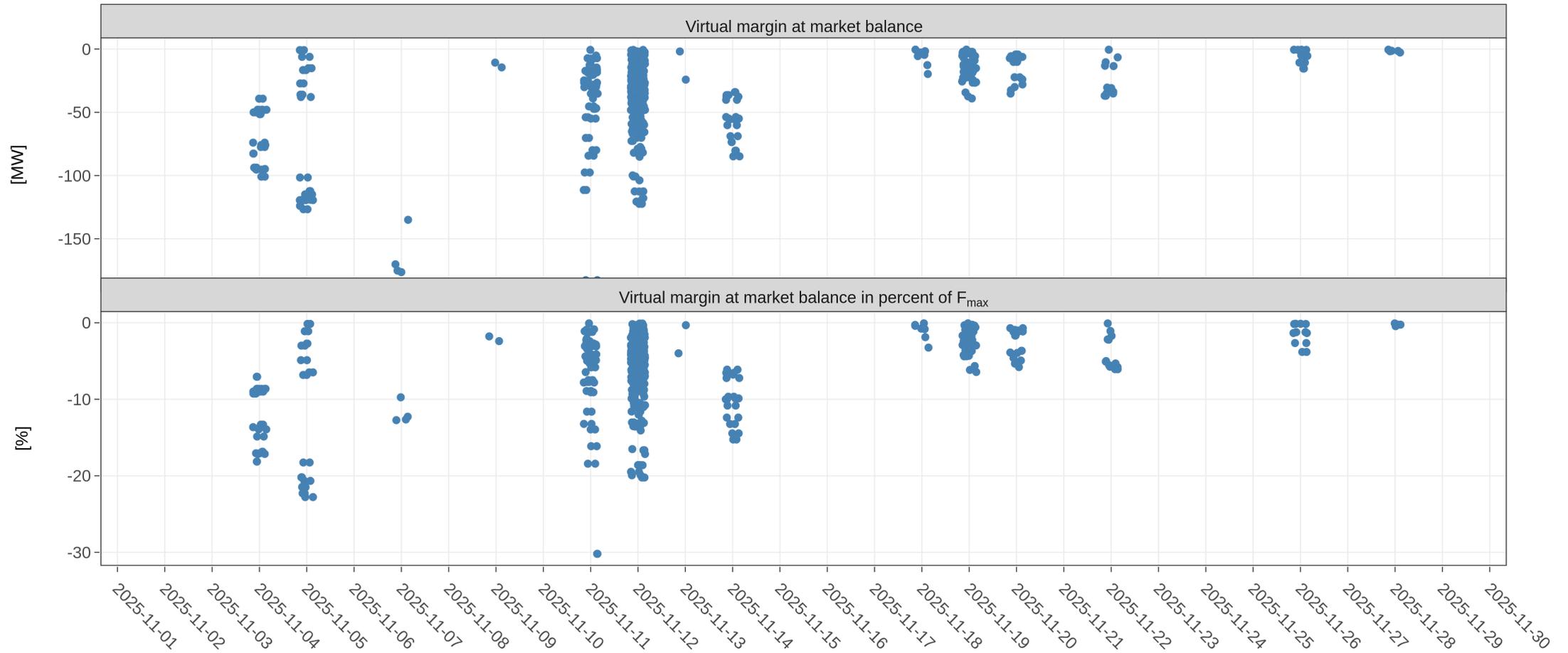
SK



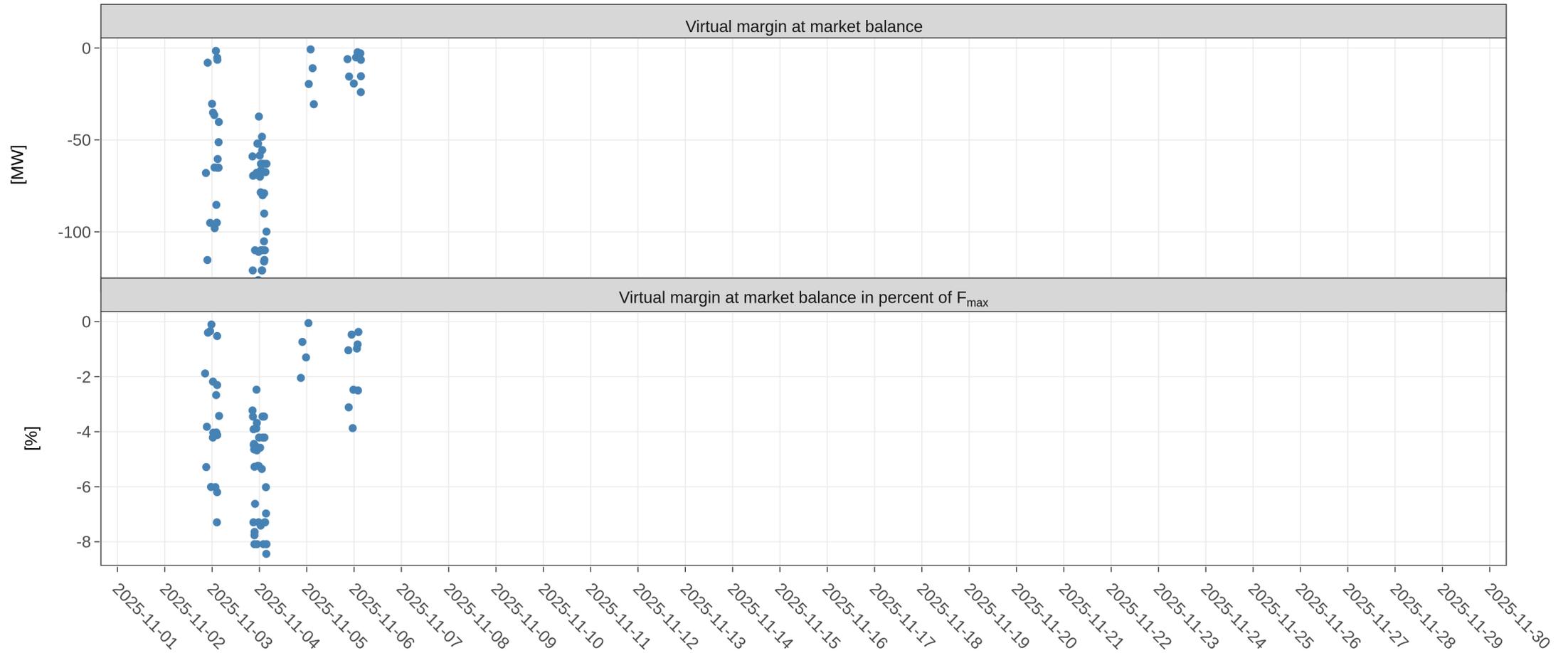
KPI 6a: Highest virtual margins at market balance for CORE TSOs



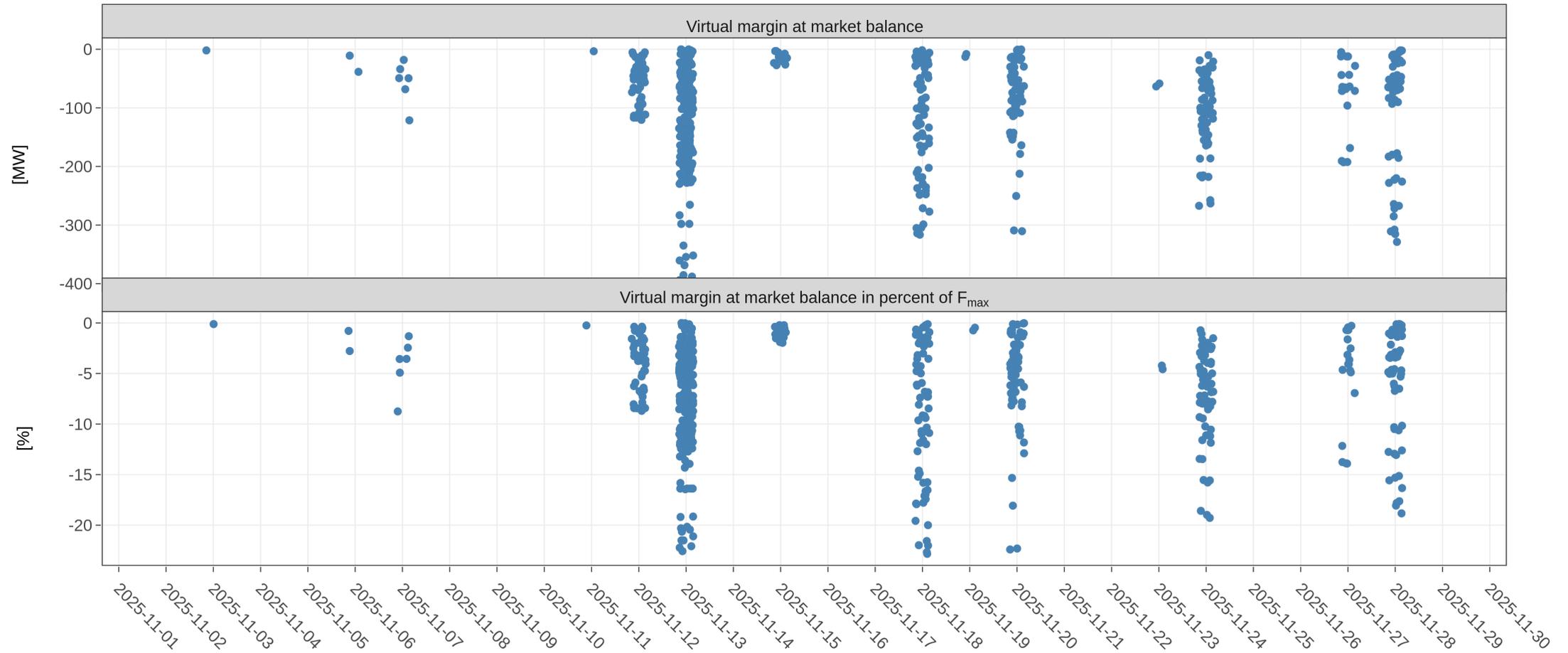
KPI 6b: Virtual margins at market balance AT



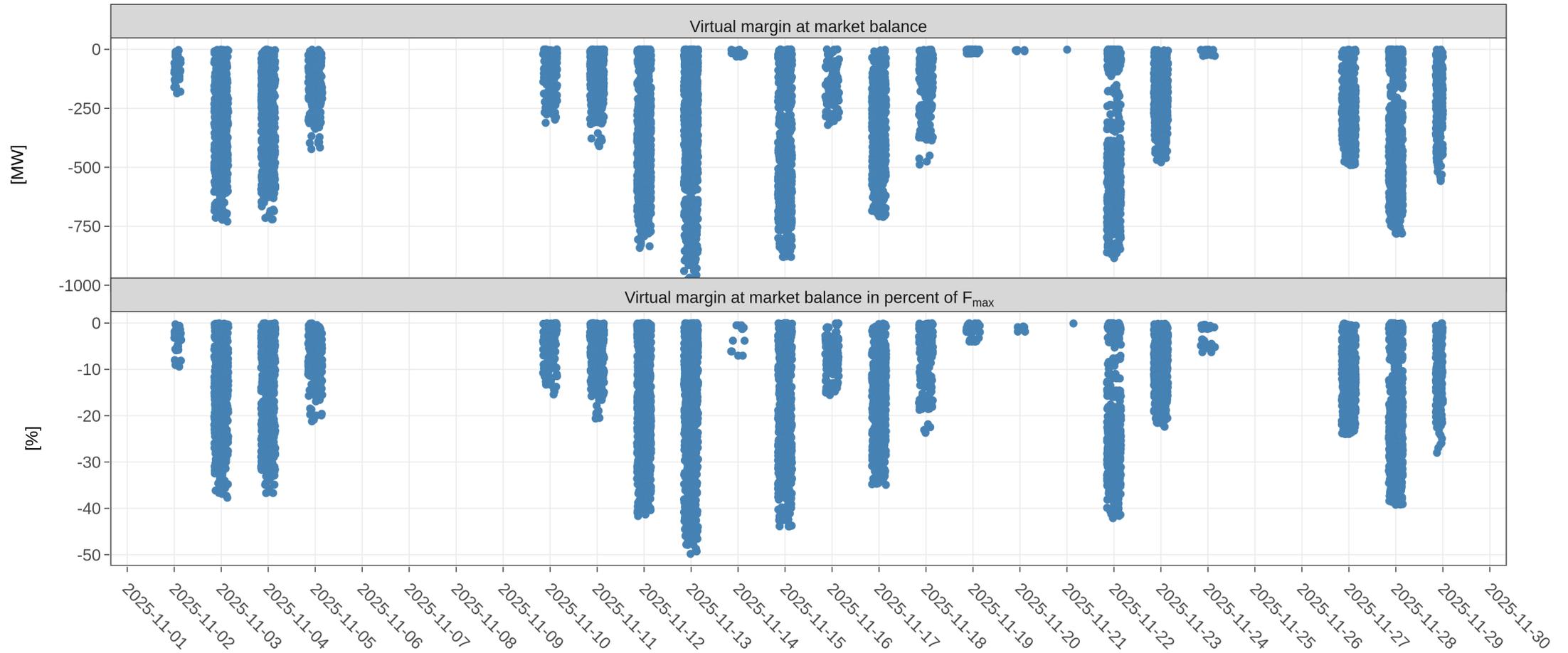
KPI 6b: Virtual margins at market balance BE



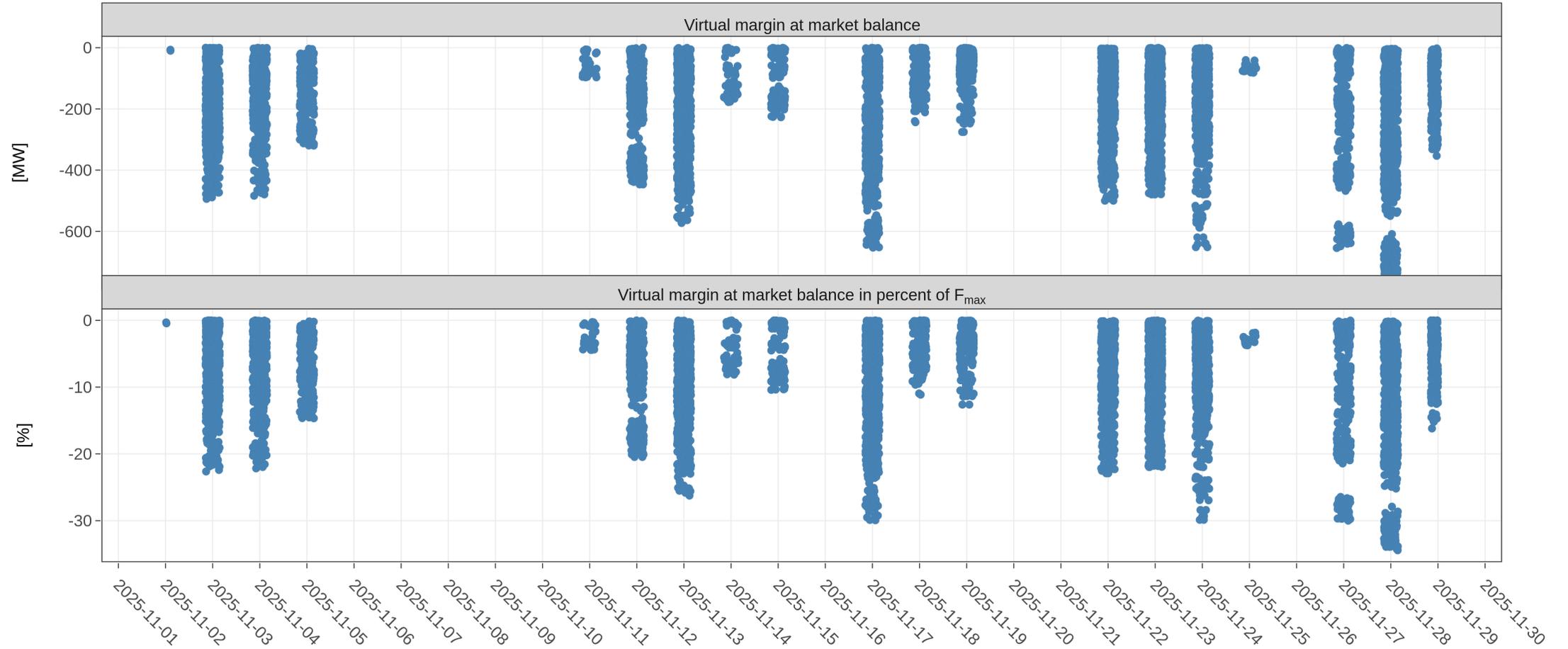
KPI 6b: Virtual margins at market balance CZ



KPI 6b: Virtual margins at market balance D2



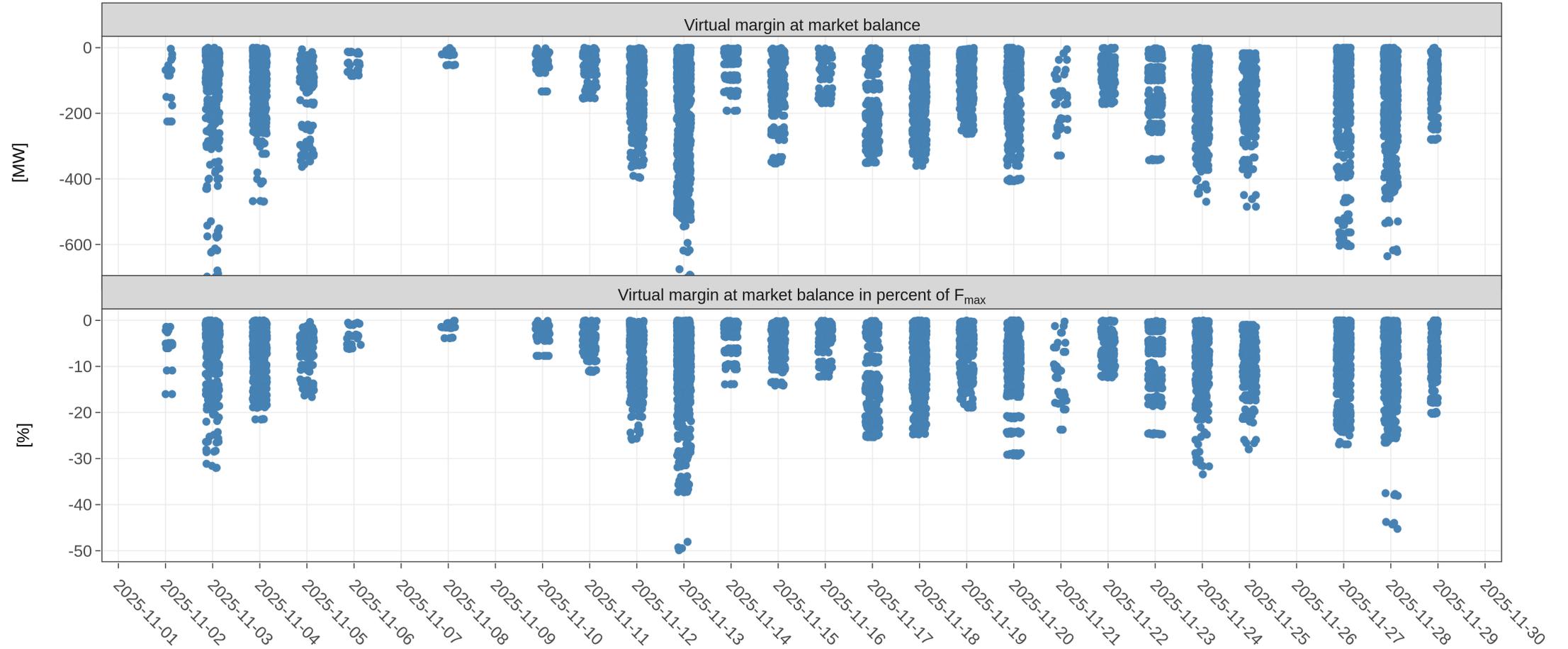
KPI 6b: Virtual margins at market balance D4



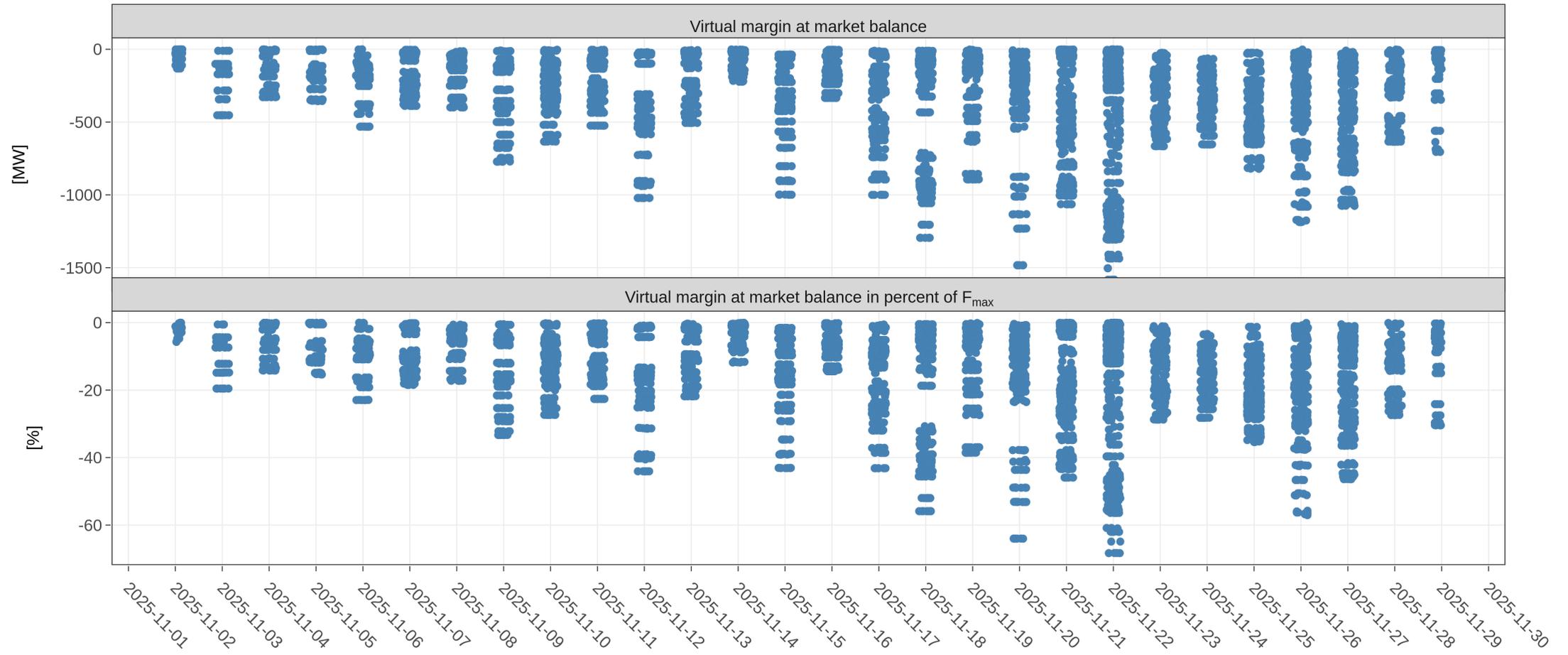
KPI 6b: Virtual margins at market balance D7



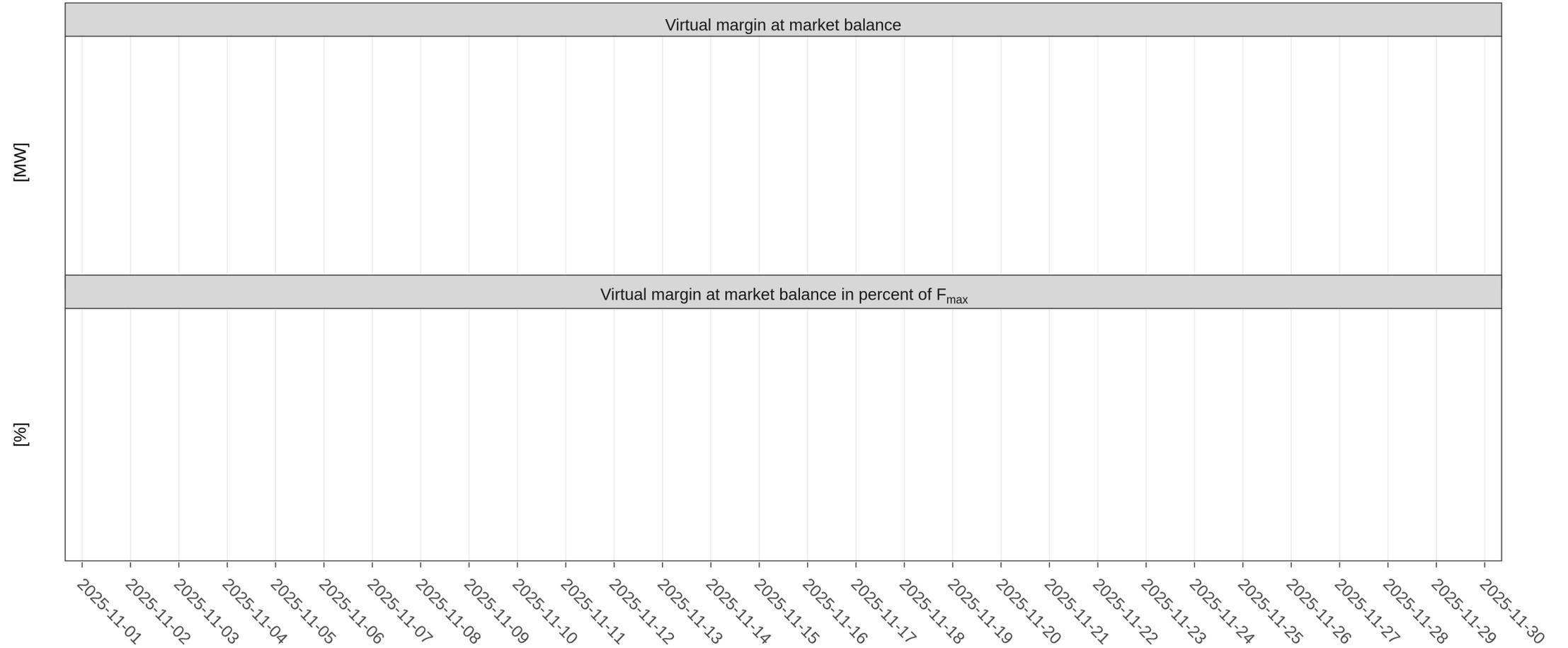
KPI 6b: Virtual margins at market balance D8



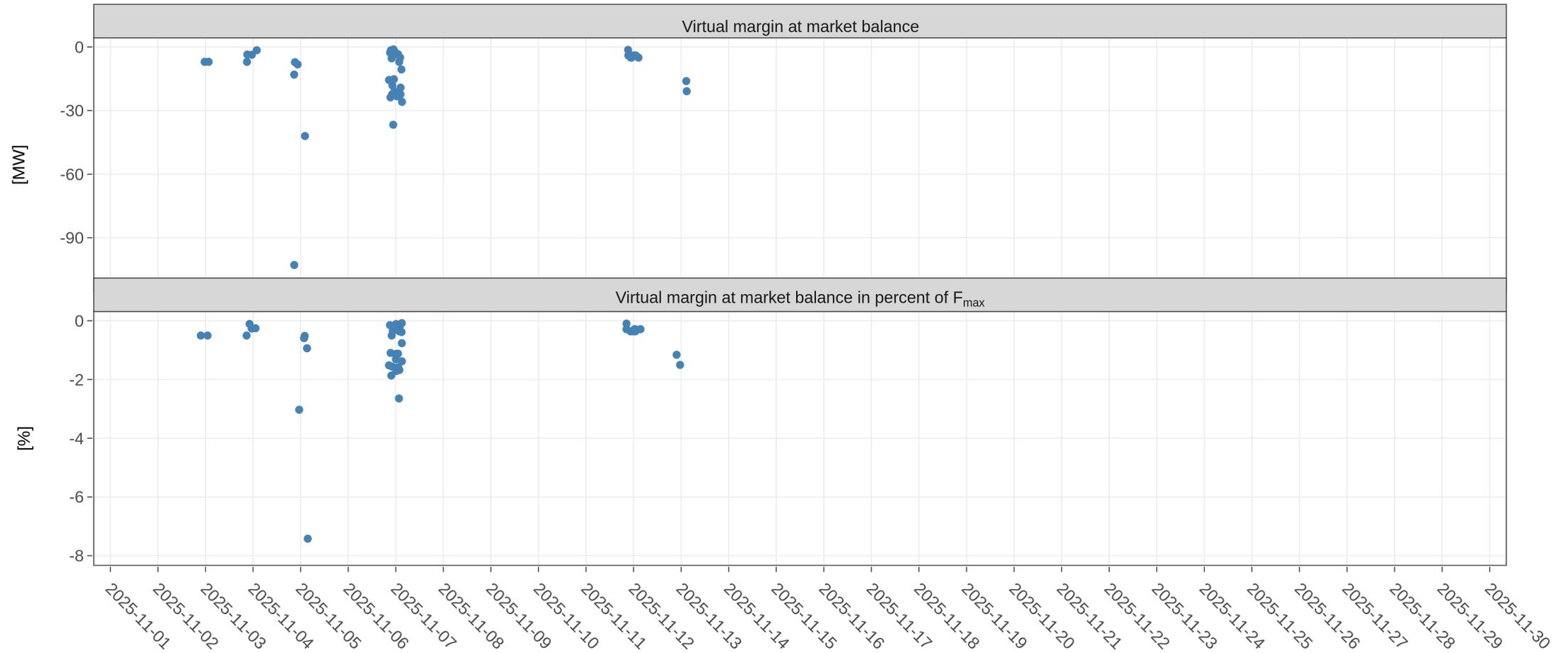
KPI 6b: Virtual margins at market balance FR



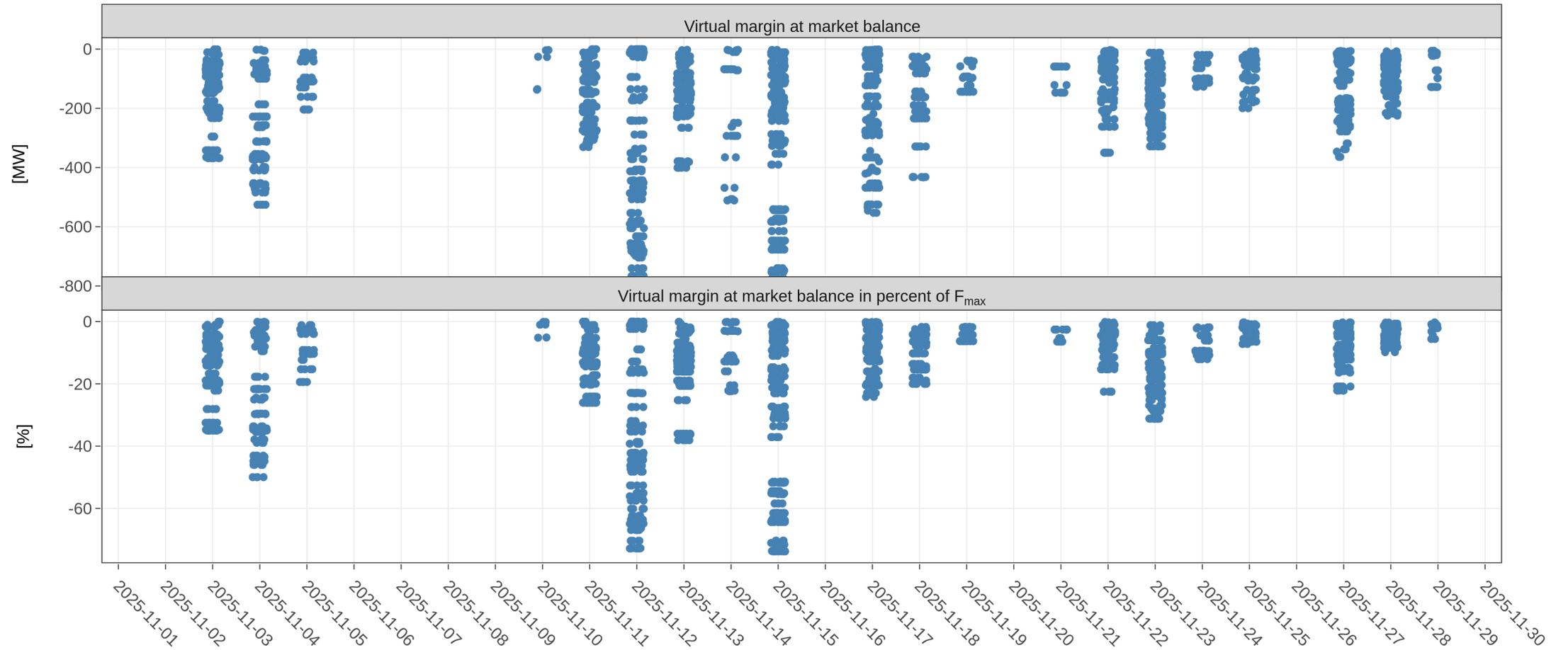
KPI 6b: Virtual margins at market balance HR



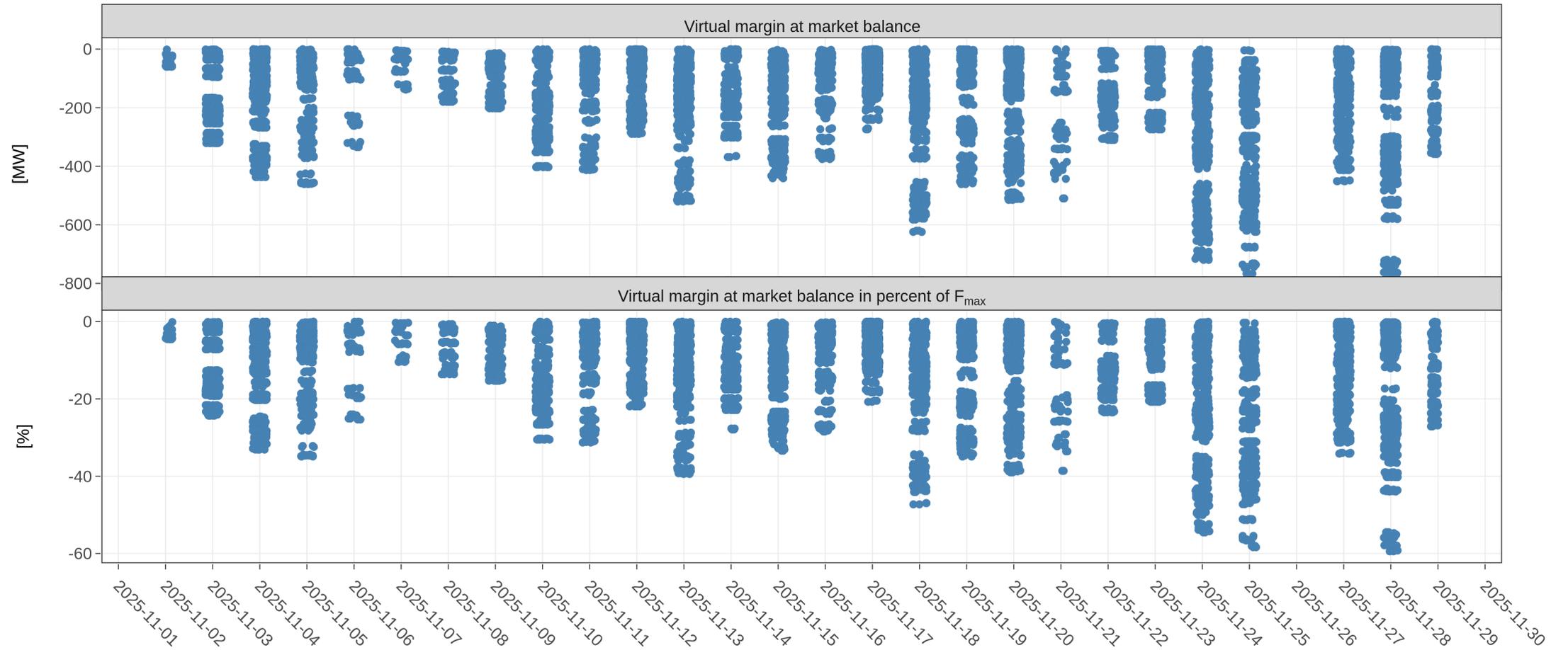
KPI 6b: Virtual margins at market balance HU



KPI 6b: Virtual margins at market balance NL



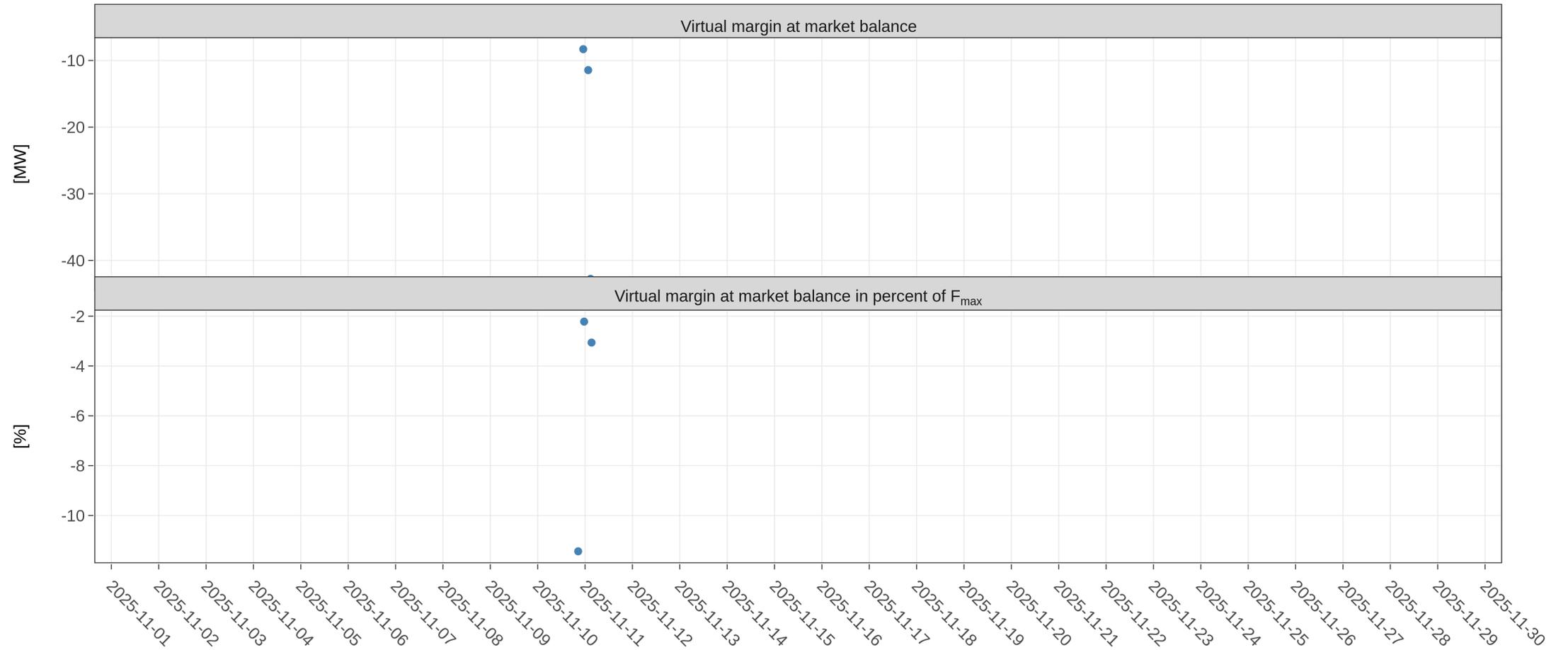
KPI 6b: Virtual margins at market balance PL



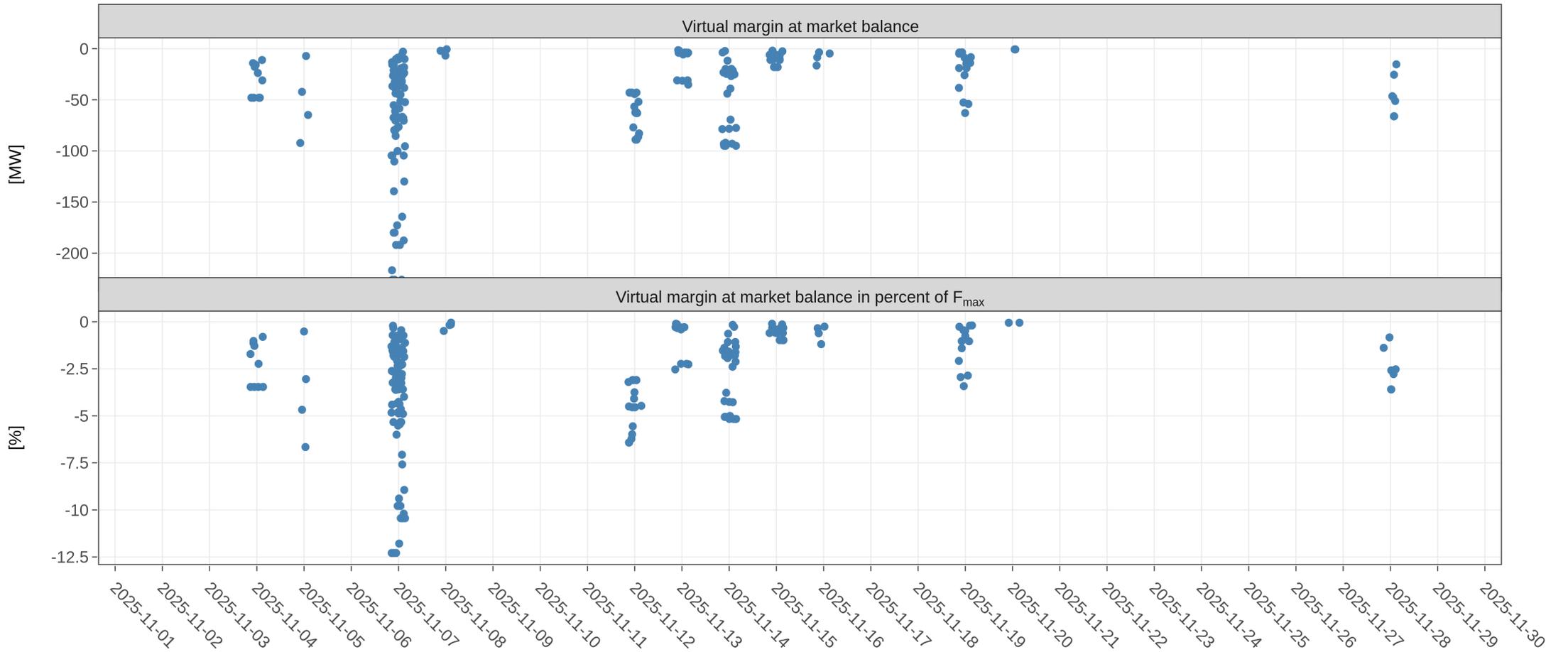
KPI 6b: Virtual margins at market balance RO



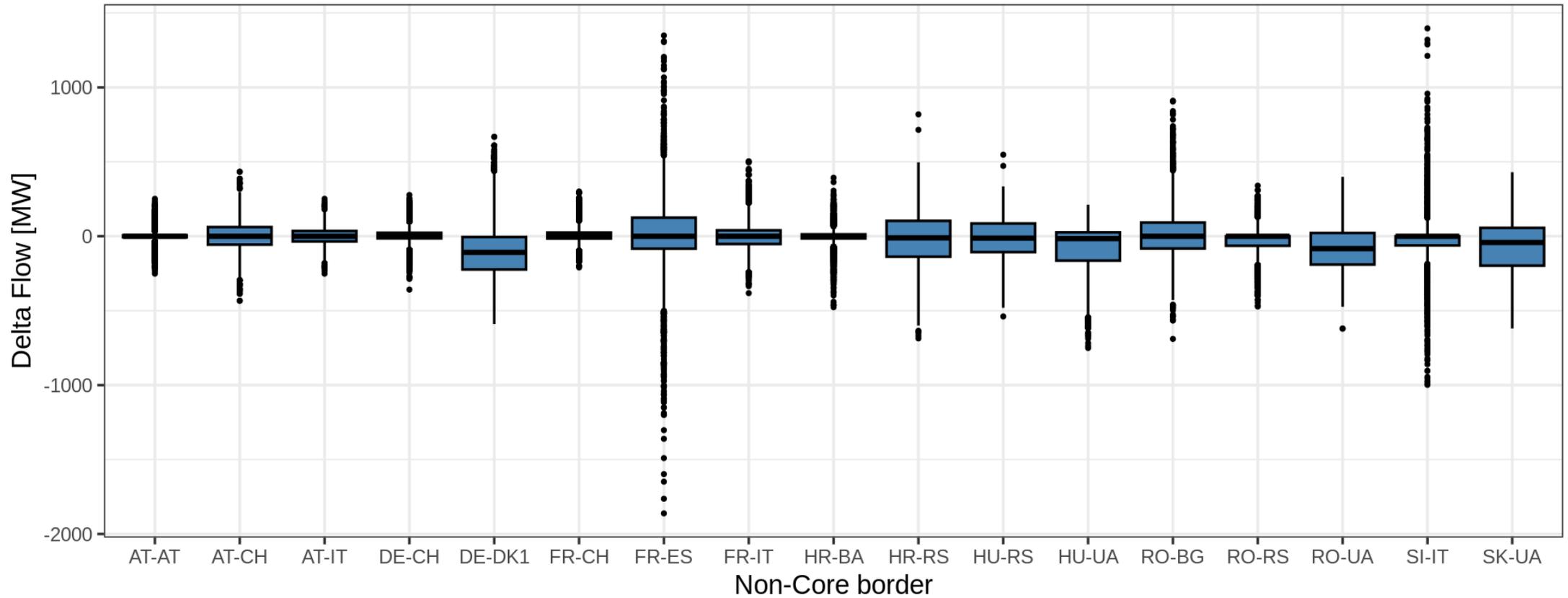
KPI 6b: Virtual margins at market balance SI



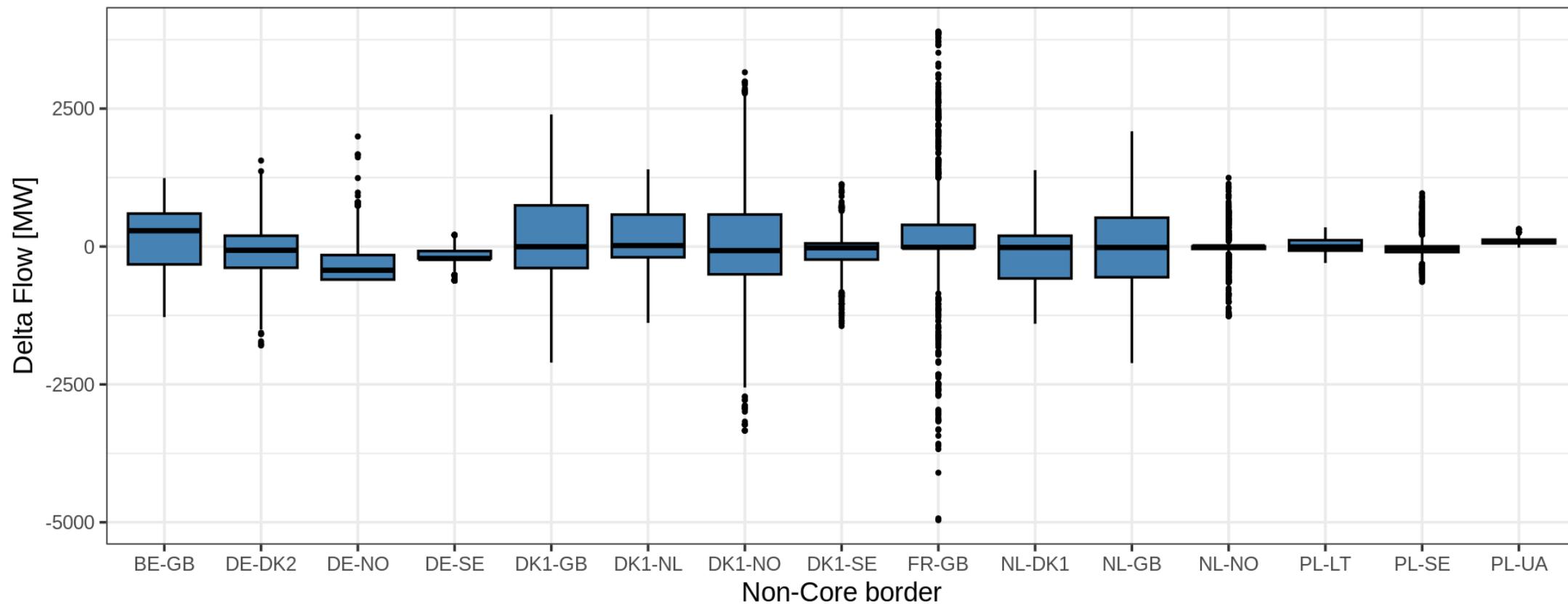
KPI 6b: Virtual margins at market balance SK



KPI 7: Non-Core exchanges AC delta flow



KPI 7: Non-Core exchanges DC delta flow



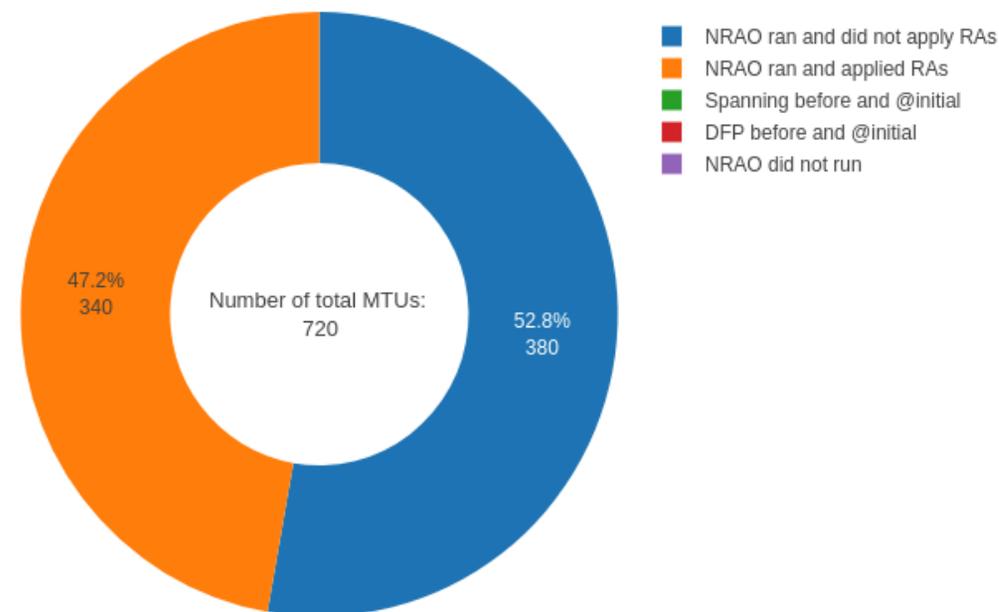
KPI 8: NRAO – Applied Remedial Action



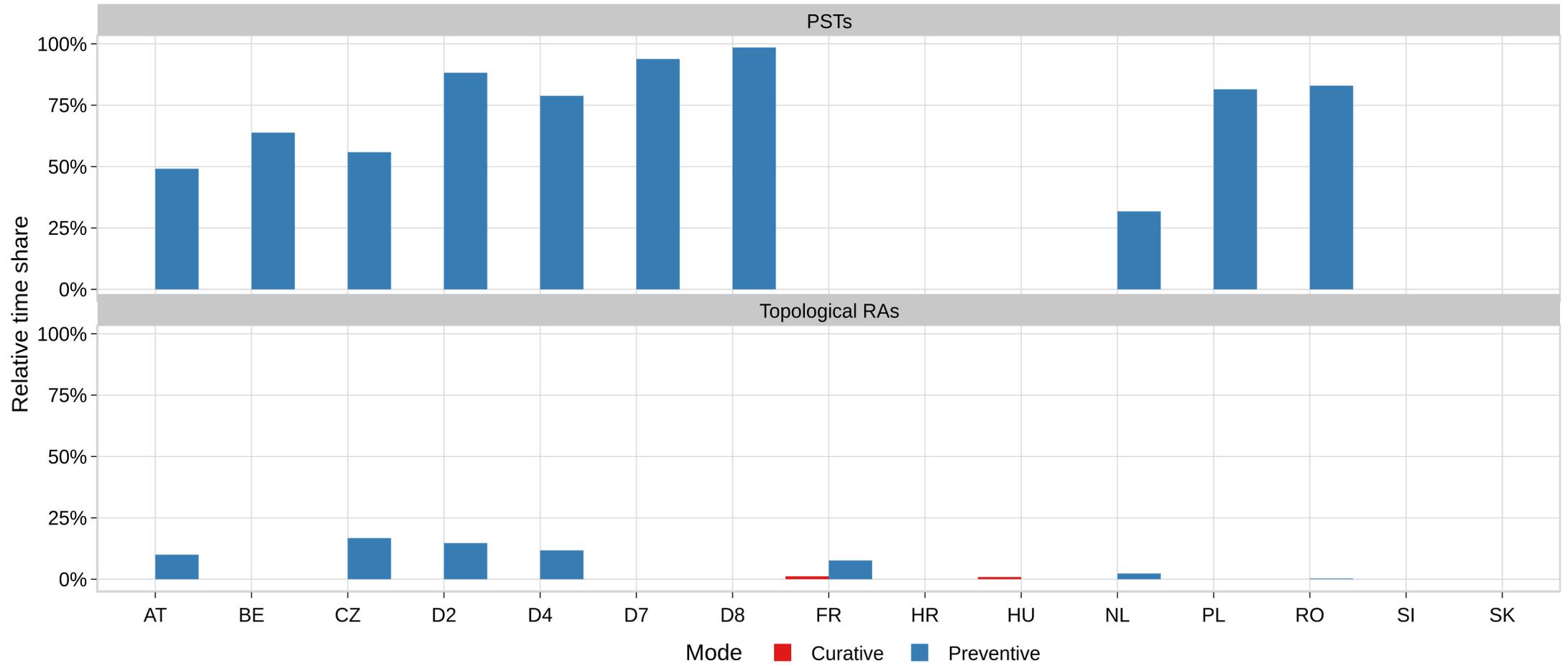
In the following plots, the relative time share relates to the hours labeled 'NRAO Ran and Applied RAs'.

Total MTUs: 720 hours

Category	Hours (%)
NRAO ran and did not apply RAs	380 hours (52.8%)
NRAO ran and applied RAs	340 hours (47.2%)
Spanning before and @initial	0 hours (0%)
DFP before and @initial	0 hours (0%)
NRAO did not run	0 hours (0%)

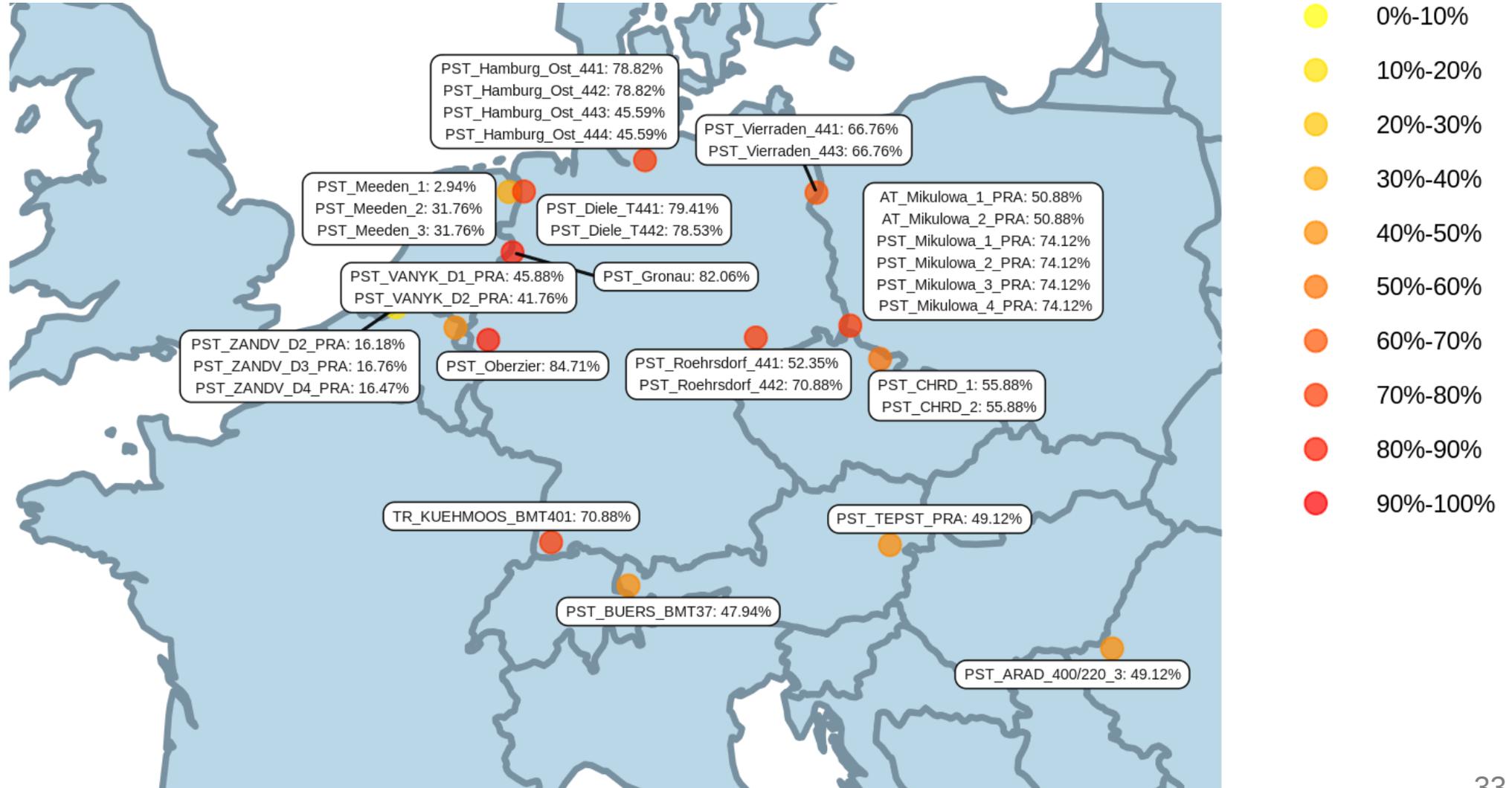


KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode



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



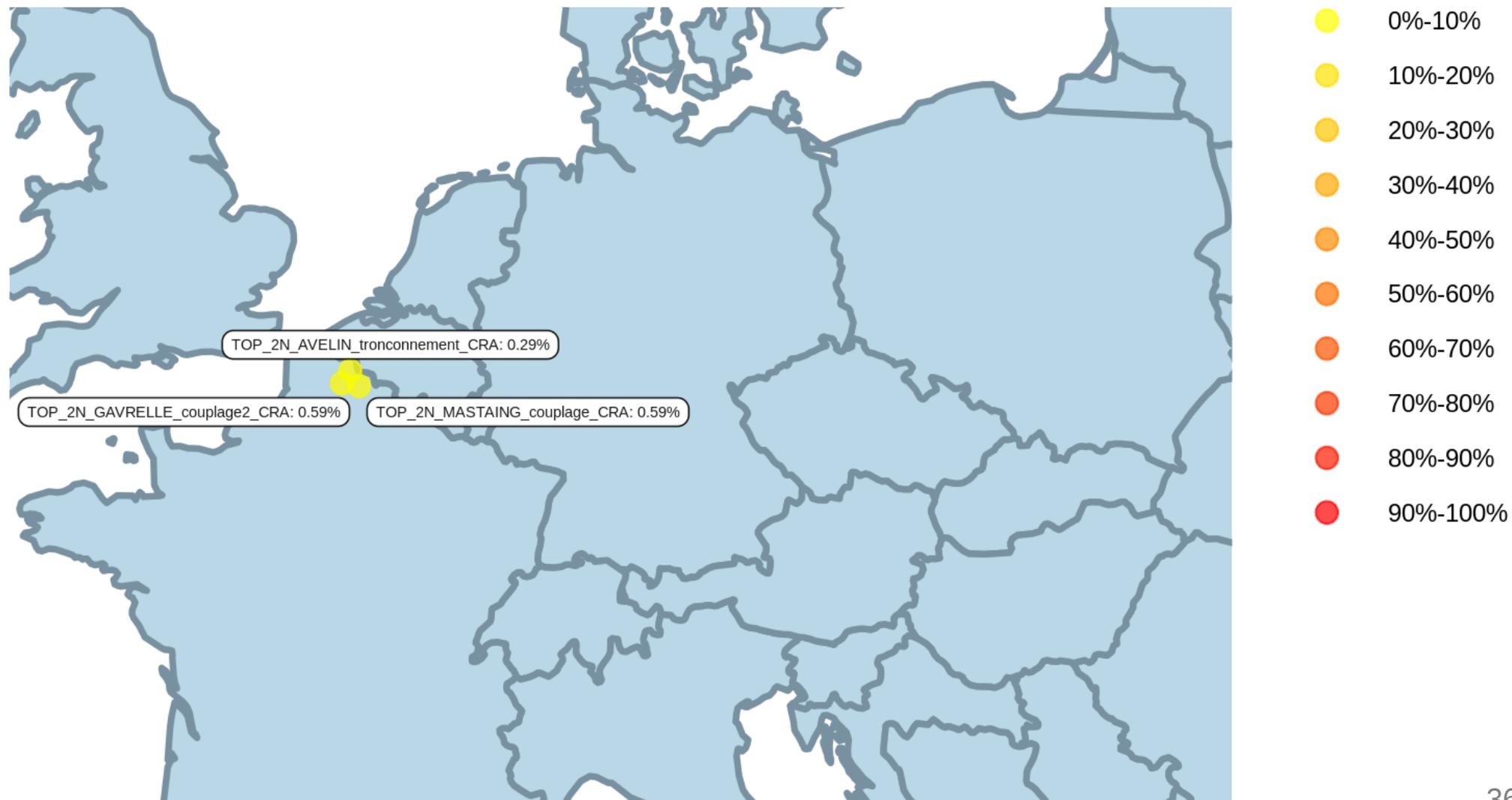
KPI 8: Relative Time Share of Applied RAs, by TSO, Type and Mode

Relative Time Share of Applied Topological RAs in Preventive Mode



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

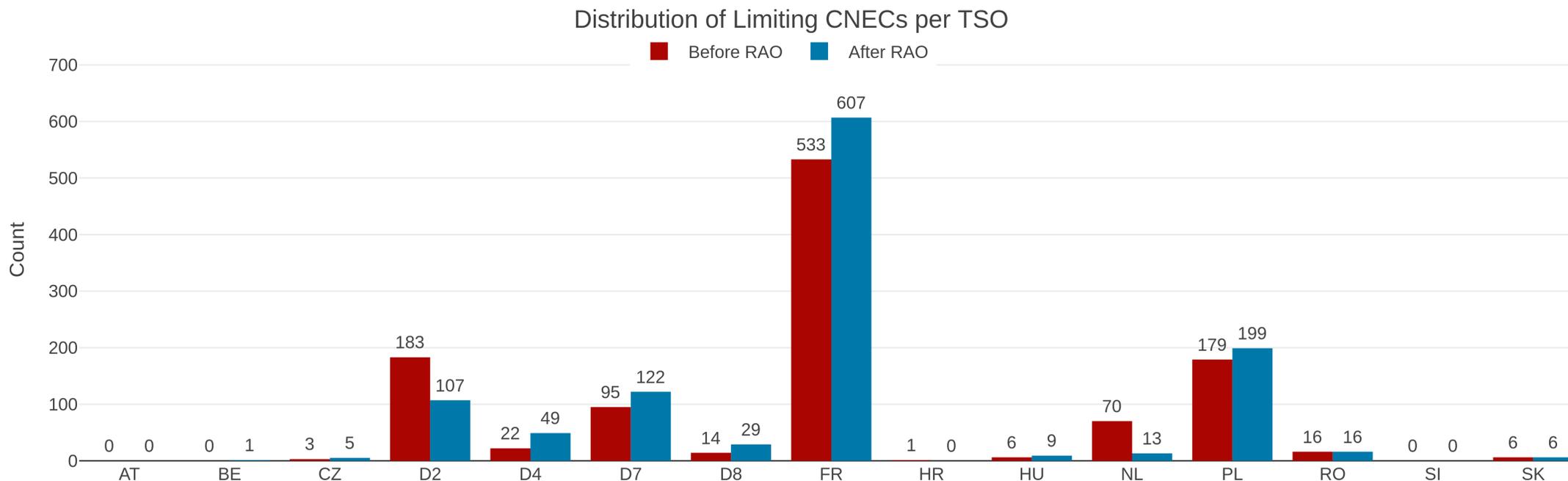
Relative Time Share of Applied Topological RAs in Curative Mode



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



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.

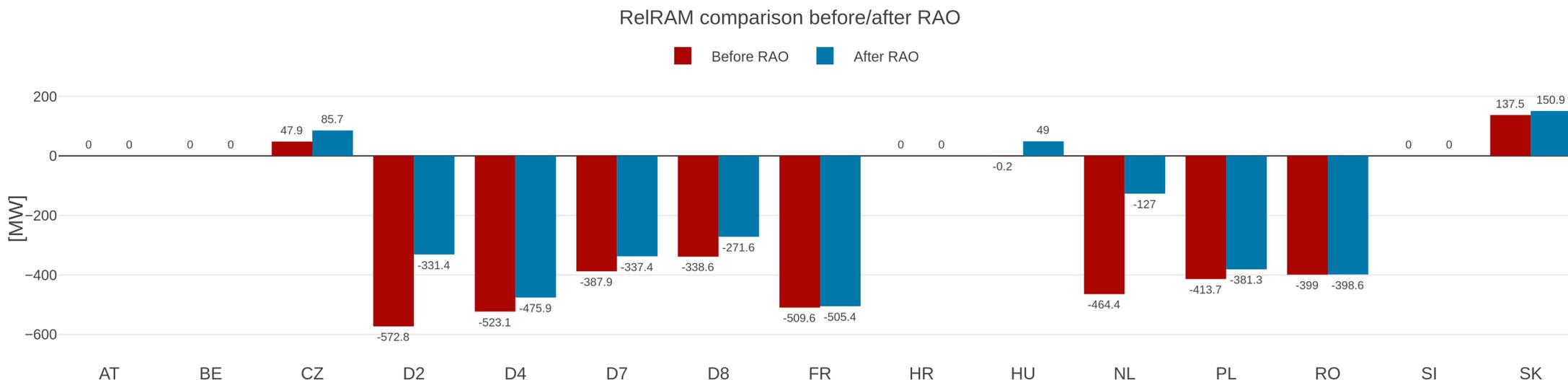
KPI 10: Average variation of relative RAM before and after NRAO



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

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



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
[CZ-PL] Wielopole - Nosovice [DIR] [PL]	720	2330	59.81%	44.88%	84.78%	0.3952	1.3463
[D8-D8] Roehrsdorf - Roehrsdorf PST442 [DIR]	720	720	52.89%	25.91%	92.46%	0.2985	1.2292
[CZ-SK] Nosovice - Varin [OPP] [CZ]	720	1192	90.45%	69.91%	124.68%	0.3635	1.5188
[SK-SK] Gabcikovo - P.Biskupice [DIR]	720	720	87.68%	71.88%	102.51%	0.3208	1.1215
[HR-SI] 220kV Pehlin - Divaca [DIR] [HR]	720	721	47.89%	9.09%	88.24%	0.1834	0.4243
[HR-SI] 220kV Pehlin - Divaca [OPP] [HR]	720	1437	119.60%	84.22%	170.32%	0.1834	0.4243
[HU-HU] Gonyu - Gyor [DIR]	720	1603	72.21%	57.14%	100.79%	0.2411	1.3417
[SI-HU] Cirkovce - Heviz [OPP] [HU]	720	720	79.67%	63.42%	96.97%	0.2704	1.1494
[SI-HU] 400 kV Cirkovce - Hevitz [OPP] [SI]	720	1440	80.16%	62.58%	101.53%	0.1849	0.985
[AT-AT] Westtirol 1 - Westtirol 2 WTRHU41 [OPP]	720	1624	53.18%	19.80%	118.50%	0.1893	0.8773
[SI-HU] 400 kV Cirkovce - Hevitz [DIR] [SI]	719	1438	99.97%	78.45%	119.39%	0.1849	0.985
[CZ-SK] Nosovice - Varin [DIR] [CZ]	716	1114	85.38%	55.27%	127.27%	0.3635	1.4989
[HU-HU] Gonyu - Gyor [OPP]	715	719	115.87%	79.15%	155.41%	0.2294	1.3417
[D8-PL] Mikulowa PST1 [DIR] [PL]	710	710	51.69%	19.62%	77.27%	0.418	1.5292
[NL-NL] MEE DRT2 [DIR] [NL]	709	713	47.18%	19.96%	148.29%	0.3577	0.7976
[SK-UA] V.Kapusany - Mukachevo (WPS) [DIR] [SK]	705	705	78.68%	53.50%	103.43%	0.2711	0.9431
[NL-BE] Maasbracht - Van Eyck 380 White/28 [OPP] [BE]	703	1997	79.61%	41.18%	129.41%	0.3194	0.6914
[NL-BE] Maasbracht - Van Eyck 380 White/28 [DIR] [BE]	700	1604	98.00%	61.70%	138.77%	0.3228	0.702
[CZ-PL] Wielopole - Nosovice [OPP] [PL]	699	1135	121.64%	92.50%	157.94%	0.3778	1.276
[SK-SK] H.Zdana - Sucany [DIR]	699	821	73.73%	68.11%	80.74%	0.1478	0.7613

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]	408	408	919.74	22.30%	19.98%	36.69%	0.1466
[D8-PL] Mikulowa PST1 [DIR] [PL]	266	266	675.43	45.54%	19.62%	62.88%	0.418
[CZ-SK] Nosovice - Varin [DIR] [SK]	143	143	552.28	66.30%	46.25%	82.32%	0.4497
[D2-D2] Altheim - Sittling 219 [OPP]	134	134	1097.92	69.28%	34.22%	96.18%	0.0777
[FR-D7] Vigy - Ensdorf VIGY2 S [DIR] [D7]	125	125	1112.72	21.39%	19.90%	31.53%	0.222
[D8-D8] Roehrsdorf - Roehrsdorf PST442 [DIR]	117	117	396.24	50.46%	35.94%	64.77%	0.2817
[AT-D2] St. Peter 2 - Pleinting 258 [OPP] [AT]	105	112	594.11	80.17%	41.65%	104.15%	0.1725
[FR-FR] Creys - Saint-Vulbas 1 [OPP]	105	105	934.41	20.54%	19.98%	28.27%	0.1487
[NL-NL] Krimpen a/d IJssel-Geertruidenberg 380 W [DIR]	101	101	217.55	51.63%	30.27%	100.92%	0.5008
[SK-HU] Levice - God [DIR] [HU]	81	81	1033.31	45.97%	26.84%	69.48%	0.2366
[RO-RO] TR Rosiori 400/220 1 [DIR]	71	71	1305.42	41.99%	27.29%	63.96%	0.1212
[NL-NL] MEE DRT2 [DIR] [NL]	69	69	350.64	24.22%	19.96%	47.53%	0.308
[FR-D7] Vigy - Ensdorf VIGY1 N [DIR] [D7]	67	67	727.7	33.82%	19.96%	51.27%	0.2202
[D2-D2] Altheim - Sittling 220 [OPP]	56	56	1396.82	64.83%	31.24%	93.98%	0.0766
[SK-HU] R.Sobota - Sajoivanka [DIR] [HU]	45	45	719.8	59.85%	49.78%	73.74%	0.2775
[D8-D8] Vierraden - Vierraden PST441 [DIR]	43	43	434.99	48.70%	39.83%	58.23%	0.2994
[NL-D7] Maasbracht - Oberzier SELFK WS [DIR] [D7]	39	39	43.18	53.67%	36.41%	76.17%	0.2576
[NL-BE] Maasbracht - Van Eyck 380 White/28 [DIR] [BE]	37	37	167.73	91.13%	76.34%	110.09%	0.3483
[RO-RO] Resita - Timisoara c1 [DIR]	31	31	4612.39	29.96%	20.86%	43.32%	0.1024
[D7-FR] Ensdorf - Vigy VIGY2 S [OPP] [FR]	28	28	402.82	21.11%	19.96%	24.84%	0.2191

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	894
AC < 0 MW	386
AC = 0 MW	504
AC > 0 MW	4

	PL AC Import [MW]	PL AC Export [MW]
Avg.	-2553.89	4305.63
Min.	-9292.00	0.00
Max.	0.00	15152.00

