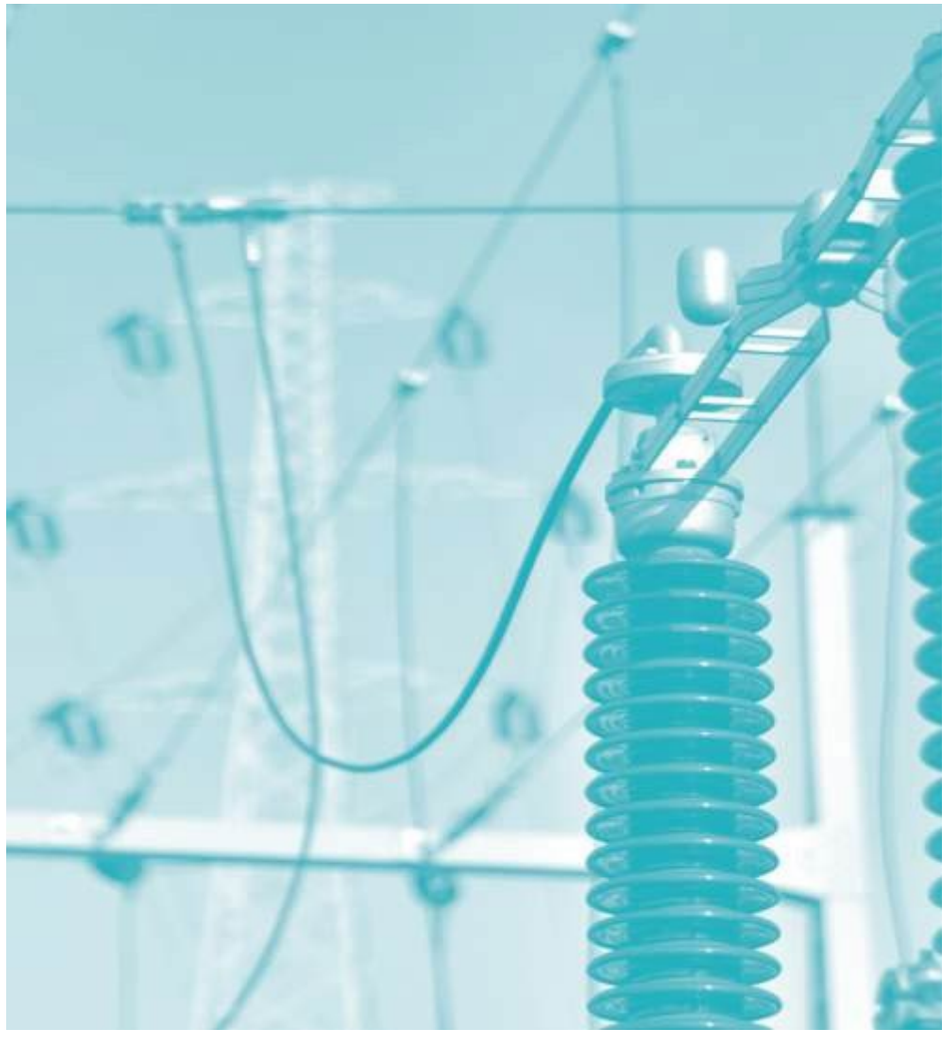
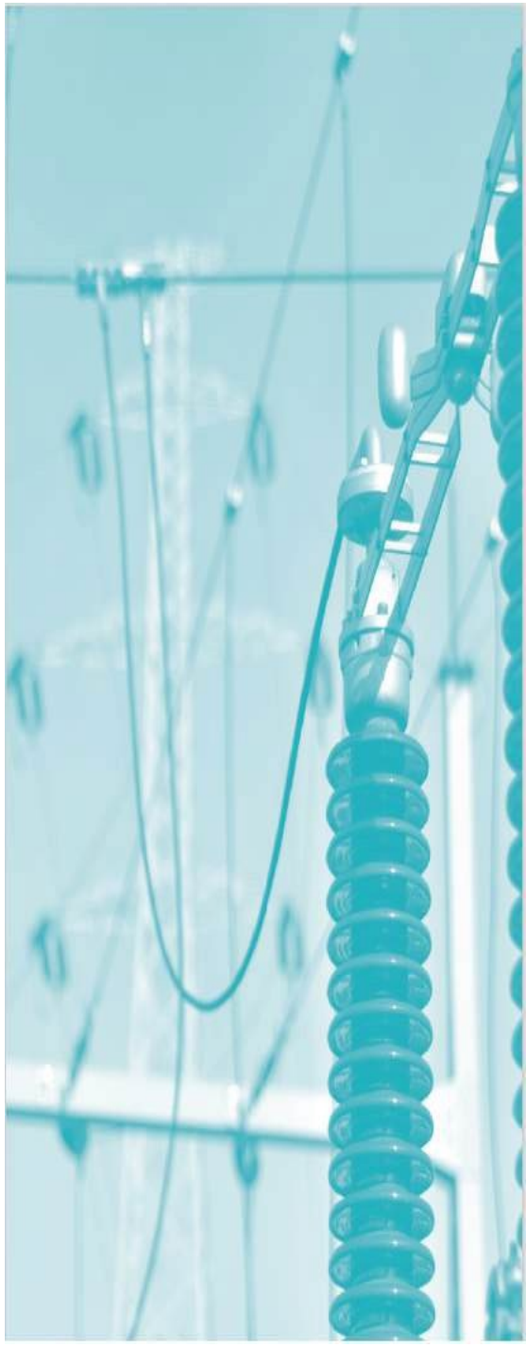


Energy Market Monitoring Report

November 2024

SEM committee



Market Results

Summary Dashboard

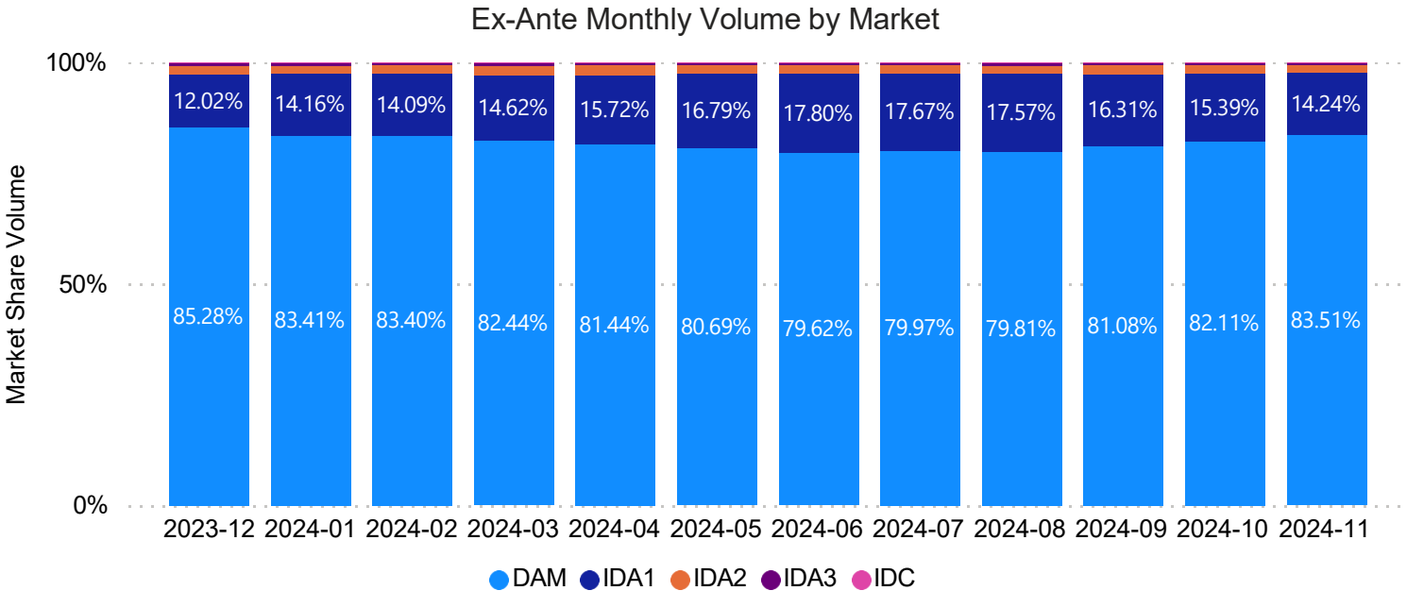
Monthly Averages	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24
DAM (€/MWh)	122.9	88.97	99.9	84.6	86.67	88.52	107.75	107.74	110.94	100.44	112.73	122.9	146.14
% Change from previous month	-2%	-28%	12%	-15%	2%	2%	22%	0%	3%	-9%	12%	9%	19%
% Change from previous year	-14%	-68%	-38%	-47%	-40%	-30%	2%	-8%	15%	-6%	1%	-2%	19%
Actual System Demand (MW)	4873	4862	5151	4946	4833	4610	4356	4193	4279	4255	4467.76	4671	5084.68
% Change from previous month	8%	0%	6%	-4%	-2%	-5%	-6%	-4%	2%	-1%	5%	5%	9%
% Change from previous year	5%	0%	5%	3%	0%	3%	2%	0%	4%	2%	3%	3%	4%
Actual Wind Generation (MW)	1811	2446	1854	2000	2072	1496	894	1072	883	1437	1263	1668	1448
% Change from previous month	33%	35%	-24%	8%	4%	-28%	-40%	20%	-18%	63%	-12%	32%	-13%
% Change from previous year	-19%	49%	-7%	-1%	19%	-3%	1%	22%	-33%	3%	-9%	22%	-20%
Gas Price p/therm	104.97	84.2	74.87	63.37	68.18	71.69	76.69	81.51	75.07	84.71	86.94	99.04	111
% Change from previous month	0%	-20%	-11%	-15%	8%	5%	7%	6%	-8%	13%	3%	14%	12%
% Change from previous year	-19%	-68%	-52%	-53%	-39%	-29%	6%	5%	6%	2%	-5%	-6%	6%
Carbon Price (€/Tonne)	76.25	71.79	65.52	55.79	57.94	63.25	70.90	68.29	67.00	70.12	64.86	63.51	67.15
% Change from previous month	-6%	-6%	-9%	-15%	4%	9%	12%	-4%	-2%	5%	-8%	-2%	6%
% Change from previous year	1%	-16%	-18%	-39%	-35%	-30%	-16%	-20%	-23%	-17%	-21%	-22%	-12%
Coal Price ($/tonne)	122.16	118.31	107.65	96.84	111.78	118.13	106.15	109.54	105.93	121.36	114.96	119.65	120.84
% Change from previous month	-7%	-3%	-9%	-10%	15%	6%	-10%	3%	-3%	15%	-5%	4%	1%
% Change from previous year	-43%	-51%	-38%	-29%	-17%	-14%	-11%	-3%	-5%	5%	-5%	-9%	-1%
EWIC % Import Periods	68.78%	56.38%	69.76%	69.10%	63.78%	81.94%	84.98%	85.90%	94.59%	85.29%	81.53%	71.32%	78.30%
EWIC % Export Periods	9.11%	20.36%	14.78%	11.00%	11.32%	4.86%	0.67%	3.72%	1.11%	7.56%	5.52%	10.31%	9.03%
EWIC % Not Flow Periods	22.11%	23.25%	15.46%	19.90%	24.90%	13.19%	14.35%	10.38%	4.30%	7.15%	12.95%	18.37%	12.67%
Moyle % Import Periods	83.47%	67.81%	78.16%	79.59%	79.00%	87.40%	94.96%	92.47%	96.77%	80.71%	91.98%	81.08%	82.47%
Moyle % Export Periods	16.50%	32.16%	21.81%	20.34%	20.83%	12.50%	5.27%	7.53%	3.23%	10.44%	7.60%	18.65%	17.50%
Moyle % Not Flow Periods	0.03%	0.03%	0.03%	0.07%	0.17%	0.10%	0.03%	0.00%	0.00%	8.84%	0.42%	0.28%	0.03%

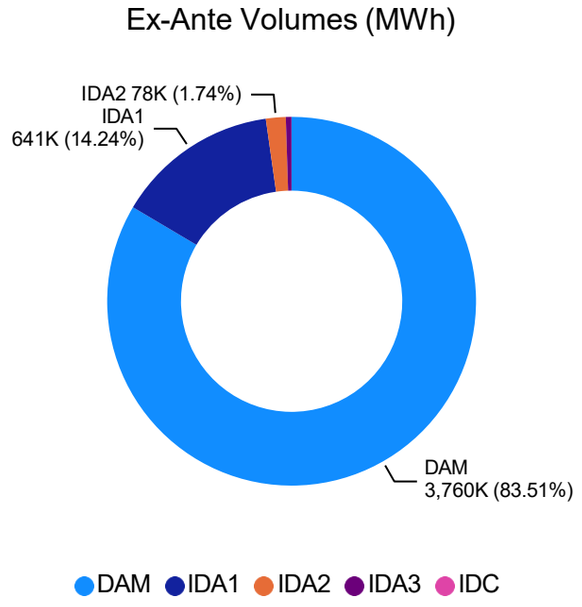
Market Volumes November 2024

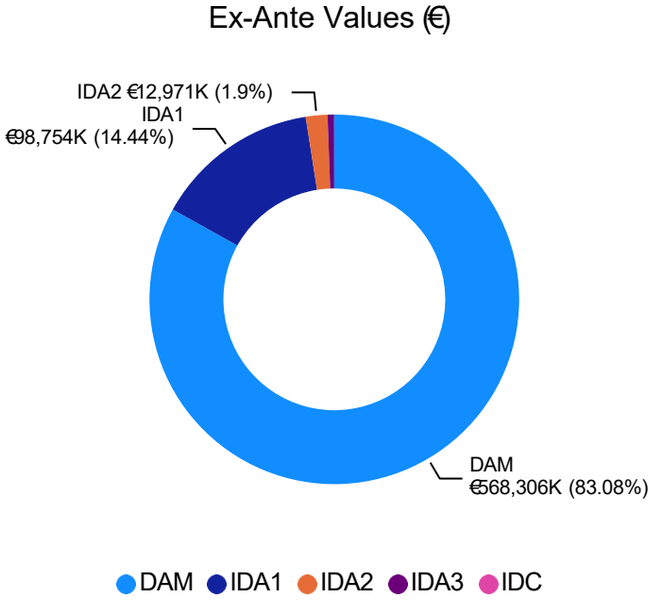
Daily Average Volume	MWh
DAM	125,338
IDA1	21,378
IDA2	2,610
IDA3	737
IDC	22

Total Monthly Volume	MWh
DAM	3,760,151
IDA1	641,325
IDA2	78,310
IDA3	22,117
IDC	487
Total	**4,502,390**

Total Market Value	€
DAM	€568,305,563
IDA1	€98,754,133
IDA2	€12,970,525
IDA3	€3,917,110
IDC	€100,478
Total	**€ 684,047,809**







Market Volumes and Values

The Day Ahead Market is, by far, the largest market in the SEM, circa 80-85% of all transactions are cleared in this market. The distribution of volumes across the SEM markets have been broadly constant since the introduction of these trading arrangements in October 2018.

Generally, in power markets, market participants will prefer to lock their positions well ahead of delivery time given the increased volatility in prices closer to real time.

Another important factor is associated with the TSO dispatch arrangements. The vast majority of wind generation in the SEM is cleared at the Day Ahead stage. That might also explain to some extent the additional volumes cleared in this market.

Day Ahead Market November 2024

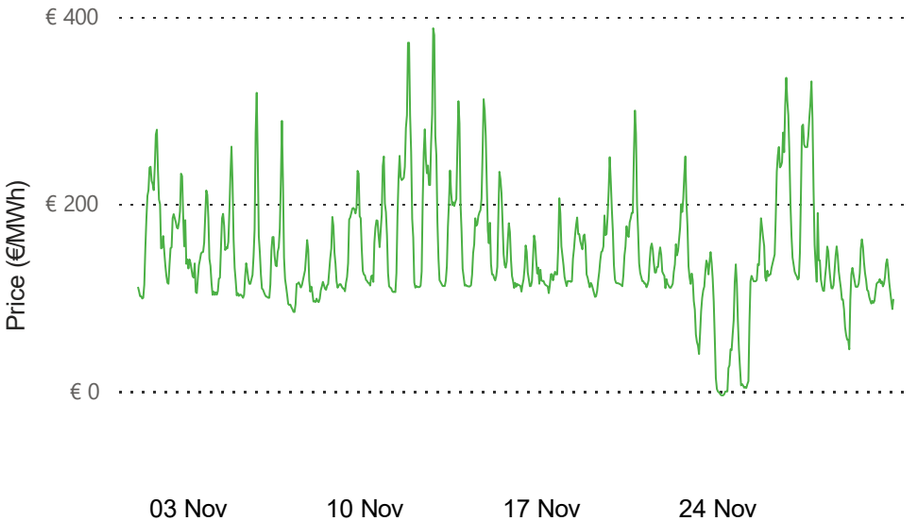
€146.14
Average DAM Price

-€4.12
Min DAM Price

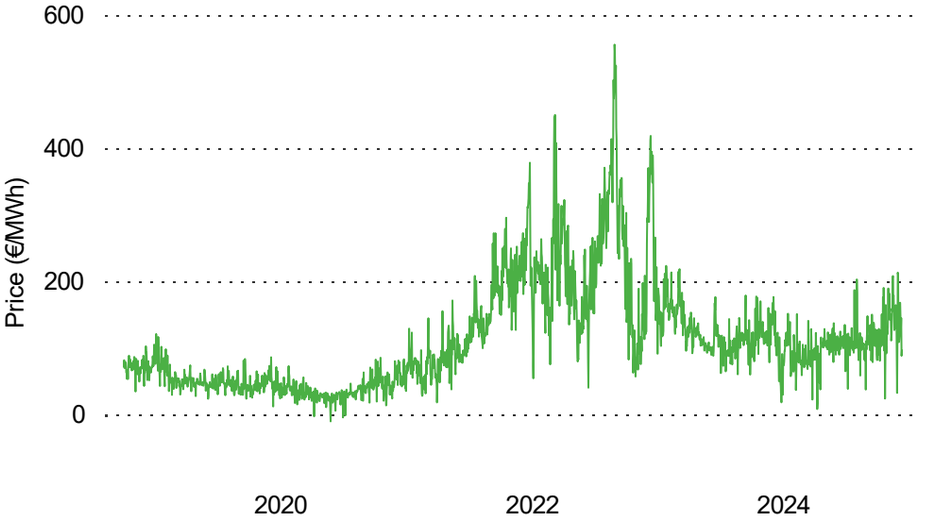
€387.89
Max DAM Price

The most frequent price range for October was between €110 and €166.

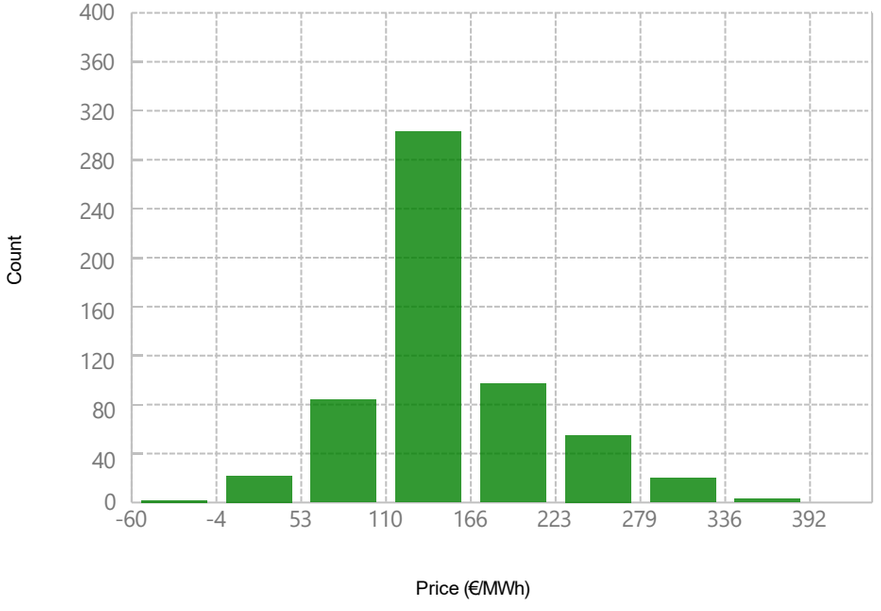
DAM Prices



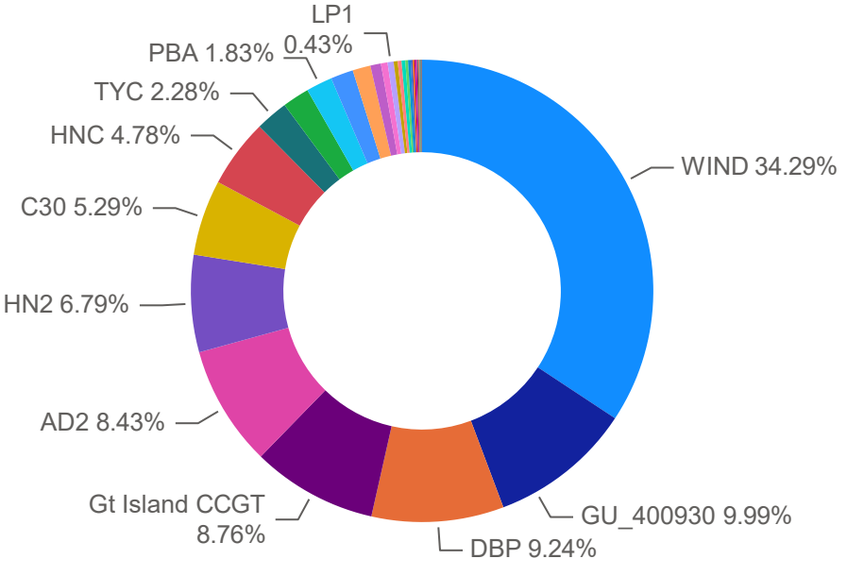
Historic Daily Average DAM Prices



Histogram of DAM Prices



DAM Sell Side Generator Order Results



Intraday Market November 2024

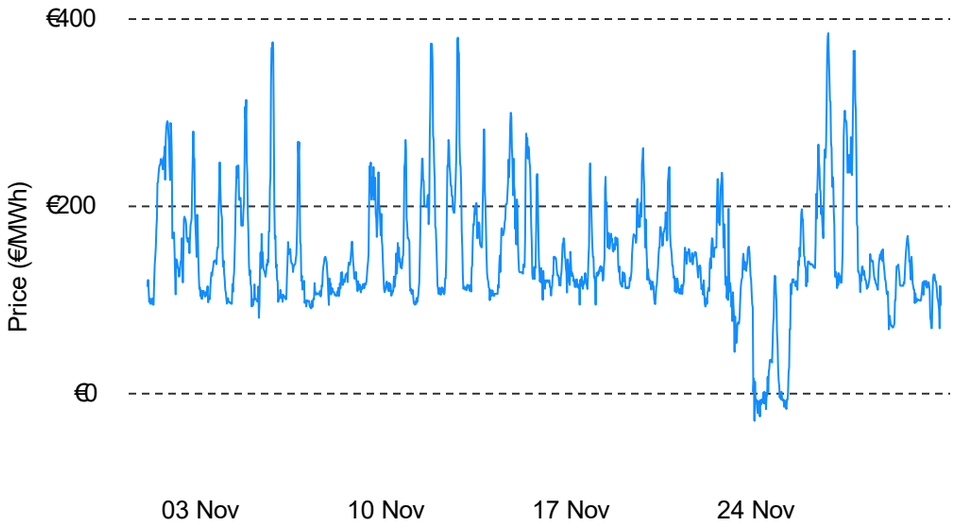
€145.05
Average IDA1 Price

-€30.05
Min IDA1 Price

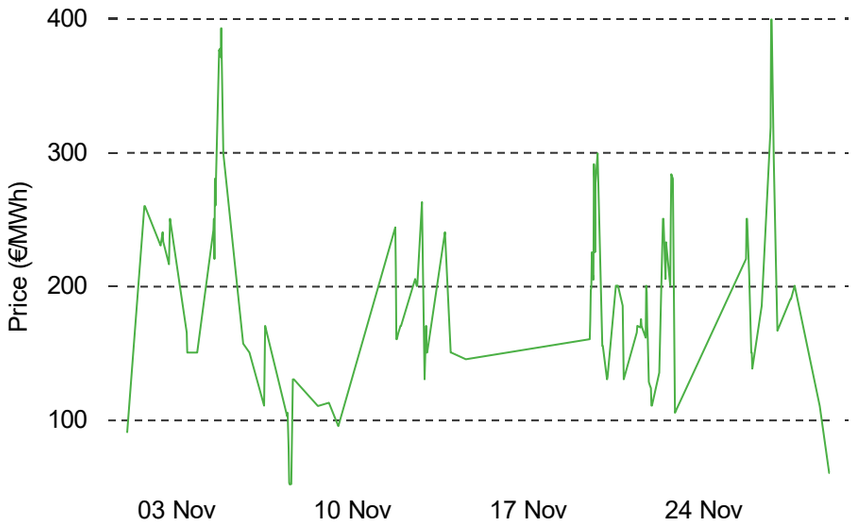
€383.97
Max IDA1 Price

The most frequent price range for October was between €110 and €166.

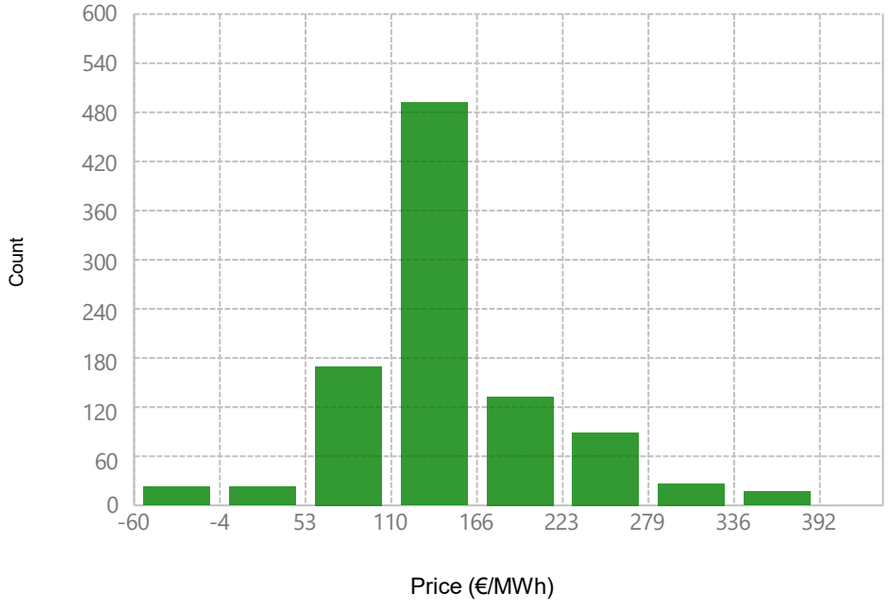
IDA 1 Prices



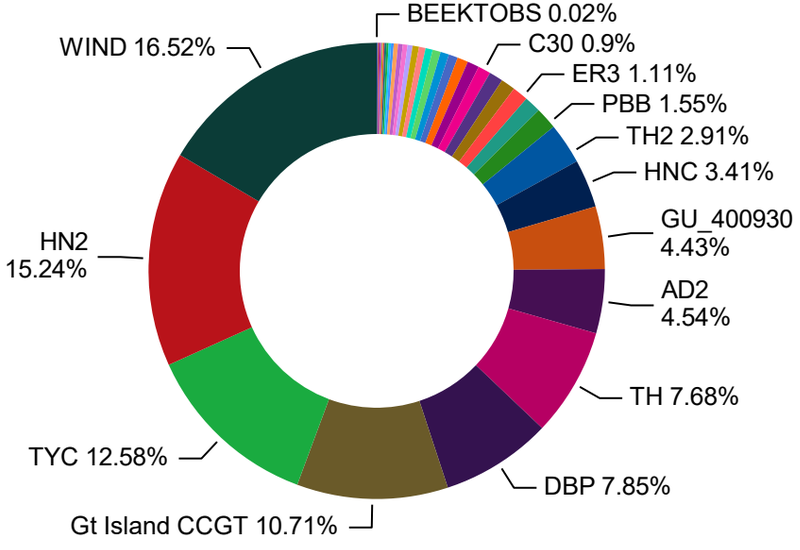
IDC Prices



Histogram of IDA1 Prices



IDA1 Sell Order Results By Market Participant



SEM vs GB DAM November 2024

SEM Day Ahead Price
€146.14
Average DAM Price

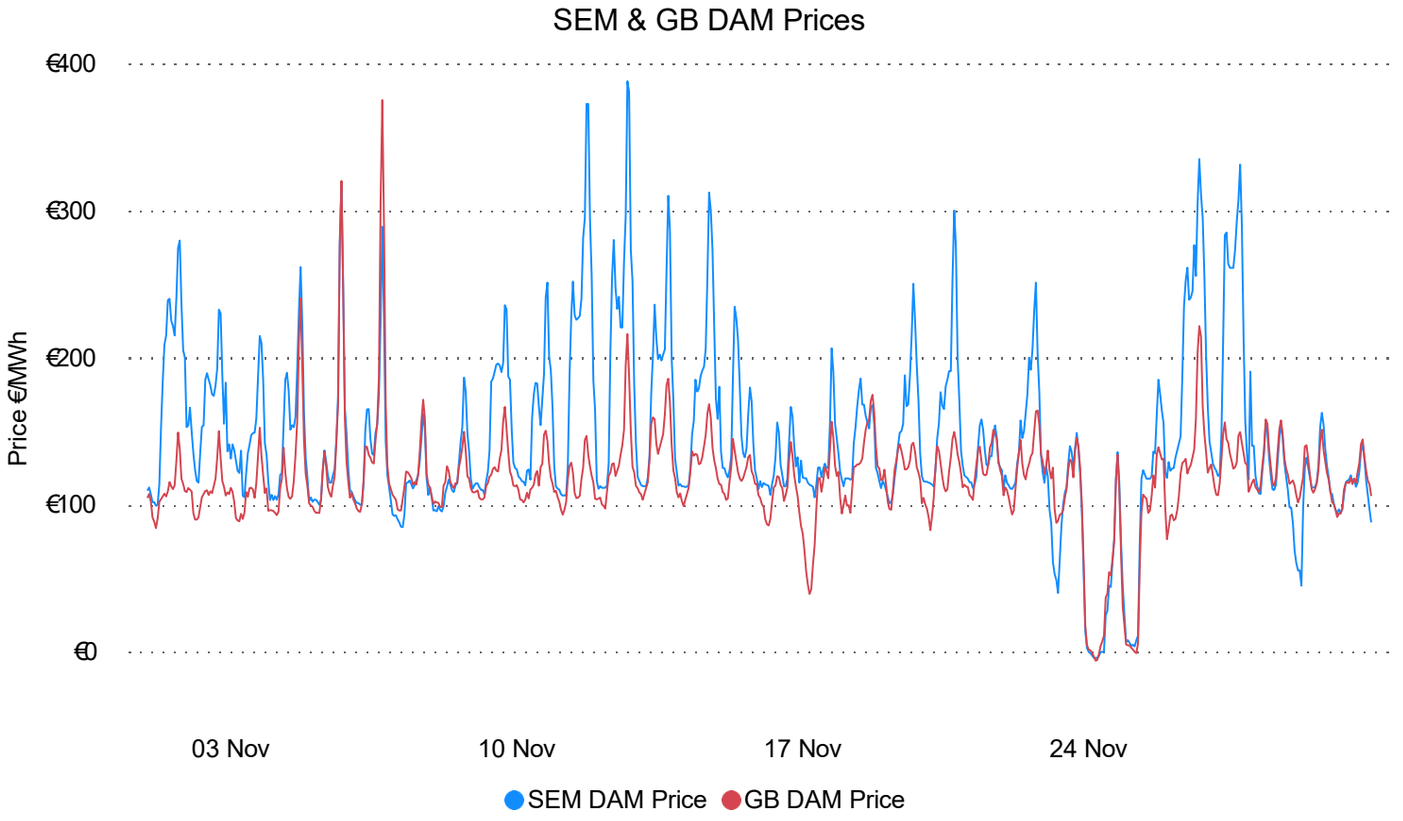
-€4.12
Min DAM Price

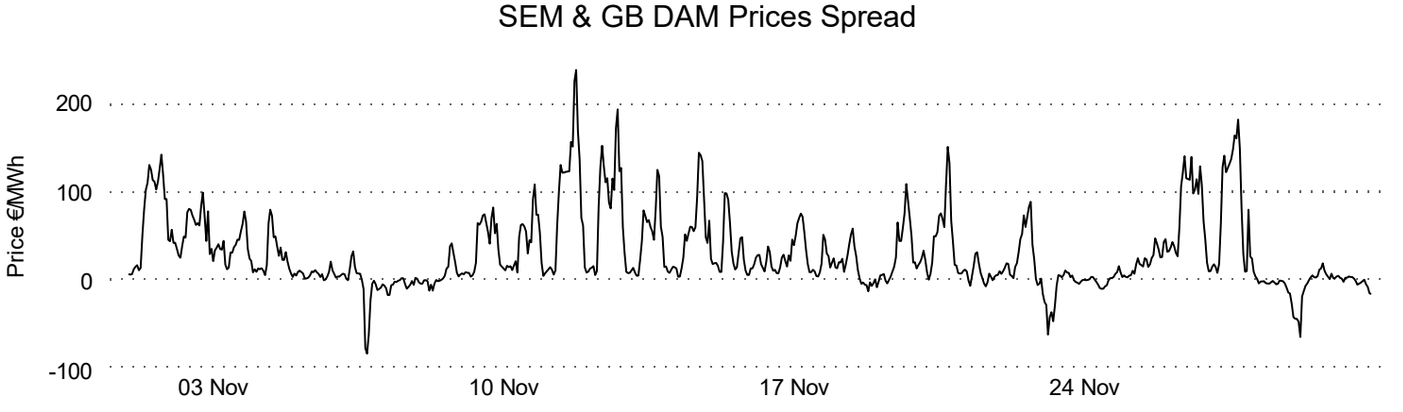
€387.89
Max DAM Price

GB Day Ahead Price
€117.16
Average Price

-€5.91
Min Price

€375.04
Max Price





SEM-GB Price Differential

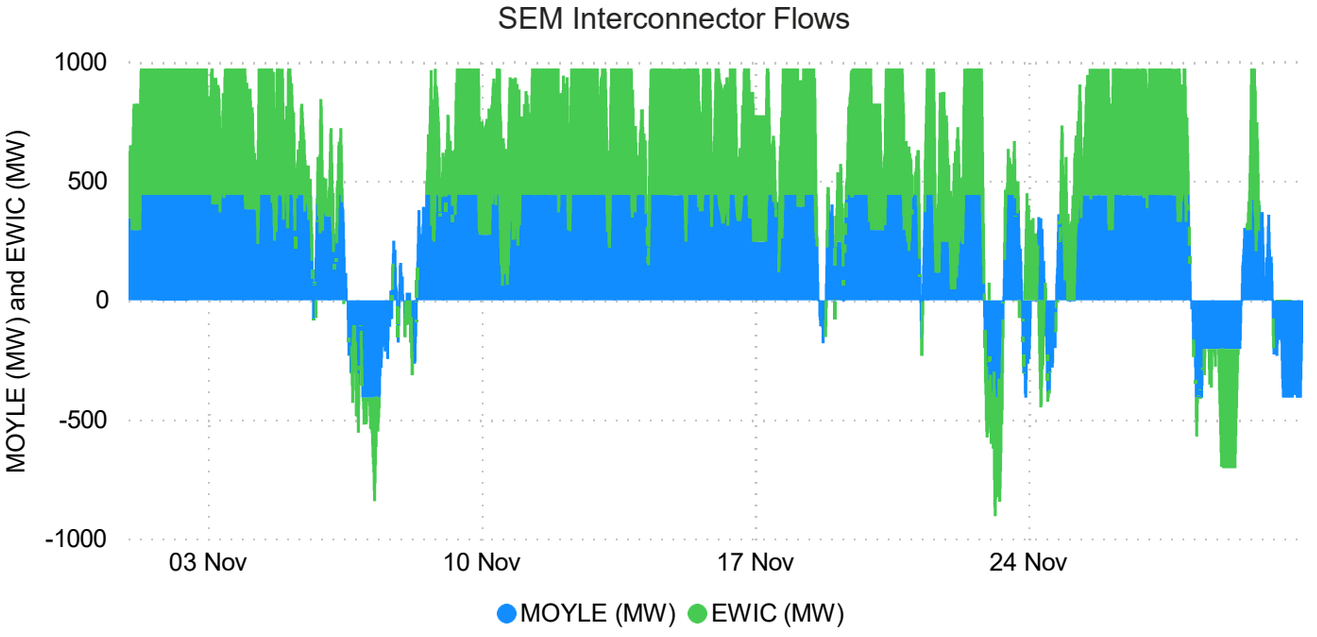
The charts show that the SEM and GB prices appear to follow the same general trend. Significant spreads can be observed on several occasions. The MMU has investigated the underlying reasons for these spreads and the findings are consistent with those discussed with the SEMC previously.

Basically, the periods of significant spreads between the two markets are generally correlated with period of very low wind. Due to the prevailing fuel mix across both regions, the effects of low wind are felt more intensively in the SEM than in GB. The MMU is investigating this matter further and will come back to the SEMC in the foreseeable future with more information on this front.

SEM Interconnectors November 2024

Events of capacity curtailment (by the SEM TSO) in the direction SEM to GB.

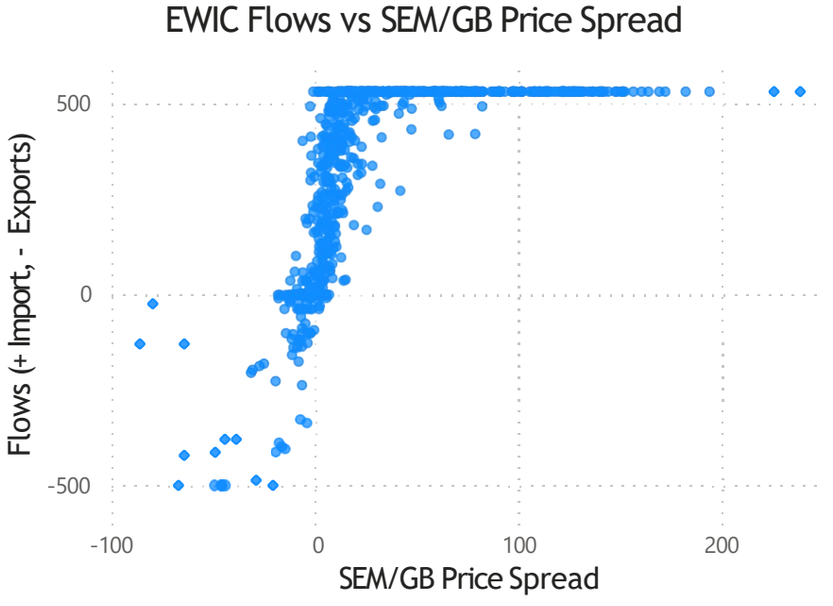
Moyle	EWIC
8th 17:13 -20:00	30th 08:00 -23:59

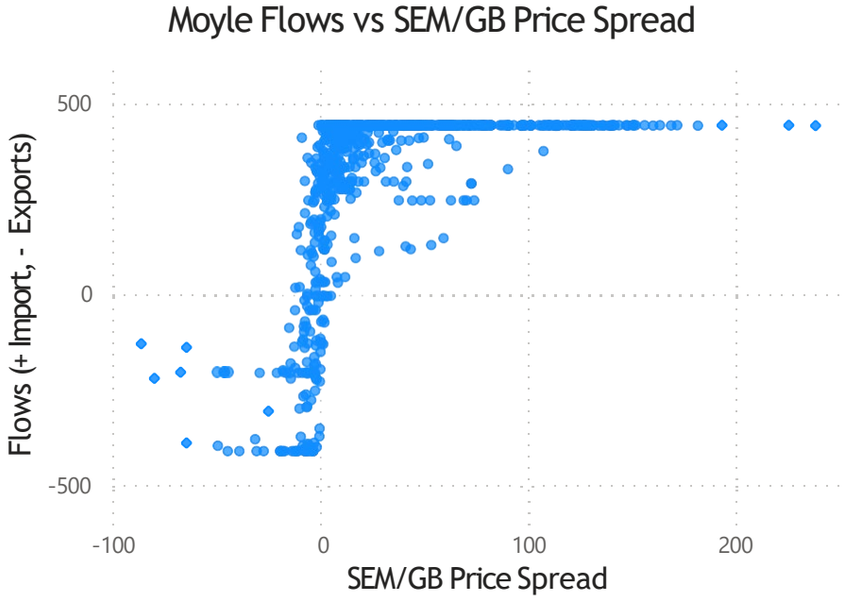


Interconnector Flows

In November, the SEM Interconnectors mostly imported power from GB, with only minimal exports. This reflects the predominantly higher prices in the SEM compared with GB.

There were number of periods in November when Moyle was not fully exporting due to lower volumes traded in IDA1 and IDA2 markets.

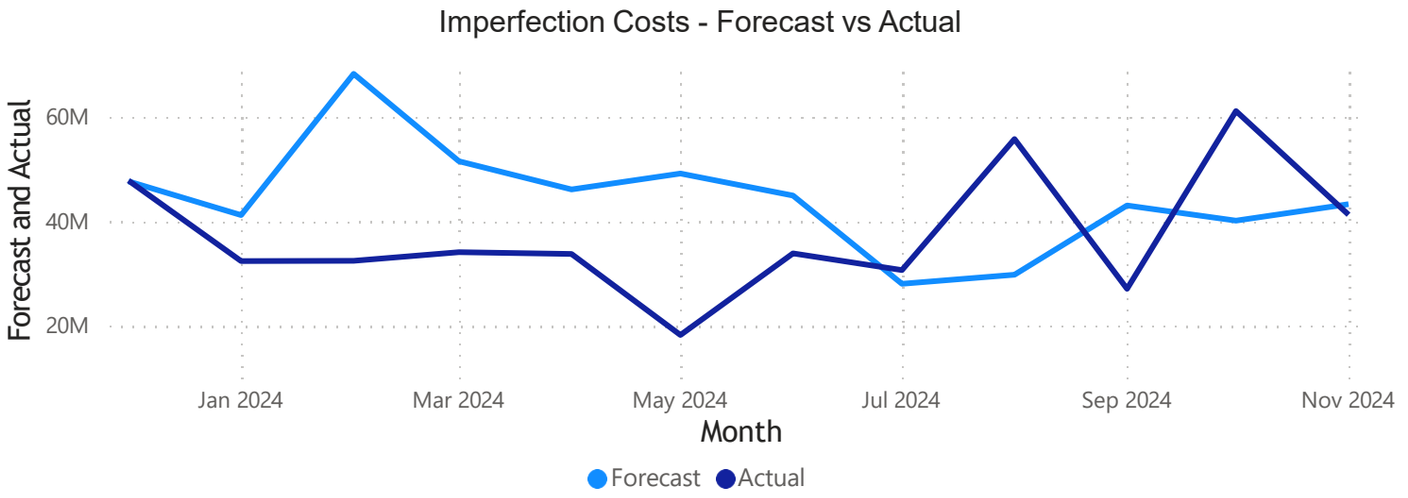




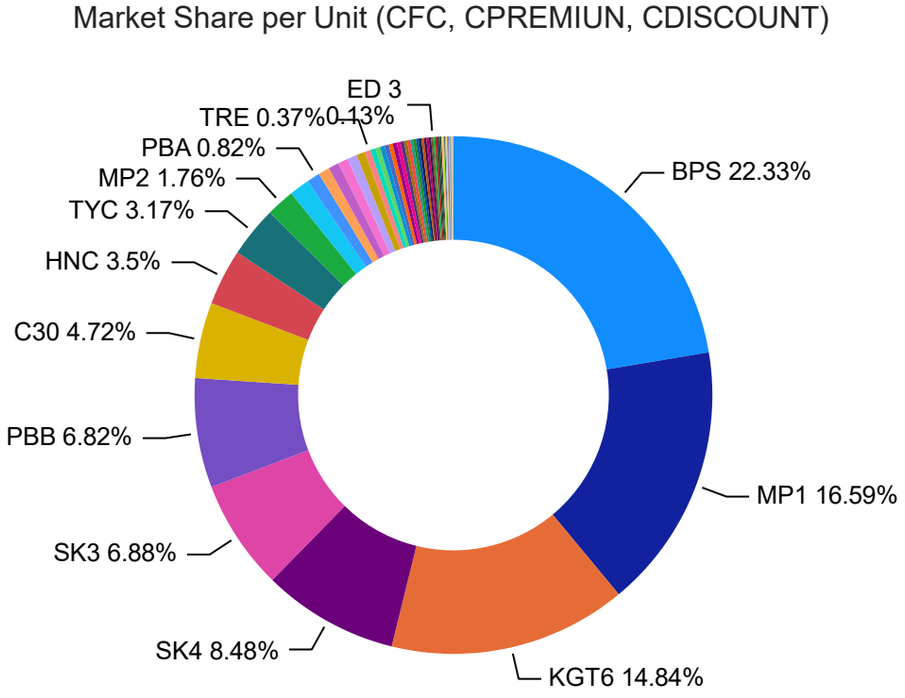
Balancing Market November 2024

Where power stations are run differently from the market schedule, it is termed “constraint". Subject to the Trading and Settlement Code and Firm Access, Constraint payments keep generators financially neutral for the difference between the market schedule and what actually happened when generating units were dispatched.

Generators can be constrained ‘on' or ‘up' if the market schedule indicated they were to be run at lower levels than actually happened. Or they could be constrained ‘down' or ‘off' if they were to be run at a higher level than happened in reality. There is always an overall net cost to the system associated with constraints.



Determinant Name	Value €
CABBPO	138,942.38
CAOOPO	-525,802.57
CCURL	-713,533.60
CDISCOUNT	14,990,726.09
CFC	8,585,751.10
CPREMIUM	19,742,332.06
CTEST	-83,682.20
CUNIMB	-850,280.56
Total	**41,284,452.71**

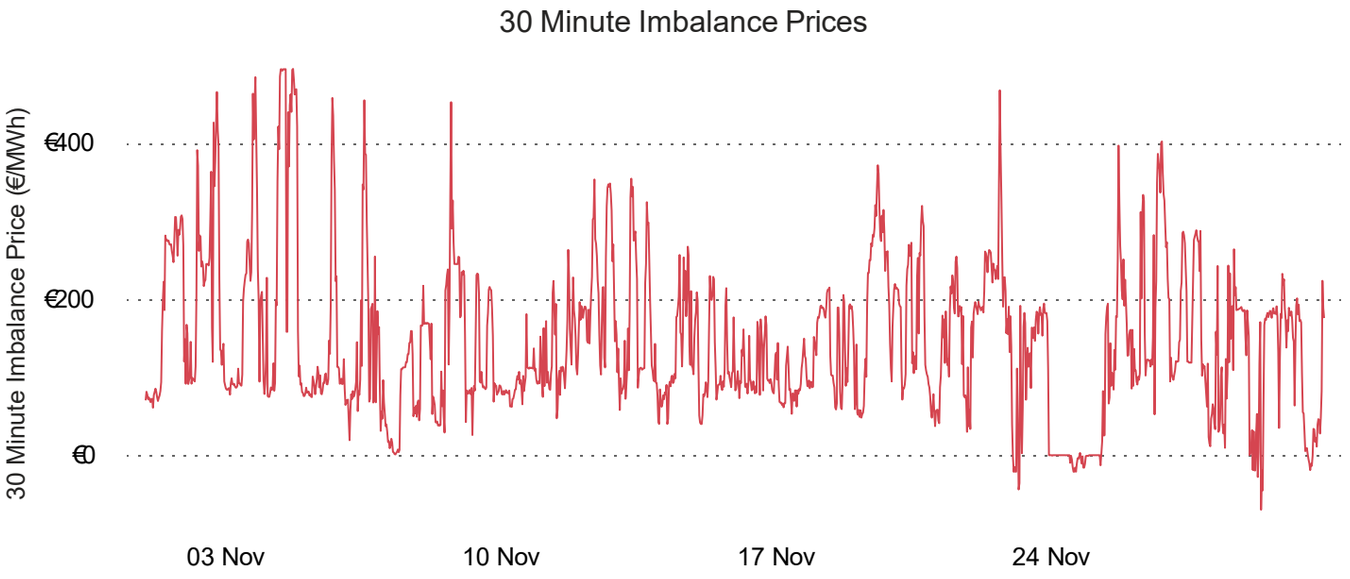


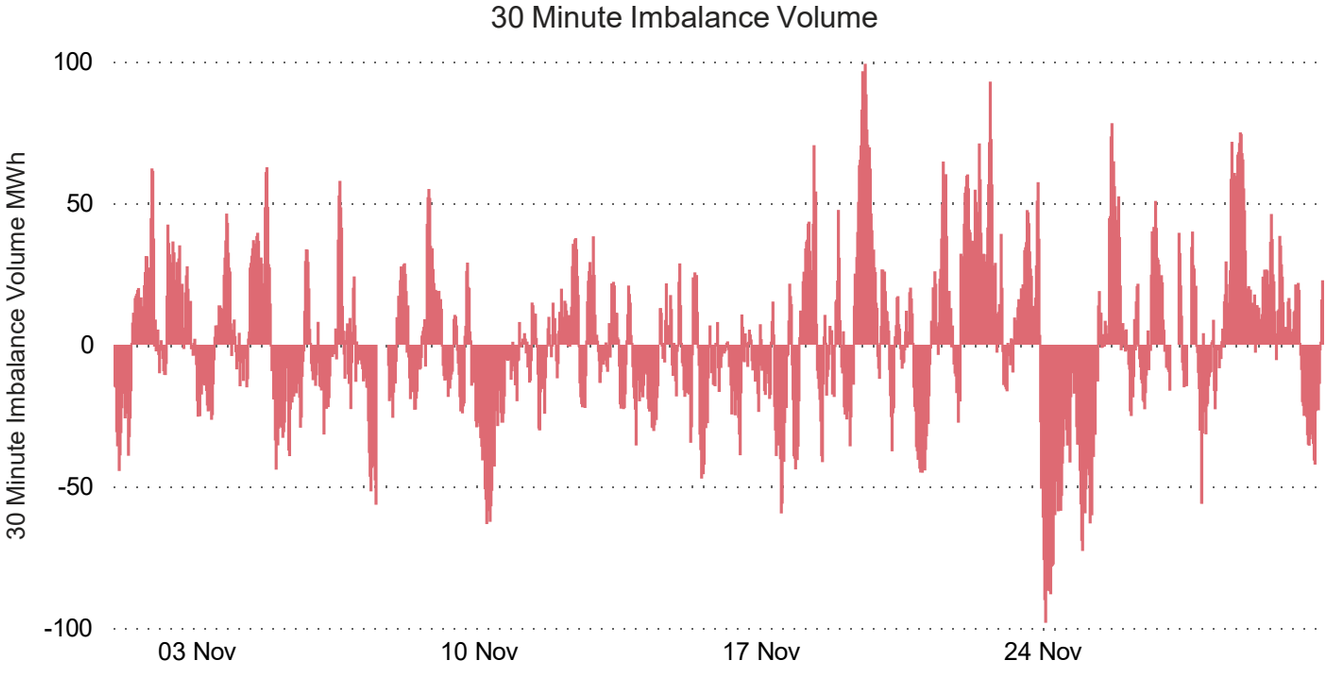
Constraints Payments

This charts illustrates the distribution of selected Constraint Payments, to specific power plants. As it can be seen, BPS (EP Ballylumford) was the largest receiver of these payments in November followed by Moneypoint 1 and KGT6 (EP Killroot Ltd).

Balancing Market November 2024

30 Minutes Imbalance Price
€145.28
Average Price
-€69.85
Lowest Price
€495.05
Highest Price



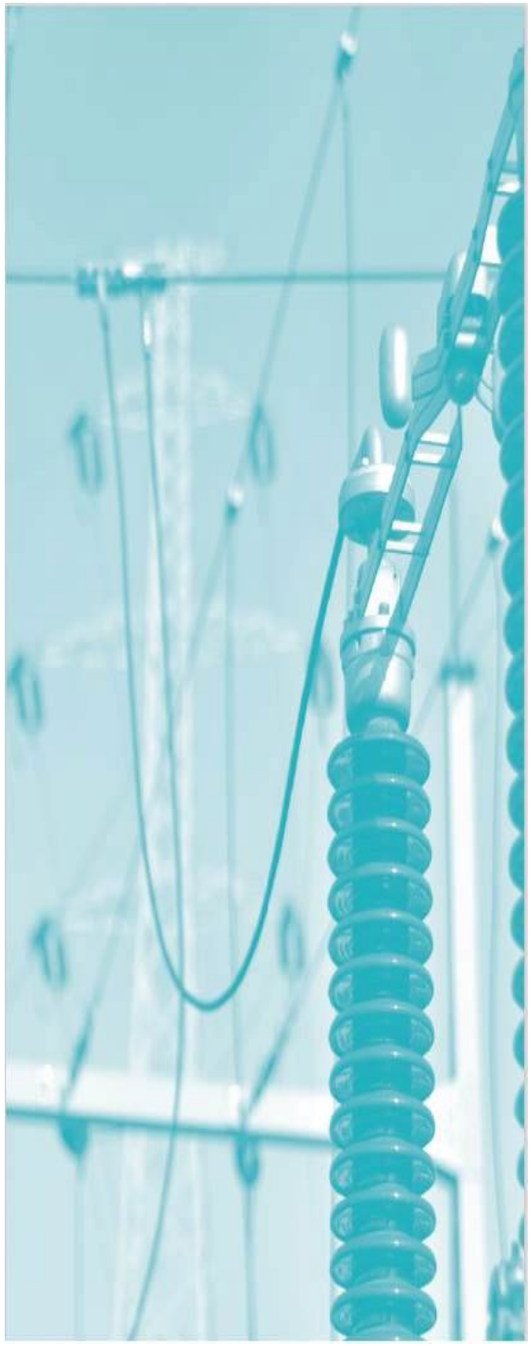


SEM committee

Imbalance Price & Volumes

The average Imbalance (BM) Price this month is lower than the Day Ahead Price. Additionally, the Balancing Market prices has exhibited a much higher range of prices indicating a higher level of volatility compared to Day Ahead Market Prices. This is an expected characteristic of the Balancing Market.

There were no Reliability Options events this month as the Balancing Market prices have not breached the PSTR level.



Demand and Generation Mix

Demand November 2024

SEM Demand

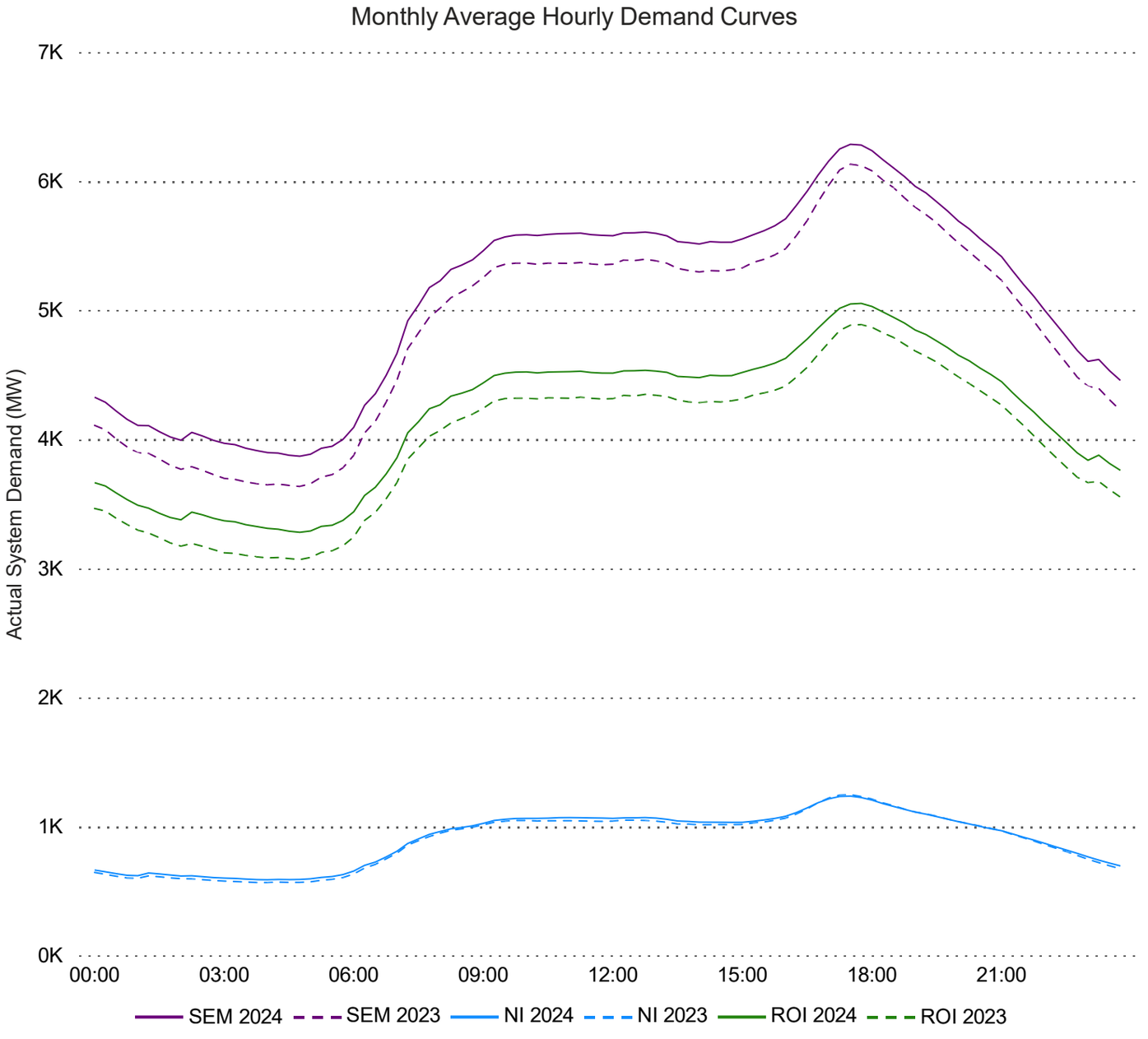
5,084.68 SEM Average 2024	4,873.01 SEM Average 2023
3,868.77 SEM Min 2024	3,634.61 SEM Min 2023
6,285.80 SEM Max 2024	6,131.58 SEM Max 2023

NI Demand

905.57 NI Average 2024	891.55 NI Average 2023
587.17 NI Min 2024	565.52 NI Min 2023
1,235.33 NI Max 2024	1,247.32 NI Max 2023

ROI Demand

4,177.94 ROI Average 2024	3,981.45 ROI Average 2023
3,279.37 ROI Min 2024	3,067.94 ROI Min 2023
5,053.00 ROI Max 2024	4,888.77 ROI Max 2023



SEM Demand

The graph illustrates a steady demand within NI, with only increase of 1.57% compared to the corresponding period in the previous year.

The demand for ROI during the month has shown an increase of 4.93% relative to the same period last year.

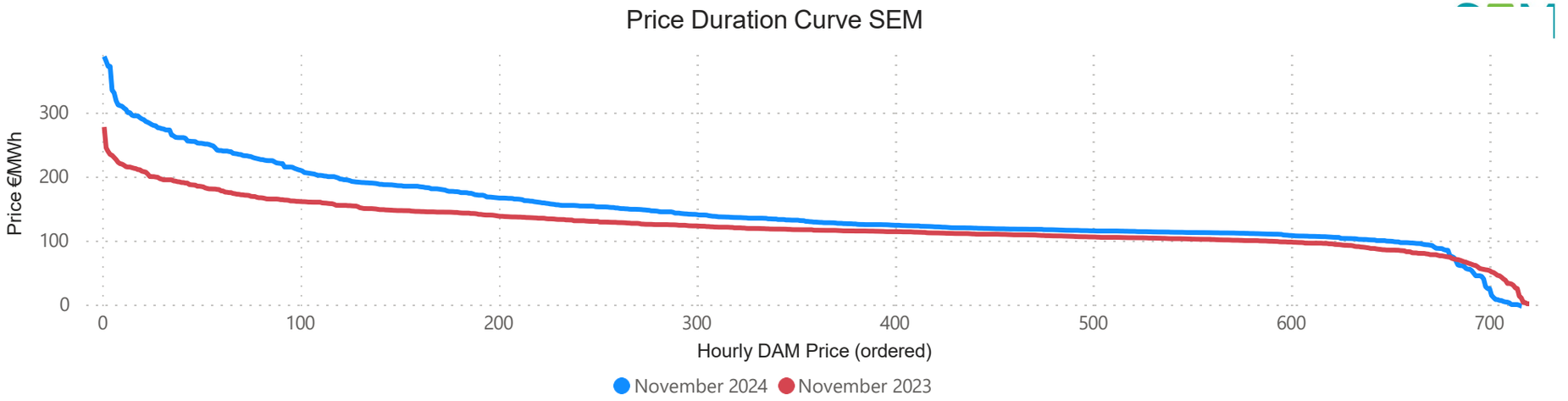
Demand in the SEM as a whole is up by 4.34% compared to the same period last year.

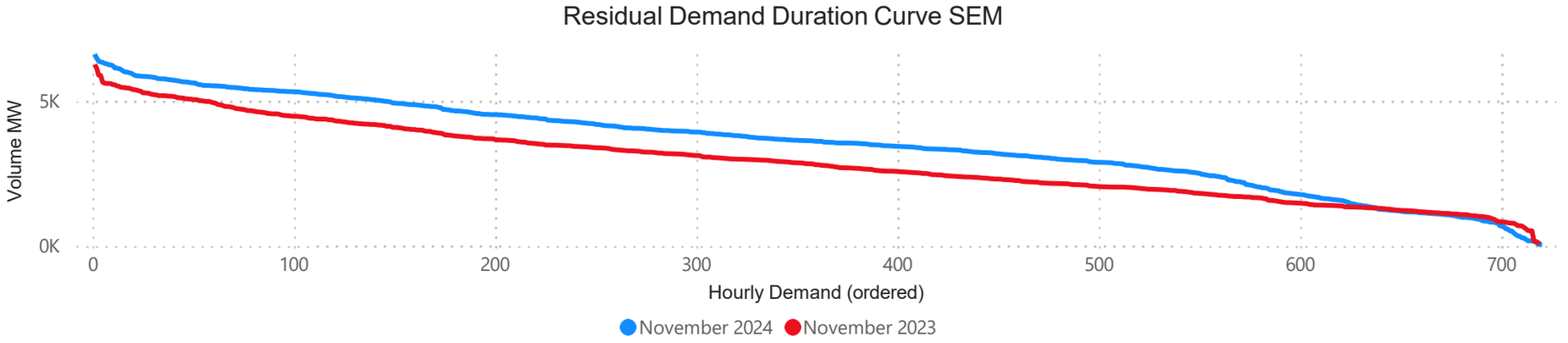
Duration Curves November 2024

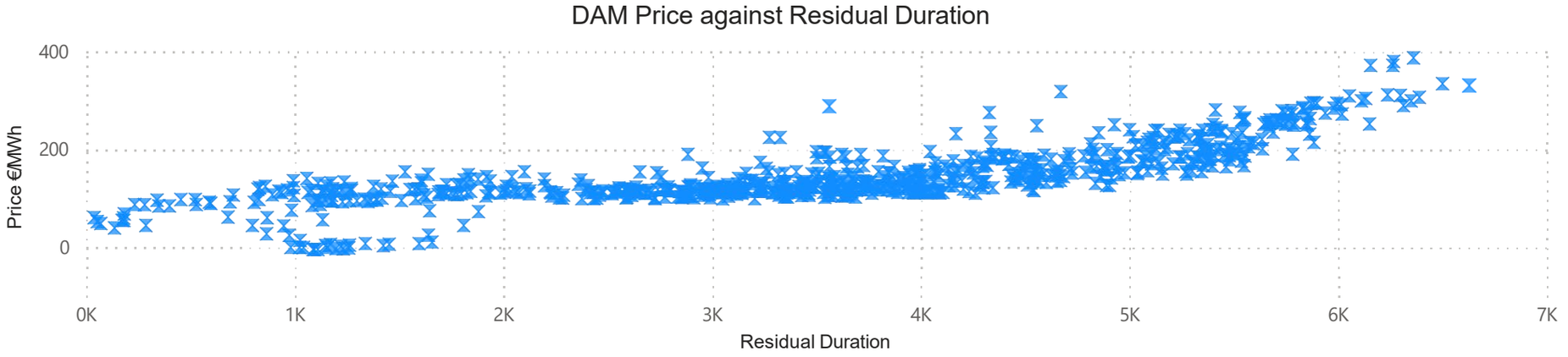
Price Duration
The price duration curve shows the hourly DAM prices across the month ordered from the largest to the smallest.

Residual Duration
The residual demand curve shows the ordered hourly demand level across the month which can't be met by renewable generation.

Price against Residual Duration
Shows the residual duration for each period relative to the DAM price for that period.



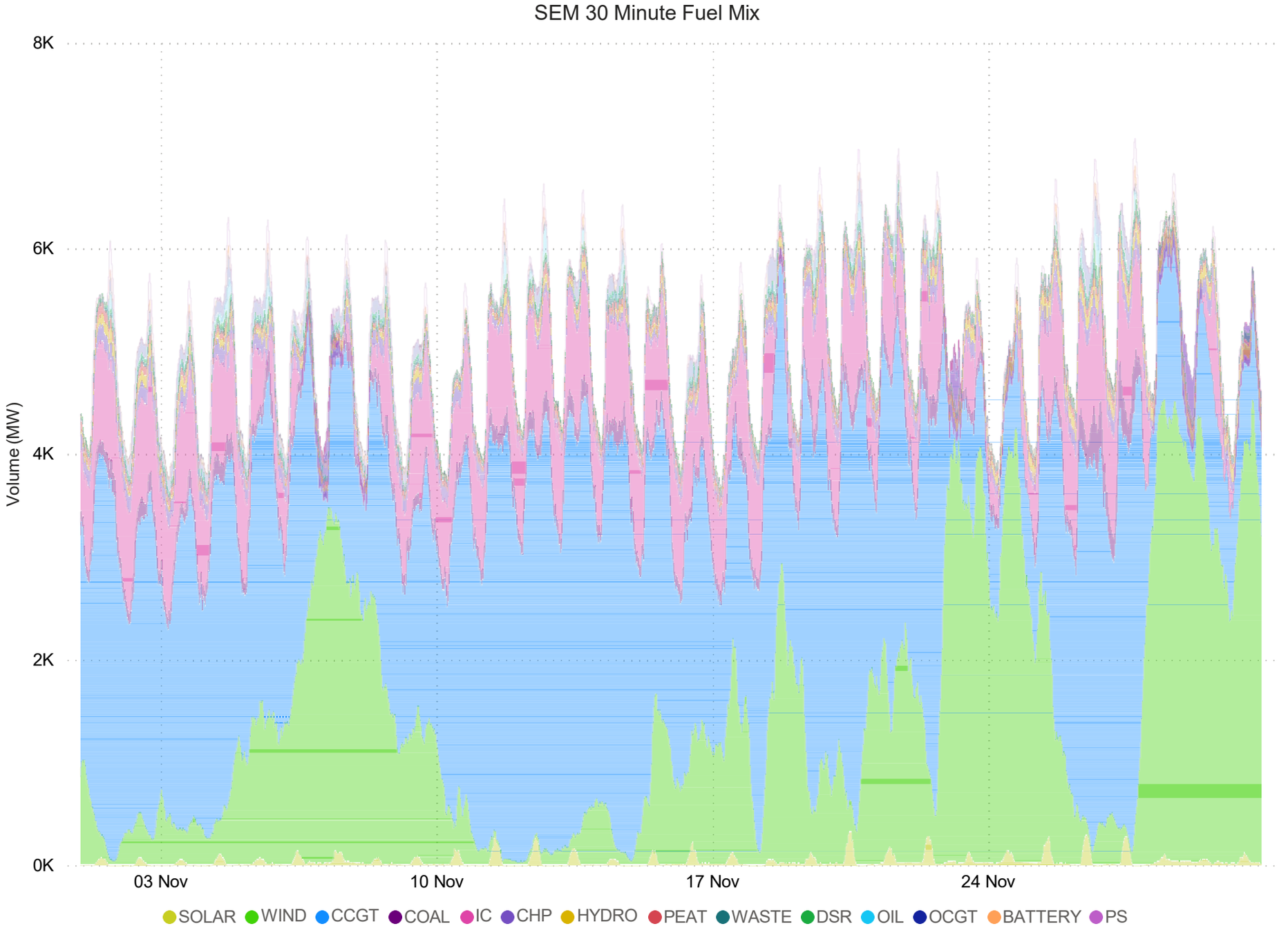




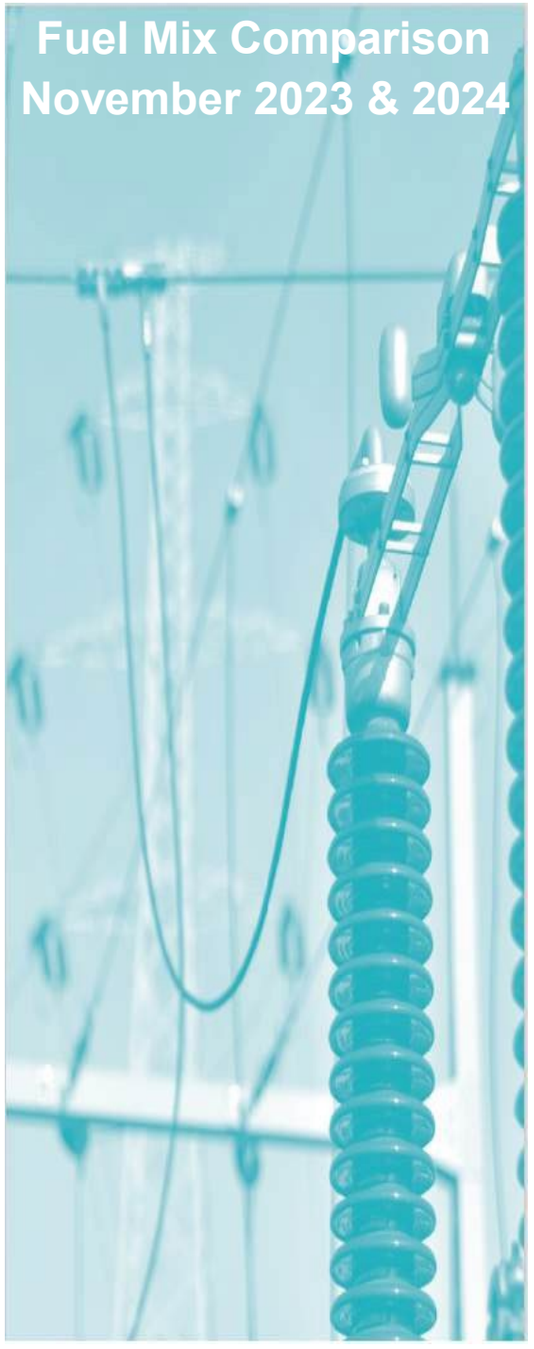
Fuel Mix November 2024

Fuel Type	Avg Monthly	Per. Monthly
CCGT	2472	48.7%
WIND	1447	28.5%
INTERCONNECTORS	590	11.6%
CHP	133	2.6%
COAL	118	2.3%
OCGT	68	1.3%
HYDRO	66	1.3%
PEAT	62	1.2%
WASTE	61	1.2%
SOLAR	37	0.7%
DSR	31	0.6%
OIL	15	0.3%
BATTERY	-7	-0.1%
PUMPED STORAGE	-20	-0.4%

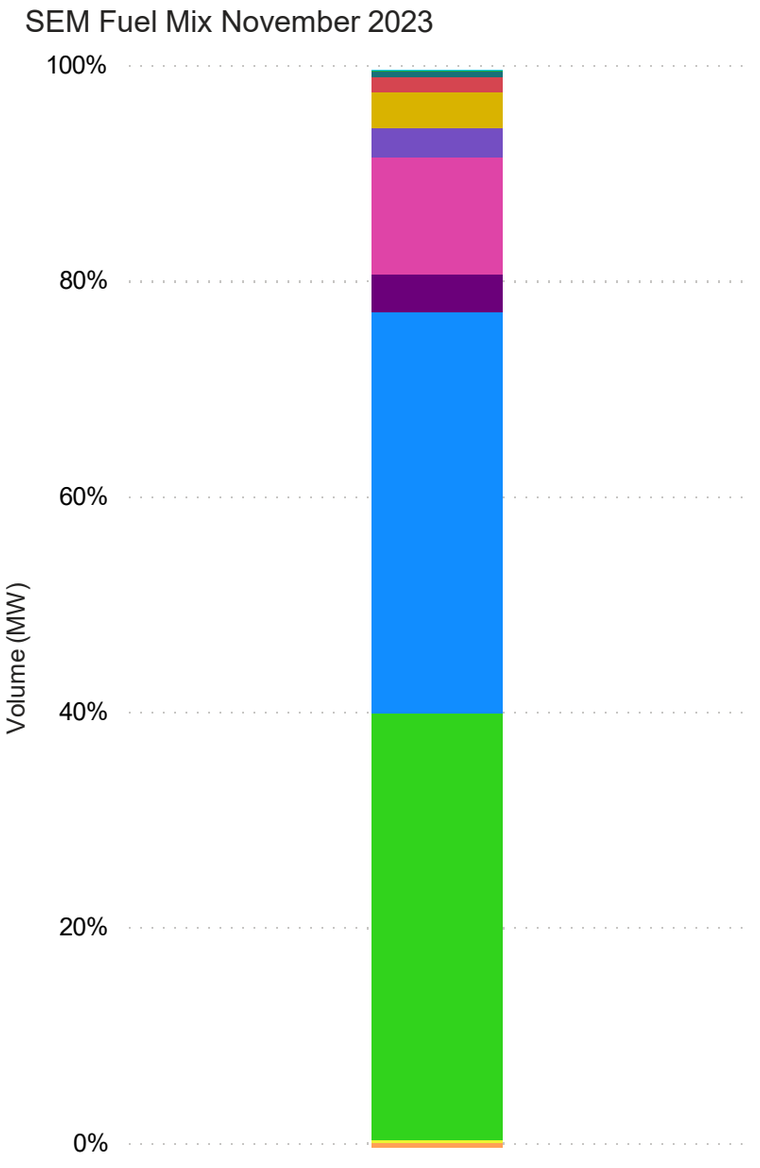
Fuel Type	Max Monthly	Min Monthly
WIND	4500	22
CCGT	4250	746
INTERCONNECTORS	977	-848
COAL	451	0
OCGT	345	0
SOLAR	324	0
OIL	314	0
PUMPED STORAGE	289	-302
BATTERY	215	-104
DSR	192	0
CHP	168	74
HYDRO	160	1
PEAT	115	41
WASTE	81	17

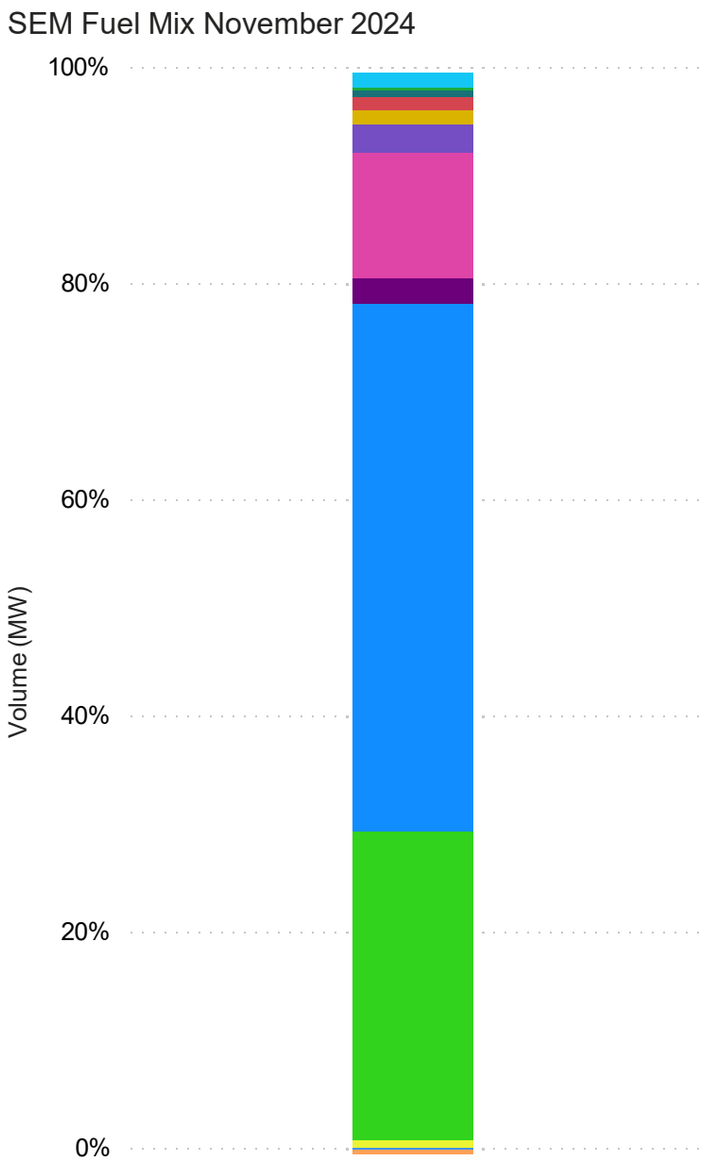


Fuel Mix Comparison November 2023 & 2024



SOLAR
WIND
CCGT
COAL
INTERCONNECTORS
CHP
HYDRO
WASTE
DSR
OIL
OCGT
BATTERY
PUMPED STORAGE





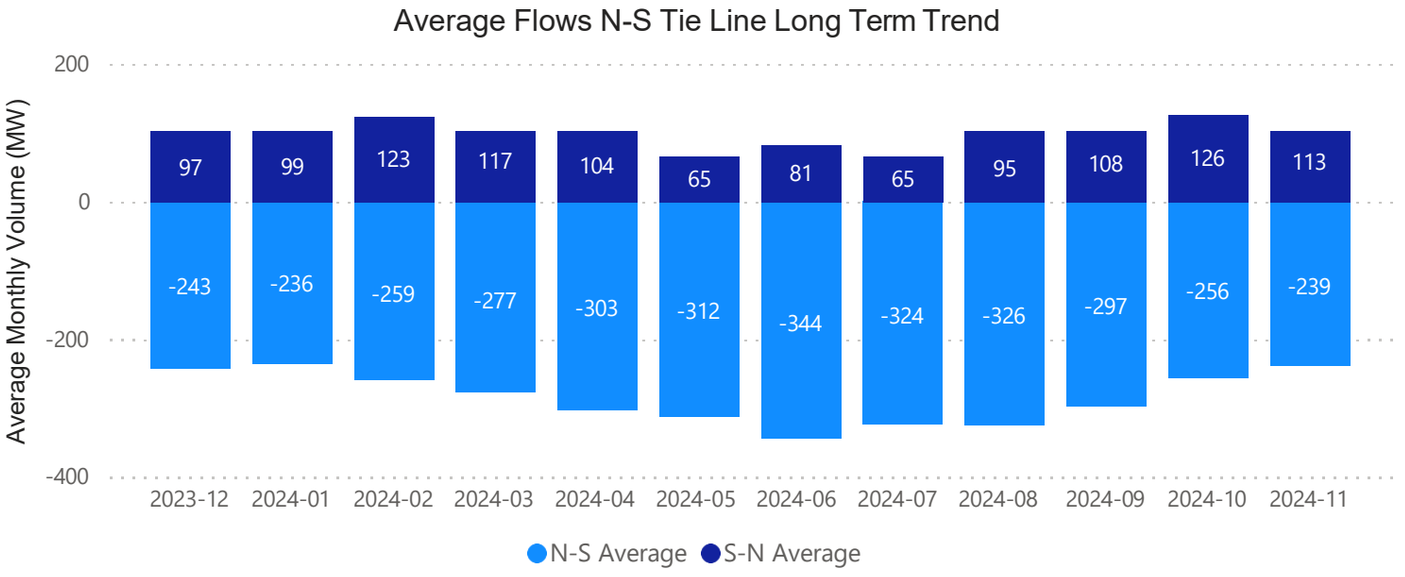
North-South Tie Line November 2024

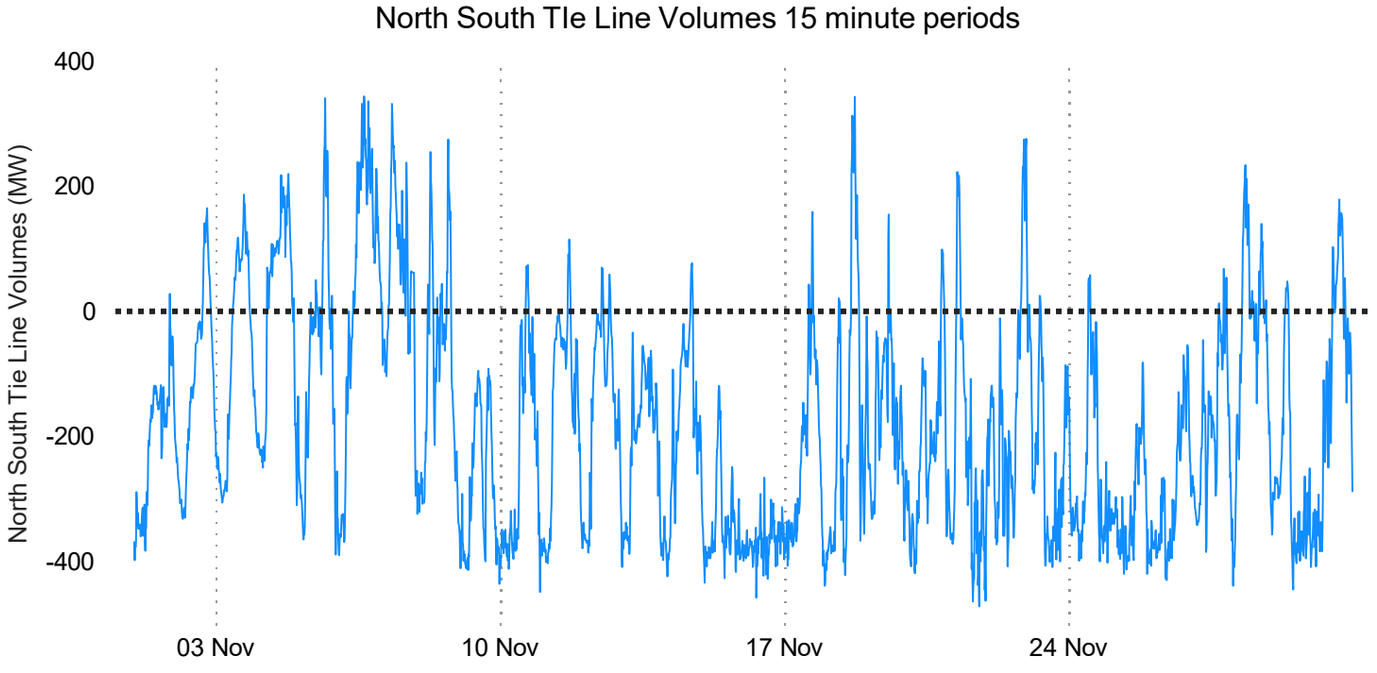
Average Flow NI to ROI (MW)
-239.26

Average Flow ROI to NI (MW)
112.74

Average Net Flow NI to ROI (MW)
-178.26

-ve flow NI to ROI
+ve flow ROI to NI





North South Tie Line

Flows across the N-S Tie Line were predominantly in the North to South direction this month. This has been the long term trend. There are persistence reasons for this trend.

- When the wind penetration is high in NI, a surplus of power can be formed as the TSO must run a minimal number of thermal units in NI to deal with operational constrains in the system. Exporting power southwards is a mechanism to avoid wind curtailment.
- The Moyle Interconnector, due to it's lower physical losses, is allocated first for flows in the GB to NI direction. Similar to what happens when the wind penetration is high or demand is low, the interconnector flows compete with the system constrains. In order to not curtail the interconnection capacity with GB, power flows are directed southwards.
- Finally, the demand in ROI has been growing at a faster pace than in NI.

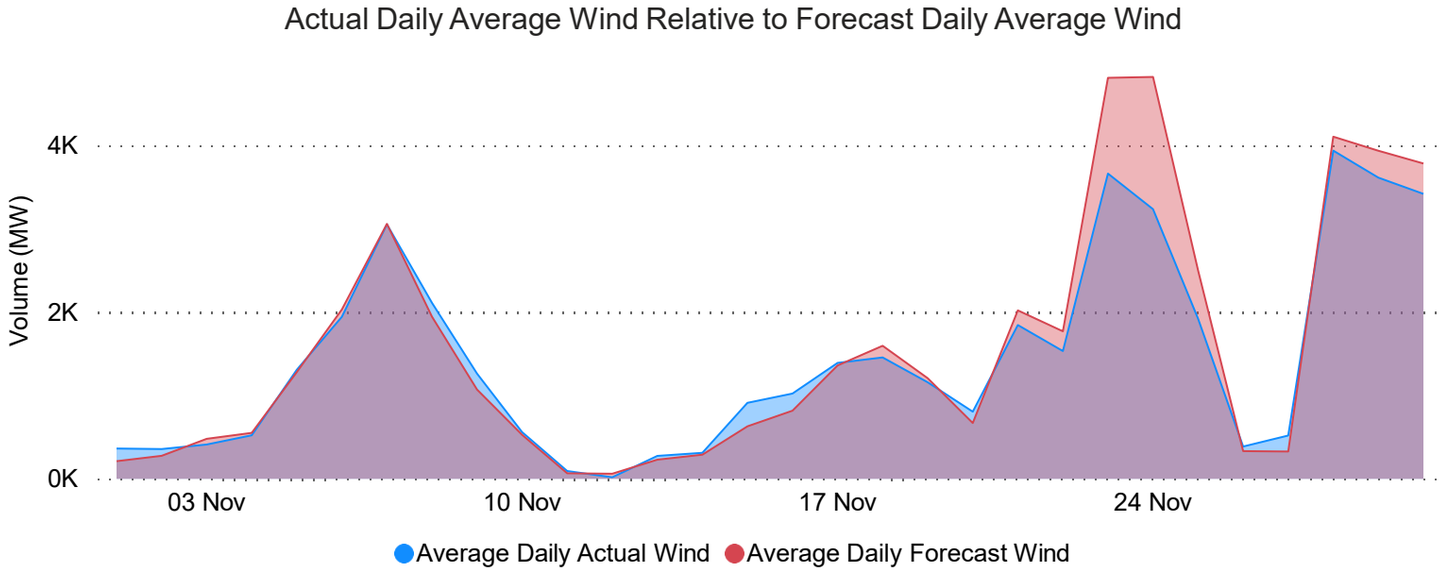
Wind Generation November 2024

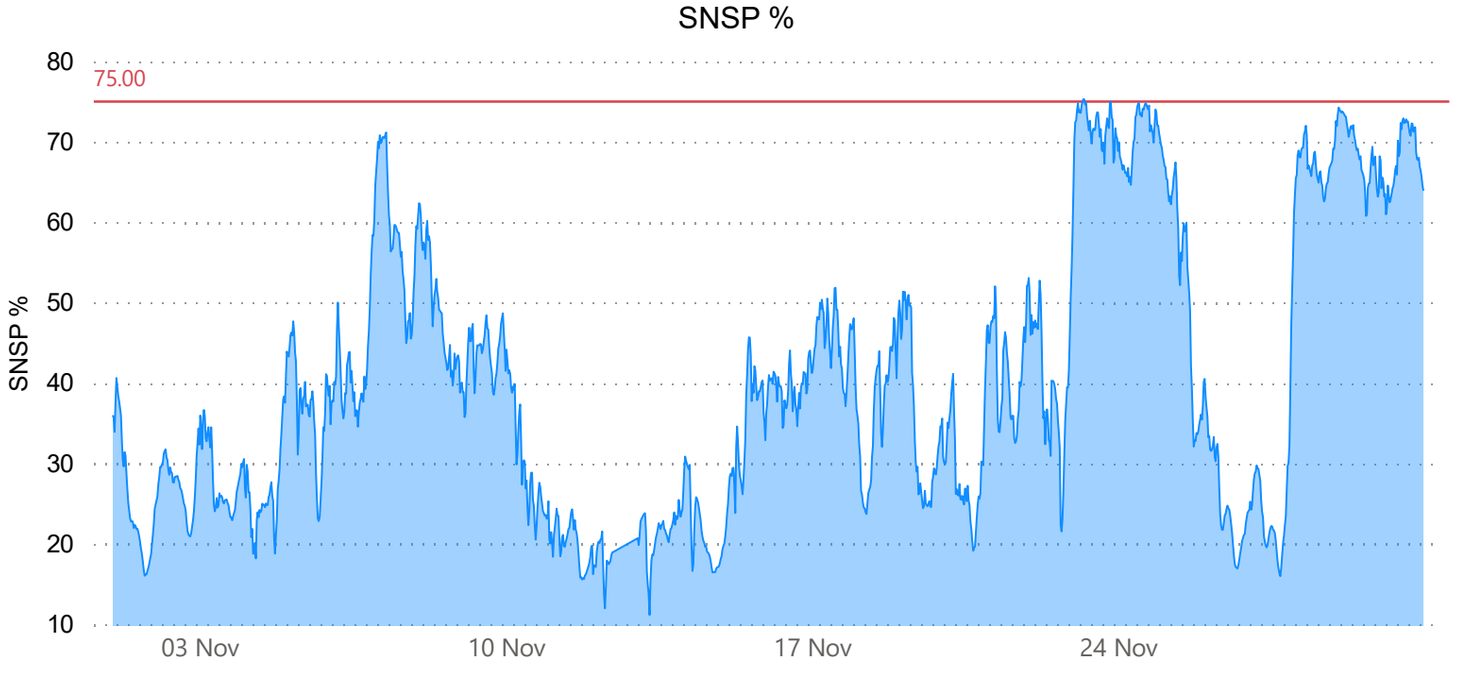
Average Daily Actual Wind (MW)
1,448

Average Daily Forecast Wind (MW)
1,560

Min SNSP%
11.14

Max SNSP%
75.32





Wind Generation

Wind generation decreased 13% compared to previous month and 20% from the same period last year.
.

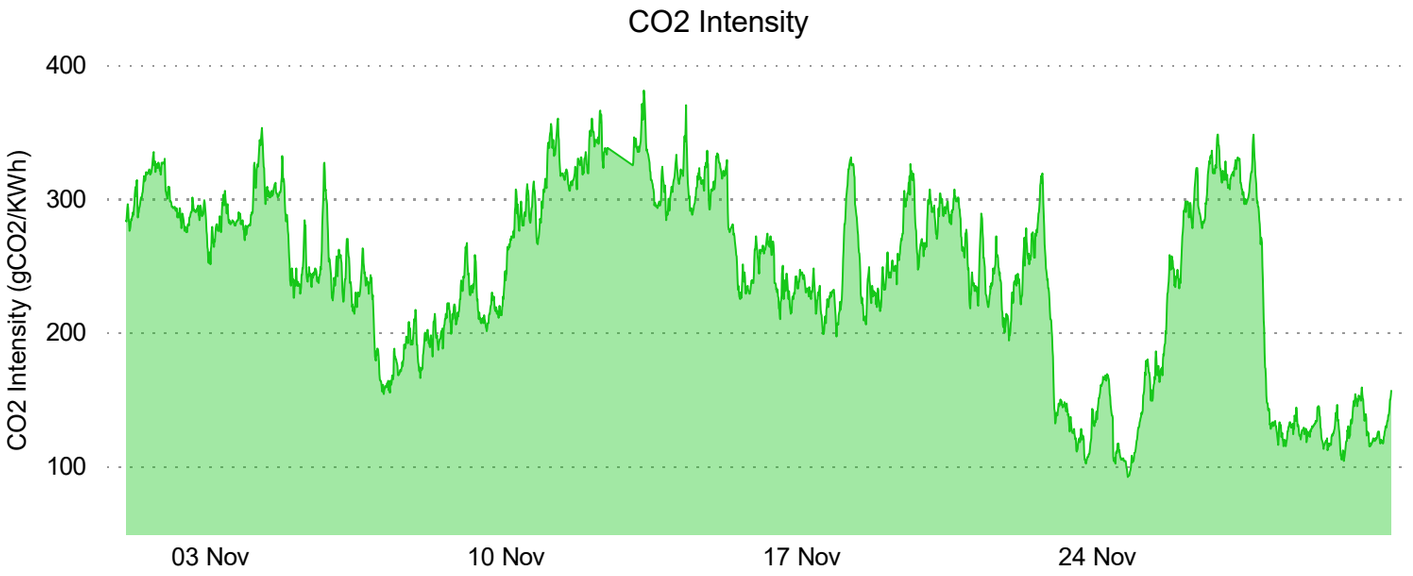
SNSP

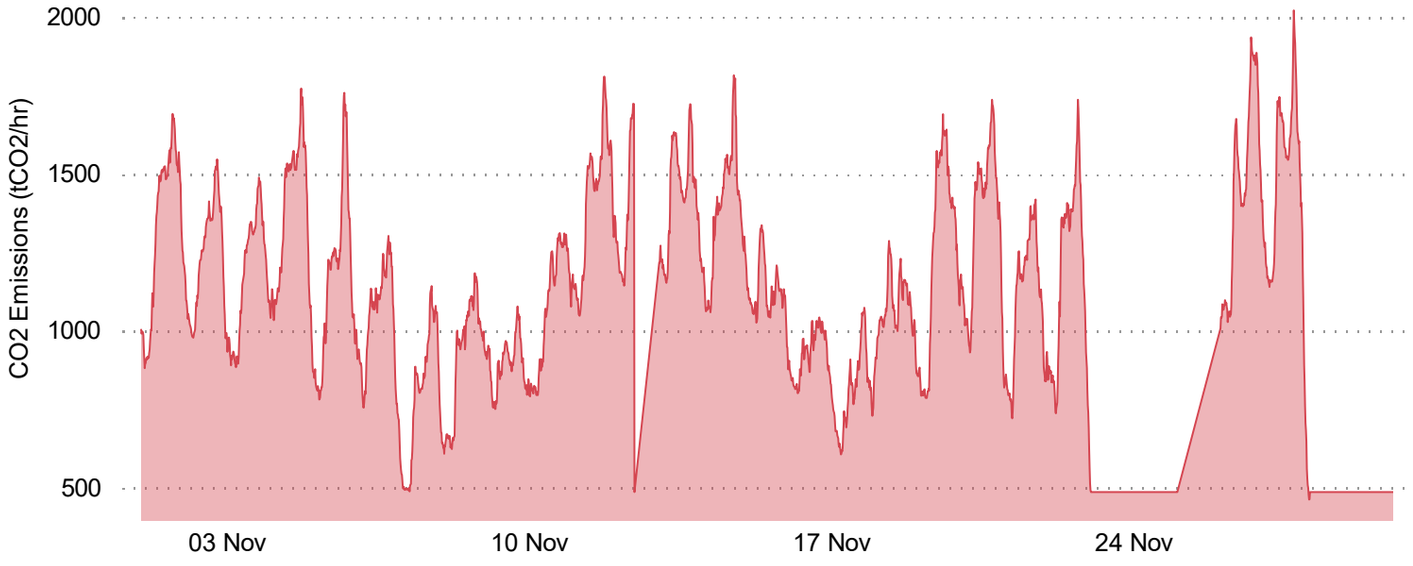
SNSP is closely linked to wind generation and as such follows the same trend across the month.

CO_2 November 2024

CO2 Intensity (gCO2/kWh)
242.87
Average
92
Lowest
381
Highest

CO2 Emissions (tCO2/hr)
1166
Average
462
Lowest
2022
Highest



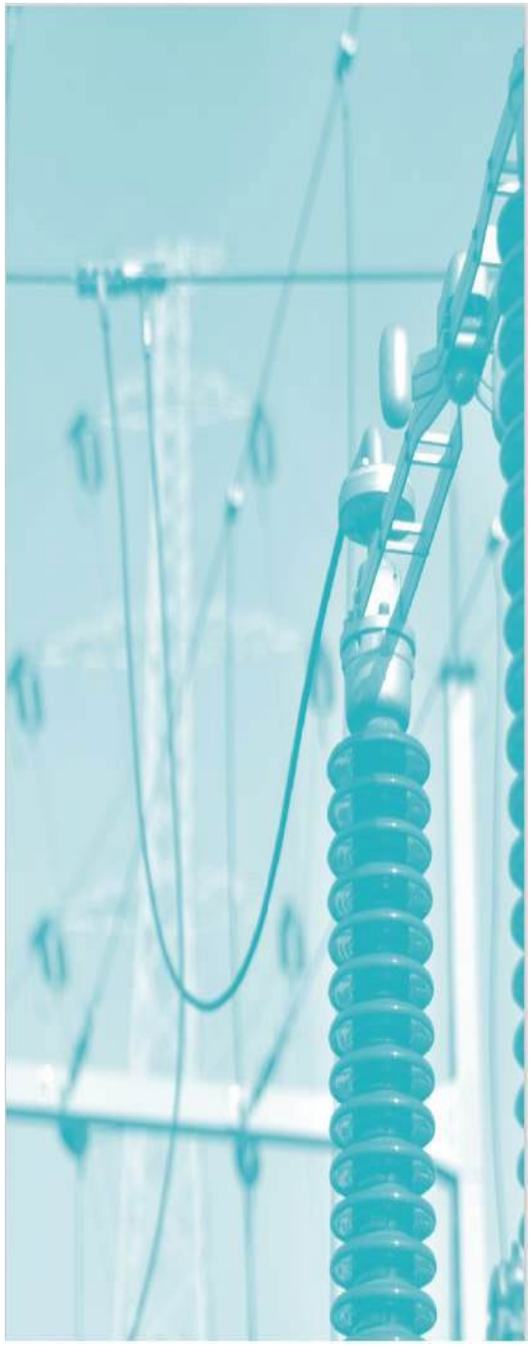


CO_2 Intensity

CO2 Intensity i.e. how many grams of carbon are emitted for every unit of electricity used, should be negatively correlated with the volume of wind output on the system.

CO2 Emissions

CO2 emissions i.e. the estimated total CO2 emissions from all large power stations, follows the same trends as CO2 intensity levels over the course of the month.



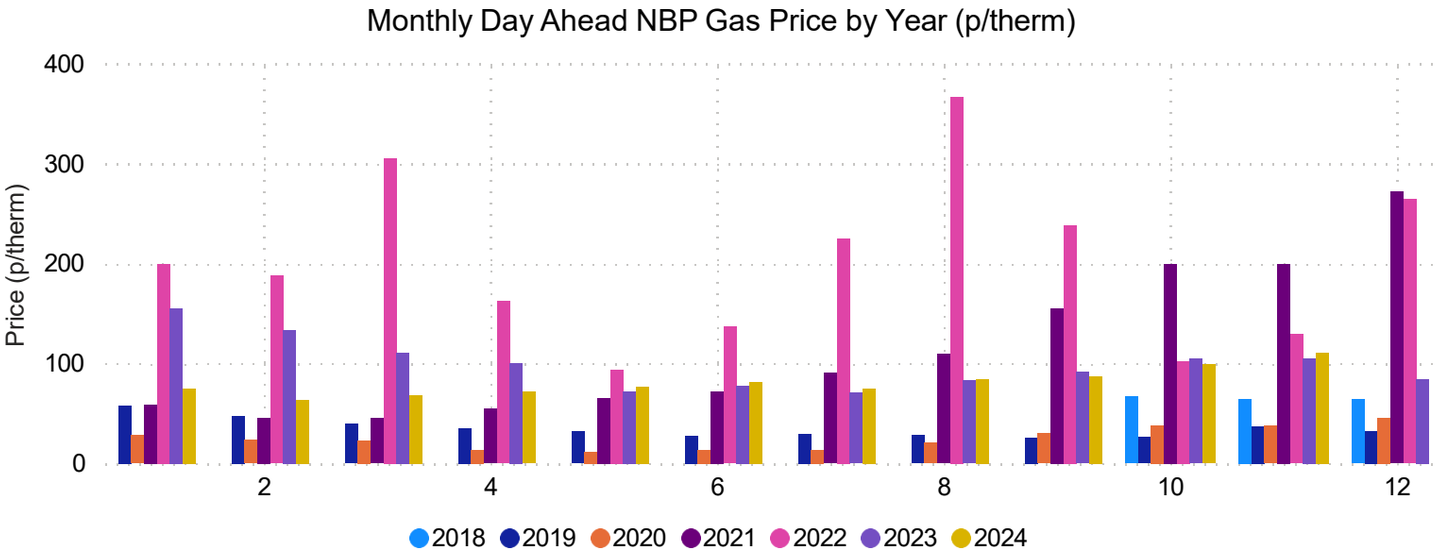
Fuel Costs and Spreads

Gas Price November 2024

111.00
Monthly Average (p/therm)

96.25
Monthly Low (p/therm)

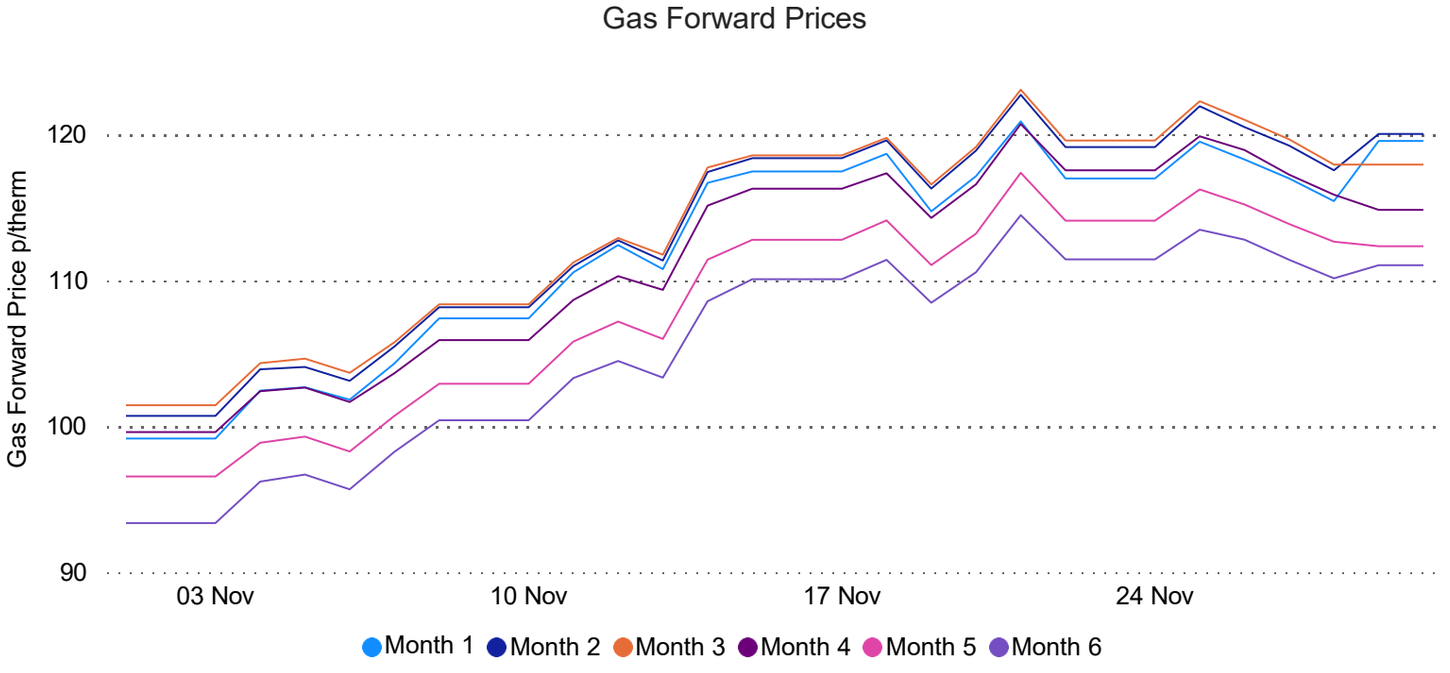
121.20
Monthly High (p/therm)



Gas Prices

Gas prices have experienced further increase of 12% compared to the previous month, increasing from 99.04p to 111p.

The market is expected to remain volatile, with potential impacts from weather conditions and geopolitical developments affecting the supply and demand dynamic.



Gas Forward Prices

Forward curves increased further due to potential supply issues as the Russian Transit agreement concludes at the end of the year.

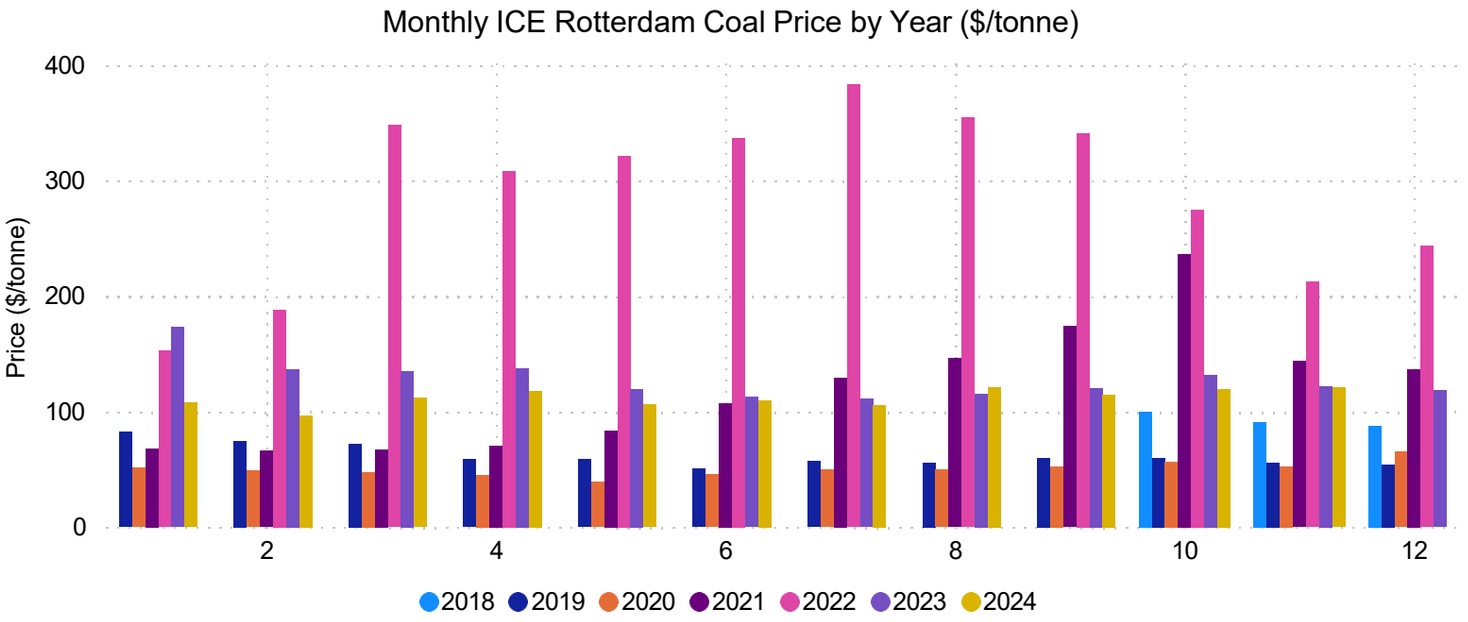
Coal Price November 2024

Coal Prices Per Tonne

$120.84
Monthly Average

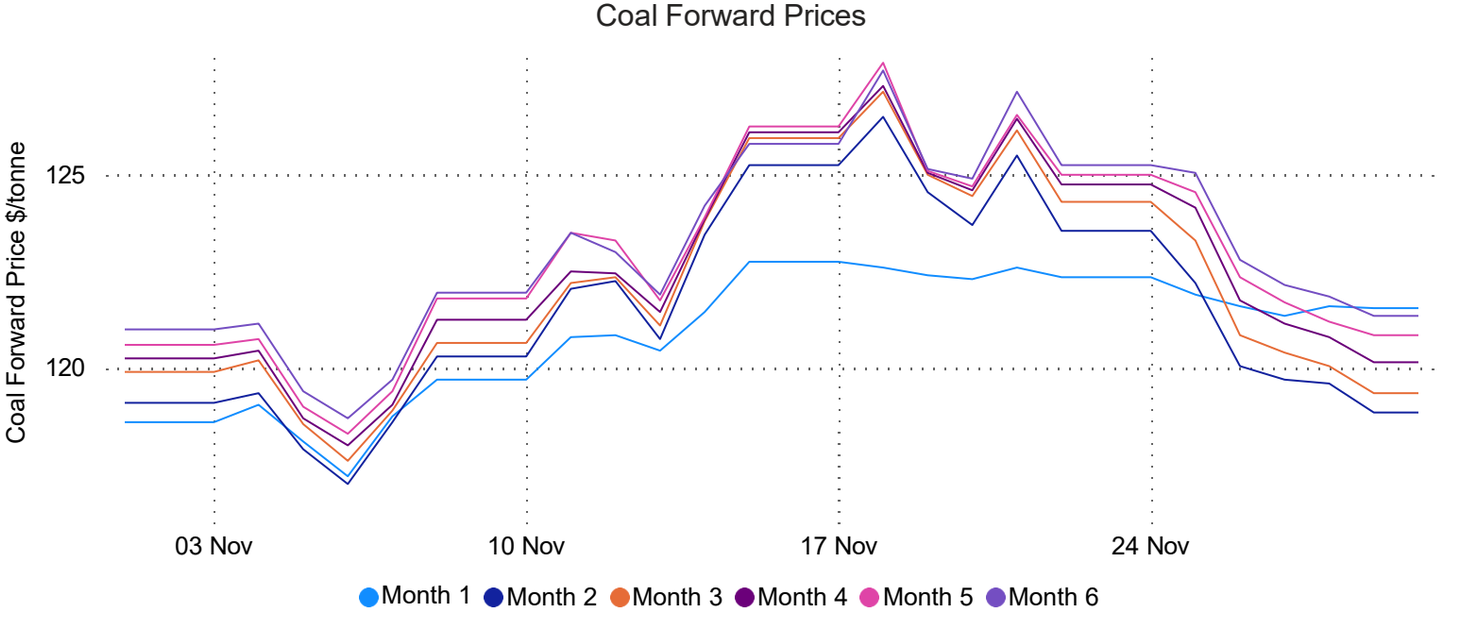
$117.20
Monthly Low

$122.75
Monthly High



Coal Prices

Coal prices were a bit higher compared to the previous month at $120.84/tonne (1% increase from the last month).



Coal Forward Prices

Coal forward prices demonstrate a decrease at the end of the month.

Carbon Price November 2024

EU Carbon Prices (€/tonne)

€67.15
Monthly Average

€63.58
Monthly Low

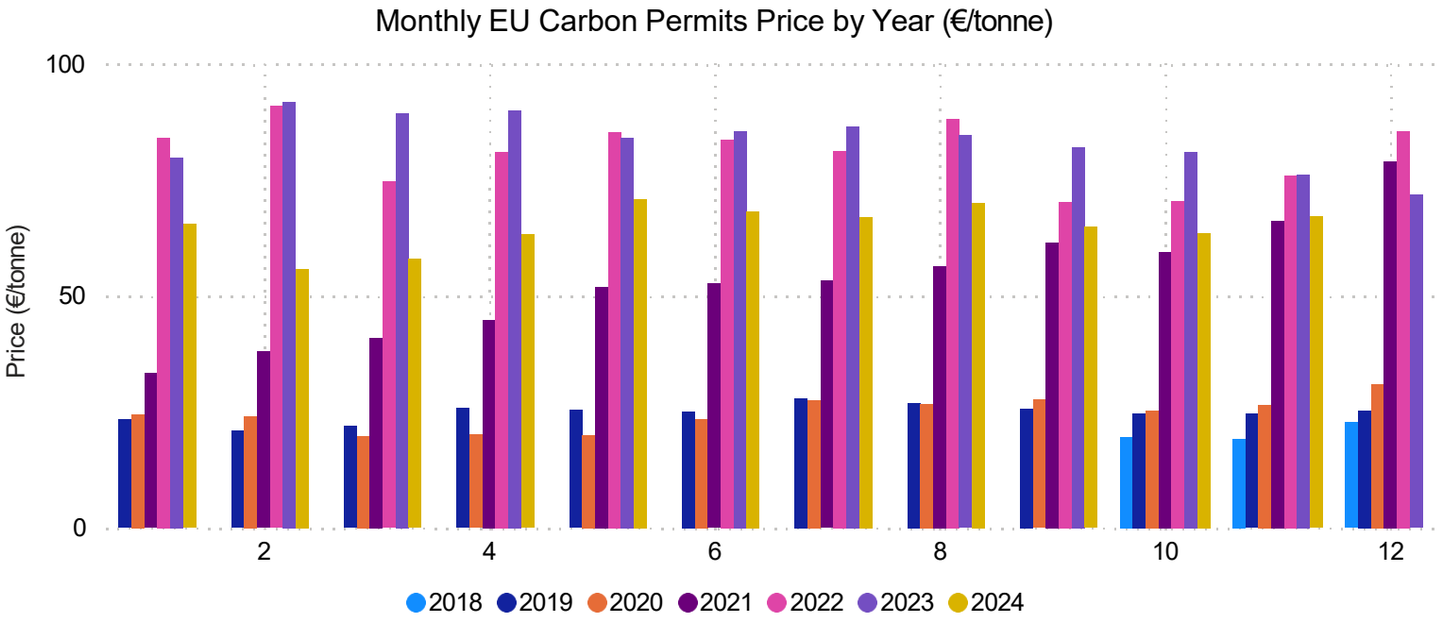
€70.39
Monthly High

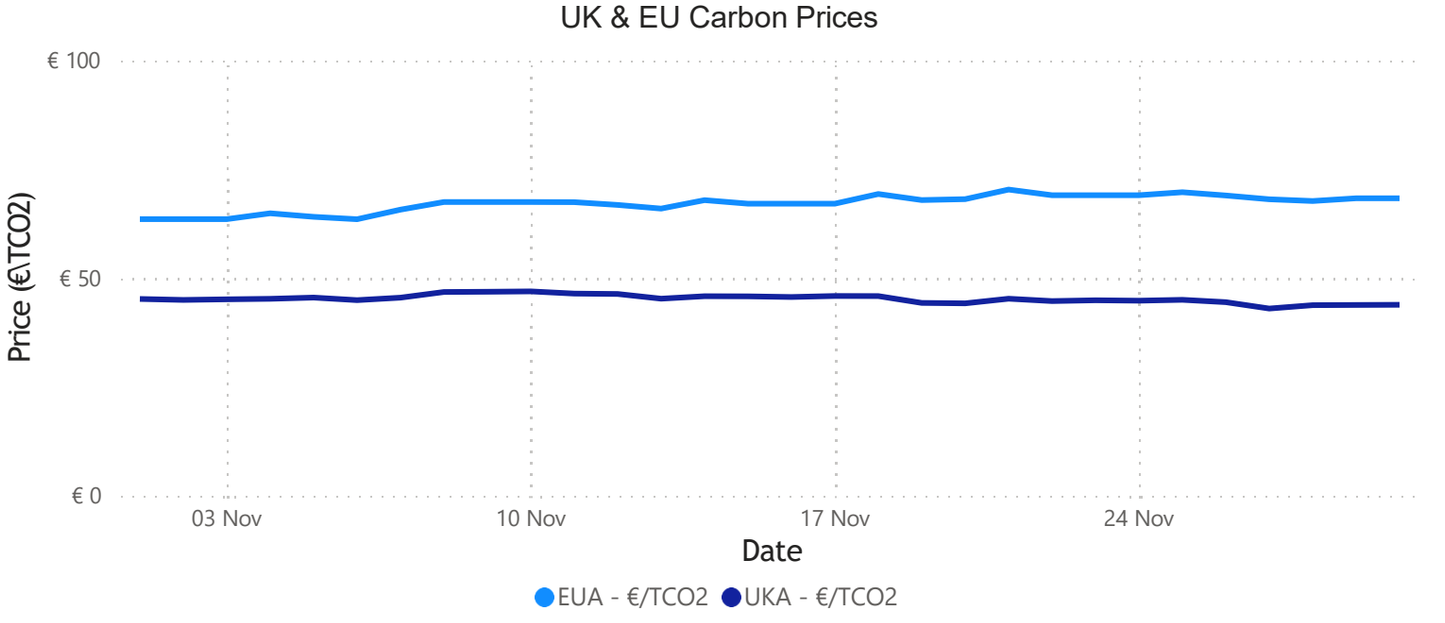
UK Carbon Prices (€/tonne)

€45.28
Monthly Average

€43.07
Monthly Low

€47.01
Monthly High





Carbon Prices

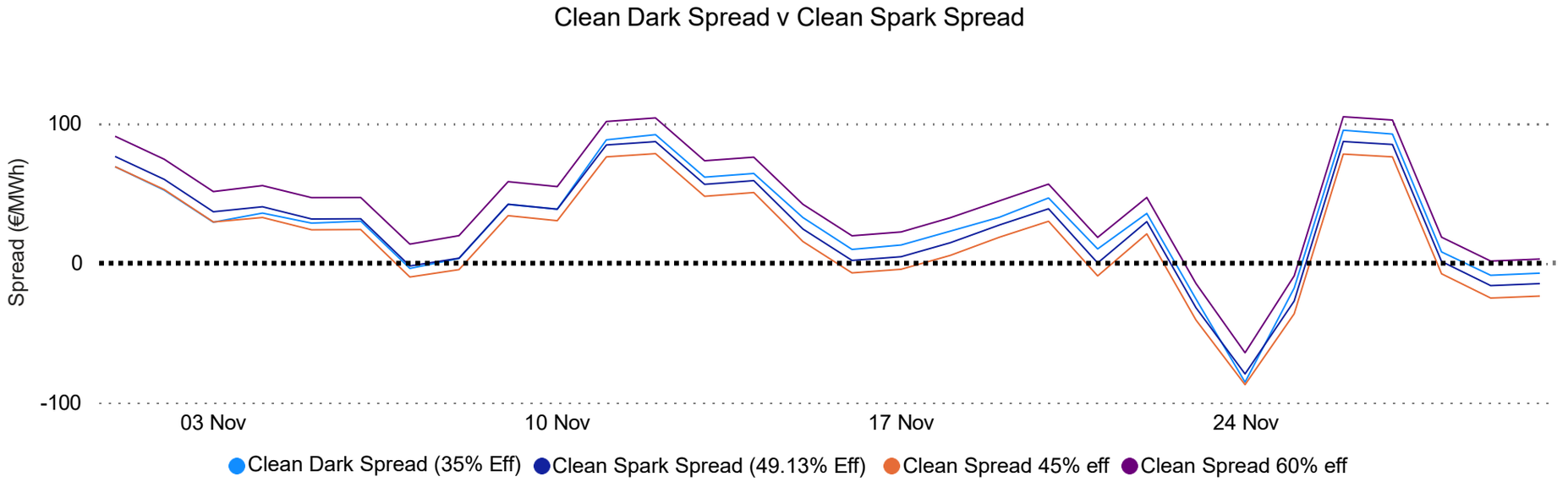
Carbon has increased relative to the previous month by 6%.

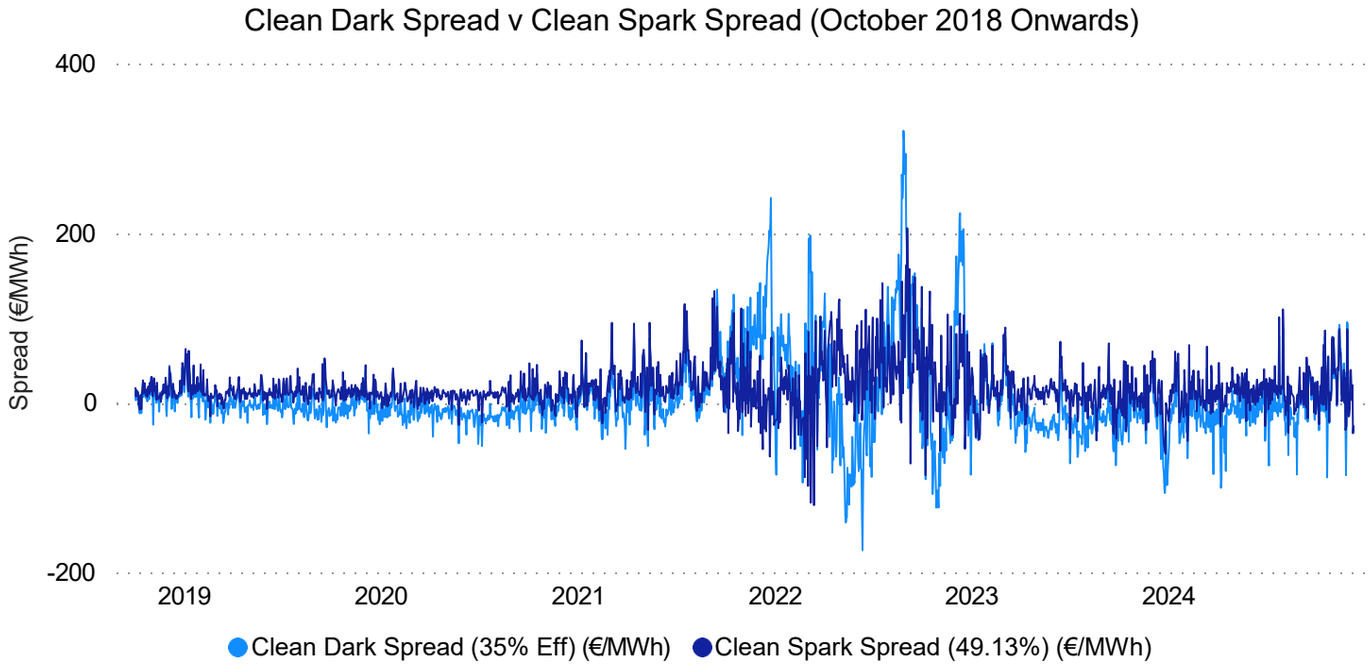
EU emission allowance prices have been trading lower for much of this year, alongside gas and power. We believe this pressure is likely to persist. EUA prices have been weighed down by a combination of bearish factors, including a sluggish industrial recovery, strong renewables output and limited power demand from mild weather. This does not seem to be the case for November.

Spark Spreads November 2024

Clean Dark Spread measure the profitability of coal fired power generation based on the variable cost of inputs (coal and carbon credits) and the value of the output (electricity).

Clean Spark Spread is the difference between the price received by a generator for electricity produced and the cost of the natural gas + Carbon needed to produce that electricity.





Clean Dark Spread vs Clean Spark Spread

Gas was still more profitable than coal for the duration of the month even after a massive increase in the gas price. The spread between them was generally consistent across the month.

Clean Spark Spread was generally positive with a decrease on 24th Nov when the wind increased for a sustained period.