

Energy Market Monitoring Report

March 2024



Market Results

Summary Dashboard

Monthly Averages	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
DAM (€/MWh)	145.25	125.57	105.19	117.11	96.24	106.46	111.62	125.54	122.9	88.97	99.9	84.6	86.67
% Change from previous month	-9%	-14%	-16%	11%	-18%	11%	5%	12%	-2%	-28%	12%	-15%	2%
% Change from previous year	-50%	-42%	-27%	-36%	-64%	-73%	-61%	-8%	-14%	-68%	-38%	-47%	-40%
Actual System Demand (MW)	4833	4469	4276	4189	4101	4185	4335	4516	4873	4862	5151	4946	4833
% Change from previous month	1%	-8%	-4%	-2%	-2%	2%	4%	4%	8%	0%	6%	-4%	-2%
% Change from previous year	3%	1%	2%	0%	0%	2%	3%	4%	5%	0%	5%	3%	0%
Actual Wind Generation (MW)	1748	1545	884	878	1316	1401	1384	1363	1811	2446	1854	2000	2072
% Change from previous month	-14%	-12%	-43%	-1%	50%	6%	-1%	-2%	33%	35%	-24%	8%	4%
% Change from previous year	12%	8%	-38%	-22%	54%	71%	28%	-33%	-19%	49%	-7%	-1%	19%
Gas Price p/therm	110.96	100.32	72.41	77.87	70.76	82.87	91.52	104.88	104.97	84.2	74.87	63.37	68.18
% Change from previous month	-17%	-10%	-28%	8%	-9%	17%	10%	15%	0%	-20%	-11%	-15%	8%
% Change from previous year	-64%	-38%	-24%	-44%	-68%	-77%	-61%	3%	-19%	-68%	-52%	-53%	-39%
Carbon Price (€/Tonne)	89.41	89.98	84.18	85.51	86.57	84.61	82.09	81.10	76.25	71.79	65.52	55.79	57.94
% Change from previous month	-3%	1%	-6%	2%	1%	-2%	-3%	-1%	-6%	-6%	-9%	-15%	4%
% Change from previous year	20%	11%	-1%	2%	6%	-4%	17%	15%	1%	-16%	-18%	-39%	-35%
Coal Price (\$/tonne)	134.95	137.83	119.57	112.56	111.02	115.57	120.40	131.80	122.16	118.31	107.65	96.84	111.78
% Change from previous month	-1%	2%	-13%	-6%	-1%	4%	4%	9%	-7%	-3%	-9%	-10%	15%
% Change from previous year	-61%	-55%	-63%	-67%	-71%	-67%	-65%	-52%	-43%	-51%	-38%	-29%	-17%
EWIC % Import Periods	50.00%	50.56%	75.86%	77.72%	67.11%	68.11%	73.75%	86.90%	68.78%	56.38%	69.76%	69.07%	63.77%
EWIC % Export Periods	16.47%	13.65%	8.28%	4.06%	9.21%	11.96%	8.89%	2.99%	9.11%	20.36%	14.78%	11.02%	11.33%
EWIC % Not Flow Periods	23.86%	30.80%	15.88%	18.22%	22.68%	19.93%	17.36%	10.11%	22.11%	23.25%	15.46%	19.91%	24.90%
Moyle % Import Periods	64.68%	77.50%	85.42%	92.22%	84.04%	75.24%	83.33%	92.31%	83.47%	67.81%	78.16%	79.60%	79.00%
Moyle % Export Periods	25.50%	27.43%	14.58%	7.67%	15.89%	20.33%	16.60%	7.66%	16.50%	32.16%	21.81%	20.33%	20.83%
Moyle % Not Flow Periods	0.13%	0.07%	0.00%	0.10%	0.07%	4.44%	0.07%	0.03%	0.03%	0.03%	0.03%	0.07%	0.17%

Market Volumes March 2024

Daily Average Volume MWh

DAM	118,943
IDA1	21,094
IDA2	3,245
IDA3	955
IDC	54

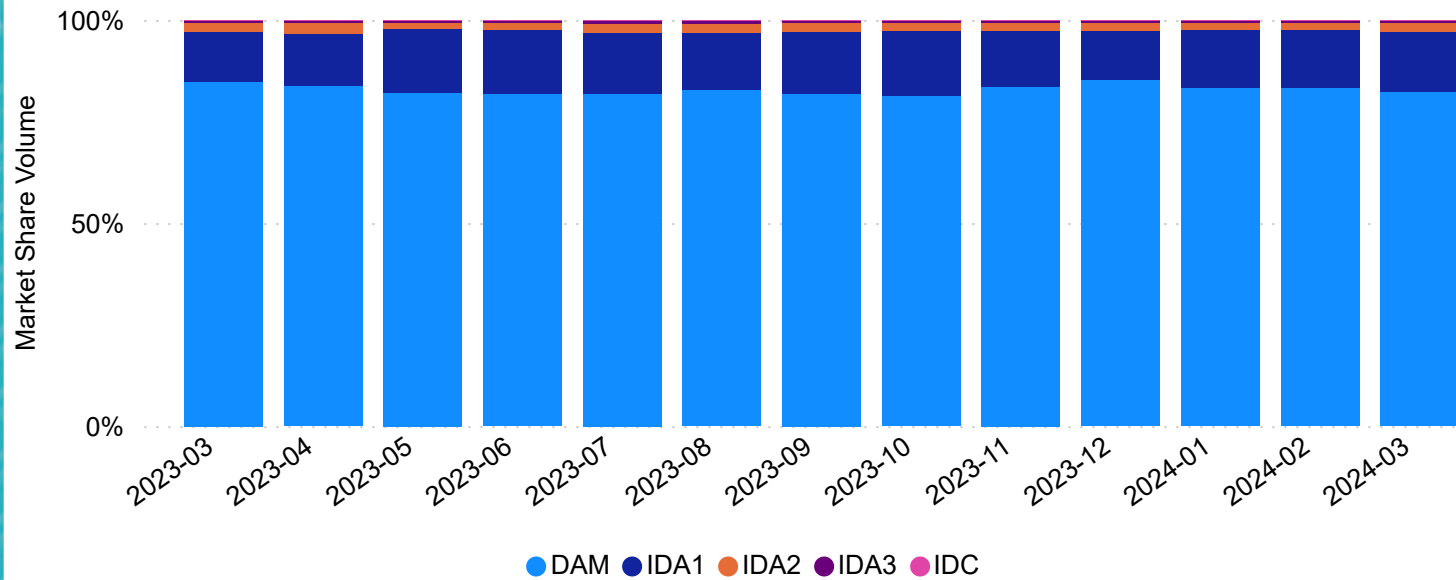
Total Monthly Volume MWh

DAM	3,687,222
IDA1	653,922
IDA2	100,601
IDA3	29,604
IDC	1,409
Total	4,472,757

Total Market Value €

DAM	€ 325,247,783
IDA1	€ 60,845,262
IDA2	€ 9,339,931
IDA3	€ 3,227,928
IDC	€ 135,759
Total	€ 398,796,662

Ex-Ante Monthly Volume by Market



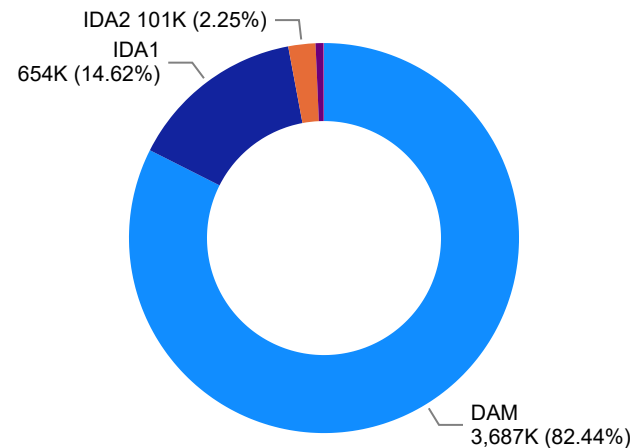
Market Volumes and Values

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.

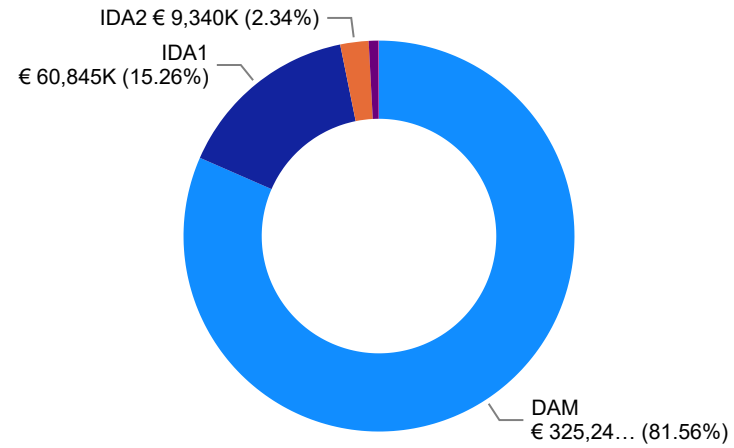
Generally, in power markets, market participants will prefer to lock their positions well ahead of delivery time given the increased volatility in prices closer to real time.

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.

Ex-Ante Volumes (MWh)



Ex-Ante Values (€)



● DAM ● IDA1 ● IDA2 ● IDA3 ● IDC

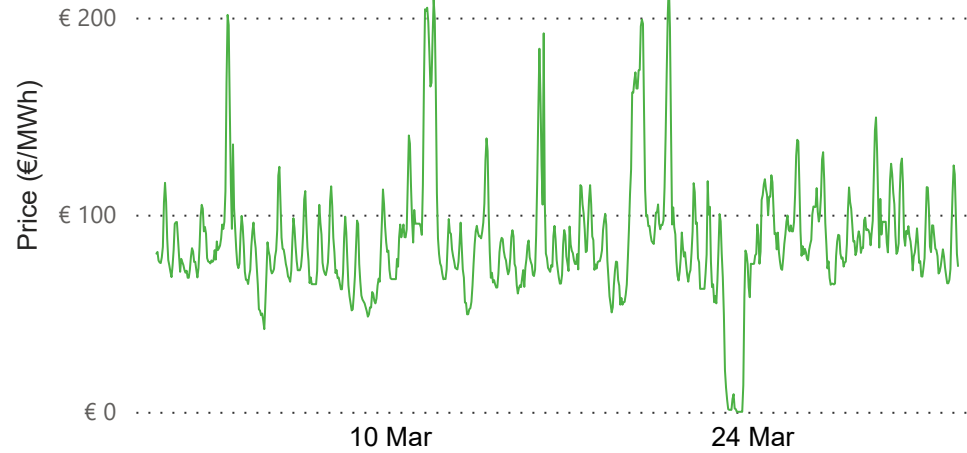
● DAM ● IDA1 ● IDA2 ● IDA3 ● IDC

Day Ahead Market March 2024

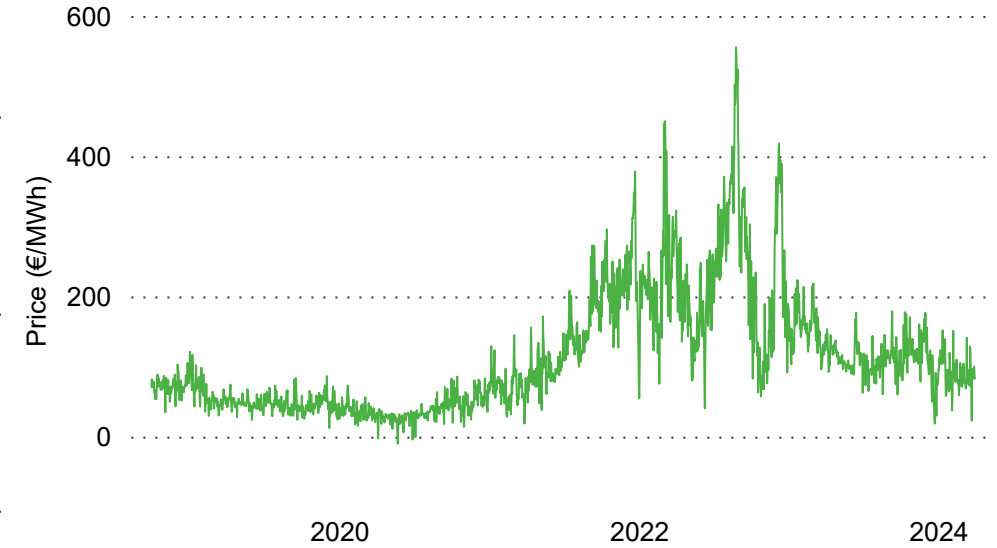
€ 86.67
Average DAM Price
€ 0.00
Min DAM Price
€ 218.00
Max DAM Price

The most frequent price range for February was between €60 and €90

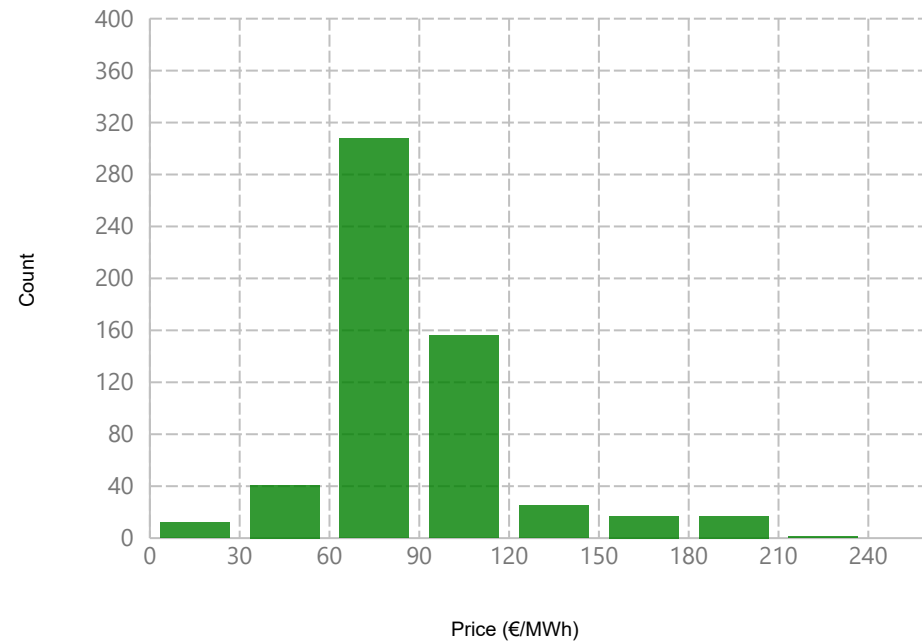
DAM Prices



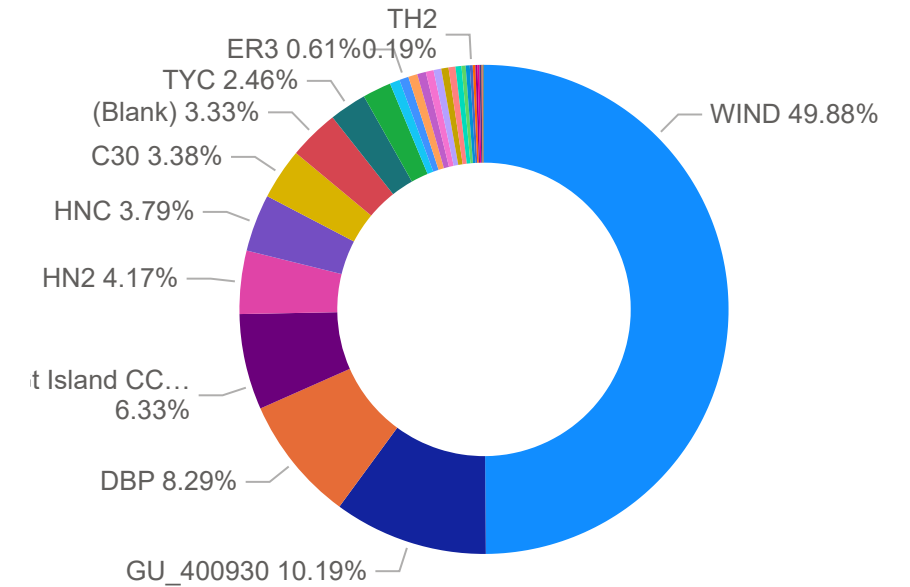
Historic Daily Average DAM Prices



Histogram of DAM Prices



DAM Sell Side Generator Order Results

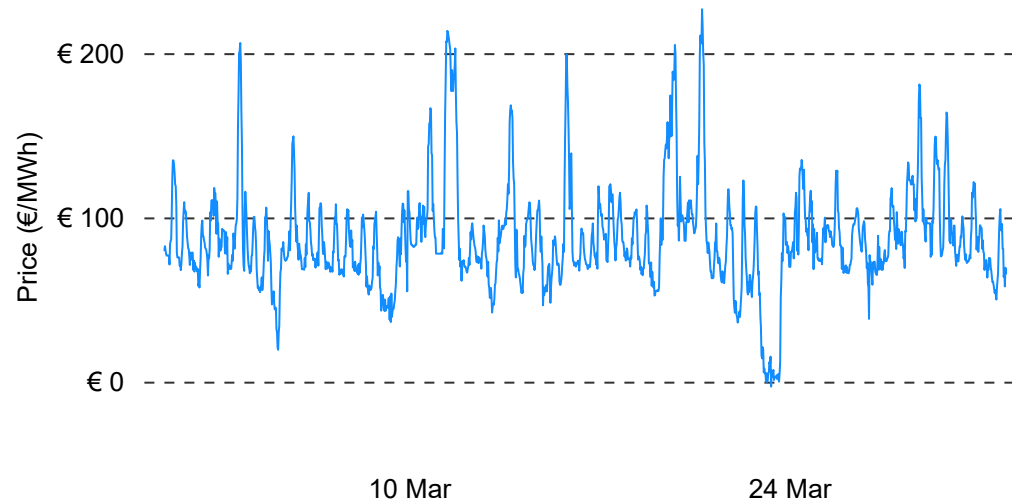


Intraday Market March 2024

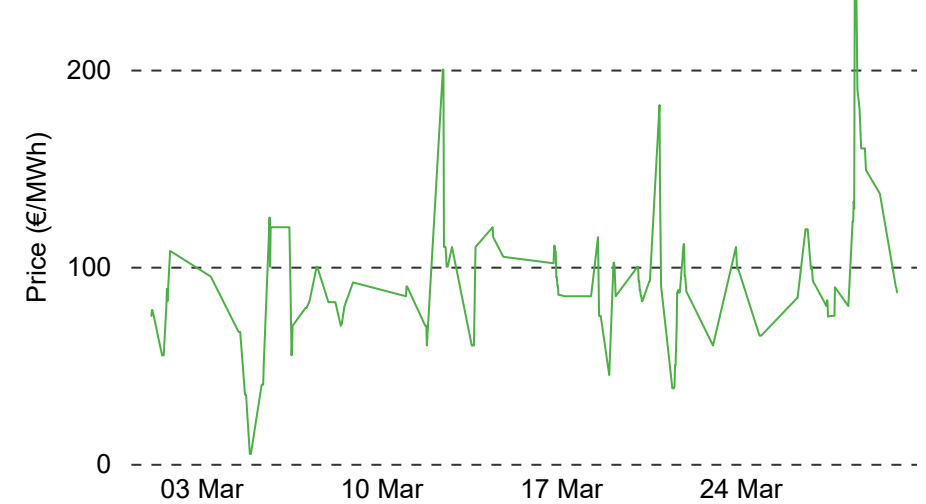
€ 87.25
Average IDA1 Price
-€ 3.00
Min IDA1 Price
€ 226.75
Max IDA1 Price

The most frequent price range for February was between €40 and €120

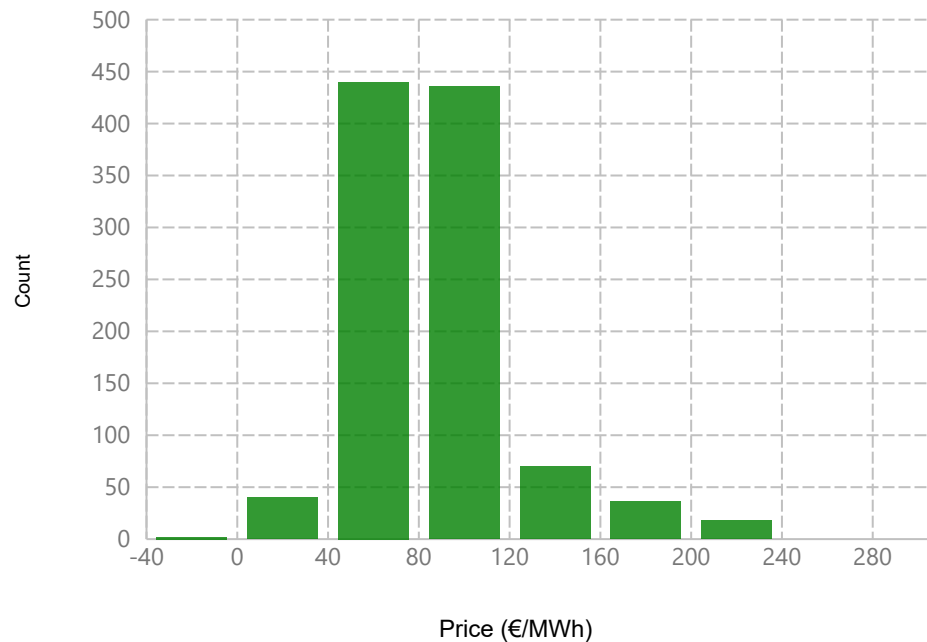
IDA 1 Prices



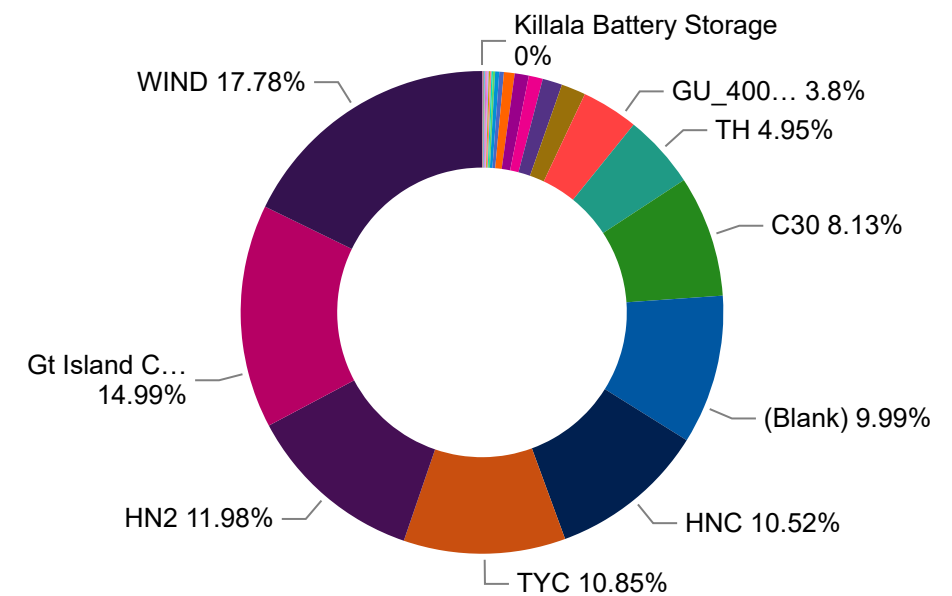
IDC Prices



Histogram of IDA1 Prices



IDA1 Sell Order Results By Market Participant



Intraday Market March 2024

SEM Day Ahead Price

€ 86.67
Average Price

€ 0.00
Min Price

€ 218.00
Max Price

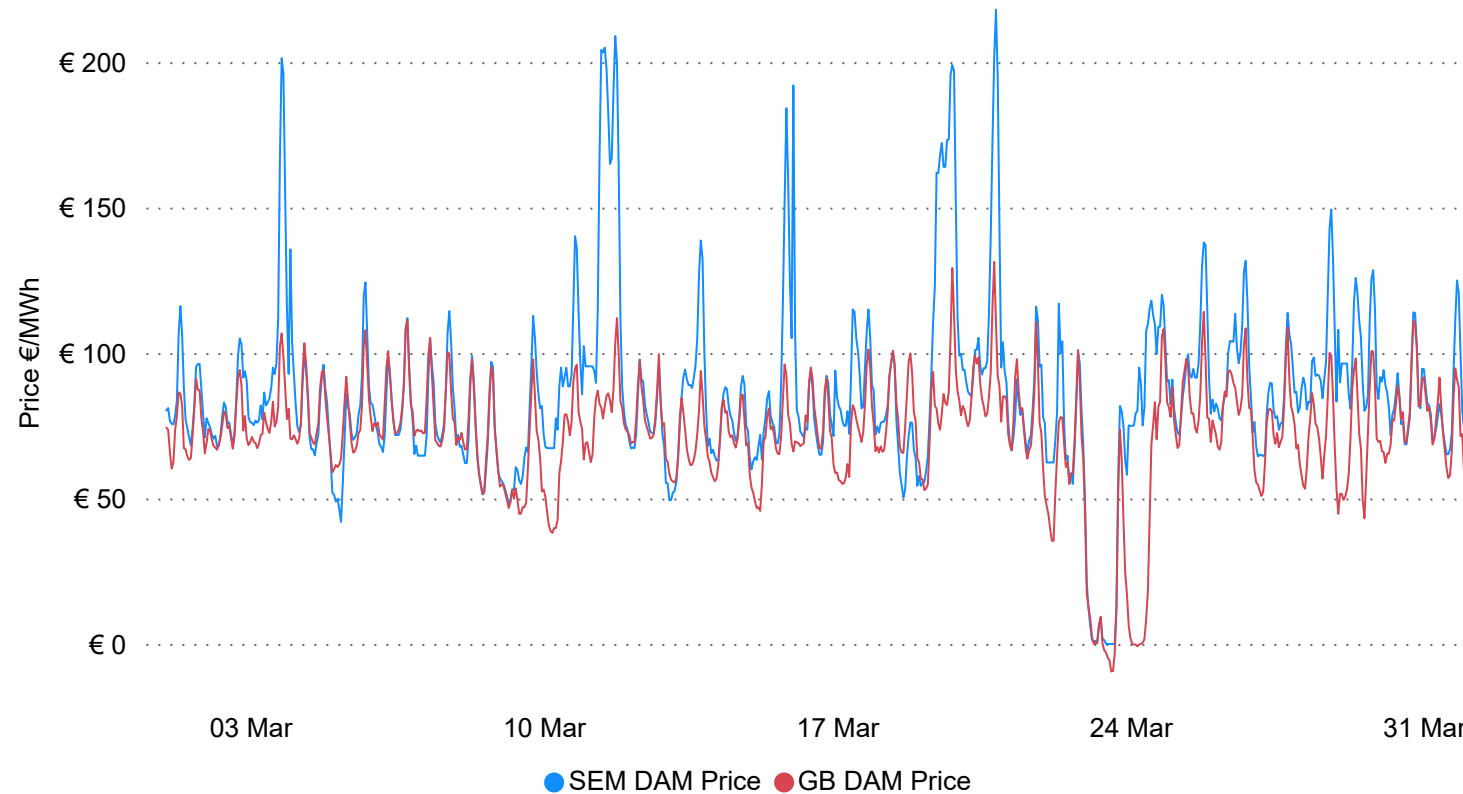
GB Day Ahead Price

€ 72.06
Average Price

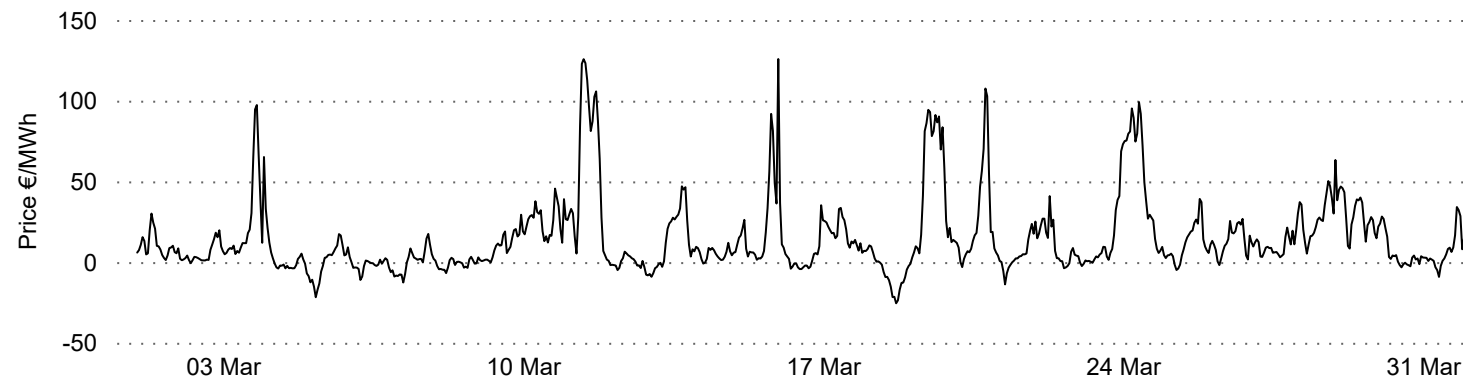
-€ 9.46
Min Price

€ 131.37
Max Price

SEM & GB DAM Prices



SEM & GB DAM Prices Spread



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 will continue to investigate this matter further and come back to the SEMC in the foreseeable future with more information on this front.

SEM Interconnectors March 2024

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

Moyle	EWIC
2nd 18:00-20:00	3rd 10:00 - 23:00
3rd 09:00 - 23:00	11th 07:00 - 22:00
5th 15:00 - 21:00	15th 10:00 - 23:00
10th 16:00 - 22:00	19th 08:00 - 22:00
11th 06:00 - 00:00	20th 15:00 - 22:00
13th 16:00 - 22:00	24th 00:00 - 23:59
14th 09:00 - 21:00	25th 00:00 - 23:59
15th 15:00 - 00:00	28th 13:00 - 22:00
17th 18:00 - 19:00	29th 07:00 - 21:00
19th 07:00 - 23:00	
20th 08:00 - 00:00	
24th 08:00 - 21:00	
25th 09:00 - 22:00	
26th 07:00 - 11:00	
28th 08:00 - 23:00	
29th 06:00 - 22:00	

Interconnector Flows

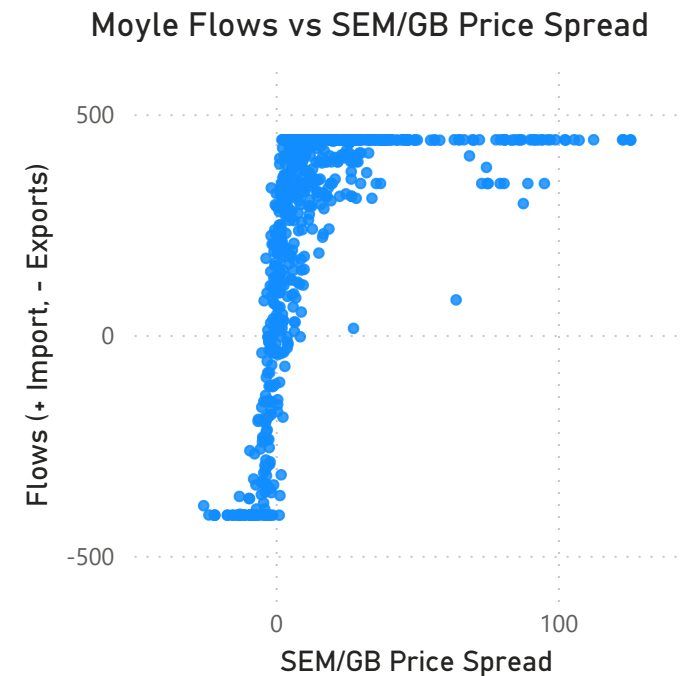
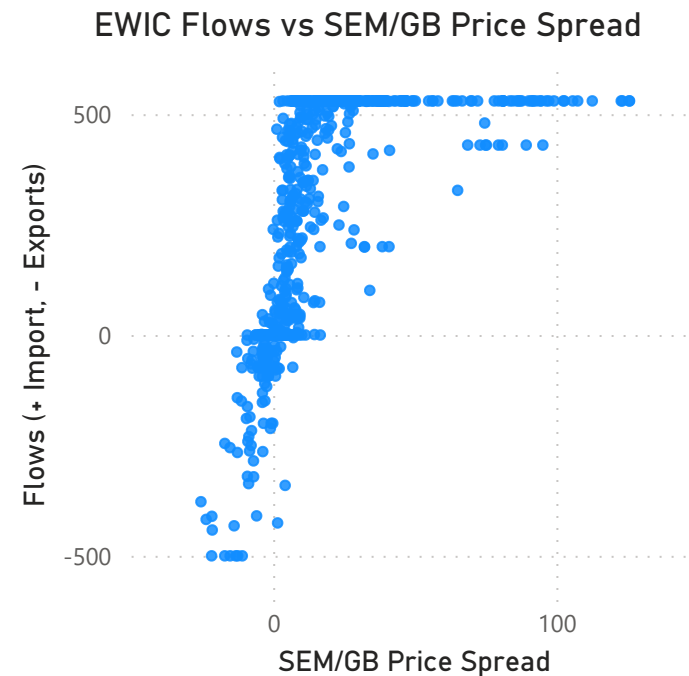
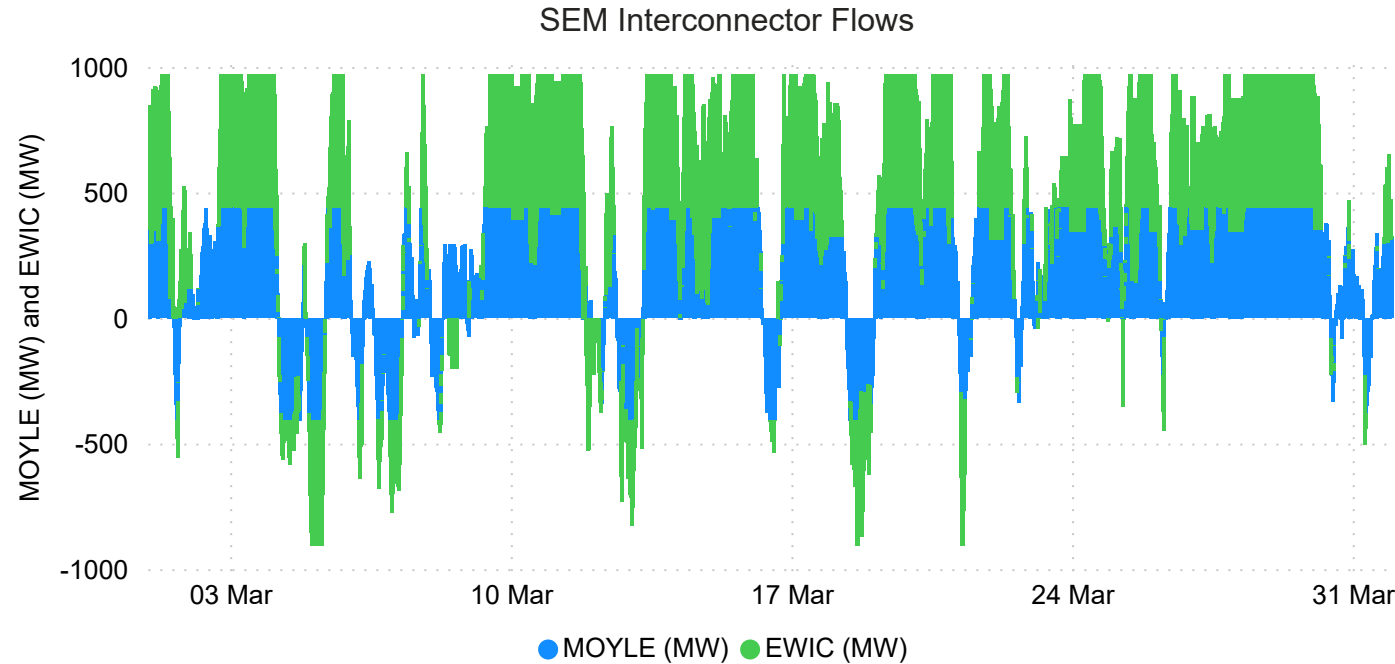
In March, the SEM Interconnectors have imported significantly more power from GB than it has exported. This reflects the predominantly higher prices in the SEM compared with GB. There were also a substantial number of events when interconnection capacity is curtailed by the TSO in the SEM GB direction.

EWIC imports volumes were slightly higher than Moyle and exports were lower than last month with higher number of no flow periods.

March 2024

Moyle Imports	349
EWIC Imports	409
Moyle Exports	-229
EWIC Exports	-188

SEM Imports	758
SEM Exports	-417
SEM Net Import/Export	341

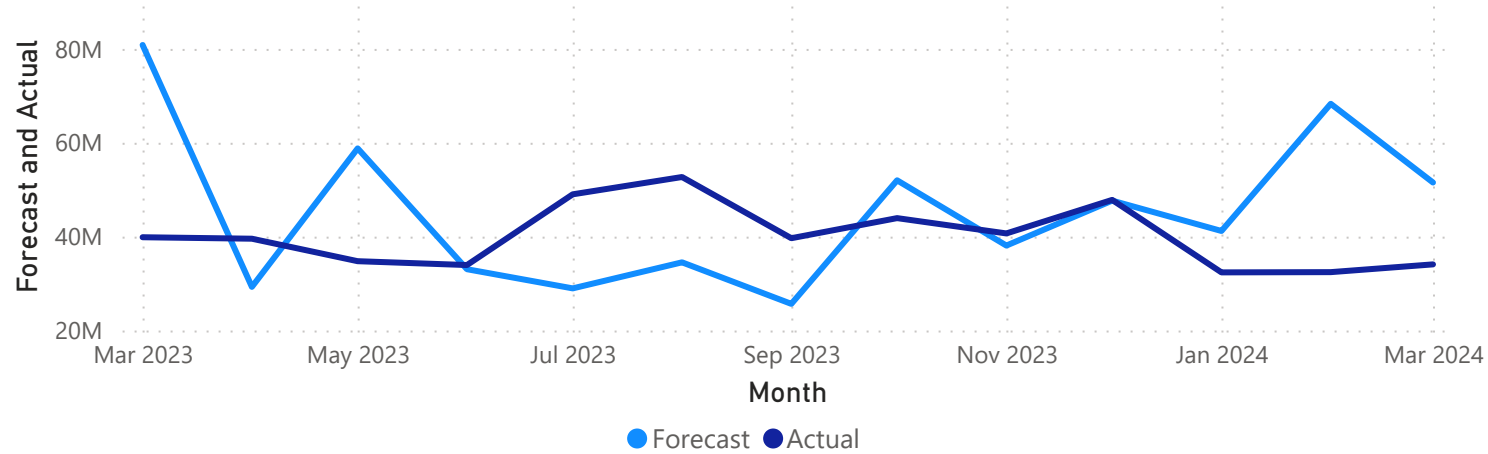


Balancing Market March 2024

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.

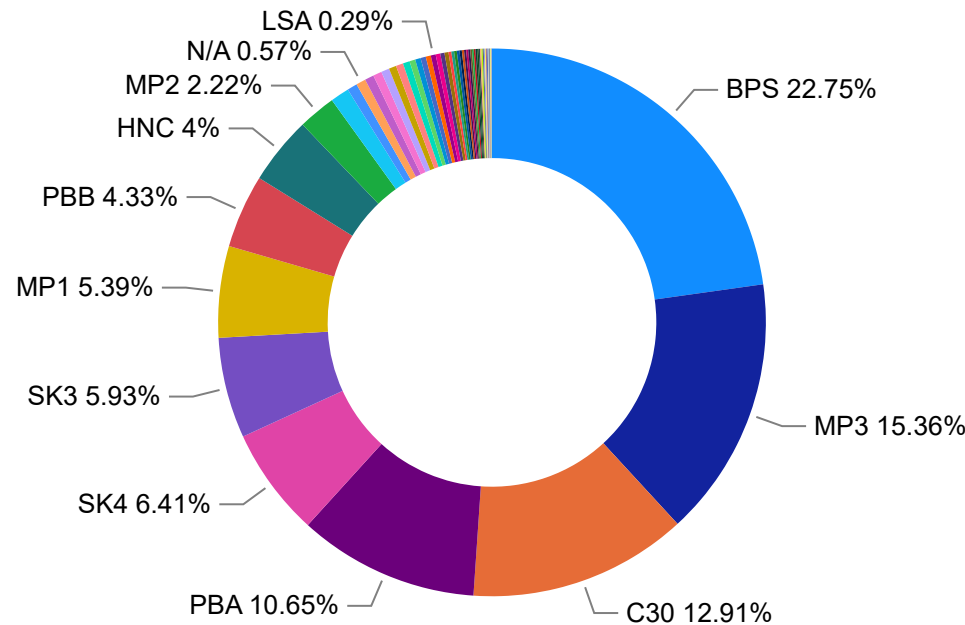
Generators can be constrained 'on' or 'up' if the market schedule indicated they were to be run at lower levels than actually happened. Or they could be constrained 'down' or 'off' if they were to be run at a higher level than happened in reality. There is always an overall net cost to the system associated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

Imperfection Costs - Forecast vs Actual



Determinant Name	Value €
CABBPO	10,042.99
CAOPO	-449,519.66
CCURL	-434,763.56
CDISCOUNT	14,533,856.19
CFC	8,268,298.72
CPREMIUM	12,715,287.55
CTEST	-8,824.52
CUNIMB	-538,475.99
Total	34,095,901.72

Market Share per Unit (CFC, CPREMIUN, CDISCOUNT)



Constraints Payments

This chart illustrates the distribution of selected Constraint Payments, to specific power plants. As it can be seen, BPS (EP Ballylumpford Ltd) was the largest receiver of these payments in March followed by MoneyPoint 3 and Coolkeeragh. The distribution of Constraint Payment has not changed substantially in the last few months and years. This is something that the MMU is monitoring to determine whether the balancing market is working as designed.

Balancing Market March 2024

30 Minutes Imbalance Price

€ 89.49

Average Price

-€ 59.24

Lowest Price

€ 331.57

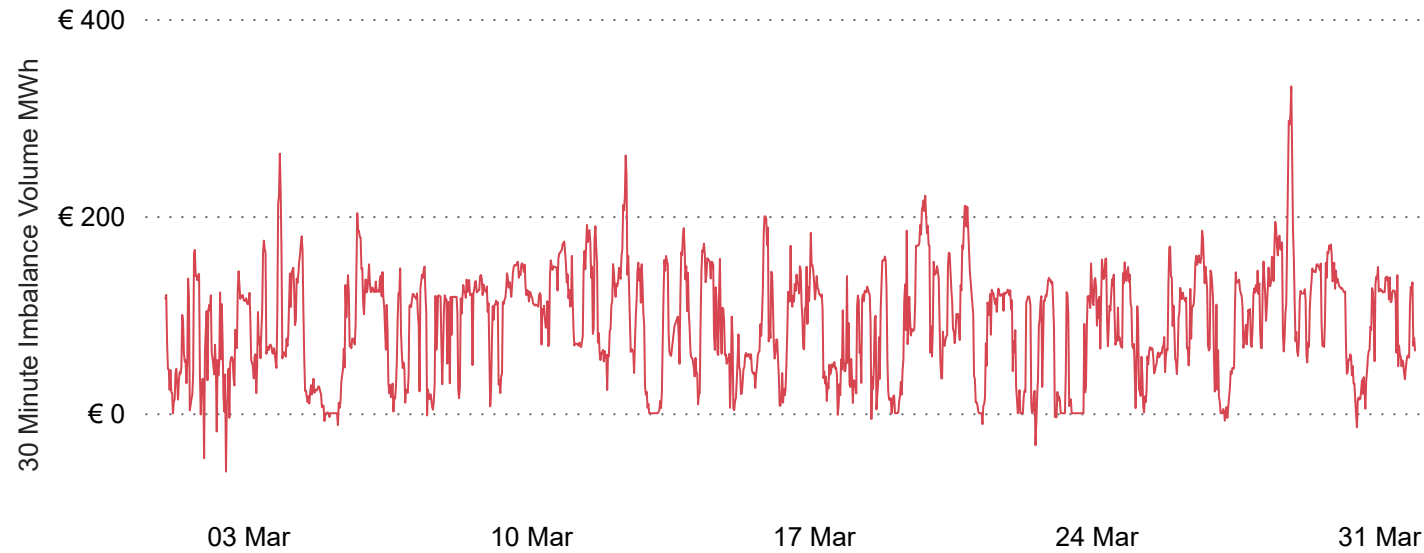
Highest Price

Imbalance Price & Volumes

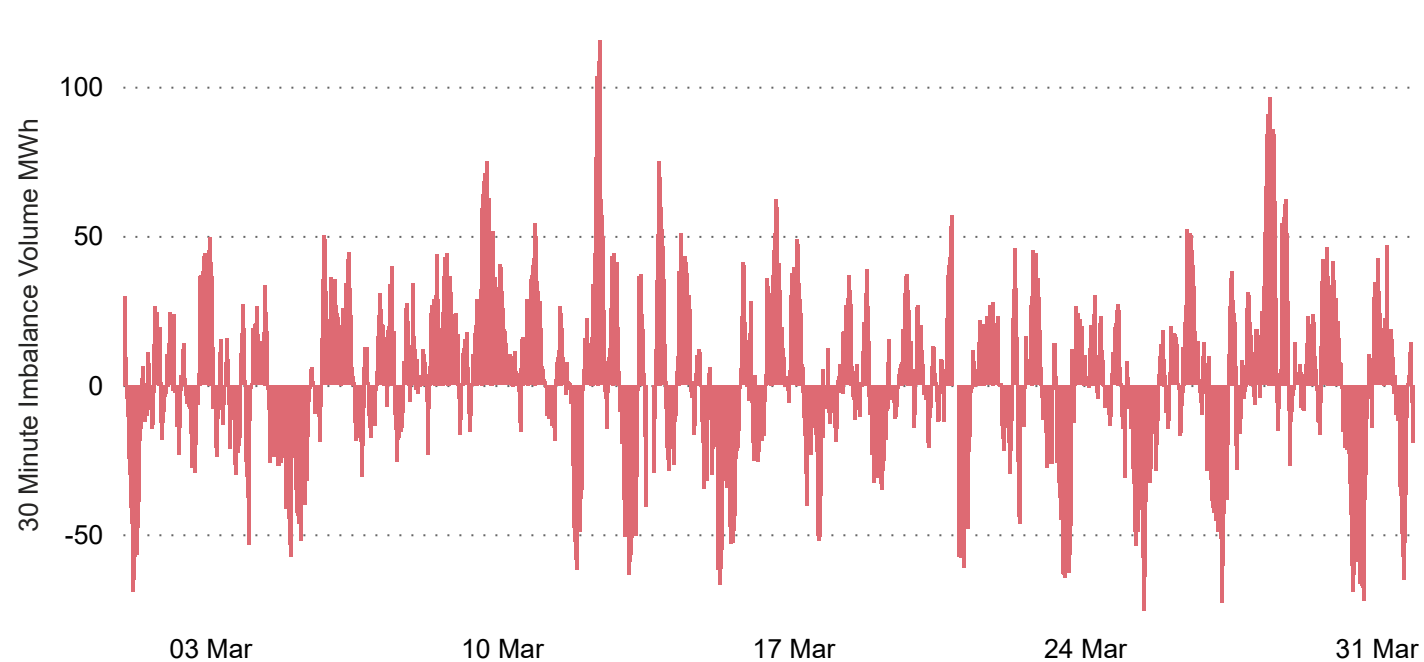
The Balance (BM) Prices this month are slightly higher than the Day Ahead Prices. Additionally, the Balancing Market prices has exhibited a must higher range of prices indicating a higher level of volatility compared to Day Ahead Market Prices. This is an expected characteristic of the Balance Prices.

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

30 Minute Imbalance Prices



30 Minute Imbalance Volume





Demand and Generation Mix

Demand March 2024

SEM Demand

4,841.72	4,838.33
SEM Average 2024	SEM Average 2023
3,774.26	3,702.68
SEM Min 2024	SEM Min 2023
5,758.26	5,705.03
SEM Max 2024	SEM Max 2023

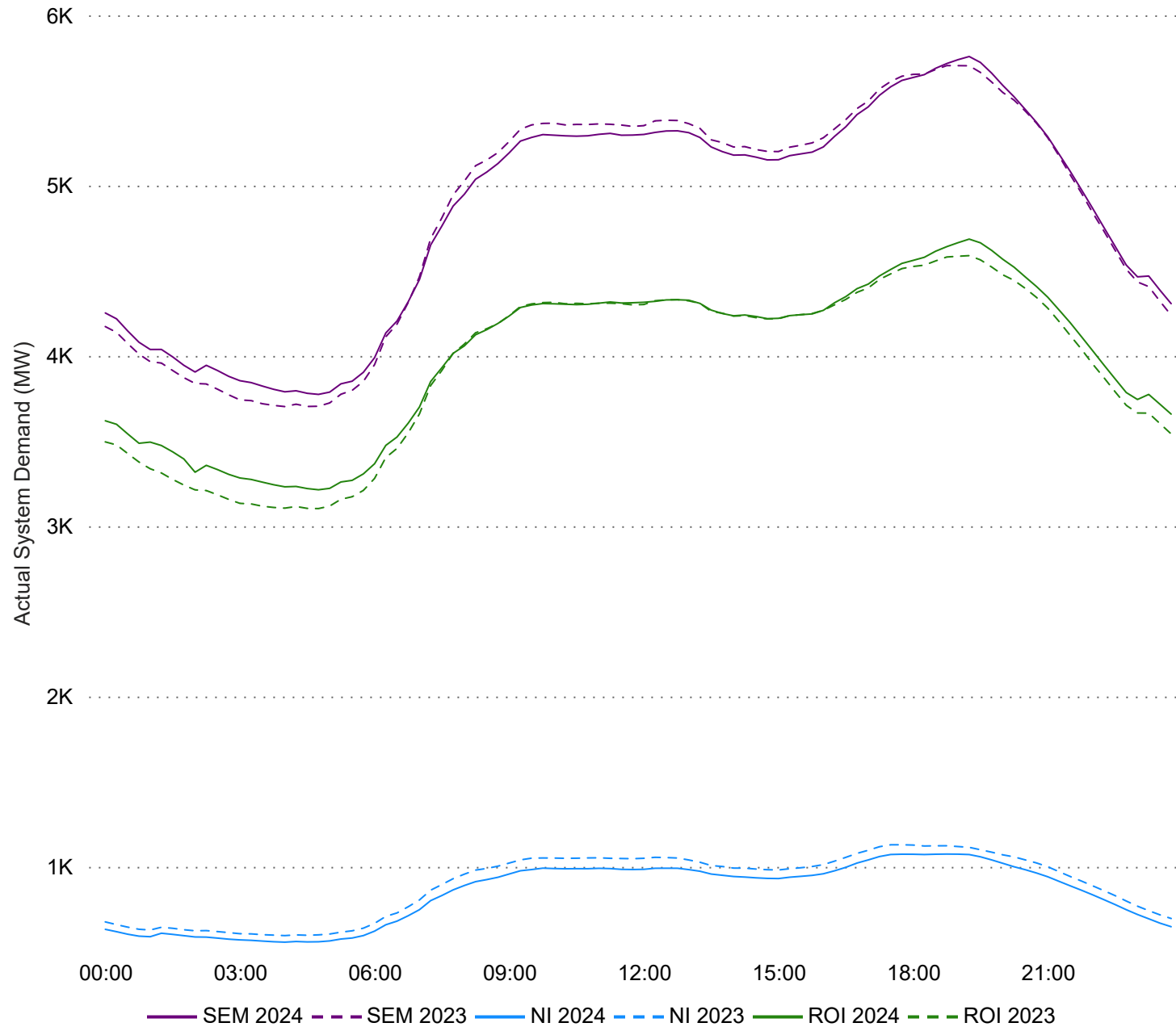
NI Demand

843.67	895.24
NI Average 2024	NI Average 2023
557.90	596.35
NI Min 2024	NI Min 2023
1,075.16	1,129.81
NI Max 2024	NI Max 2023

ROI Demand

3,999.98	3,943.11
ROI Average 2024	ROI Average 2023
3,214.23	3,103.84
ROI Min 2024	ROI Min 2023
4,686.10	4,589.03
ROI Max 2024	ROI Max 2023

Monthly Average Hourly Demand Curves



SEM Demand

The graph shows a decrease in demand within NI, with the monthly average level falling by 6% compared to the same period last year.

ROI's demand is consistently above its monthly average level from last year and has risen on average by 1.5%.

Demand in the SEM as a whole is up by 0.2% relative to the same period last year.

Duration Curves March 2024

Price Duration

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

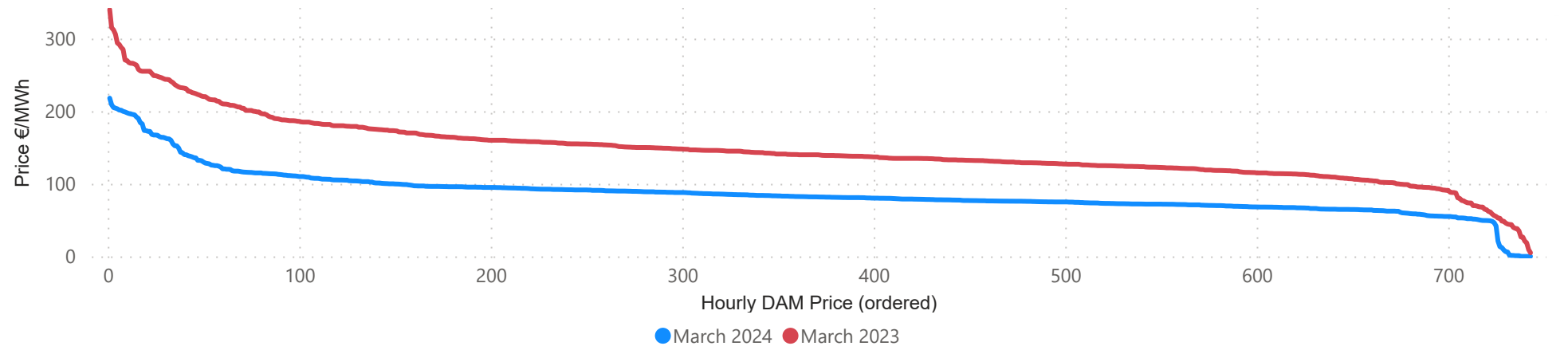
Residual Duration

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

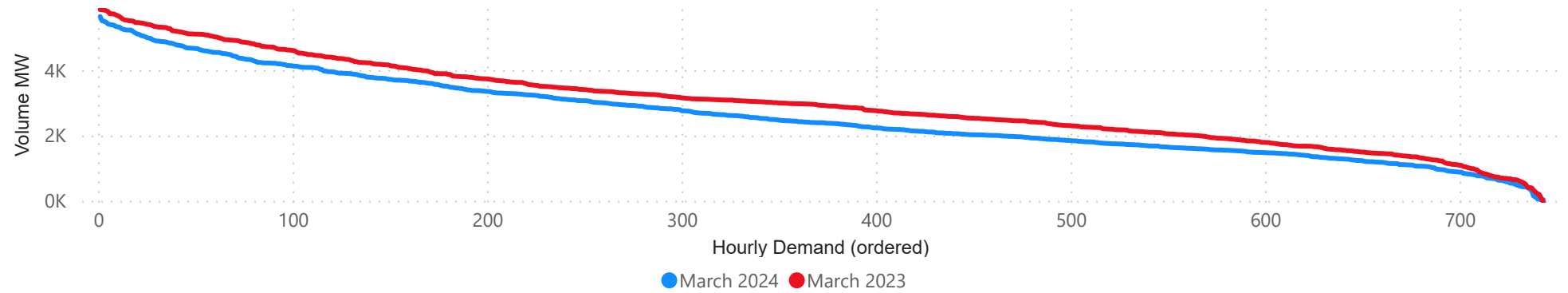
Price against Residual Duration

Shows the residual duration for each period relative to the DAM price for that period.

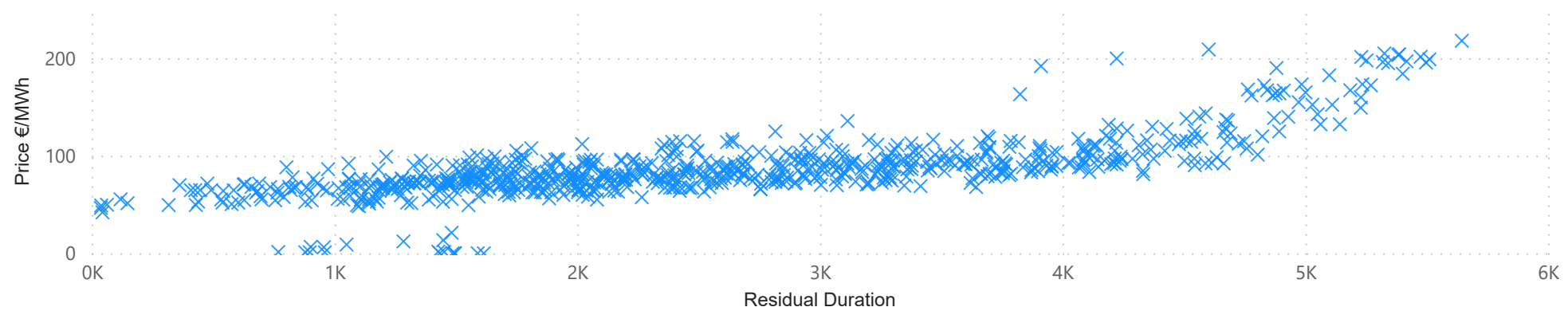
Price Duration Curve SEM



Residual Demand Duration Curve SEM



DAM Price against Residual Duration

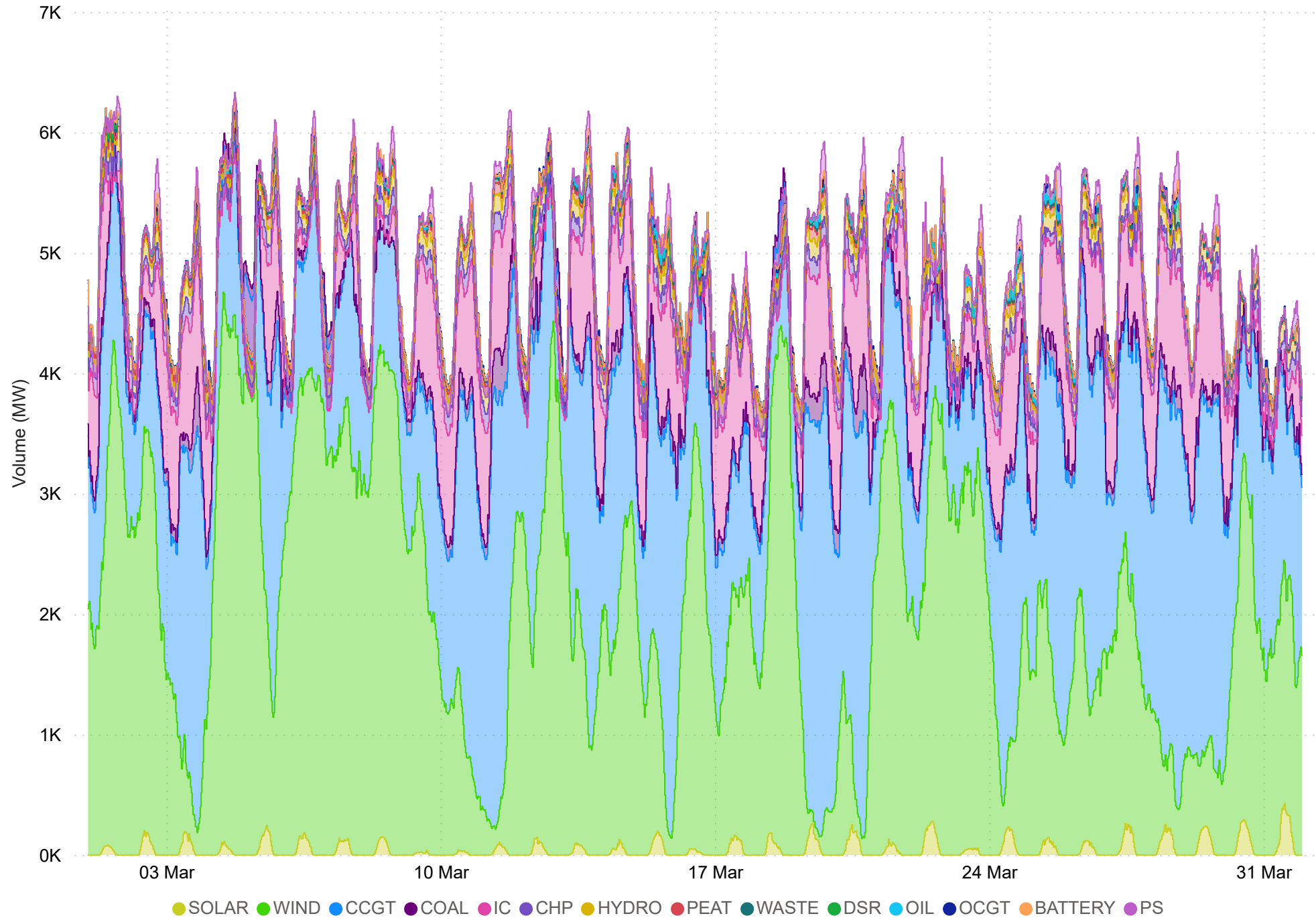


Fuel Mix March 2024

Fuel Type	Monthly Average	Monthly %
CCGT	1,747	36.1%
WIND	2,075	42.8%
INTERCONNECTOR	468	9.7%
COAL	120	2.5%
HYDRO	149	3.1%
CHP	128	2.7%
PEAT	65	1.3%
WASTE	30	0.6%
SOLAR	46	0.9%
DSR	23	0.5%
OIL	01	0.0%
OCGT	13	0.3%
Battery	-5	-0.1%
PUMPED STORAGE	-20	-0.4%

Fuel Type	Max	Min
CCGT	3,659	780
WIND	4,574	71
INTERCONNECTOR	981	-900
COAL	492	0
HYDRO	170	101
CHP	163	74
PEAT	102	0
WASTE	62	9
SOLAR	428	0
DSR	180	0
OIL	132	0
OCGT	187	0
BATTERY	101	-100
PUMPED STORAGE	292	-303

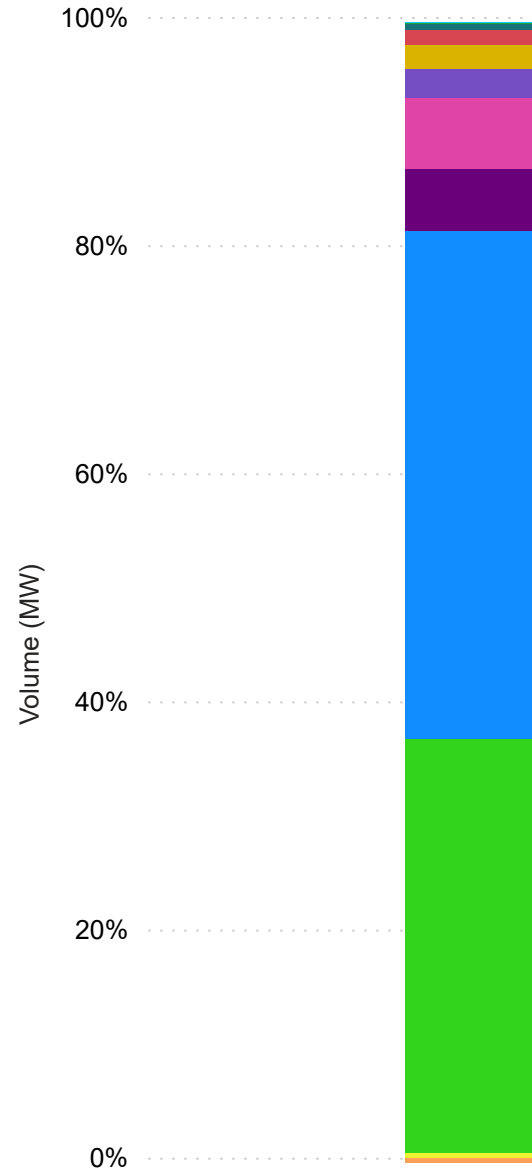
SEM 30 Minute Fuel Mix



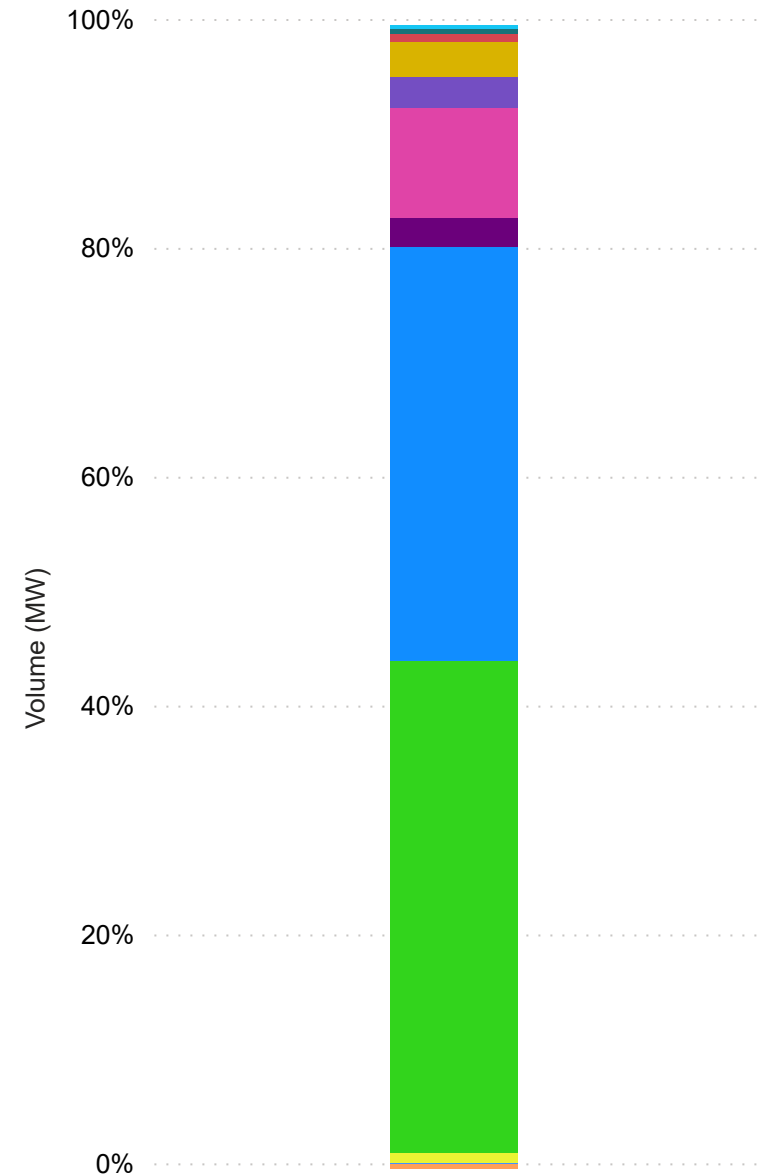
Fuel Mix Comparison March 2023 & 2024

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

SEM Fuel Mix March 2023



SEM Fuel Mix March 2024



North-South Tie Line March 2024

Average Flow NI to ROI (MW)

-276.52

Average Flow ROI to NI (MW)

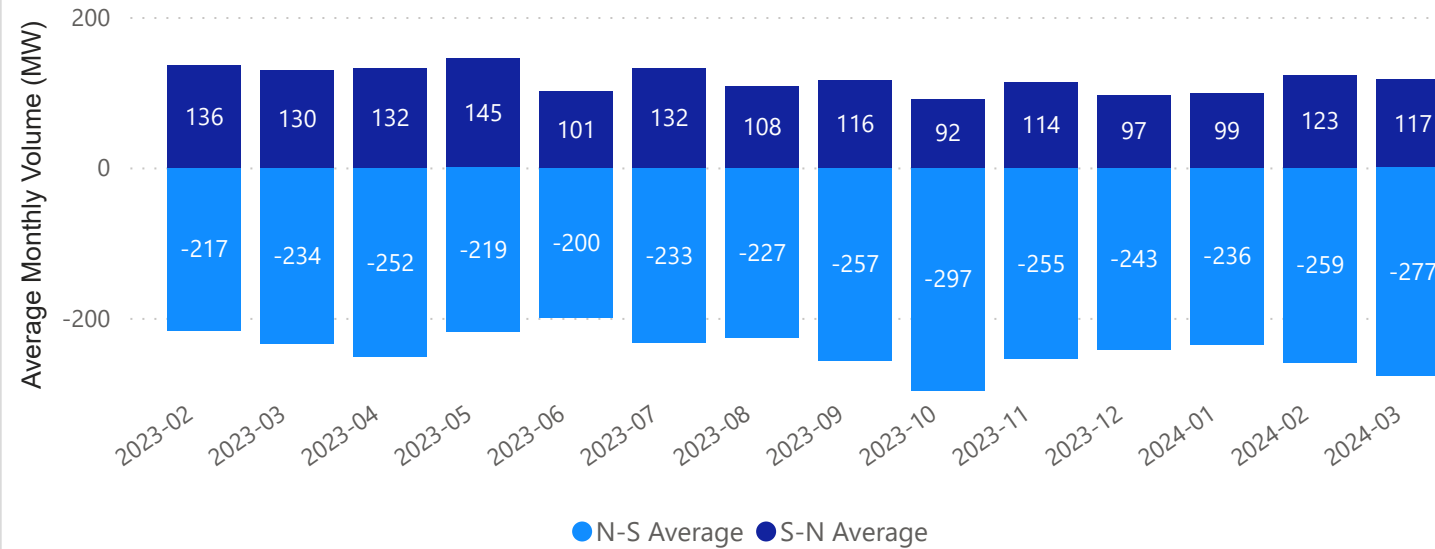
116.91

Average Net Flow NI to ROI (MW)

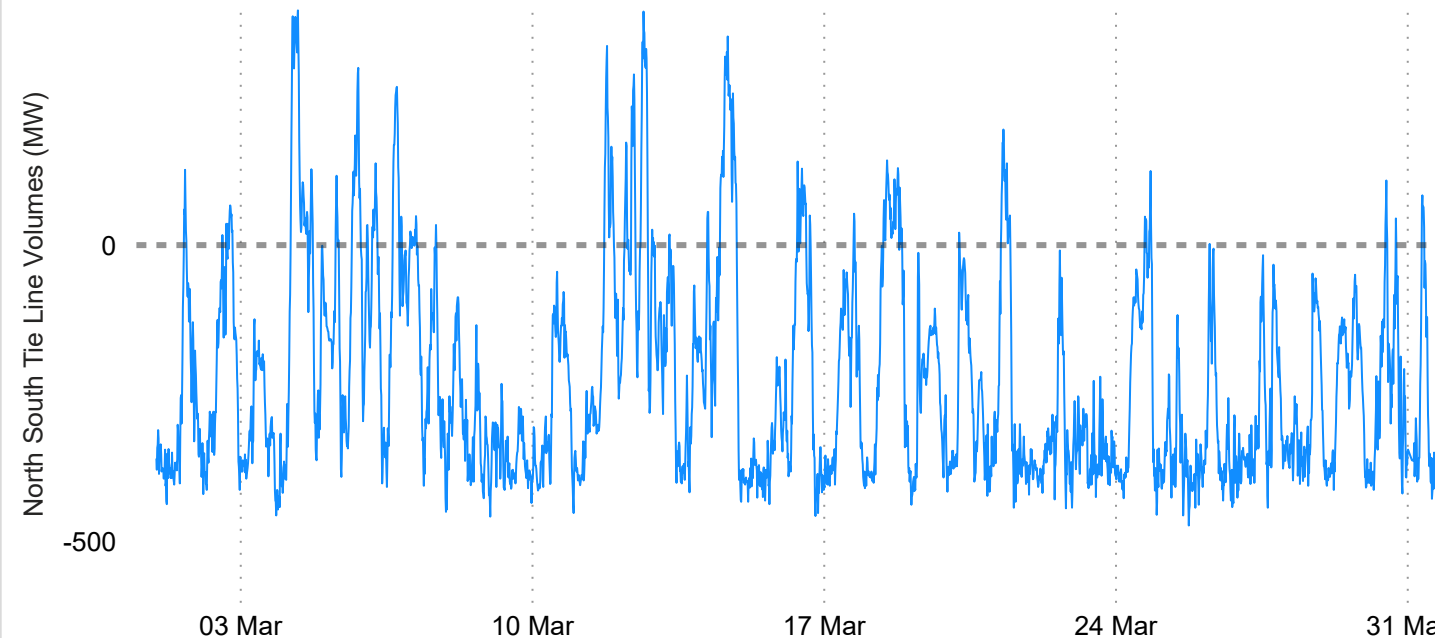
-228.84

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

Average Flows N-S Tie Line Long Term Trend



North South Tie Line Volumes 15 minute periods



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 March 2024

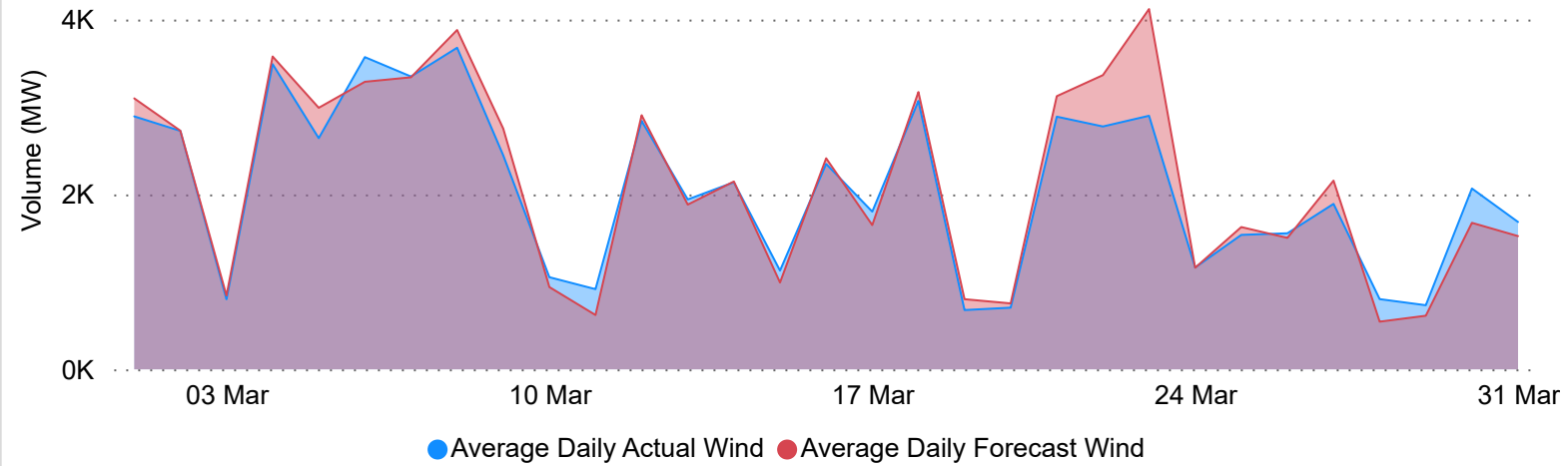
Average Daily Actual Wind (MW)
2,072

Average Daily Forecast Wind (MW)
2,136

Min SNSP%
17.87

Max SNSP%
75.30

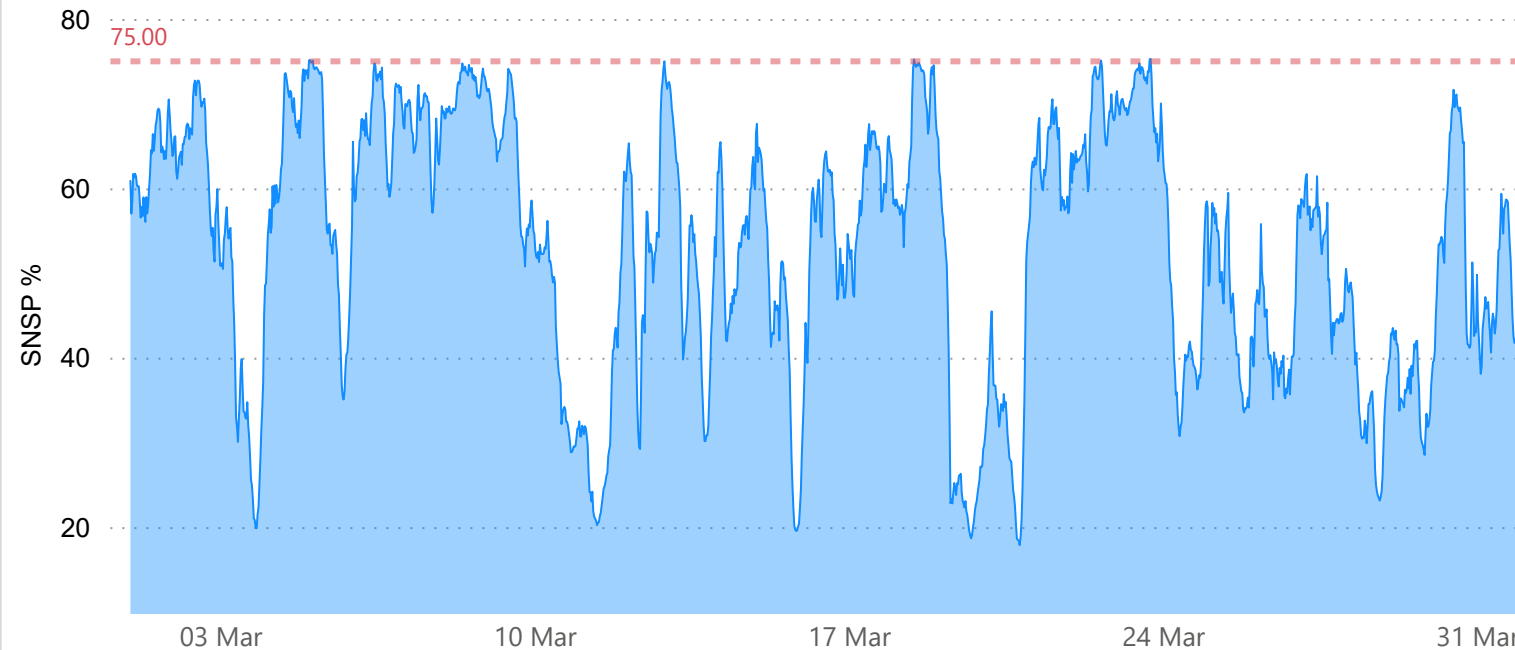
Actual Daily Average Wind Relative to Forecast Daily Average Wind



Wind Generation

Wind generation again was considerably high averaging around 2 GWs. Renewable energy was the main source of generation for the second month in a row.

SNSP %



SNSP

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

CO₂ March 2024

CO₂ Intensity (gCO₂/kWh)

201.49
Average

101
Lowest

343
Highest

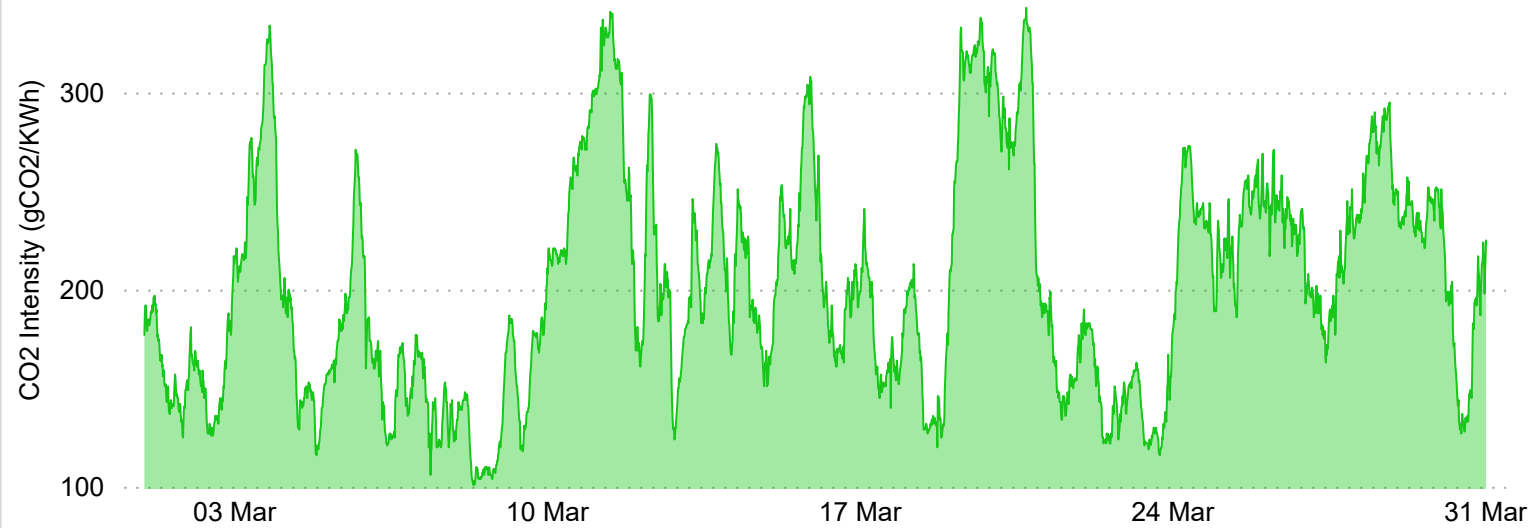
CO₂ Emissions (tCO₂/hr)

843
Average

450
Lowest

1641
Highest

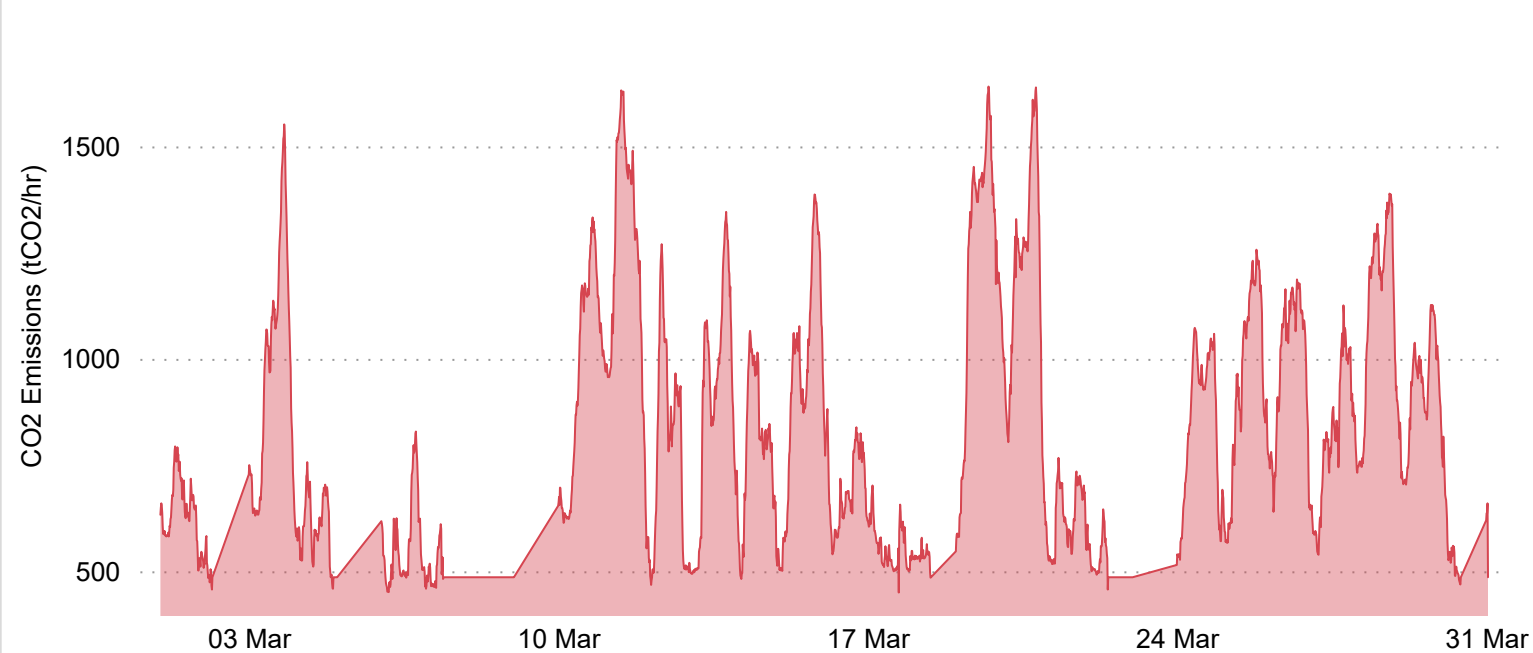
CO₂ Intensity



CO₂ Intensity

CO₂ Intensity should be negatively correlated with the volume of wind output on the system.

CO₂ Emissions



CO₂ Emissions

CO₂ intensity is directly related to emissions and therefore follows the same trends as CO₂ intensity levels over the course of the month.

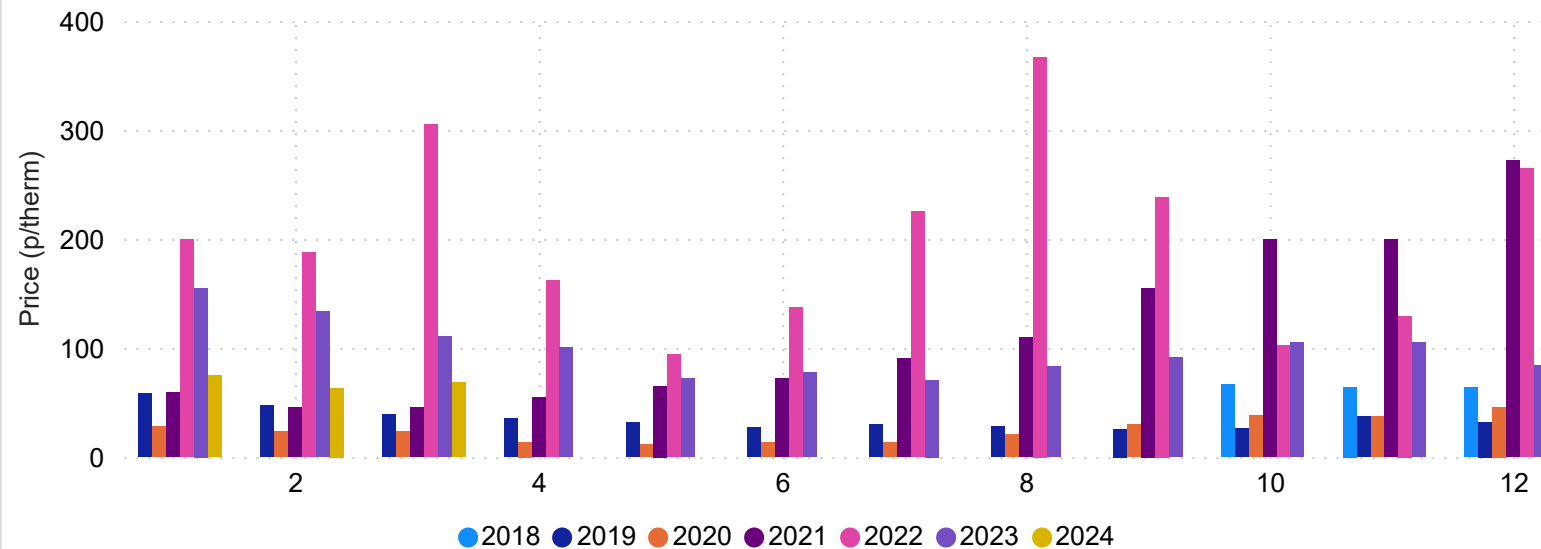
Fuel Costs and Spreads



Gas Price March 2024

68.18
Monthly Average (p/therm)
62.00
Monthly Low (p/therm)
74.50
Monthly High (p/therm)

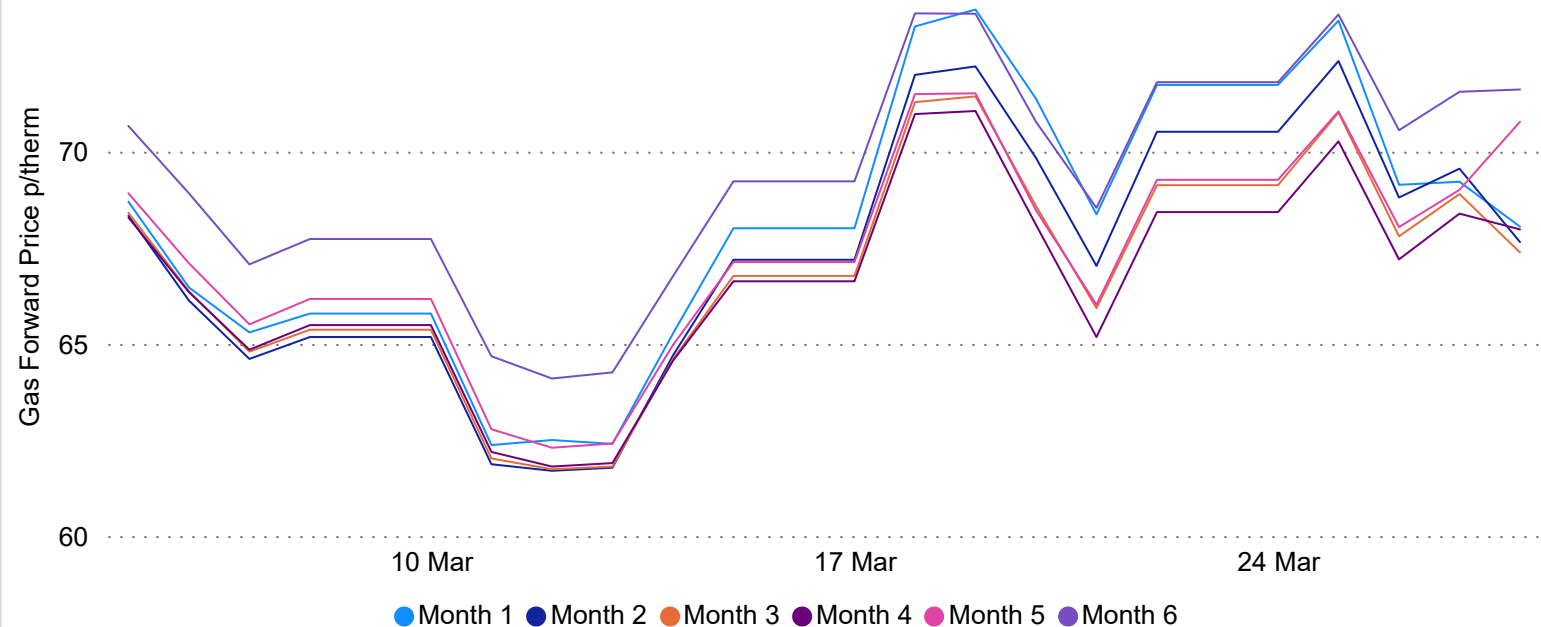
Monthly Day Ahead NBP Gas Price by Year (p/therm)



Gas Prices

Gas prices has increased 8% compared to the previous month from 63.37p to 68.18p.

Gas Forward Prices



Gas Forward Prices

Similarly, Gas forward prices have increased slightly from February 24.

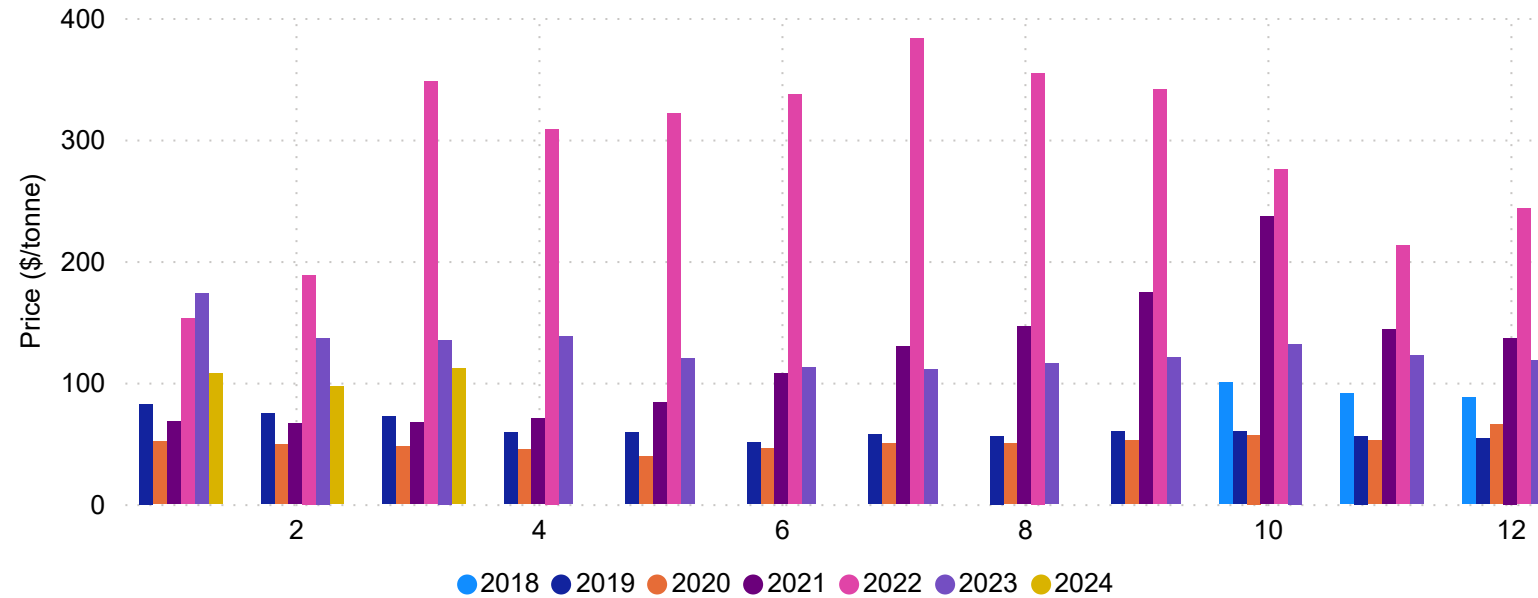
Forward gas prices are considerably lower than the prices seen over the past few years.

Coal Price March 2024

Coal Prices Per Tonne

\$111.78
Monthly Average
\$106.95
Monthly Low
\$114.05
Monthly High

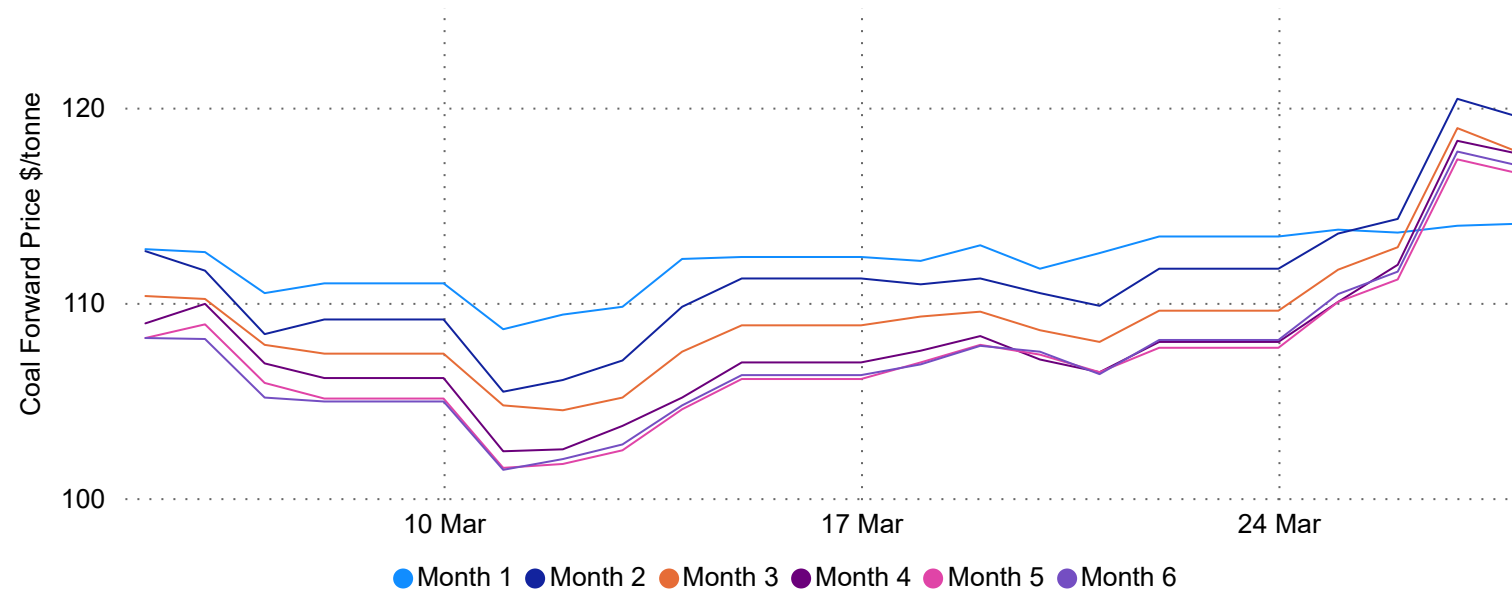
Monthly ICE Rotterdam Coal Price by Year (\$/tonne)



Coal Prices

Coal prices were higher compared to the previous month at \$111.78/tonne (15% increase).

Coal Forward Prices



Coal Forward Prices

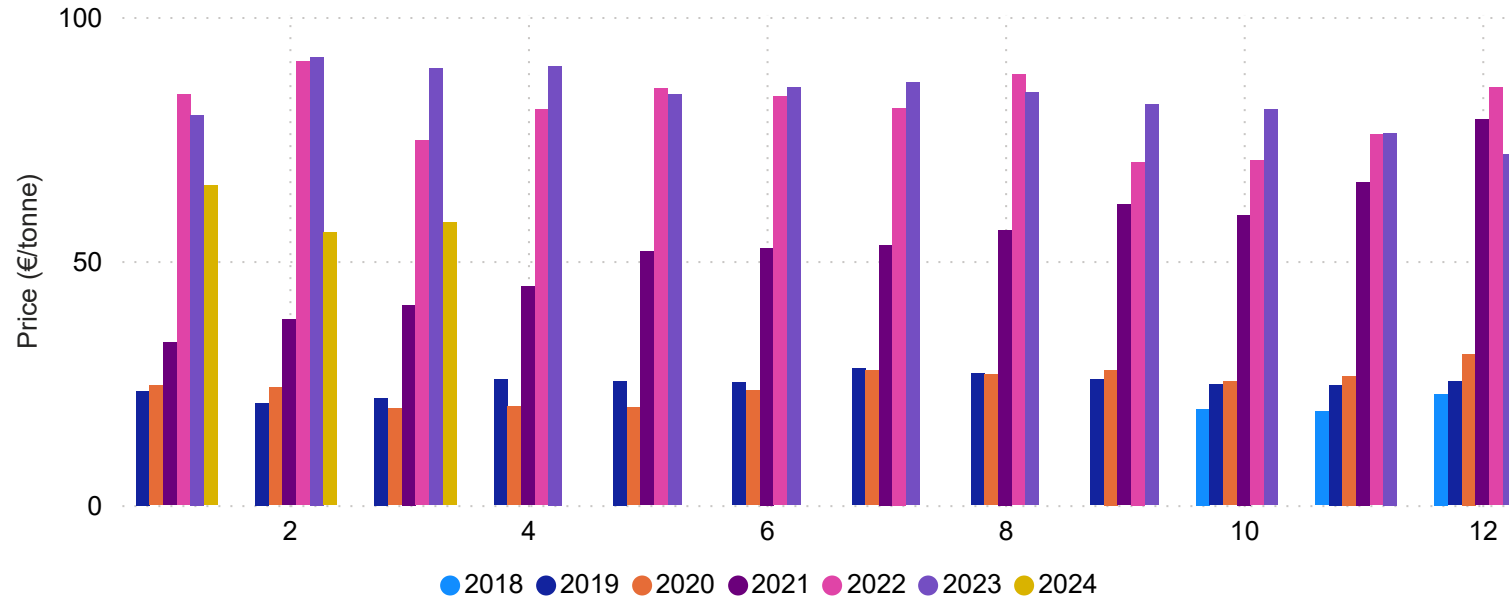
Coal forward prices demonstrate a small increase during the month.

Carbon Price March 2024

EU Carbon Prices (€/tonne)
 € 57.94
 Monthly Average
 € 54.14
 Monthly Low
 € 63.02
 Monthly High

UK Carbon Prices (€/tonne)
 € 41.31
 Monthly Average
 € 38.66
 Monthly Low
 € 42.63
 Monthly High

Monthly EU Carbon Permits Price by Year (€/tonne)

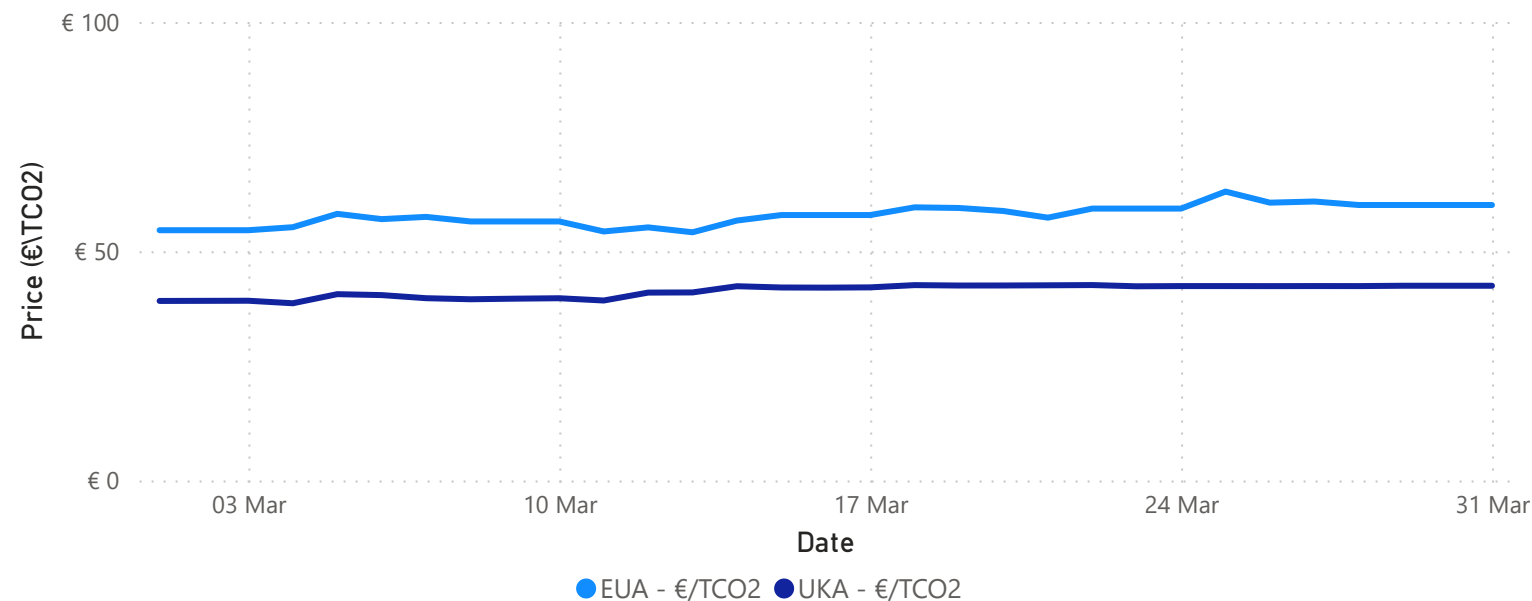


Carbon Prices

Carbon has increased relative to the previous month by 4%.

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.

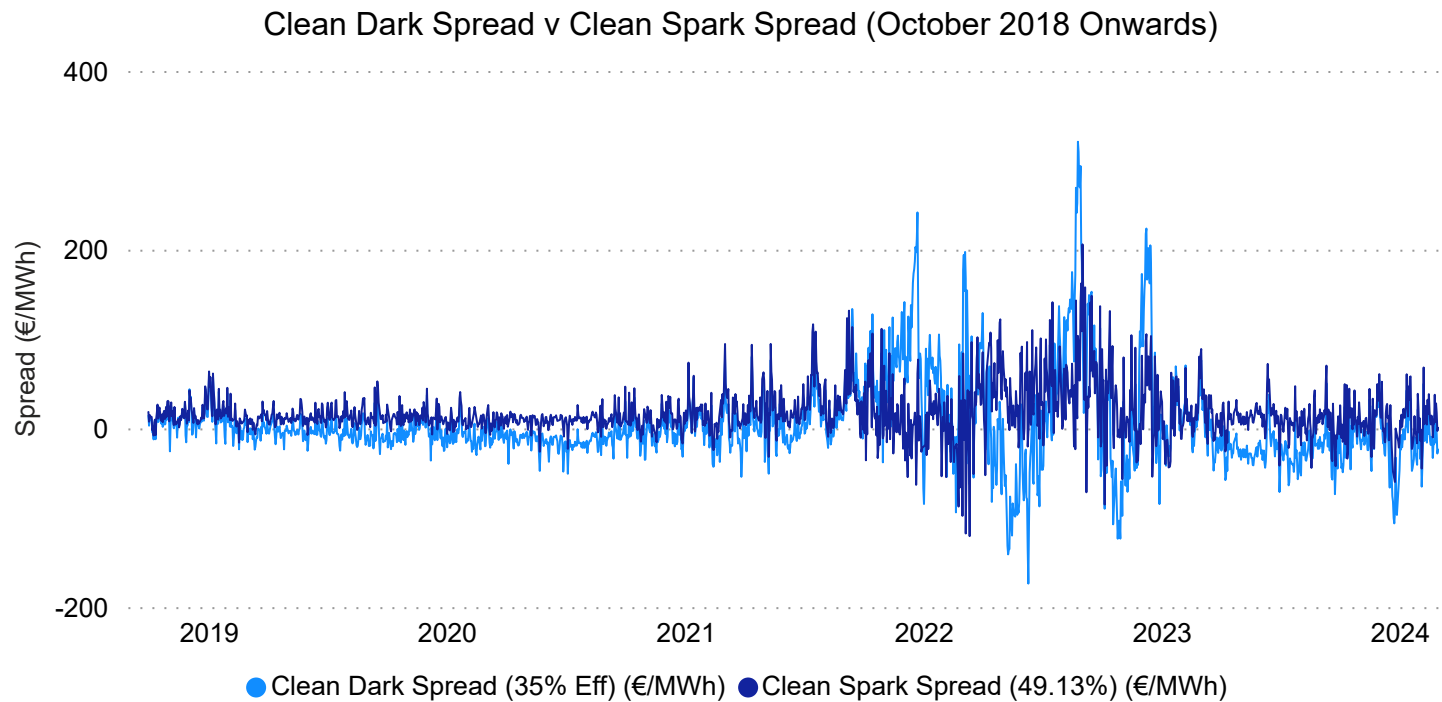
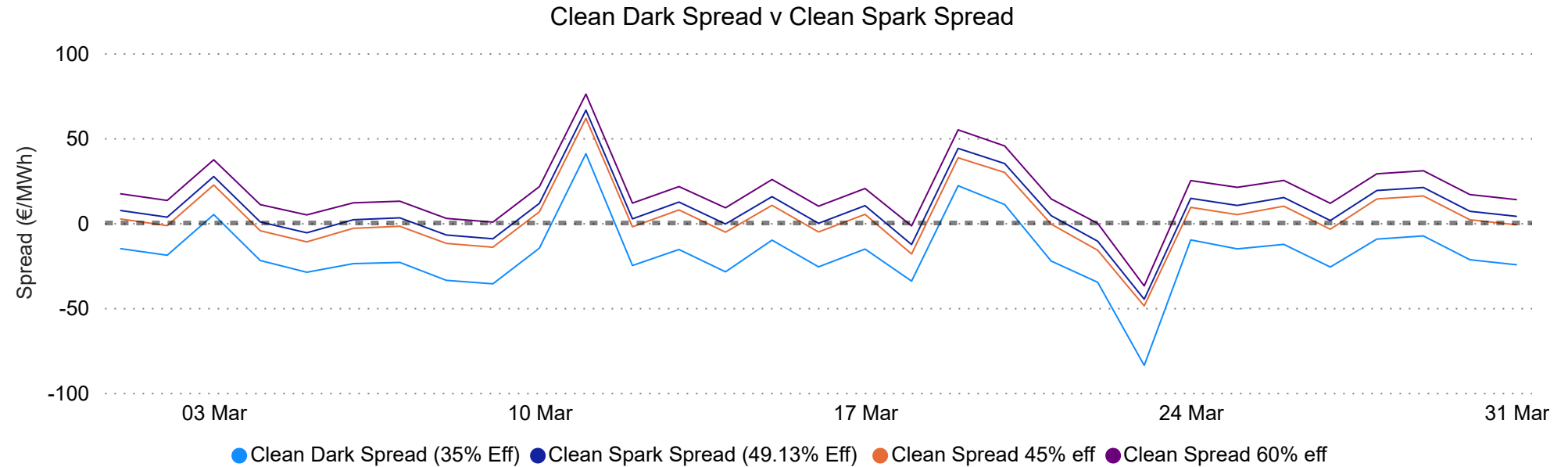
UK & EU Carbon Prices



Spark Spreads March 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 more profitable than coal for the duration of the month. The spread between them was generally consistent across the month.

Clean Dark Spread has been negative for most of the month. This corresponds to lower wind and higher prices.

Clean Spark Spread was generally positive for the whole month with a big fall on 23rd when the wind increases for a sustained period.