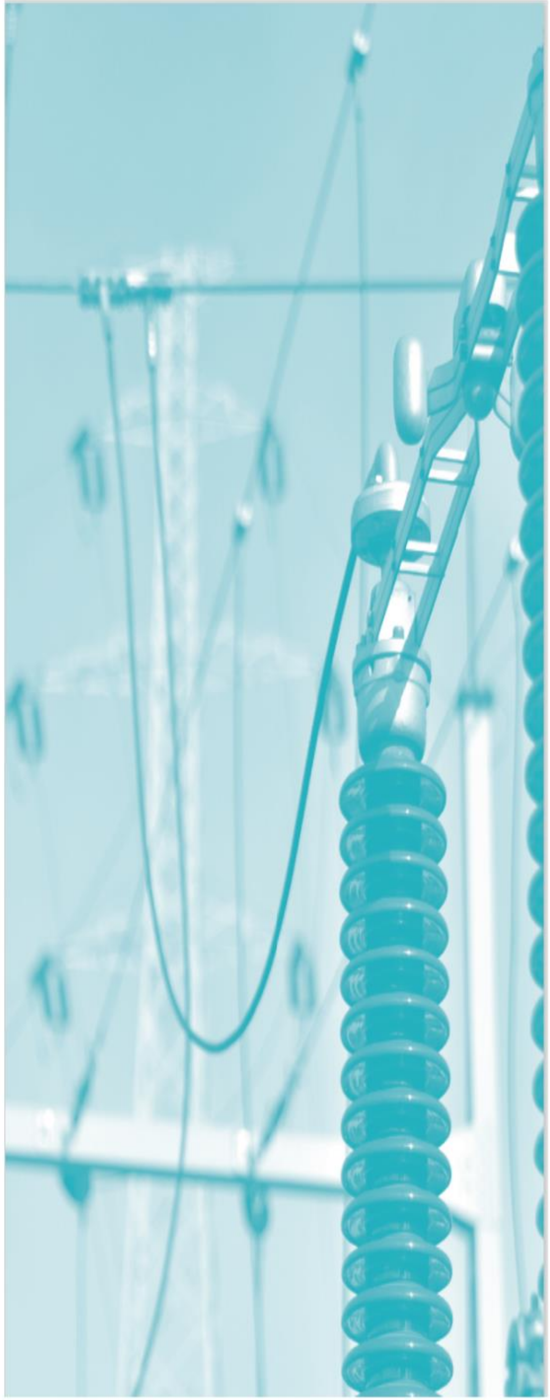
Energy Market Monitoring Report

May 2024

SEM committee



Market Results

Summary Dashboard

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Monthly Averages	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24
DAM (€/MWh)	105.19	117.11	96.24	106.46	111.62	125.54	122.9	88.97	99.9	84.6	86.67	88.52	107.75
% Change from previous month	-16%	11%	-18%	11%	5%	12%	-2%	-28%	12%	-15%	2%	2%	22%
% Change from previous year	-27%	-36%	-64%	-73%	-61%	-8%	-14%	-68%	-38%	-47%	-40%	-30%	2%
Actual System Demand (MW)	4276	4189	4101	4185	4335	4516	4873	4862	5151	4946	4833	4610	4356
% Change from previous month	-4%	-2%	-2%	2%	4%	4%	8%	0%	6%	-4%	-2%	-5%	-6%
% Change from previous year	2%	0%	0%	2%	3%	4%	5%	0%	5%	3%	0%	3%	2%
Actual Wind Generation (MW)	884	878	1316	1401	1384	1363	1811	2446	1854	2000	2072	1496	894
% Change from previous month	-43%	-1%	50%	6%	-1%	-2%	33%	35%	-24%	8%	4%	-28%	-40%
% Change from previous year	-38%	-22%	54%	71%	28%	-33%	-19%	49%	-7%	-1%	19%	-3%	1%
Gas Price p/therm	72.41	77.87	70.76	82.87	91.52	104.88	104.97	84.2	74.87	63.37	68.18	71.69	76.69
% Change from previous month	-28%	8%	-9%	17%	10%	15%	0%	-20%	-11%	-15%	8%	5%	7%
% Change from previous year	-24%	-44%	-68%	-77%	-61%	3%	-19%	-68%	-52%	-53%	-39%	-29%	6%
Carbon Price (€/Tonne)	84.18	85.51	86.57	84.61	82.09	81.10	76.25	71.79	65.52	55.79	57.94	63.25	70.90
% Change from previous month	-6%	2%	1%	-2%	-3%	-1%	-6%	-6%	-9%	-15%	4%	9%	12%
% Change from previous year	-1%	2%	6%	-4%	17%	15%	1%	-16%	-18%	-39%	-35%	-30%	-16%
Coal Price ($/tonne)	119.57	112.56	111.02	115.57	120.40	131.80	122.16	118.31	107.65	96.84	111.78	118.13	106.15
% Change from previous month	-13%	-6%	-1%	4%	4%	9%	-7%	-3%	-9%	-10%	15%	6%	-10%
% Change from previous year	-63%	-67%	-71%	-67%	-65%	-52%	-43%	-51%	-38%	-29%	-17%	-14%	-11%
EWIC % Import Periods	75.86%	77.72%	67.11%	68.11%	73.75%	86.90%	68.78%	56.38%	69.76%	69.10%	63.78%	81.94%	84.98%
EWIC % Export Periods	8.28%	4.06%	9.21%	11.96%	8.89%	2.99%	9.11%	20.36%	14.78%	11.00%	11.32%	4.86%	0.67%
EWIC % Not Flow Periods	15.88%	18.22%	22.68%	19.93%	17.36%	10.11%	22.11%	23.25%	15.46%	19.90%	24.90%	13.19%	14.35%
Moyle % Import Periods	85.42%	92.22%	84.04%	75.24%	83.33%	92.31%	83.47%	67.81%	78.16%	79.59%	79.00%	87.40%	94.96%
Moyle % Export Periods	14.58%	7.67%	15.89%	20.33%	16.60%	7.66%	16.50%	32.16%	21.81%	20.34%	20.83%	12.50%	5.27%
Moyle % Not Flow Periods	0.00%	0.10%	0.07%	4.44%	0.07%	0.03%	0.03%	0.03%	0.03%	0.07%	0.17%	0.10%	0.03%

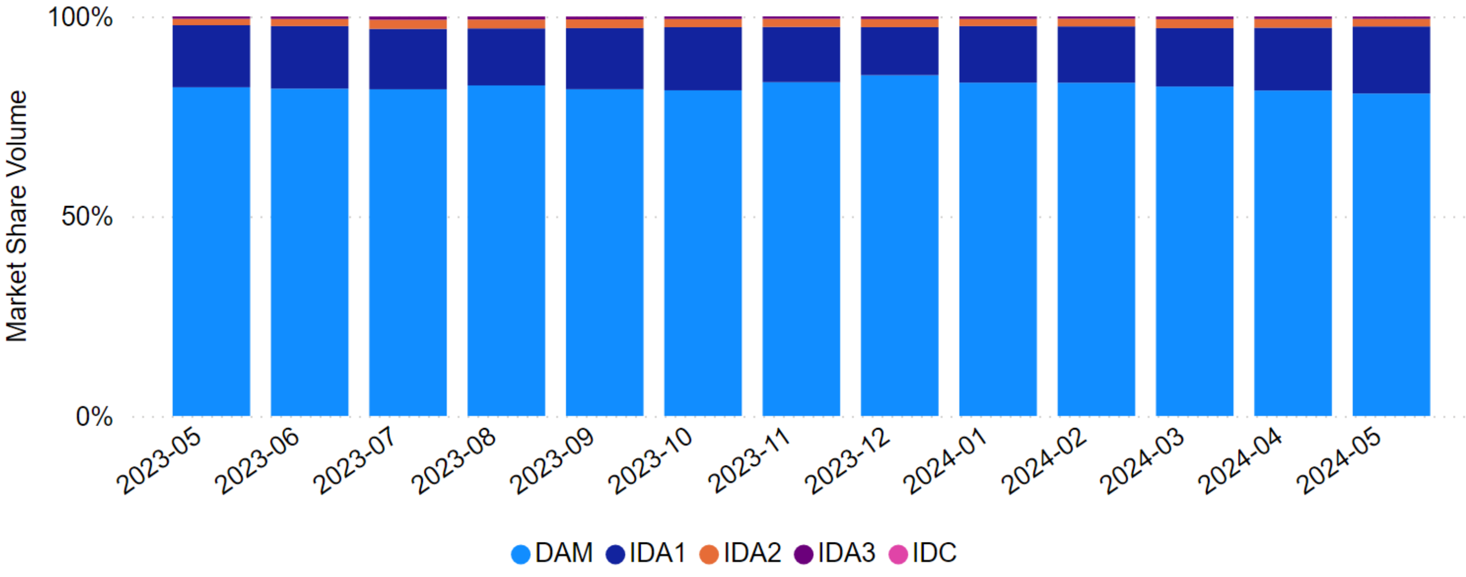
Market Volumes May 2024

Daily Average Volume	MWh
DAM	109,069
IDA1	22,690
IDA2	2,571
IDA3	791
IDC	72

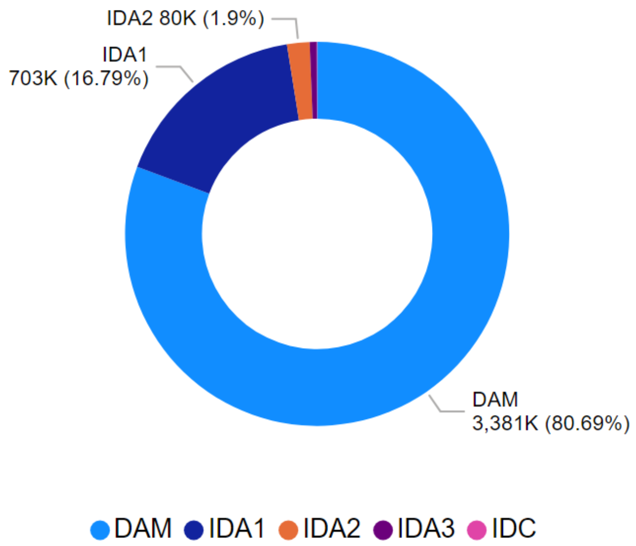
Total Monthly Volume	MWh
DAM	3,381,128
IDA1	703,392
IDA2	79,701
IDA3	24,528
IDC	1,573
Total	**4,190,321**

Total Market Value	€
DAM	€ 369,803,580
IDA1	€ 76,783,335
IDA2	€ 8,674,242
IDA3	€ 3,010,342
IDC	€ 177,565
Total	**€ 458,449,065**

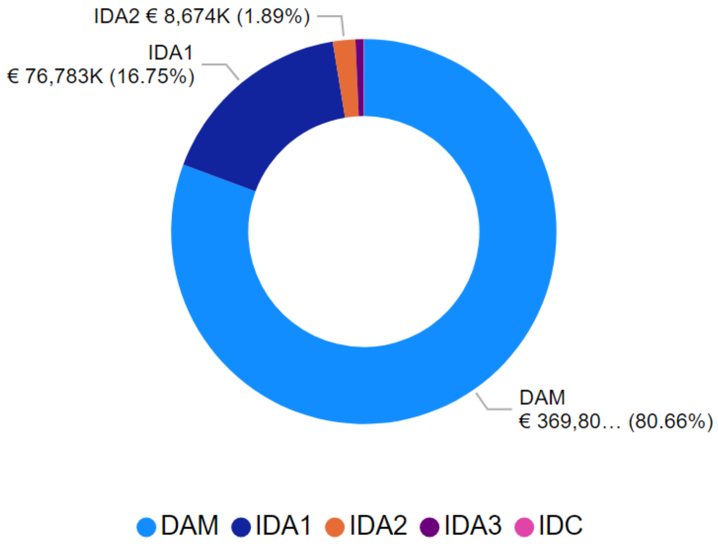
Ex-Ante Monthly Volume by Market



Ex-Ante Volumes (MWh)



Ex-Ante Values (€)



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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.

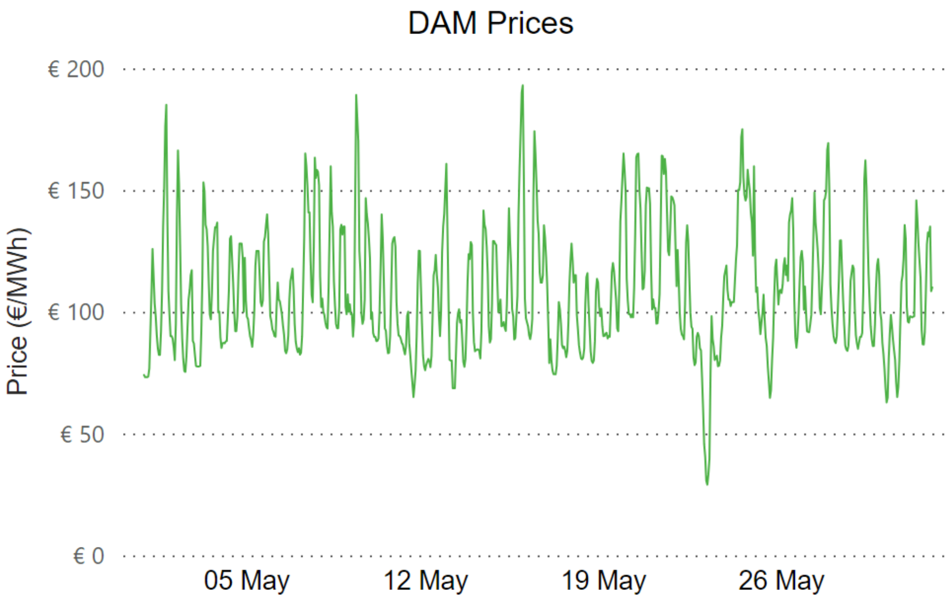
Day Ahead Market May 2024

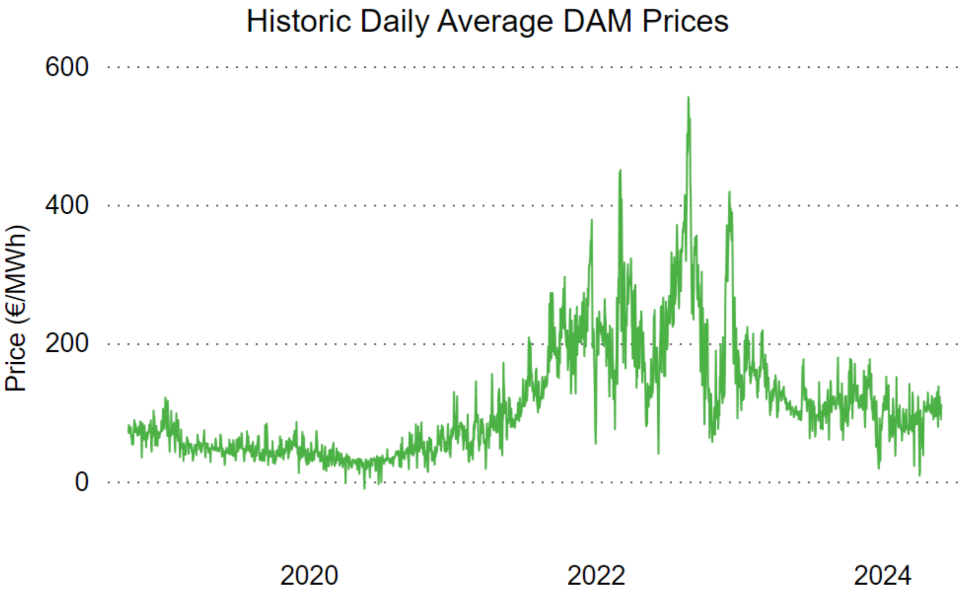
€ 107.76
Average DAM Price

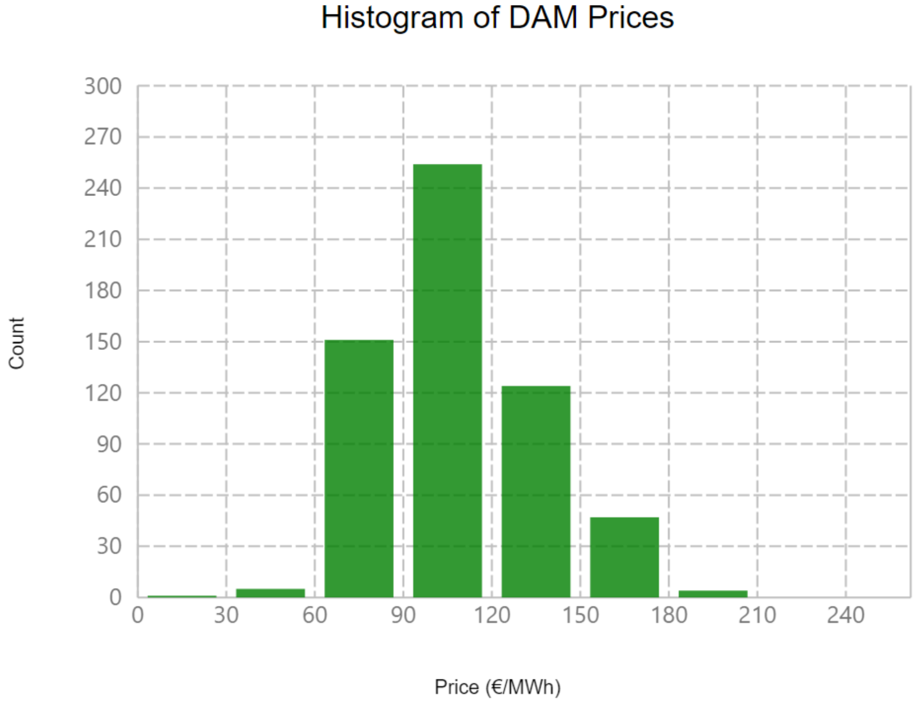
€ 29.00
Min DAM Price

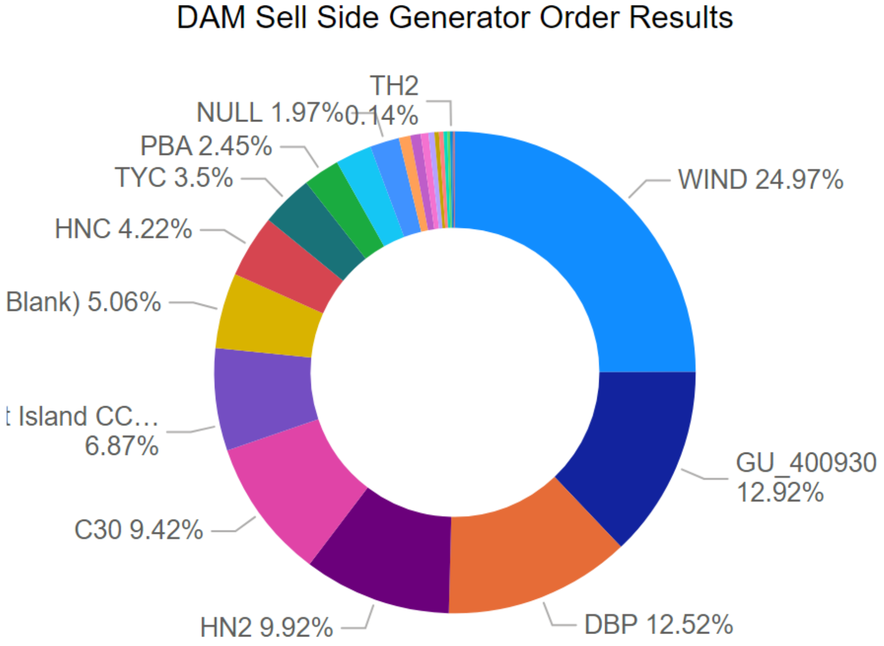
€ 193.00
Max DAM Price

The most frequent price range for May was between €90 and €120









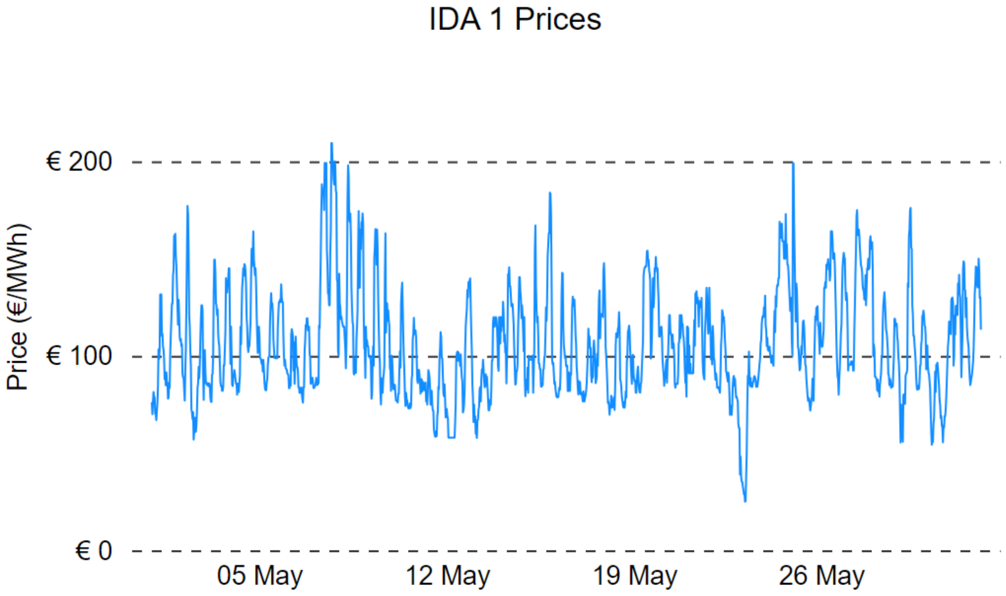
Intraday Market May 2024

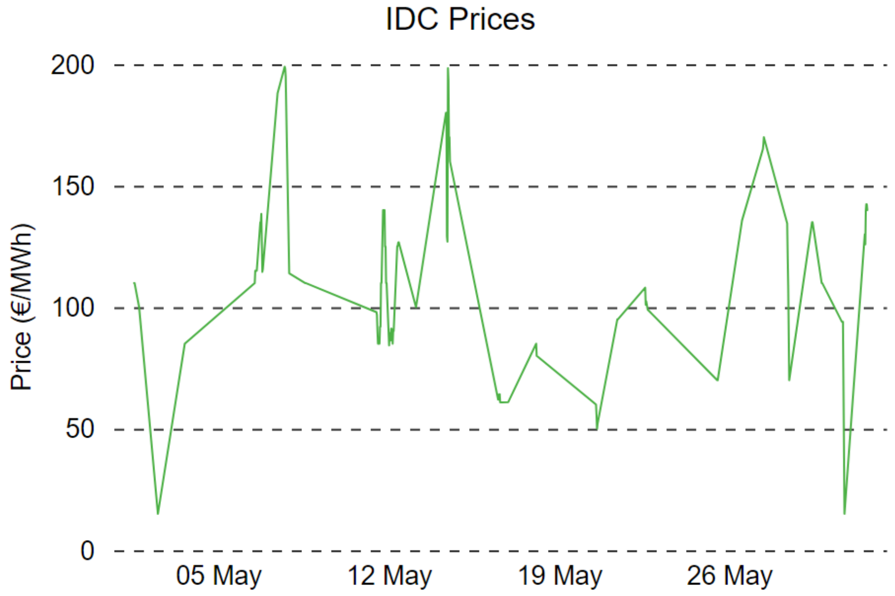
€ 106.40
Average IDA1 Price

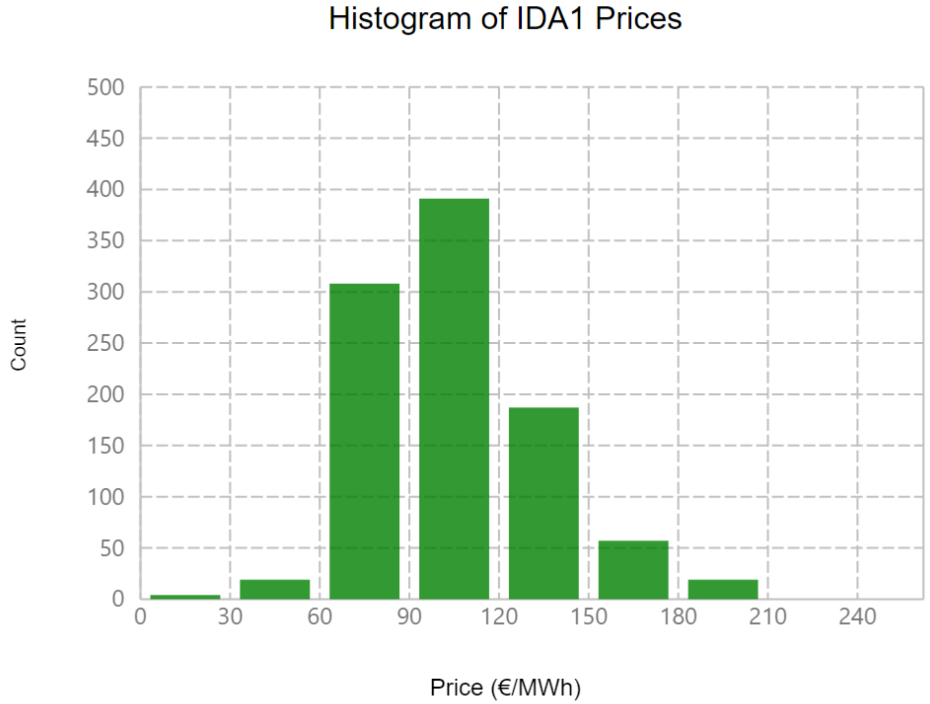
€ 25.00
Min IDA1 Price

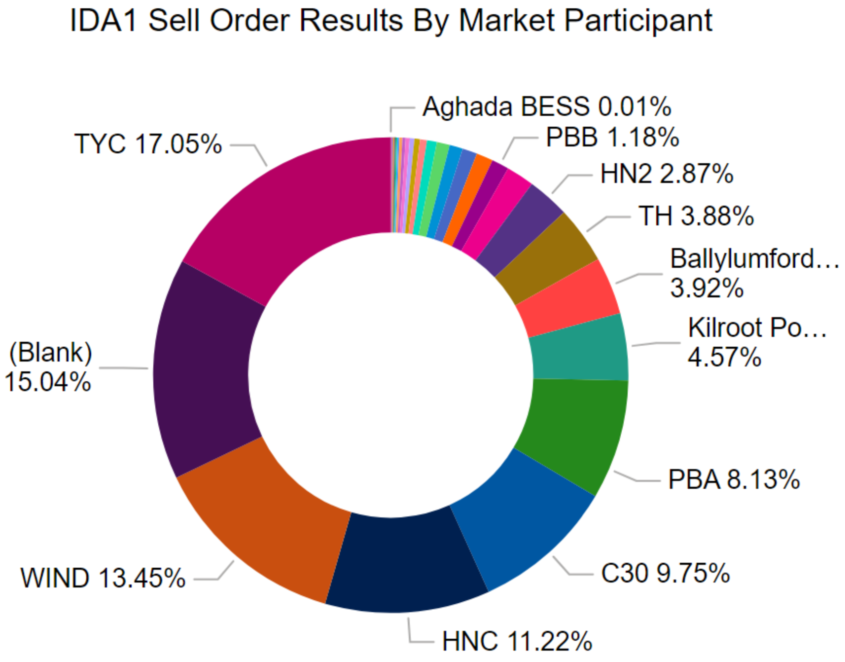
€ 209.50
Max IDA1 Price

The most frequent price range for May was between €90 and €90









Intraday Market May 2024

SEM Day Ahead Price

€ 107.76
Average Price

€ 29.00
Min Price

€ 193.00
Max Price

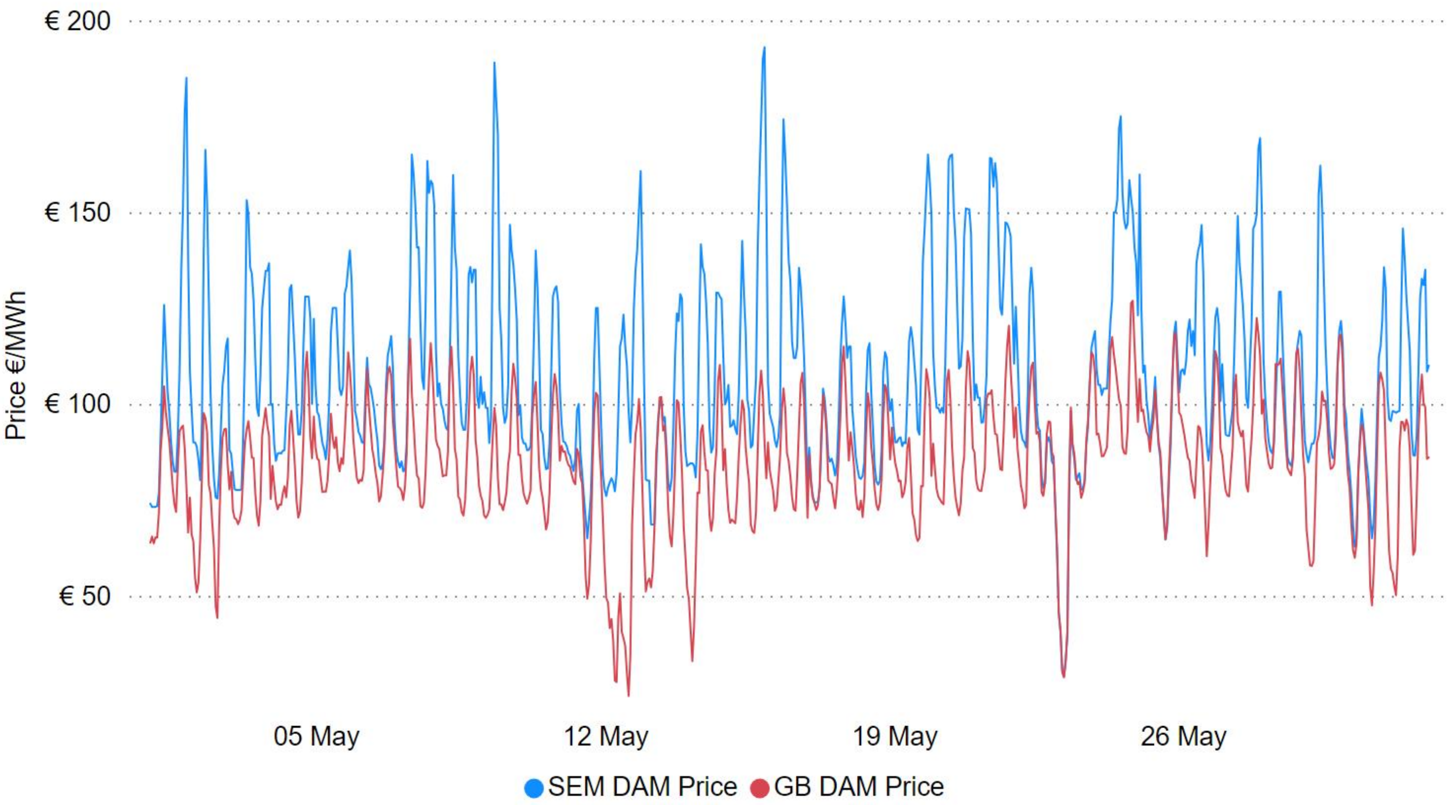
GB Day Ahead Price

€ 84.74
Average Price

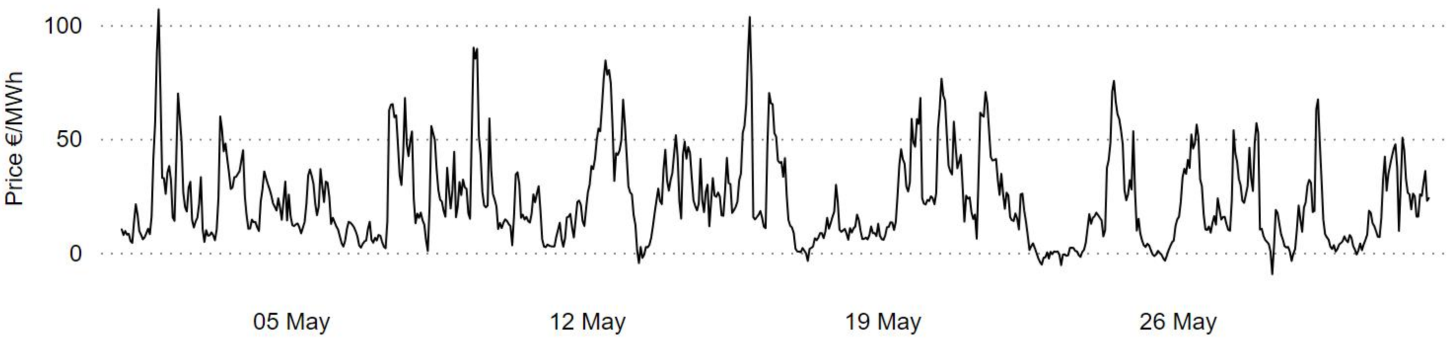
€ 23.90
Min Price

€ 126.89
Max Price

SEM & GB DAM Prices



SEM & GB DAM Prices Spread



SEM-GB Price Differential

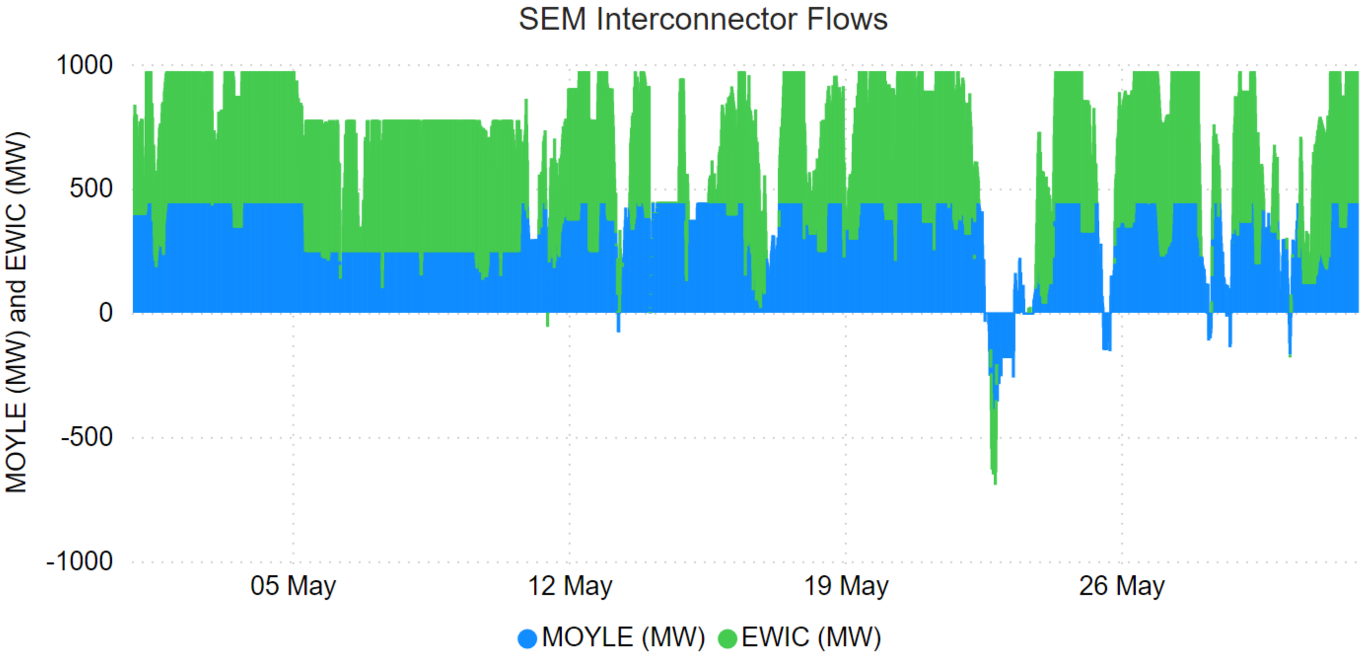
The charts show that the SEM and GB prices appear to follow the same general trend. Significant spreads can be observed on several occasions. The MMU has investigated the underlying reasons for these spreads and the findings are consistent with those discussed with the SEMC previously.

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 May 2024

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

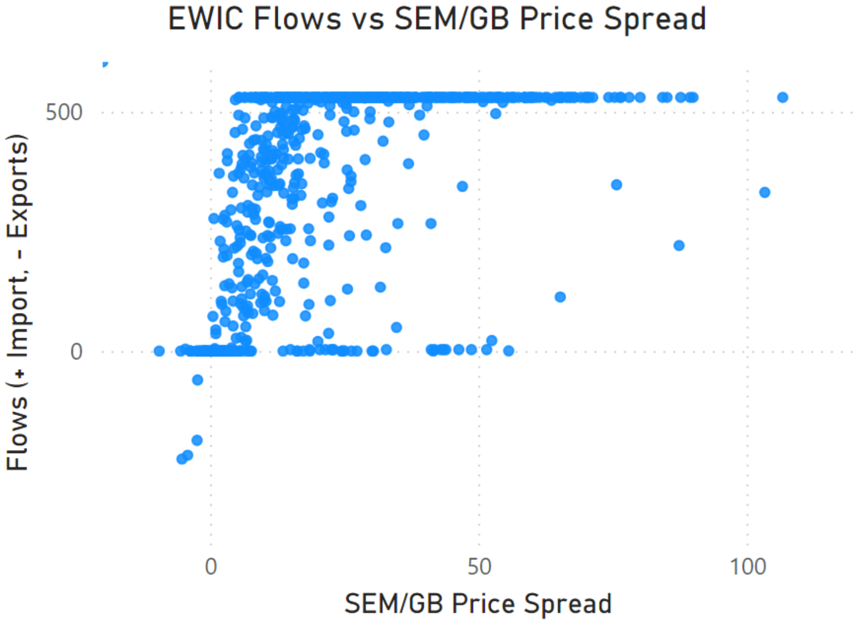
Moyle	EWIC
5th 07:00-17:00	7th 07:00 - 23:59
7th 07:00 - 23:00	8th 06:00 - 22:00
8th 06:00 - 22:00	9th 05:00 - 22:00
9th 05:00 - 22:00	10th 06:00 - 23:59
10th 07:00 - 22:00	11th 18:00 - 23:59
11th 08:00 - 10:00	12th 00:00 - 22:00
12th 08:00 - 22:00	13th 18:00 - 23:00
13th 16:00 - 22:00	14h 01:00 - 23:59
14th 22:00 - 23:59	15th 00:00 - 23:59
15th 00:00 - 23:59	16th 00:00 - 22:00
16th 00:00 - 22:00	19th 16:00 - 23:00
17th 07:00 - 22:00	20th 05:00 -23:00
18th 07:00 - 22:00	21st 05:00 -23:00
19th 14:00 -22:00	24th 06:00 -23:00
20th 06:00 -22:00	27th 07:00 -23:00
21st 06:00 - 22:00	
24th 07:00 - 22:00	
27th 10:00 - 19:00	

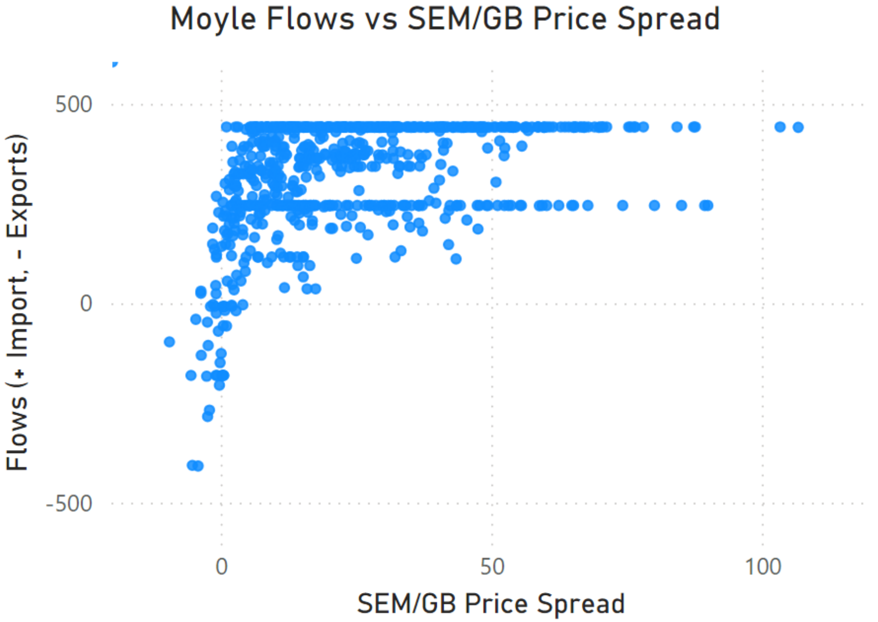


Interconnector Flows

In May, the SEM Interconnectors primarily imported power from GB, with only minimal exports. 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 that of Moyle.



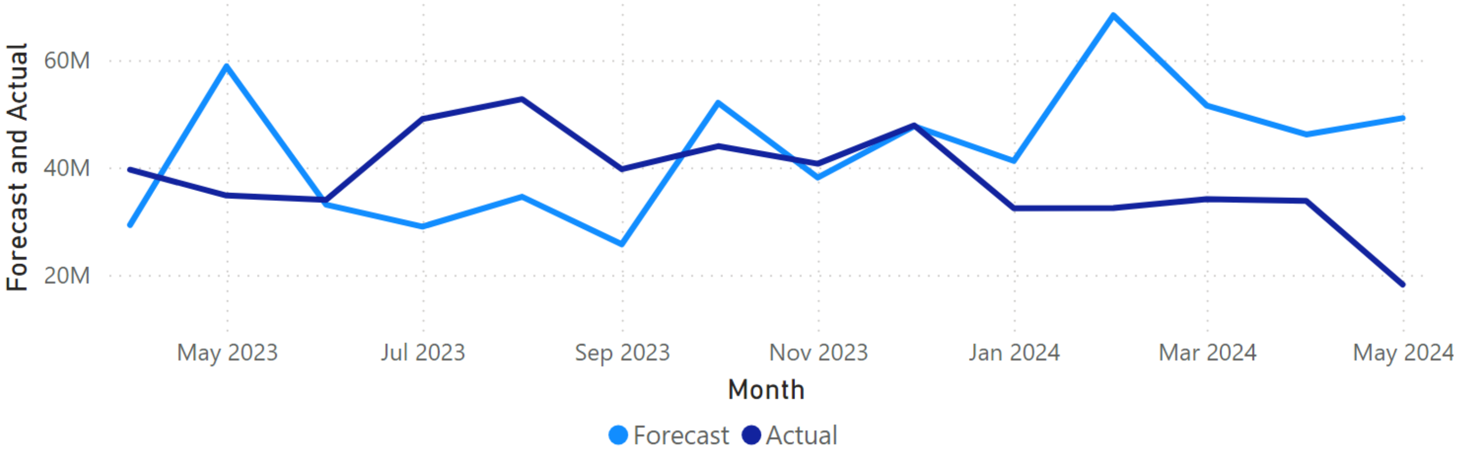


Balancing Market May 2024

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.

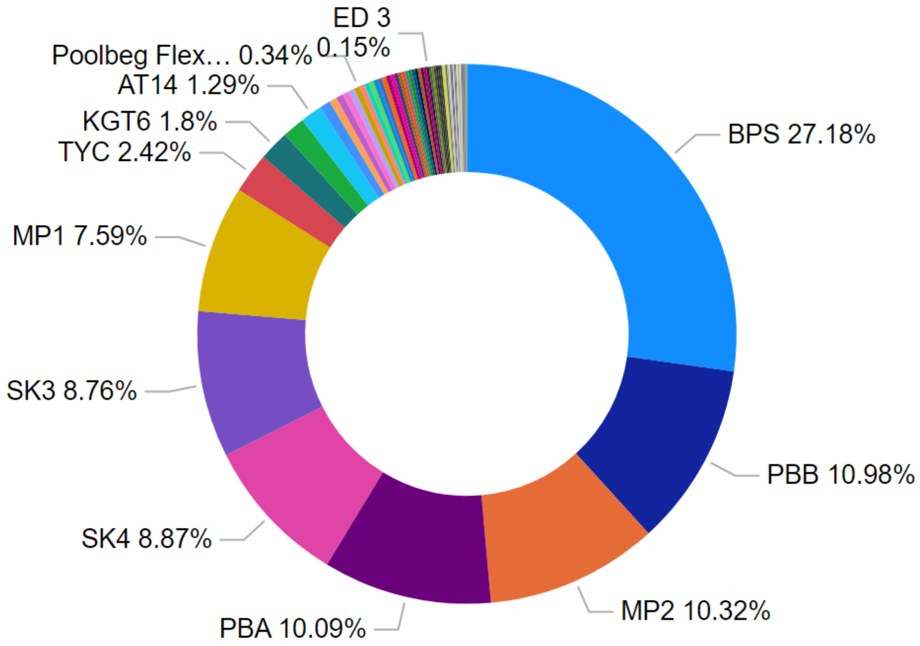
Generators can be constrained ‘on' or ‘up' if the market schedule indicated they were to be run at lower levels than actually happened. Or they could be constrained ‘down' or ‘off' if they were to be run at a higher level than happened in reality. There is always an overall net cost to the system associated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

Imperfection Costs - Forecast vs Actual



Determinant Name	Value €
CABBPO	6,617.22
CAOOPO	11,466.05
CCURL	-337,048.86
CDISCOUNT	9,138,688.40
CFC	2,901,254.95
CPREMIUM	6,873,214.68
CTEST	-47,287.86
CUNIMB	-340,041.44
Total	**18,206,863.14**

Market Share per Unit (CFC, CPREMIUN, CDISCOUNT)



Constraints Payments

This charts illustrates the distribution of selected Constraint Payments, to specific power plants. As it can be seen, BPS (EP Ballylumford Ltd) was the largest receiver of these payments in May followed by Poolbeg B and MoneyPoint 2. The distribution of Constraint Payment has not changed substantially in the last few months. The MMU are continuing to monitor Balancing Market outcomes.

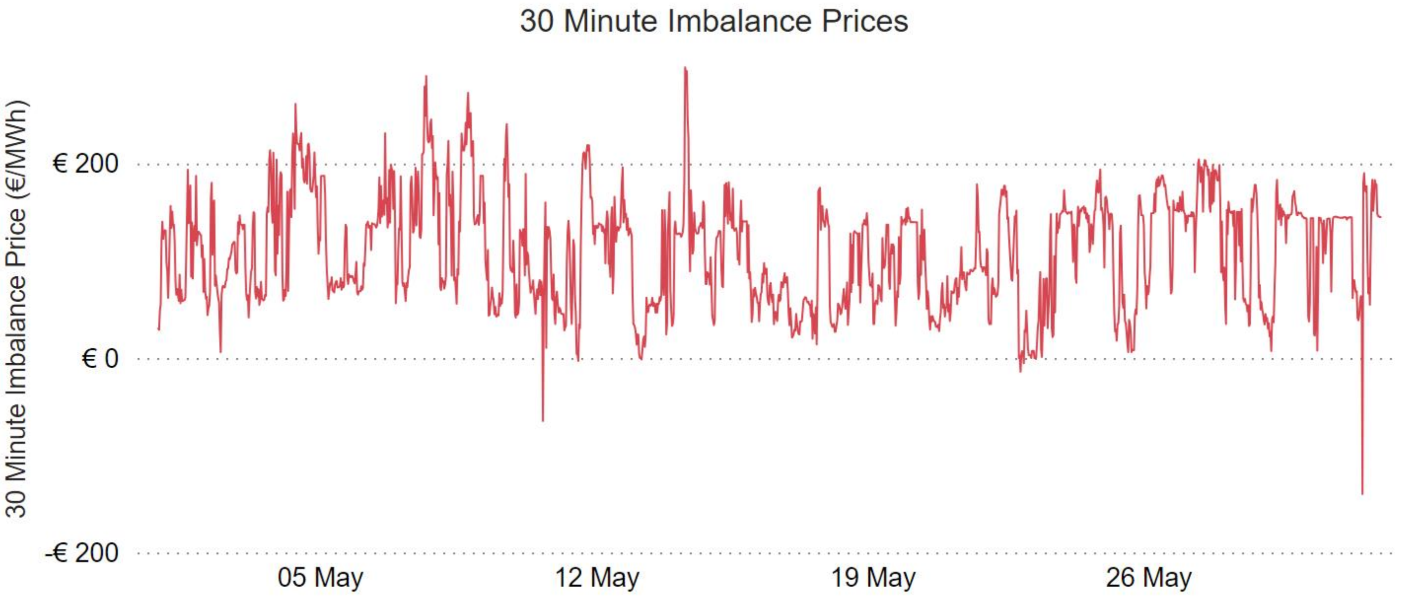
Balancing Market May 2024

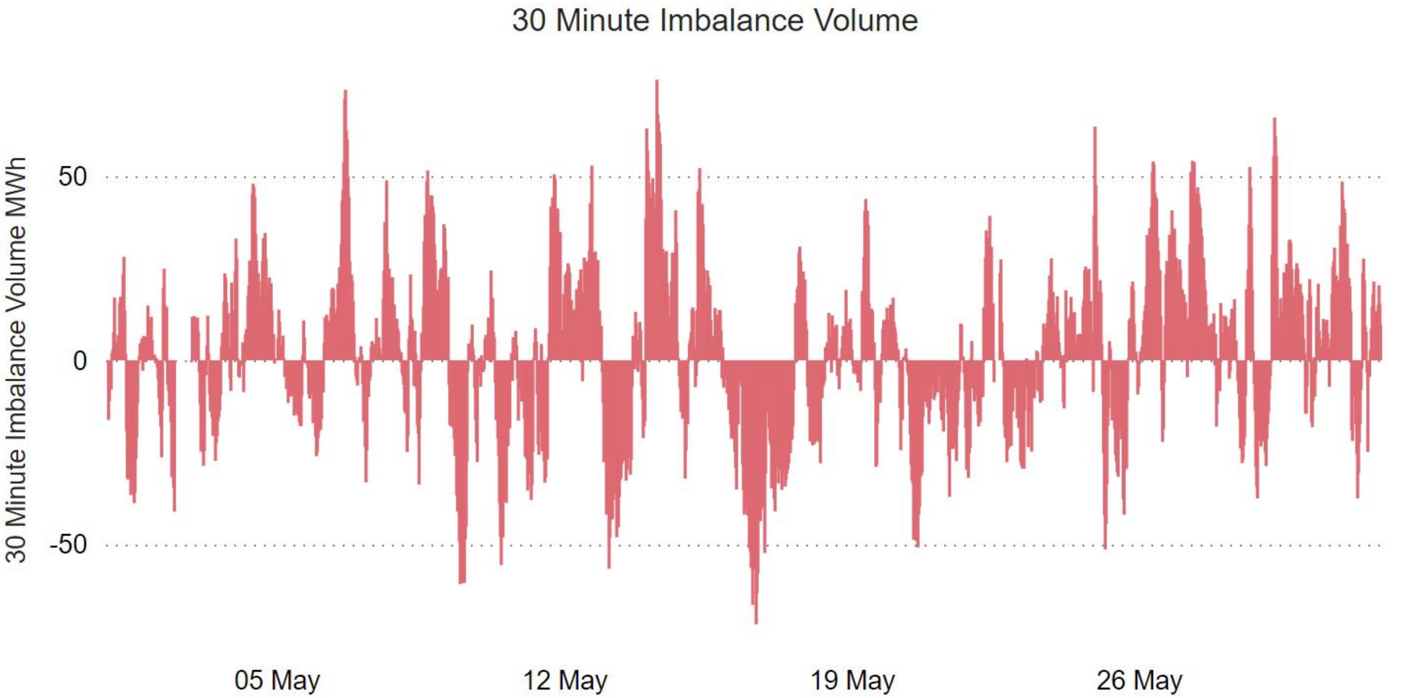
30 Minutes Imbalance Price

€ 109.92
Average Price

-€ 139.71
Lowest Price

€ 298.63
Highest Price





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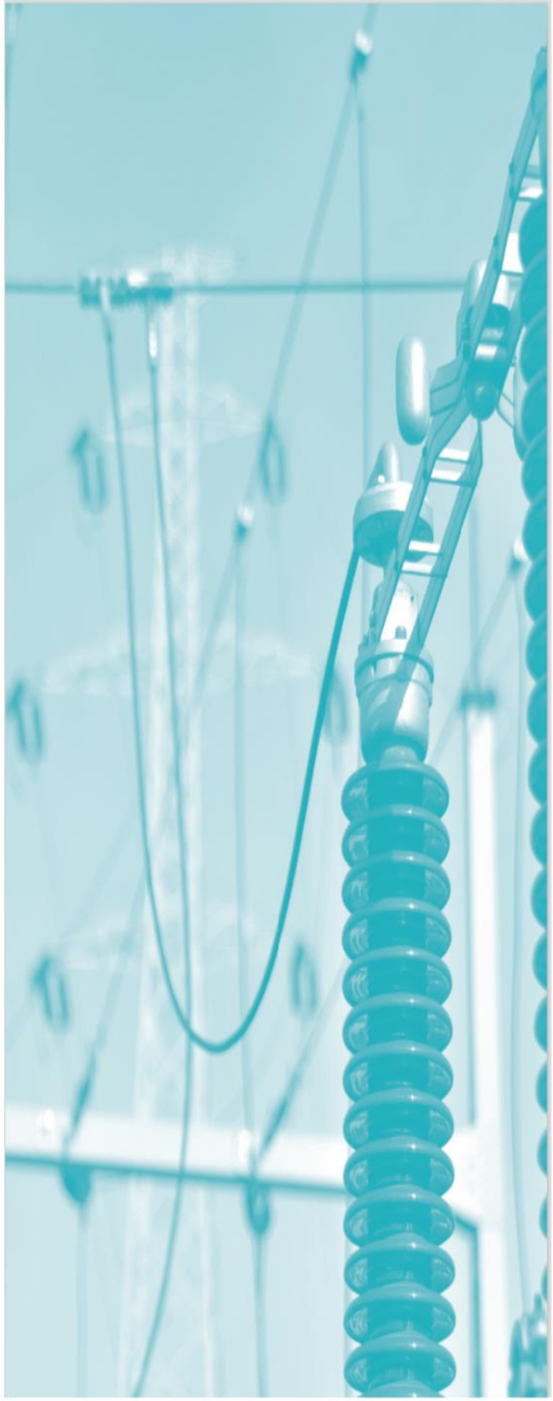
Imbalance Price & Volumes

The average Balance (BM) Price this month is slightly higher than the Day Ahead Price. Additionally, the Balancing Market prices has exhibited a much higher range of prices indicating a higher level of volatilely 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.



Demand and Generation Mix

Demand May 2024

SEM Demand

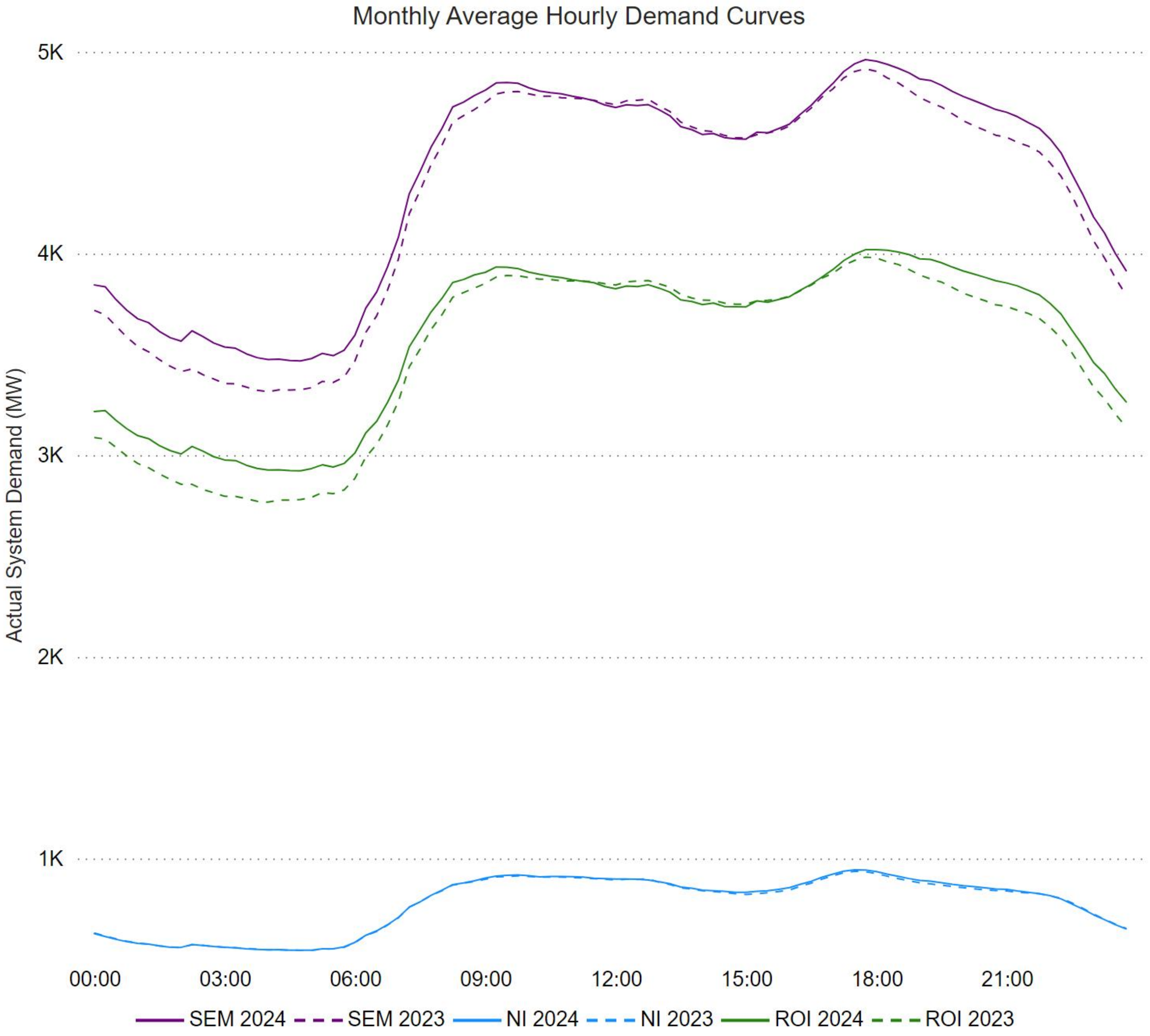
4,356.86 SEM Average 2024	4,276.44 SEM Average 2023
3,467.25 SEM Min 2024	3,314.23 SEM Min 2023
4,961.44 SEM Max 2024	4,915.81 SEM Max 2023

NI Demand

775.62 NI Average 2024	772.19 NI Average 2023
545.19 NI Min 2024	543.90 NI Min 2023
943.81 NI Max 2024	936.32 NI Max 2023

ROI Demand

3,581.24 ROI Average 2024	3,504.25 ROI Average 2023
2,922.09 ROI Min 2024	2,766.97 ROI Min 2023
4,018.56 ROI Max 2024	3,981.71 ROI Max 2023



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SEM Demand

The graph illustrates a steady demand within NI, with no significant deviation compared to the corresponding period in the previous year.

The demand for ROI during the daylight period (11AM to 5PM) has remained consistently in line with the same period last year, while the overall monthly average has shown an increase of 2.2% from the previous year.

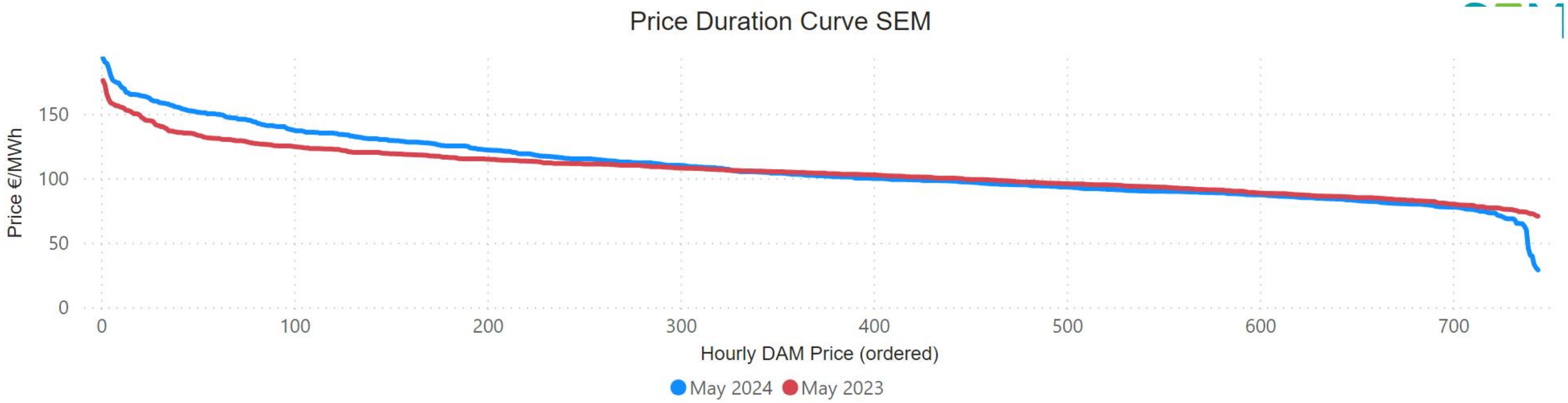
Demand in the SEM as a whole is up by 1.9% relative to the same period last year.

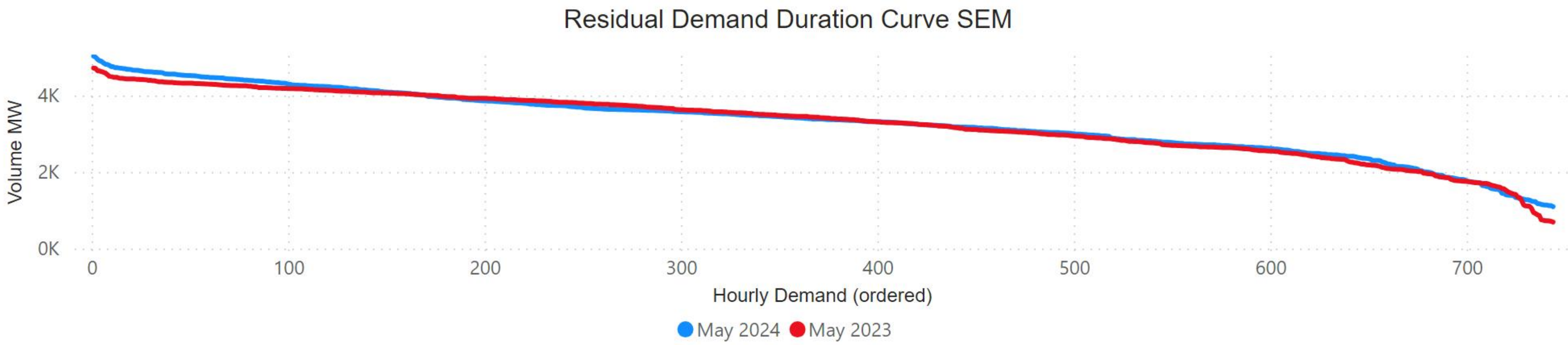
Duration Curves May 2024

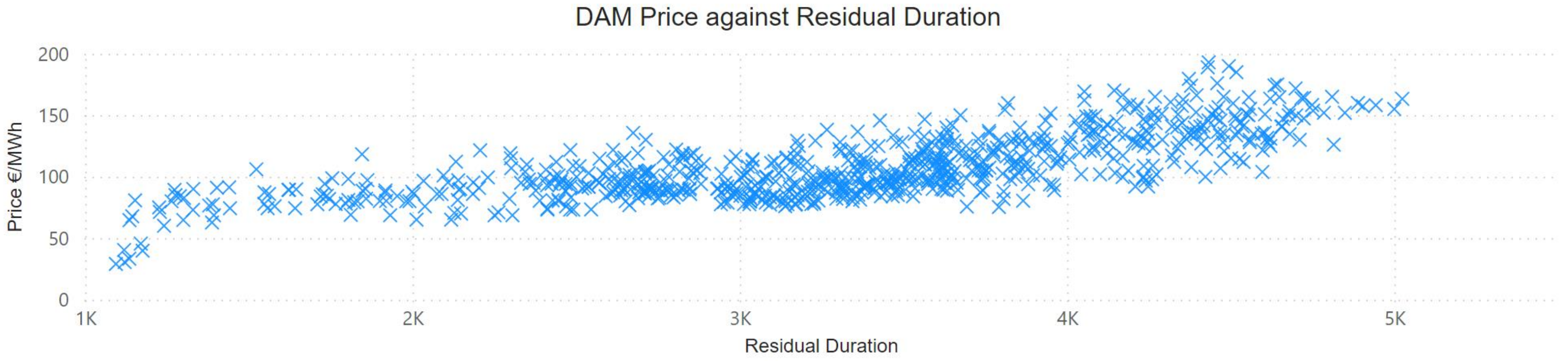
Price Duration
The price duration curve shows the hourly DAM prices across the month ordered from the largest to the smallest.

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.





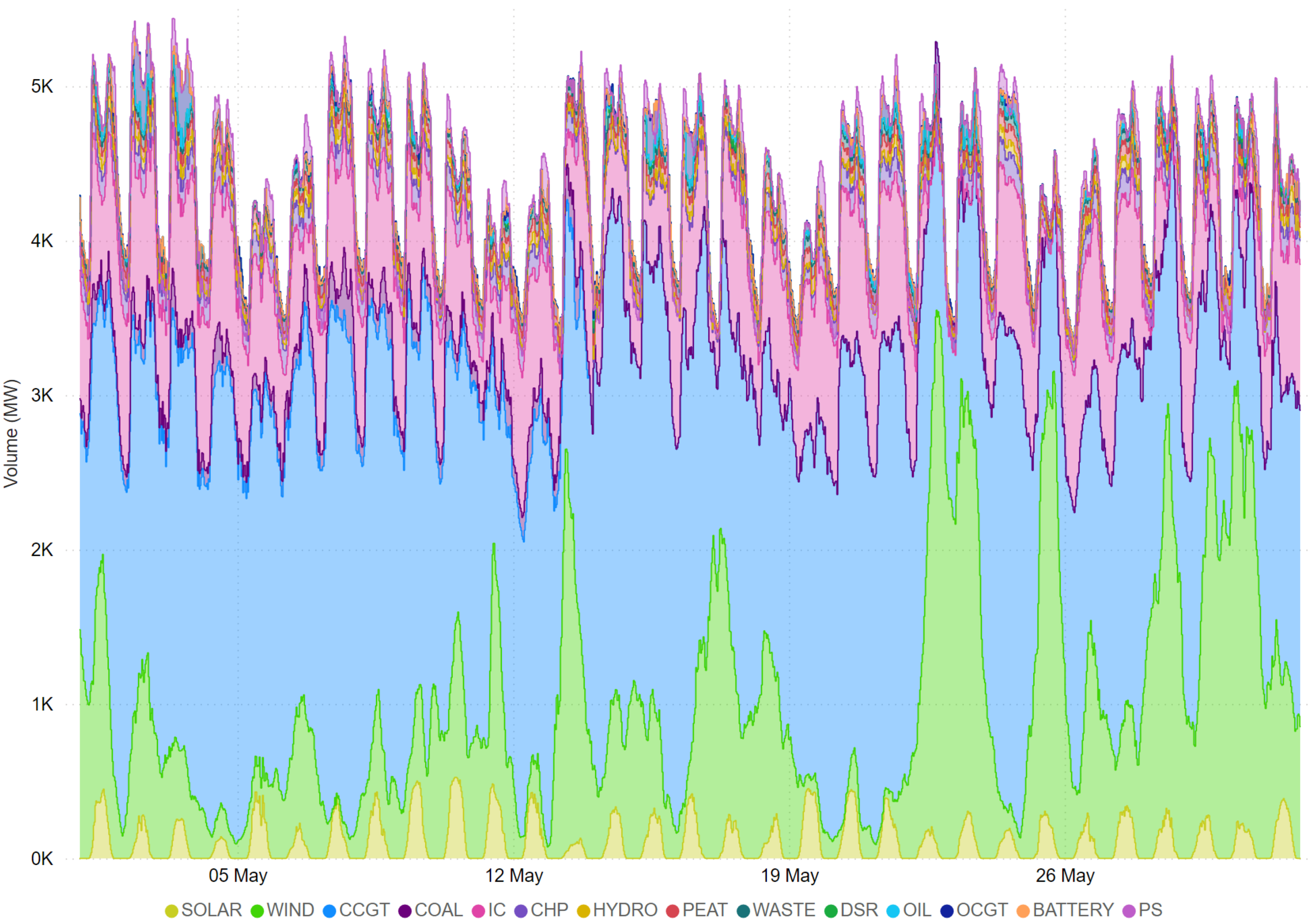


Fuel Mix
May 2024

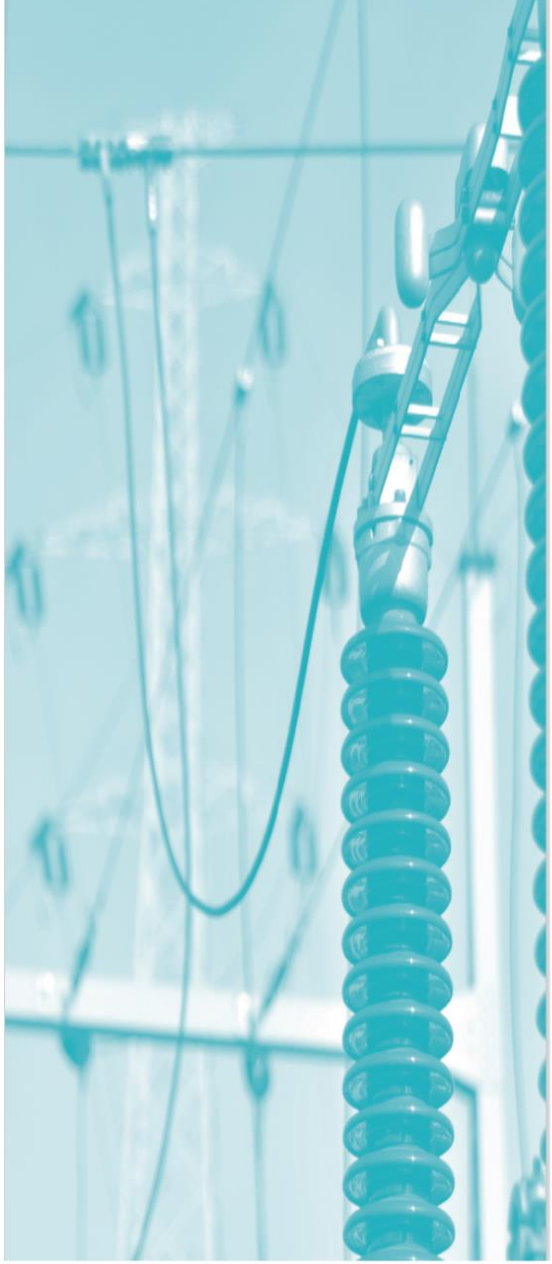
Fuel Type	Avg Monthly	Per. Monthly
CCGT	2219	51.2%
WIND	895	20.6%
INTERCONNECTORS	681	15.7%
CHP	130	3.0%
SOLAR	113	2.6%
PEAT	78	1.8%
WASTE	74	1.7%
COAL	63	1.4%
HYDRO	44	1.0%
OCGT	34	0.8%
DSR	28	0.7%
OIL	2	0.0%
BATTERY	-6	-0.1%
PUMPED STORAGE	-18	-0.4%

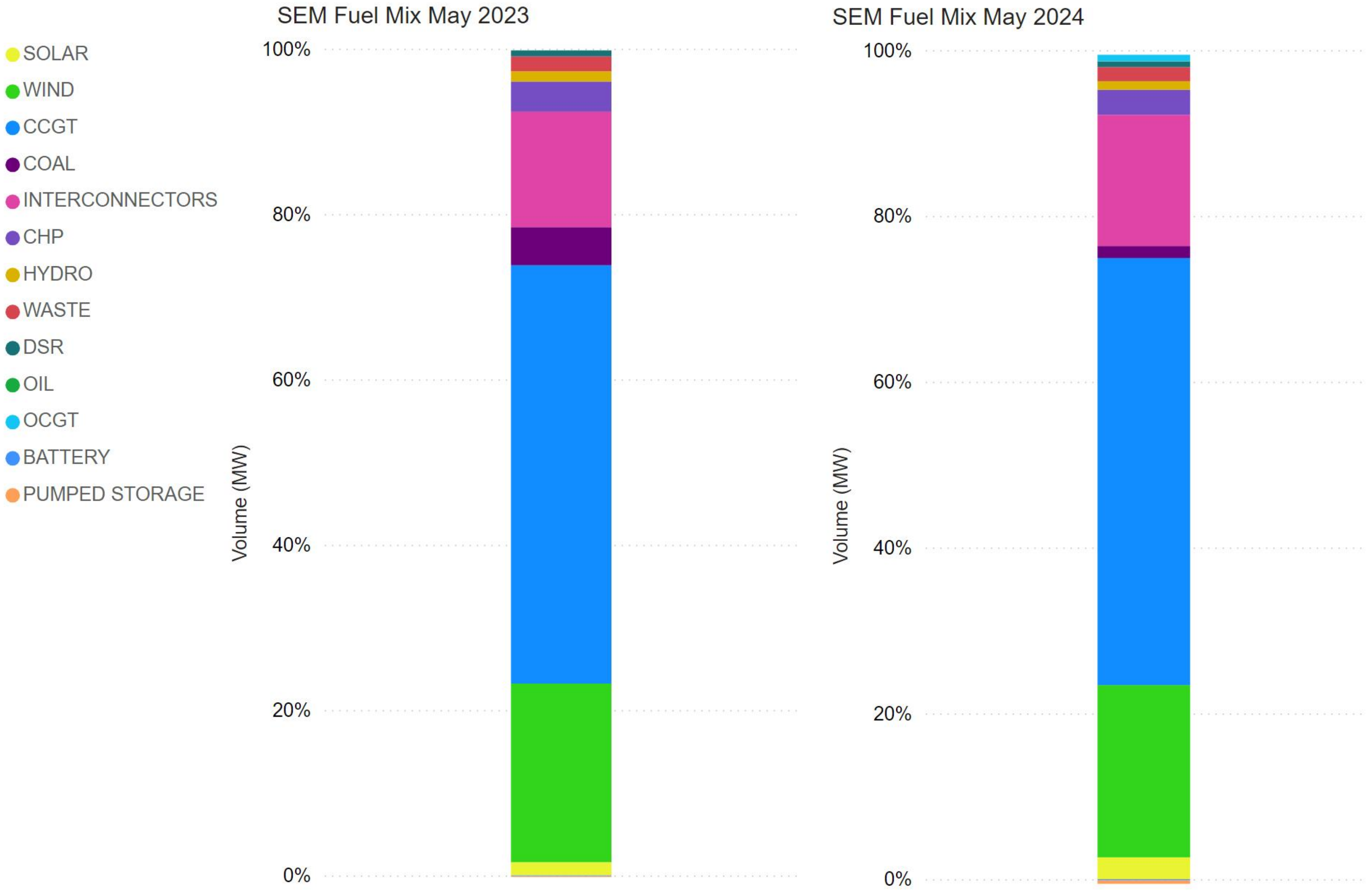
Fuel Type	Max Monthly	Min Monthly
WIND	3500	13
CCGT	3367	1069
INTERCONNECTORS	982	-633
SOLAR	526	0
COAL	468	0
OCGT	417	0
PUMPED STORAGE	291	-301
DSR	167	0
CHP	165	0
BATTERY	132	-105
HYDRO	120	0
PEAT	105	41
OIL	82	0
WASTE	81	14

SEM 30 Minute Fuel Mix



Fuel Mix Comparison May 2023 & 2024





North-South Tie Line May 2024

Average Flow NI to ROI (MW)

-313.31

Average Flow ROI to NI (MW)

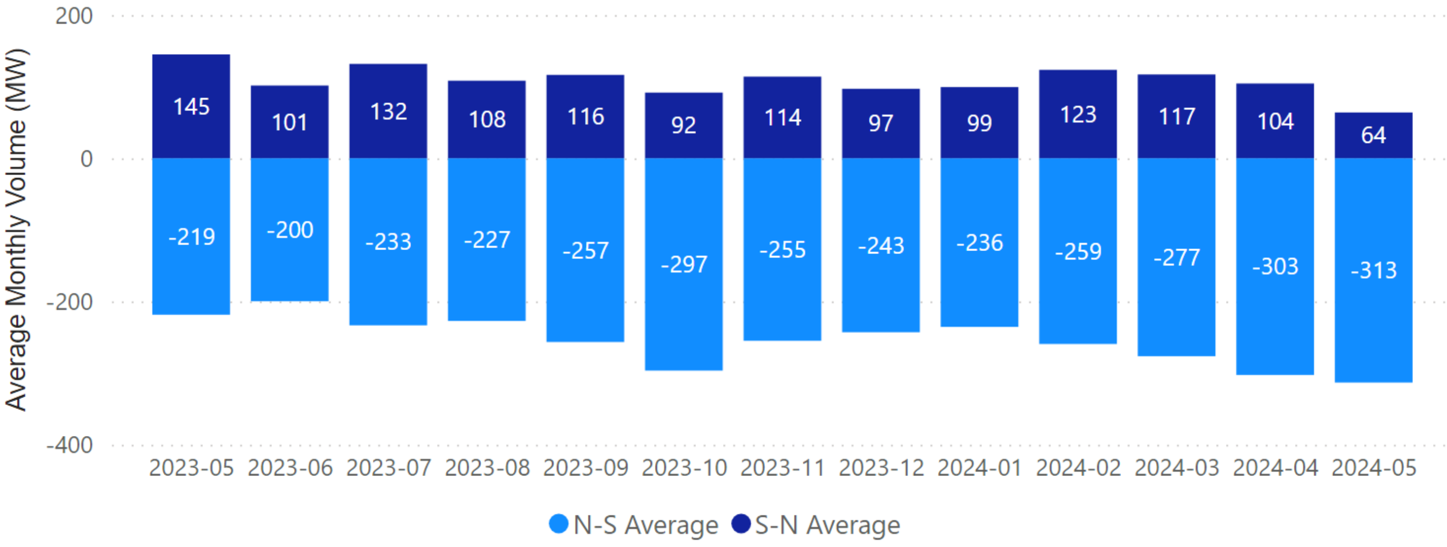
63.82

Average Net Flow NI to ROI (MW)

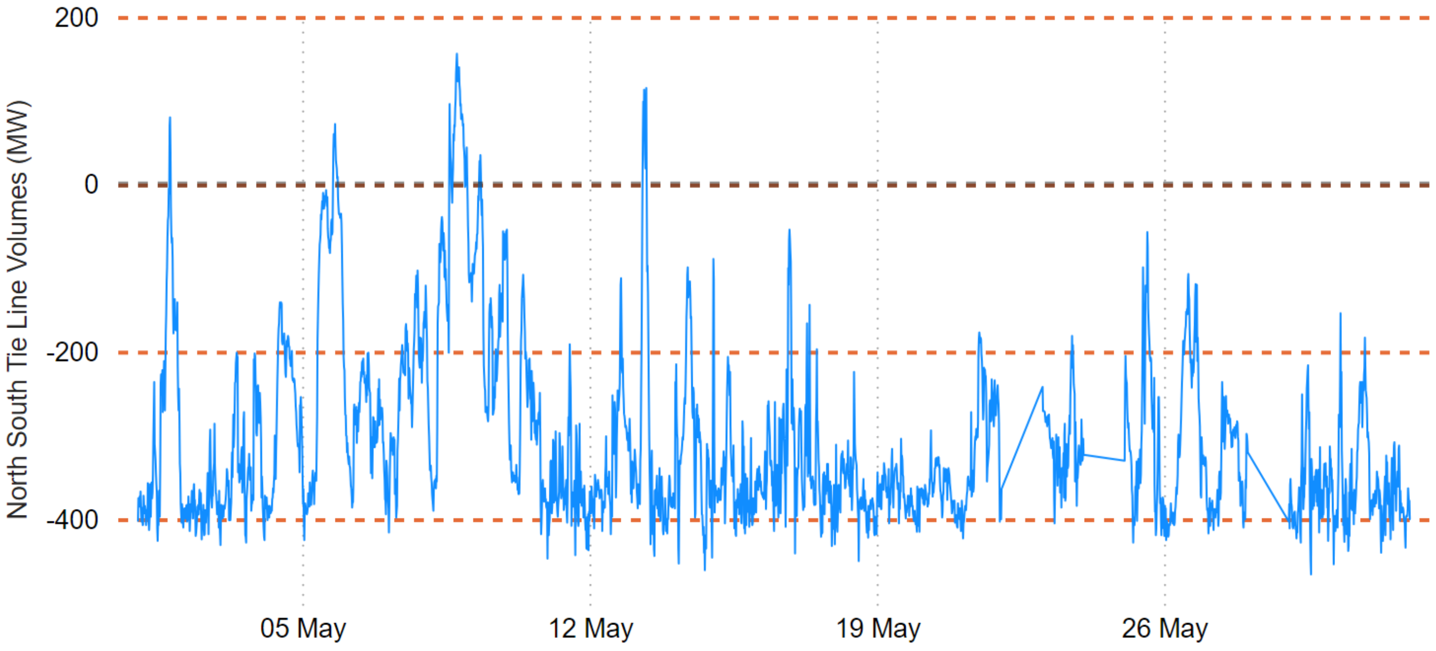
-303.40

-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.

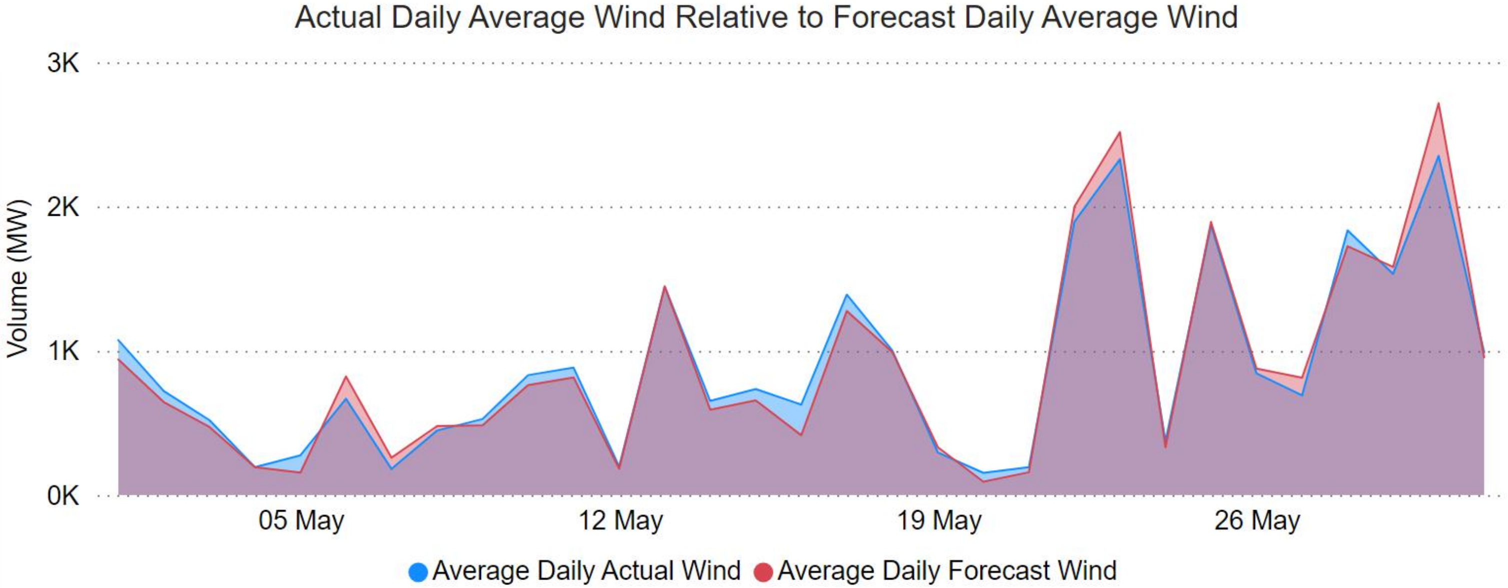
Wind Generation May 2024

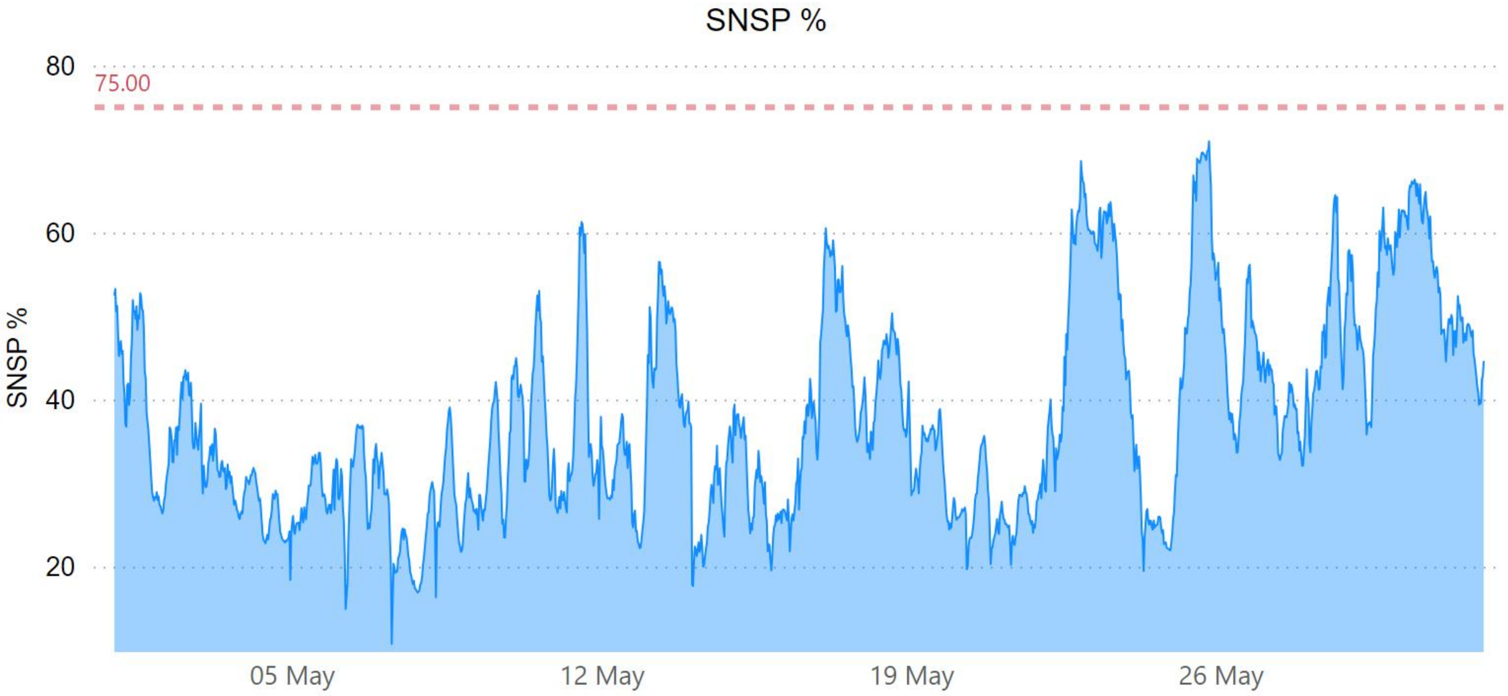
Average Daily Actual Wind (MW)
894

Average Daily Forecast Wind (MW)
890

Min SNSP%
10.73

Max SNSP%
70.93





Wind Generation

Wind generation hit its lowest point of the year this month, continuing a trend observed during the same period last year.
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SNSP

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

CO_2 May 2024

CO2 Intensity (gCO2/kWh)

248.46
Average

133
Lowest

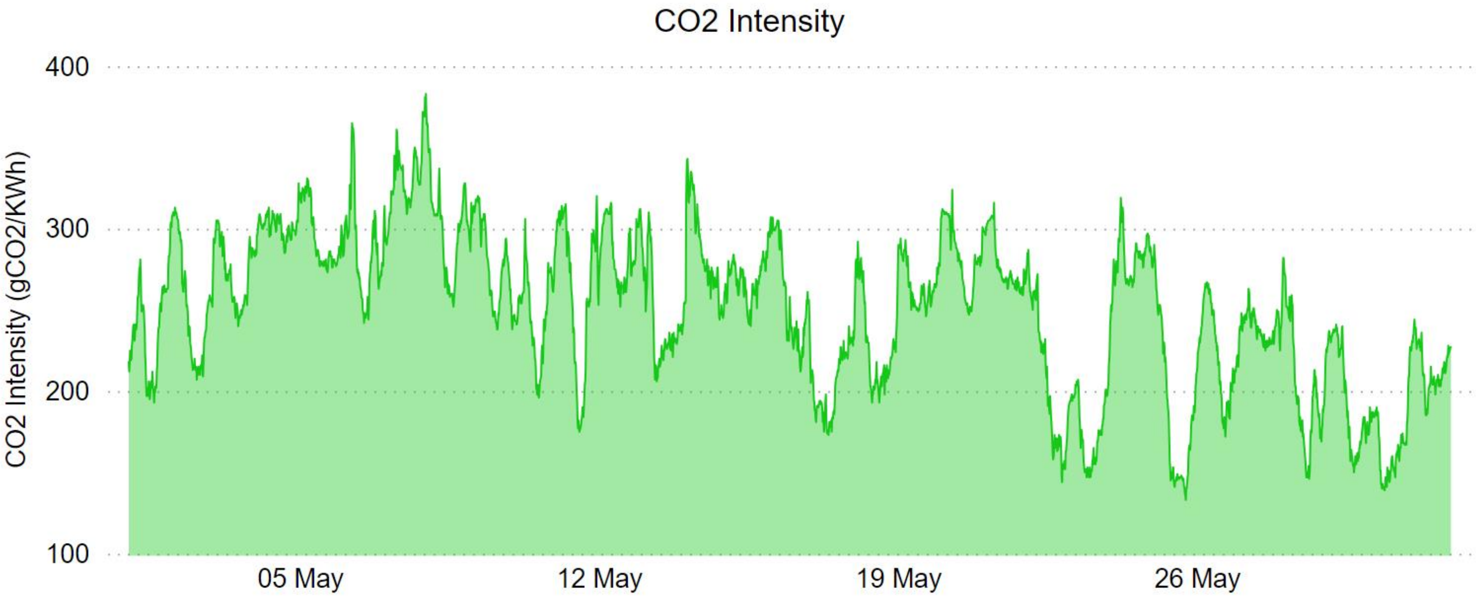
383
Highest

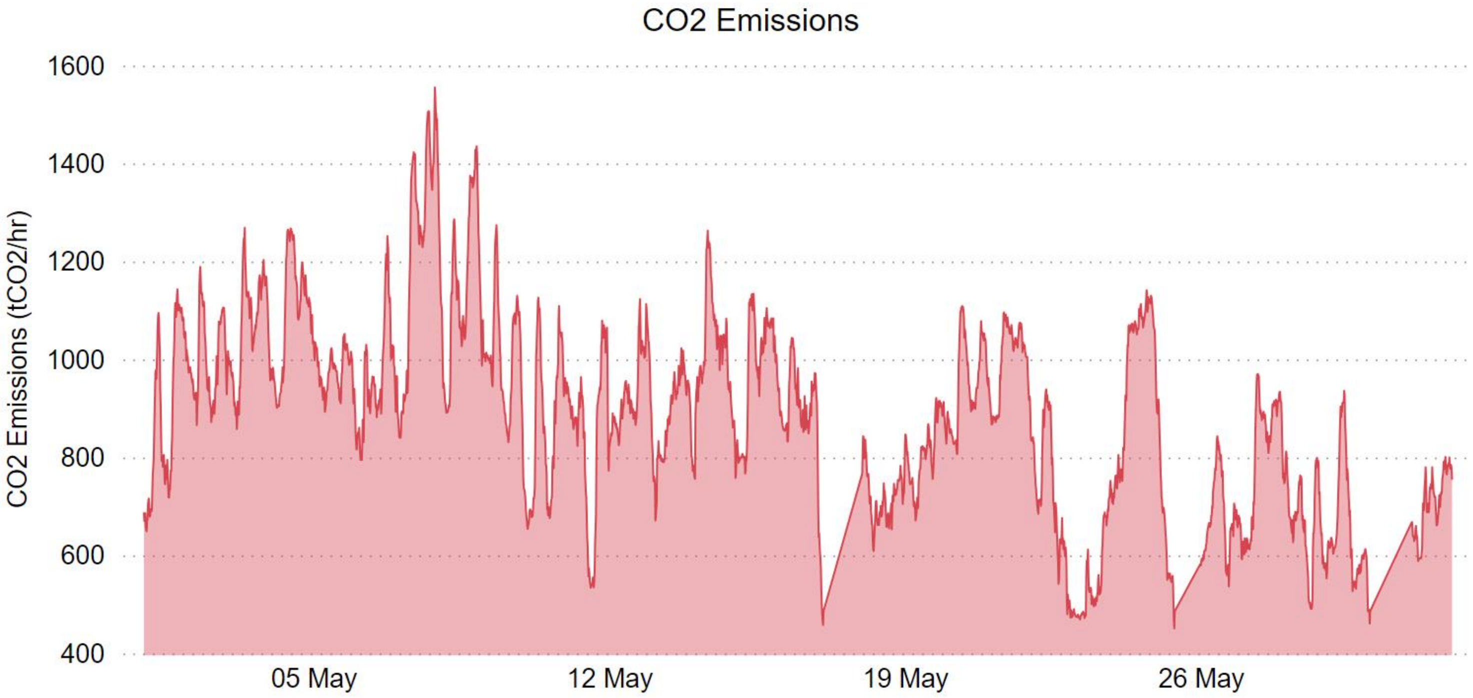
CO2 Emissions (tCO2/hr)

879
Average

451
Lowest

1555
Highest



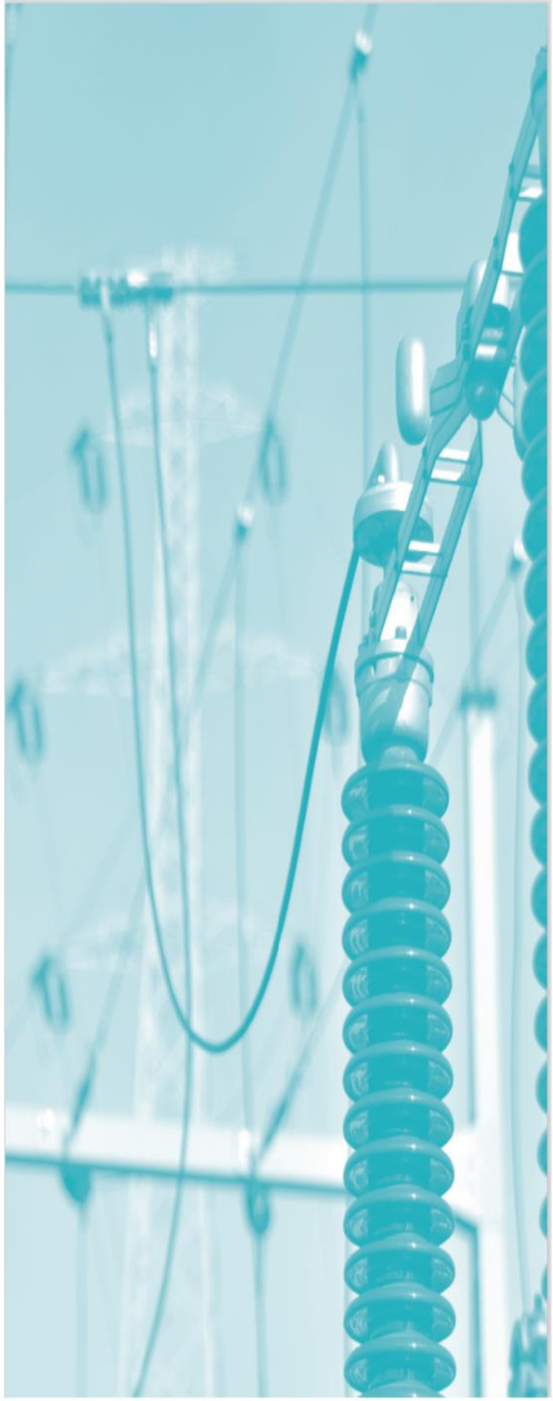


CO_2 Intensity

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

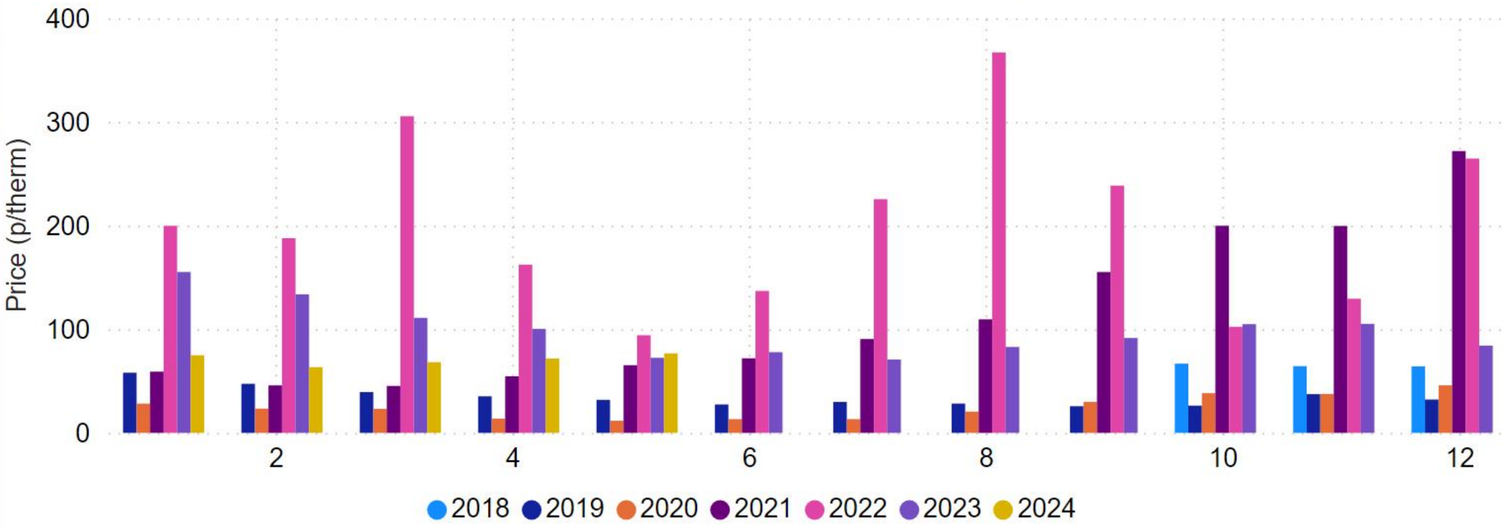
Gas Price
May 2024

76.69
Monthly Average (p/therm)

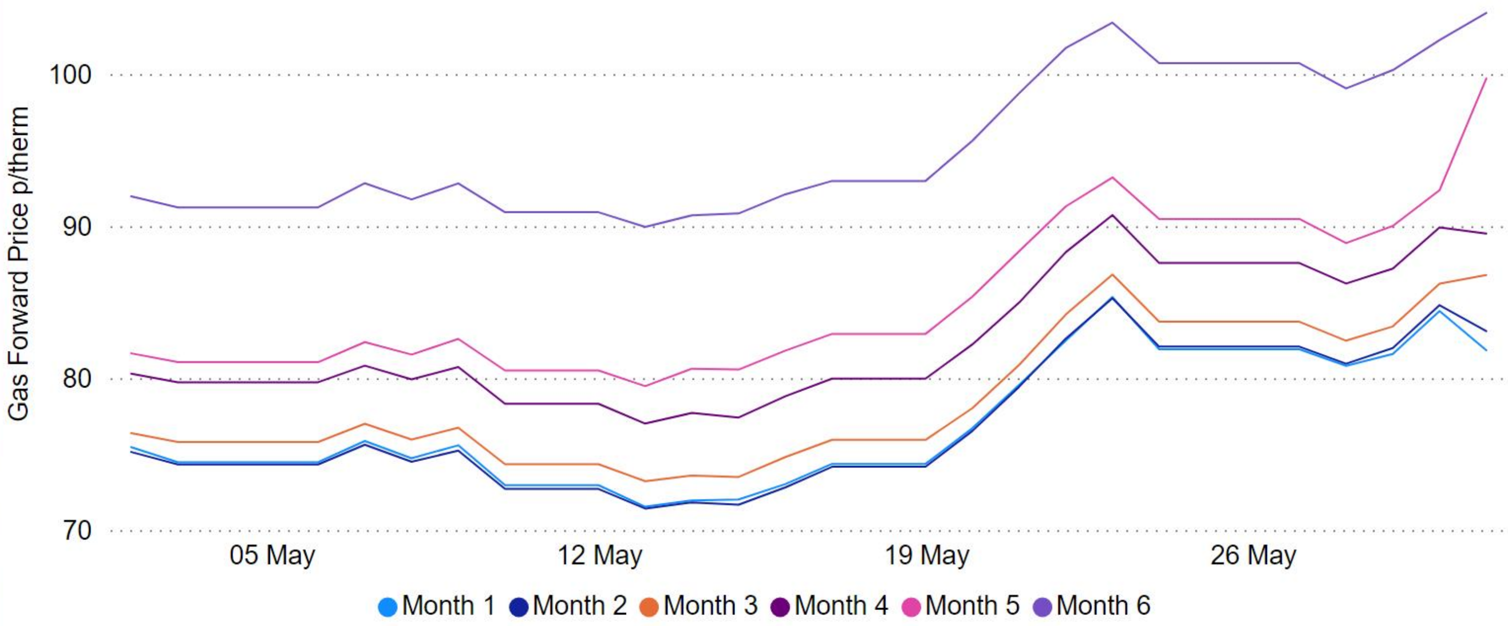
68.35
Monthly Low (p/therm)

86.05
Monthly High (p/therm)

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



Gas Forward Prices



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Gas Prices

Gas prices have experienced a 7% increase compared to the previous month, rising from 71.69p to 76.69p.

Also, for the first time this year, a 6% increase in gas prices was observed (from 72.41p to 76.69p) from the same period last year.

Gas Forward Prices

Similarly, Gas forward prices have increased from the last month due to supply concerns.

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

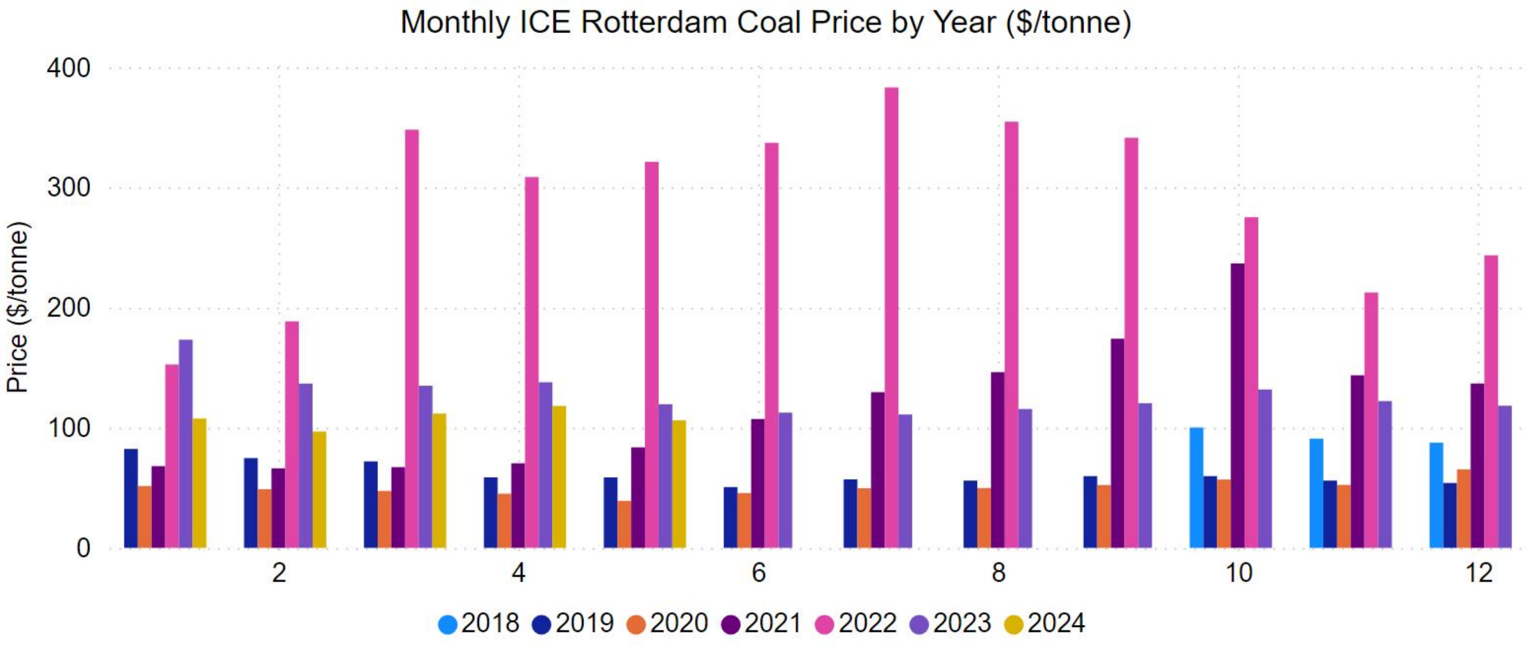
Coal Price May 2024

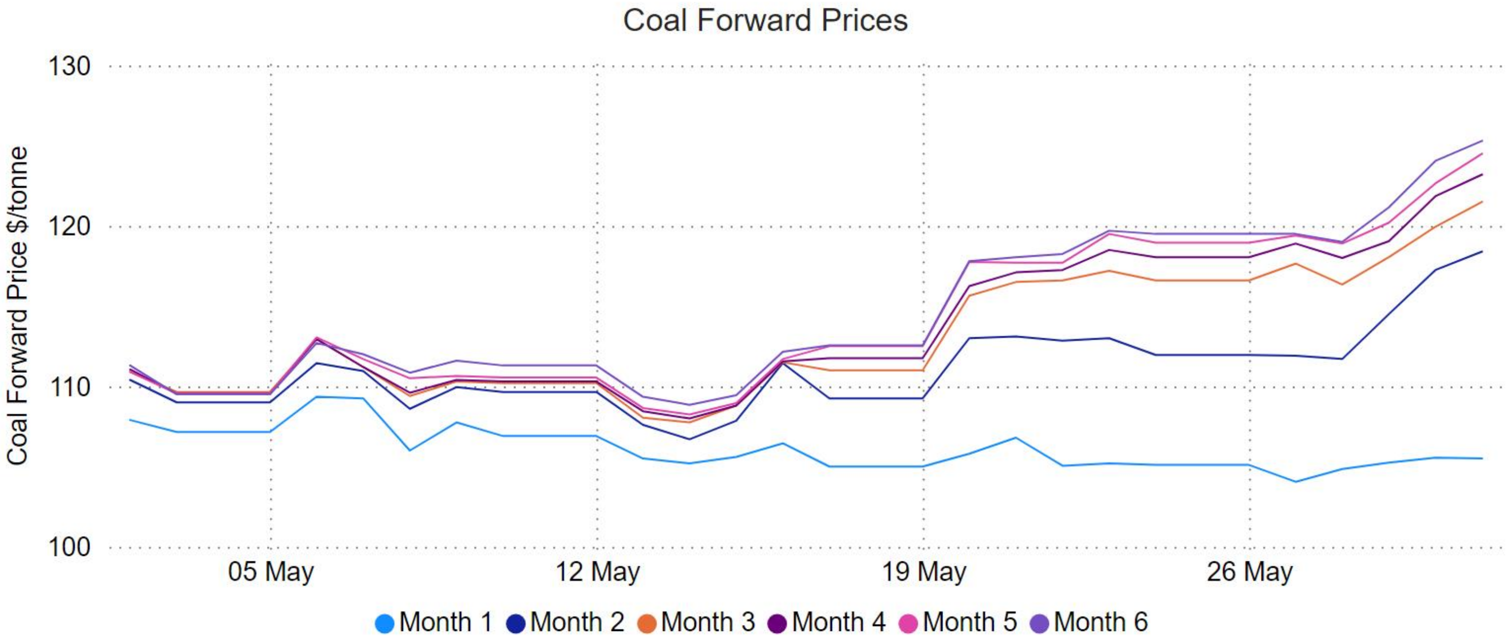
Coal Prices Per Tonne

$106.15
Monthly Average

$104.05
Monthly Low

$109.35
Monthly High





Coal Prices

Coal prices were lower compared to the previous month at $106.15/tonne (10% decrease from the last month).

Coal Forward Prices

Coal forward prices demonstrate a small increase during the month.

Carbon Price May 2024

EU Carbon Prices (€/tonne)

€ 70.90
Monthly Average

€ 65.81
Monthly Low

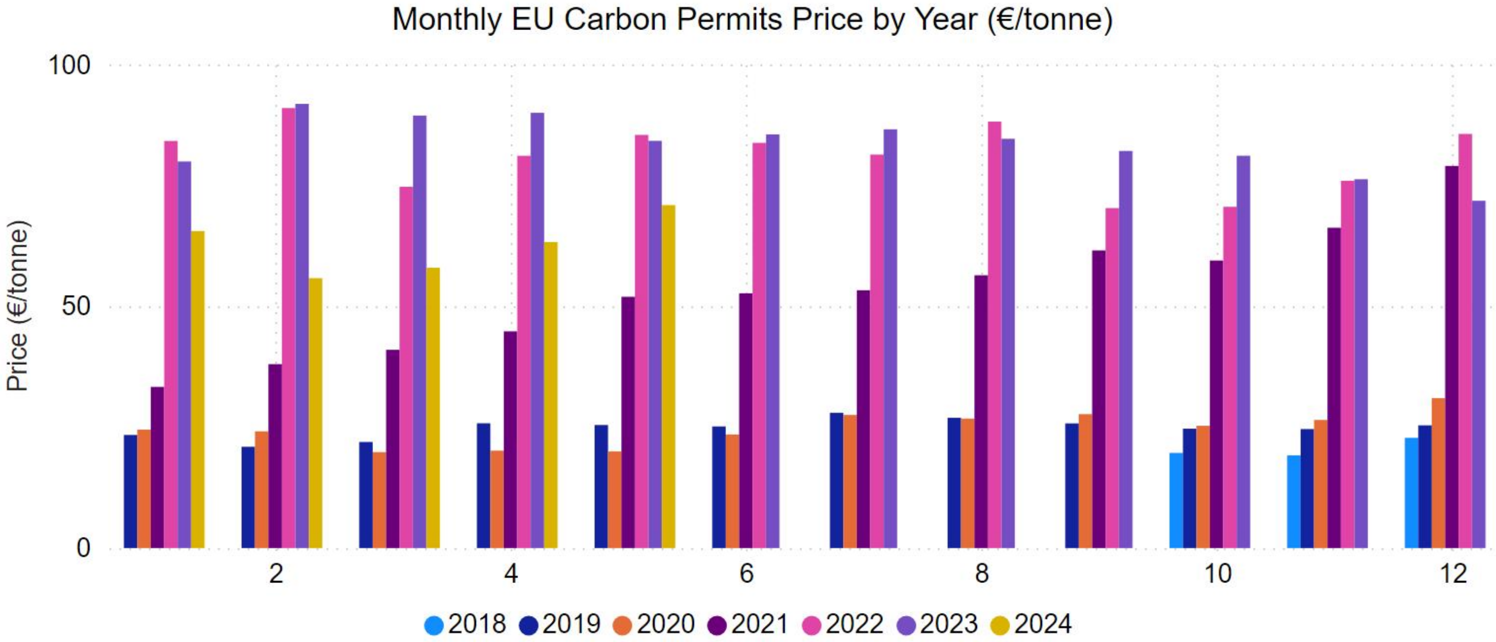
€ 74.47
Monthly High

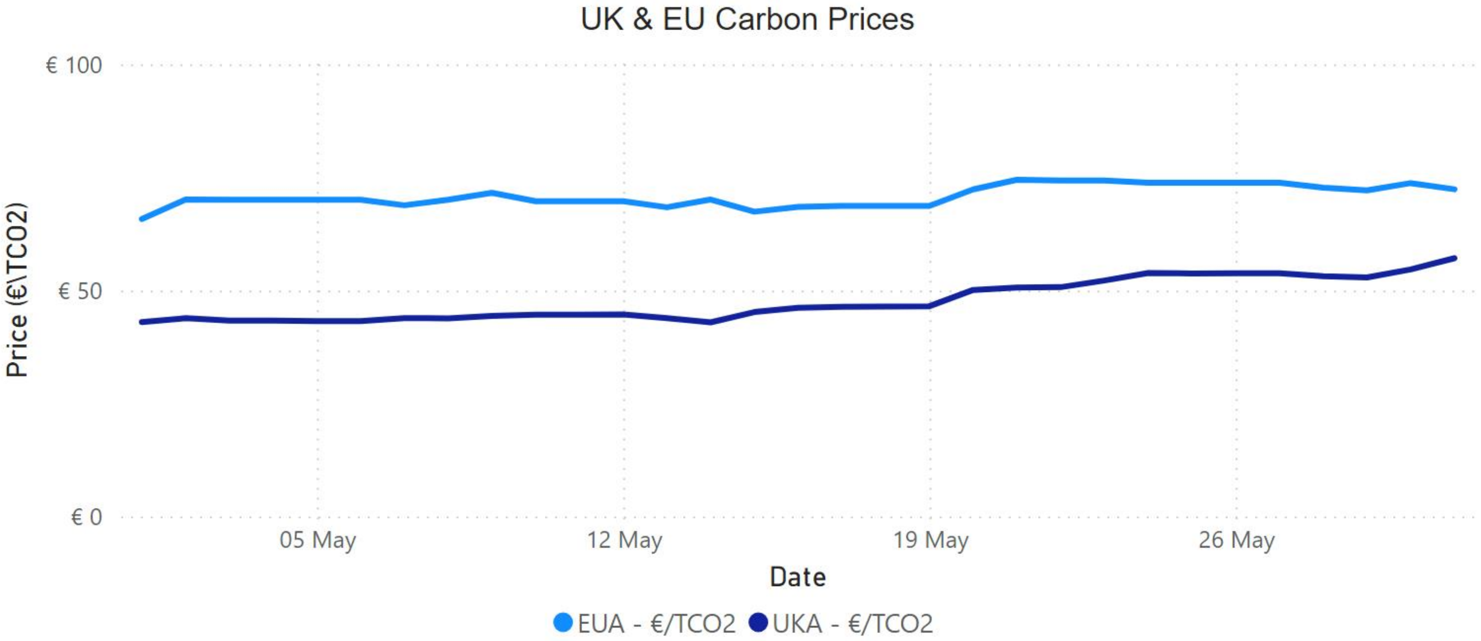
UK Carbon Prices (€/tonne)

€ 47.75
Monthly Average

€ 42.95
Monthly Low

€ 57.12
Monthly High





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Carbon Prices

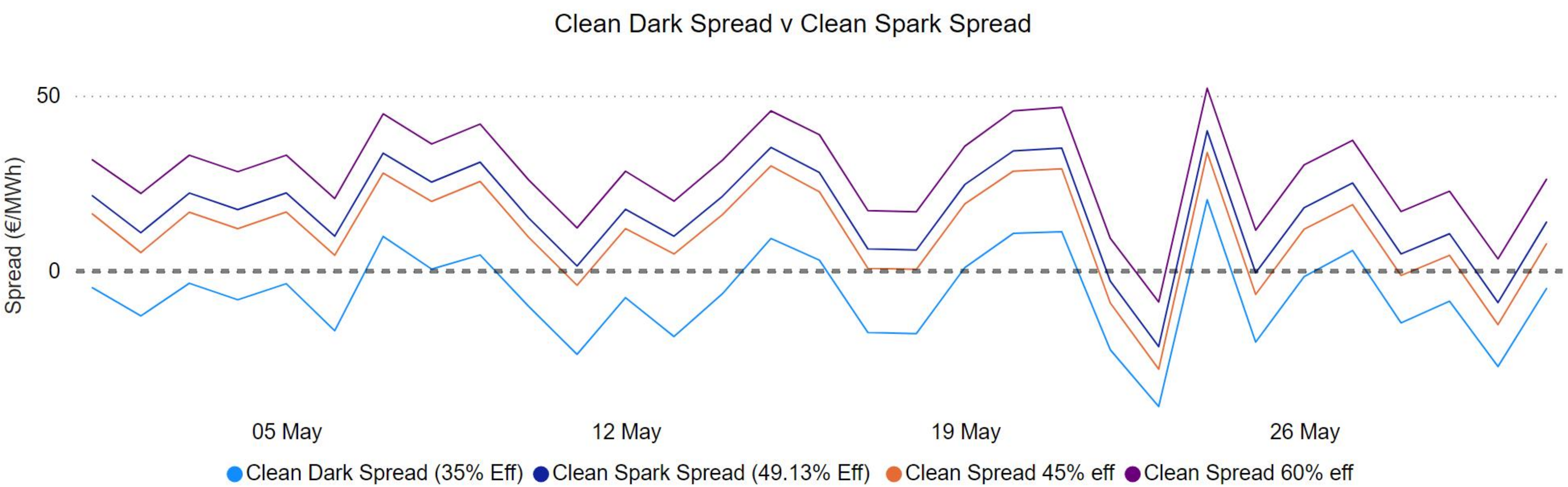
Carbon has increased relative to the previous month by 12%.

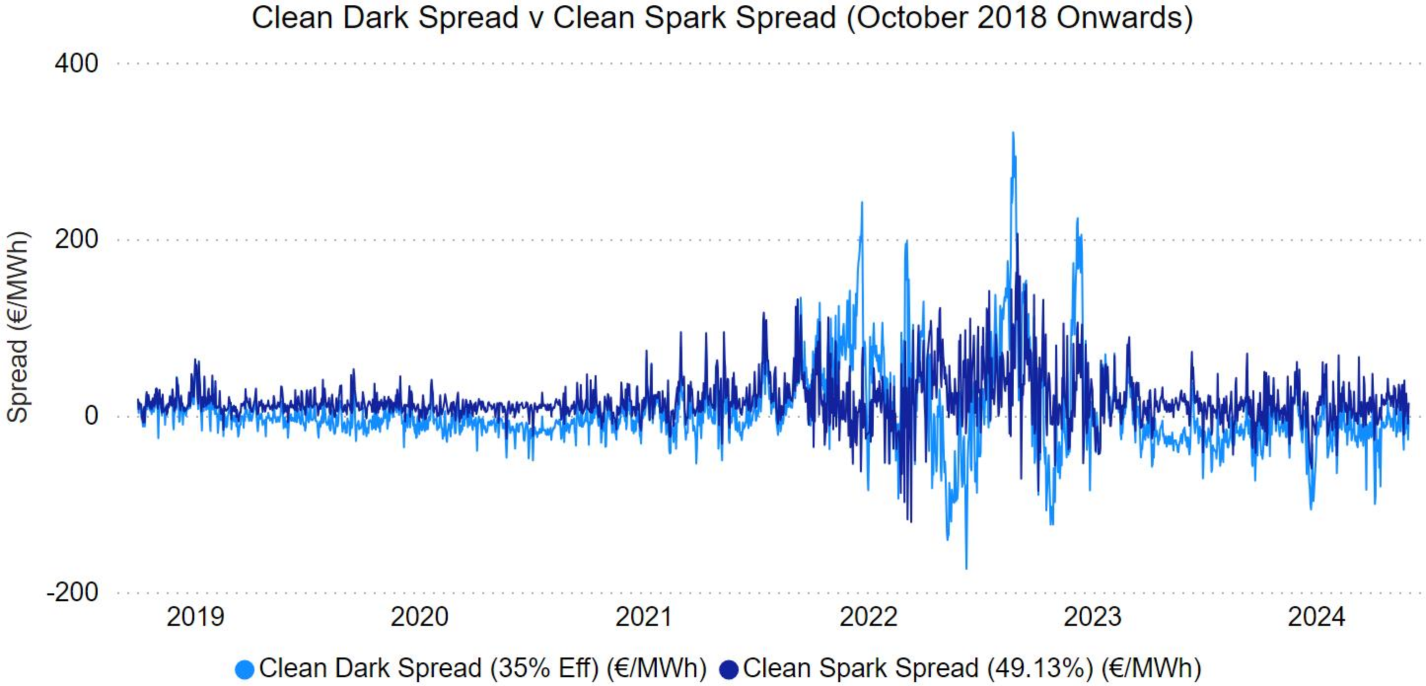
EU emission allowance prices have been trading lower for much of this year, alongside gas and power. We believe this pressure is likely to persist. EUA prices have been weighed down by a combination of bearish factors, including a sluggish industrial recovery, strong renewables output and limited power demand from mild weather.

Spark Spreads May 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 but periods of positive spread corresponds to lower wind and higher prices.

Clean Spark Spread was generally positive for the whole month with a fall on 23rd and 30th when the wind increases for