

Energy Market Monitoring Report

April 2024



Market Results

Summary Dashboard

Monthly Averages	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24
DAM (€/MWh)	125.57	105.19	117.11	96.24	106.46	111.62	125.54	122.9	88.97	99.9	84.6	86.67	88.52
% Change from previous month	-14%	-16%	11%	-18%	11%	5%	12%	-2%	-28%	12%	-15%	2%	2%
% Change from previous year	-42%	-27%	-36%	-64%	-73%	-61%	-8%	-14%	-68%	-38%	-47%	-40%	-30%
Actual System Demand (MW)	4469	4276	4189	4101	4185	4335	4516	4873	4862	5151	4946	4833	4610
% Change from previous month	-8%	-4%	-2%	-2%	2%	4%	4%	8%	0%	6%	-4%	-2%	-5%
% Change from previous year	1%	2%	0%	0%	2%	3%	4%	5%	0%	5%	3%	0%	3%
Actual Wind Generation (MW)	1545	884	878	1316	1401	1384	1363	1811	2446	1854	2000	2072	1496
% Change from previous month	-12%	-43%	-1%	50%	6%	-1%	-2%	33%	35%	-24%	8%	4%	-28%
% Change from previous year	8%	-38%	-22%	54%	71%	28%	-33%	-19%	49%	-7%	-1%	19%	-3%
Gas Price p/therm	100.32	72.41	77.87	70.76	82.87	91.52	104.88	104.97	84.2	74.87	63.37	68.18	71.69
% Change from previous month	-10%	-28%	8%	-9%	17%	10%	15%	0%	-20%	-11%	-15%	8%	5%
% Change from previous year	-38%	-24%	-44%	-68%	-77%	-61%	3%	-19%	-68%	-52%	-53%	-39%	-29%
Carbon Price (€/Tonne)	89.98	84.18	85.51	86.57	84.61	82.09	81.10	76.25	71.79	65.52	55.79	57.94	63.25
% Change from previous month	1%	-6%	2%	1%	-2%	-3%	-1%	-6%	-6%	-9%	-15%	4%	9%
% Change from previous year	11%	-1%	2%	6%	-4%	17%	15%	1%	-16%	-18%	-39%	-35%	-30%
Coal Price (\$/tonne)	137.83	119.57	112.56	111.02	115.57	120.40	131.80	122.16	118.31	107.65	96.84	111.78	118.13
% Change from previous month	2%	-13%	-6%	-1%	4%	4%	9%	-7%	-3%	-9%	-10%	15%	6%
% Change from previous year	-55%	-63%	-67%	-71%	-67%	-65%	-52%	-43%	-51%	-38%	-29%	-17%	-14%
EWIC % Import Periods	50.56%	75.86%	77.72%	67.11%	68.11%	73.75%	86.90%	68.78%	56.38%	69.76%	69.07%	63.77%	70.60%
EWIC % Export Periods	13.65%	8.28%	4.06%	9.21%	11.96%	8.89%	2.99%	9.11%	20.36%	14.78%	11.02%	11.33%	10.30%
EWIC % Not Flow Periods	30.80%	15.88%	18.22%	22.68%	19.93%	17.36%	10.11%	22.11%	23.25%	15.46%	19.91%	24.90%	19.10%
Moyle % Import Periods	77.50%	85.42%	92.22%	84.04%	75.24%	83.33%	92.31%	83.47%	67.81%	78.16%	79.60%	79.00%	74.00%
Moyle % Export Periods	27.43%	14.58%	7.67%	15.89%	20.33%	16.60%	7.66%	16.50%	32.16%	21.81%	20.33%	20.83%	25.80%
Moyle % Not Flow Periods	0.07%	0.00%	0.10%	0.07%	4.44%	0.07%	0.03%	0.03%	0.03%	0.03%	0.07%	0.17%	0.20%

Market Volumes April 2024

Daily Average Volume MWh

DAM	112,925
IDA1	21,795
IDA2	3,032
IDA3	874
IDC	62

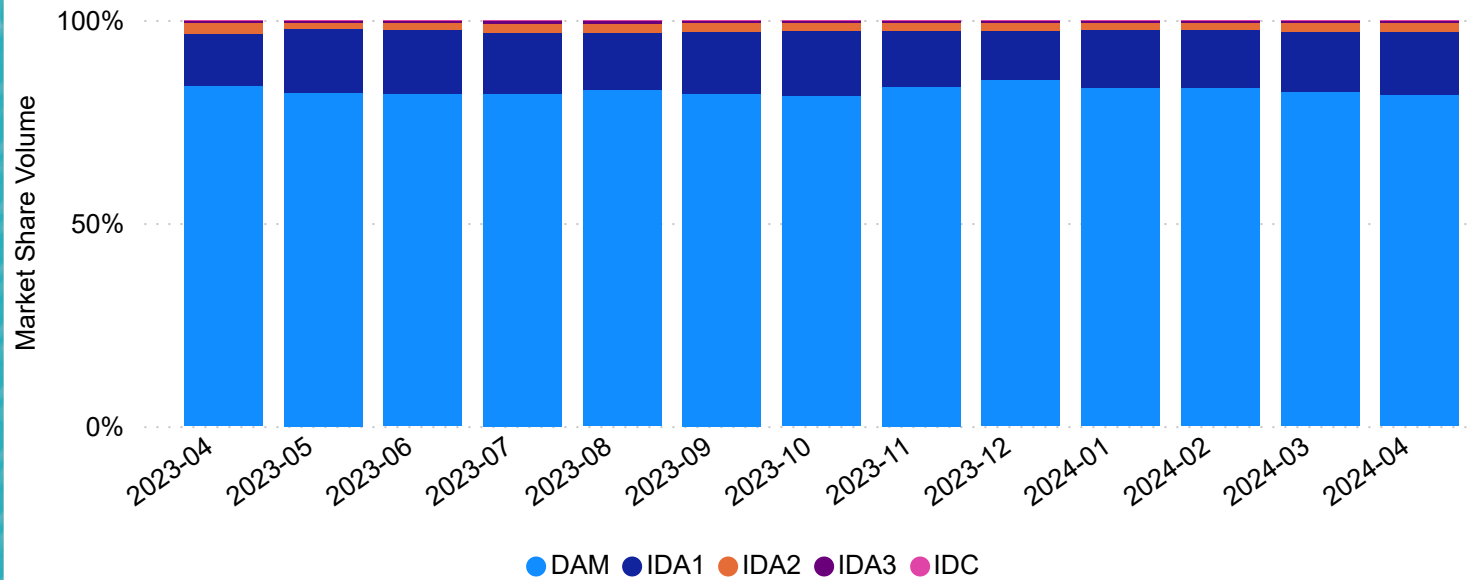
Total Monthly Volume MWh

DAM	3,387,755
IDA1	653,844
IDA2	90,951
IDA3	26,205
IDC	989
Total	4,159,743

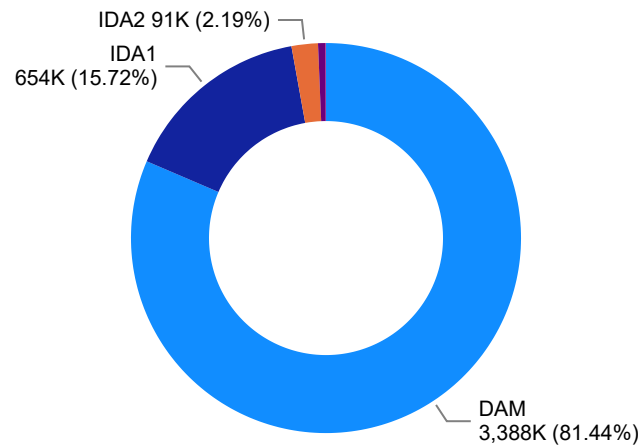
Total Market Value €

DAM	€ 303,137,682
IDA1	€ 60,237,611
IDA2	€ 8,294,833
IDA3	€ 2,787,308
IDC	€ 125,337
Total	€ 374,582,771

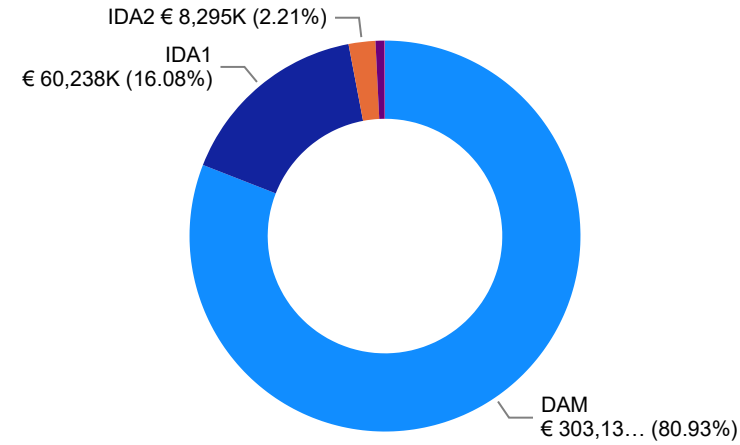
Ex-Ante Monthly Volume by Market



Ex-Ante Volumes (MWh)



Ex-Ante Values (€)



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.

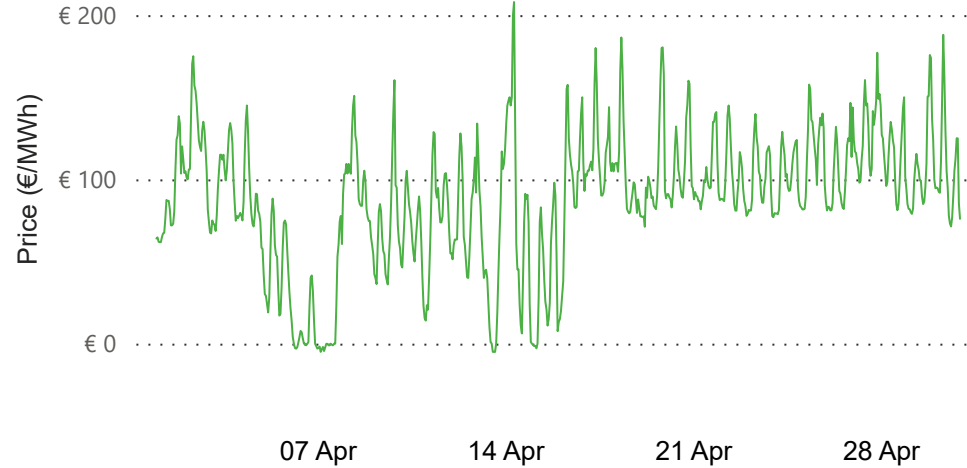
Another important factor is associated with the TSO dispatch arrangements. The vast majority of wind generation in the SEM is cleared at the Day Ahead stage. That might also explain to some extent the additional volumes cleared in this market.

Day Ahead Market April 2024

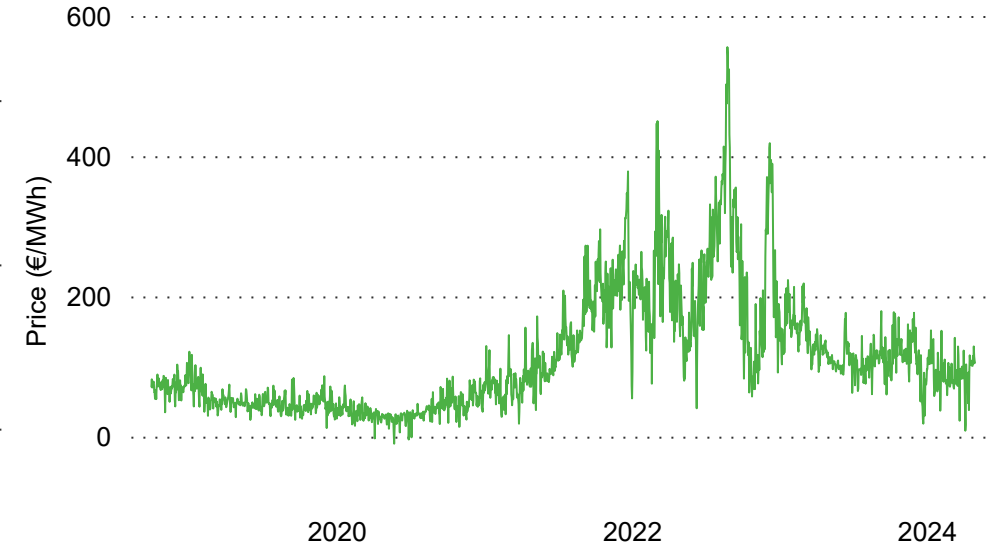
€ 88.52
Average DAM Price
-€ 5.02
Min DAM Price
€ 207.99
Max DAM Price

The most frequent price range for April was between €60 and €120

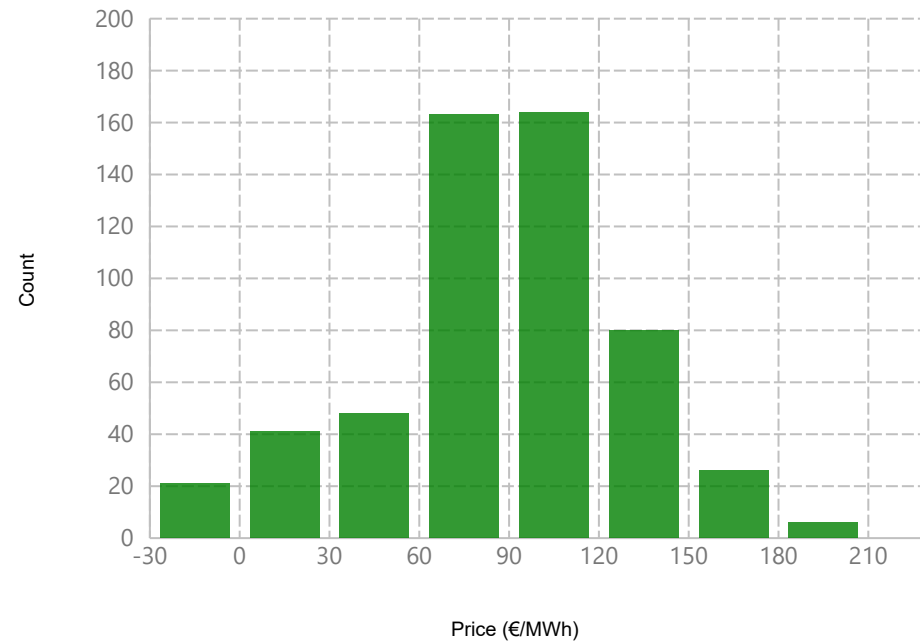
DAM Prices



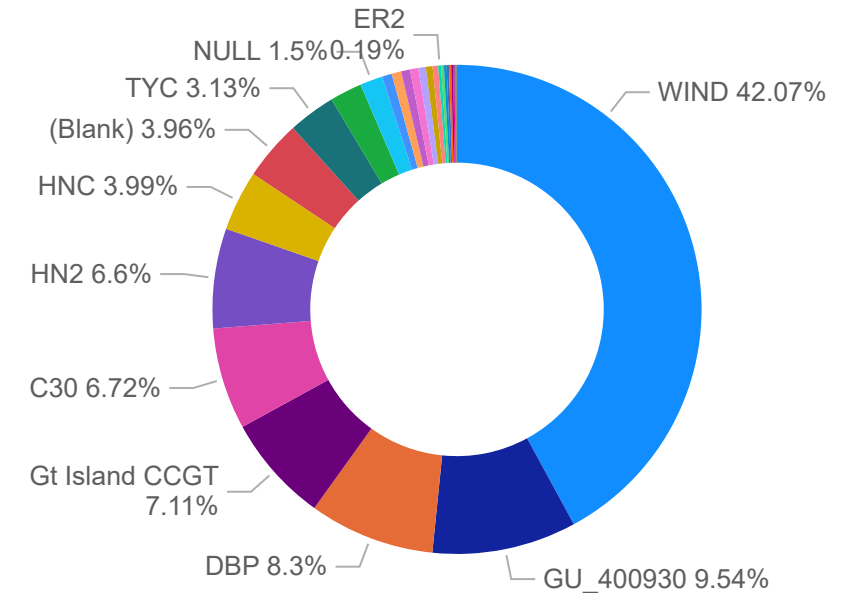
Historic Daily Average DAM Prices



Histogram of DAM Prices



DAM Sell Side Generator Order Results

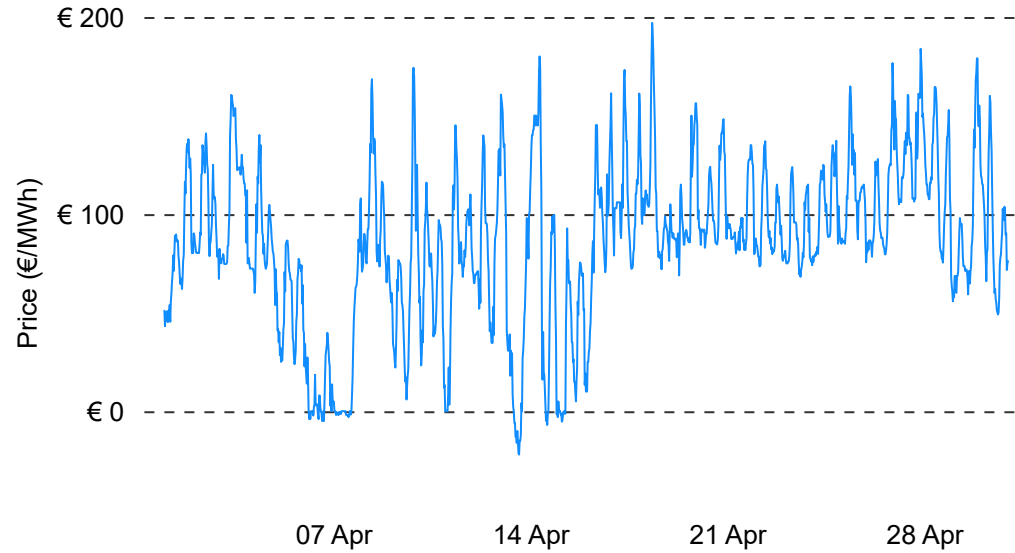


Intraday Market April 2024

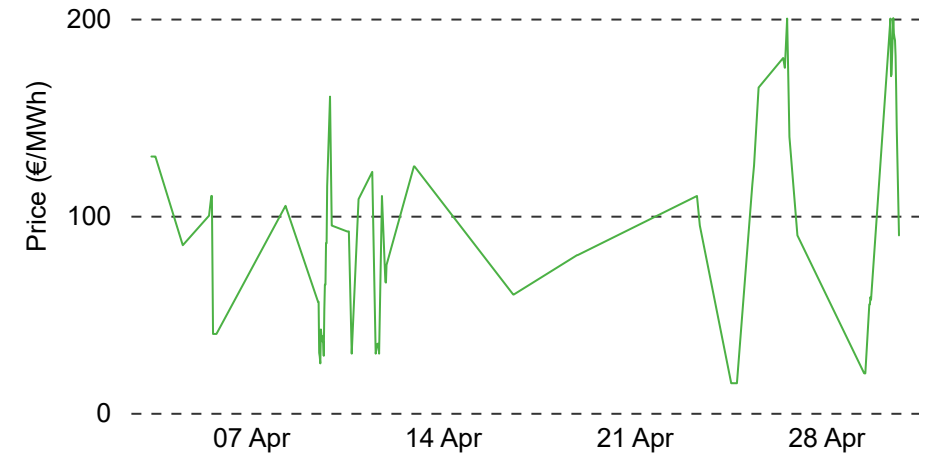
€ 85.80
Average IDA1 Price
-€ 22.00
Min IDA1 Price
€ 197.00
Max IDA1 Price

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

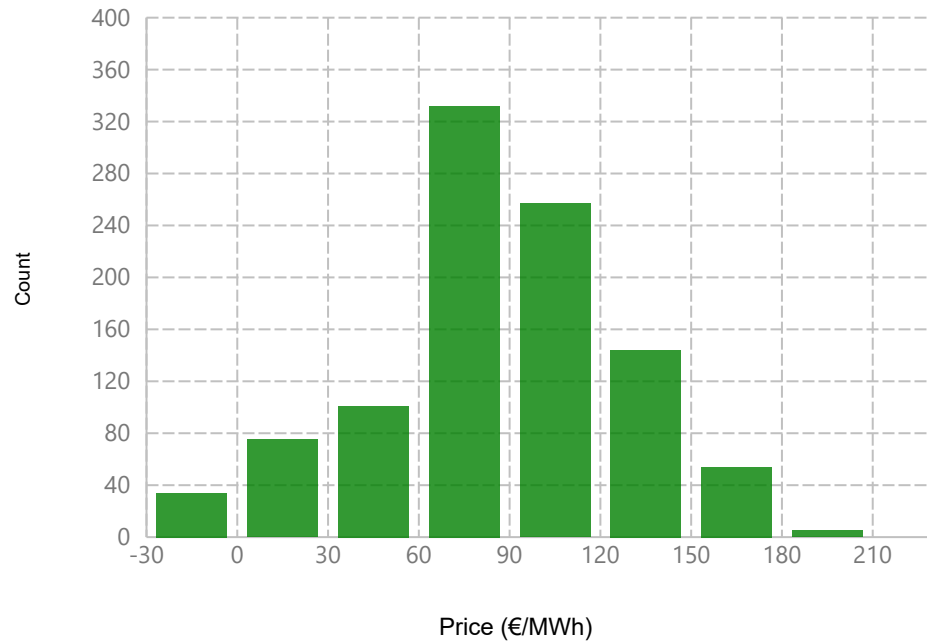
IDA 1 Prices



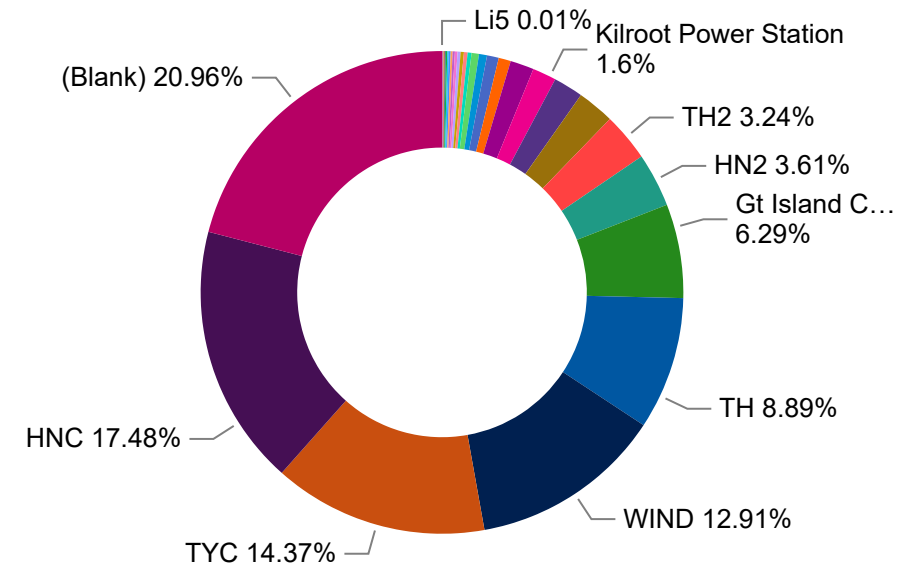
IDC Prices



Histogram of IDA1 Prices



IDA1 Sell Order Results By Market Participant



Intraday Market April 2024

SEM Day Ahead Price

€ 88.52
Average Price

-€ 5.02
Min Price

€ 207.99
Max Price

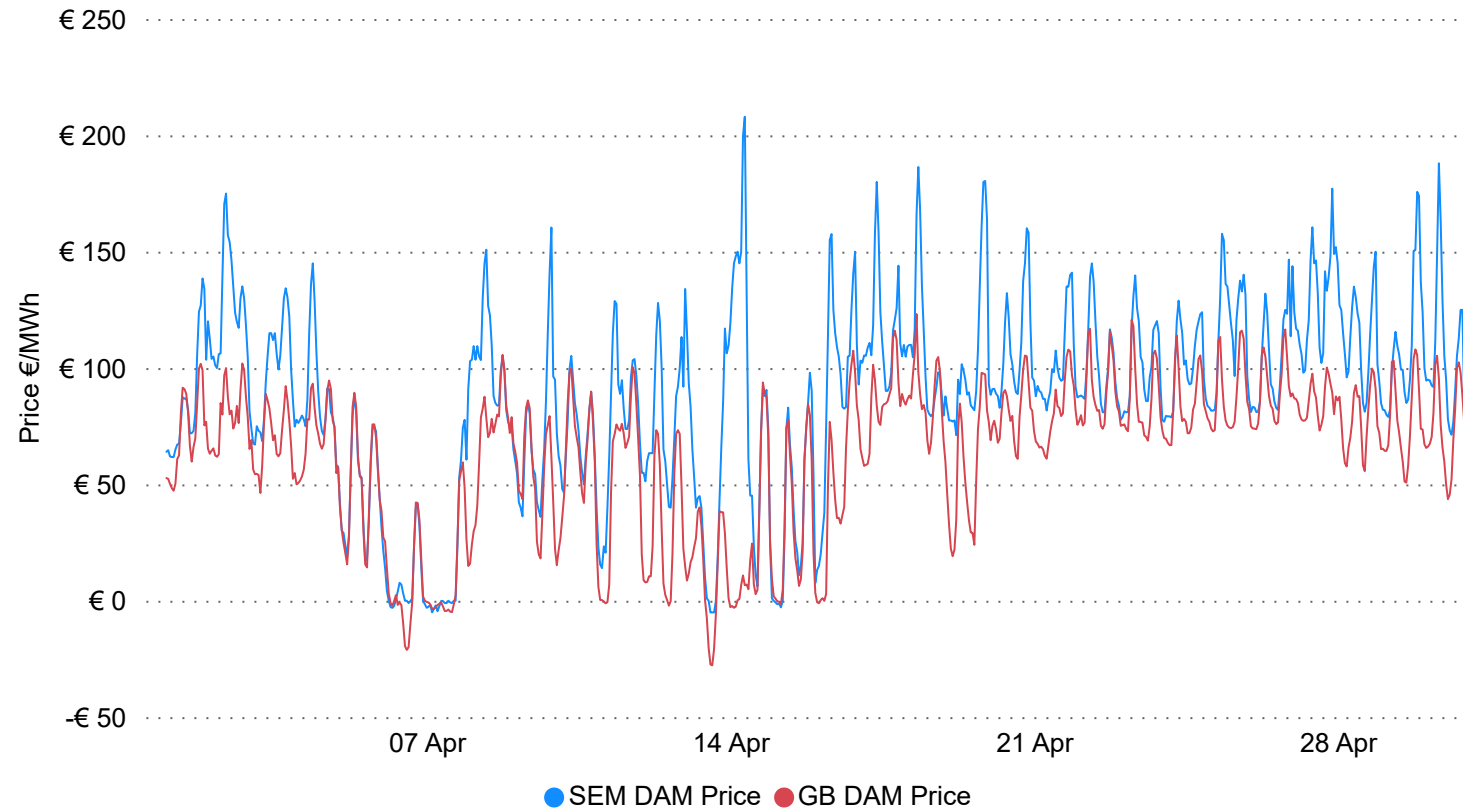
GB Day Ahead Price

€ 62.71
Average Price

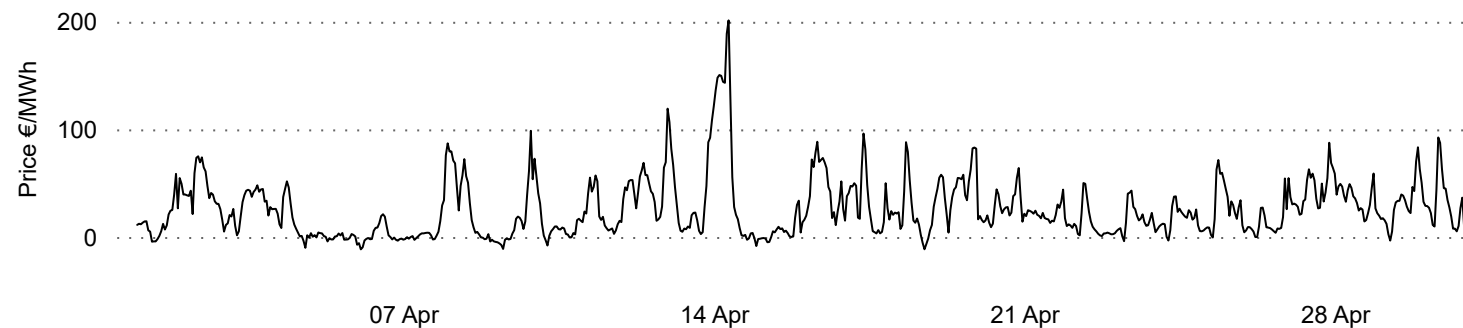
-€ 27.74
Min Price

€ 123.21
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 April 2024

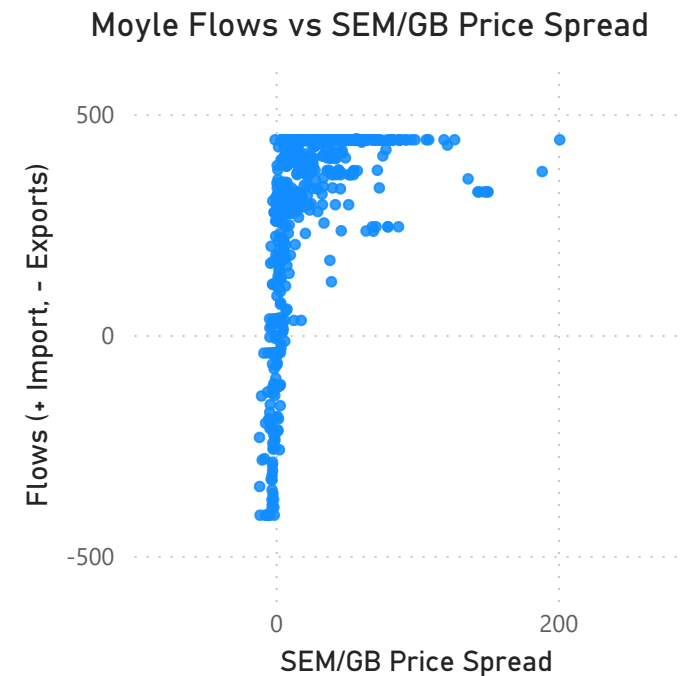
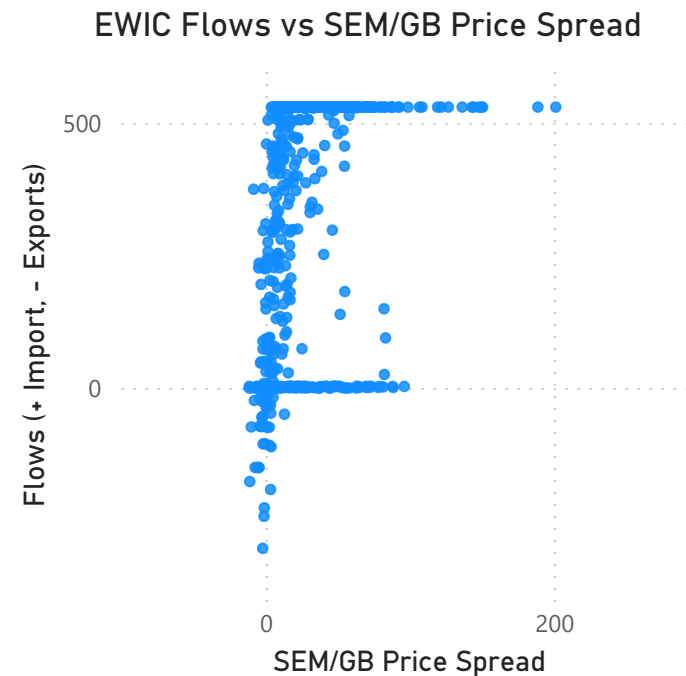
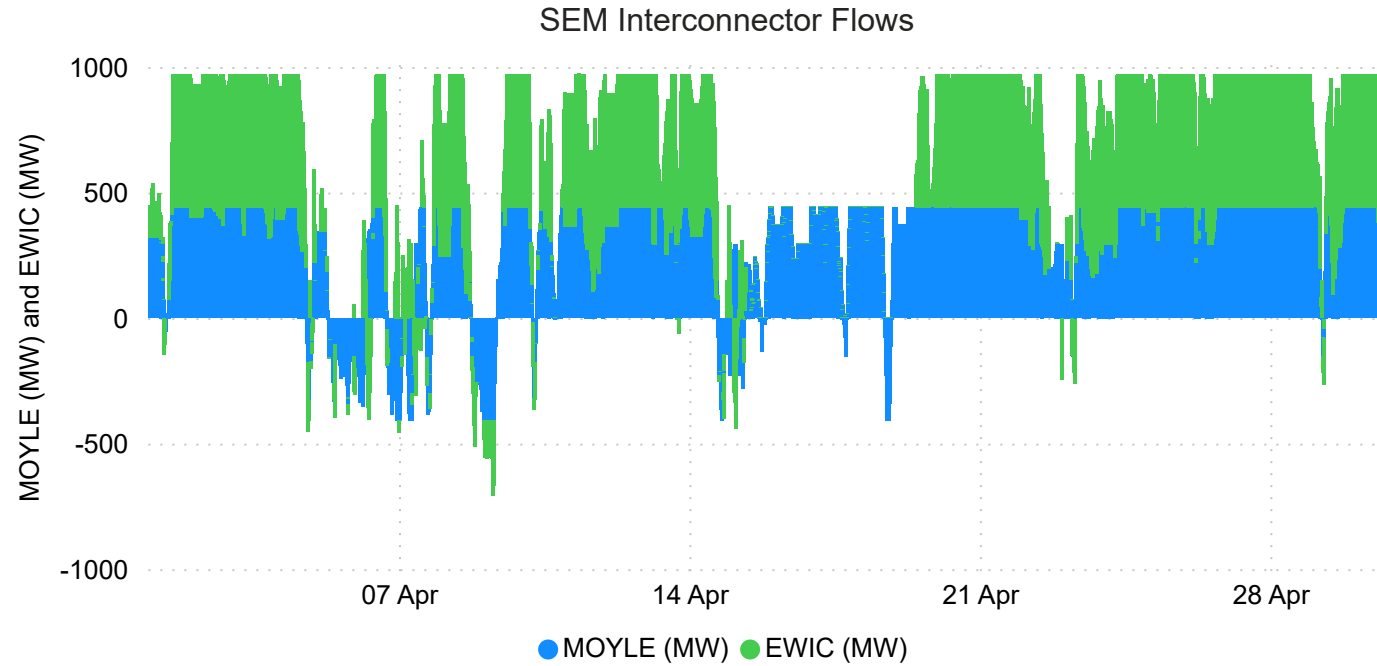
Events of capacity curtailment (by the SEM TSO) in the direction SEM to GB.

Moyle	EWIC
2nd 05:00-21:00	2nd 07:00 - 17:00
3rd 07:00 - 23:00	3rd 07:00 - 21:00
4th 05:00 - 17:00	4th 06:00 - 12:00
8th 06:00 - 21:00	8th 06:00 - 13:00
11th 07:00 - 11:00	15th 08:00 - 22:00
17th 06:00 - 21:00	22nd 06:00 - 10:00
18th 06:00 - 10:00	25th 06:00 - 12:00
19th 07:00 - 22:00	26th 08:00 - 22:00
21st 16:00 - 21:00	
22nd 05:00 - 12:00	
23rd 06:00 - 21:00	
24th 06:00 - 21:00	
25th 06:00 - 21:00	
26th 05:00 - 21:00	
27th 06:00 - 22:00	
28th 07:00 - 22:00	
29th 15:00 - 22:00	

Interconnector Flows

In April, 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 that of Moyle.



April 2024

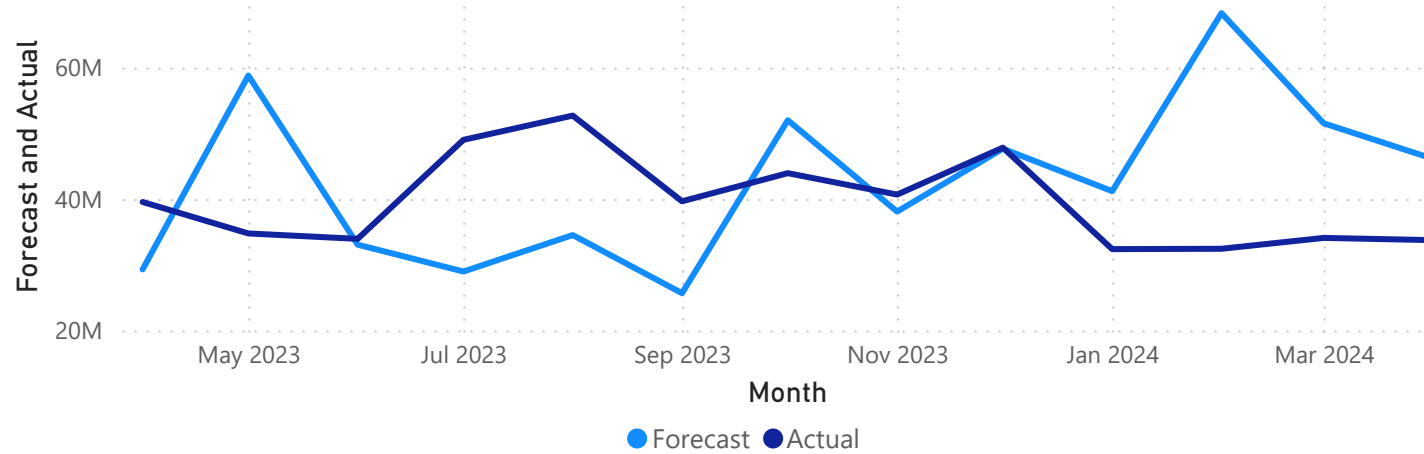
Moyle Imports	365
EWIC Imports	398
Moyle Exports	-199
EWIC Exports	-115
SEM Imports	714
SEM Exports	-224
SEM Net Import/Export	488

Balancing Market April 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.

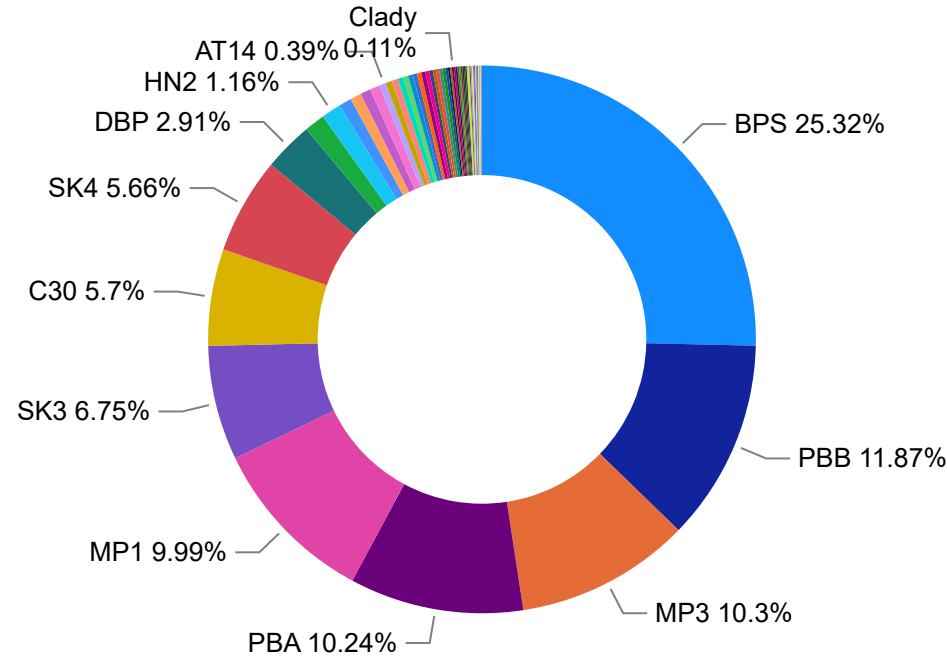
Generators can be constrained 'on' or 'up' if the market schedule indicated they were to be run at lower levels than actually happened. Or they could be constrained 'down' or 'off' if they were to be run at a higher level than happened in reality. There is always an overall net cost to the system associated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

Imperfection Costs - Forecast vs Actual



Determinant Name	Value €
CABBPO	113,111.93
CAOPO	-159,766.84
CCURL	-421,966.21
CDISCOUNT	11,845,649.22
CFC	8,005,505.95
CPREMIUM	14,812,460.53
CTEST	-38,449.38
CUNIMB	-401,921.96
Total	33,754,623.25

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 PBB(ESB Shellybanks) and MoneyPoint 3. 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 April 2024

30 Minutes Imbalance Price

€ 88.11

Average Price

-€ 124.08

Lowest Price

€ 471.88

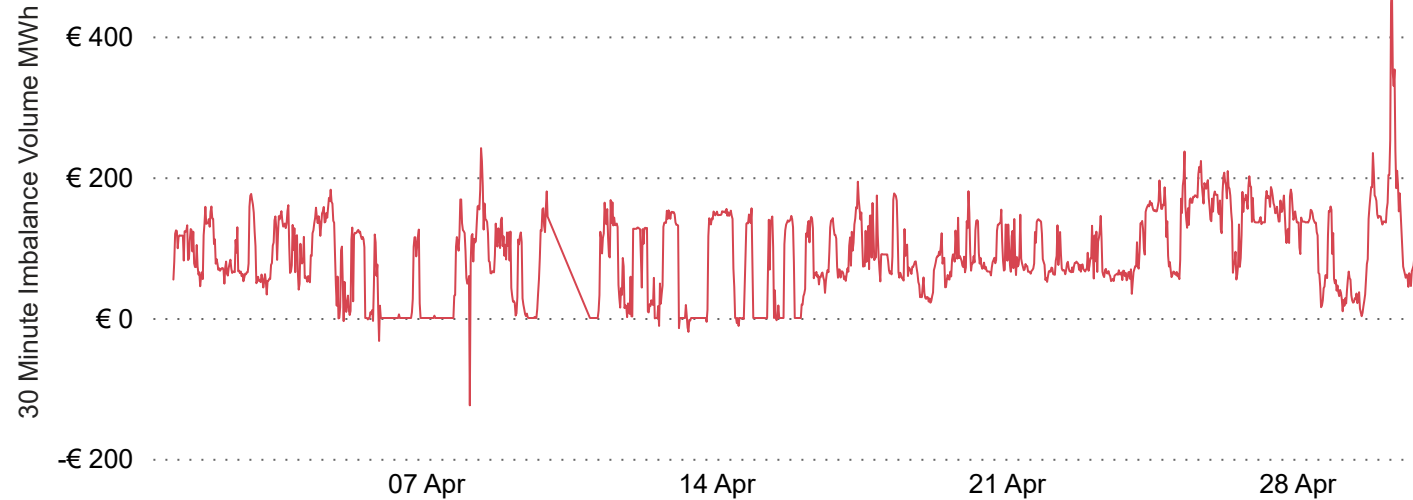
Highest Price

Imbalance Price & Volumes

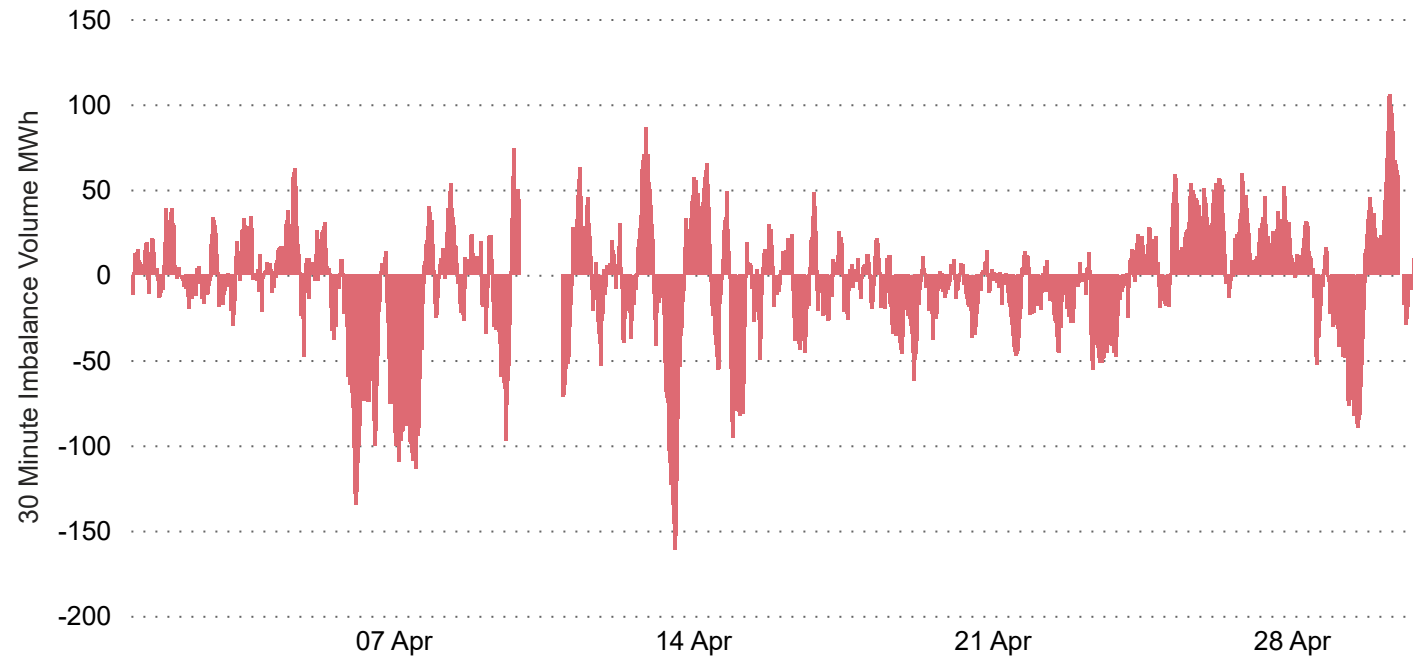
The average Balance (BM) Price this month is slightly lower than the Day Ahead Price. Additionally, the Balancing Market prices has exhibited a much higher range of prices indicating a higher level of volatility compared to Day Ahead Market Prices. This is an expected characteristic of the Balance Prices.

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

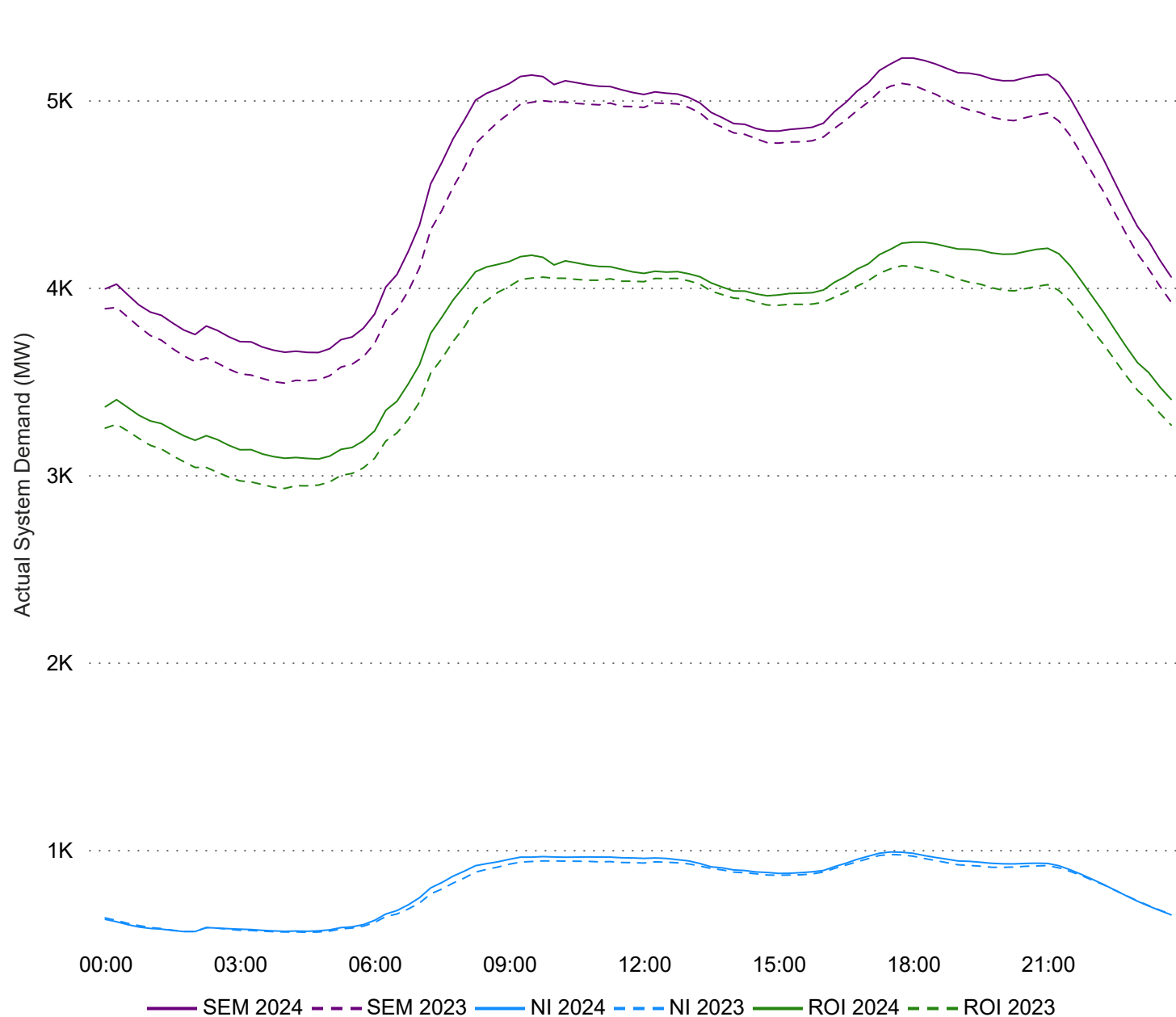
SEM Demand

The graph shows a small increase in demand within NI, with the monthly average level rising by 1.5% 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 3.5% this month.

Demand in the SEM as a whole is up by 3% relative to the same period last year.

Monthly Average Hourly Demand Curves



Demand April 2024

SEM Demand

4,610.50	4,469.22
SEM Average 2024	SEM Average 2023
3,653.55	3,490.23
SEM Min 2024	SEM Min 2023
5,224.68	5,089.17
SEM Max 2024	SEM Max 2023

NI Demand

813.03	800.41
NI Average 2024	NI Average 2023
564.23	560.33
NI Min 2024	NI Min 2023
988.87	975.30
NI Max 2024	NI Max 2023

ROI Demand

3,797.50	3,668.64
ROI Average 2024	ROI Average 2023
3,085.45	2,928.43
ROI Min 2024	ROI Min 2023
4,242.55	4,116.43
ROI Max 2024	ROI Max 2023

Duration Curves April 2024

Price Duration

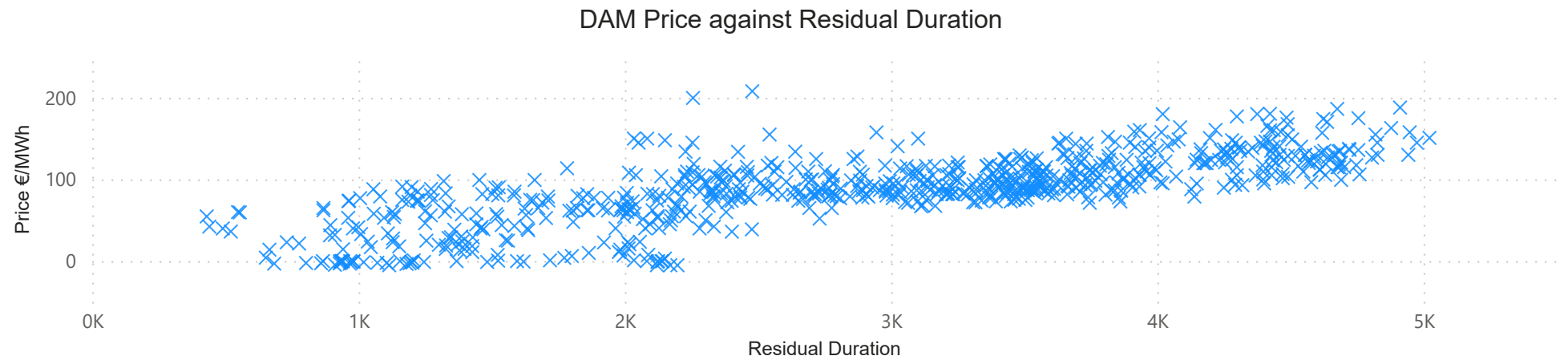
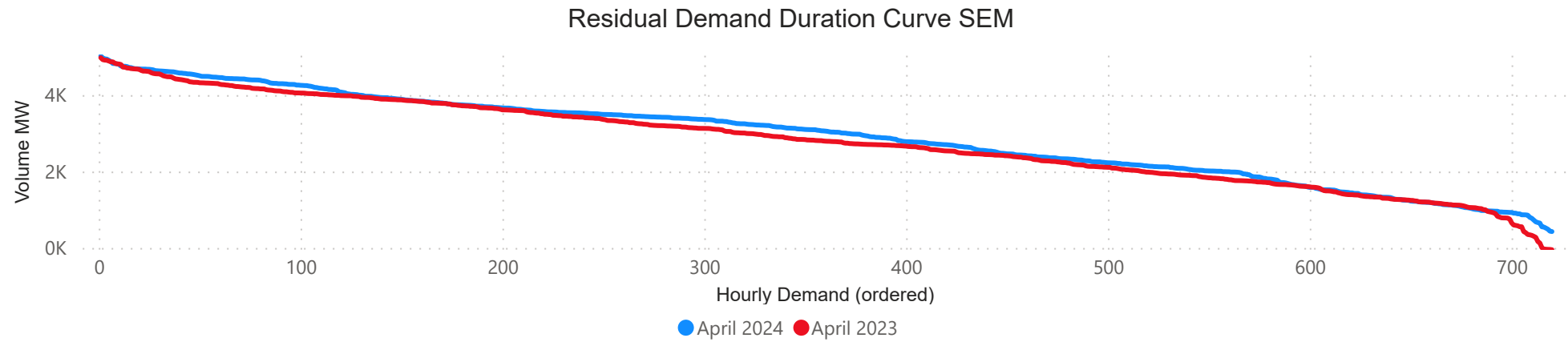
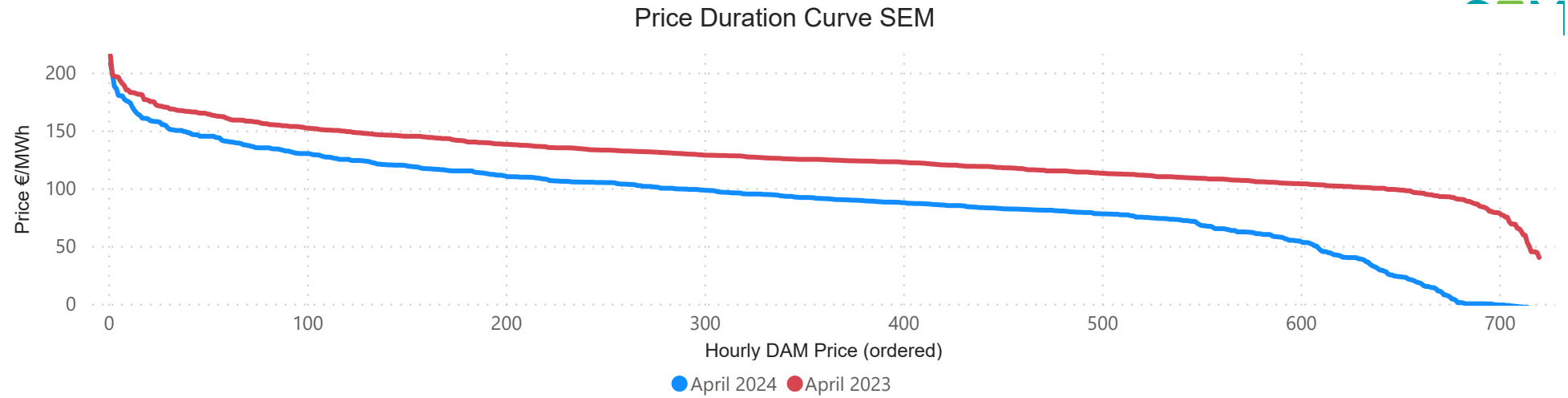
The price duration curve shows the hourly DAM prices across the month ordered from the largest to the smallest.

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.



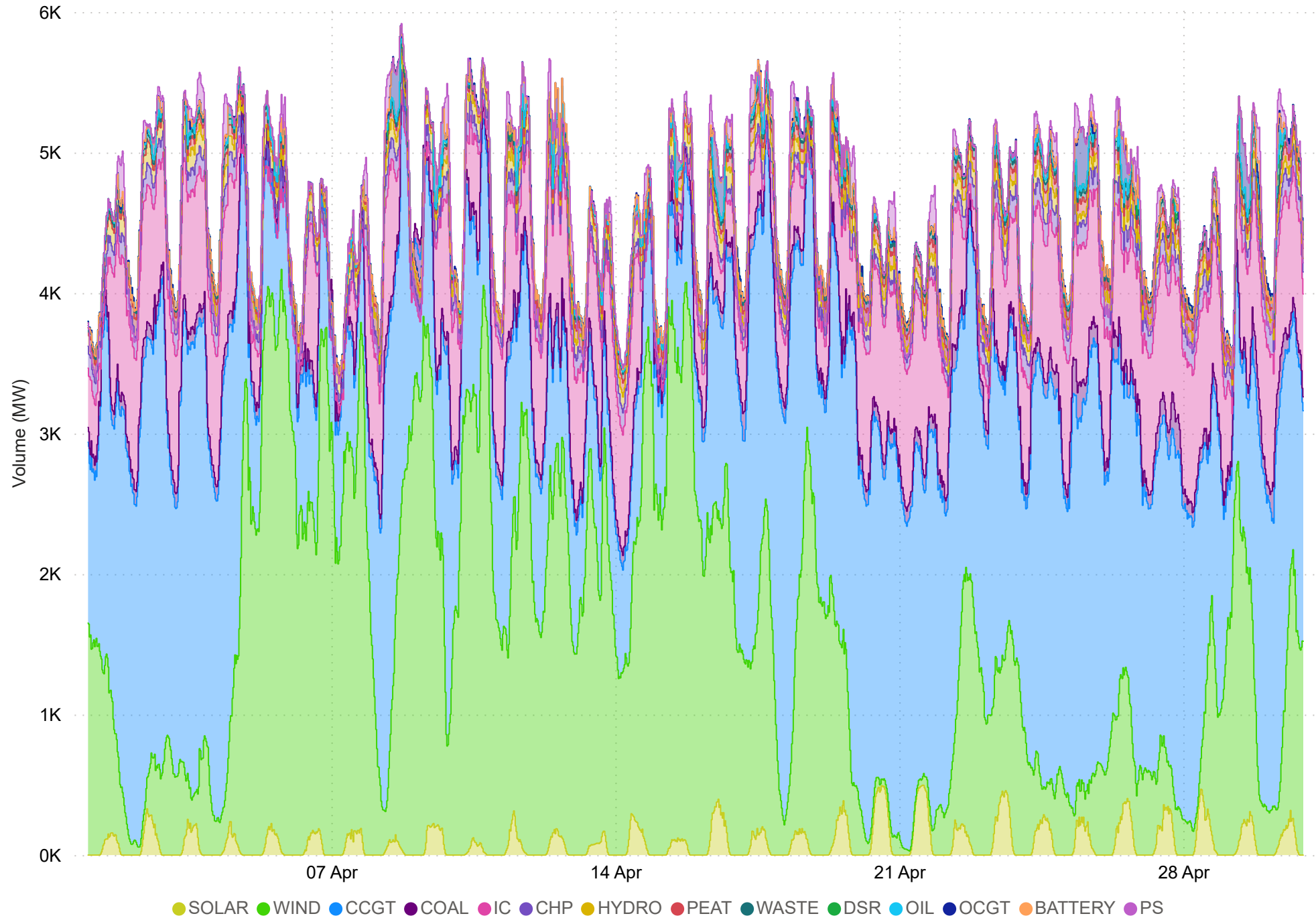


Fuel Mix April 2024

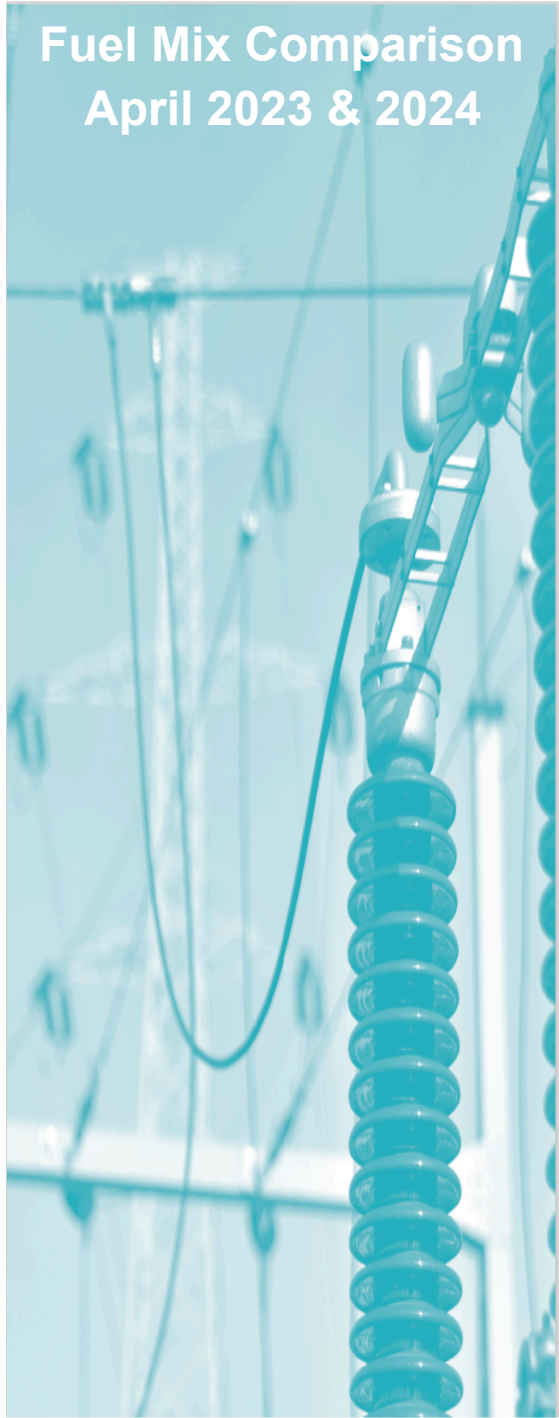
Fuel Type	Avg Monthly	Per. Monthly
CCGT	1866	40.6%
WIND	1496	32.6%
INTERCONNECTORS	620	13.5%
CHP	123	2.7%
HYDRO	118	2.6%
COAL	114	2.5%
SOLAR	88	1.9%
PEAT	70	1.5%
WASTE	54	1.2%
OCGT	41	0.9%
DSR	24	0.5%
OIL	1	0.0%
BATTERY	-6	-0.1%
PUMPED STORAGE	-17	-0.4%

Fuel Type	Max Monthly	Min Monthly
WIND	4147	21
CCGT	3535	679
INTERCONNECTORS	982	-652
SOLAR	498	0
OCGT	435	0
PUMPED STORAGE	292	-296
COAL	263	87
DSR	188	0
HYDRO	171	60
CHP	164	75
BATTERY	159	-95
PEAT	105	0
WASTE	80	17
OIL	74	0

SEM 30 Minute Fuel Mix



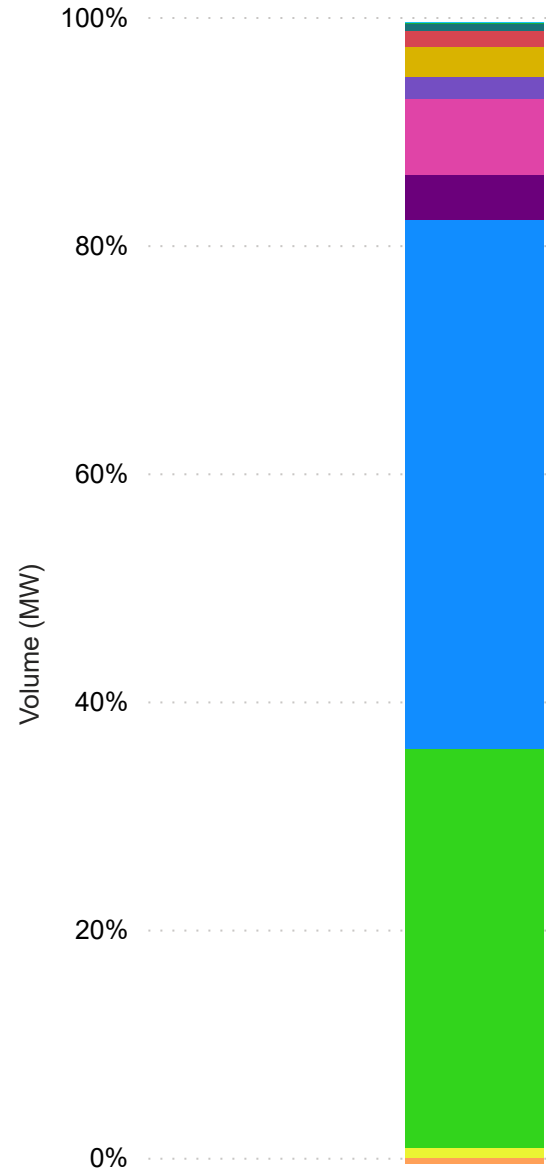
● SOLAR ● WIND ● CCGT ● COAL ● IC ● CHP ● HYDRO ● PEAT ● WASTE ● DSR ● OIL ● OCGT ● BATTERY ● PS



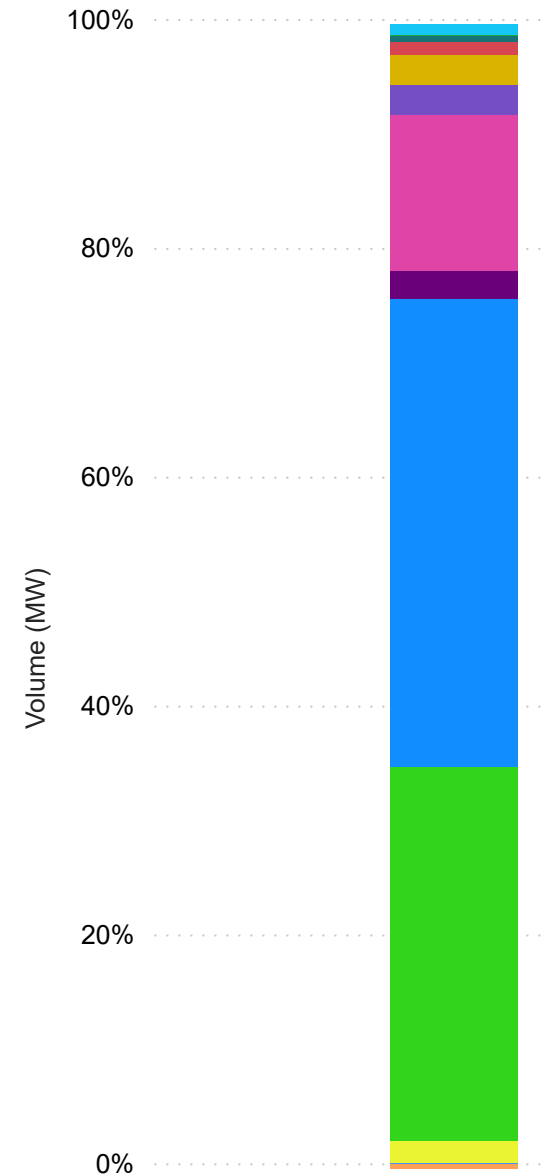
Fuel Mix Comparison April 2023 & 2024

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

SEM Fuel Mix April 2023



SEM Fuel Mix April 2024



North-South Tie Line April 2024

Average Flow NI to ROI (MW)

-302.72

Average Flow ROI to NI (MW)

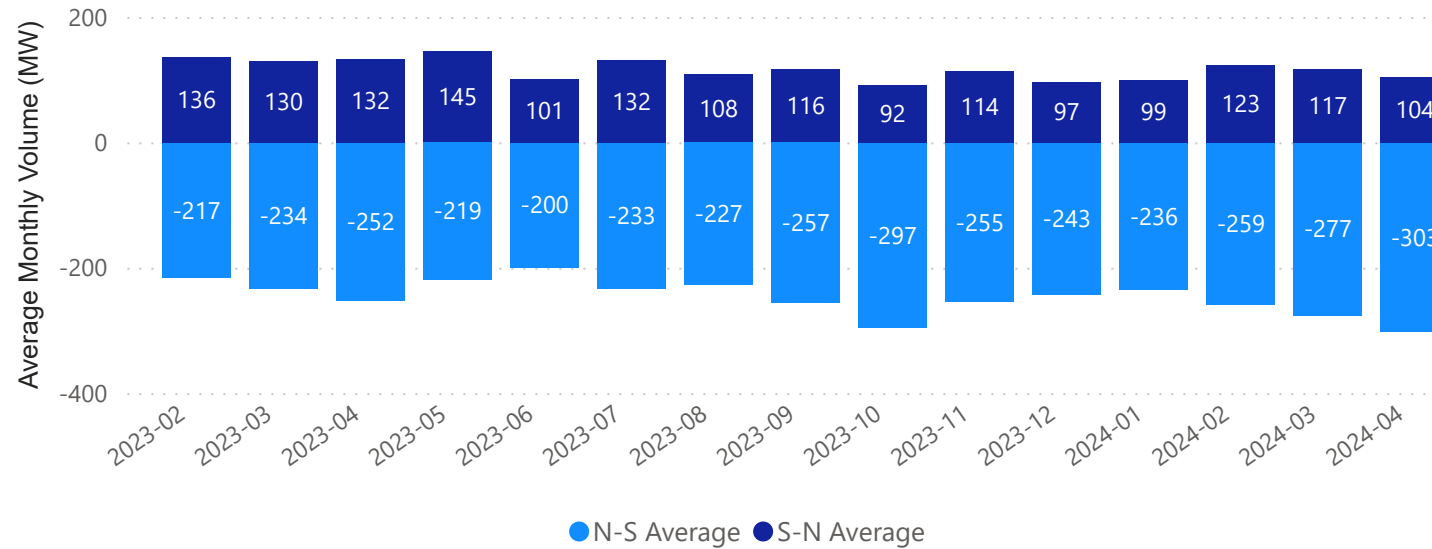
104.28

Average Net Flow NI to ROI (MW)

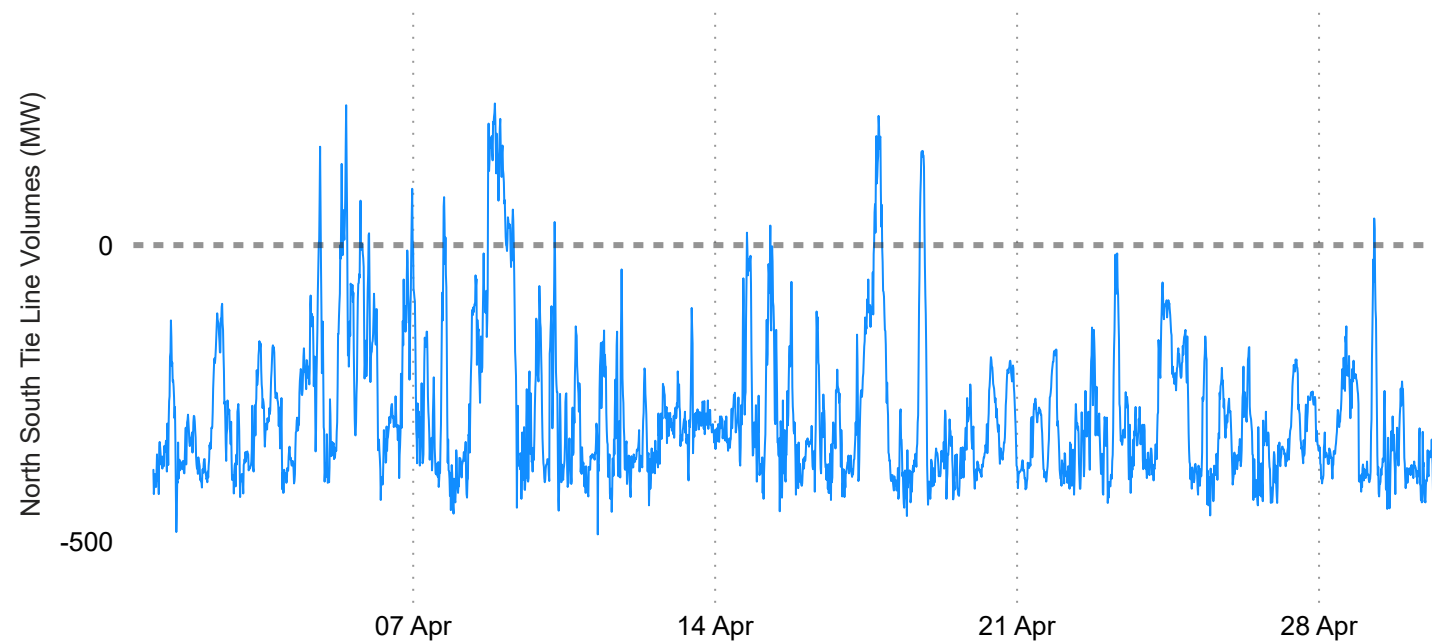
-285.27

-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.

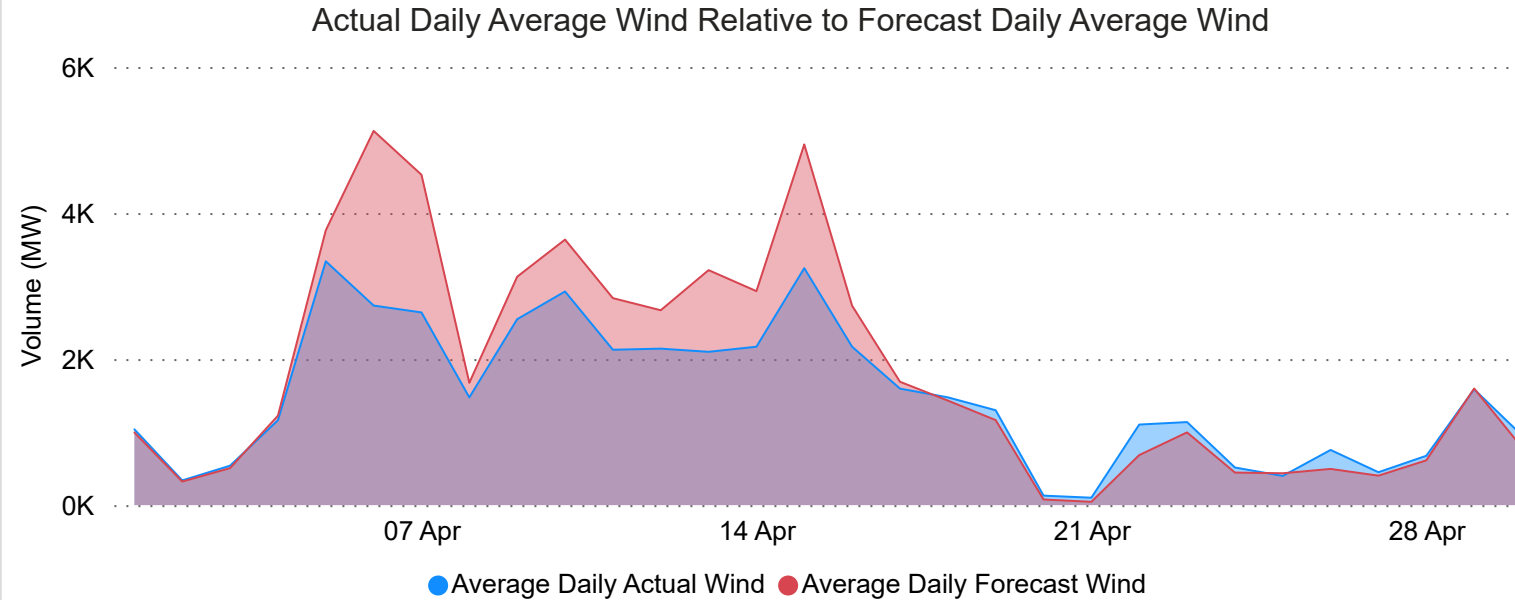
Wind Generation April 2024

Average Daily Actual Wind (MW)
1,496

Average Daily Forecast Wind (MW)
1,837

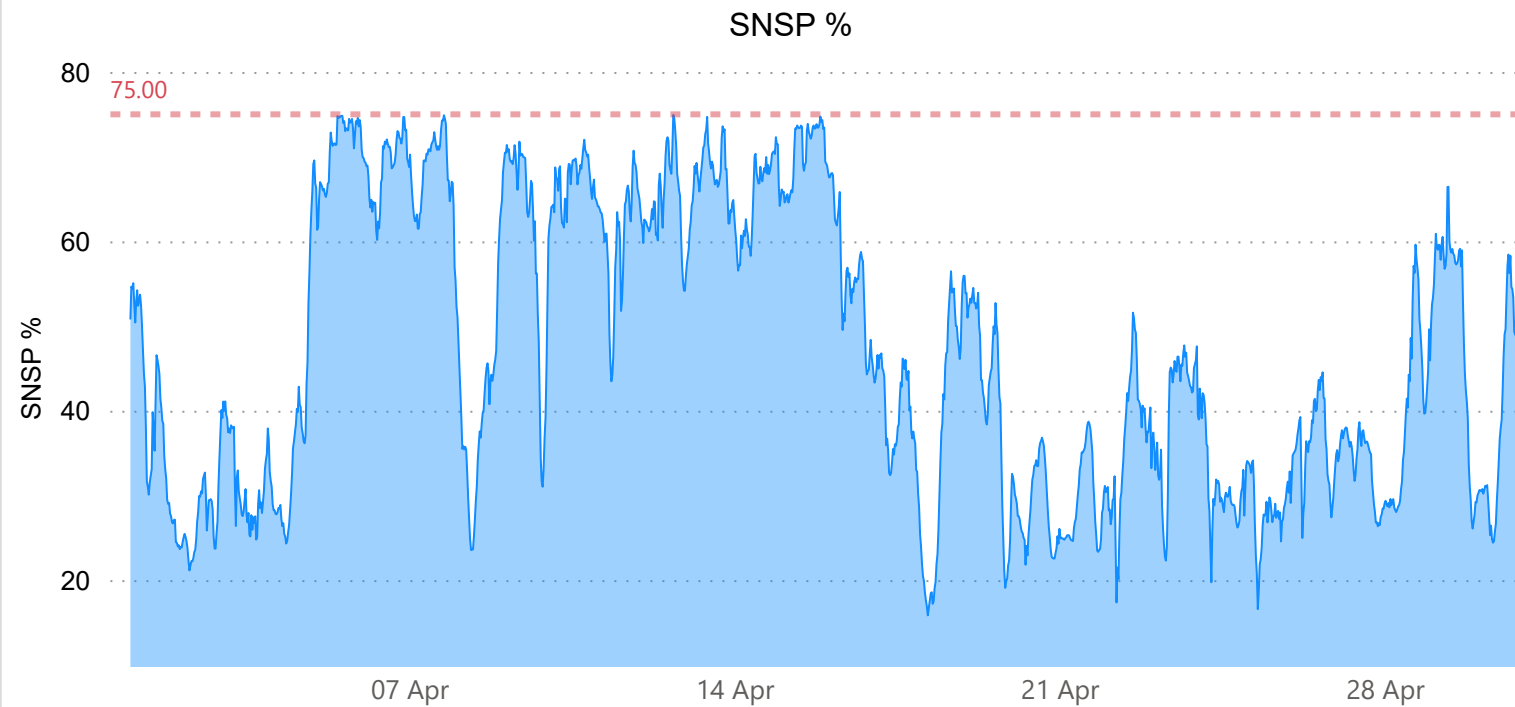
Wind Generation

Wind generation was considerably lower compared to the last month averaging around 1.5 GWs this month while last month it went up to around 2 GWs.



SNSP

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



Min SNSP%
15.84

Max SNSP%
74.94

CO₂ April 2024

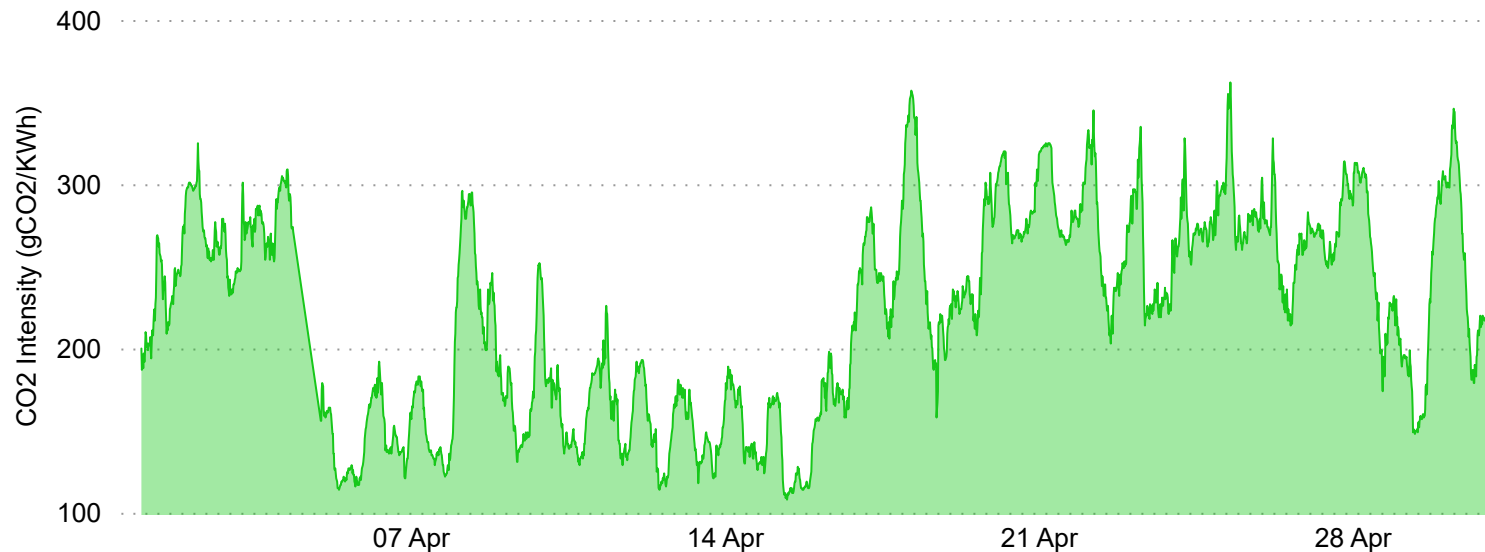
CO₂ Intensity (gCO₂/kWh)

219.01
Average
108
Lowest
362
Highest

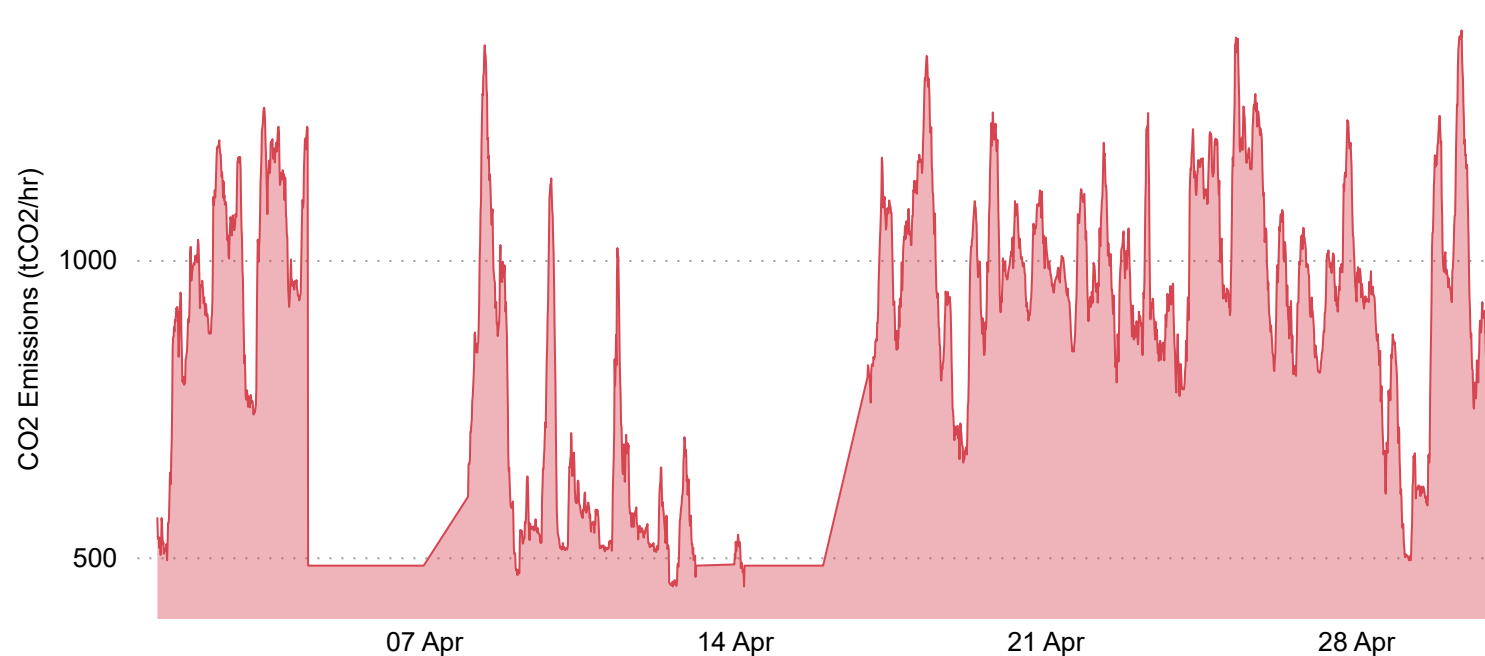
CO₂ Emissions (tCO₂/hr)

883
Average
451
Lowest
1386
Highest

CO₂ Intensity



CO₂ Emissions



CO₂ 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

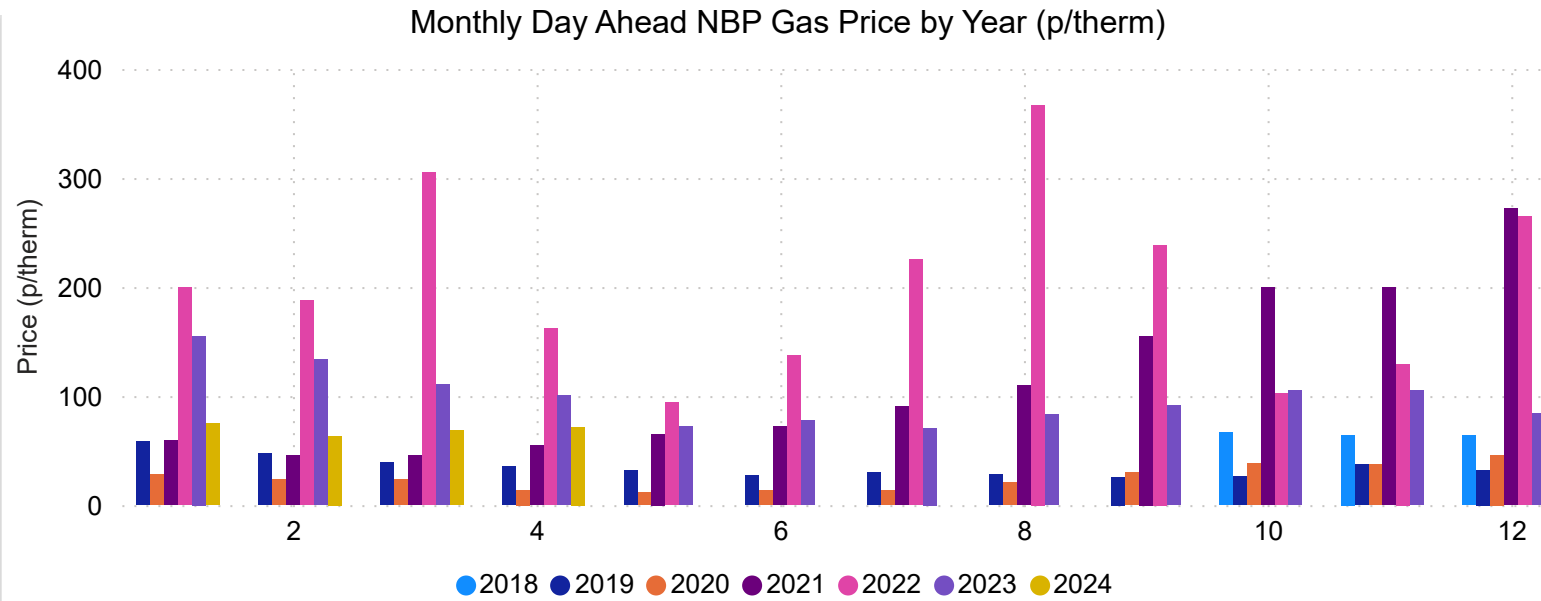
CO₂ emissions i.e. the estimated total CO₂ emissions from all large power stations, follows the same trends as CO₂ intensity levels over the course of the month.

Fuel Costs and Spreads



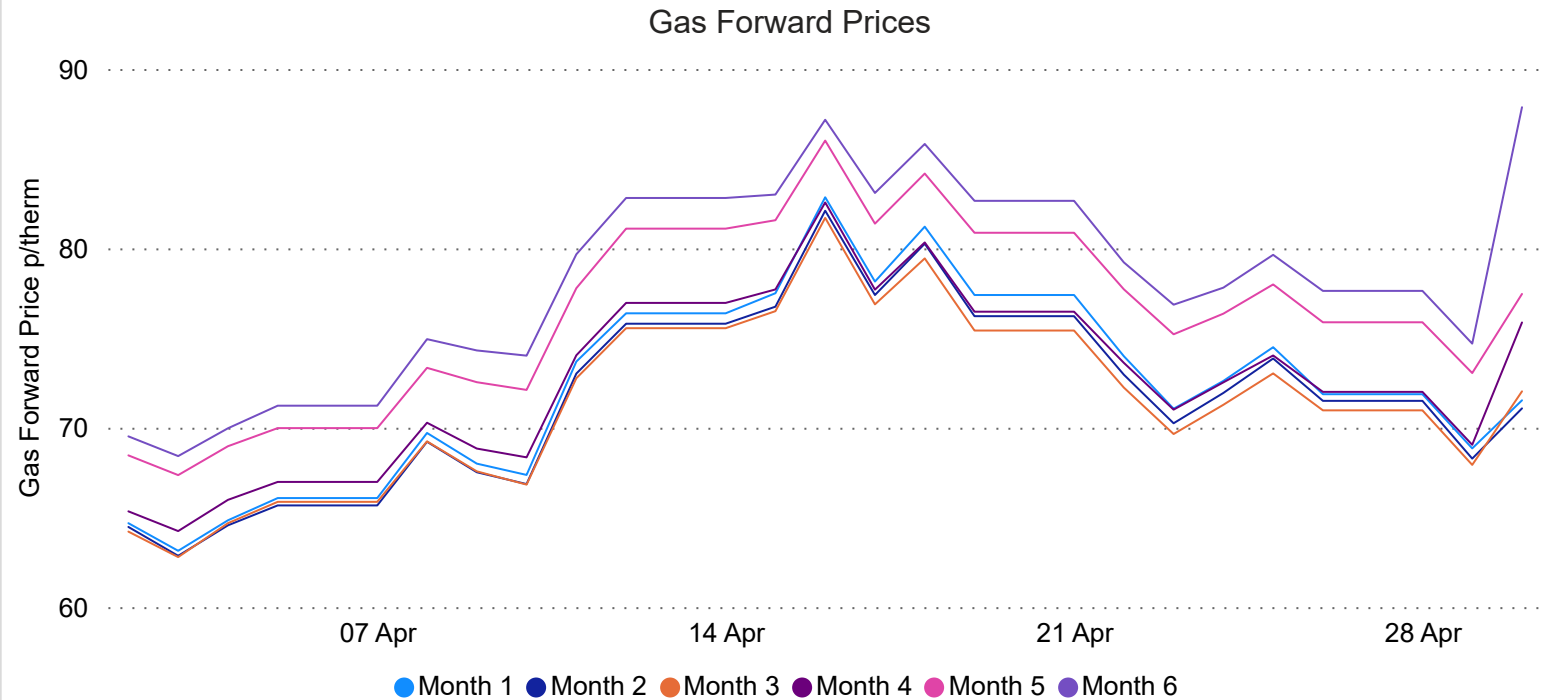
Gas Price April 2024

71.69
Monthly Average (p/therm)
61.85
Monthly Low (p/therm)
84.15
Monthly High (p/therm)



Gas Prices

Gas prices has increased again by 5% compared to the previous month (from 68.18p to 71.69p) .



Gas Forward Prices

Similarly, Gas forward prices have increased slightly from the last month.

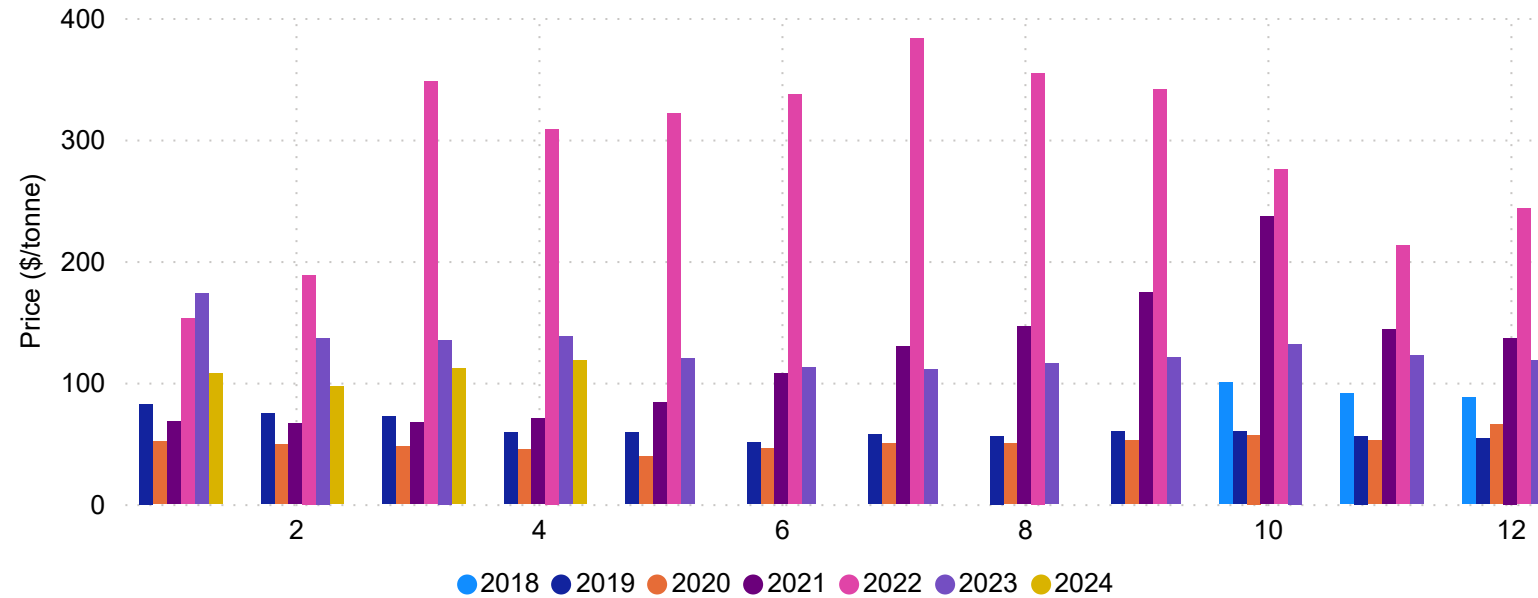
Forward gas prices are considerably lower than the prices seen over the past few years.

Coal Price April 2024

Coal Prices Per Tonne

\$118.13
Monthly Average
\$101.30
Monthly Low
\$122.15
Monthly High

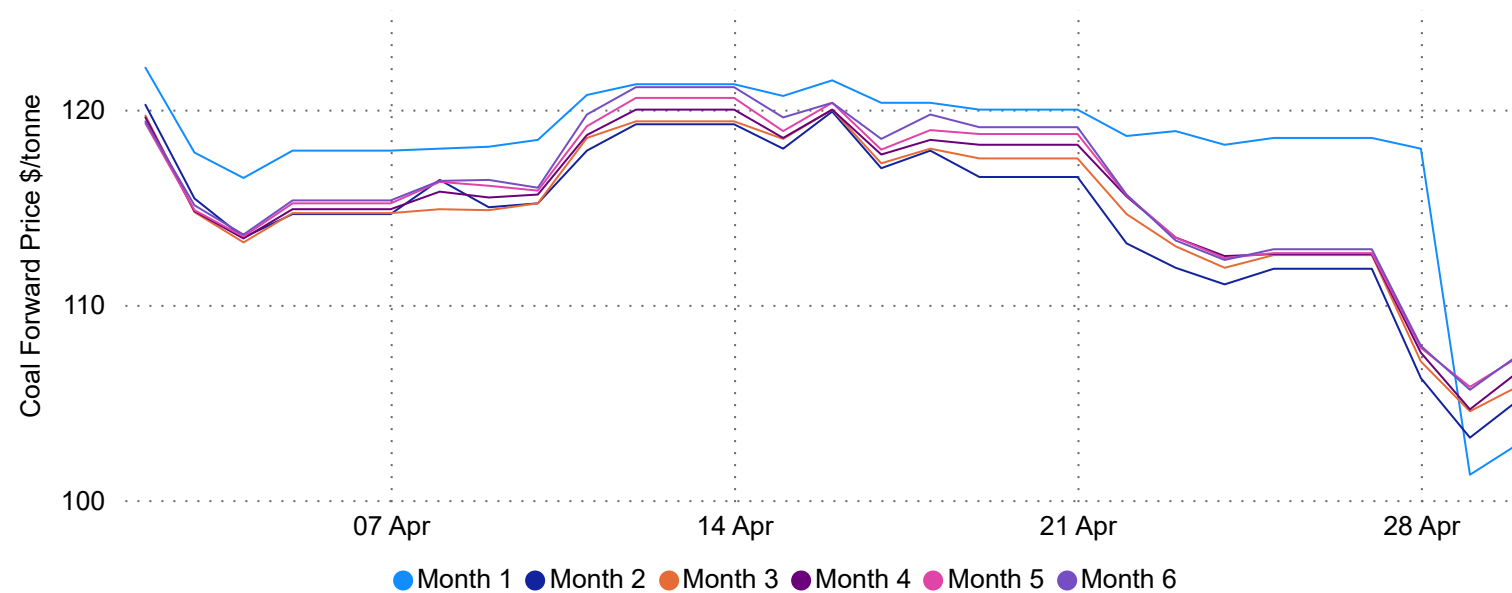
Monthly ICE Rotterdam Coal Price by Year (\$/tonne)



Coal Prices

Coal prices were again higher compared to the previous month at \$118.13/tonne (6% increase from last month).

Coal Forward Prices



Coal Forward Prices

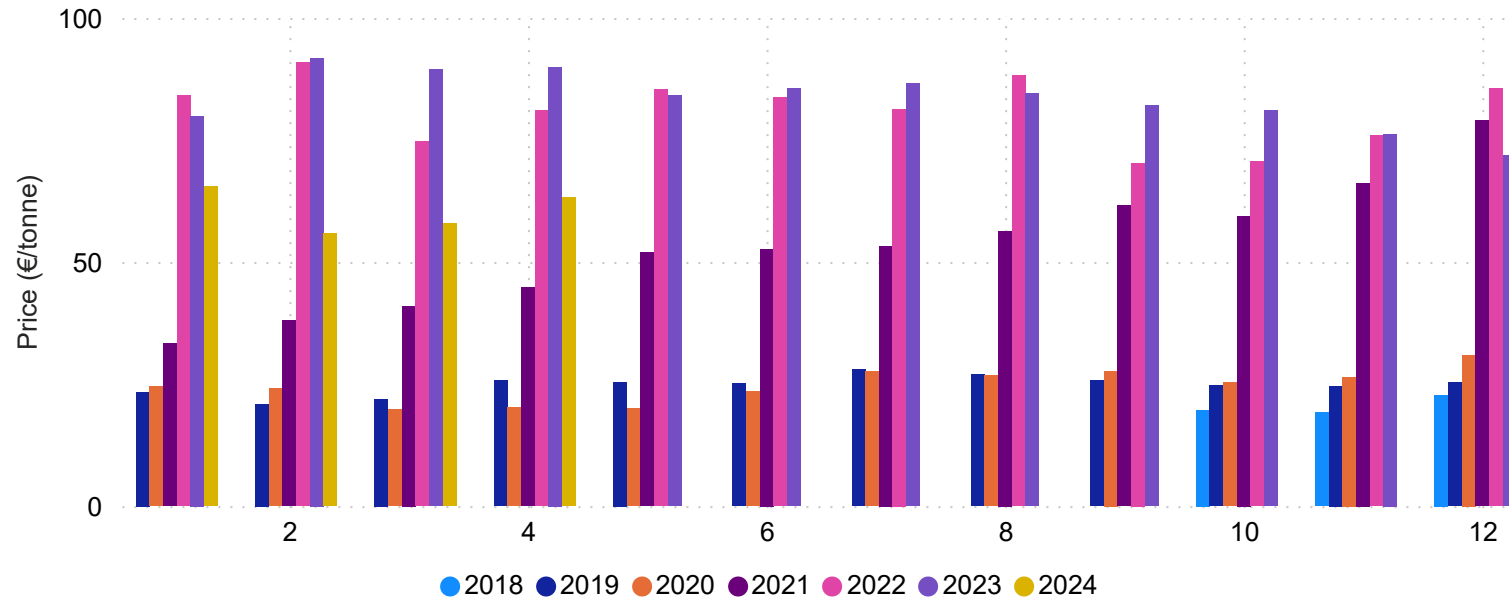
Coal forward prices demonstrate a small increase during the month.

Carbon Price April 2024

EU Carbon Prices (€/tonne)
 € 63.25
 Monthly Average
 € 56.01
 Monthly Low
 € 72.13
 Monthly High

UK Carbon Prices (€/tonne)
 € 40.63
 Monthly Average
 € 38.82
 Monthly Low
 € 43.17
 Monthly High

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

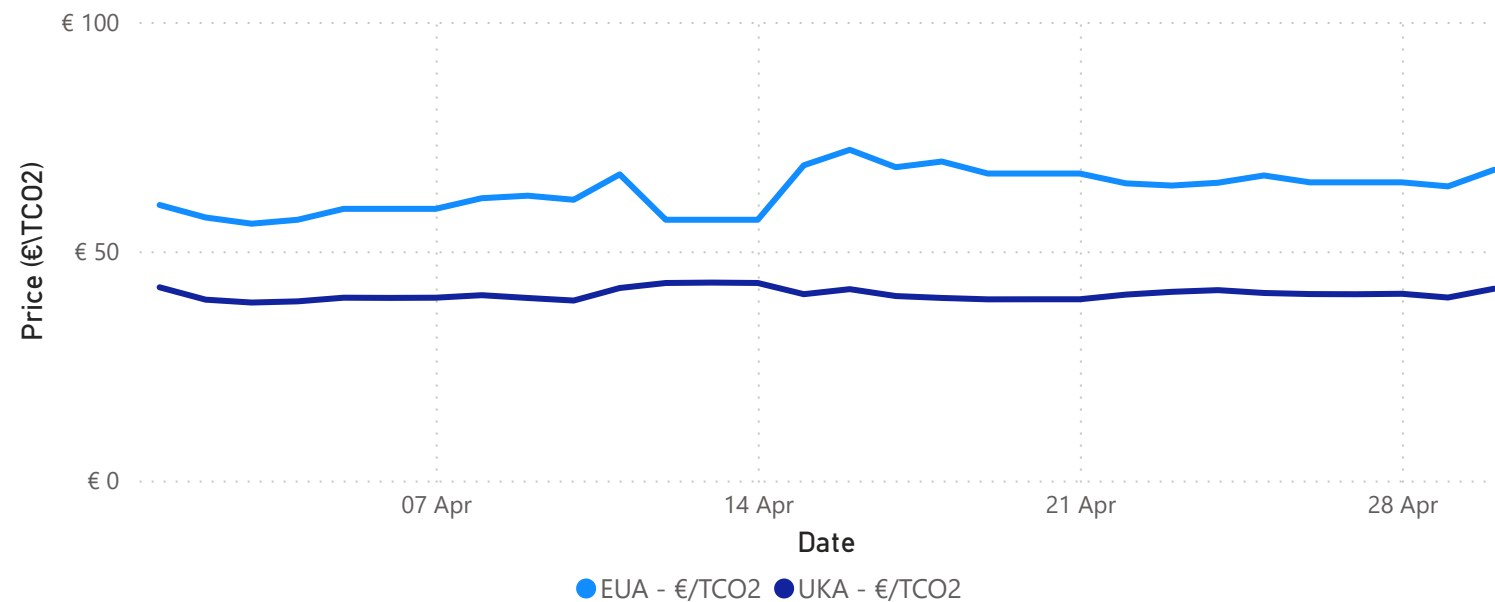


Carbon Prices

Carbon has increased relative to the previous month by 9%.

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.

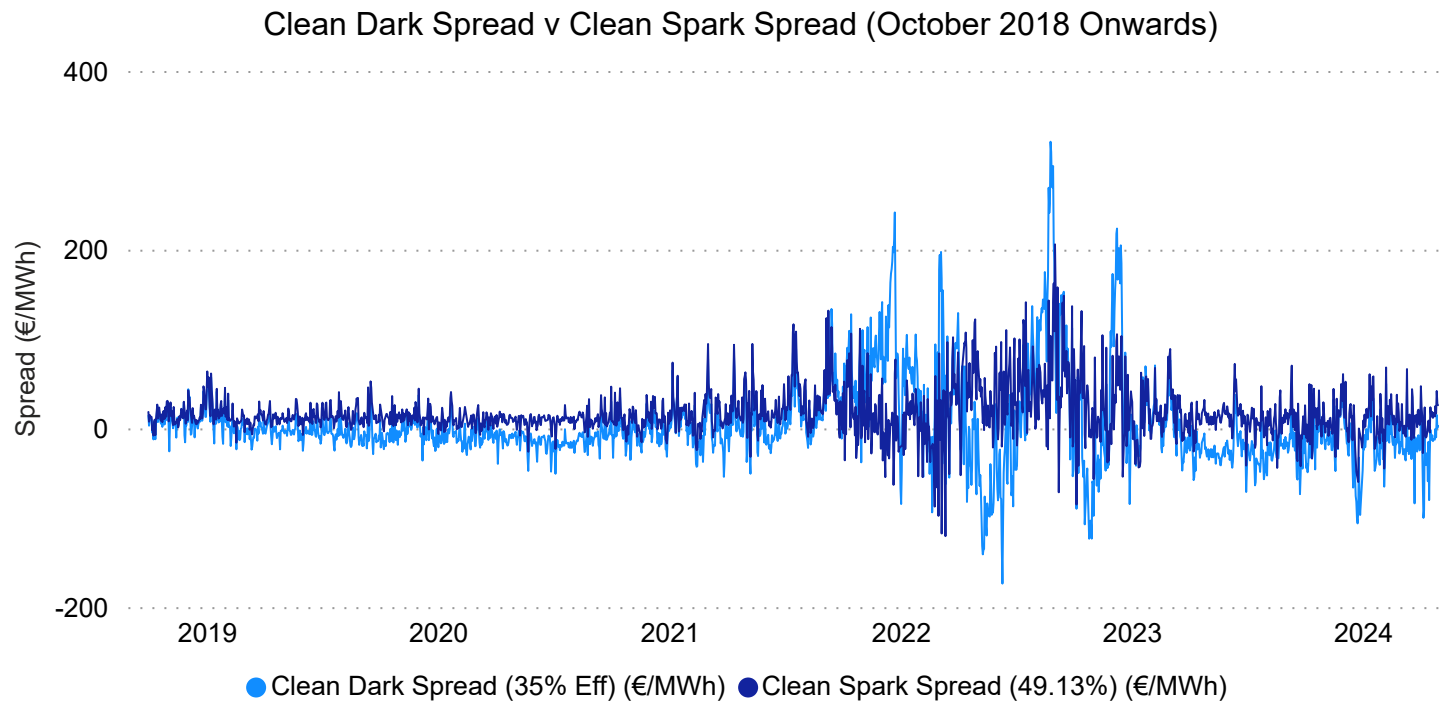
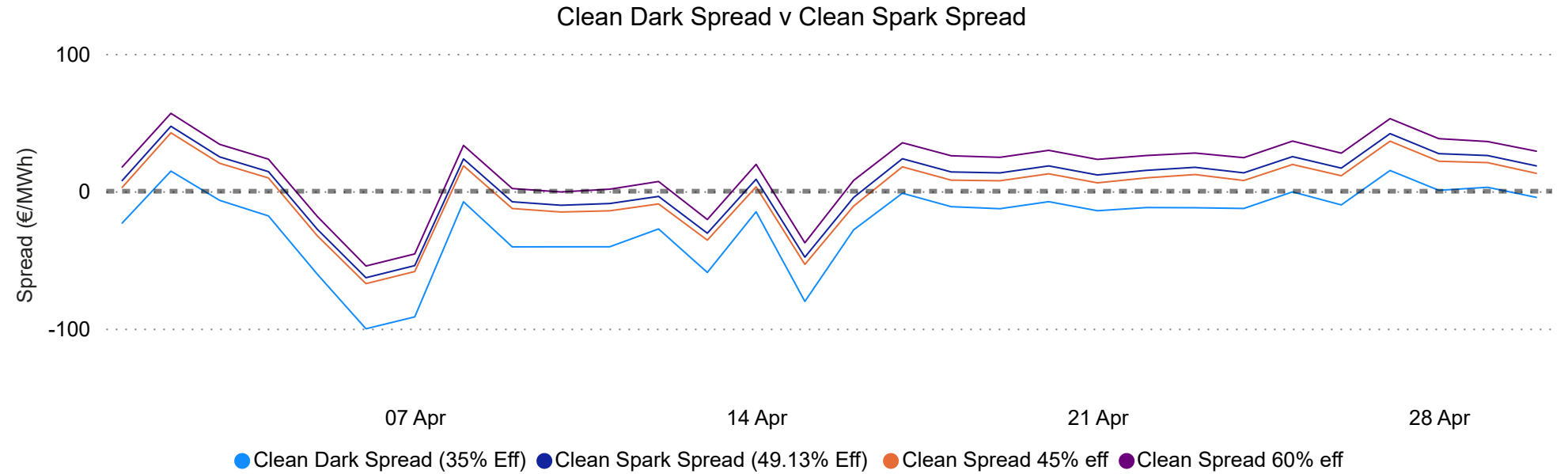
UK & EU Carbon Prices



Spark Spreads April 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 7th and 15th when the wind increases for a sustained period.