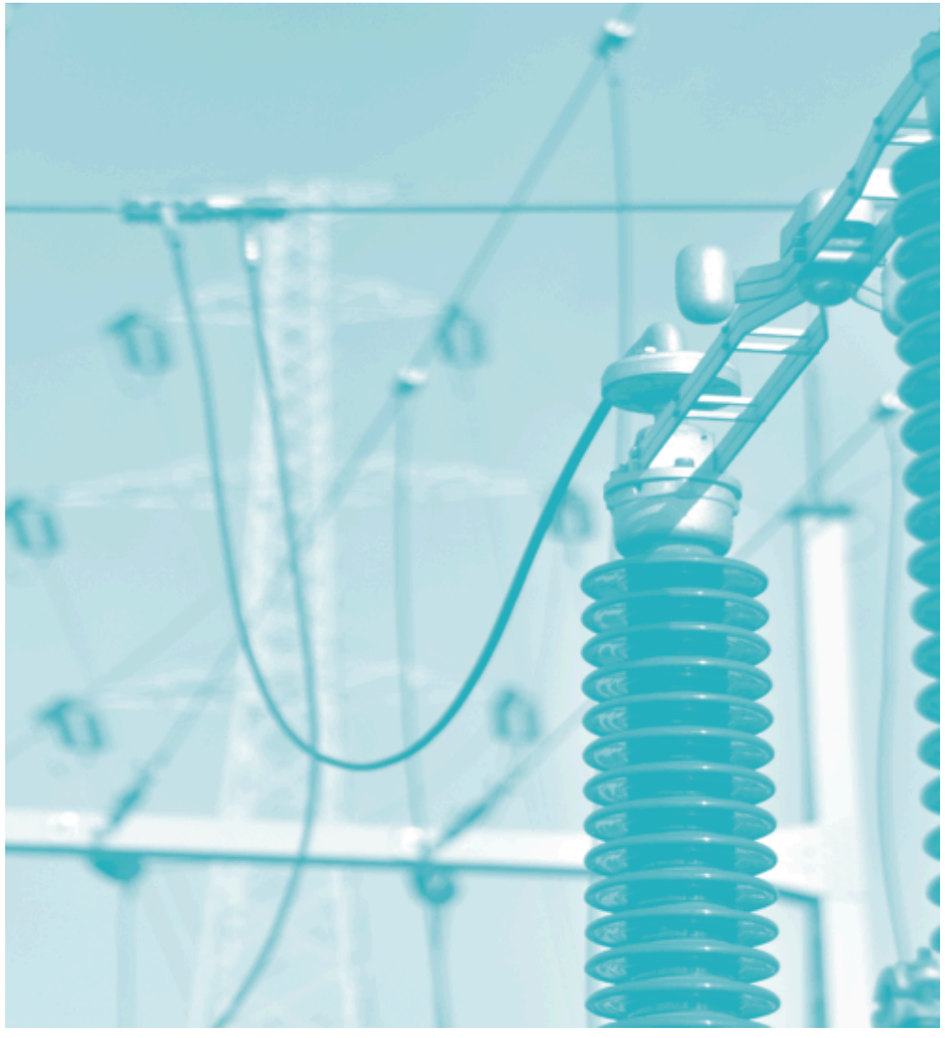


Energy Market Monitoring Report

January 2024

SEM committee

Market Results

Summary Dashboard

SEM committee

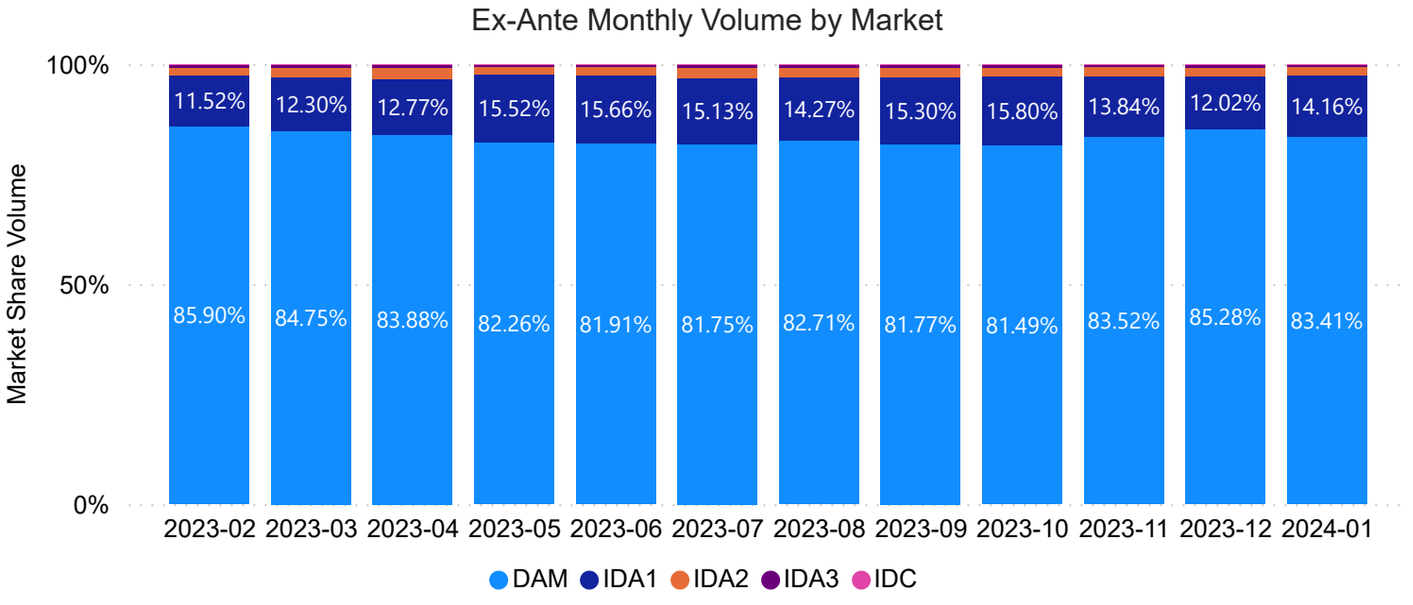
Monthly Averages	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
DAM (€/MWh)	159.19	145.25	125.57	105.19	117.11	96.24	106.46	111.62	125.54	122.9	88.97	99.9
% Change from previous month	-2%	-9%	-14%	-16%	11%	-18%	11%	5%	12%	-2%	-28%	12%
% Change from previous year	-9%	-50%	-42%	-27%	-36%	-64%	-73%	-61%	-8%	-14%	-68%	-38%
Actual System Demand (MW)	4782	4833	4469	4276	4189	4101	4185	4335	4516	4873	4862	5151
% Change from previous month	-2%	1%	-8%	-4%	-2%	-2%	2%	4%	4%	8%	0%	6%
% Change from previous year	-1%	3%	1%	2%	0%	0%	2%	3%	4%	5%	0%	5%
Actual Wind Generation (MW)	2026	1748	1545	884	878	1316	1401	1384	1363	1811	2446	1854
% Change from previous month	2%	-14%	-12%	-43%	-1%	50%	6%	-1%	-2%	33%	35%	-24%
% Change from previous year	-27%	12%	8%	-38%	-22%	54%	71%	28%	-33%	-19%	49%	-7%
Gas Price p/therm	133.65	110.96	100.32	72.41	77.87	70.76	82.87	91.52	104.88	104.97	84.2	74.87
% Change from previous month	-14%	-17%	-10%	-28%	8%	-9%	17%	10%	15%	0%	-20%	-11%
% Change from previous year	-29%	-64%	-38%	-24%	-44%	-68%	-77%	-61%	3%	-19%	-68%	-52%
Carbon Price (€/Tonne)	91.82	89.41	89.98	84.18	85.51	86.57	84.61	82.09	81.10	76.25	71.79	65.52
% Change from previous month	15%	-3%	1%	-6%	2%	1%	-2%	-3%	-1%	-6%	-6%	-9%
% Change from previous year	1%	20%	11%	-1%	2%	6%	-4%	17%	15%	1%	-16%	-18%
Coal Price ($/tonne)	136.71	134.95	137.83	119.57	112.56	111.02	115.57	120.40	131.80	122.16	118.31	107.65
% Change from previous month	-21%	-1%	2%	-13%	-6%	-1%	4%	4%	9%	-7%	-3%	-9%
% Change from previous year	-27%	-61%	-55%	-63%	-67%	-71%	-67%	-65%	-52%	-43%	-51%	-38%
EWIC % Import Periods	38.91%	50.00%	50.56%	75.86%	77.72%	67.11%	68.11%	73.75%	86.90%	68.78%	56.38%	69.76%
EWIC % Export Periods	27.19%	16.47%	13.65%	8.28%	4.06%	9.21%	11.96%	8.89%	2.99%	9.11%	20.36%	14.78%
EWIC % Not Flow Periods	33.89%	23.86%	30.80%	15.88%	18.22%	22.68%	19.93%	17.36%	10.11%	22.11%	23.25%	15.46%
Moyle % Import Periods	53.65%	64.68%	77.50%	85.42%	92.22%	84.04%	75.24%	83.33%	92.31%	83.47%	67.81%	78.16%
Moyle % Export Periods	46.02%	25.50%	27.43%	14.58%	7.67%	15.89%	20.33%	16.60%	7.66%	16.50%	32.16%	21.81%
Moyle % Not Flow Periods	0.33%	0.13%	0.07%	0.00%	0.10%	0.07%	4.44%	0.07%	0.03%	0.03%	0.03%	0.03%

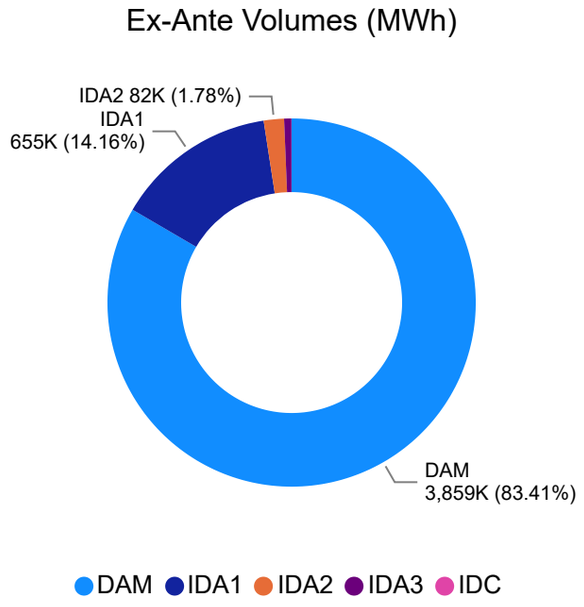
Market Volumes January 2024

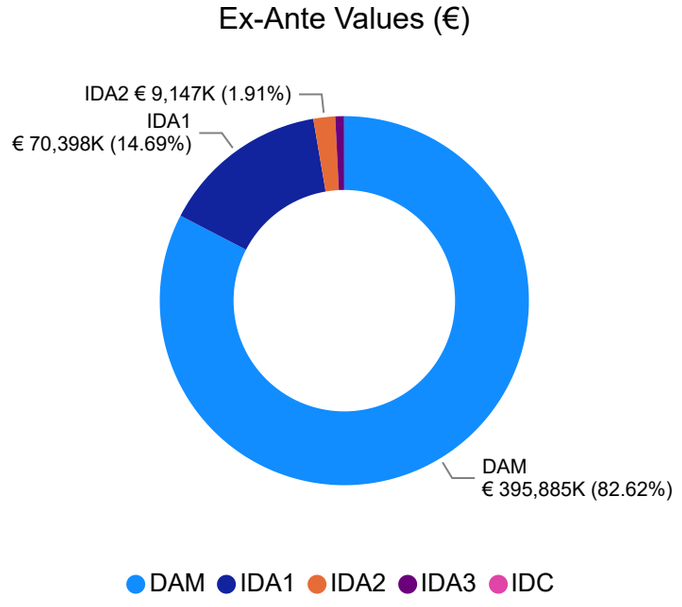
Daily Average Volume	MWh
DAM	124,473
IDA1	21,124
IDA2	2,654
IDA3	956
IDC	32

Total Monthly Volume	MWh
DAM	3,858,665
IDA1	654,850
IDA2	82,286
IDA3	29,636
IDC	549
Total	**4,625,985**

Total Market Value	€
DAM	€ 395,885,168
IDA1	€ 70,397,997
IDA2	€ 9,146,518
IDA3	€ 3,684,958
IDC	€ 68,641
Total	**€ 479,183,282**







SEM committee

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 January 2024

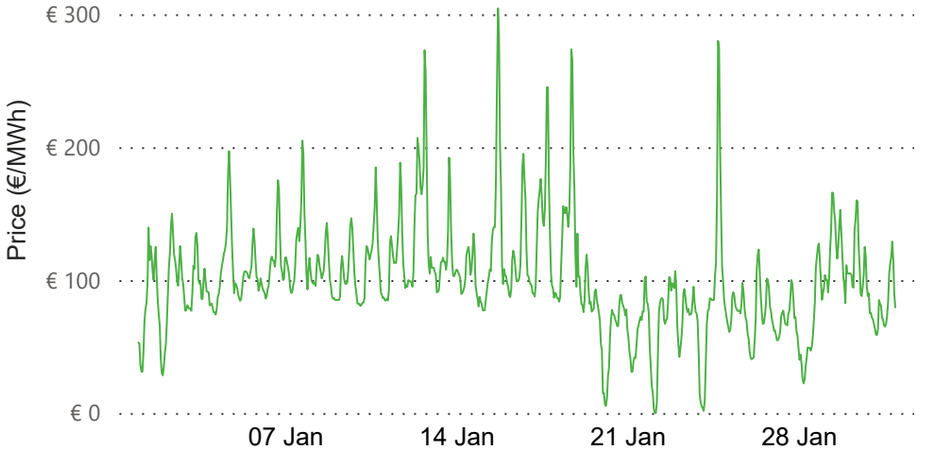
€ 99.90
Average DAM Price

€ 0.00
Min DAM Price

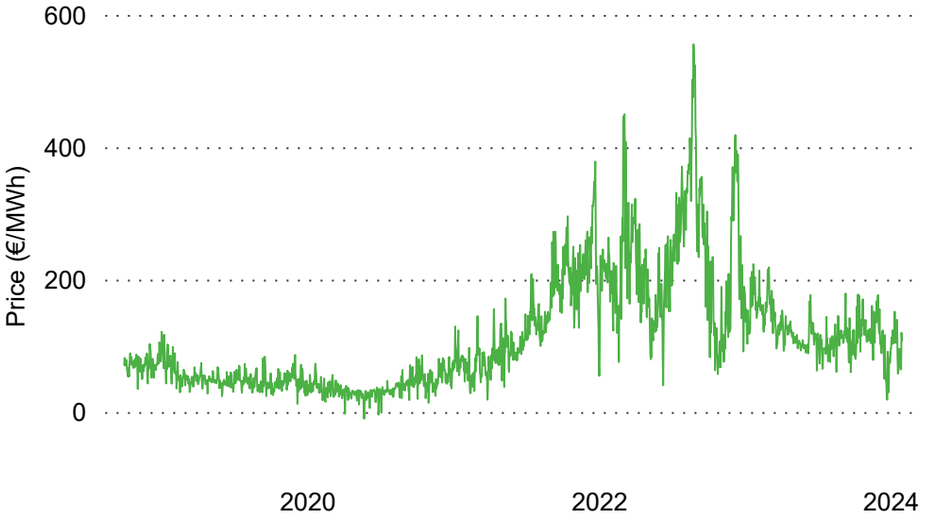
€ 304.36
Max DAM Price

The most frequent price range for January was between €80 and €120

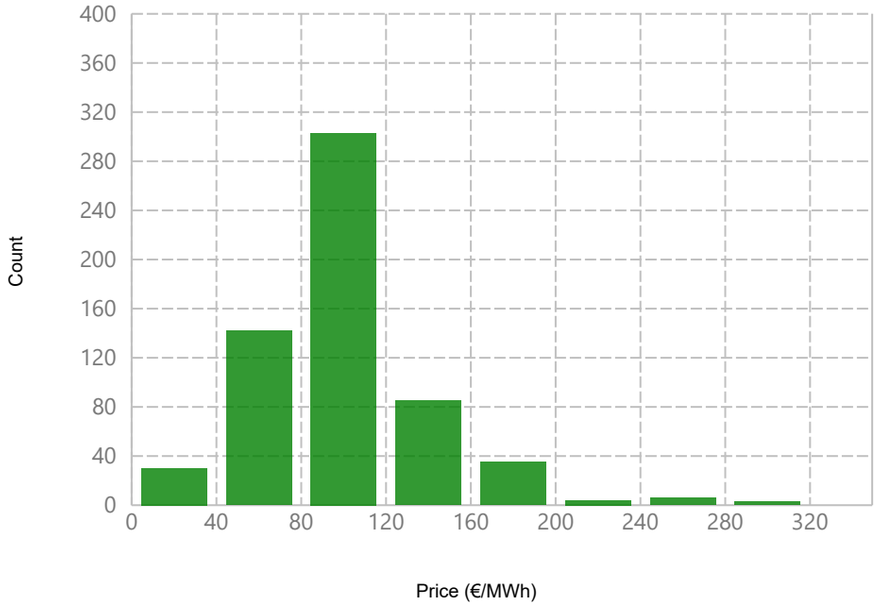
DAM Prices



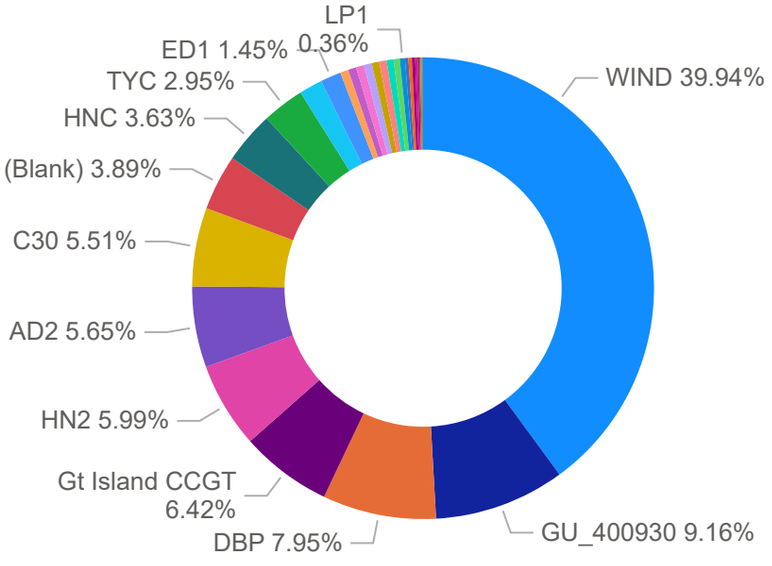
Historic Daily Average DAM Prices



Histogram of DAM Prices



DAM Sell Side Generator Order Results



Intraday Market January 2024

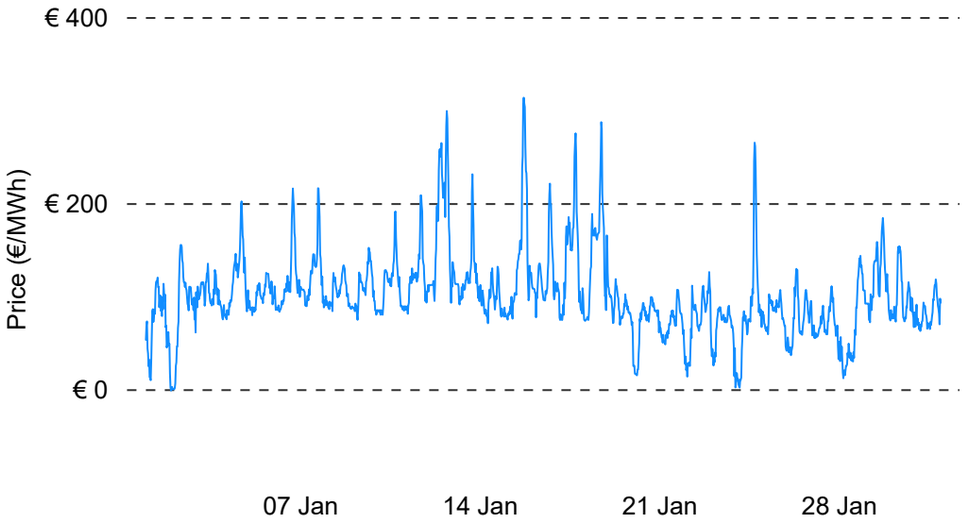
€ 100.98
Average IDA1 Price

-€ 1.50
Min IDA1 Price

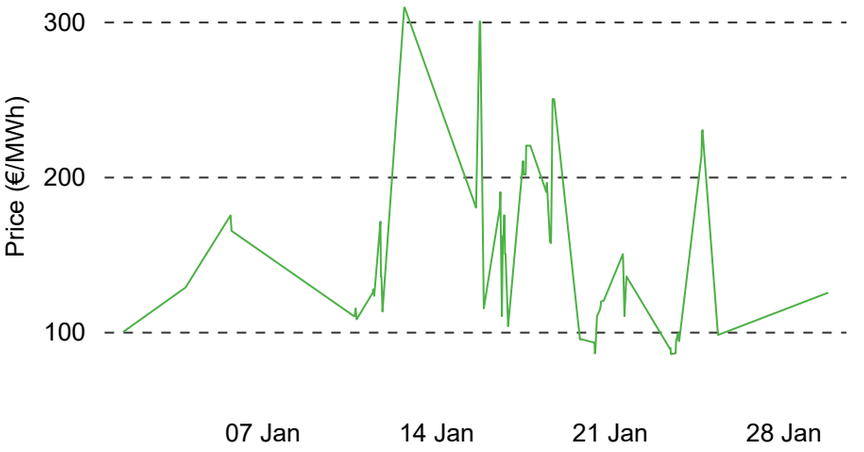
€ 313.30
Max IDA1 Price

The most frequent price range for January was between €50 and €100

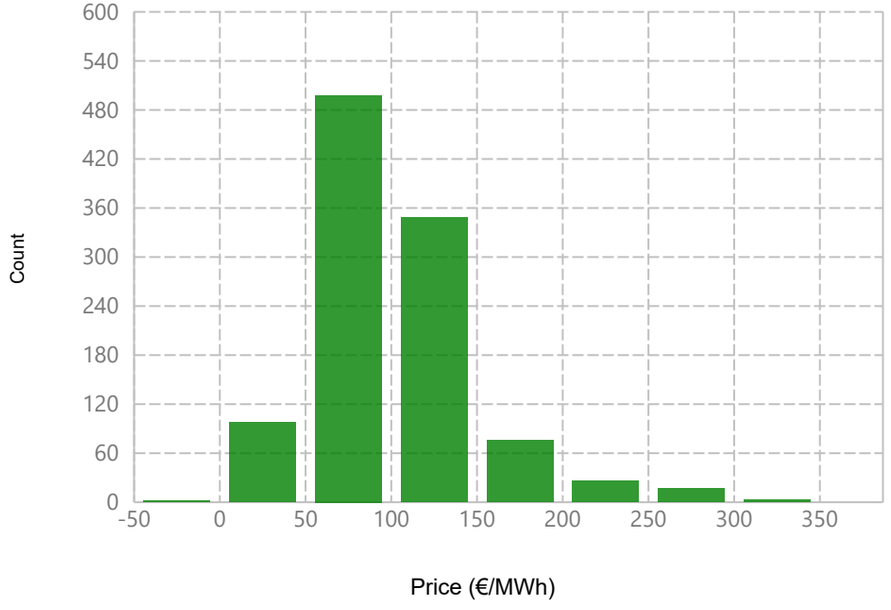
IDA 1 Prices



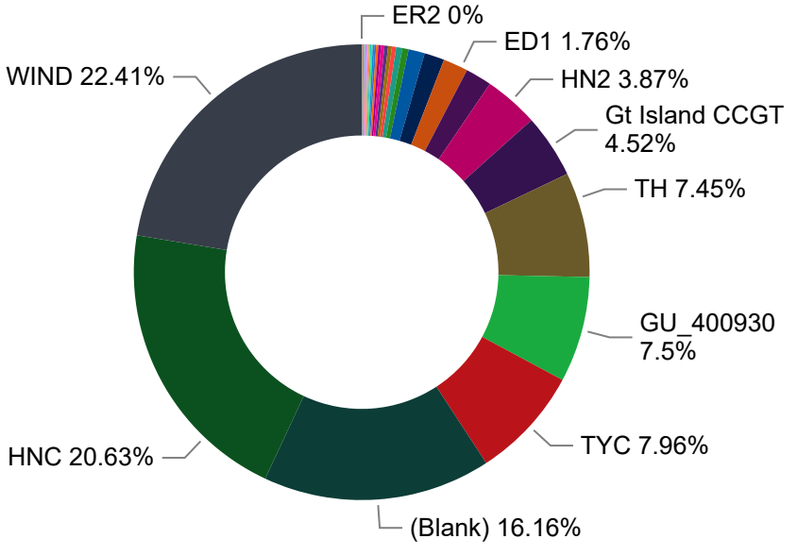
IDC Prices



Histogram of IDA1 Prices



IDA1 Sell Order Results By Market Participant



Intraday Market January 2024

SEM Day Ahead Price

€ 99.92
Average Price

€ 0.00
Min Price

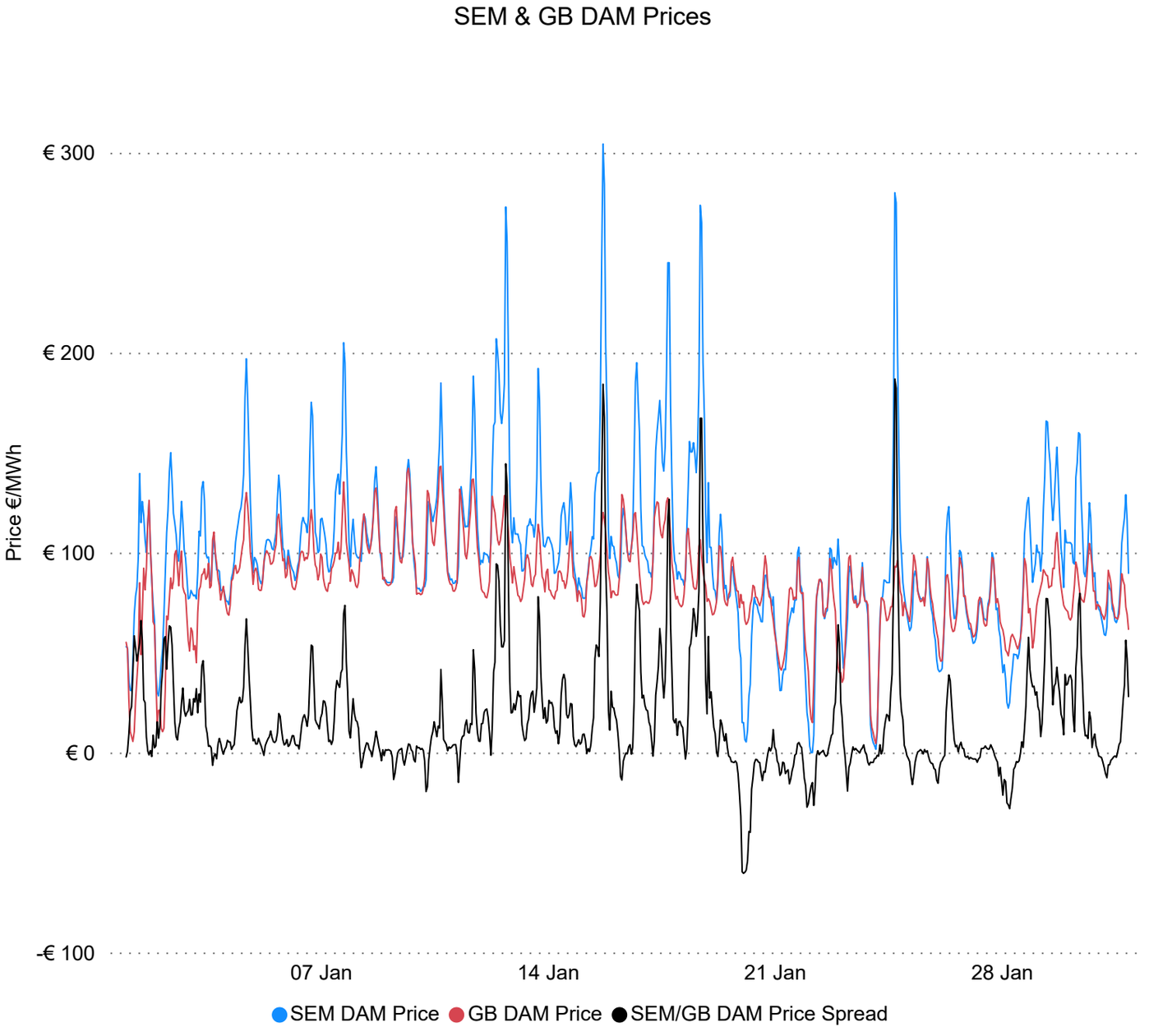
€ 304.36
Max Price

GB Day Ahead Price

€ 84.12
Average Price

€ 4.50
Min Price

€ 143.23
Max Price



SEM-GB Price Differential

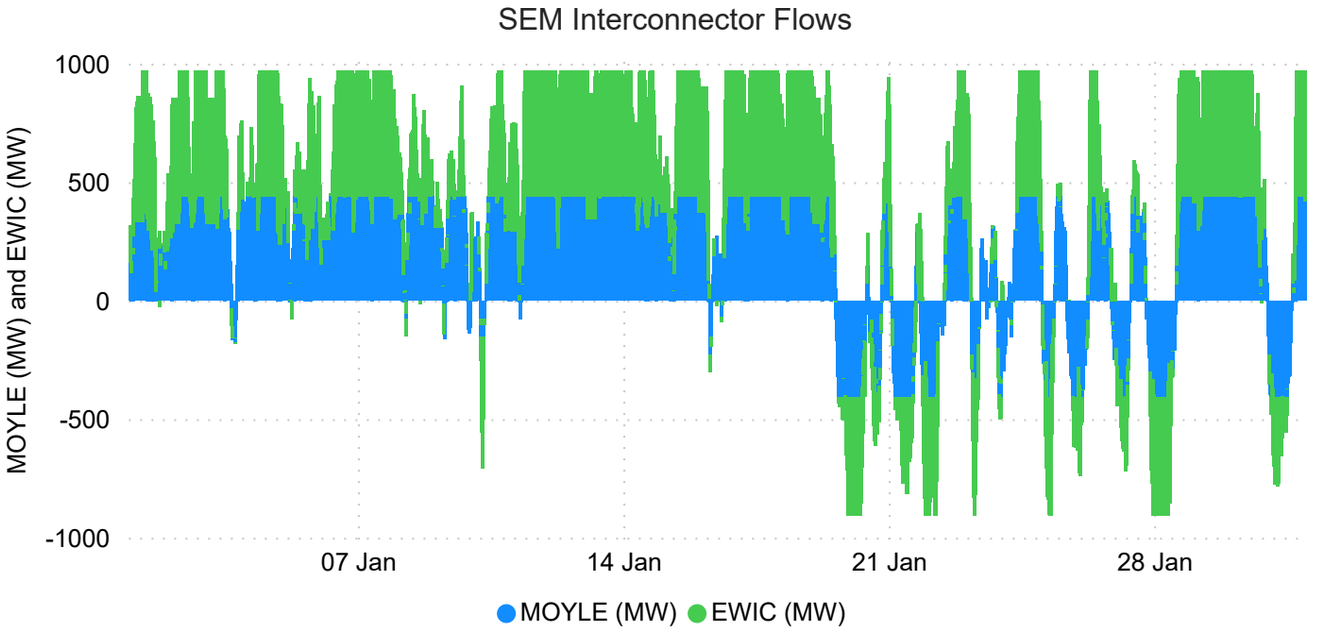
The charts show that the SEM and GB prices appear to follow the same general trend. Significant spreads can be observed on several occasions. The MMU has investigated the underline reasons for these spreads and the findings are consistent with those discussed with the SEMC in February.

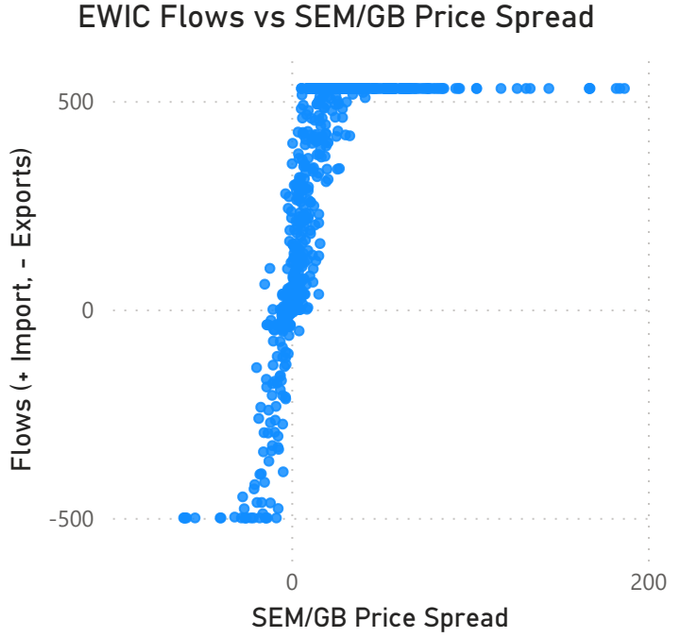
Basically, the periods of significant spread between the two markets are generally correlated with period of very low wind. Due to the prevailing fuel mix across both regions, the effects of low wind are felt more intensively in the SEM than in GB. The MMU will continue to investigate this matter further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

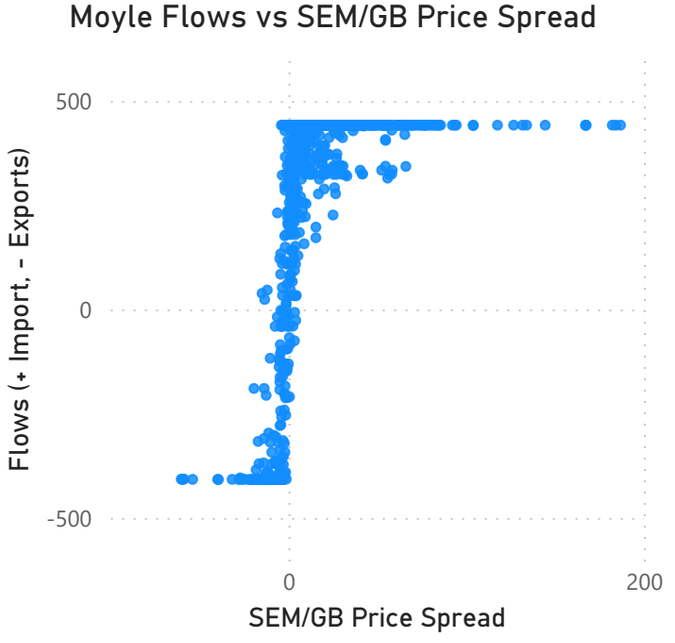
SEM Interconnectors January 2024

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

Moyle	EWIC
2nd 09:00 - 19:00	4th 11:00 - 22:00
3rd 09:00 - 20:00	6th 16:00 - 21:00
4th 08:00 - 19:00	7th 11:00 - 21:00
5th 09:00 - 23:00	10th 09:00 - 21:00
6th 09:00 - 23:00	11th 07:00 - 23:00
7th 08:00 - 23:00	12th 07:00 - 22:00
8th 07:00 - 21:00	13th 15:00 - 22:00
9th 08:00 - 21:00	15th 09:00 - 23:00
10th 08:00 - 21:00	16th 15:00 - 22:00
11th 07:00 - 23:59	17th 08:00 - 22:00
12th 06:00 - 23:59	18th 09:00 - 23:00
13th 09:00 - 23:00	24th 08:00 - 19:00
14th 10:00 - 20:00	29th 06:00 - 21:00
15th 07:00 - 23:59	
16th 14:00 - 23:00	
17th 07:00 - 23:00	
18th 07:00 - 23:00	
24th 13:00 - 22:00	
29th 06:00 - 21:00	







SEM committee

Interconnector Flows

In January, 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.

Moyle imports volumes were slightly lower than EWIC and exports were higher. Typically, Moyle losses are lower than EWIC's and hence it can allocate capacity under a lower price spread between SEM and GB.

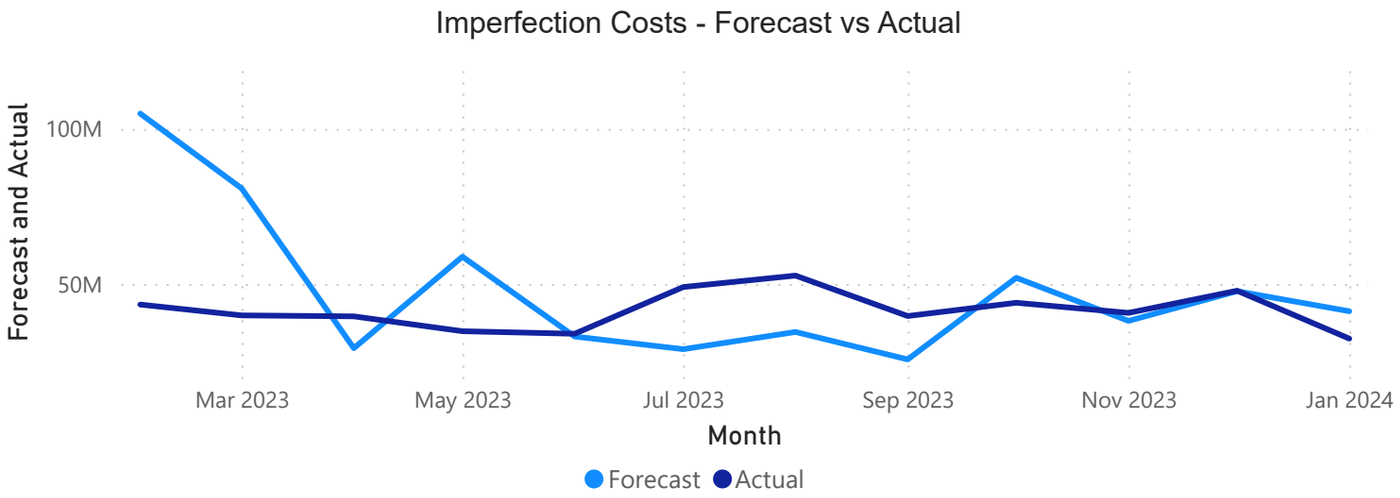
January 2023

Moyle Imports	375
EWIC Imports	384
Moyle Exports	-273
EWIC Exports	-231
SEM Imports	715
SEM Exports	-434
SEM Net Import/Export	468

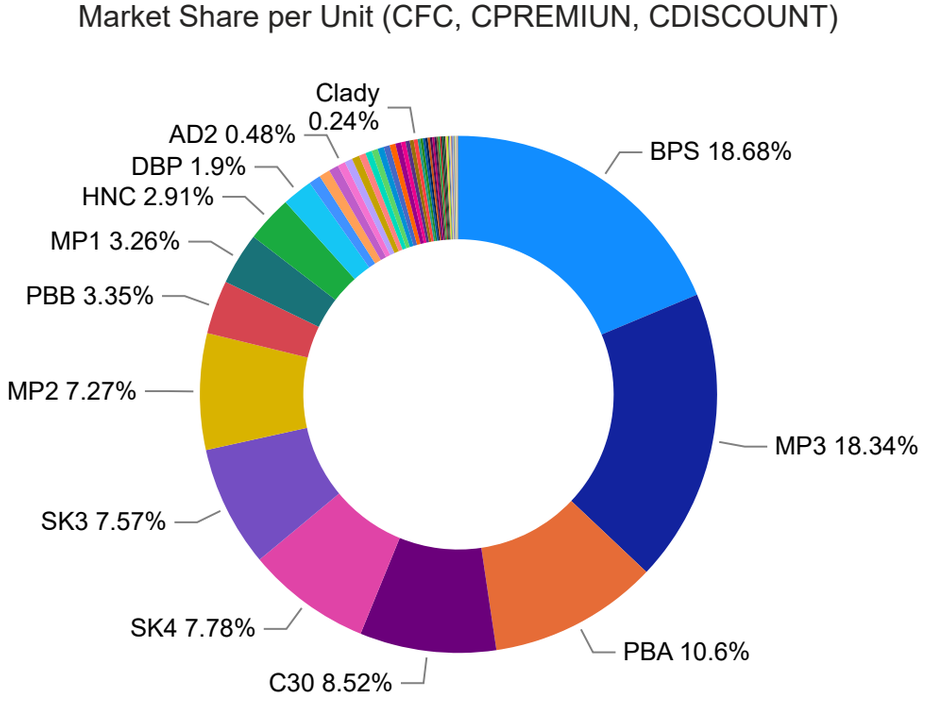
Balancing Market January 2024

Where power stations are run differently from the market schedule, it is termed “ 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	-3,965.10
CAOOPO	-95,311.06
CCURL	138,785.53
CDISCOUNT	14,729,132.32
CFC	5,801,751.91
CPREMIUM	12,372,097.91
CTEST	0.00
CUNIMB	-544,014.49
Total	**32,398,477.02**



Constraints Payments

This charts 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 January followed by MoneyPoint 3 and Poolbeg A. 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.

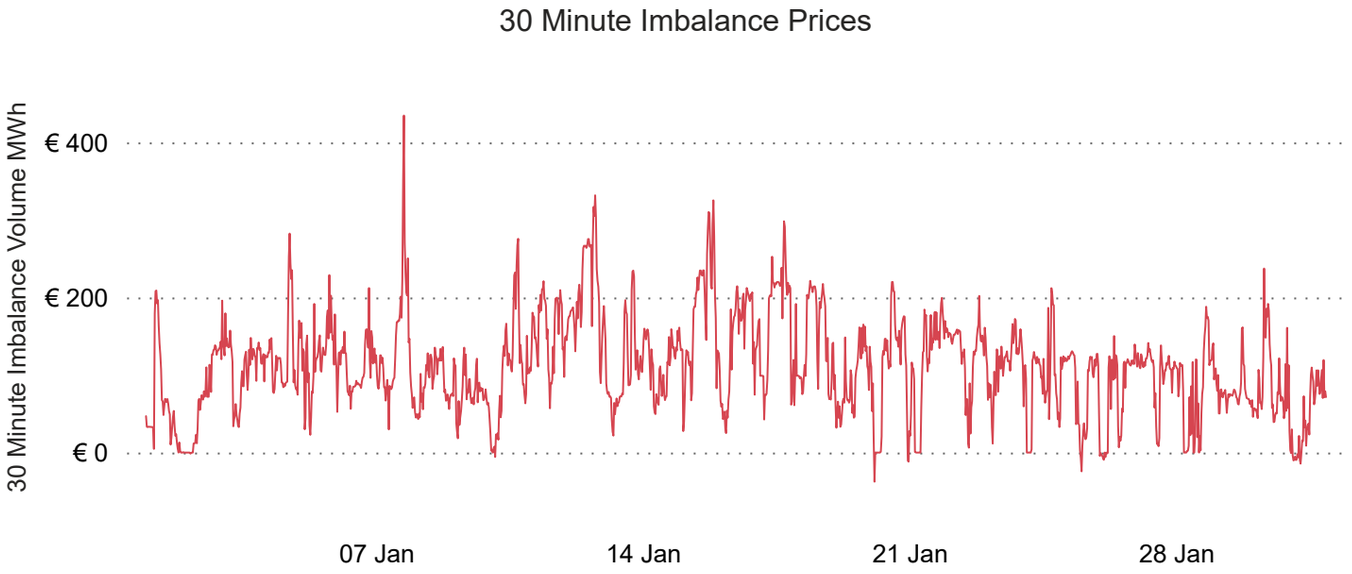
Balancing Market January 2024

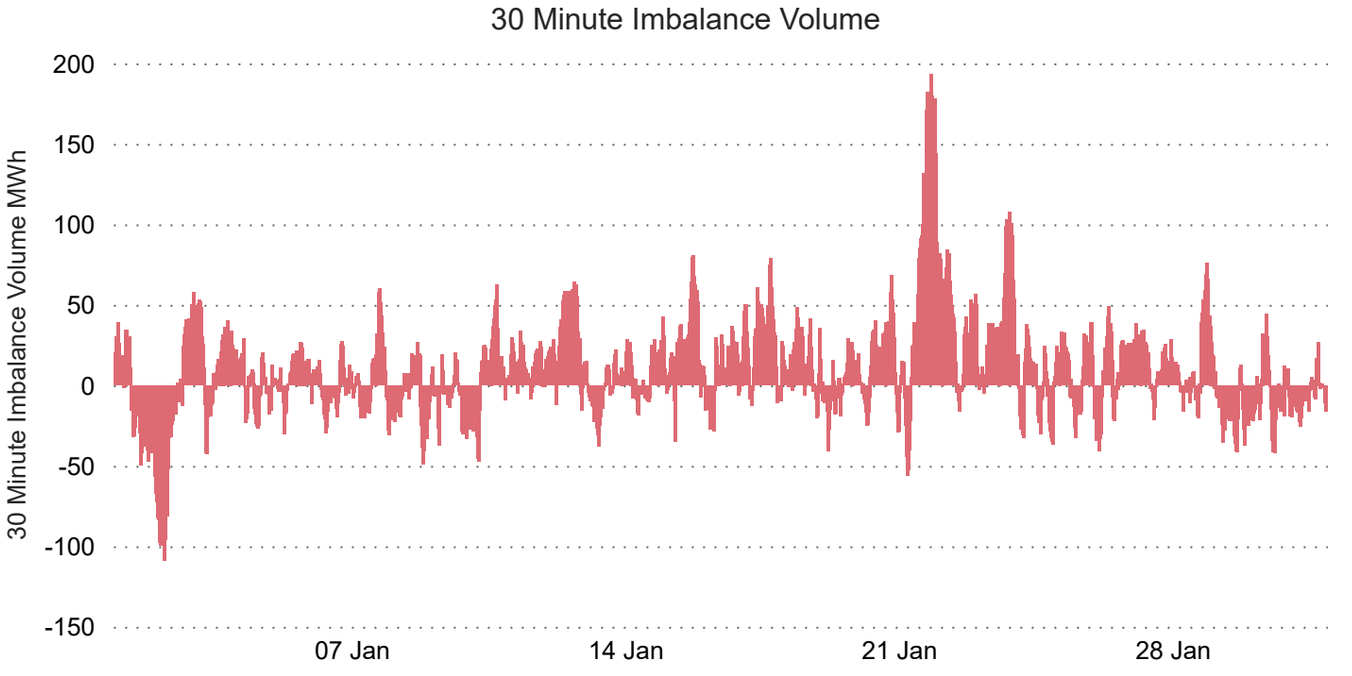
30 Minutes Imbalance Price

€ 111.05
Average Price

-€ 37.56
Lowest Price

€ 434.70
Highest Price





Imbalance Price & Volumes

The Balance (BM) Prices in January 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 volatilely compared to Day Ahead Market Prices. This is an expected characteristic of the Balance Prices.

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

Demand and Generation Mix

Demand January 2024

SEM Demand

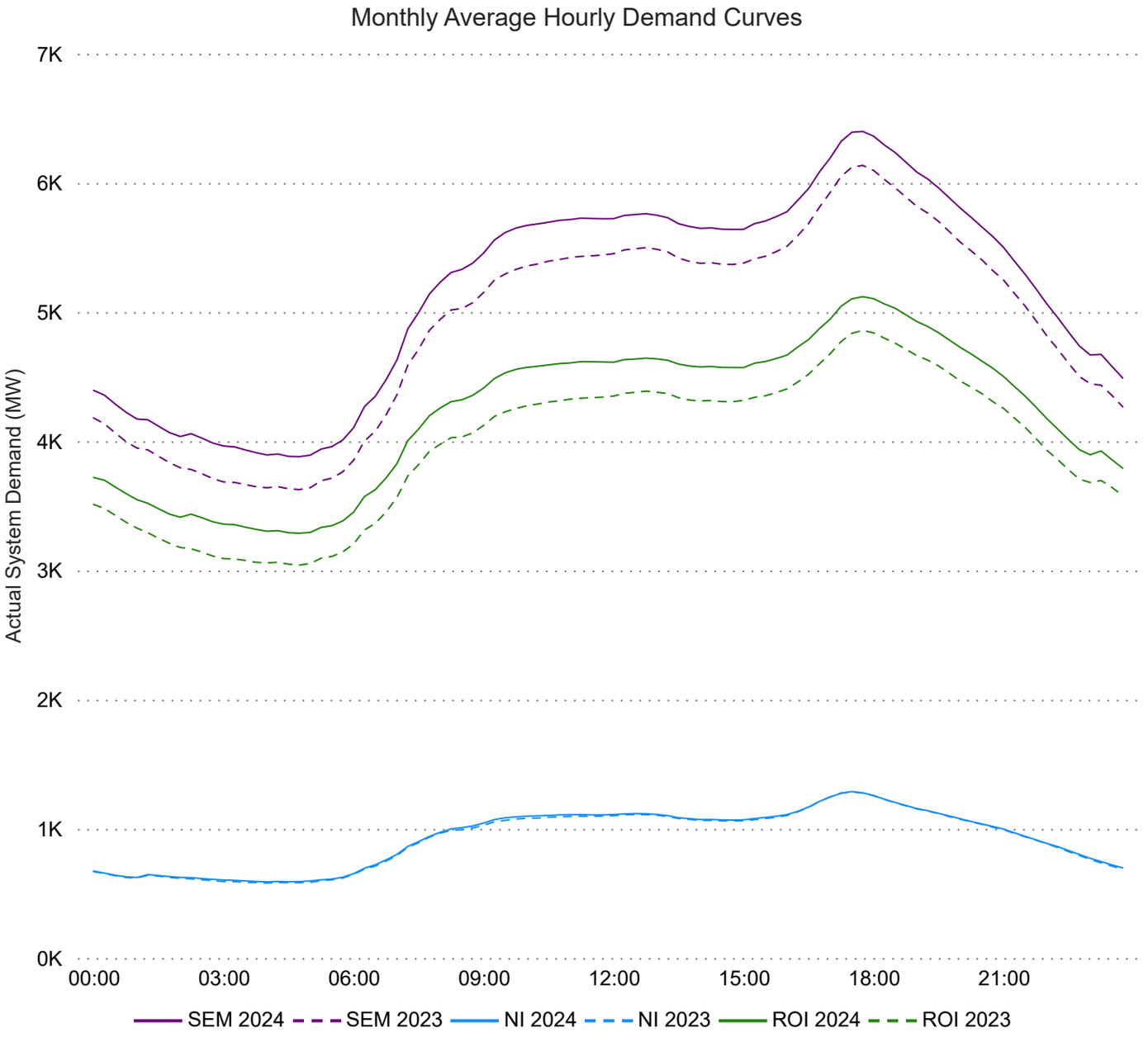
5,150.52 SEM Average 2023	4,885.32 SEM Average 2022
3,881.97 SEM Min 2023	3,627.19 SEM Min 2022
6,399.61 SEM Max 2023	6,136.39 SEM Max 2022

NI Demand

929.80 NI Average 2023	922.35 NI Average 2022
590.42 NI Min 2023	580.81 NI Min 2022
1,289.48 NI Max 2023	1,285.81 NI Max 2022

ROI Demand

4,220.74 ROI Average 2023	3,962.98 ROI Average 2022
3,289.35 ROI Min 2023	3,043.03 ROI Min 2022
5,120.55 ROI Max 2023	4,858.74 ROI Max 2022



SEM Demand

The graph shows a increase in demand within NI, with the monthly average level falling by 0.8% compared to the same period last year.

Similarly, ROI's demand is consistently above its monthly average level from last year and has risen on average by 6.5%.

Demand in the SEM as a whole is up 5.4% relative to the same period last year.

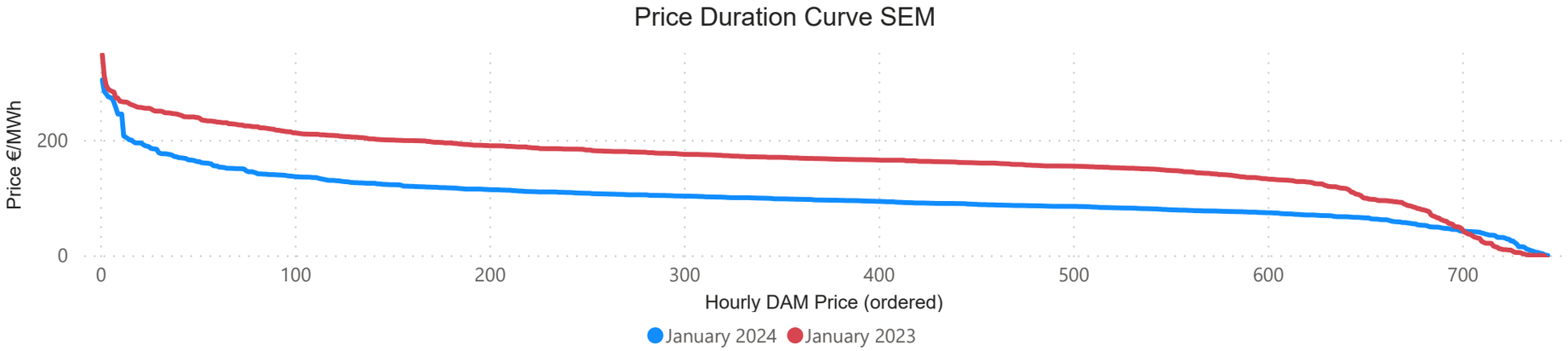
Duration Curves January 2024

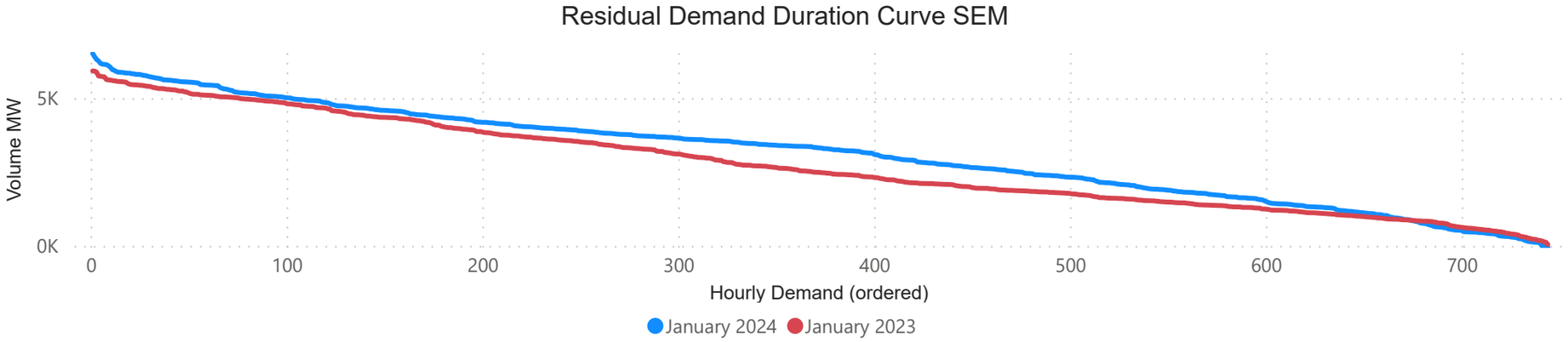
Price Duration
The price duration curve shows the hourly DAM prices across the month ordered from the largest to the smallest.

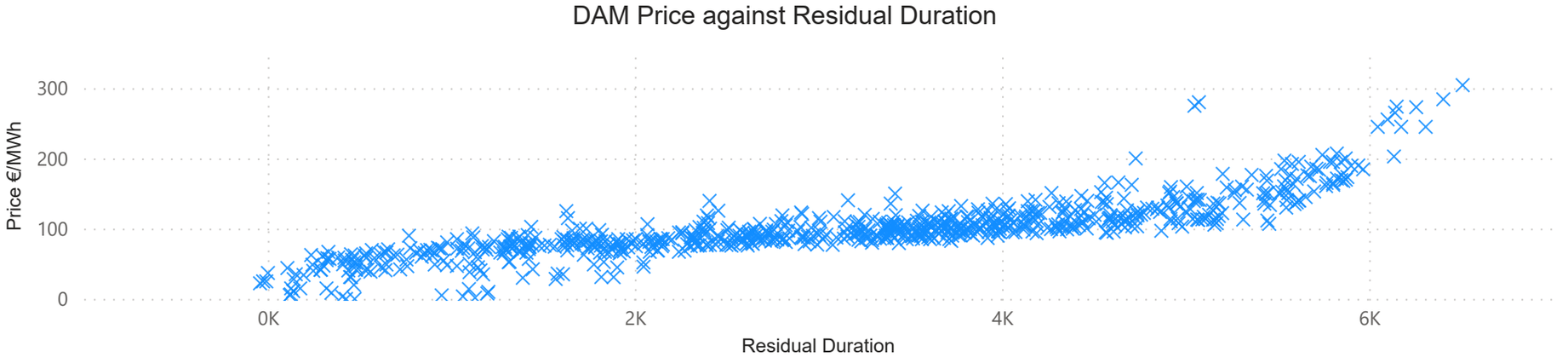
Residual Duration
The residual demand curve shows the ordered hourly demand level across the month which can't be met by renewable generation. Therefore, it shows the demand and frequency that conventical fossil fuel generators will be required to meet across the month.

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

SEM committee



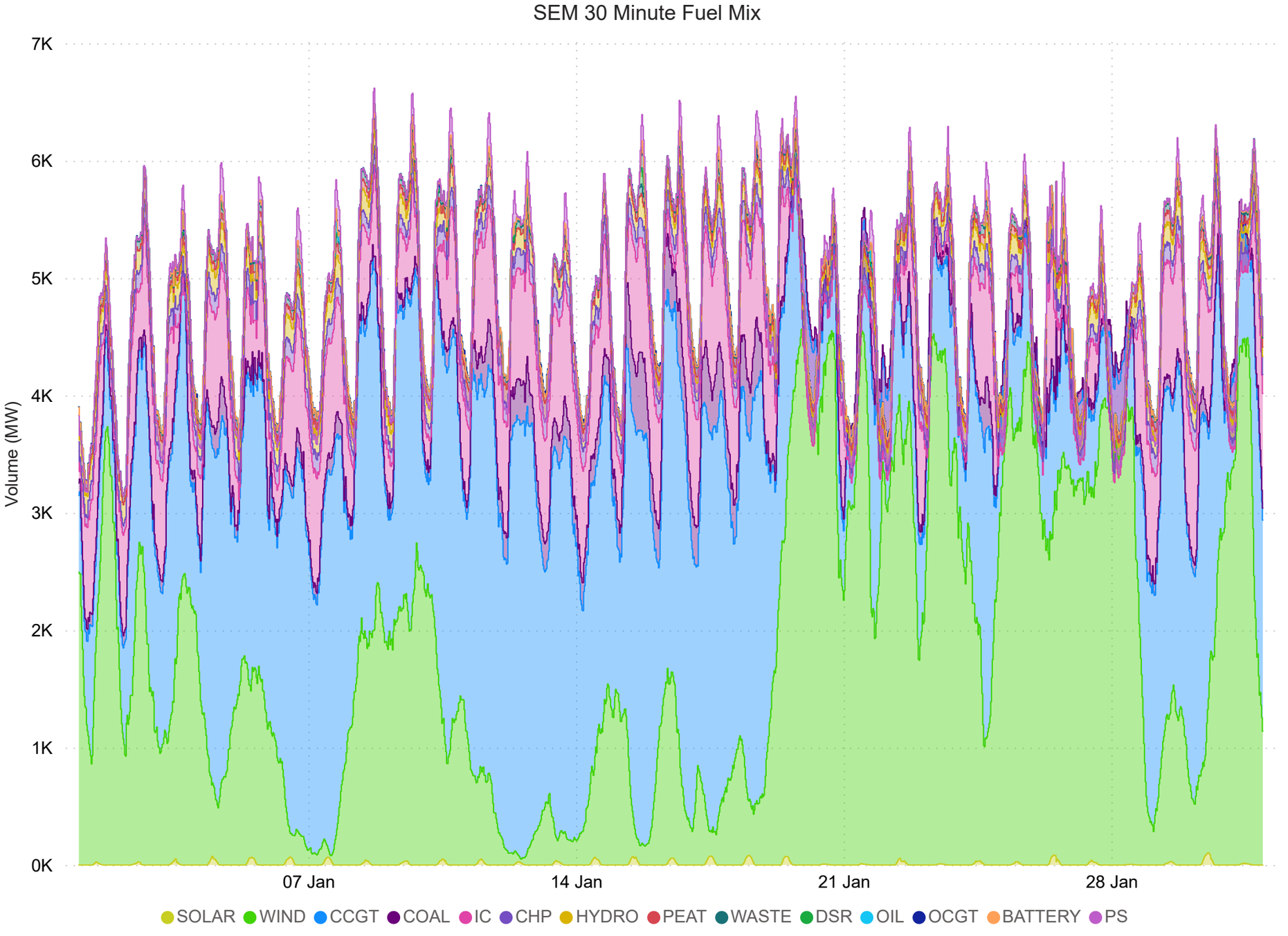




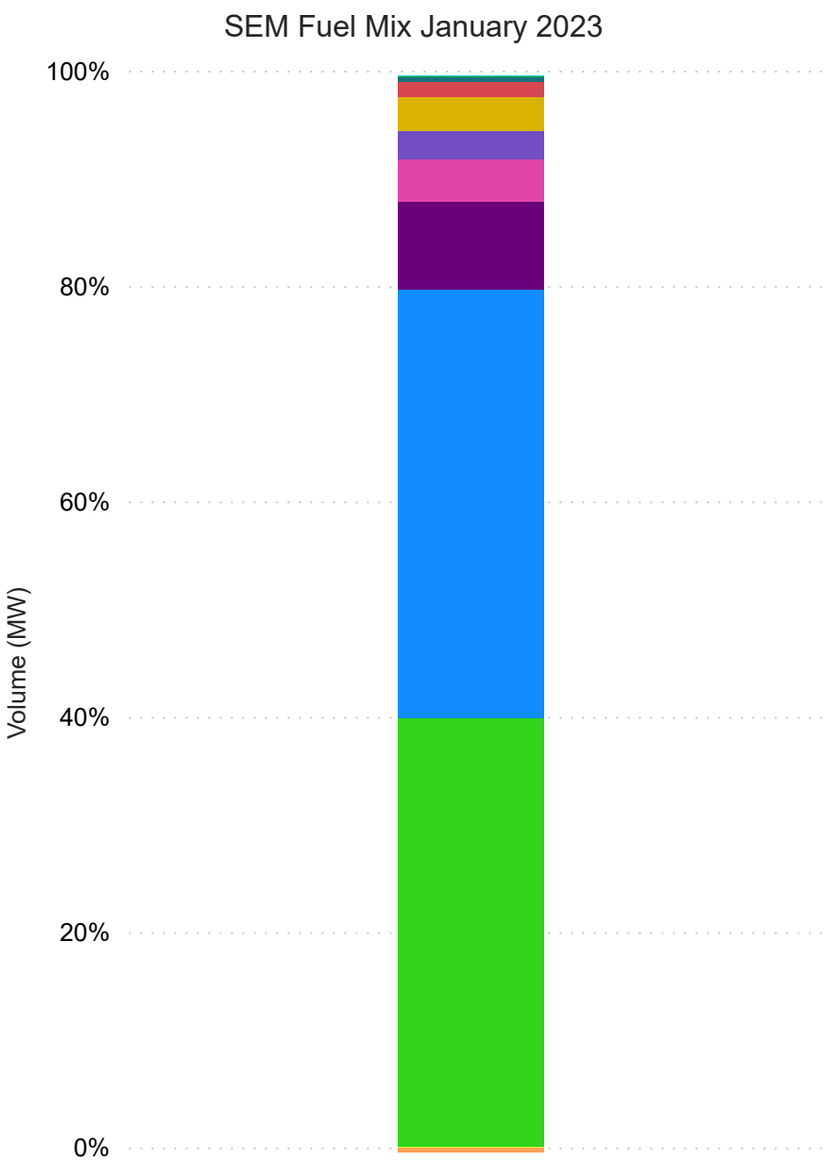
Fuel Mix January 2024

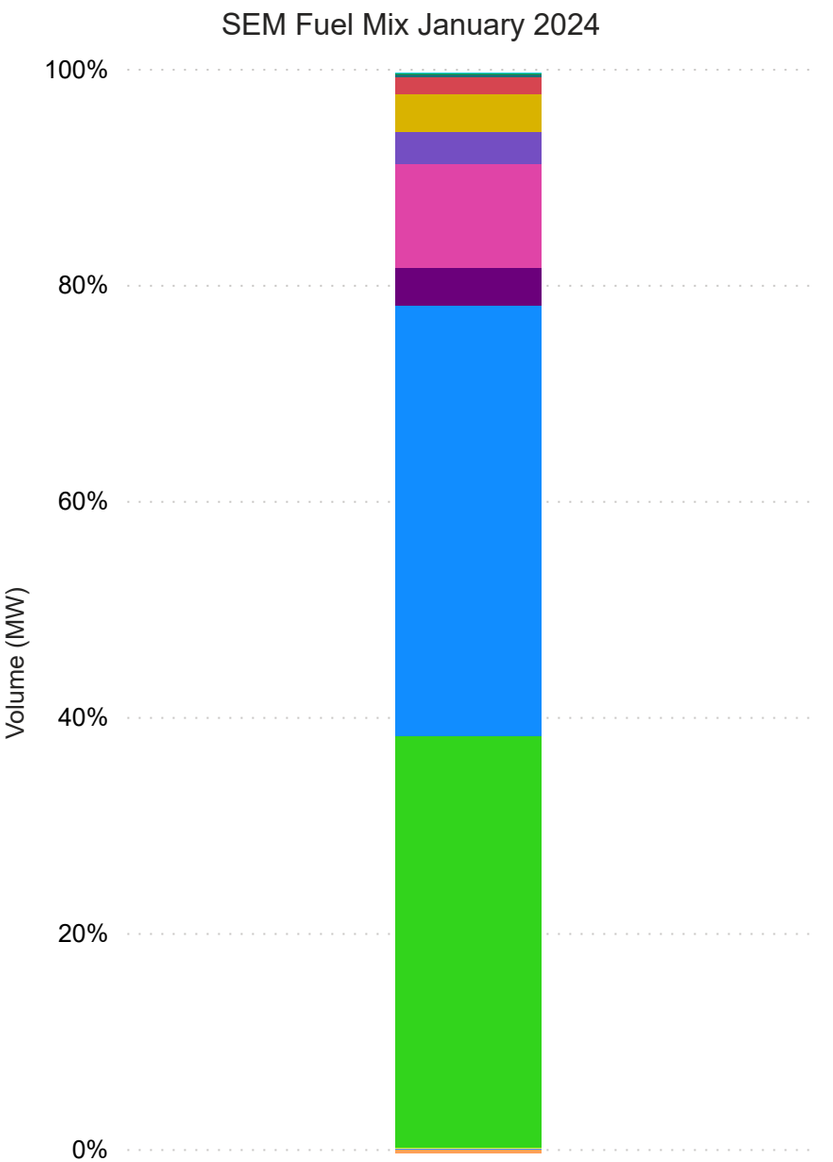
Fuel Type	Monthly Average	Monthly %
CCGT	1,947	39.8%
WIND	1,855	37.9%
INTERCONNECTOR	468	9.6%
COAL	170	3.5%
HYDRO	171	3.5%
CHP	145	3.0%
PEAT	51	1.1%
WASTE	75	1.5%
SOLAR	8	0.2%
DSR	16	0.3%
OIL	2	0.0%
OCGT	1	0.0%
BATTERY	-4	-0.1%
PUMPED STORAGE	-16	-0.3%

Fuel Type	Max	Min
CCGT	3,794	562
WIND	4,567	31
INTERCONNECTOR	981	-935
COAL	670	66
HYDRO	210	90
CHP	171	74
PEAT	102	0
WASTE	81	43
SOLAR	104	0
DSR	143	0
OIL	198	0
OCGT	153	0
BATTERY	99	-43
PUMPED STORAGE	292	-299



Fuel Mix Comparison January 2023 & 2024





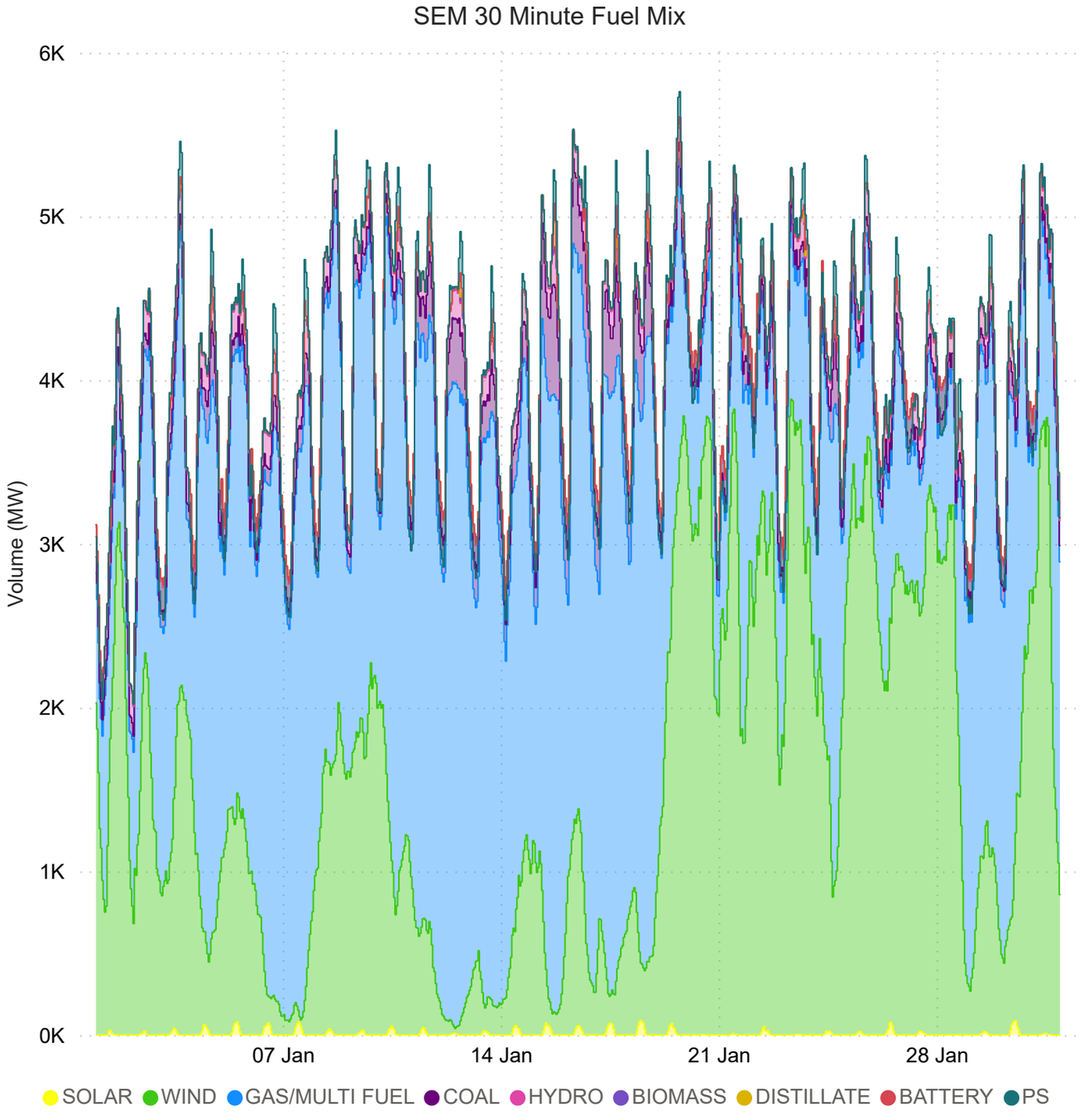
Fuel Mix January 2024

Monthly Average Volume (MW) by Fuel Type

2,149.93 Gas/Multi Fuel	1,555.53 Wind
165.57 Coal	170.10 Hydro
13.13 Biomass	8.34 Solar
1.40 Distillate	2.23 Battery
-16.57 Pump Storage	

Monthly Max\Min Volumes (MW) by Fuel Type

3,942.17 Max Gas/Multi Fuel	707.27 Min Gas/Multi Fuel
3,883.44 Max Wind	30.06 Min Wind
670.00 Max Coal	99.00 Min Coal
213.60 Max Hydro	93.00 Min Hydro
16.00 Max Biomass	0.00 Min Biomass
90.46 Max Solar	0.00 Min Solar
175.07 Max Distillate	0.00 Min Distillate
154.95 Max Battery	0.00 Min Battery
292.00 Max Pump Storage	-287.77 Min Pump Storage



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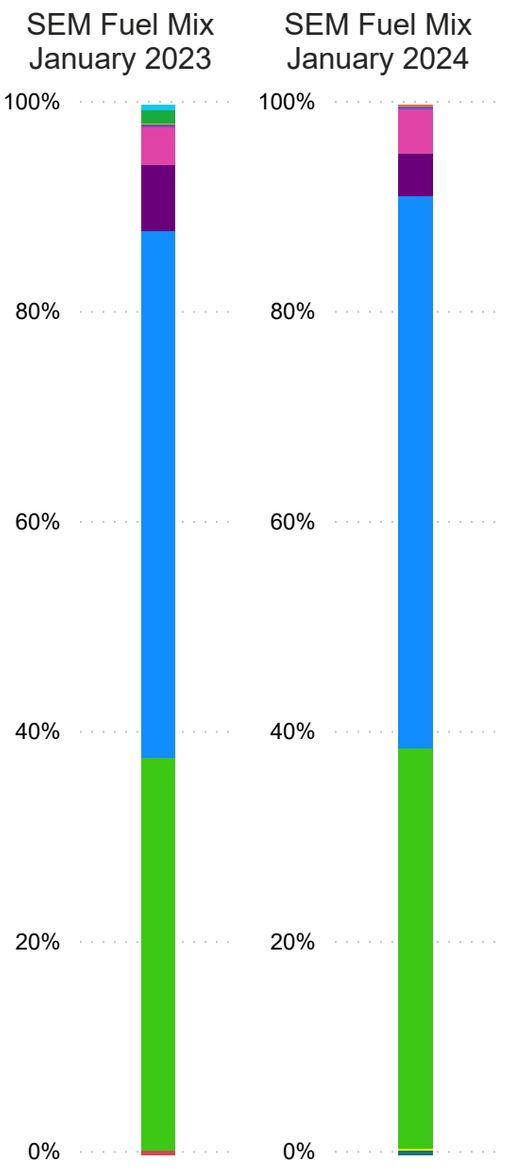


Fuel Mix Ranked by Wind Volume January 2024

SEM committee

Daily SEM Fuel Mix Ranked by Wind Volume for the Month

Volume (MW)

6K
5K
4K
3K
2K
1K
0K

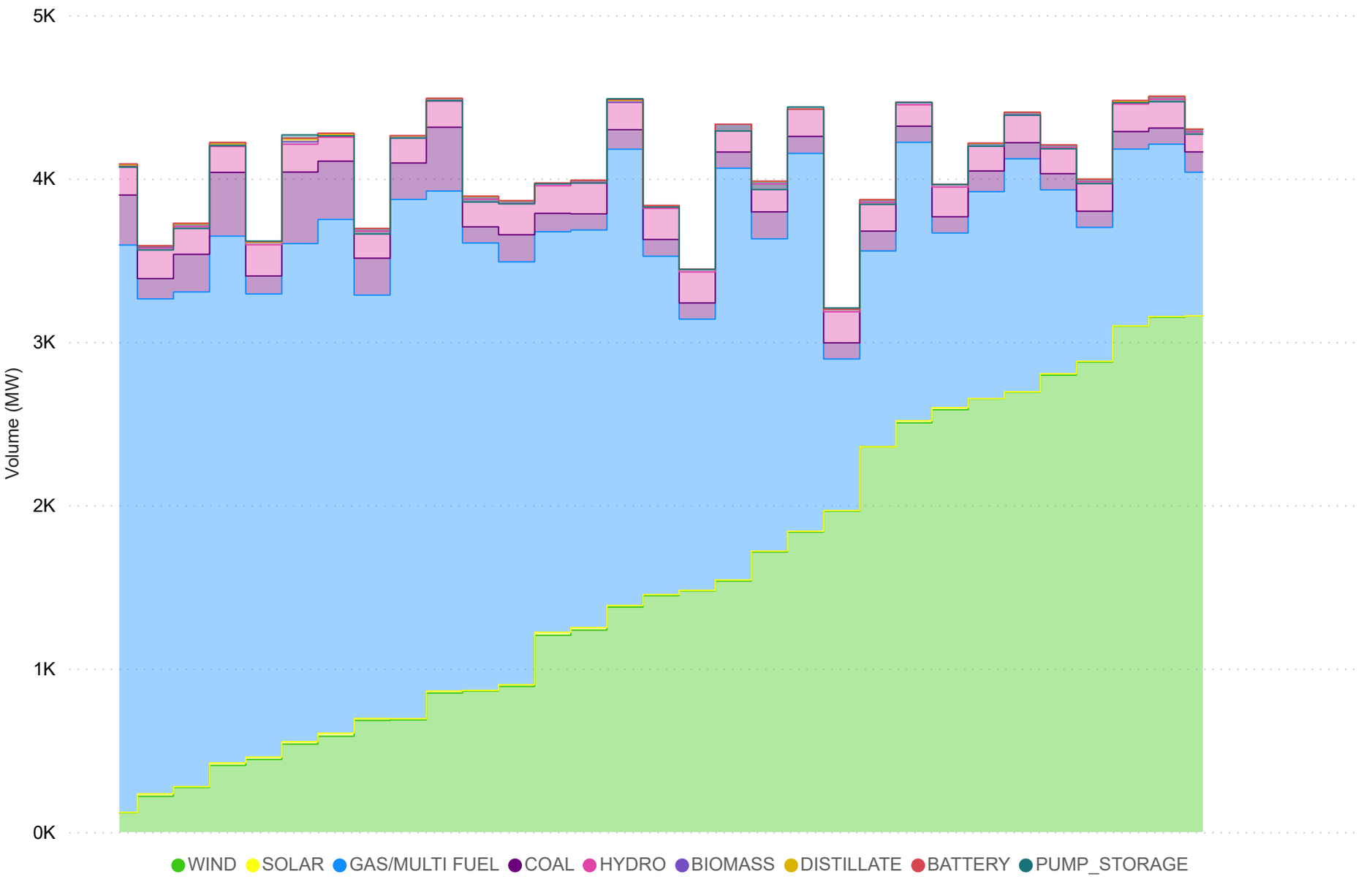
WIND SOLAR CCGT COAL IC CHP HYDRO PEAT WASTE DSR OIL OCGT BATTERY PS

Fuel Mix Ranked by Wind Volume

January 2024

SEM committee

Daily SEM Fuel Mix Ranked by Wind Volume for the Month



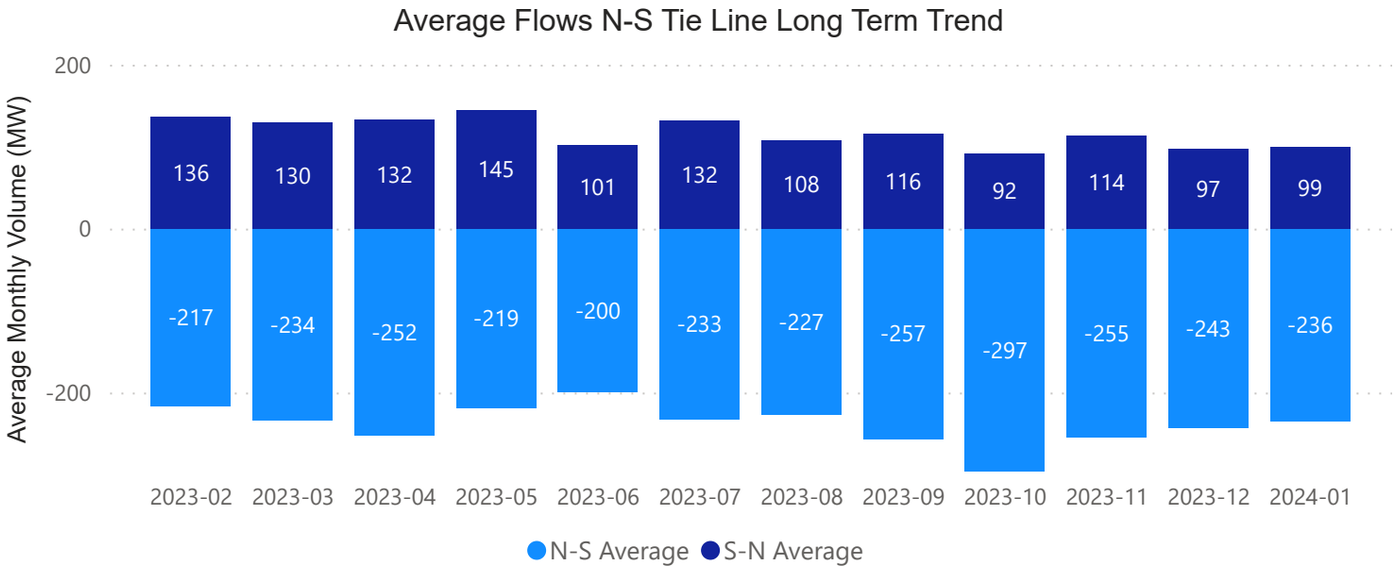
North-South Tie Line January 2024

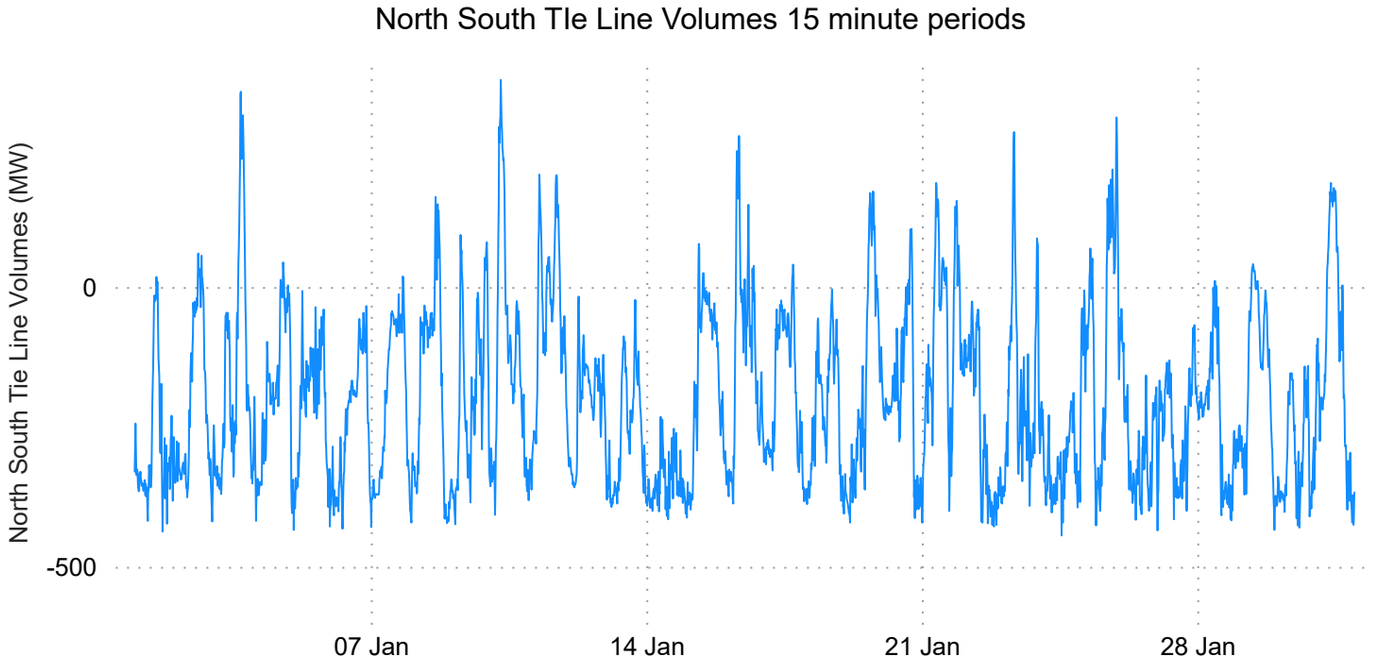
Average Flow NI to ROI (MW)
-235.59

Average Flow ROI to NI (MW)
99.28

Average Net Flow NI to ROI (MW)
-200.24

-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 in January. This has been the long term trend. There are persistence reasons for this trend.

•When the wind penetration is high in Northern Ireland, 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. Similarly 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.

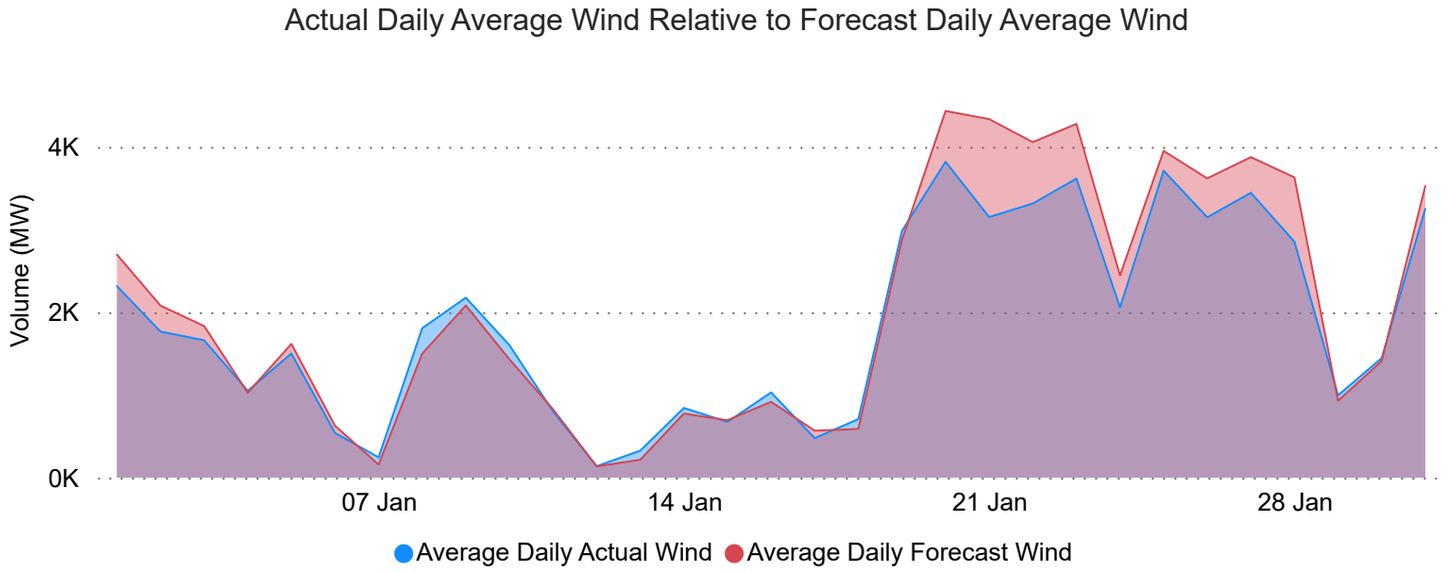
Wind Generation January 2024

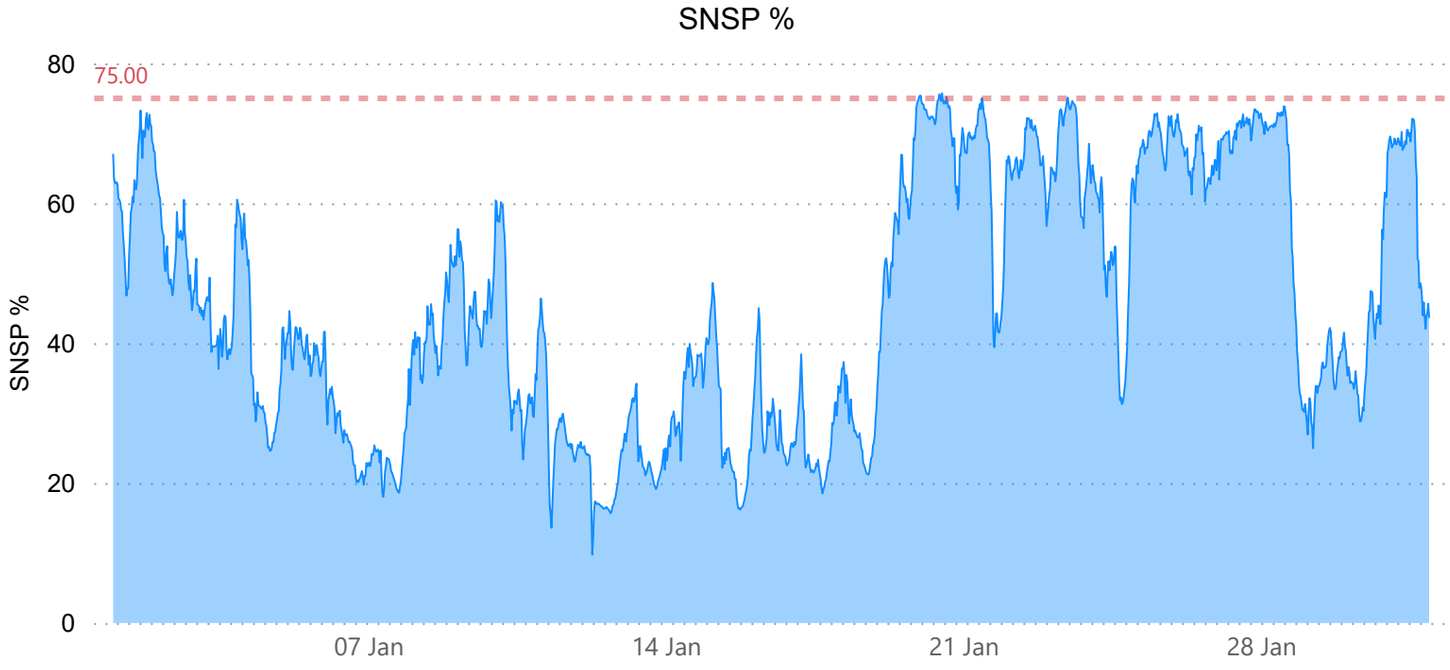
Average Daily Actual Wind (MW)
1,854

Average Daily Forecast Wind (MW)
2,037

Min SNSP%
9.77

Max SNSP%
75.73





Wind Generation

Wind generation was considerably lower compared to the previous month and would be classed as low-medium intensity month. The chart shows 13 days with wind levels averaging above 2k MWs.

SNSP

SNSP is closely linked to wind generation and as such follows the same trend across the month. The highest SNSP level was on 20th January 12:00 which corresponds to peak actual wind levels for the month.

CO_2 January 2024

CO2 Intensity (gCO2/kWh)

226.06
Average

105
Lowest

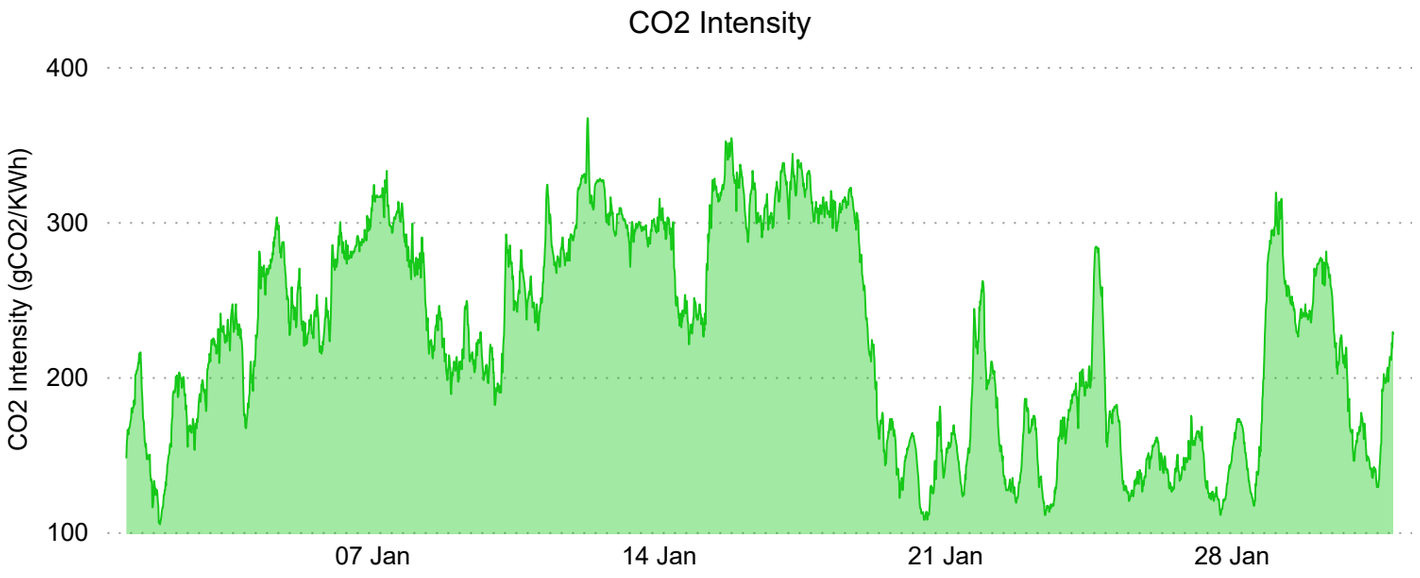
367
Highest

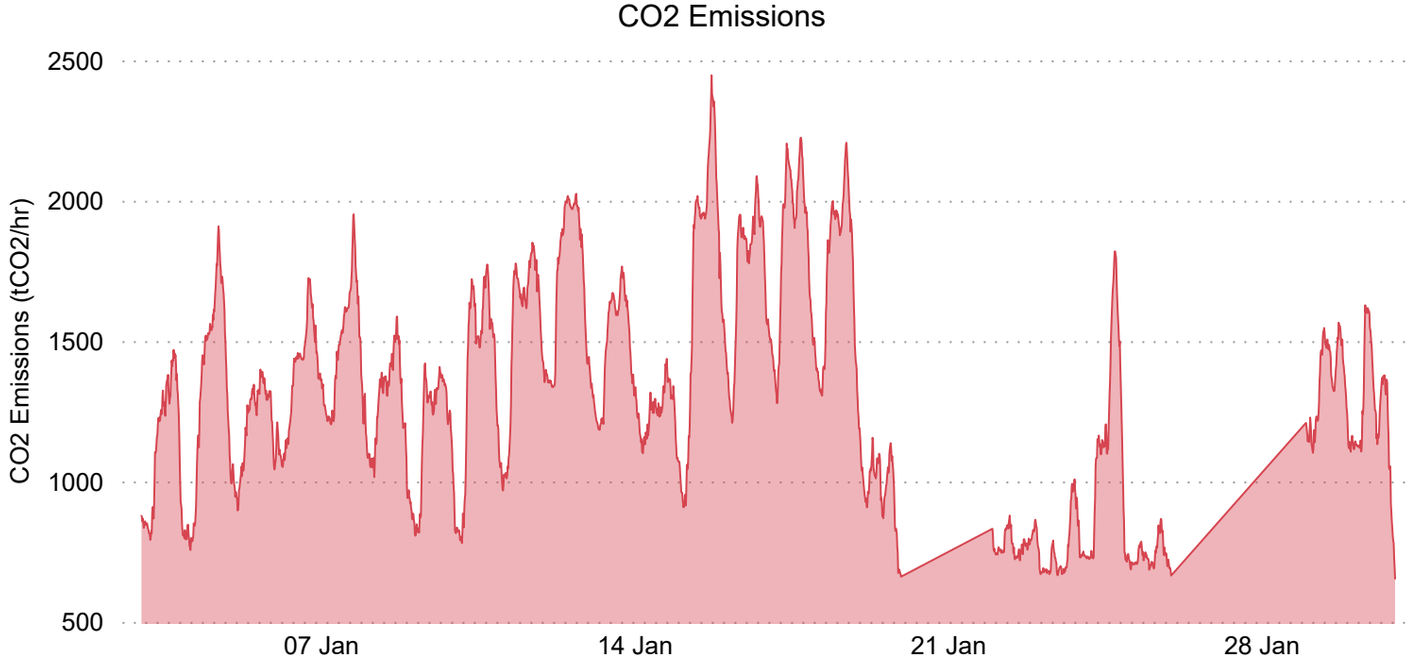
CO2 Emissions (tCO2/hr)

1312.89
Average

654
Lowest

2447
Highest





CO_2 Intensity

CO_2 Intensity should be negatively correlated with the volume of wind generation availability on the system. This is most evident around 21st - 29th January with low CO2 intensity correlating to high wind levels. Peak CO_2 Intensity occurred the 12th January at 06:30.

CO_2 Emissions

CO_2 intensity is directly related to emissions and therefore follows the same trends as CO_2 intensity levels over the course of the month.

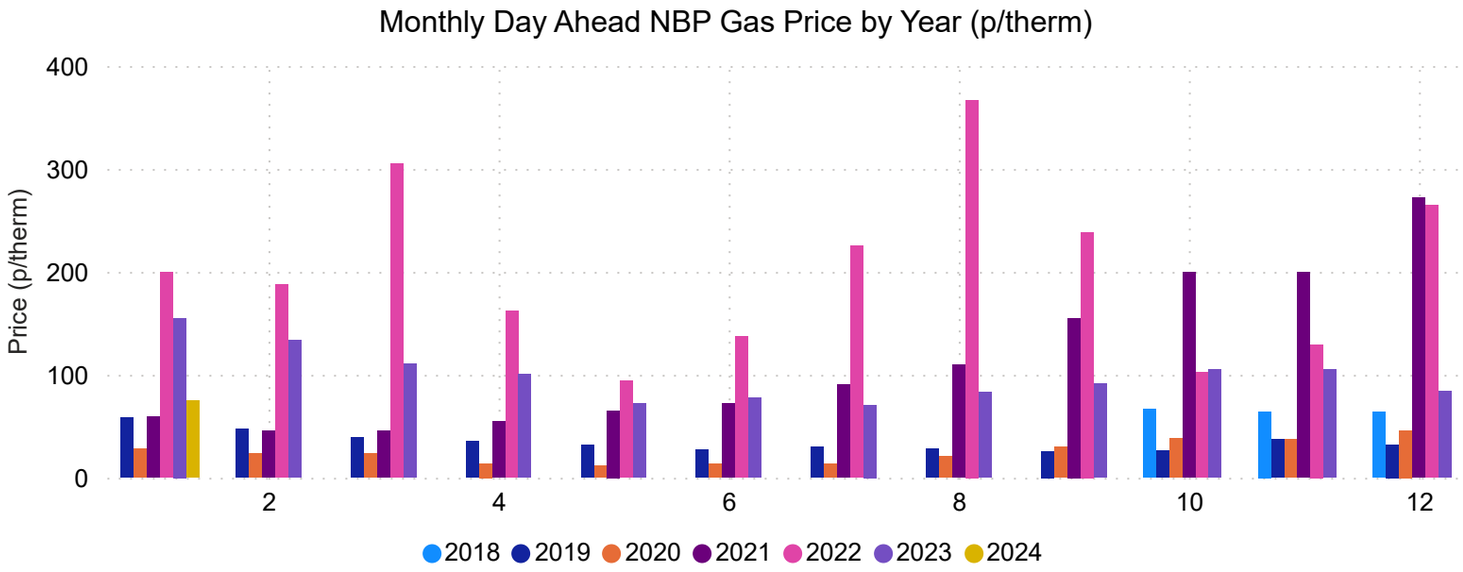
Fuel Costs and Spreads

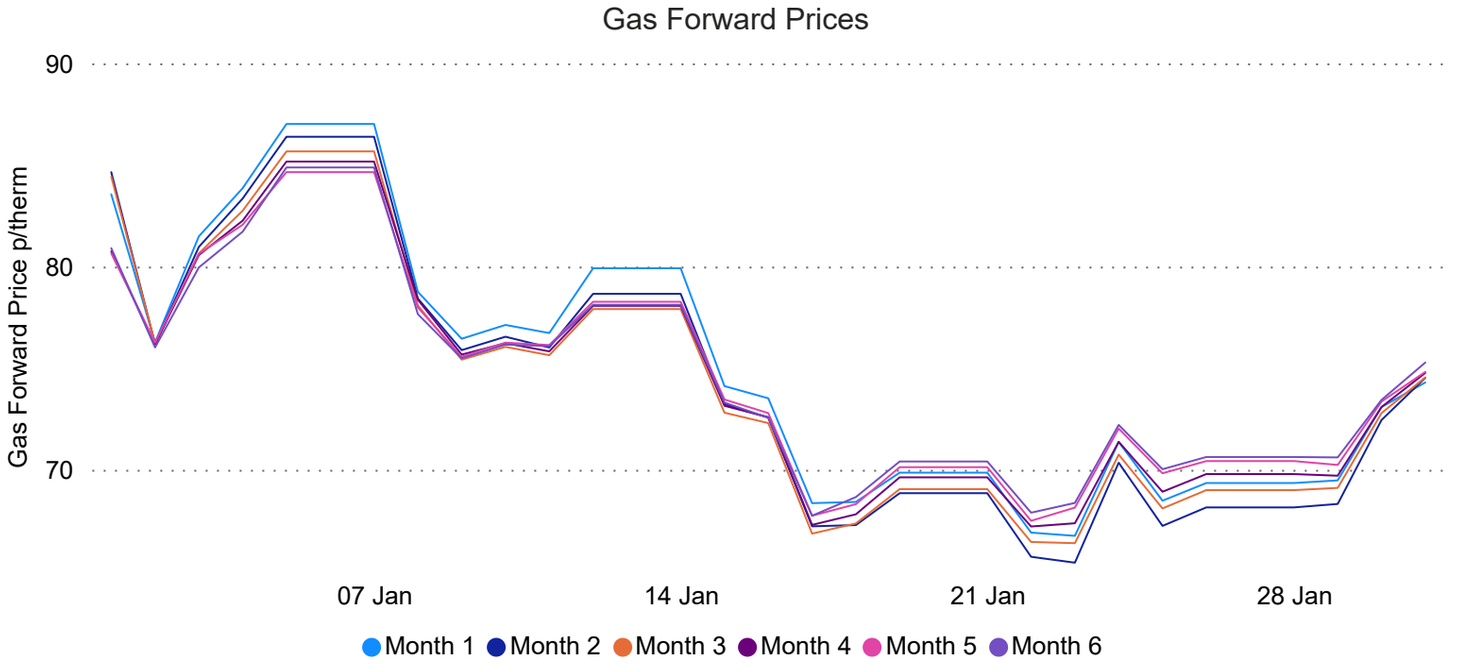
Gas Price January 2024

74.87
Monthly Average (p/therm)

65.40
Monthly Low (p/therm)

87.25
Monthly High (p/therm)





Gas Prices

Gas prices has dropped 11% compared to the previous month from 84.20p to 74.87p.

Gas Forward Prices

Similarly, Gas forward prices demonstrate a similar general decrease during the month.

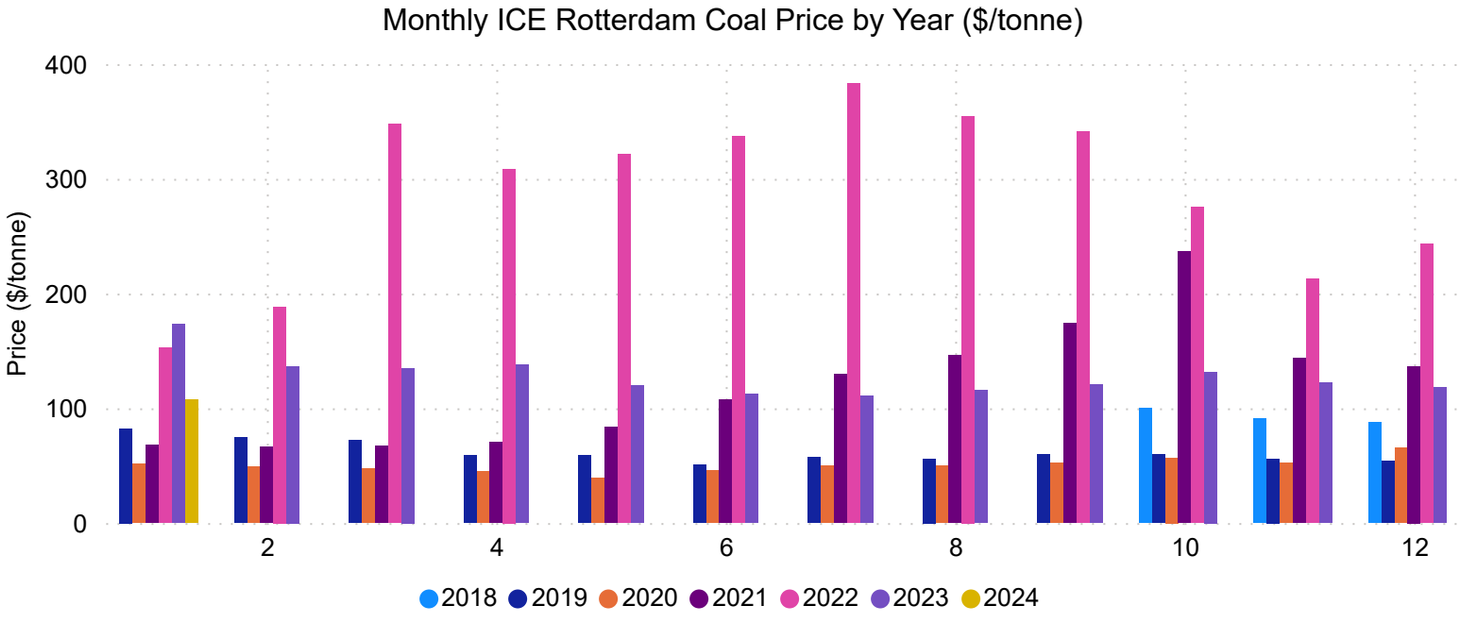
Coal Price January 2024

Coal Prices Per Tonne

$107.65
Monthly Average

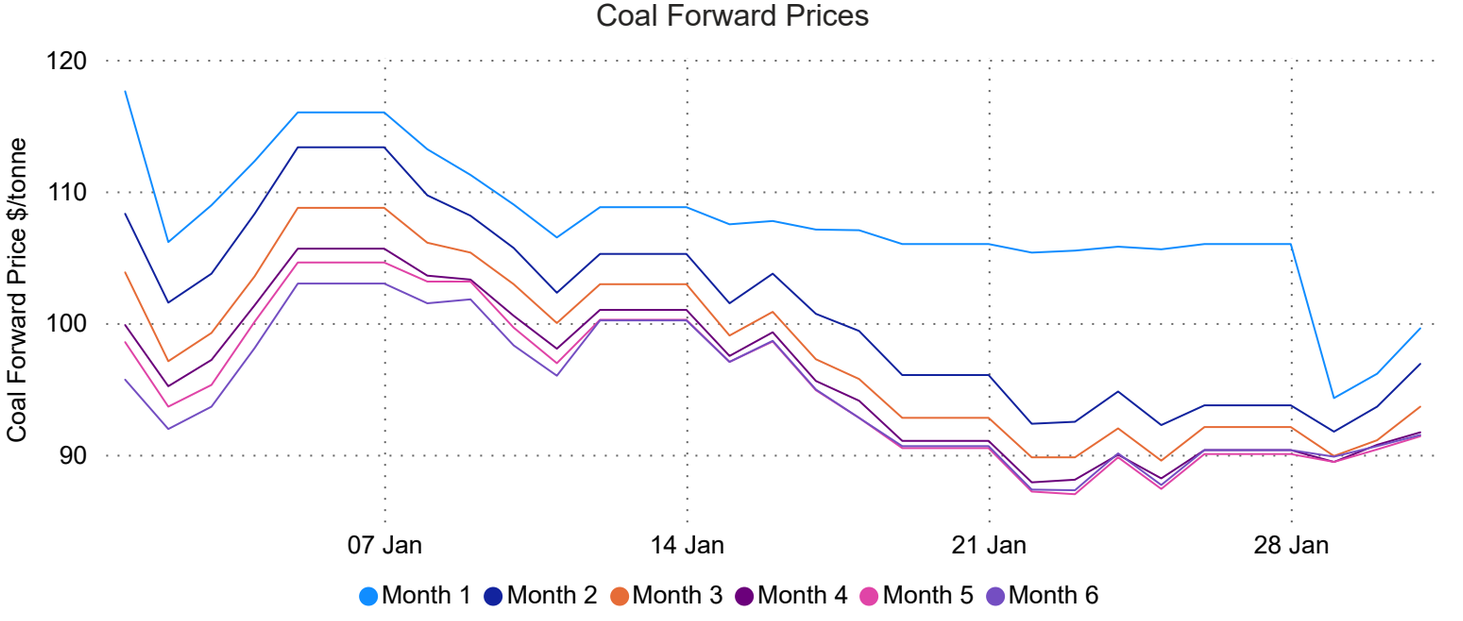
$94.30
Monthly Low

$117.60
Monthly High



Coal Prices

Coal prices were slightly lower compared to the previous month at $107.65/tonne.



Coal Forward Prices

Coal forward prices demonstrate a small general decrease during the month.

Carbon Price January 2024

EU Carbon Prices (€/tonne)

€ 65.52
Monthly Average

€ 59.58
Monthly Low

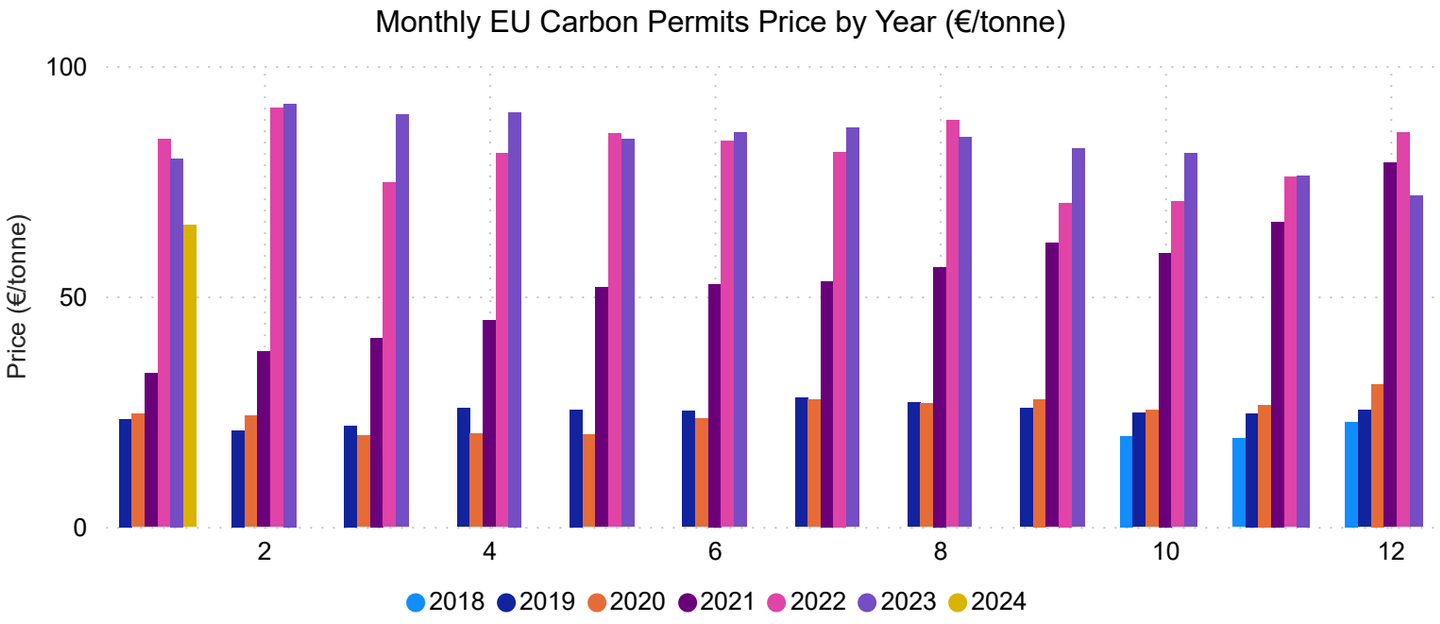
€ 77.50
Monthly High

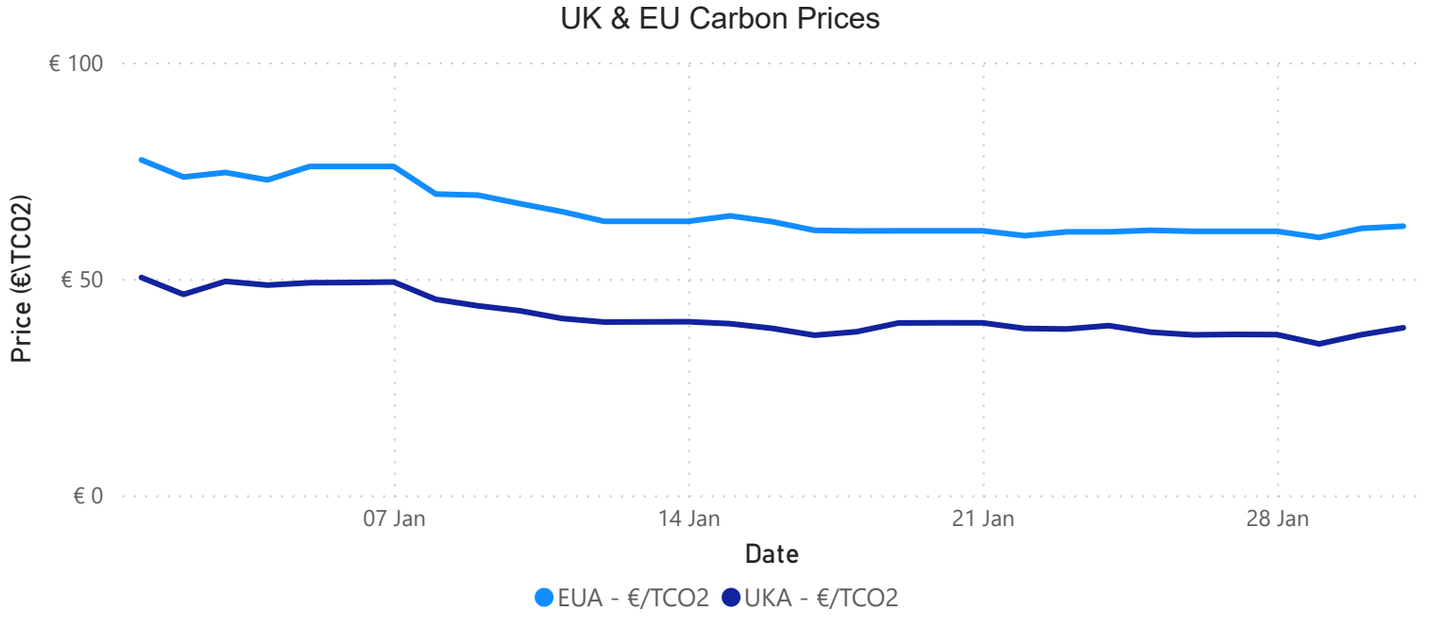
UK Carbon Prices (€/tonne)

€ 41.41
Monthly Average

€ 35.00
Monthly Low

€ 50.33
Monthly High





Carbon Prices

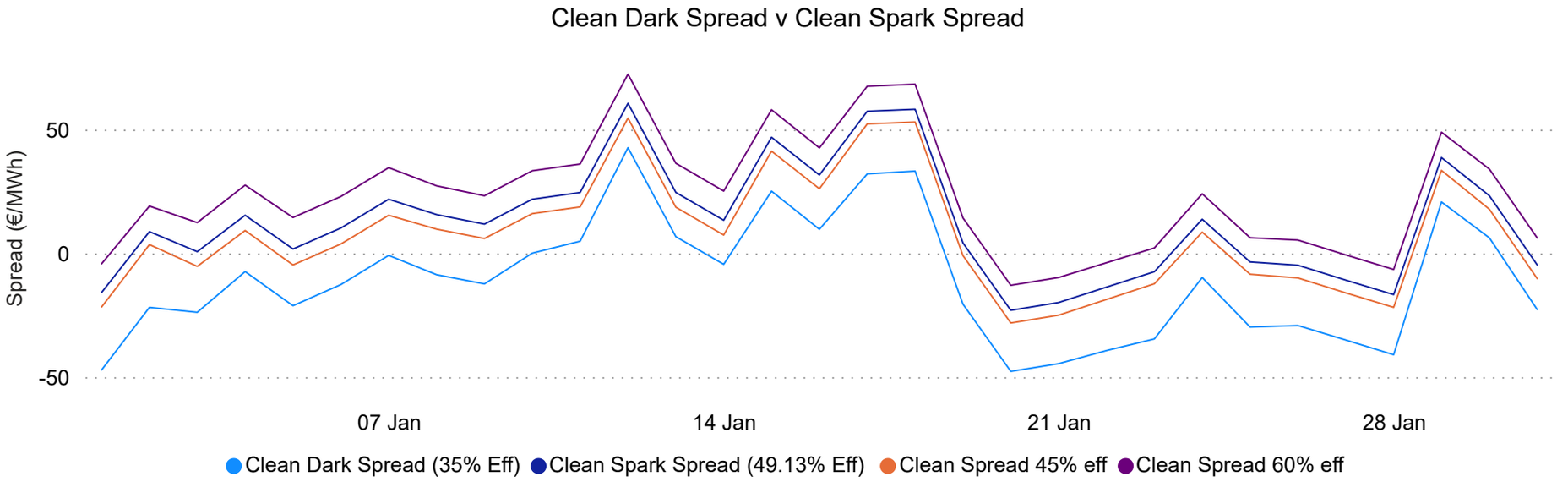
Carbon has fallen relative to the previous month by 9%.

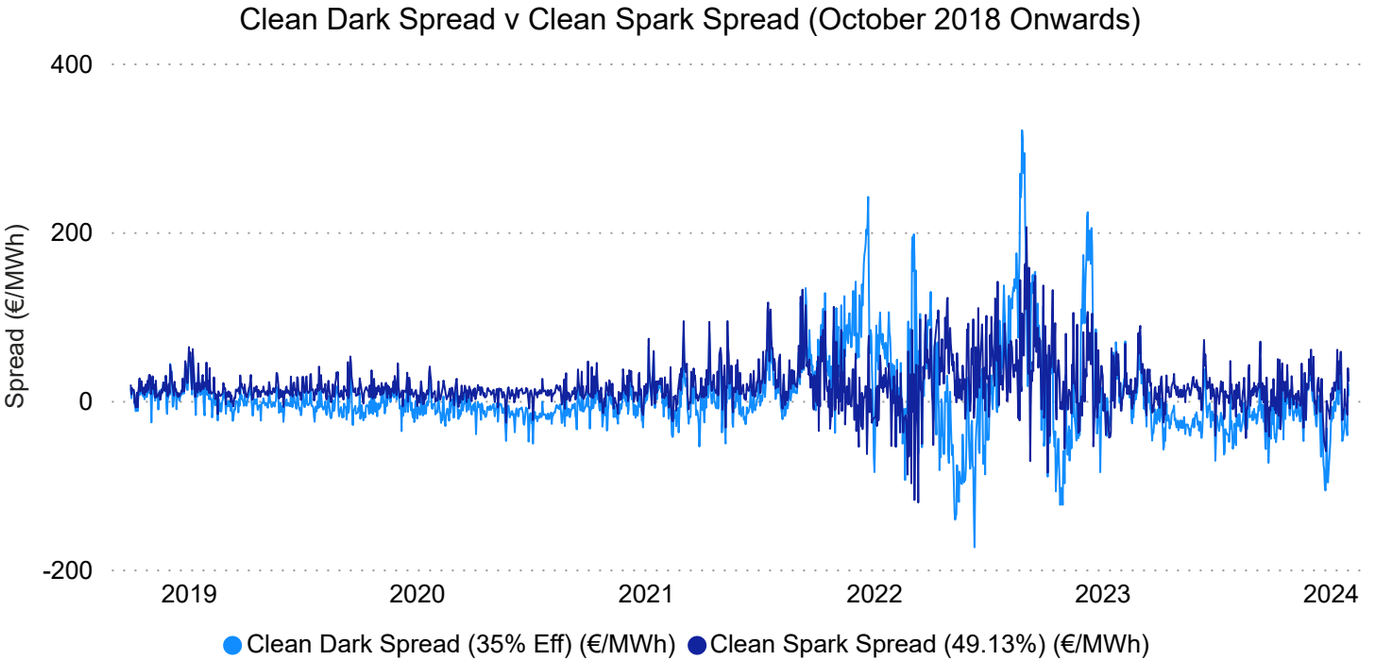
The EU's emission trading system (EU ETS) began to implement new rules that were agreed last year in the hope of meeting its climate targets, which make the system stricter for the largest polluters. This was coupled with increased demand, as companies had to buy and submit enough CO2 permits to cover its emissions for last year.

Spark Spreads January 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 positive between 10th -18th January and negative for the rest of the month. This corresponds to lower wind and higher prices.
Clean Spark Spread was generally positive for the first half of the month and negative 21th -28th when the wind increases for a sustained period.