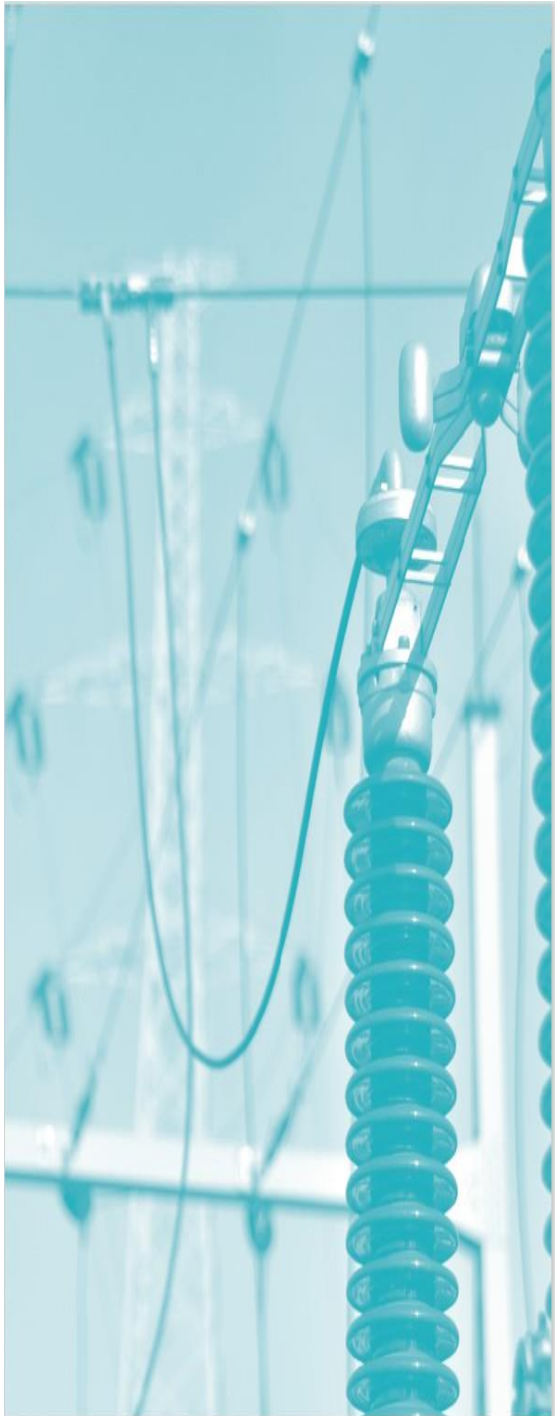


# Energy Market Monitoring Report

## July 2024



## Market Results

# Summary Dashboard

Monthly Averages	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24
DAM (€/MWh)	96.24	106.46	111.62	125.54	122.9	88.97	99.9	84.6	86.67	88.52	107.75	107.74	110.94
% Change from previous month	-18%	11%	5%	12%	-2%	-28%	12%	-15%	2%	2%	22%	0%	3%
% Change from previous year	-64%	-73%	-61%	-8%	-14%	-68%	-38%	-47%	-40%	-30%	2%	-8%	15%
Actual System Demand (MW)	4101	4185	4335	4516	4873	4862	5151	4946	4833	4610	4356	4193	4279
% Change from previous month	-2%	2%	4%	4%	8%	0%	6%	-4%	-2%	-5%	-6%	-4%	2%
% Change from previous year	0%	2%	3%	4%	5%	0%	5%	3%	0%	3%	2%	0%	4%
Actual Wind Generation (MW)	1316	1401	1384	1363	1811	2446	1854	2000	2072	1496	894	1072	883
% Change from previous month	50%	6%	-1%	-2%	33%	35%	-24%	8%	4%	-28%	-40%	20%	-18%
% Change from previous year	54%	71%	28%	-33%	-19%	49%	-7%	-1%	19%	-3%	1%	22%	-33%
Gas Price p/therm	70.76	82.87	91.52	104.88	104.97	84.2	74.87	63.37	68.18	71.69	76.69	81.51	75.07
% Change from previous month	-9%	17%	10%	15%	0%	-20%	-11%	-15%	8%	5%	7%	6%	-8%
% Change from previous year	-68%	-77%	-61%	3%	-19%	-68%	-52%	-53%	-39%	-29%	6%	5%	6%
Carbon Price (€/Tonne)	86.57	84.61	82.09	81.10	76.25	71.79	65.52	55.79	57.94	63.25	70.90	68.29	67.00
% Change from previous month	1%	-2%	-3%	-1%	-6%	-6%	-9%	-15%	4%	9%	12%	-4%	-2%
% Change from previous year	6%	-4%	17%	15%	1%	-16%	-18%	-39%	-35%	-30%	-16%	-20%	-23%
Coal Price (\$/tonne)	111.02	115.57	120.40	131.80	122.16	118.31	107.65	96.84	111.78	118.13	106.15	109.54	105.93
% Change from previous month	-1%	4%	4%	9%	-7%	-3%	-9%	-10%	15%	6%	-10%	3%	-3%
% Change from previous year	-71%	-67%	-65%	-52%	-43%	-51%	-38%	-29%	-17%	-14%	-11%	-3%	-5%
EWIC % Import Periods	67.11%	68.11%	73.75%	86.90%	68.78%	56.38%	69.76%	69.10%	63.78%	81.94%	84.98%	85.90%	94.59%
EWIC % Export Periods	9.21%	11.96%	8.89%	2.99%	9.11%	20.36%	14.78%	11.00%	11.32%	4.86%	0.67%	3.72%	1.11%
EWIC % Not Flow Periods	22.68%	19.93%	17.36%	10.11%	22.11%	23.25%	15.46%	19.90%	24.90%	13.19%	14.35%	10.38%	4.30%
Moyle % Import Periods	84.04%	75.24%	83.33%	92.31%	83.47%	67.81%	78.16%	79.59%	79.00%	87.40%	94.96%	92.47%	96.77%
Moyle % Export Periods	15.89%	20.33%	16.60%	7.66%	16.50%	32.16%	21.81%	20.34%	20.83%	12.50%	5.27%	7.53%	3.23%
Moyle % Not Flow Periods	0.07%	4.44%	0.07%	0.03%	0.03%	0.03%	0.03%	0.07%	0.17%	0.10%	0.03%	0.00%	0.00%

# Market Volumes July 2024

## Daily Average Volume MWh

DAM	106,583
IDA1	23,547
IDA2	2,289
IDA3	828
IDC	49

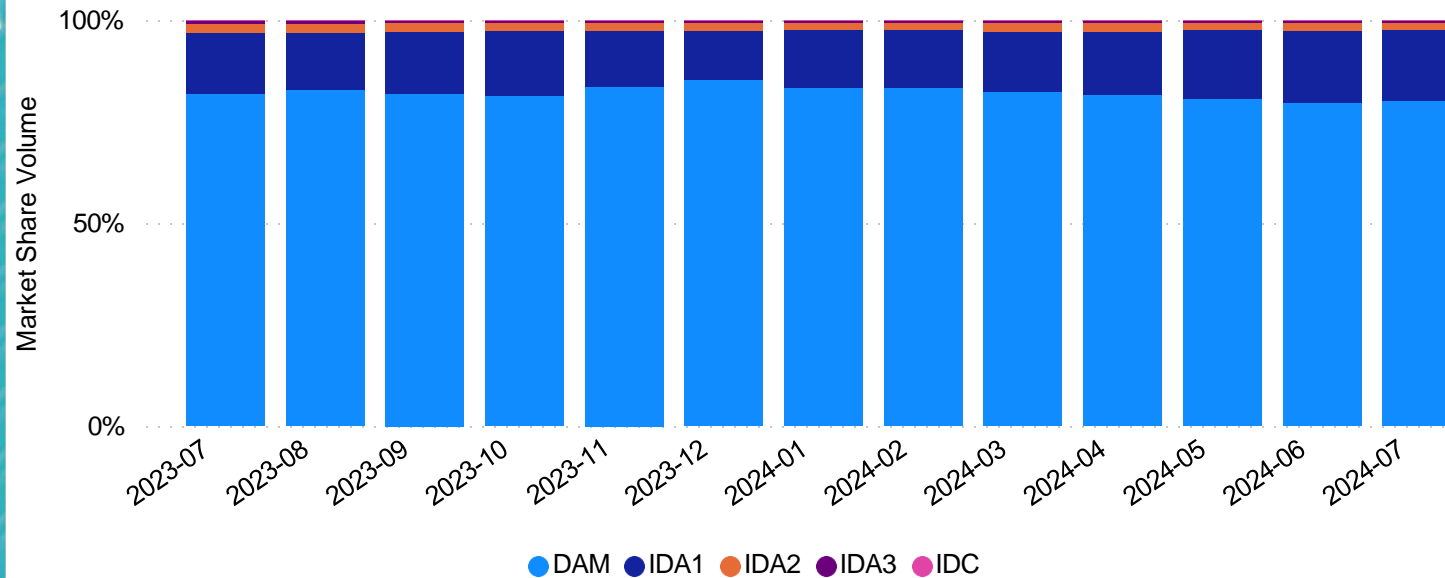
## Total Monthly Volume MWh

DAM	3,304,083
IDA1	729,953
IDA2	70,951
IDA3	25,654
IDC	931
<b>Total</b>	<b>4,131,572</b>

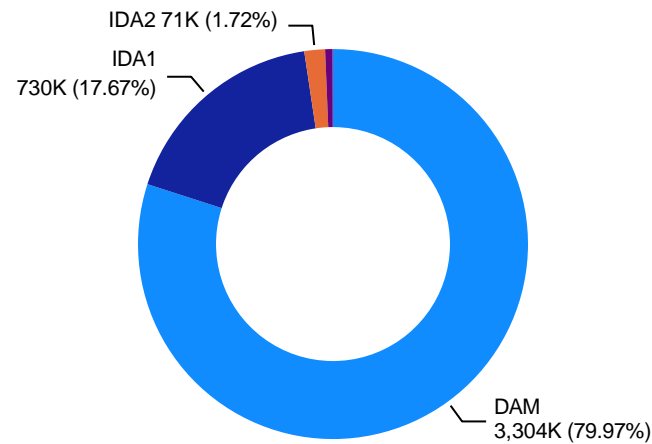
## Total Market Value €

DAM	€ 374,764,693
IDA1	€ 82,608,016
IDA2	€ 7,961,143
IDA3	€ 3,312,578
IDC	€ 128,403
<b>Total</b>	<b>€ 468,774,835</b>

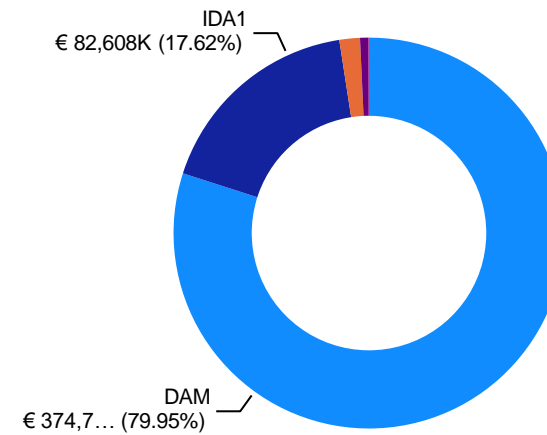
Ex-Ante Monthly Volume by Market



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.

● DAM ● IDA1 ● IDA2 ● IDA3 ● IDC

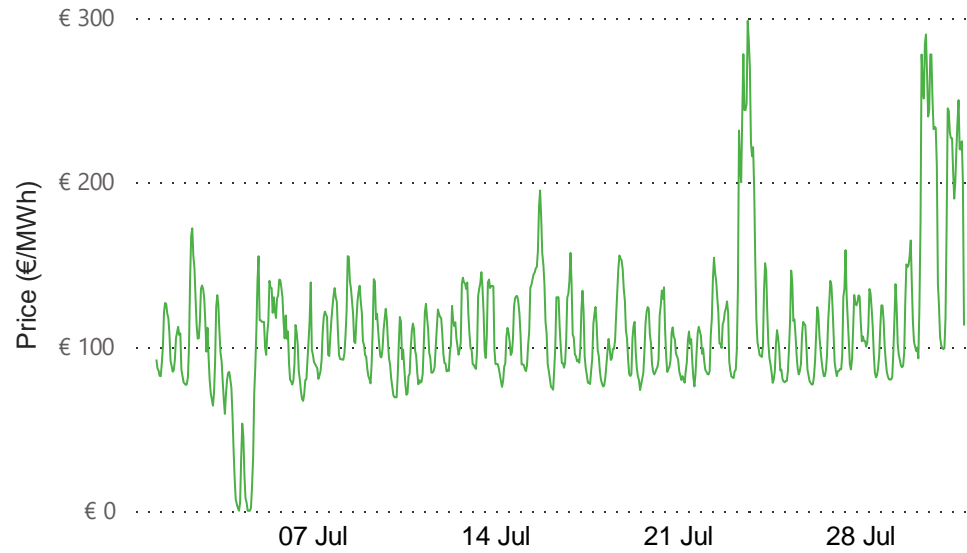
● DAM ● IDA1 ● IDA2 ● IDA3 ● IDC

# Day Ahead Market July 2024

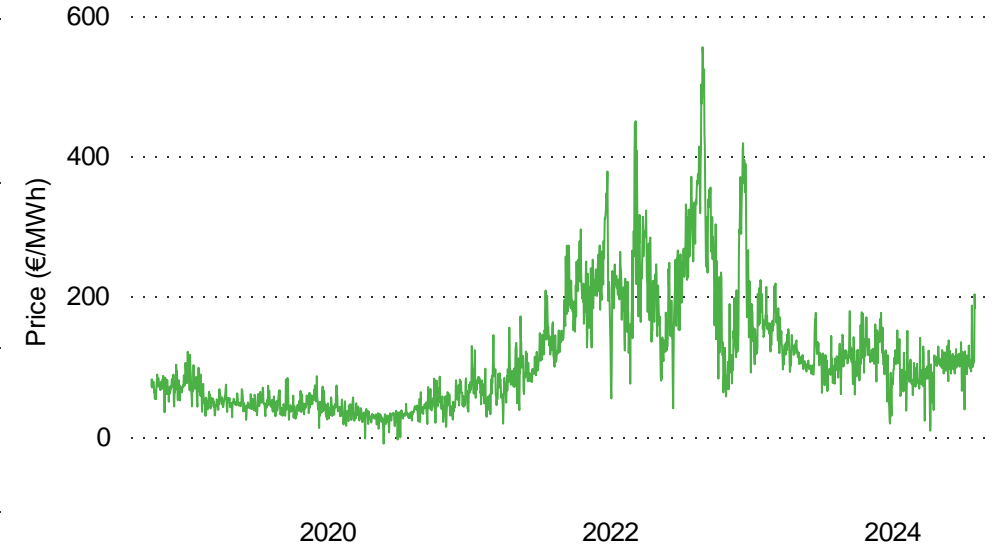
€ 110.94  
Average DAM Price  
€ 0.00  
Min DAM Price  
€ 298.33  
Max DAM Price

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

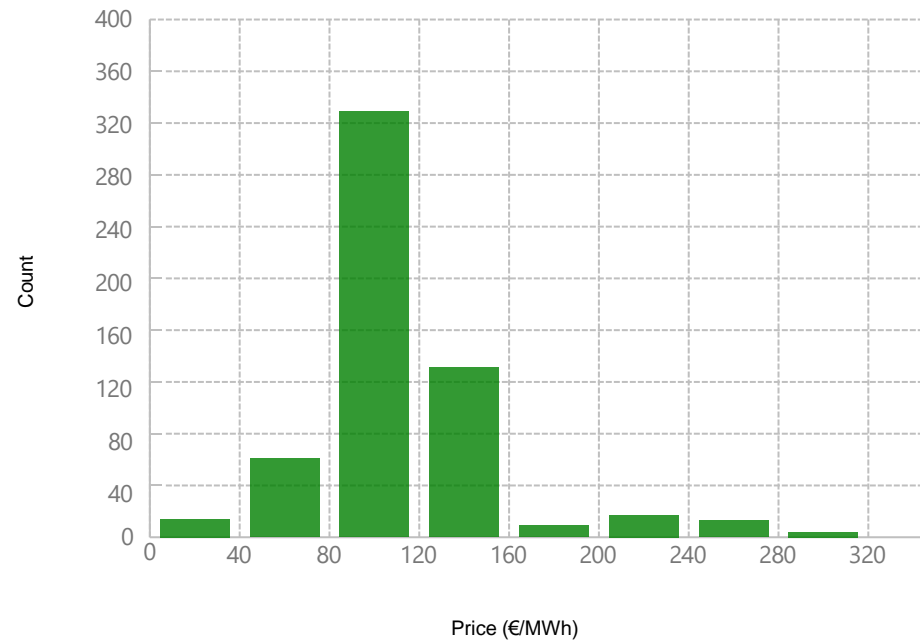
### DAM Prices



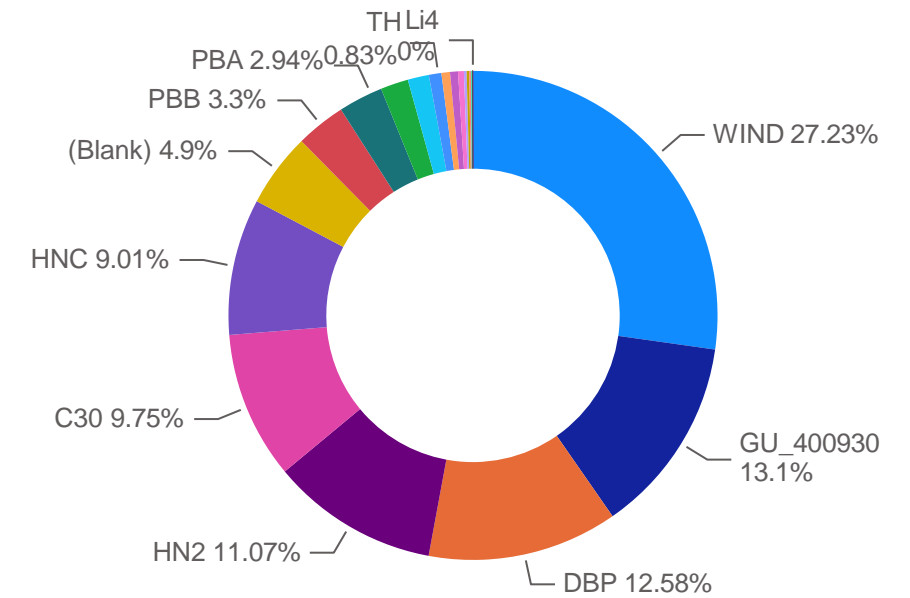
### Historic Daily Average DAM Prices



### Histogram of DAM Prices



### DAM Sell Side Generator Order Results

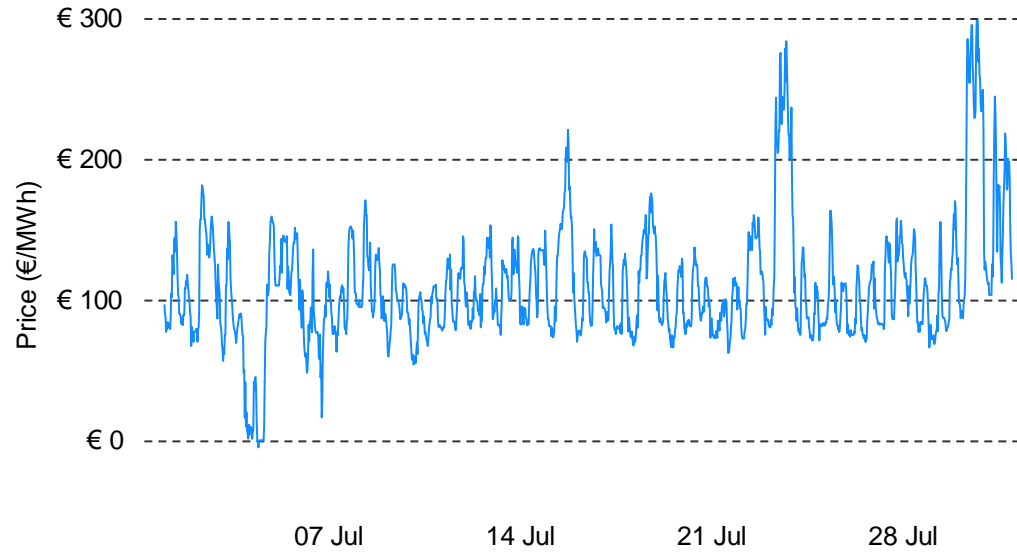


# Intraday Market July 2024

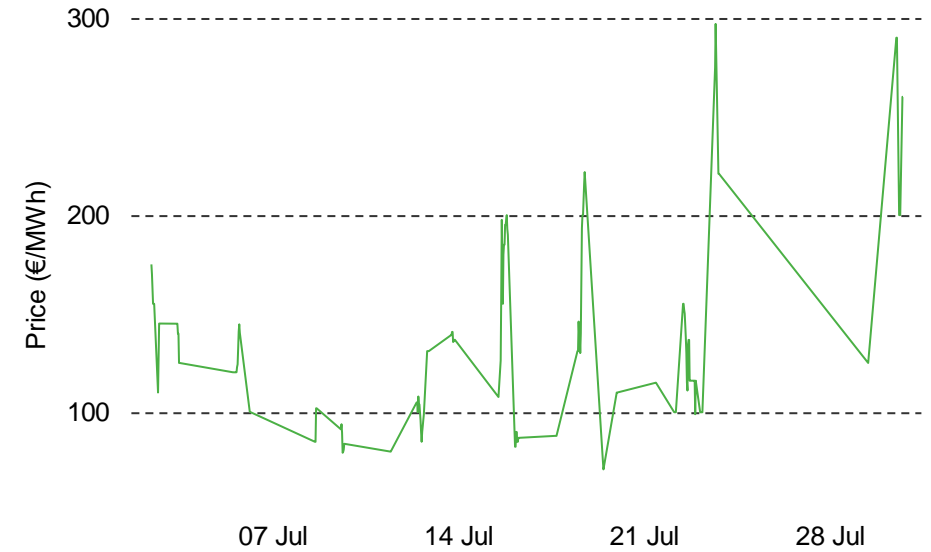
€ 109.78  
Average IDA1 Price  
-€ 5.00  
Min IDA1 Price  
€ 298.00  
Max IDA1 Price

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

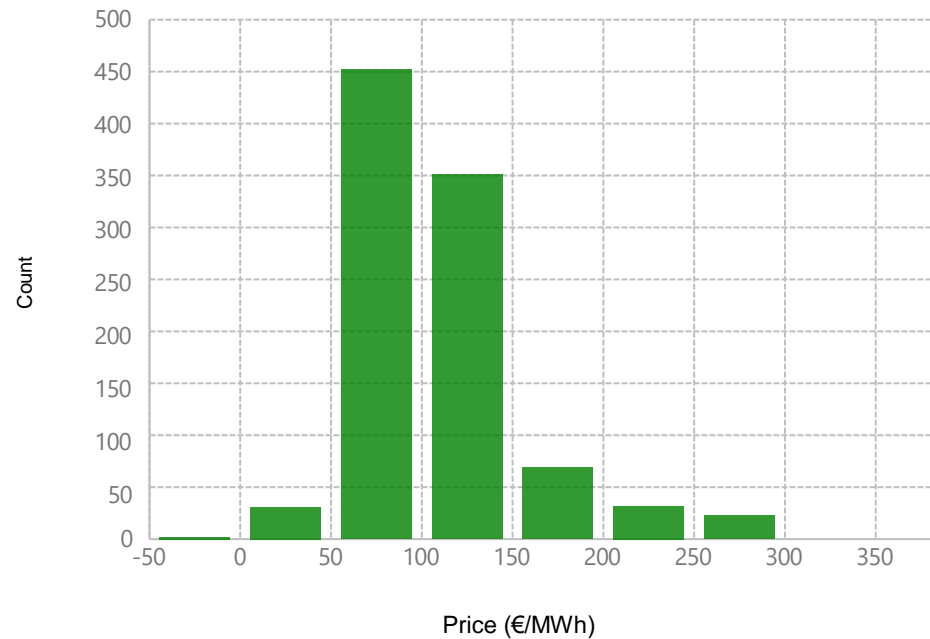
### IDA 1 Prices



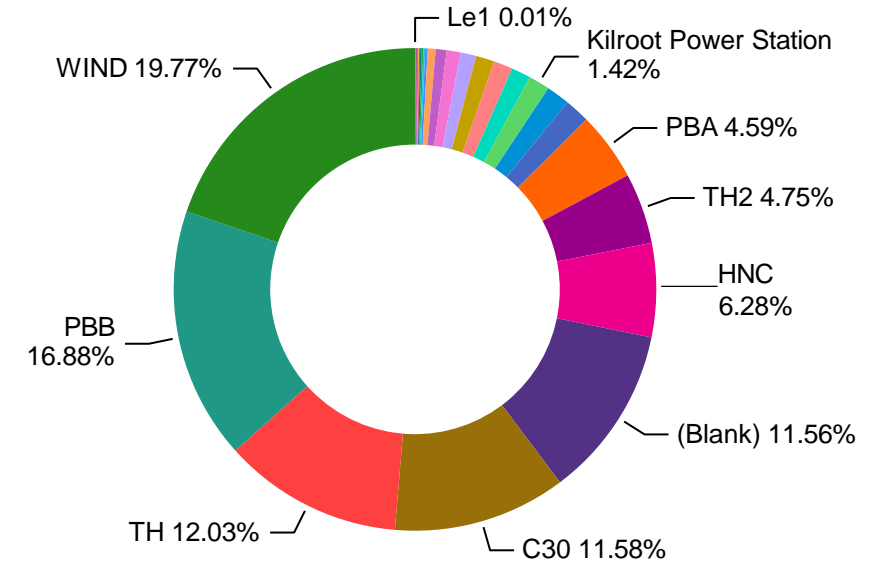
### IDC Prices



### Histogram of IDA1 Prices



### IDA1 Sell Order Results By Market Participant



# Intraday Market July 2024

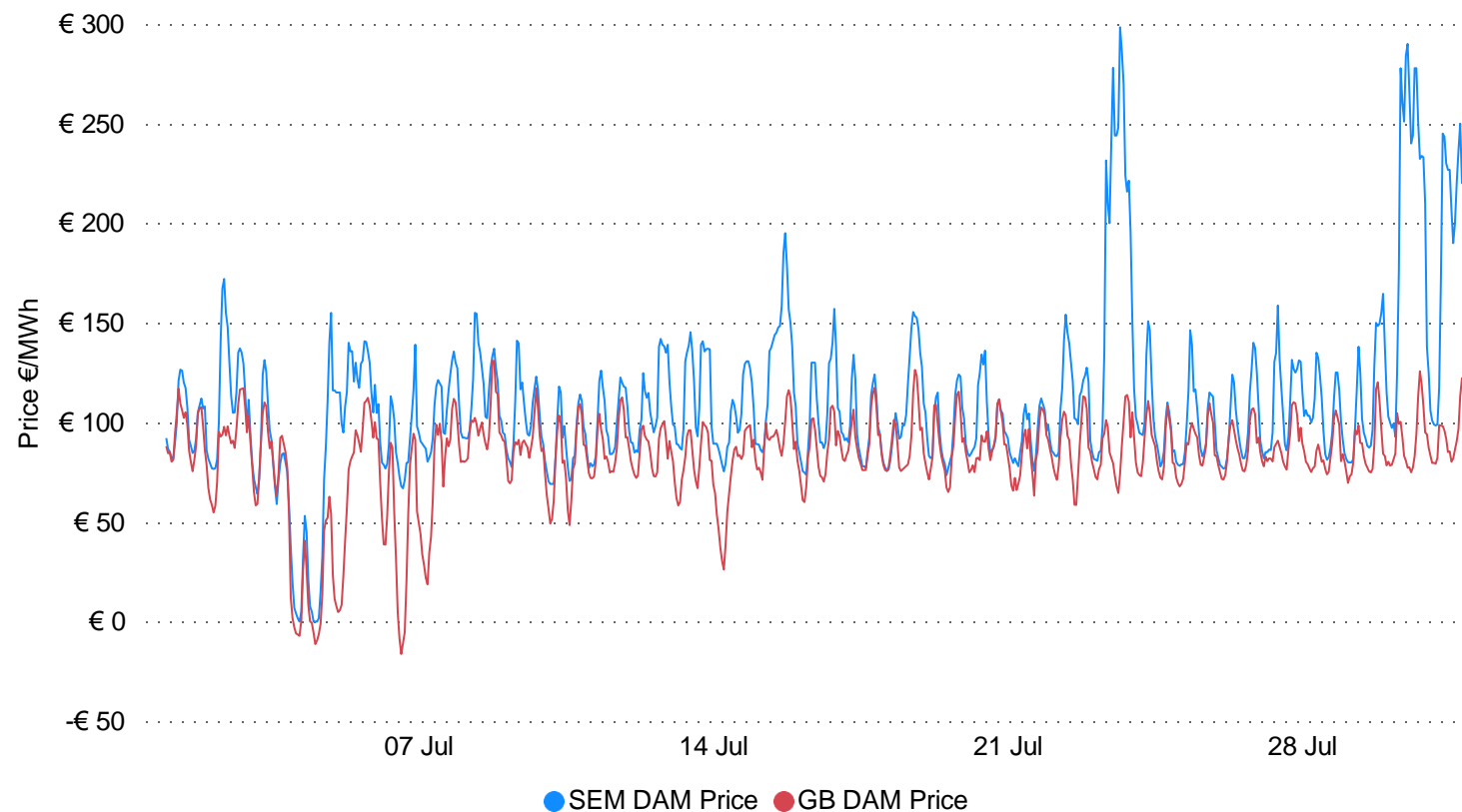
## SEM Day Ahead Price

€ 110.94  
Average Price  
€ 0.00  
Min Price  
€ 298.33  
Max Price

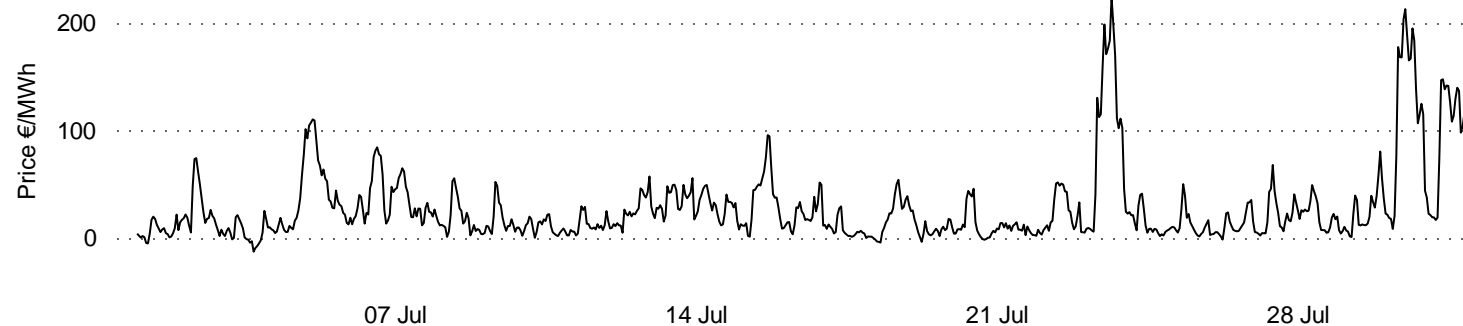
## GB Day Ahead Price

€ 82.58  
Average Price  
-€ 16.25  
Min Price  
€ 130.94  
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.

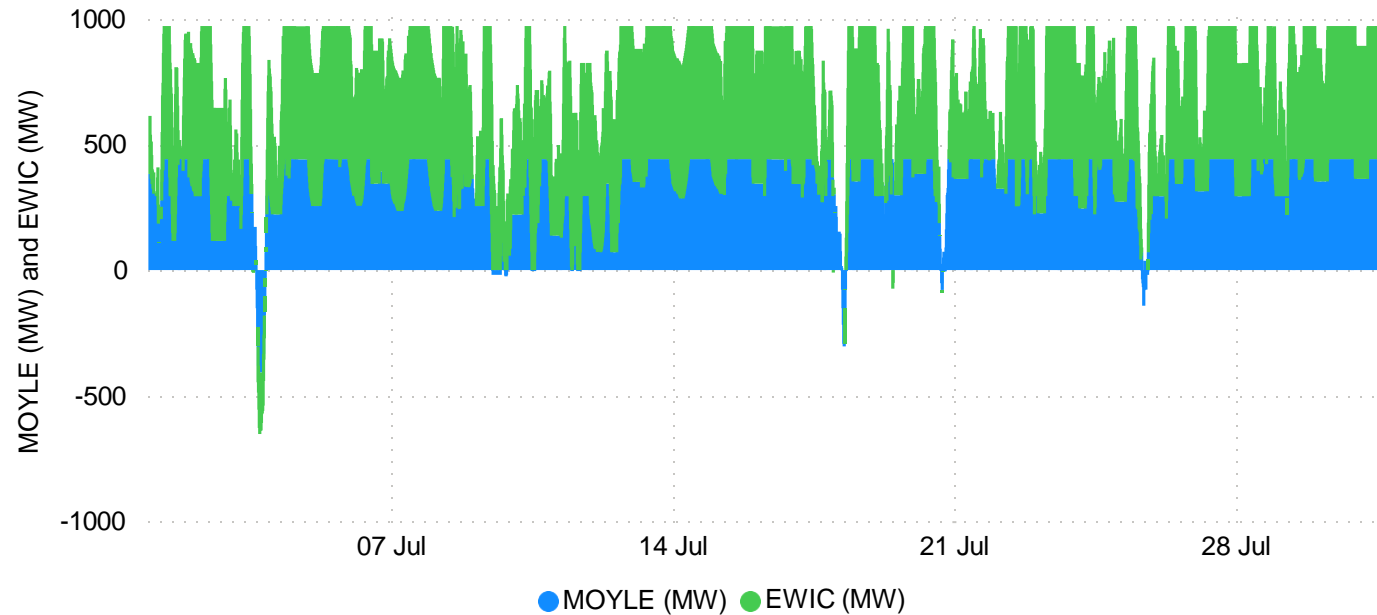
Basically, the periods of significant spreads between the two markets are generally correlated with period of very low wind. Due to the prevailing fuel mix across both regions, the effects of low wind are felt more intensively in the SEM than in GB. The MMU will continue to investigate this matter further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

# SEM Interconnectors July 2024

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

Moyle	EWIC
2nd 07:00 - 11:00	2nd 05:00 - 13:00
5th 16:00 - 22:00	5th 05:00 - 21:00
7th 02:00 - 23:00	7th 07:00 - 22:00
8th 02:00 - 23:00	8th 01:00 - 22:00
9th 06:00 - 21:00	9th 00:00 - 22:00
11th 06:00 - 13:00	10th 07:00 - 12:00
12th 05:00 - 23:59	11th 06:00 - 22:00
14th 01:00 - 22:00	12h 06:00 - 22:00
15th 06:00 - 23:00	14th 17:00 - 21:00
18th 14:00 - 21:00	15th 08:00 - 21:00
20th 07:00 - 14:00	16th 06:00 - 23:00
22nd 07:00 - 22:00	17th 07:00 - 08:00
23rd 05:00 - 23:00	18th 15:00 - 22:00
24th 06:00 - 09:00	20th 06:00 - 13:00
25th 09:00 - 10:00	22nd 06:00 - 18:00
26th 07:00 - 22:00	23rd 05:00 - 23:00
27th 07:00 - 22:00	24th 06:00 - 09:00
28th 01:00 - 22:00	25th 09:00 - 10:00
29th 05:00 - 23:00	26th 07:00 - 22:00
	27th 07:00 - 22:00
	28th 01:00 - 22:00
	29th 05:00 - 23:00

SEM Interconnector Flows

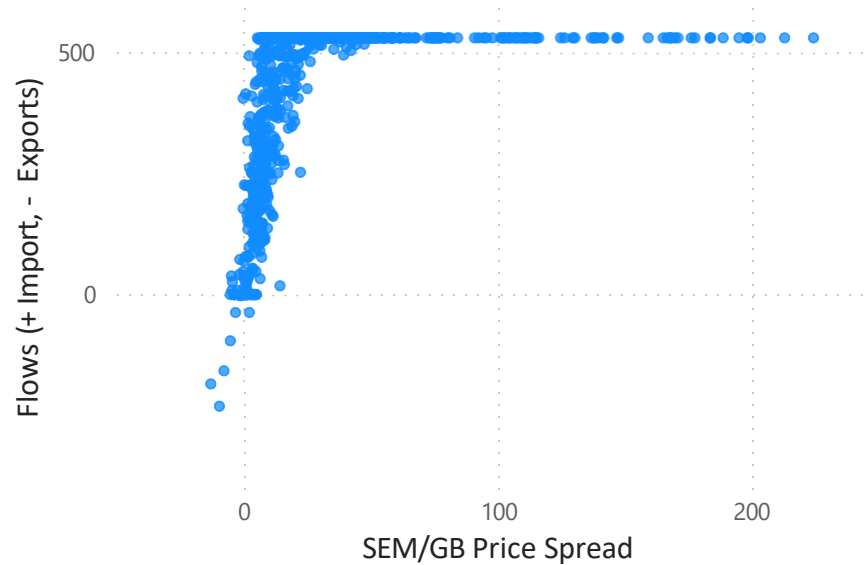


## Interconnector Flows

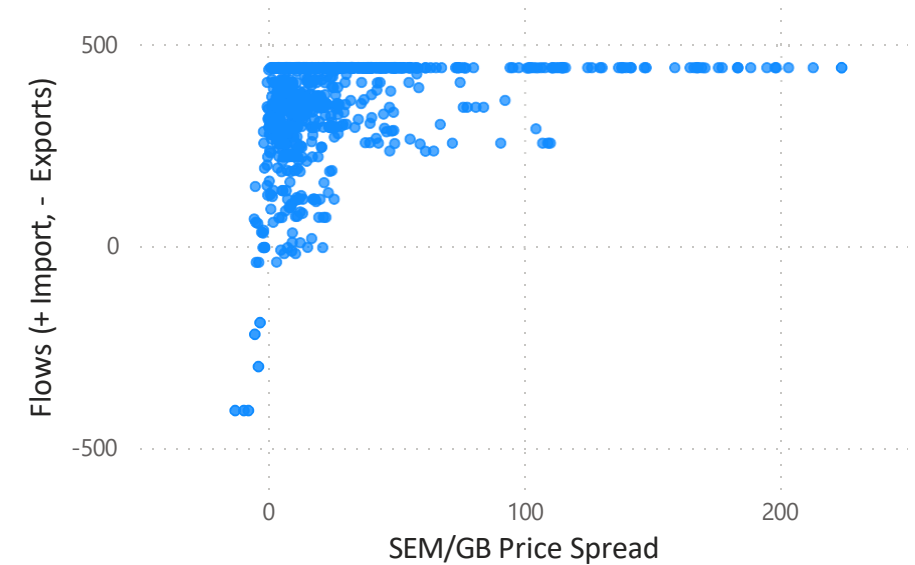
In July, the SEM Interconnectors mostly imported power from GB, with only minimal exports. This reflects the predominantly higher prices in the SEM compared with GB. There were also a substantial number of events when interconnection capacity is curtailed by the TSO in the SEM GB direction.

EWIC imports volumes were slightly higher than Moyle and exports were lower than that of Moyle.

EWIC Flows vs SEM/GB Price Spread



Moyle Flows vs SEM/GB Price Spread



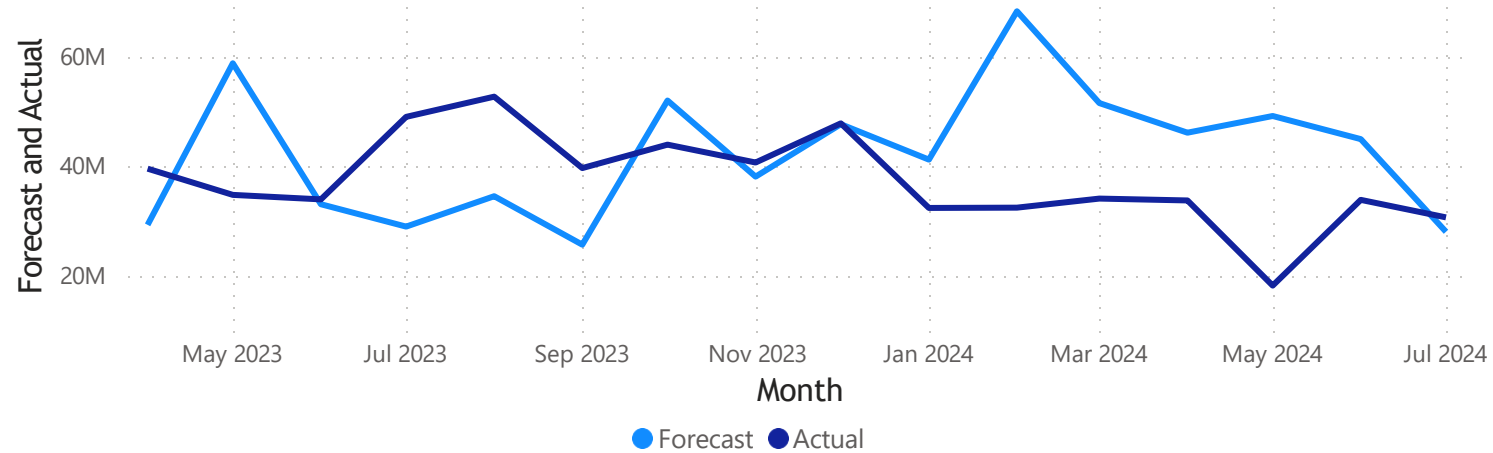


# Balancing Market July 2024

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.

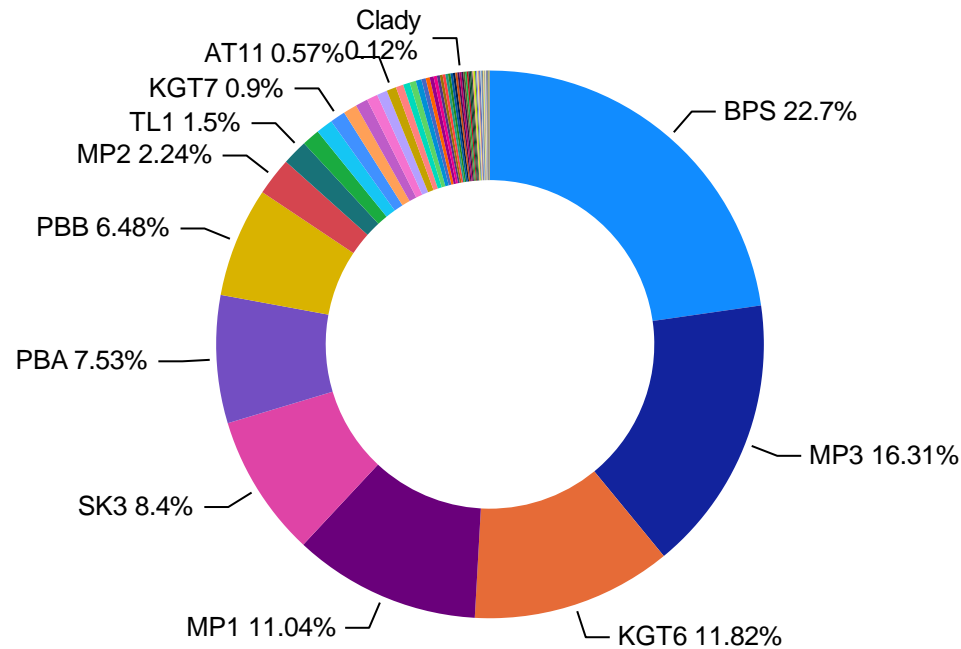
Generators can be constrained 'on' or 'up' if the market schedule indicated they were to be run at lower levels than actually happened. Or they could be constrained 'down' or 'off' if they were to be run at a higher level than happened in reality. There is always an overall net cost to the system associated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

Imperfection Costs - Forecast vs Actual



Determinant Name	Value €
CABBPO	3,918.76
CAOPO	-70,689.68
CCURL	-77,938.93
CDISCOUNT	12,768,136.60
CFC	8,996,953.10
CPREMIUM	9,799,753.25
CTEST	-82,229.34
CUNIMB	-676,410.41
<b>Total</b>	<b>30,661,493.34</b>

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 July followed by Moneypoint 3 and EP Kilroot GT6. 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 July 2024

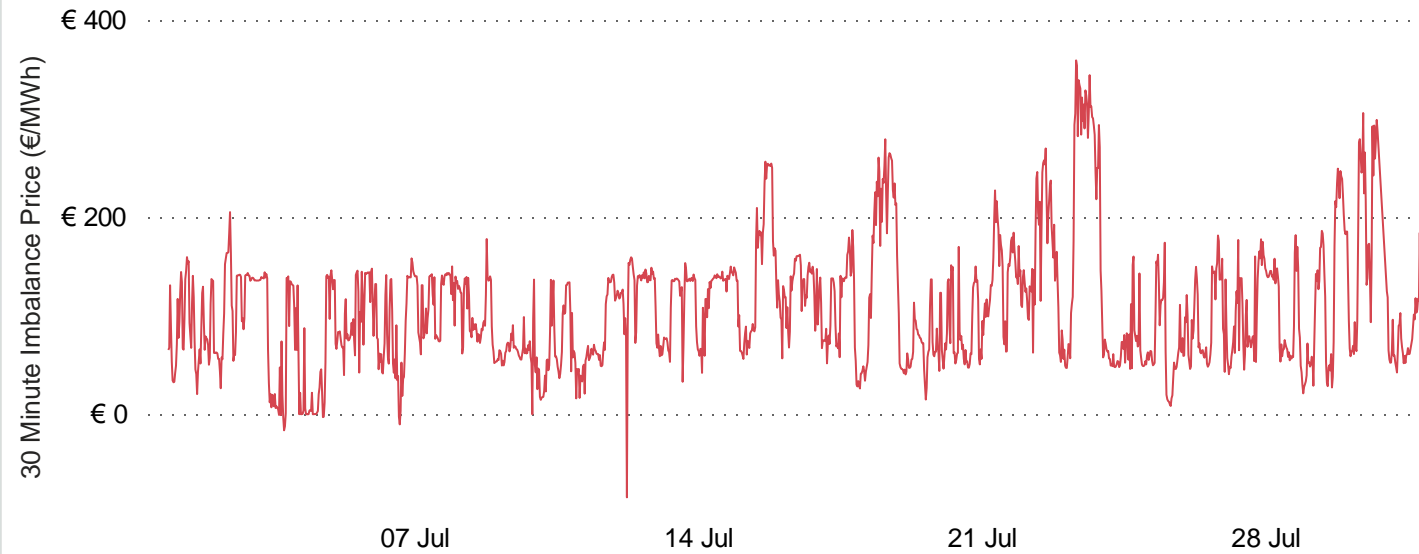
30 Minutes Imbalance Price  
€ 107.02  
Average Price  
-€ 84.33  
Lowest Price  
€ 359.03  
Highest Price

## Imbalance Price & Volumes

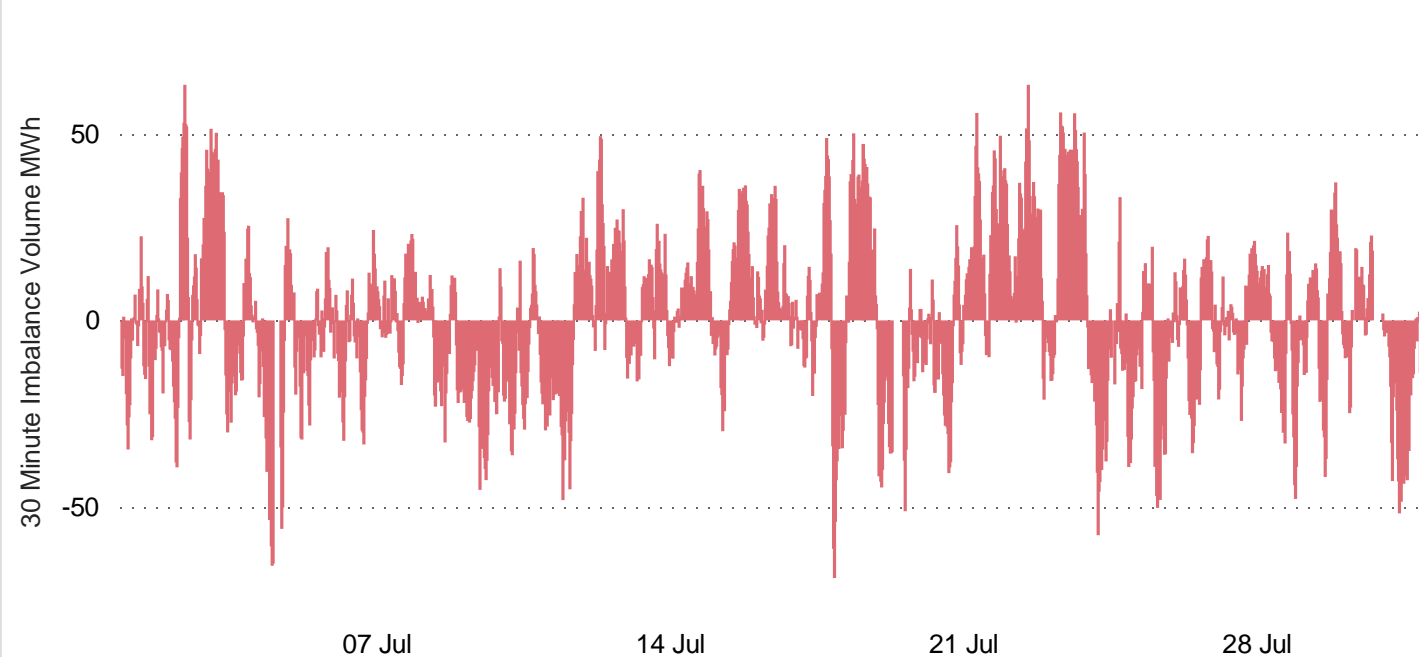
The average Imbalance (BM) Price this month is slightly lower than the Day Ahead Price. Additionally, the Balancing Market prices has exhibited a much higher range of prices indicating a higher level of volatility compared to Day Ahead Market Prices. This is an expected characteristic of the Balancing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

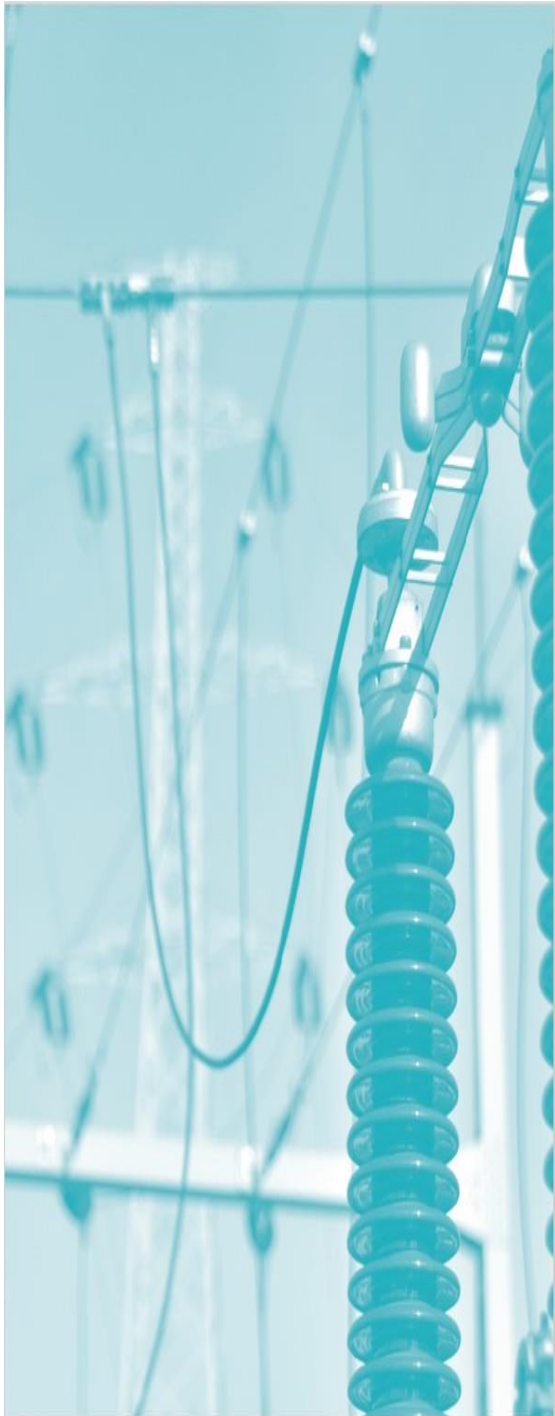
There were no Reliability Options events this month as the Balancing Market prices have not breached the PSTR level.

30 Minute Imbalance Prices



30 Minute Imbalance Volume





## **Demand and Generation Mix**

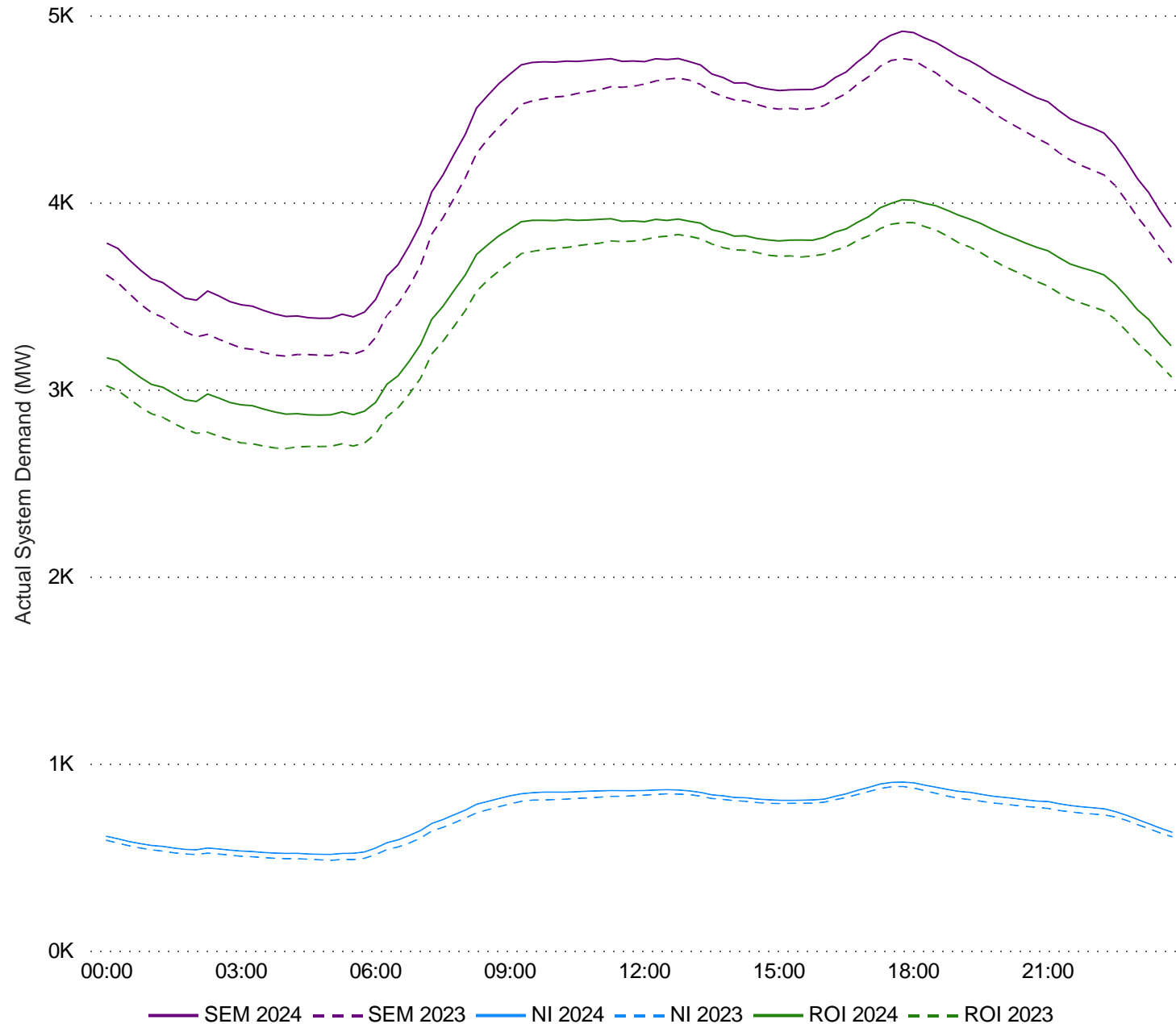
## SEM Demand

The graph 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 month has shown an increase of 4.4% relative to the same period last year.

Demand in the SEM as a whole is up by 4.3% relative to the same period last year.

### Monthly Average Hourly Demand Curves



## Demand July 2024

### SEM Demand

4,279.36	4,101.08
SEM Average 2024	SEM Average 2023
3,380.48	3,178.03
SEM Min 2024	SEM Min 2023
4,914.71	4,768.97
SEM Max 2024	SEM Max 2023

### NI Demand

734.54	705.13
NI Average 2024	NI Average 2023
516.77	485.31
NI Min 2024	NI Min 2023
900.19	876.94
NI Max 2024	NI Max 2023

### ROI Demand

3,544.82	3,395.94
ROI Average 2024	ROI Average 2023
2,863.23	2,684.00
ROI Min 2024	ROI Min 2023
4,014.39	3,891.94
ROI Max 2024	ROI Max 2023

# Duration Curves July 2024

## Price Duration

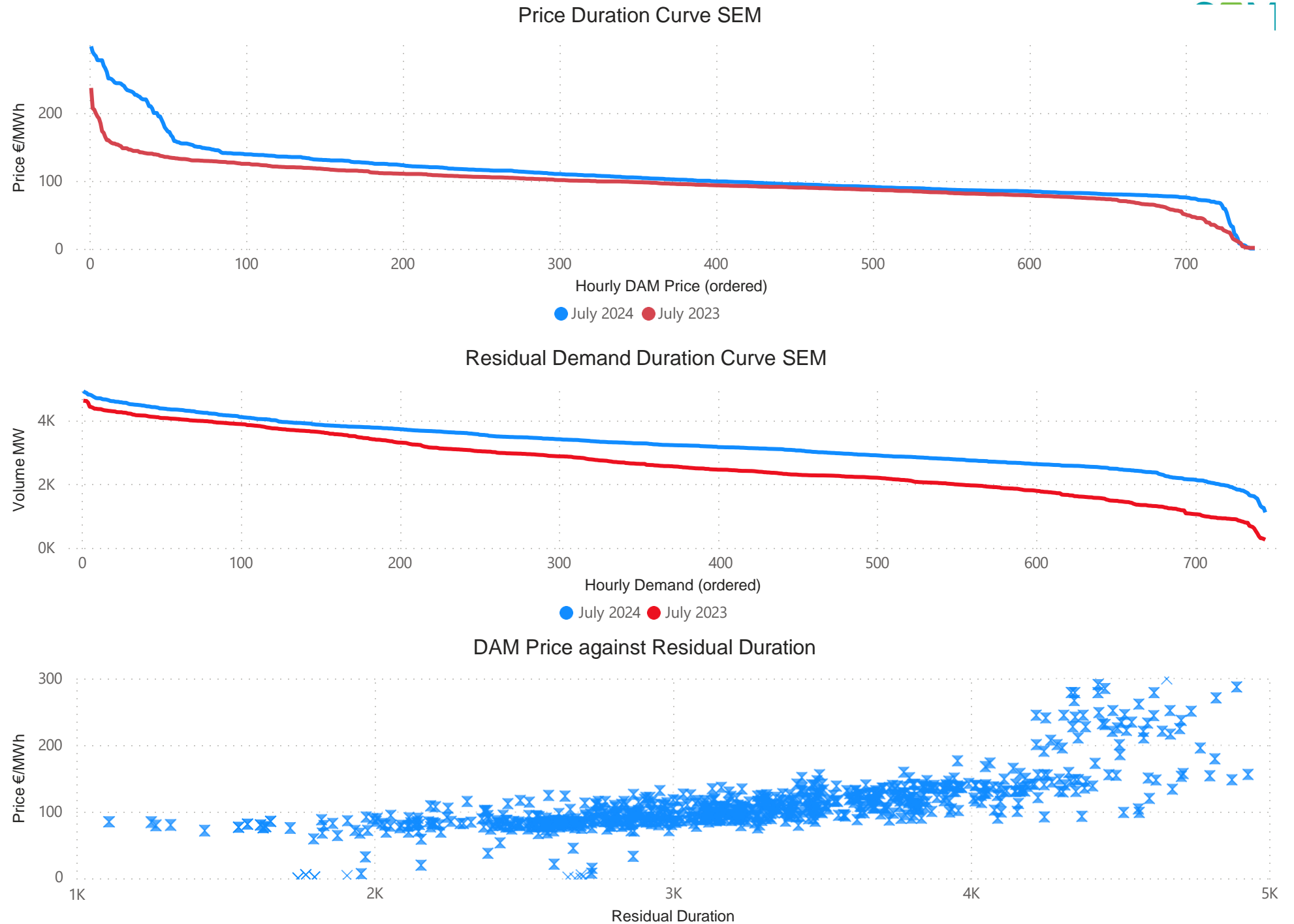
The price duration curve shows the hourly DAM prices across the month ordered from the largest to the smallest.

## 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.



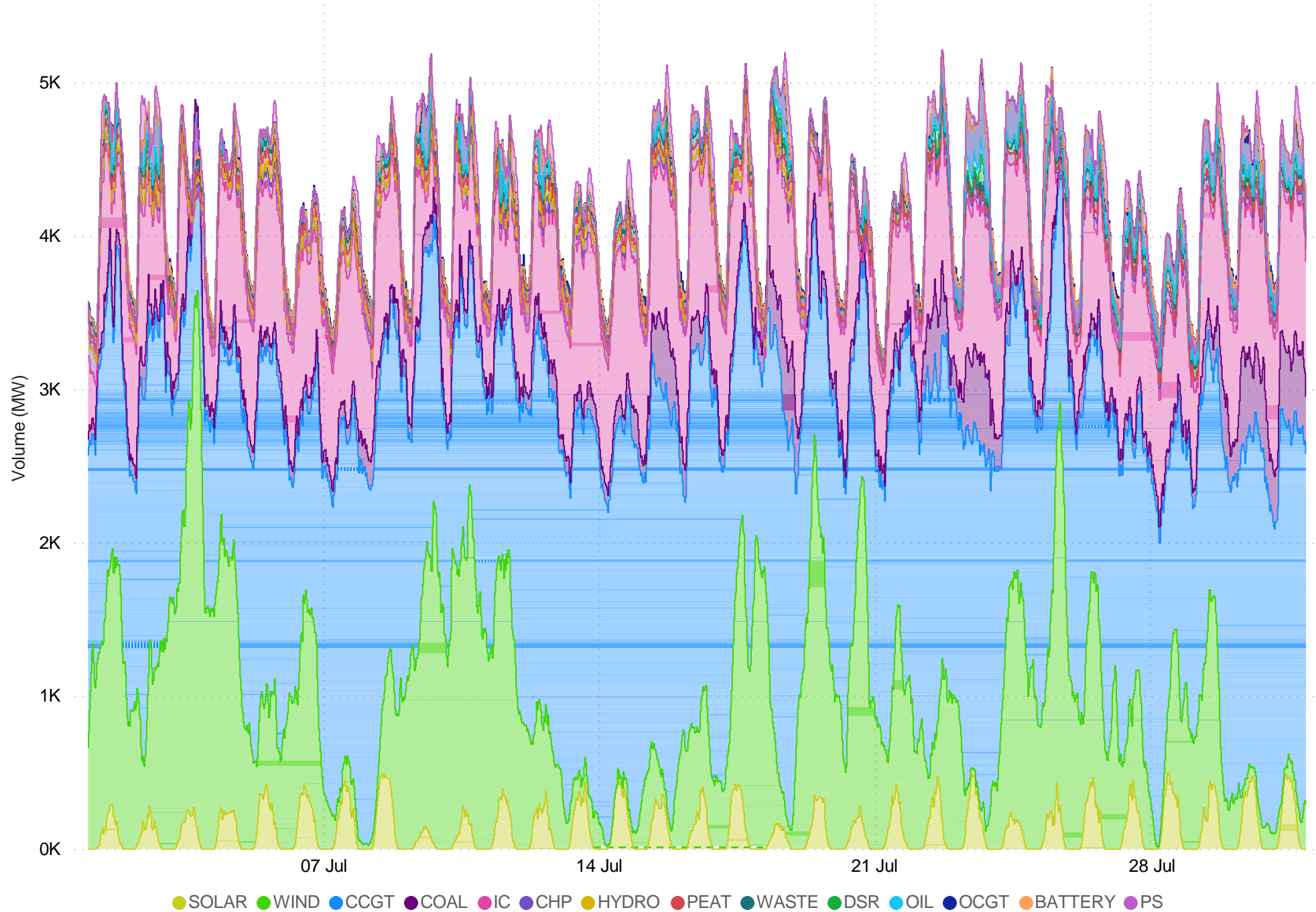


# Fuel Mix July 2024

Fuel Type	Avg Monthly <sup>MWh</sup>	Per. Monthly
CCGT	1974	46.9%
WIND	883	21.0%
INTERCONNECTORS	753	17.9%
COAL	179	4.2%
SOLAR	128	3.0%
OCGT	78	1.8%
CHP	77	1.8%
WASTE	71	1.7%
PEAT	40	0.9%
DSR	31	0.7%
HYDRO	13	0.3%
OIL	4	0.1%
BATTERY	-6	-0.1%
PUMPED STORAGE	-17	-0.4%

Fuel Type	Max Monthly <sup>MWh</sup>	Min Monthly
WIND	3535	0
CCGT	2779	1076
INTERCONNECTORS	976	-634
COAL	651	93
SOLAR	500	0
OCGT	488	0
PUMPED STORAGE	291	-299
DSR	179	7
CHP	159	72
OIL	150	0
PEAT	105	0
HYDRO	82	0
WASTE	80	17
BATTERY	78	-90

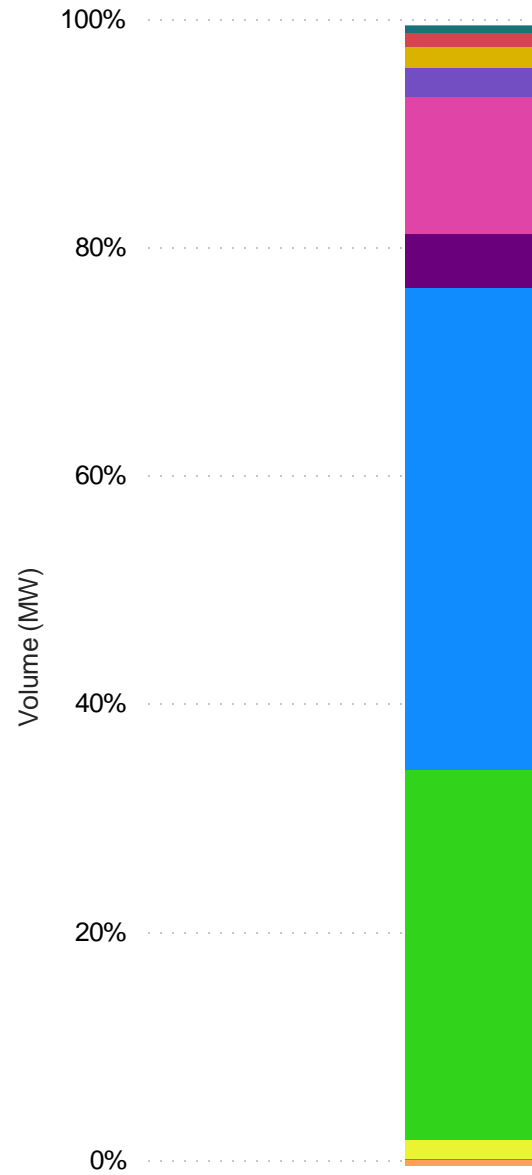
### SEM 30 Minute Fuel Mix



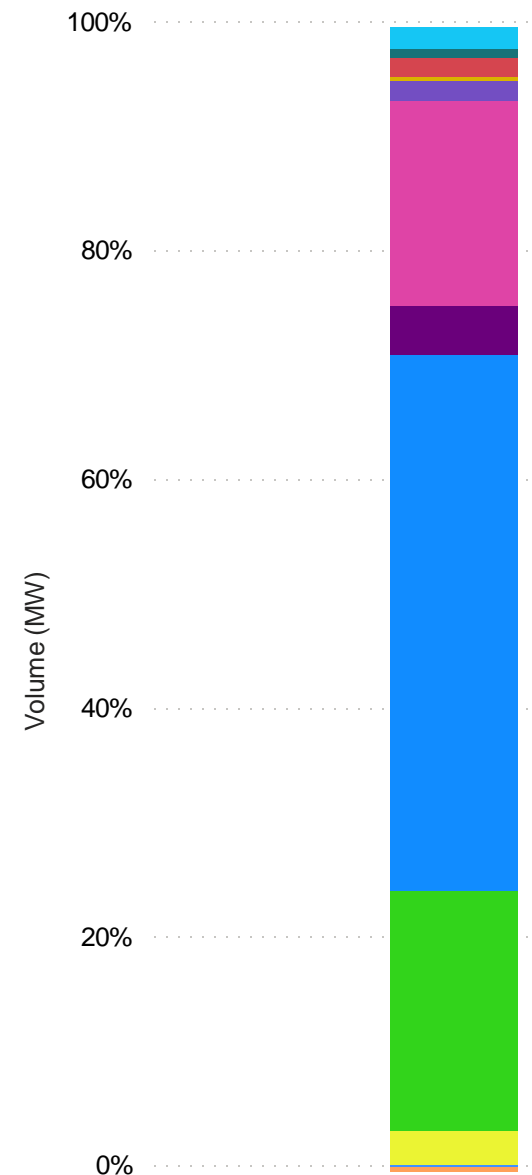
# Fuel Mix Comparison July 2023 & 2024

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

SEM Fuel Mix July 2023



SEM Fuel Mix July 2024



# North-South Tie Line July 2024

Average Flow NI to ROI (MW)

-324.30

Average Flow ROI to NI (MW)

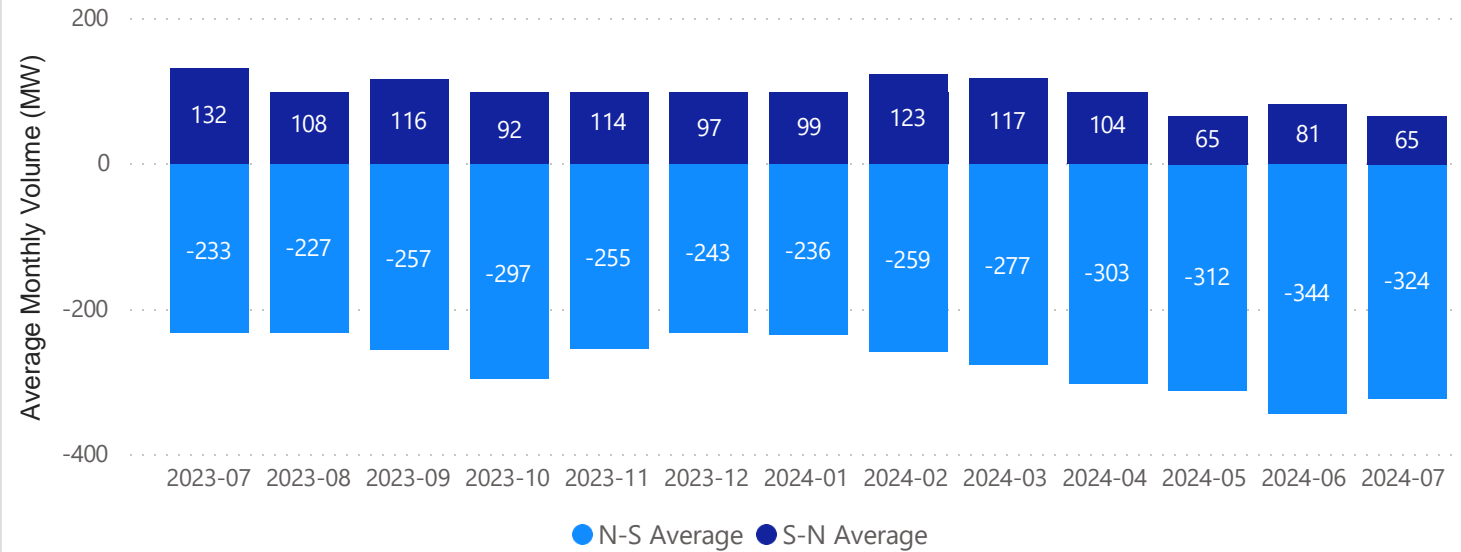
64.57

Average Net Flow NI to ROI (MW)

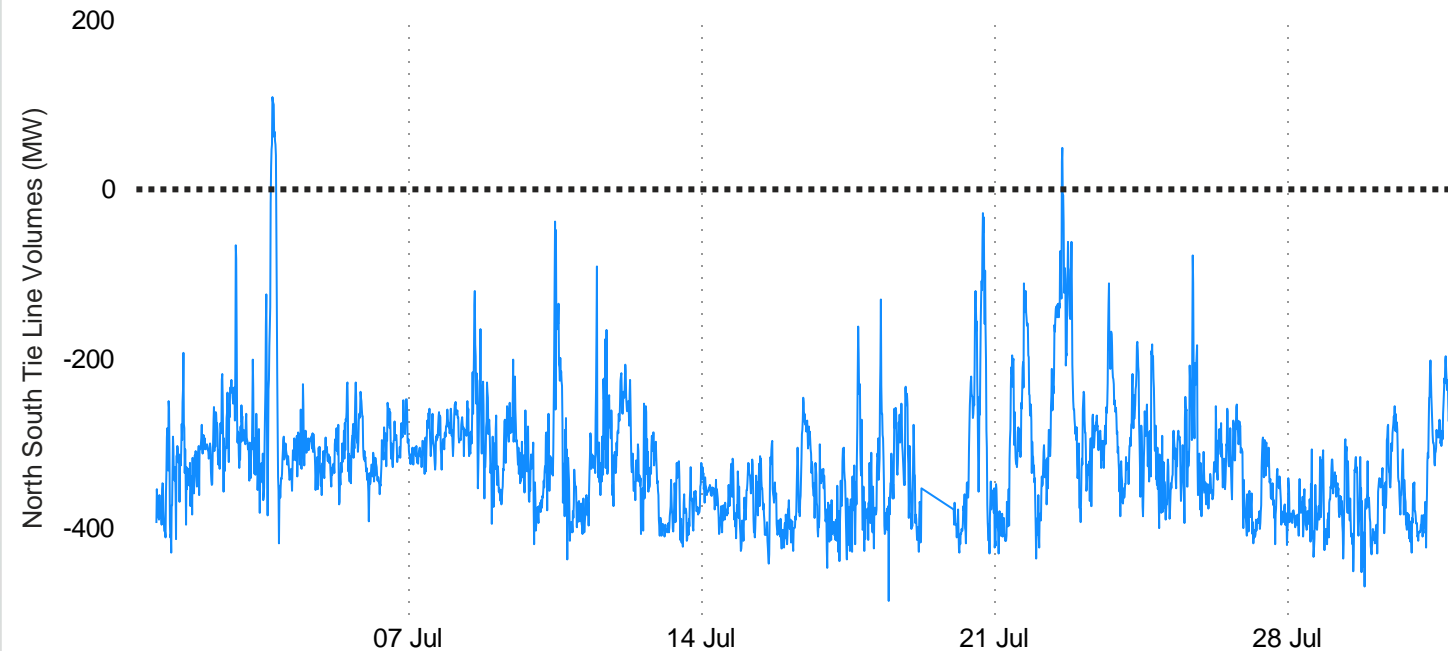
-322.16

-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.



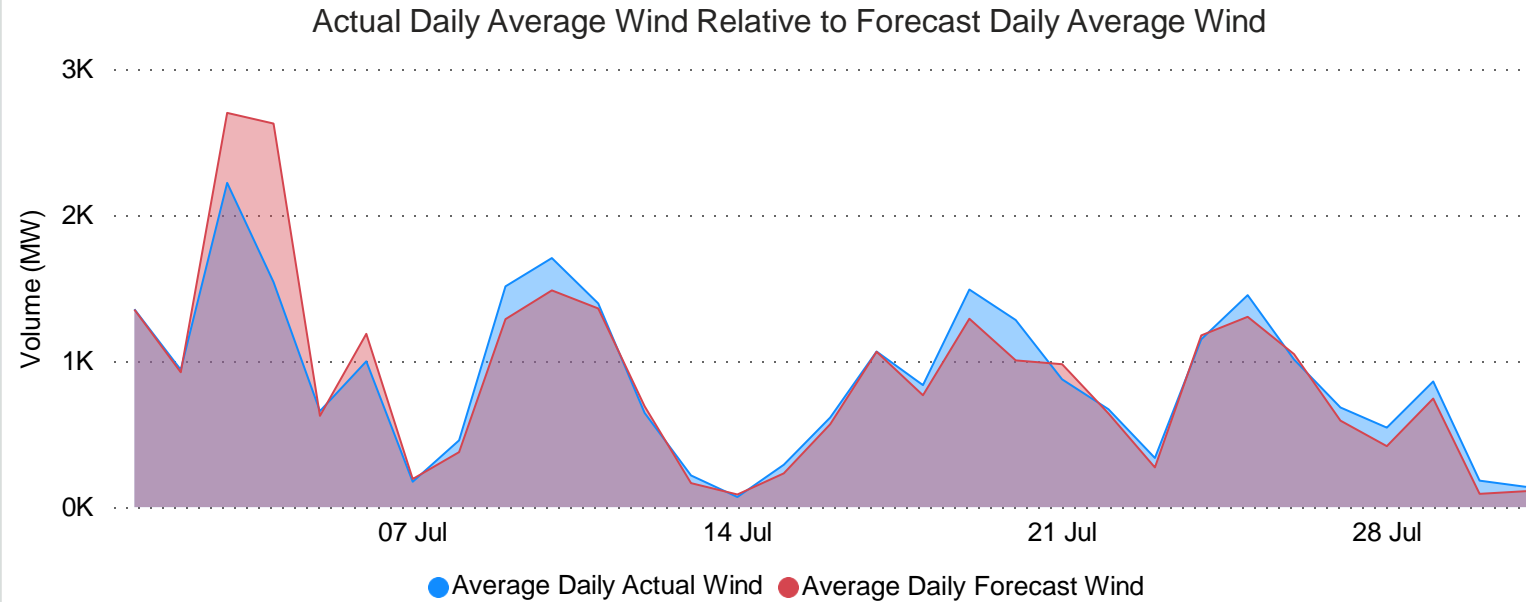
# Wind Generation July 2024

Average Daily Actual Wind (MW)  
883

Average Daily Forecast Wind (MW)  
882

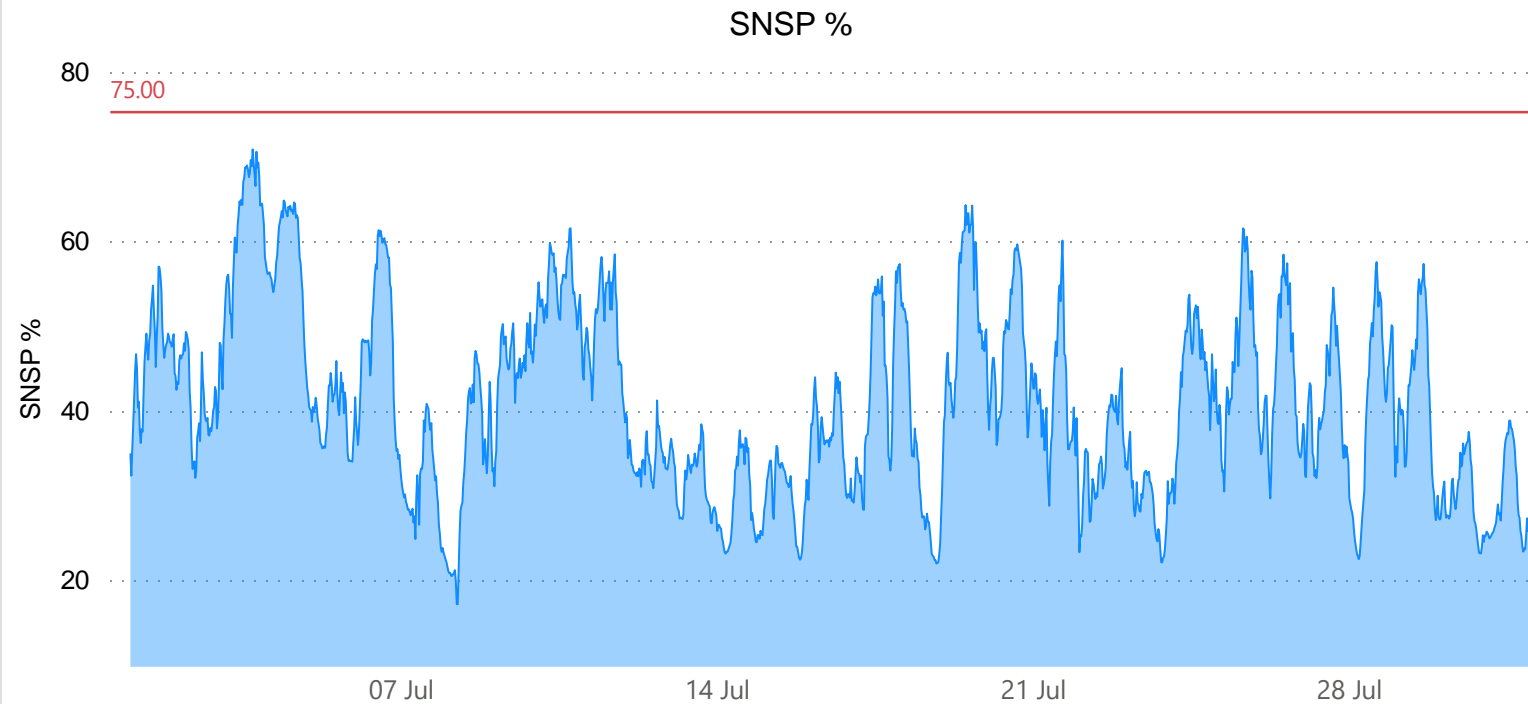
## Wind Generation

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



## SNSP

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



Min SNSP%  
17.15

Max SNSP%  
70.86

# CO<sub>2</sub> July 2024

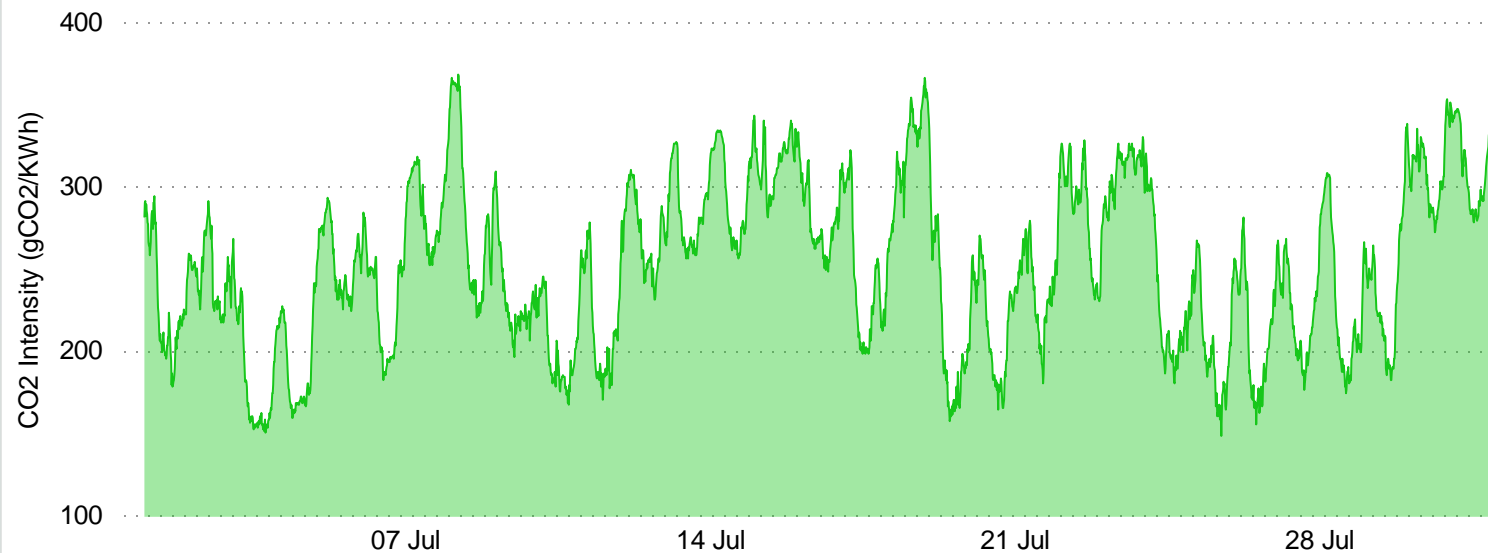
## CO<sub>2</sub> Intensity (gCO<sub>2</sub>/kWh)

251.16  
Average  
148  
Lowest  
368  
Highest

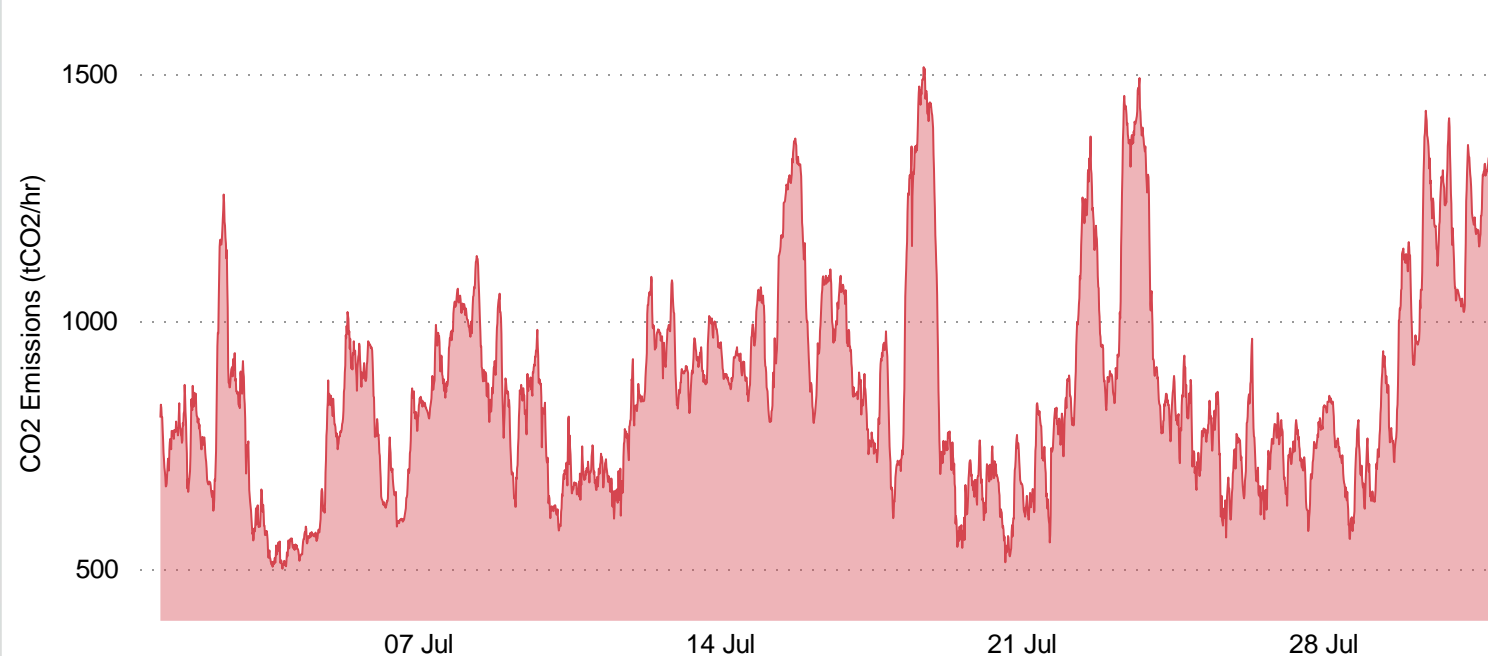
## CO<sub>2</sub> Emissions (tCO<sub>2</sub>/hr)

861  
Average  
501  
Lowest  
1513  
Highest

### CO<sub>2</sub> Intensity



### CO<sub>2</sub> Emissions



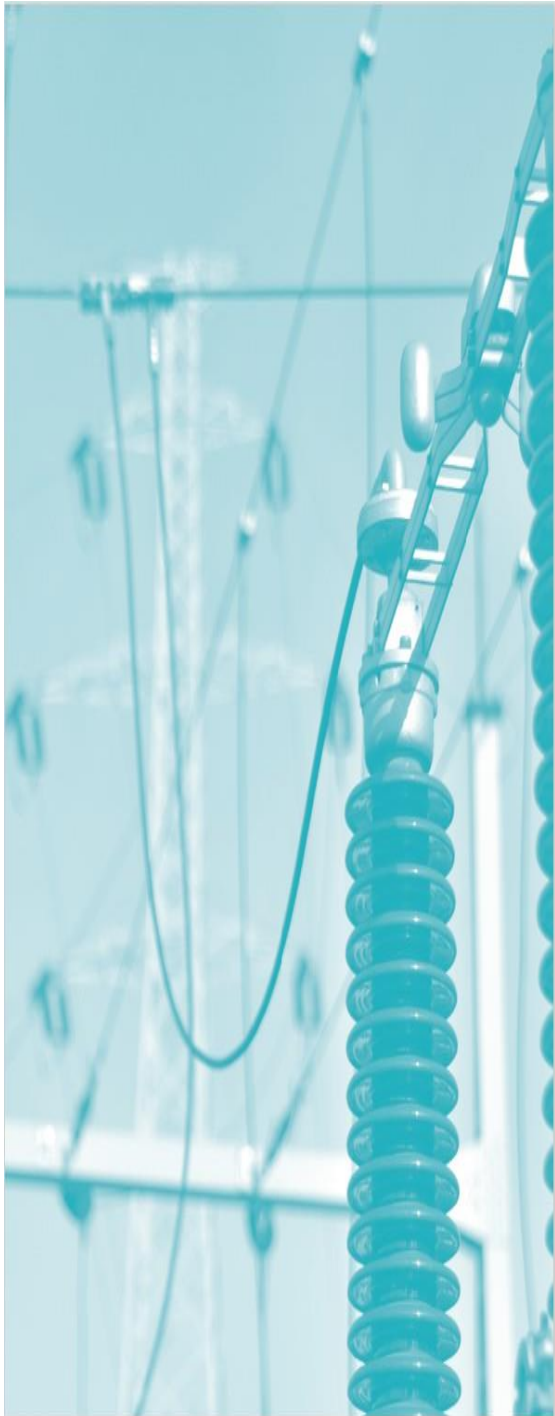
## CO<sub>2</sub> Intensity

CO<sub>2</sub> 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.

## CO<sub>2</sub> Emissions

CO<sub>2</sub> emissions i.e. the estimated total CO<sub>2</sub> emissions from all large power stations, follows the same trends as CO<sub>2</sub> intensity levels over the course of the month.

## Fuel Costs and Spreads

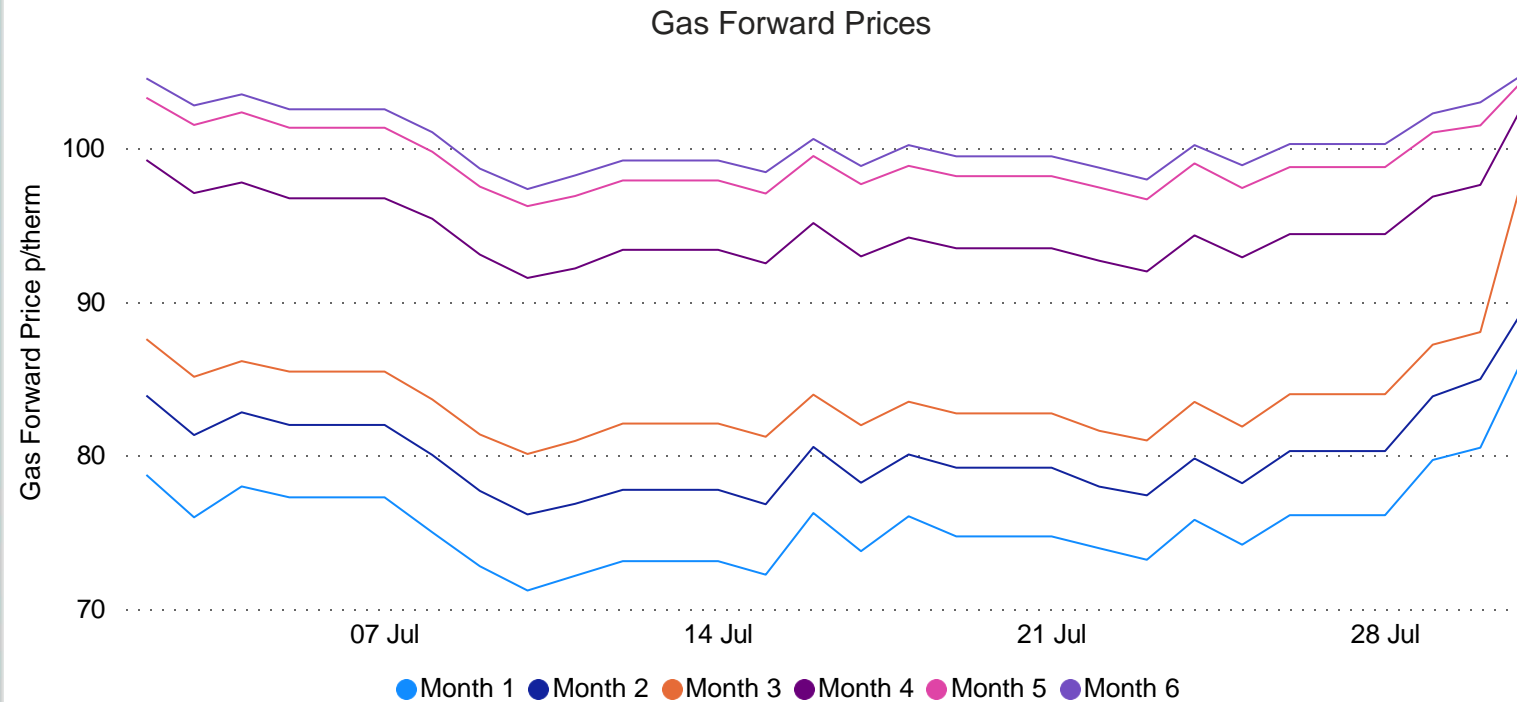
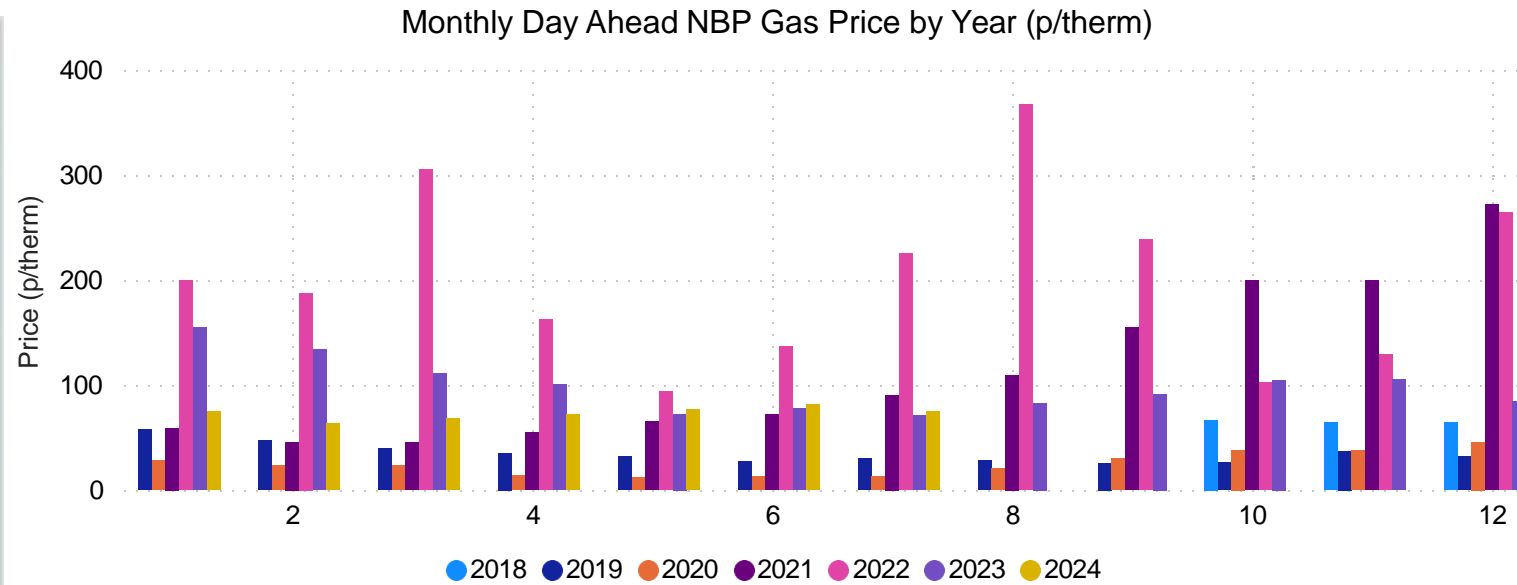


# Gas Price July 2024

75.07  
Monthly Average (p/therm)  
71.00  
Monthly Low (p/therm)  
82.20  
Monthly High (p/therm)

## Gas Prices

Gas prices have experienced a 8% decrease compared to the previous month, dropping from 81.51p to 75.07p.



## Gas Forward Prices

Gas forward prices have increased towards the end of the month due to unplanned outages in Norwegian gas fields and lower LNG deliveries compared to June.

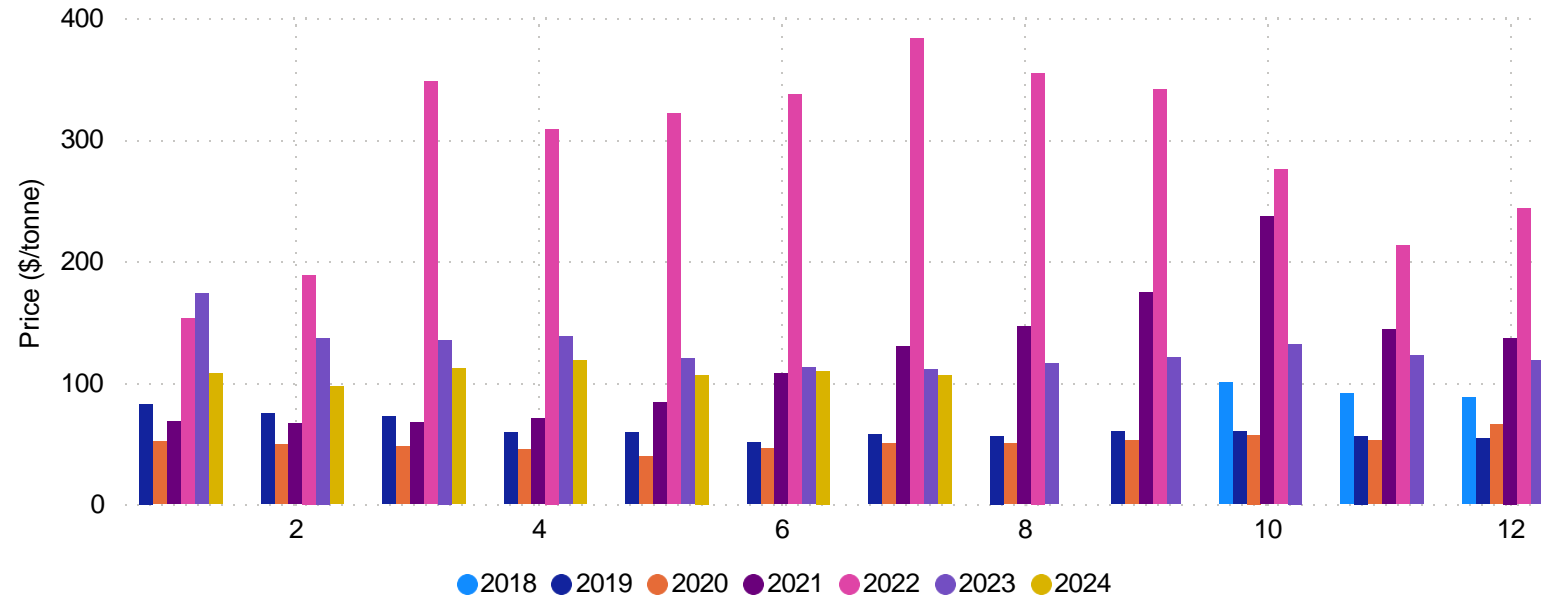
Forward gas prices are considerably lower than the prices seen over the past few years.

# Coal Price July 2024

## Coal Prices Per Tonne

\$105.93  
Monthly Average  
\$101.85  
Monthly Low  
\$116.85  
Monthly High

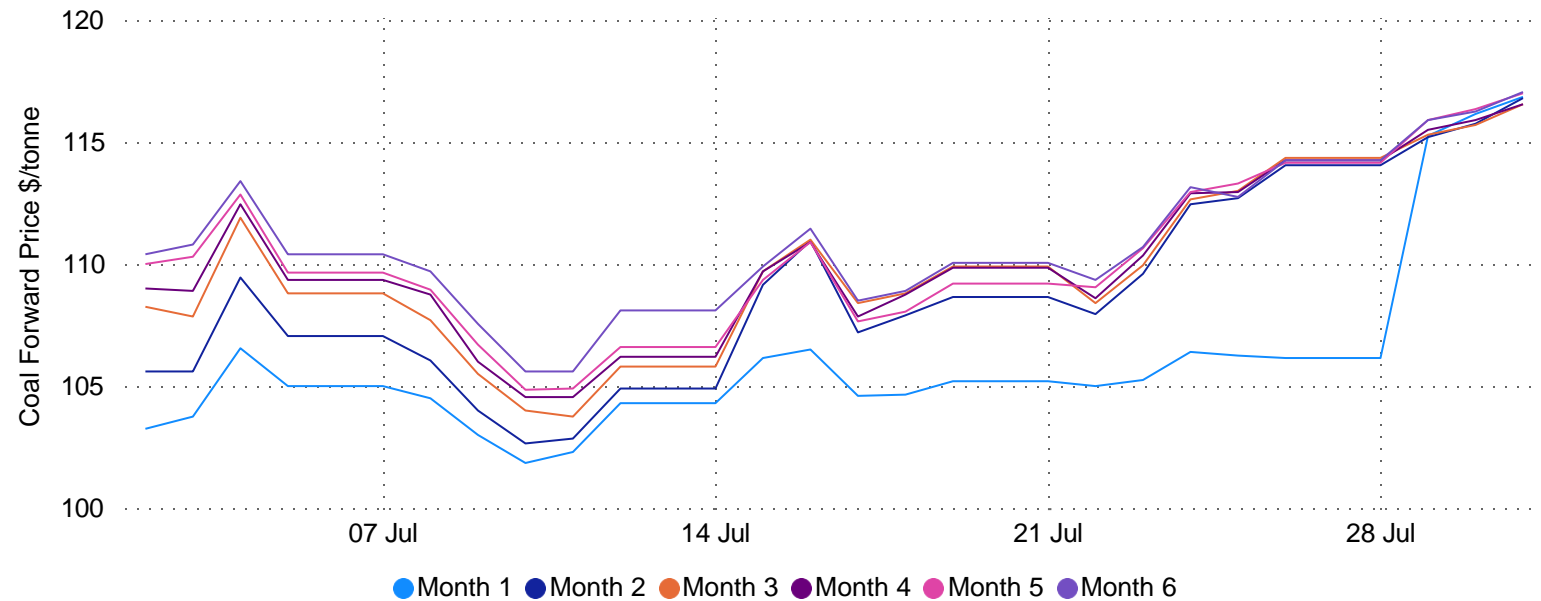
Monthly ICE Rotterdam Coal Price by Year (\$/tonne)



## Coal Prices

Coal prices were lower compared to the previous month at \$105.93/tonne (3% decrease from the last month).

Coal Forward Prices



## Coal Forward Prices

Coal forward prices demonstrate a small increase during the month.

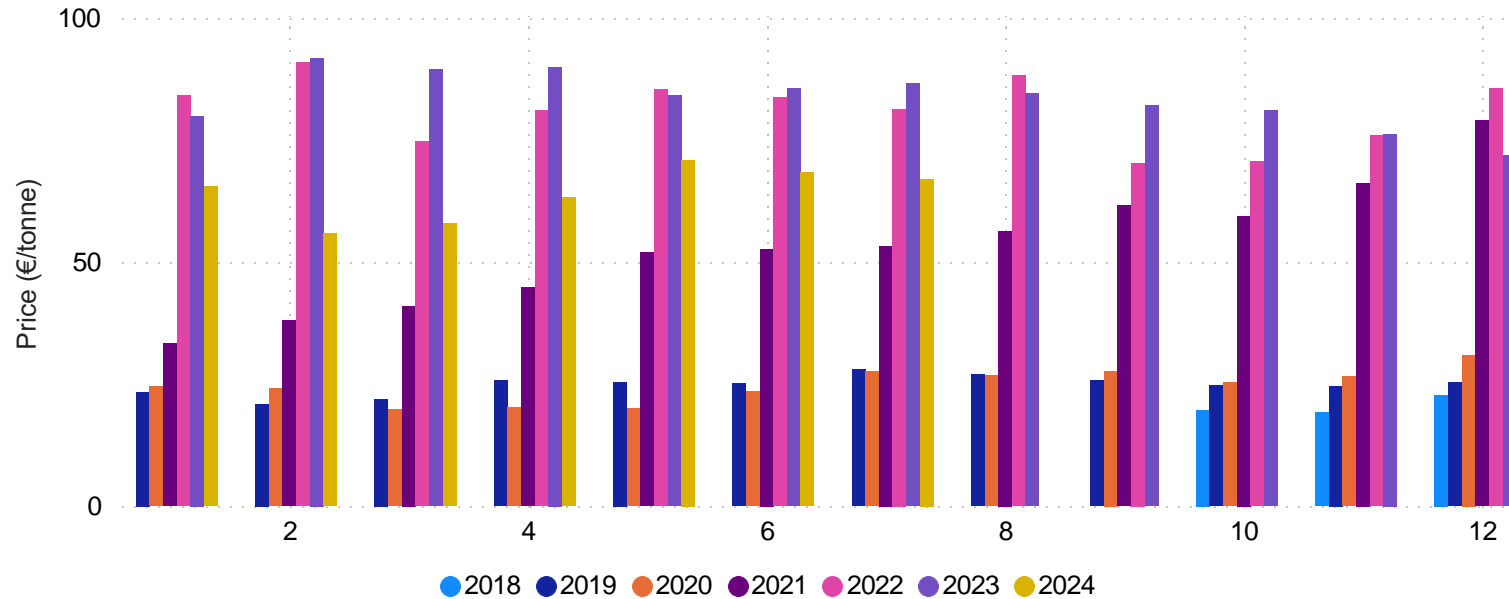
In the SEM, coal almost doubled its output from June, due to lower renewable output.

# Carbon Price July 2024

**EU Carbon Prices (€/tonne)**  
 € 67.00  
 Monthly Average  
 € 63.80  
 Monthly Low  
 € 69.52  
 Monthly High

**UK Carbon Prices (€/tonne)**  
 € 49.49  
 Monthly Average  
 € 45.47  
 Monthly Low  
 € 55.03  
 Monthly High

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

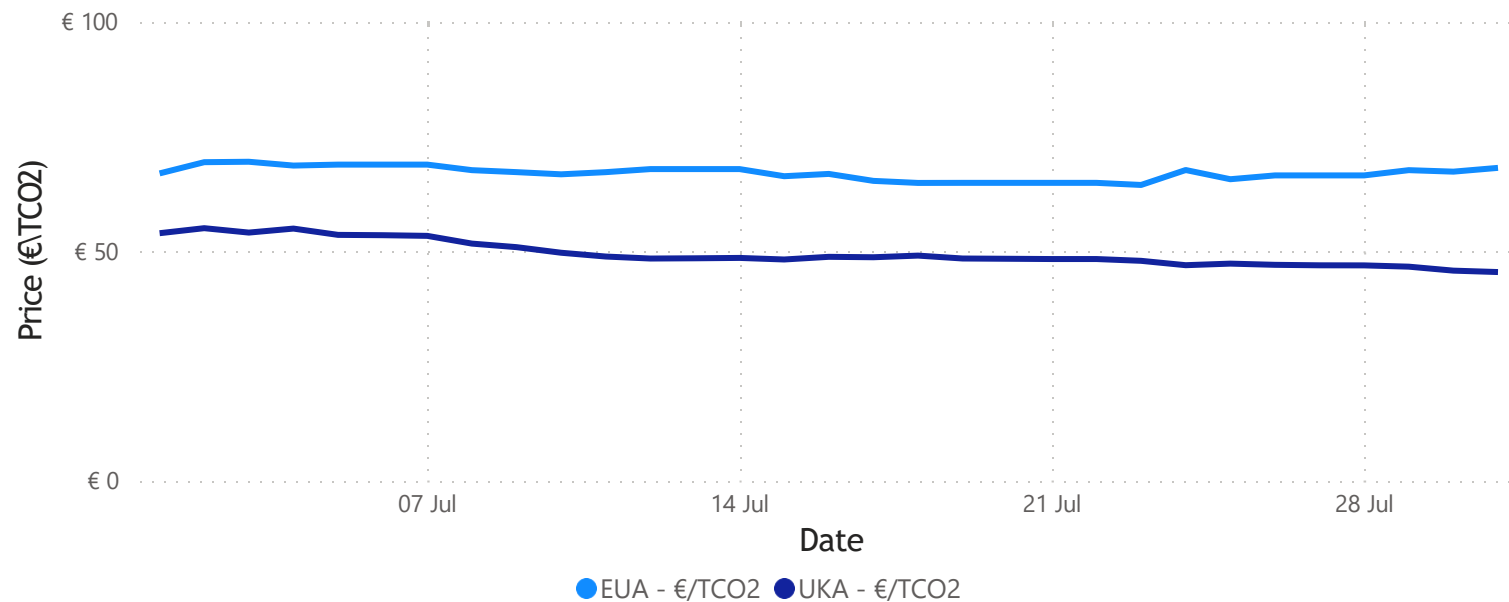


## Carbon Prices

Carbon has decreased relative to the previous month by 2%.

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

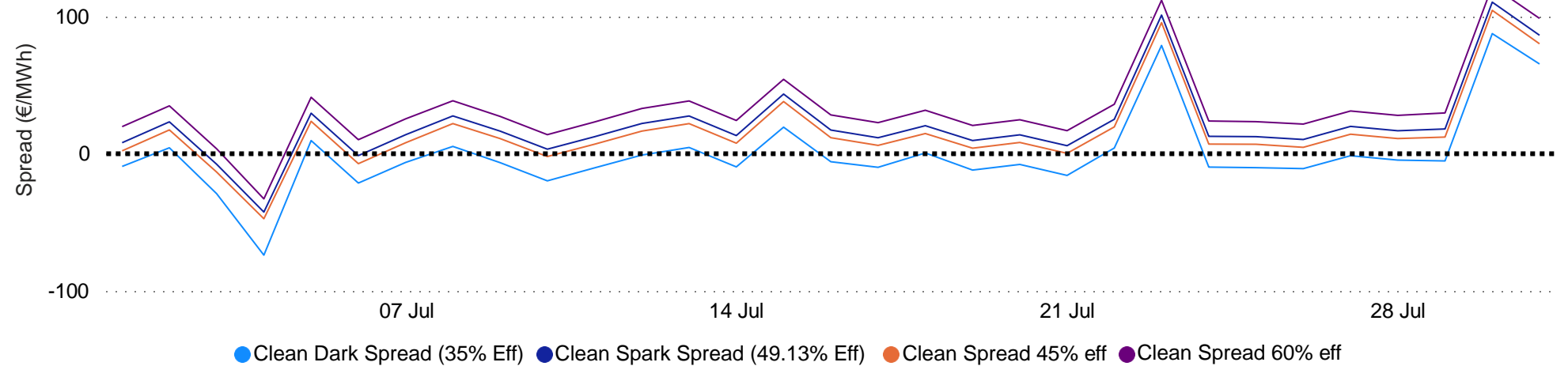


# Spark Spreads July 2024

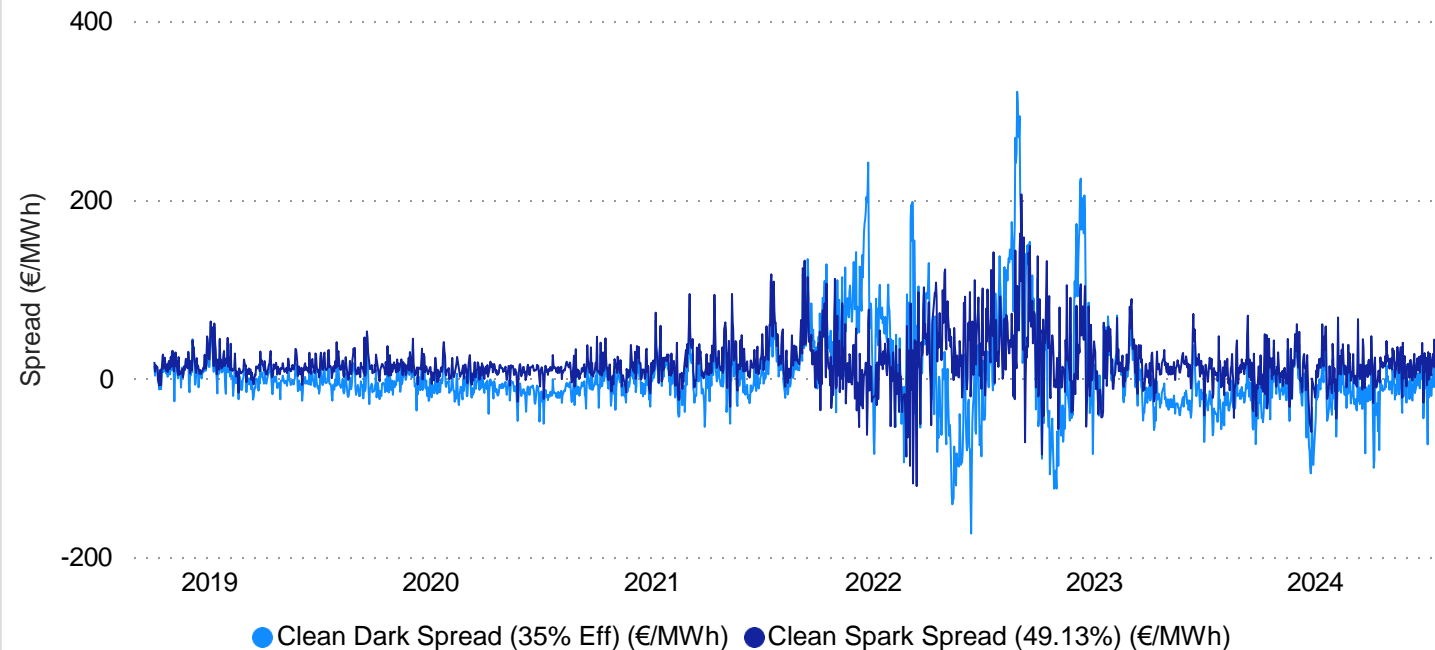
**Clean Dark Spread** measure the profitability of coal fired power generation based on the variable cost of inputs (coal and carbon credits) and the value of the output (electricity).

**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 v Clean Spark Spread



Clean Dark Spread v Clean Spark Spread (October 2018 Onwards)



## 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 4th when the wind increases for a sustained period.