



**Single Electricity Market
Performance
01 October 2021 – 31 December 2021
SEM-22-004**

SEM Monitoring Report

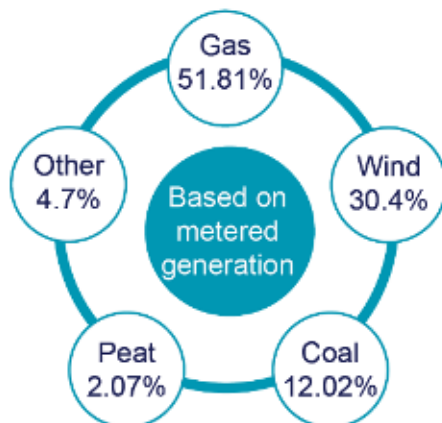
1st October 2021 - 31st December 2021

SEM
committee

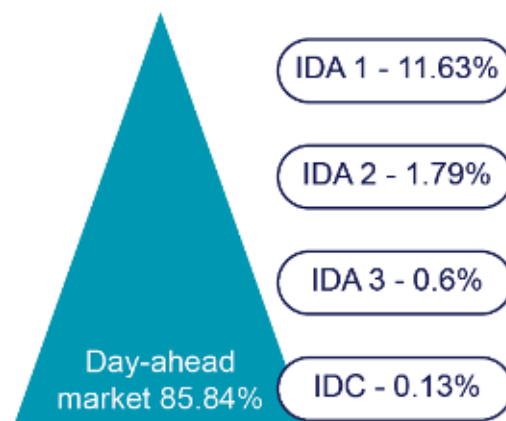
Key Highlights

- The average day-ahead market price in Q4 2021 was €223.42/MWh compared to €50.97/MWh in the same period last year. This is primarily due to increased wholesale fuel prices and carbon costs while an increase in wind was seen to have slight dampening effect on prices.
- Liquidity continues to be concentrated in the day-ahead market with over 85.84% of ex-ante volumes traded with an overall value of over €2.54 billion.
- Overall, actual system demand across the quarter has remained above the levels seen when compared to the same period in 2020.

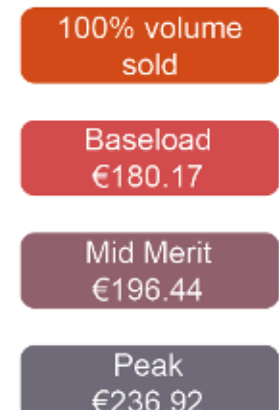
Fuel Mix



Ex Ante Market Share by volume



DC Contracts



Prices and impact of wind

- In periods of higher wind prices tend to drop
- The highest prices are associated with a lower wind forecast
- The wind forecast across the quarter increased by 134% when compared to the previous quarter.



Average daily price in DAM
€223.42/MWh

Lowest average daily price
€123.50/MWh

Highest average daily price
€378.35/MWh

Highest prices during morning or evening peak demand
Lowest prices overnight

1 INTRODUCTION

The Single Electricity Market (SEM) is the wholesale electricity market for the island of Ireland. This report is compiled by the SEM Market Monitoring Unit (MMU), which closely monitors the market, in particular in relation to bidding controls in place and to the requirements of the Regulation on Wholesale Energy Market Integrity and Transparency (REMIT). The report provides an overview of the performance of the market and of the trading arrangements that exist in a number of different timeframes. These arrangements are shown graphically in Figure 1 below:



Figure 1 - SEM Energy Markets

Trading in the forwards market is financial only and does not entail physical delivery of power. It does however provide market participants with the opportunity to hedge their positions in the Day Ahead Market (DAM) through forward contracts.

The DAM is a daily auction that takes place at 11:00 each day. Participation in the DAM is not mandatory. This market is no longer coupled with Great Britain (GB). Following the DAM, the Intraday Auctions (IDA) enable participants to adjust their physical positions closer to real time. IDA1 and IDA2 are coupled with the GB market.

The Intraday Continuous Market (IDC) also provides market participants with the opportunity to refine their market position and minimise their exposure in the Balancing Market (BM). Through the BM the Transmission System Operators (TSOs) buy and sell power from market participants to ensure that the demand and supply of power is exactly matched.

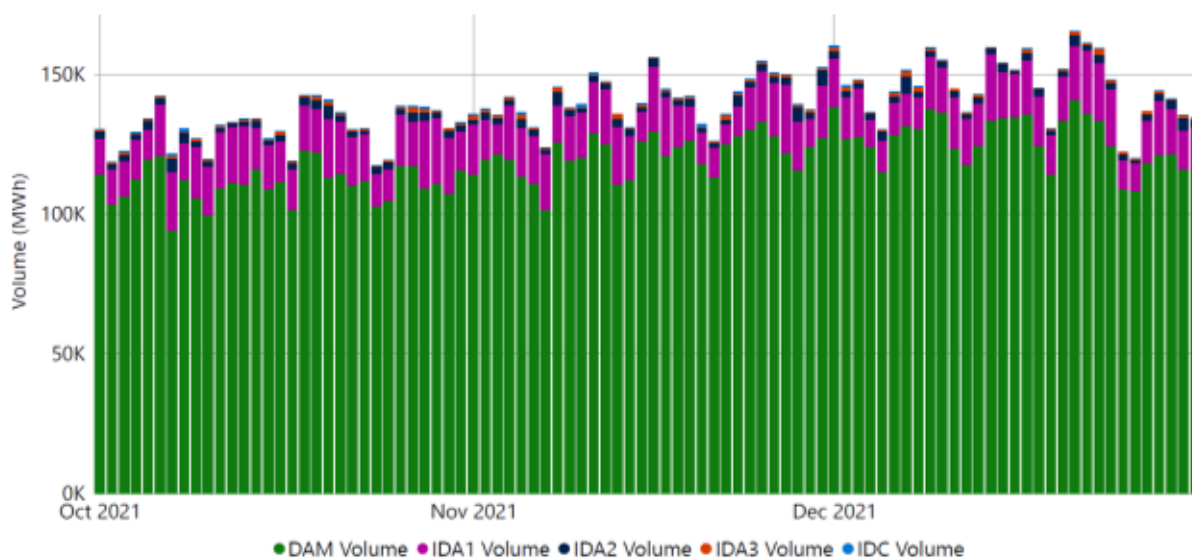
This report covers the fourth quarter of 2021 from 01 October to 31 December.

2 MARKET PERFORMANCE

2.1 OVERALL PERFORMANCE

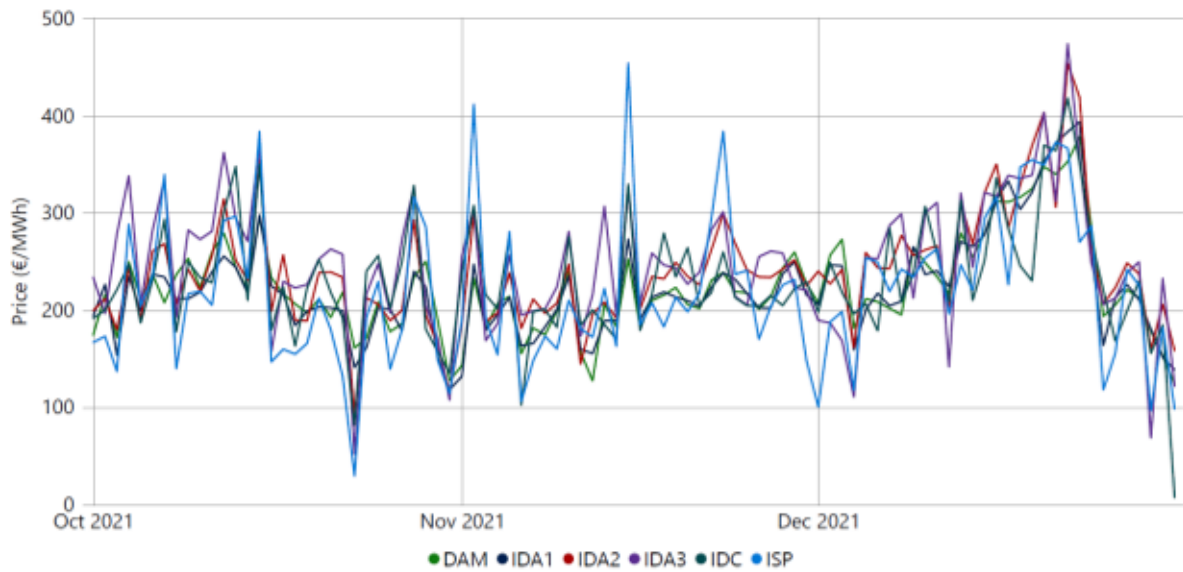
This section summarises overall SEM performance for the period 01 October 2021 to 31 December 2021.

The graph below charts the daily volumes in each Ex-Ante market in the SEM during the quarter. The average DAM daily volume for the period was 119,352 MWhs with the average daily volume in IDA1 16,170 MWhs, IDA2 2,495 MWhs, IDA3 830 MWhs and IDC 197 MWhs.



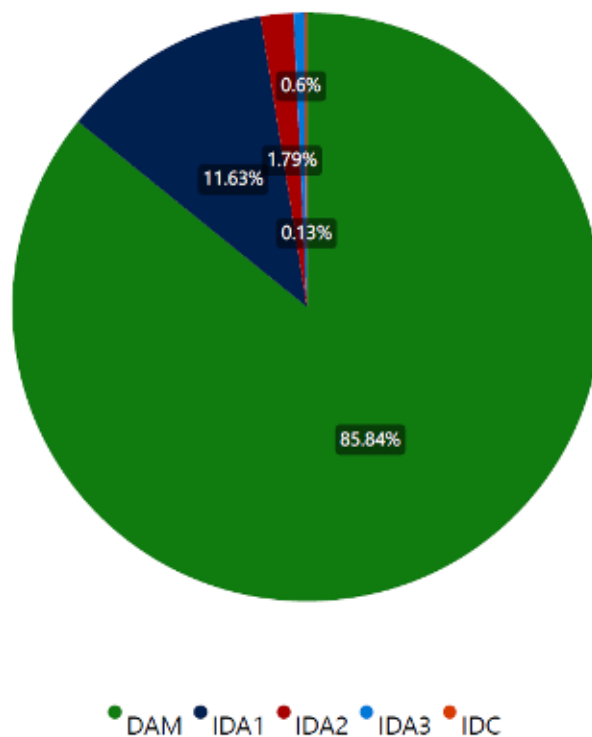
Graph 1 - SEM Ex-Ante Daily Volumes

The graph below shows the daily average Ex-Ante and Balancing Market prices across the quarter. The average daily DAM price was €223.42/MWh, IDA1 €221.03/MWh, IDA2 €239.96/MWh, IDA3 €247.48/MWh, IDC €241/MWh and the Imbalance Settlement Price was €218.41/MWh.



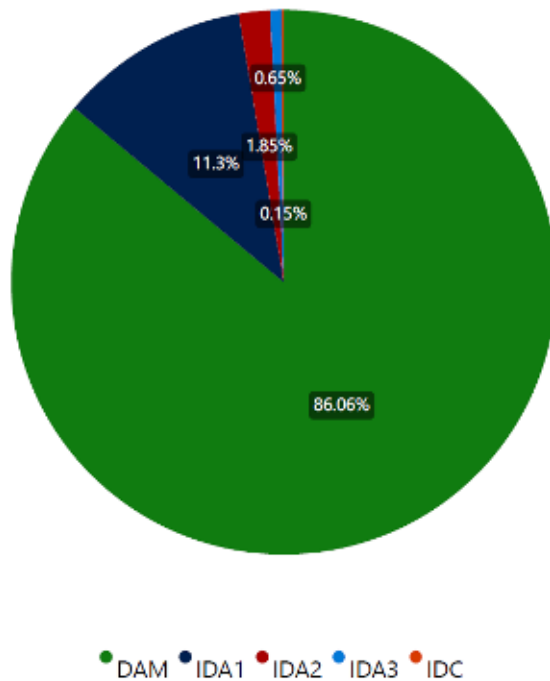
Graph 2 - SEM Ex-Ante & Balancing Market Daily Average Price

Graphs 3 and 4 below show the market share for each Ex-Ante Market by volume and value. By volumes (MWh), the DAM represented 85.84% of volumes traded, followed by IDA1 11.63%, IDA2 1.79%, IDA3 0.6% and IDC 0.13%.



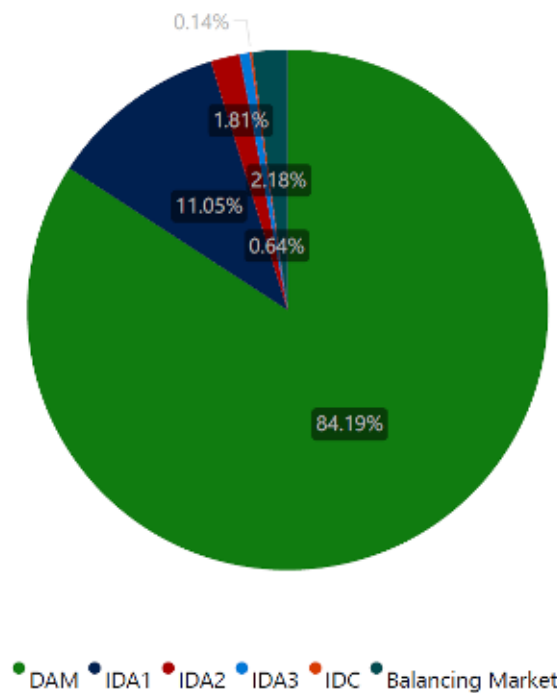
Graph 3 - Market (Ex-Ante) Share by Volume (MWh)

By value, the DAM represents 86.06%, IDA1 11.3%, IDA2 1.85%, IDA3 0.65% and IDC 0.15%.



Graph 4 - Market (Ex-Ante) Share by Value (€)

The graph below shows, when the Balancing Market value is included with the Ex-Ante Markets, the DAM represents 84.19% of the market, followed by the IDA1 with 11.05%, Balancing Market with 2.18%, IDA2 with 1.81%, IDA3 with 0.64% and the IDC with 0.14%.



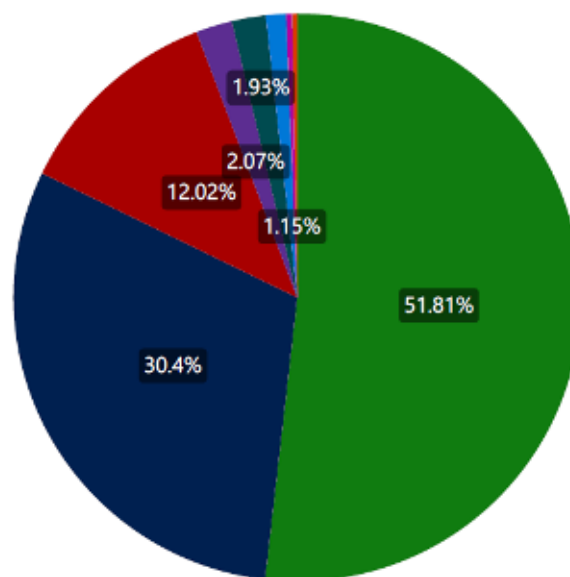
Graph 5 - Market Share by Value (inc. Balancing Market) (€)

Overall, as shown in the graph below, actual system demand in across the quarter has remained above the levels seen when compared to the same period in 2020,



Graph 6 – 7 Day Rolling System Demand Average

Demand is being met by a number of fuel types. The below graph shows the fuel mix of metered generation across the Island in Q4 2021.



● GAS ● WIND ● COAL ● PEAT ● HYDRO ● OIL ● DISTILLATE ● BIOMASS ● PUMP STORAGE

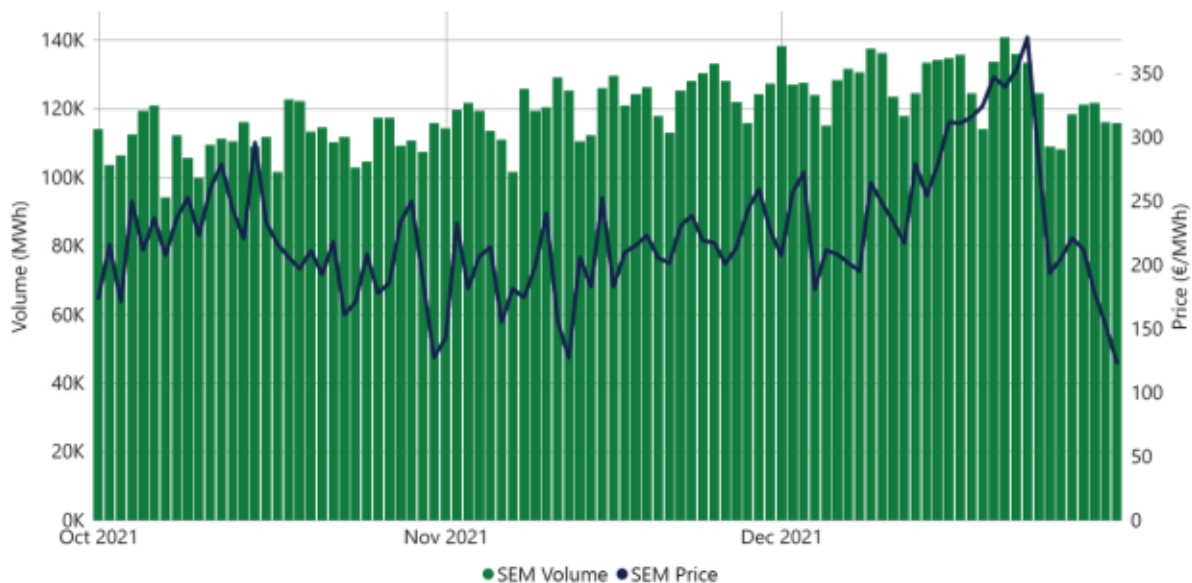
Graph 7 – Fuel Mix Metered Generation

This quarter gas represented 51.81%, Wind 30.4%, Coal 12.02%, Peat 2.07%, Hydro 1.93% and Oil 1.15% with the remainder made up of Biomass, Distillate and Pumped Storage.

2.2 DAY AHEAD MARKET

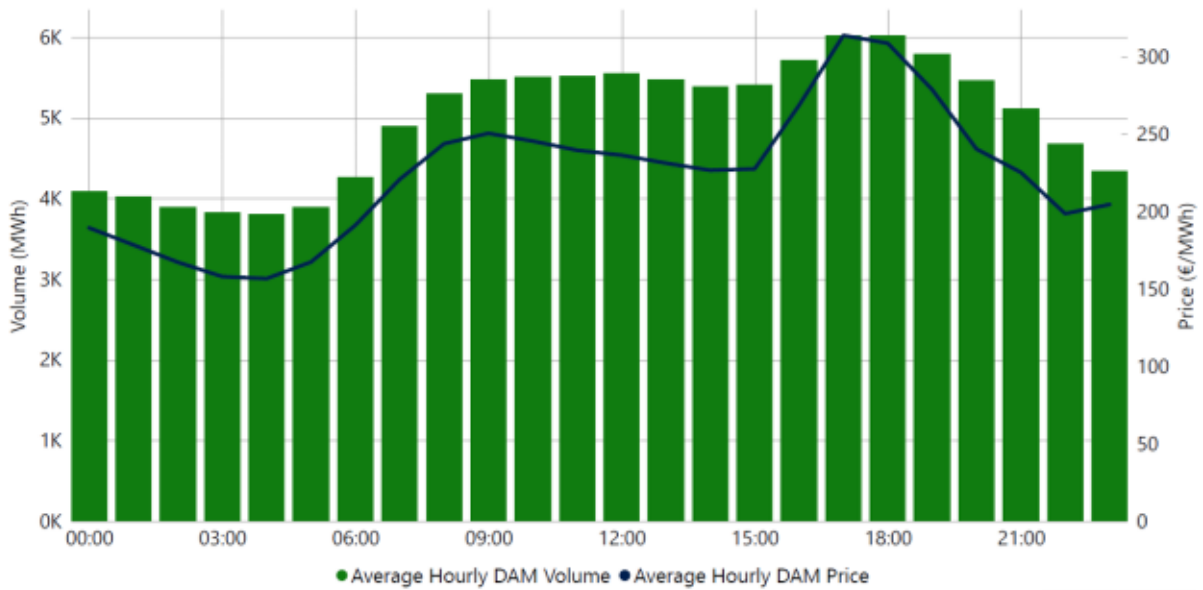
The graph below shows the daily average DAM price and volume for the market in Q4 2021. In total, the value of the DAM market during the period was €2.54 billion. The average daily price in the DAM was €223.42/MWh during the period, up from €156.40/MWh in Q3 2021, a 42.9% increase. This is also a 338% increase on the average price in Q4 2020 (€50.97/MWh). The lowest average daily price was €123.50/MWh seen on 31 December, with the highest average daily price €378.35/MWh seen on 23 December. The lowest price recorded in an individual hourly period was €0/MWh at 05:00 on 05 November whilst the maximum price recorded in a single period was €495.67/MWh at 17:00 on 22 December.

Higher market prices over the period have been driven primarily by increased input costs (mainly wholesale fuel prices, in particular Gas and Coal prices which increased throughout the period) and increased carbon costs while an increase in wind did have a slight dampening effect on prices.



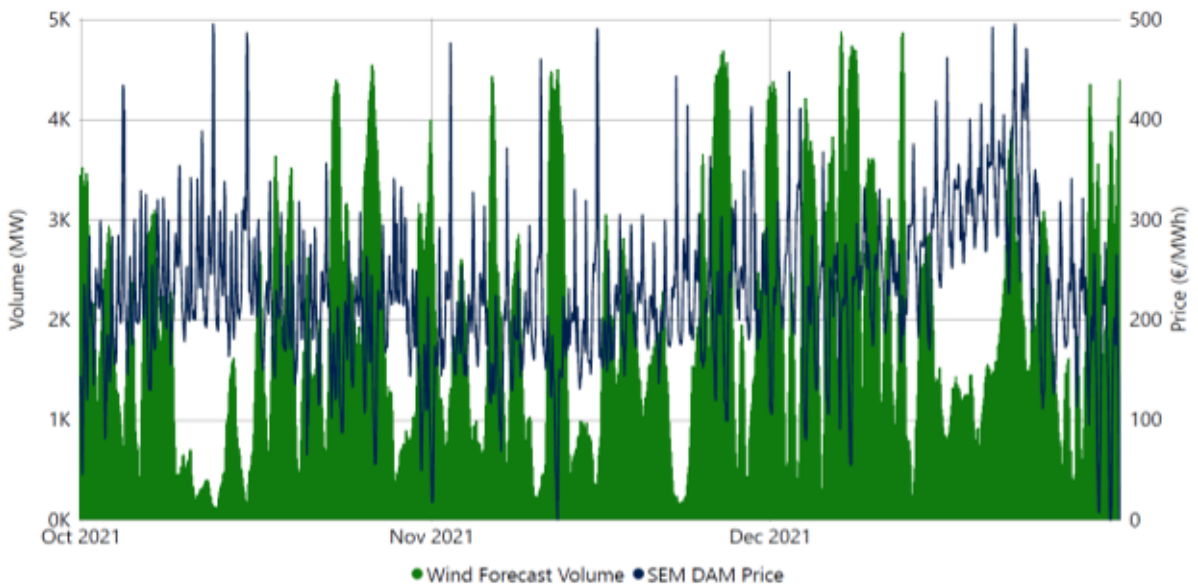
Graph 8 - DAM Market Volume and Average Daily DAM Price

The below graph shows the average volume and price across each hourly period in the trading day. It continues to show that the highest volumes are traded across peak morning and evening periods where the highest prices are seen. However, the dip in volumes between these periods is less than in previous quarters indicating a more steady DAM demand volume across the day.



Graph 9 – Average Volume and Price per Hourly Period

DAM price formation continues to be impacted by the level of wind in the system and the forecast of wind at the day ahead stage, with periods of high wind associated with a reduction in DAM prices. The highest prices continue to be affected by low wind forecast while the lowest prices occurred during periods of much higher expected levels of wind. The average wind forecast across the quarter was 1872 MW compared to 798 MW in the previous quarter, a 134% increase.



Graph 10 – Hourly Wind Forecast and Hourly DAM Price

Table 1 and 2 below illustrates the relationship between prices and the forecast level of wind at day-ahead stage. It shows the highest prices over the period covered occurred during morning or evening peak demand and the lowest prices occurring

overnight. Higher forecasted wind overnight was observed to have a noticeable effect on lowering prices however, whilst higher forecasted wind over evening peaks has not necessarily necessitated lower prices due to the effect on increase input costs and the fact that thermal generation was more likely to be required to meet demand.

Date/Time	DAM Price (€/MWh)	Wind Forecast Volume (MW)
22/12/2021 17:00:00	495.67	2,835.00
12/10/2021 18:00:00	495.43	116.00
20/12/2021 17:00:00	492.36	1,473.00
15/11/2021 17:00:00	490.91	293.00
22/12/2021 16:00:00	487.90	2,891.00

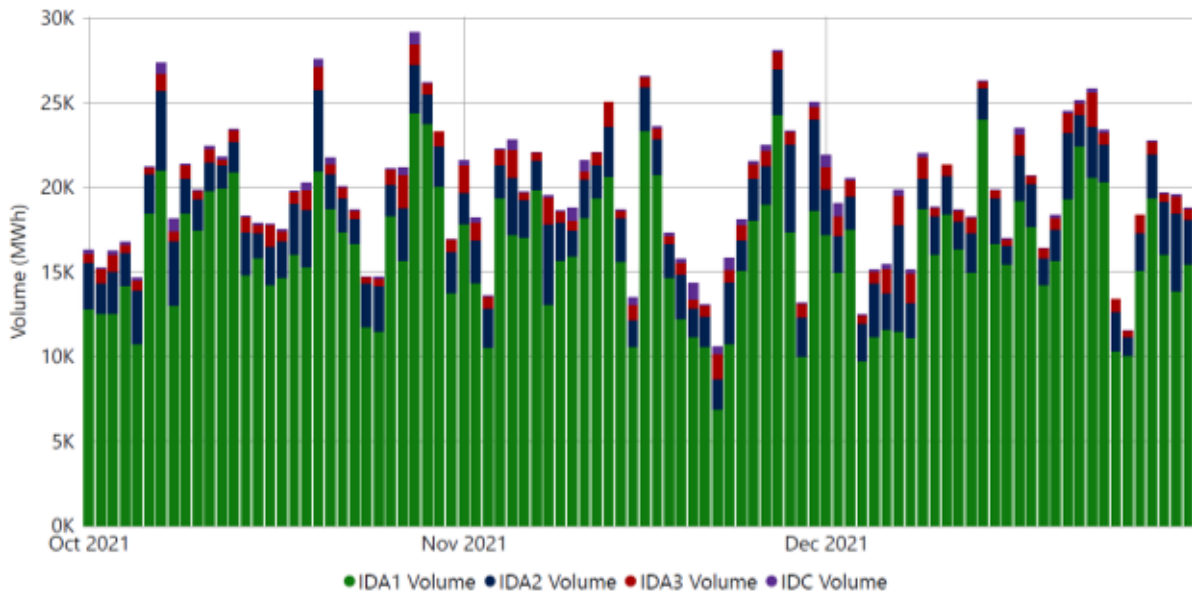
Table 1- High DAM Price and Wind Forecast

Date/Time	DAM Price (€/MWh)	Wind Forecast Volume (MW)
12/11/2021 05:00:00	0.00	4,502.00
31/12/2021 03:00:00	0.00	3,599.00
31/12/2021 04:00:00	0.00	3,759.00
31/12/2021 05:00:00	0.00	3,875.00
31/12/2021 23:00:00	0.27	4,390.00

Table 2- Low DAM Price and Wind Forecast

2.2 INTRADAY MARKET

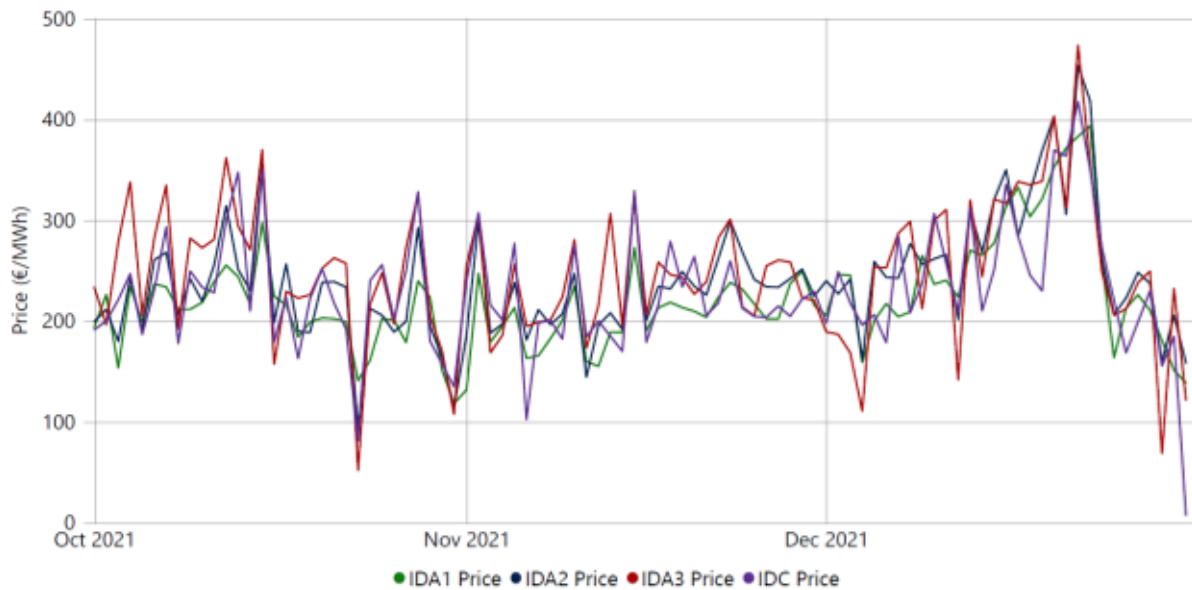
During Q4 IDA1 accounted for 11.63% of ex-ante traded volumes down from 14.27% in Q3, IDA2 accounted for 1.79%, IDA3 accounted for 0.6% of trades by volume and the IDC accounted for 0.13% of traded volumes of the ex-ante markets. The share of the market by value is similar, with IDA1 accounting for 11.3% of total ex-ante market value, IDA2 1.85%, IDA3 0.65% and IDC 0.15%.



Graph 11 – Total Intraday Volumes

Average prices in each auction have risen when compared to last quarter. Average price in the IDA1 in Q4 was €221.03/MWh, compared to €152.26/MWh in Q3, IDA2 €239.96/MWh compared to €165.68/MWh in Q3, IDA3 €247.48/MWh compared to €164.99/MWh in Q3 and the IDC market €241/MWh compared to €198.28/MWh in Q3. The total value of these markets over the period was €333.2M in IDA1, €54.5M in IDA2, €19.2M in the IDA3 and €4.3MM in the IDC market. The IDA2 and IDA3 cover a smaller timeframe and are closer to peak hours (where prices are generally higher to meet the increased level of demand and thus the average prices would be expected to be higher). However, all the rise of prices in all intraday actions follows a similar trend and reasoning to that seen in the DAM.

Graph 12 below illustrates the generally lower prices in the IDA1 with the higher prices in the IDA3 market. Prices in all markets generally move in a similar direction.



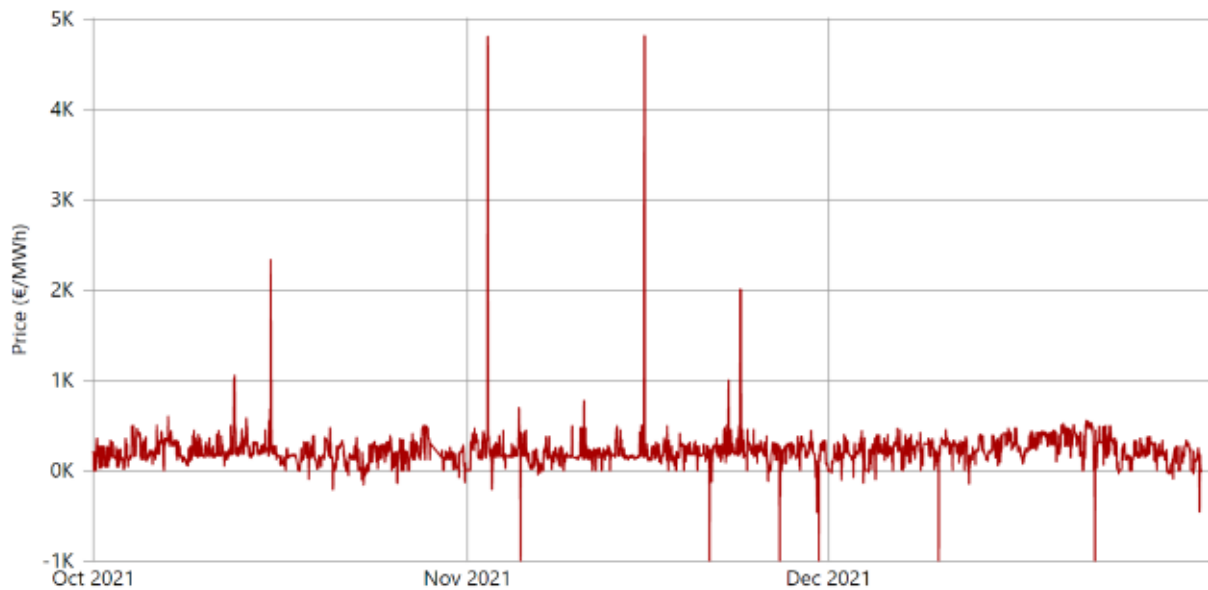
Graph 12 – Average Daily Intraday Prices

2.3 BALANCING MARKET

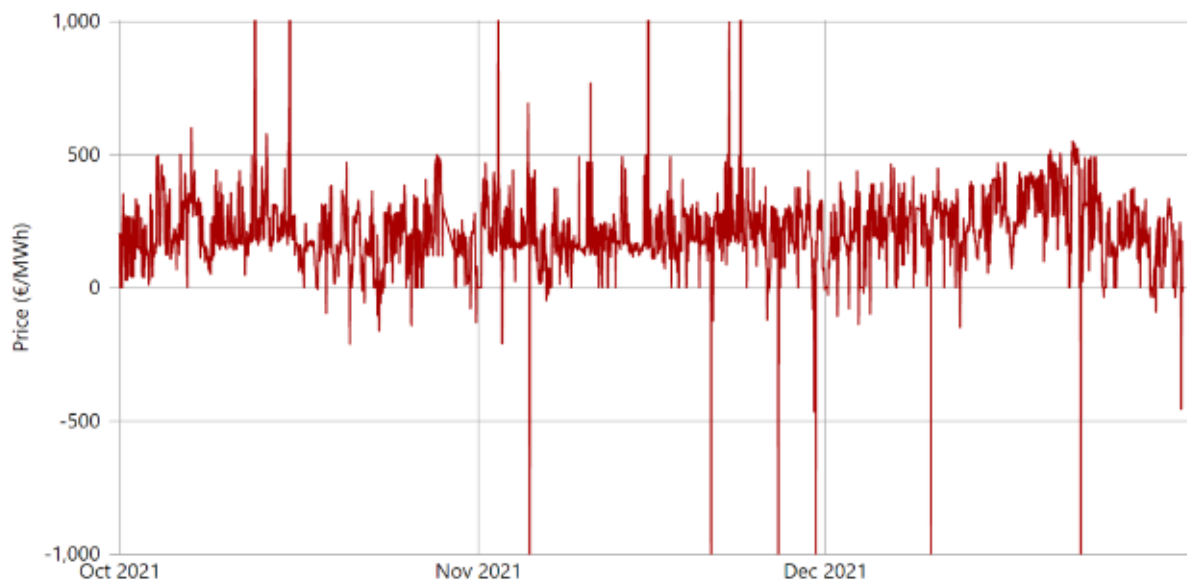
The balancing market is a complex market that determines the Imbalance Settlement Price for settlement of the TSO's balancing actions and any uninstructed deviations from a participant's notified ex ante position. It is made up of numerous energy/non energy actions, charge and payment components. Using these components to calculate the value of balancing, we can show the value of the overall Balancing Market value for Q4 2021 was €65.7M.

Imbalance Prices for 5 minute and 30 minute periods are set out below, showing relatively higher volatility in the market.

The graph below shows the price for each 5 minute Imbalance Price Period, highlighting the underlying price volatility in the Balancing Market. The average 5 minute price across the quarter was €218.18/MWh compared to €163.17/MWh in Q3.



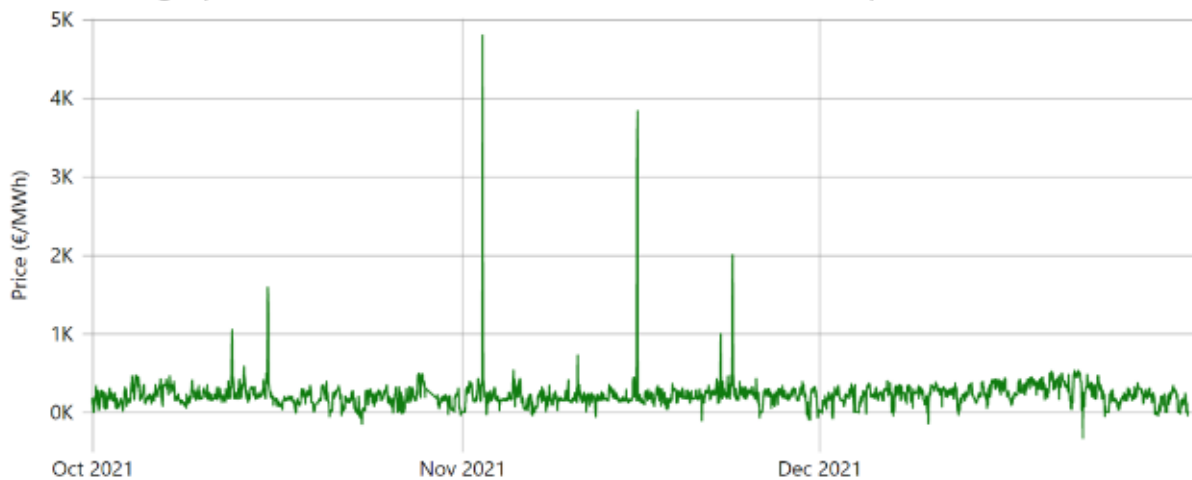
Graph 13 – 5 Minute Imbalance Price



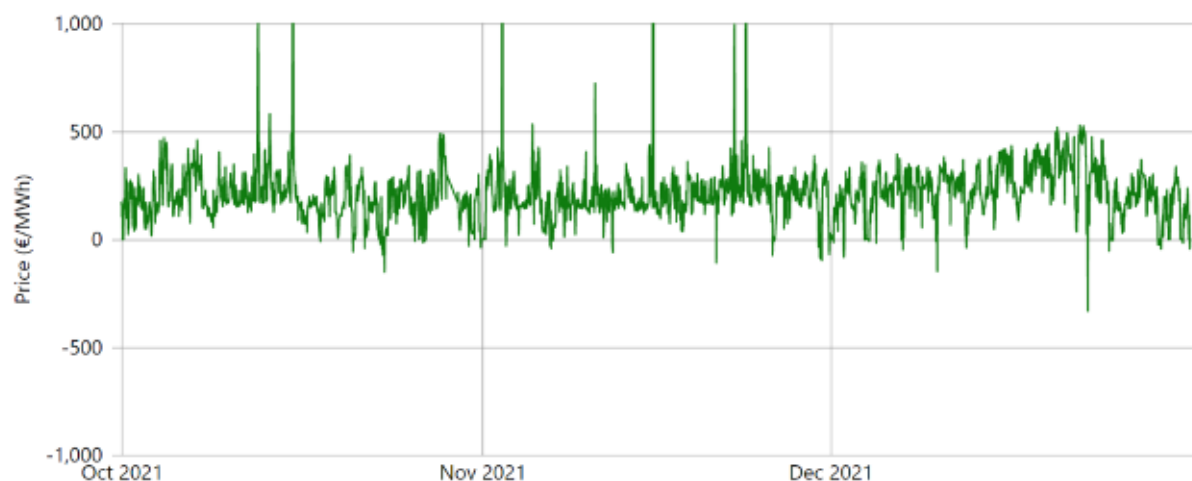
Graph 14 – 5 Minute Imbalance Price (Cropped €1000/MWh)

The highest settlement 5 minute Imbalance Price occurred on 15 November at 18:00 of €4,808/MWh. This high price was due to trading across the interconnectors to ensure security of supply and the same reasons contributed to a number of other very high prices across the quarter. It should be noted that due to T&SC Modification MOD_16_21 this does not feed into market settlement, instead the market back up price is used on such occasions. The lowest 5 minute Imbalance Price of (-)€1000 occurred on 05 November at 11:00.

The 5 minute Imbalance Price is used in the 30 minute Imbalance Price formation. In the below graph the Imbalance Settlement Price across the quarter can be seen.



Graph 15 – 30 Minute Imbalance Settlement Price



Graph 16 – 30 Minute Imbalance Settlement Price (Cropped €1000/MWh)

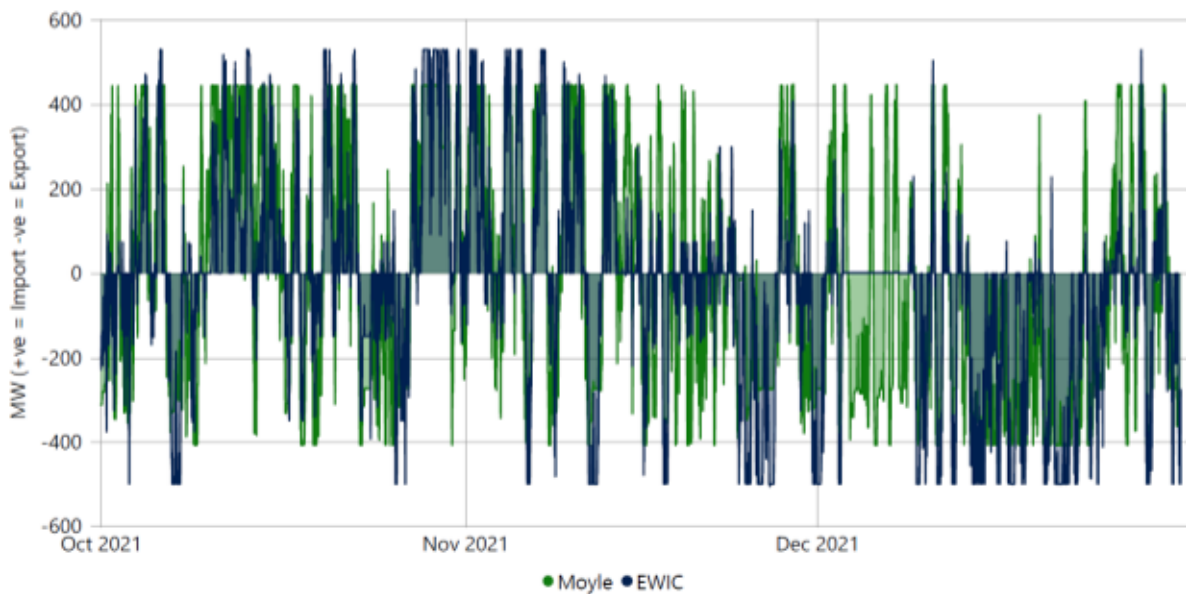
During the quarter, the highest 30 minute Imbalance Settlement Price was €4,800/MWh at 17:30 on 02 November. The lowest 30-minute settlement price was (-) €332.04/MWh at 03:30 on 23 December. The average Imbalance Settlement Price across the quarter was €218.32/MWh compared to €154.22/MWh in Q3.

2.4 INTERCONNECTION

As mentioned in previous reports, from 01 January 2021 cross border capacity is no longer coupled through the DAM. Cross border trading has however continued in the intraday timeframe via the IDA1 and IDA2 auctions. As with the previous coupling arrangement, scheduling of the flows on each of the interconnectors is determined by

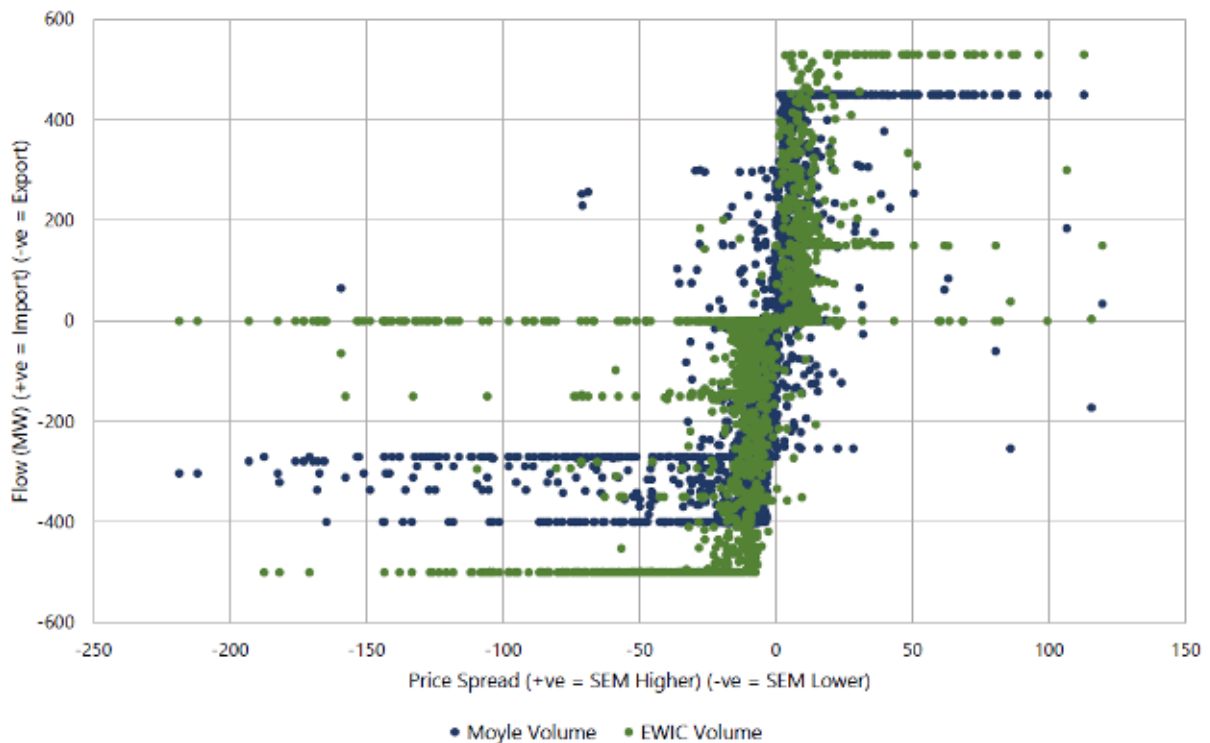
the price spread between SEM and GB in the IDA 1 and IDA 2. A spread where the SEM is priced higher than GB the interconnectors should import and where the SEM is priced lower than GB the interconnectors should be exporting.

In the graph below, the actual flows of each interconnector are shown across the quarter. A positive flow on the top half of the graph shows the interconnectors importing, indicating that the intraday SEM prices are higher than the intraday GB price. A negative flow in the bottom half of the graph shows that the SEM is exporting, indicating that the SEM price is lower.



Graph 17 – Actual Interconnector Flows (15 Minute Intervals)

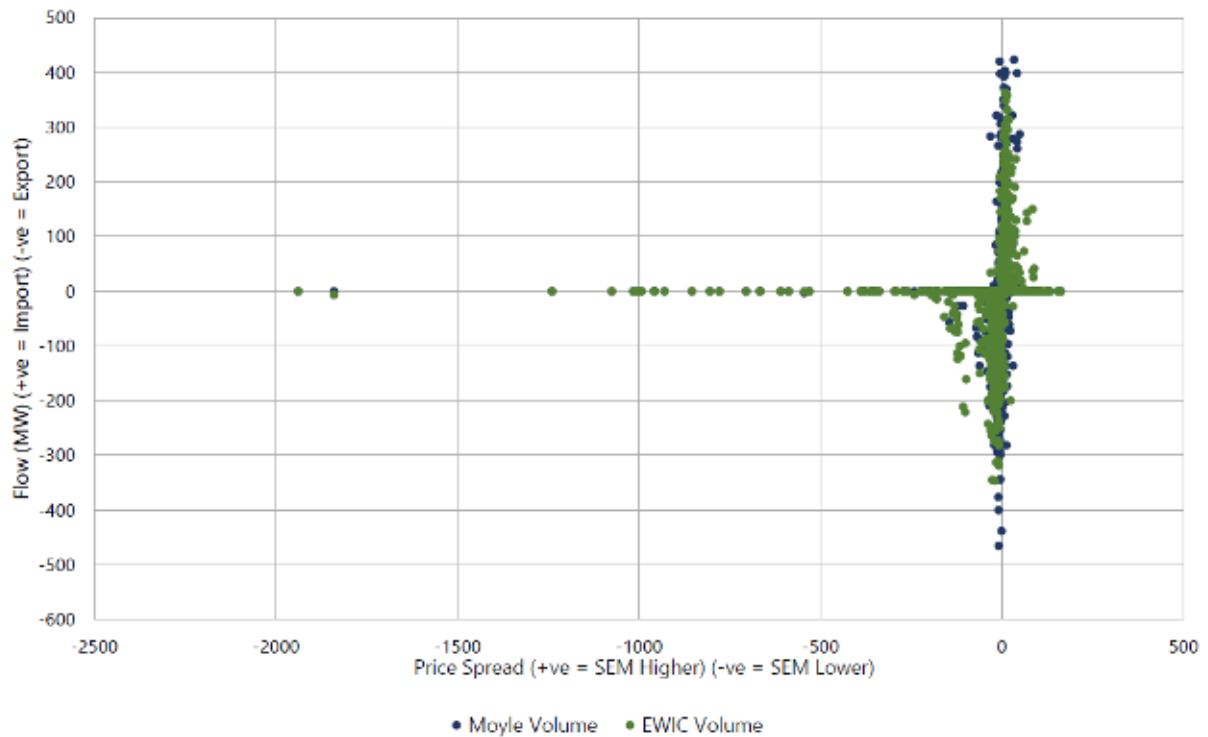
In the graph below, the X-axis shows the difference in IDA1 prices between the SEM and GB so that the positive price difference on the right of the graph is when the SEM price is higher than the GB price and the interconnector should be importing. The negative values on the left of the graph is when the SEM price is lower and the interconnectors should be exporting. The Y-axis shows the auction result flow on the day and their direction so that in the upper half of the graph, in which values are positive, the interconnectors are scheduled to be importing into the SEM from GB. In the lower half the negative values indicate scheduled export.



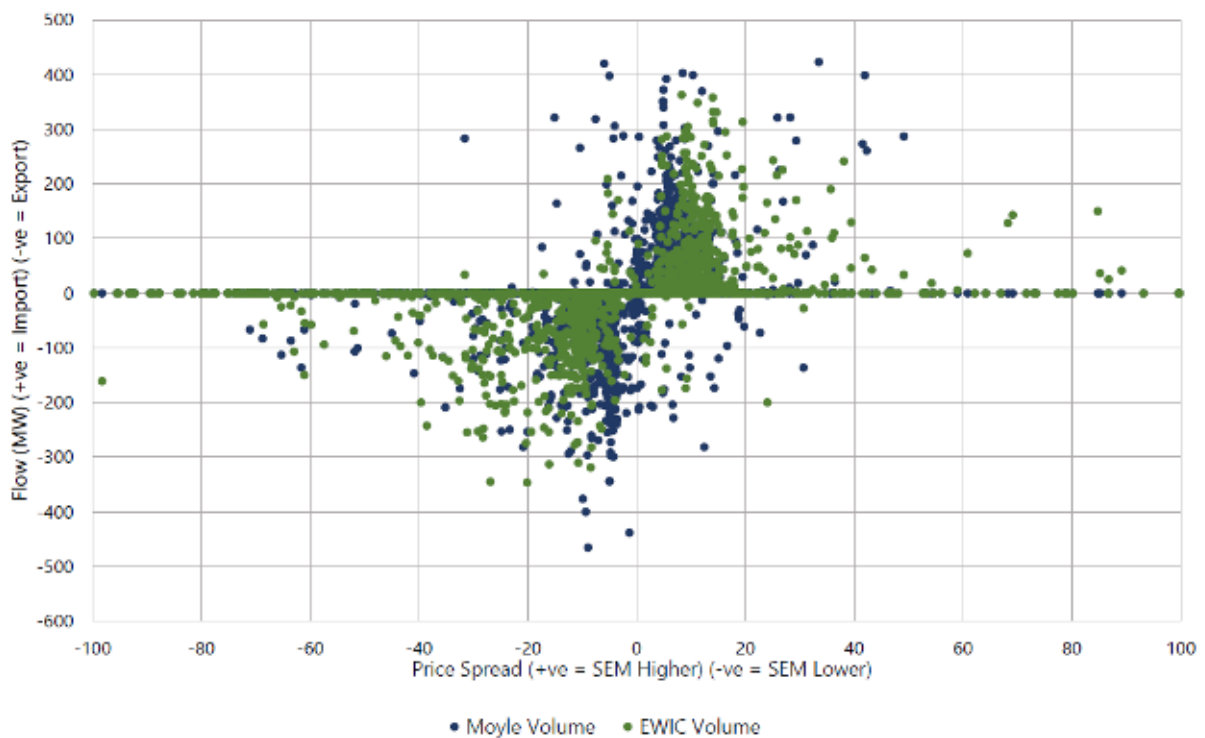
Graph 18 – IDA1 Interconnector Schedule Efficiency

In the graph above there are points in the top left and bottom right quadrants that appear to show flows in the counter-intuitive direction based upon the SEM/GB price spread. These points are due to the interconnectors either scheduled to export or import across a number of periods in the expected direction based on the SEM/GB price spread, then the price spread inverts for one period or small number of periods before reverting back to the previous positive or negative spread. The interconnectors are also ramping up or down from high imports or exports where the price differential has already inverted thus the points appear counter-intuitive.

Graph 19 & 20 below show the interconnector flows based on the IDA2 results. The IDA2 covers periods across peak evening times and the flow volumes are based upon a combination of IDA1 and IDA2 with the direction being determined by the price spread. This graph also shows that due to some high prices seen across these periods in GB, the price spread becomes highly negative (SEM lower than GB) which would indicate that SEM should be scheduled to export and also highly positive (SEM higher than GB) which would indicate that SEM should be scheduled to import. However, due to security of supply reasons the Net Transfer Capacity across a number of periods in September was set to 0 MW and so no volume allocated in the auctions.



Graph 19 – IDA2 Interconnector Schedule Efficiency



Graph 20 – IDA2 Interconnector Schedule Efficiency (Cropped (-)€100/MWh)

3 DIRECTED CONTRACTS Q4 2021

3.1 DIRECTED CONTRACTS Q4 2021 ROUND 17

The tables and figures below show the price and volume of Directed Contracts subscriptions for the latest DC Round 17, which was held in December 2021, covering the period Q2 2022 to Q1 2023.

Key information is summarised in Table 3 below.

Quarters on offer	Q2 2022 to Q1 2023		
Primary subscription dates	7 th – 9 th December 2021		
Supplementary subscription date	16 th December 2021		
Volume sold	1.09 TWh		
% Volume Sold	100%		
Average price / MWh	Baseload	Mid Merit	Peak
	€180.17	€196.44	€236.92

Table 3 - Round 17 Key Information

A breakdown of the volumes sold in the Round 17 Primary and Supplemental windows are shown in Table 4 and Table 5.

Quarter	Volumes Offered in the Primary Window (MW)			Volumes Sold in the Primary Window (MW)			Volumes Sold in the Primary Window as a % of Total Volumes Offered		
	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak
Q2 2022	195	146	-	187	140	-	96%	96%	-
Q3 2022	19	127	-	18	122	-	96%	96%	-
Q4 2022	2	60	76	2	57	62	100%	96%	82%
Q1 2023	16	60	29	15	57	28	95%	96%	96%

Table 4 - Round 17 Primary Window Volumes Summary

Quarter	Volumes Offered in the Supplemental Window (MW)			Volumes Sold in the Supplemental Window (MW)			Volumes Sold in the Supplemental Window as a % of Total Volumes Offered		
	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak
Q2 2022	8.1	6.1	-	8.1	6.1	-	100%	100%	-
Q3 2022	0.8	5.3	-	0.8	5.3	-	100%	100%	-
Q4 2022	0	2.6	13.6	0	2.6	13.6	100%	100%	100%
Q1 2023	0.7	2.6	1.1	0.7	2.6	1.1	100%	100%	100%

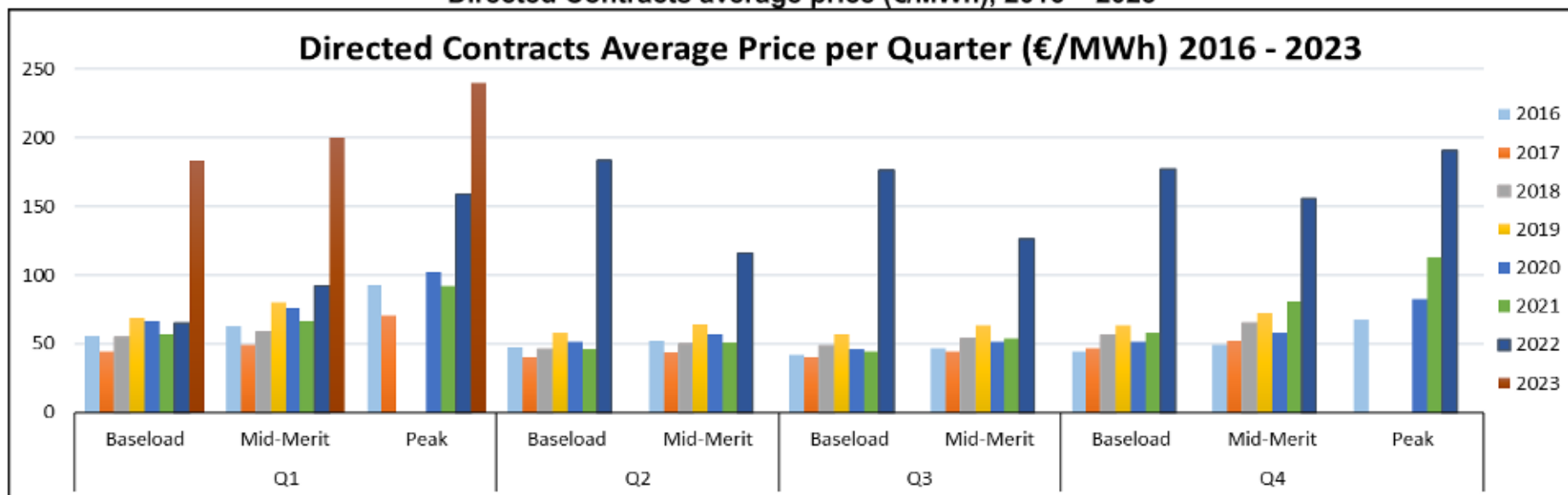
Table 5 - Round 17 Supplemental Window Volumes Summary

During Round 17, an average of 97% of Baseload, 96% of Mid-Merit, and 89% of Peak products were sold in the Primary Subscription Window. The remaining volumes were purchased in the Supplemental Window.

Directed Contracts Average Price (€/MWh), 2016 – 2023

DC Average Price per Quarter (€/MWh, 2016 - 2023)												
Year	Q1			Q2			Q3			Q4		
	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak
2016	€ 55.61	€ 62.31	€ 93.18	€ 47.85	€ 52.55		€ 41.91	€ 46.67		€ 44.25	€ 49.31	€ 67.30
2017	€ 44.09	€ 49.12	€ 70.73	€ 40.27	€ 43.65		€ 40.69	€ 44.12		€ 46.49	€ 52.16	-
2018	€ 54.51	€ 58.48	-	€ 46.30	€ 49.68		€ 48.20	€ 53.56		€ 55.90	€ 64.66	-
2019	€ 68.92	€ 80.20	-	€ 57.76	€ 63.94		€ 57.22	€ 63.73		€ 63.46	€ 72.44	-
2020	€ 66.72	€ 76.03	€ 102.60	€ 51.62	€ 56.74		€ 46.14	€ 51.18		€ 51.30	€ 58.25	€ 82.19
2021	€ 56.97	€ 66.42	€ 92.00	€ 45.62	€ 50.63		€ 44.55	€ 54.10		€ 58.14	€ 81.29	€ 112.42
2022	€ 64.86	€ 92.40	€ 159.06	€ 183.45	€ 115.66		€ 176.77	€ 126.18		€ 177.15	€ 156.08	€ 190.55
2023	€ 183.31	€ 200.43	€ 239.93	-	-		-	-		-	-	-

Directed Contracts average price (€/MWh), 2016 – 2023



Directed Contracts volumes (GWh), 2016 – 2023

DC Volumes (GWh, 2016 - 2023)															
Year	Q1			Q2			Q3			Q4			Total		
	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak	Baseload	Mid-Merit	Peak
2016	871	10	47	1135	7	0	1259	3	0	967	7	0	4232	26	47
2017	841	27	12	1148	160	0	695	191	0	1023	172	0	3707	550	12
2018	1370	0	0	1958	320	0	790	580	0	727	659	0	4846	1558	0
2019	801	606	0	609	362	0	535	739	0	450	871	0	2394	2579	0
2020	1231	193	7	518	436	0	293	407	0	534	414	13	2577	1450	20
2021	604	204	1	188	615	0	258	565	0	258	505	26	1308	1890	27
2022	149	313	51	426	454	0	42	524	0	4	142	32	621	1433	83
2023	34	81	10	0	0	0	0	0	0	0	0	0	34	81	10

Directed Contracts volumes (GWh), 2016 – 2023

