



Annual Report

Oct 2019 – Sep 2020

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1. Foreword from the SEM Committee

It has been another exceptionally busy year for the Single Electricity Market and one that has presented a wide range of unique challenges.

As we moved into the second year of operation of the new market arrangements, we built on the successes observed during the first year of these new, more efficient and competitive arrangements. We continue to see the system work as it was designed. Our interconnectors are flowing in the right direction, increased levels of renewables are being accommodated on the system, more trading opportunities are available for market participants and consumers saw the benefit of market forces putting a downward pressure on wholesale prices. Average prices in the day-ahead market were almost 36% lower compared to the same period the year before. Increased wind availability, lower fuel costs and lower demand all contributed to these lower prices. We continue to see a direct correlation between prices and wind availability with lower prices linked to high wind availability with higher prices observed when wind availability was low. Although we experienced some delays due to the Covid-19 pandemic, we welcomed progress in the DS3 programme which seeks to increase the level of renewables the system can accommodate. This will help us to further harness the benefits of renewable generation across the market.

As the world responded to the challenges of the Covid-19 pandemic, our focus was to ensure that consumers were protected as we worked with the RAs, the market operator, transmission system operators and generators to ensure the lights stayed on. Our market monitoring unit delivered key data to allow us to keep a close eye on the market impact of the pandemic. This included analysis of changes in demand and focus on changes in market prices. As the impact of the pandemic continues to be felt across energy markets throughout the world, we have enhanced our monitoring regime to ensure we can respond to market issues quickly and deliver a market that continues to operate to protect consumers.

In addition to a robust and detailed monitoring framework, we also continue to oversee the market to ensure all market participants are acting in accordance with the market rules and investigate where we see cause for concern. Our quarterly market monitoring reports help to provide valued transparency on market performance and we welcome the ongoing development of our external communications. During the year we developed and published our strategic objectives. Through this strategy we set the direction and our vision for the wholesale electricity market and outlined our mission, vision and values – the tools we will use to help us achieve these objectives. We have also developed and published our forward work programme which details some of the most significant projects that we will undertake over the next year.

In parallel to our work to ensure the effective operation of the market, we worked to confirm the market is prepared for the UK's exit from the European Union. With the commitment that the SEM will continue, we took a number of steps to facilitate future trade between the SEM and the market in Great Britain. We worked to minimize the loss of efficiency in trading across the Moyle and EWIC interconnectors by putting in place new arrangements which facilitate greater access for GB participants to the SEM. New, more flexible order types were added to the intraday markets between the SEM and Great Britain to offer additional trading options. We will continue to monitor

the market outcomes following the UK's exit from the EU and will take all possible steps to ensure the market is as efficient as possible.

We also made significant progress on the delivery of the requirements of the EU's Clean Energy Package (CEP) across the year. Setting out clearly our key areas of focus, we published a roadmap detailing how we will progress changes in the SEM to ensure compliance with the CEP. This included work on balance responsibility, priority dispatch, redispatch, aggregation, market parameters, regional coordination centres and impacts on the capacity remuneration mechanism. Although work continues, we have made significant progress and will work to implement any necessary market changes over the months ahead.

The past twelve months also saw the successful completion of three further capacity auctions. The CRM seeks to protect consumers by promoting competition between market participants and ensures payments reflect the value provided by the capacity delivered. To date, six capacity auctions have completed successfully resulting in savings of over €1bn if compared to the old capacity payment mechanism it replaced. The CRM continues to attract new investment and secure new generation capacity for the years ahead. With new and traditional technologies competing together, we have continued to see the development and diversification of the fuel mix within the market.

This year more than any other has seen the value in the effective working relationships with our stakeholders. We are grateful of the support from our government colleagues in the Department for the Economy and Department of the Environment, Climate and Communications. We thank our colleagues across industry for their commitment to the effective operation of the market and our other key stakeholders for their invaluable ongoing engagement. By working together we have still been able to deliver real benefits for consumers through the wholesale market alongside addressing the significant challenges.

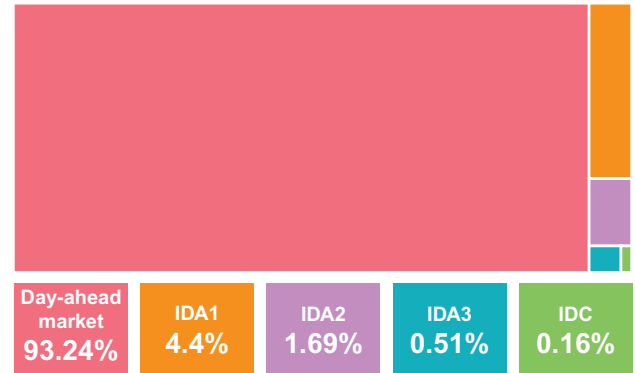
We must also recognise the unwavering commitment of our colleagues across the RAs in their professionalism and support of the work of the Committee. We also thank Jenny Pyper for her significant contribution to the work of the Committee over the last seven years as she retires from her role at the Utility Regulator. We wish her well for the future and welcome her successor John French who joins the Committee following his appointment as Chief Executive of the Utility Regulator. As we look forward to the next twelve months and beyond, we are committed to maximising the opportunities and meeting the challenges that lie ahead.

2. The year in summary

Key highlights

- High liquidity concentrated in the day-ahead market and other ex-ante markets performing as expected
- Day ahead market worth over €1.51bn
- Prices in the day-ahead market were 35.97% lower than the same period last year. Increased levels of wind generation put a downward pressure on electricity prices. Wholesale fuel prices also dropped across the year.
- Three successful capacity auctions completing helping to deliver security of supply at a competitive price. CRM auctions saving consumers over €1bn to date
- Drops in demand were observed during the first half of 2020 as a result of the Covid-19 pandemic

Ex-ante market share by volume

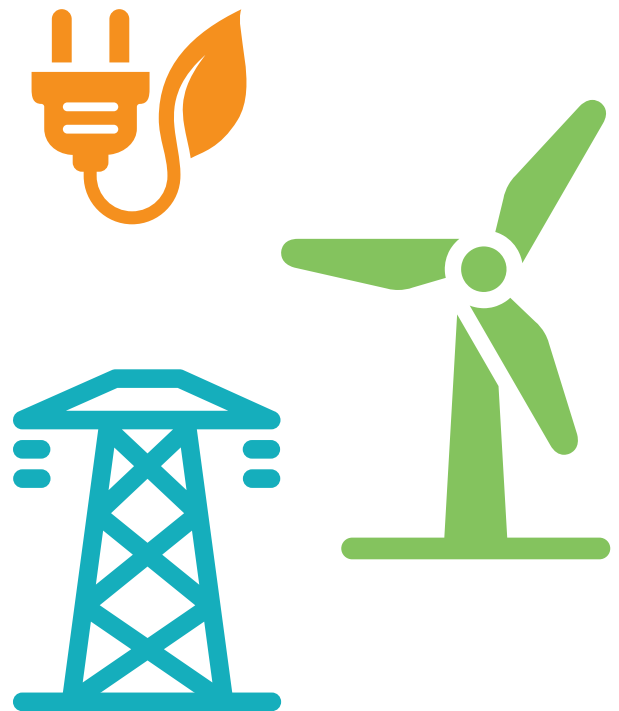
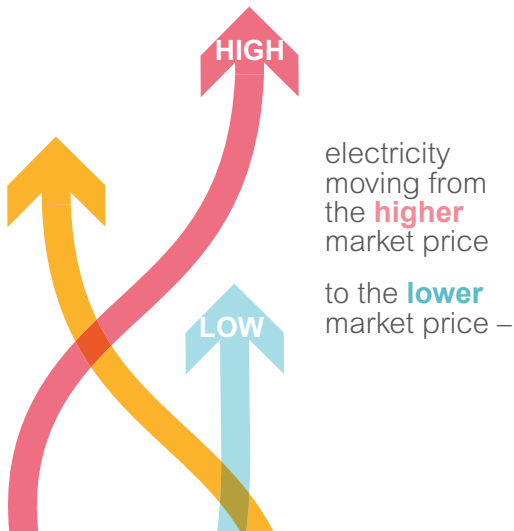


DS3

- System operating with up to 65% non-synchronous penetration (SNSP). Progress made to allow for move to 70%
- Work commenced on future arrangements for system services beyond April 2023

Interconnector efficiency

Interconnectors flowing in the right direction



Capacity Remuneration Mechanism

CRM vs CPM = c. €200m annual saving

T-1 CY2020/21 – 7,606MW capacity secured, €360m cost

T-2 CY2021/22 – 7,512MW capacity secured, €358m cost

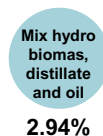
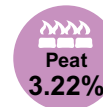
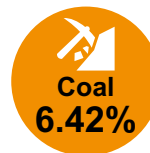
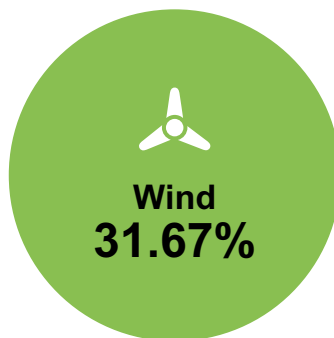
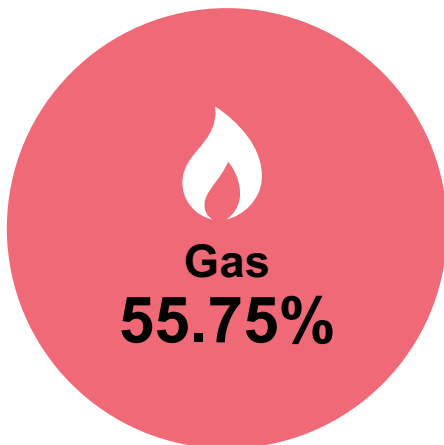
T-4 CY2023/24 – 7,322MW capacity secured, €363m cost

New investment and generation secured

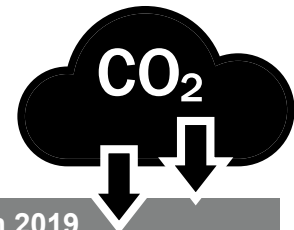


Secured Capacity

Fuel Mix




CO₂ emissions




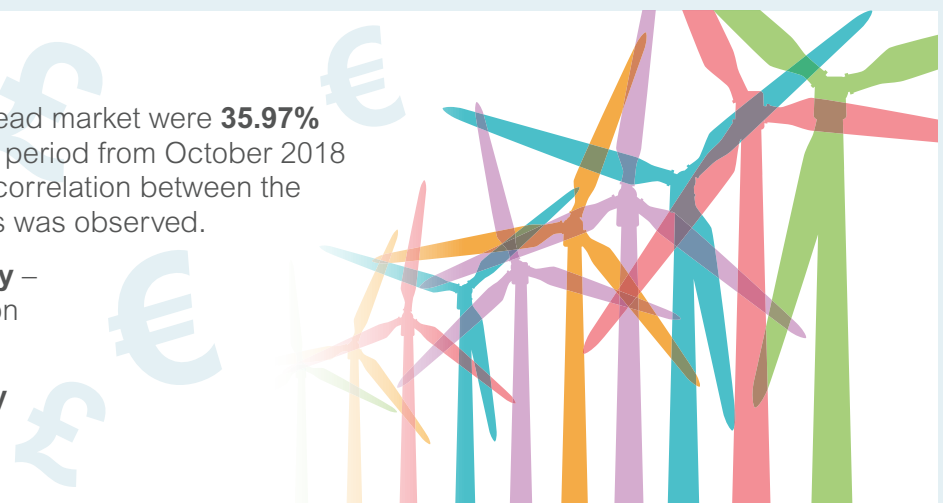
Fell from 0.291 tonnes per MWh in 2018 to 0.254 tonnes per MWh in 2019

Prices

Average prices in the day-ahead market were **35.97% lower** compared to the same period from October 2018 – September 2019. A direct correlation between the availability of wind and prices was observed.

 **High wind availability** – downward pressure on prices

 **Low wind availability** – higher prices observed





3. How the SEM works

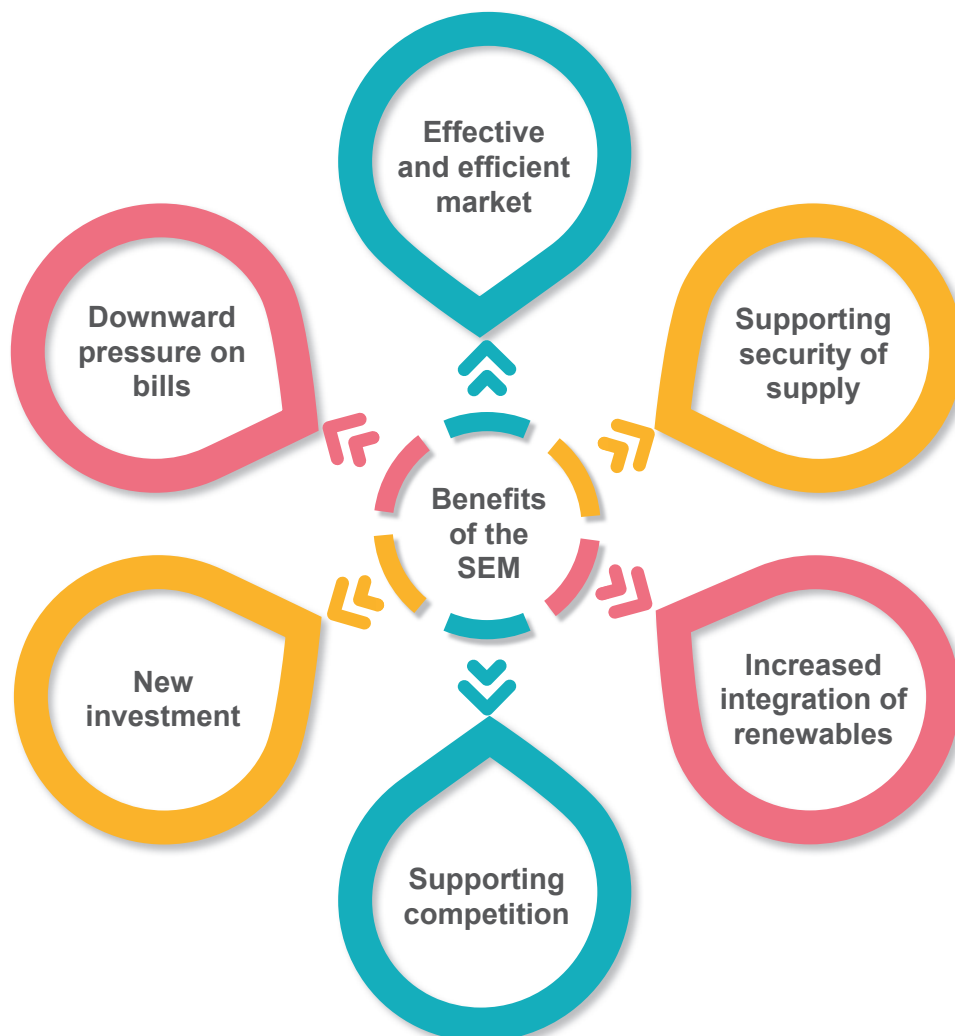
The Single Electricity Market (SEM) is the wholesale market on the island of Ireland where electricity generators and suppliers trade the power used by homes and businesses across Ireland.

Much has changed since the SEM was established in 2007, not least the significant increase of renewable generation, introduction of new technologies and the increased advantages to be gained from interconnection with other markets.

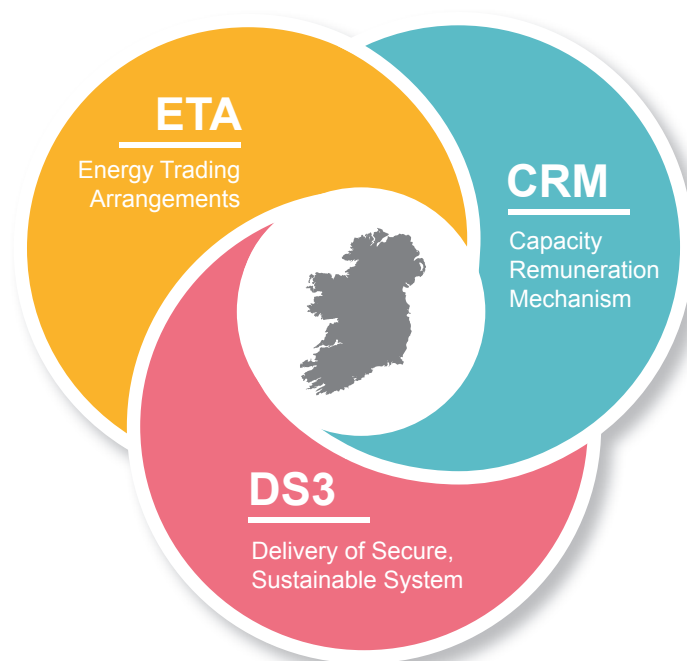
To take advantage of new opportunities and to improve the efficiency, competitiveness and operation of the market, new operational arrangements were put in place from 1 October 2018. This project, known as ISEM, sought to make best use of all the power on the system and ensure that interconnectors operate in the most efficient way. Compliance with the EU target model and alignment of cross border trading arrangements within the region was also at the core of the project.

Benefits of the SEM

The SEM brings significant benefits for all consumers. It provides trading opportunities for generators, suppliers and investors while delivering an efficient and competitive electricity market. The market is designed to support competition, allow increased renewables on the system, encourage new investment and support security of supply, all while placing a downward pressure on prices.



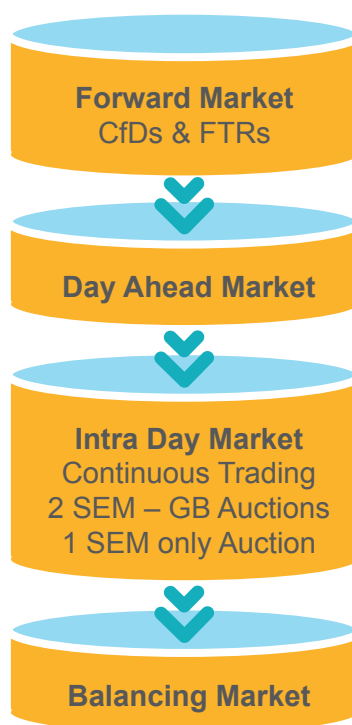
The SEM comprises three distinct areas that provide revenue streams relating to the services provided by market participants. The Energy Trading Arrangements (ETA), Capacity Remuneration Mechanism (CRM) and Delivering a Secure Sustainable Electricity System (DS3) make up the three main pillars of the market.



Energy Trading Arrangements (ETA)

The ETA are the activities comprising wholesale energy trading, which make up the major portion of revenue and cost for the majority of market participants. A key principle of the SEM is the flexibility it offers for those who wish to sell and purchase power. A number of markets each spanning different trading timeframes, have been designed to enable increasing levels of competition that place a downward pressure on prices whilst ensuring that the supply of power matches demand.

The SEM Energy Markets are broken down between forward, Day Ahead, Intraday and Balancing.



Forwards market

The Forwards market is a financial market. It provides participants with the opportunity to reduce their risk of exposure to significant movements in the price. They are able to spread the risk of their financial commitments by making sure their contractual investments can be offset or spread – called hedging. These transactions can take place months to years ahead of the power being used. Products traditionally available in this timeframe include Contracts for Difference (CfD) between market participants or in the form of a Directed Contract (DC), whose price and volume is set by the Regulatory Authorities.

Financial Transmission Rights are another type of hedge available in the forwards market. They are a type of hedge purchased through an auction for those who wish to protect themselves from the price differences between the SEM and Great Britain. The differences will arise during times when the interconnection capacity between the SEM and Great Britain is insufficient to harmonise the prices between the two markets.

Day ahead market

	Market Opening	Market Close	Delivery Periods	Coupling
Day Ahead Market (DAM)	11:00 (D-19)	11:00 (D-1)	23:00 – 23:00 (24 * 1 hr.)	Across EU via a single pan EU platform

The day ahead market (DAM) is the largest ex-ante market by volume and value. The DAM is a single pan European energy trading platform that allows participants to submit bids and offers for the sale or purchase of power across Europe. Bids and offers can be submitted 19 days before the market closes at 11am the day before delivery. An algorithm, call Euphemia (the acronym for Pan-European Hybrid Electricity Market Integration Algorithm), determines prices and positions for all participants in all coupled markets. Market prices are used to determine Interconnector flows, ensuring optimal cross-border flows between and within member states.

Participation in the DAM is not mandatory, but it is the only way of achieving a day-ahead position in the SEM that will minimise exposure in the balancing market. Participants have opportunities to adjust their position by trading in the intraday market.

Intraday market

Market Name	Order Book Opening	Order Book Closing	Delivery periods	Coupling
IDM Continuous Trading	11:45 (D-1)	1hr before real time (t-1)	48 * ½ hours	I-SEM only
IDA-1	23:00 (D -19)	17:30 (D-1)	23:00 - 23:00 (48* 1/2hrs)	I-SEM – GB
IDA-2	23:00 (D -19)	08:00 (D)	11:00 - 23:00 (24* 1/2hrs)	I-SEM –GB
IDA-3	23:00 (D -19)	14.00 (D)	17:00 - 23:00 (12* 1/2hrs)	I-SEM auction only

The intraday market (IDM) allows participants to adjust their physical positions closer to the time power is delivered. The IDM runs right up to one hour before trading and takes account of up to date market information including, for example, unscheduled plant outages or congestion on interconnectors.

The market consists of three daily auctions with IDA-1 and IDA-2 coupled with the GB market via the interconnectors. The third Intraday Auction (IDA-3) is a local SEM auction that is not coupled with the GB bidding area.

Balancing market

Market Name	Market Opening	Market Close	Delivery Periods	Coupling
Balancing Market	13.30 (D-1)	1hr before real time (t-1)	23:00 – 23:00 (48*1/2 hrs)	I-SEM only

The BM is different from the other markets in that it reflects actions taken by the TSO to keep the system balanced and secure. Unlike the other ex-ante markets, participation in the Balancing Market is mandatory.

The BM trading day is divided into 48 (30 minute) imbalance settlement periods, within which are six (5 minute) imbalance pricing periods. The submission window for market data opens 19 days ahead of the trading day and closes 1 hour before the start of each 30-minute imbalance settlement period. The imbalance prices for each 5-minute imbalance pricing period are used to calculate the imbalance settlement price for each 30-minute imbalance settlement period.

A rules-based, flagging-and-tagging process is used to determine the initial imbalance price in each 5-minute imbalance pricing period. The flagging-and-tagging process prevents bids and offers that are scheduled due to a system constraint, or where units are operating at a unit constraint, from influencing the imbalance price.

Capacity market

The Capacity Remuneration Mechanism (CRM) allows generators to recover their fixed costs. It also helps to ensure there is enough capacity to meet demand and that this capacity is purchased at a competitive price via an auction.

The auctions are run a minimum of one year before the capacity is needed. Auctions for capacity required four years before delivery help to encourage new investment by providing a clear and pre-determined revenue stream. By promoting competition between market participants, it ensures payments more closely reflect the value provided by the capacity

The overall costs of these capacity payments are spread among suppliers. Those generators that do not deliver the capacity when needed are subject to a financial penalty.

Governance arrangements and market structure

We, the SEM Committee are the decision making authority for all Single Electricity Market matters. Established in 2007 following the introduction of the SEM, legislation required the establishment of SEM governance in the form of a SEM Committee.

The Committee consists of three Commission for Regulation of Utilities (CRU) and three Utility Regulator (UR) representatives along with an independent and a deputy independent member appointed jointly by the Department for the Economy and Department of the Environment, Climate and Communications.

On 25th February 2014 the UR and CRU signed a Memorandum of Understanding that outlines how the two organisations will maintain and facilitate effective and beneficial co-operation and collaboration. This signifies the ongoing commitment of both regulatory authorities to work together to ensure the effective delivery of both joint and separate statutory remits and for the customers of the energy and water sectors they regulate. They are separately responsible for the licencing of market participants, implementation of market codes as well as the regulation of the network operators.

The SEM is operated by the Single Electricity Market Operator (SEMO). This is a joint venture between the transmission system operators in Ireland (EirGrid) and Northern Ireland (SONI). EirGrid and SONI are also the Nominated Electricity Market Operators (NEMOs) for Ireland and Northern Ireland respectively. The NEMO is designated a responsible for the day-ahead and intraday market coupling in each national or regional bidding zone.

Detailed market rules and procedures govern the SEM with market behaviour scrutinised by the RAs market monitoring unit.

4. Market performance

The SEM was designed to allow the efficient coupling of the wholesale market on the island of Ireland with the wholesale electricity market across Europe through a single marketplace and common rules. The trading arrangements have been designed to achieve this through a liquid DAM on the island coupled with the DAM across Europe and the effective linking of the two through efficient use of the two interconnectors that link the SEM with Wales and Scotland.

Further coupling has been effected in the Intra-day market timeframe and currently two auctions during this time link the SEM to the wholesale market in Great Britain. The design of the SEM allows a market solution to the balancing of the demand and supply of electricity through a balancing market which takes place in real time.

Day ahead market

The market design for the SEM anticipates an active day-ahead market (DAM) in which the majority of electricity would be traded. The price is formed by a pan-European auction that sets a single price for each hour that all buyers and sellers of power will pay and receive. The DAM price that is set in the SEM is calculated on a single trading platform by a computerised calculation procedure called EUPHEMIA that takes account of all the cross-border restrictions on the transmission of power in the European market. It has ensured that the DAM has operated effectively in line with the expectations of the market design. This has therefore ensured that the DAM is the most significant market for both generators and suppliers with by far the highest volumes traded in this market timeframe.

In total, the value of the DAM market for the year was over €1.51bn and the volumes and prices traded are illustrated in Figure 1.

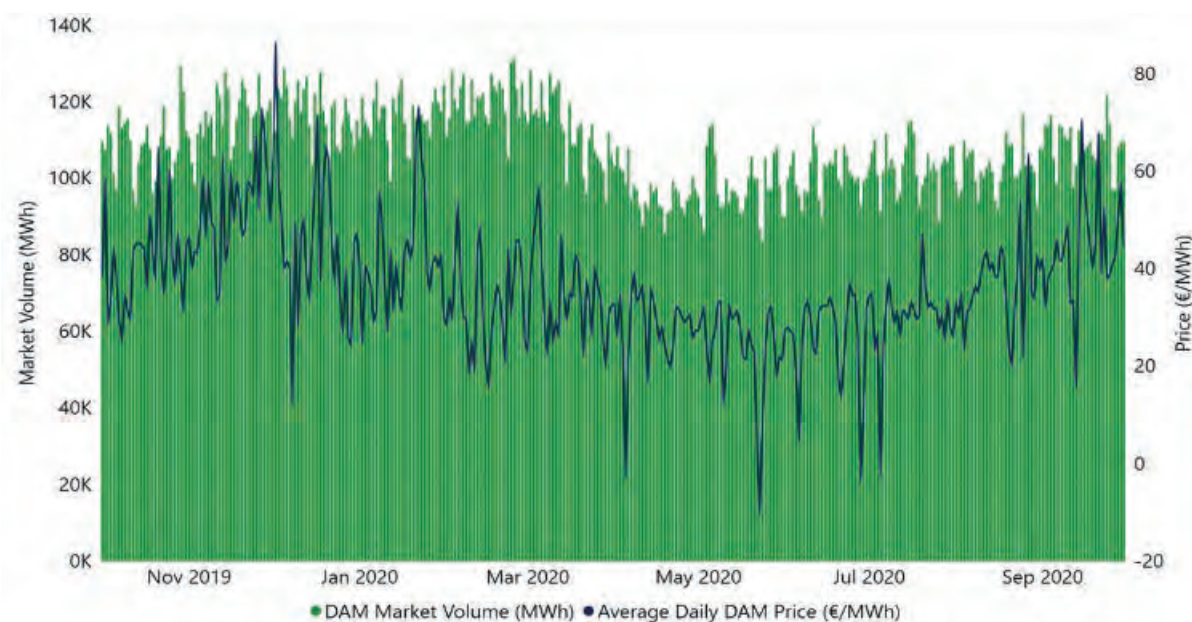


Figure 1 – Daily DAM Volume and Average Daily DAM Price

The average daily price in the DAM was €36.40. The lowest price recorded in an hourly period was -€41.09 and the maximum price recorded in a single period was €205.25. Prices in the DAM are lower (decrease of 35.97%) compared to the same period from October 2018 to September 2019. This decrease has been primarily driven by a decrease in fuel costs across long periods of the year, lower demand during much of Q2 in 2020 as a result of COVID 19 and higher levels of wind.



Figure 2 below shows the average volume and price across each hourly period in the DAM showing how higher prices are correlated to peak demand and vice versa.

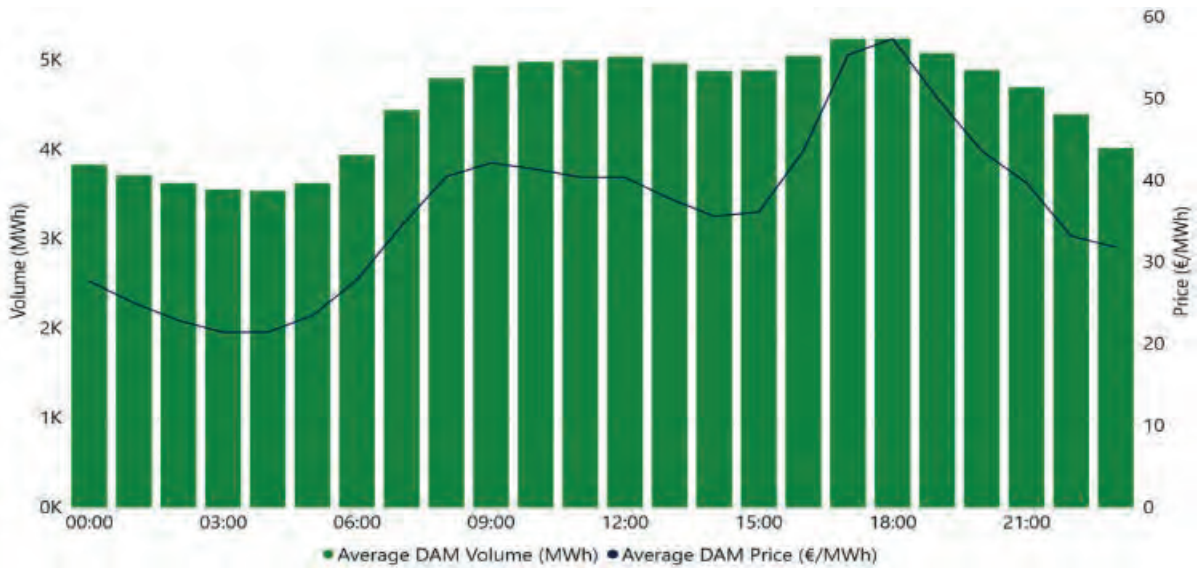


Figure 2 – Average Volume and Average DAM Price in Each Hourly Period

The concentration of trading in the DAM, compared to the other markets before final balancing of supply and demand in the balancing market, has meant that over 93% of ex-ante volumes were traded through the DAM across the year. This is illustrated in Figure 3. Generators of electricity and suppliers of electricity to business and domestic customers have sought in general to cover their requirements in this market.

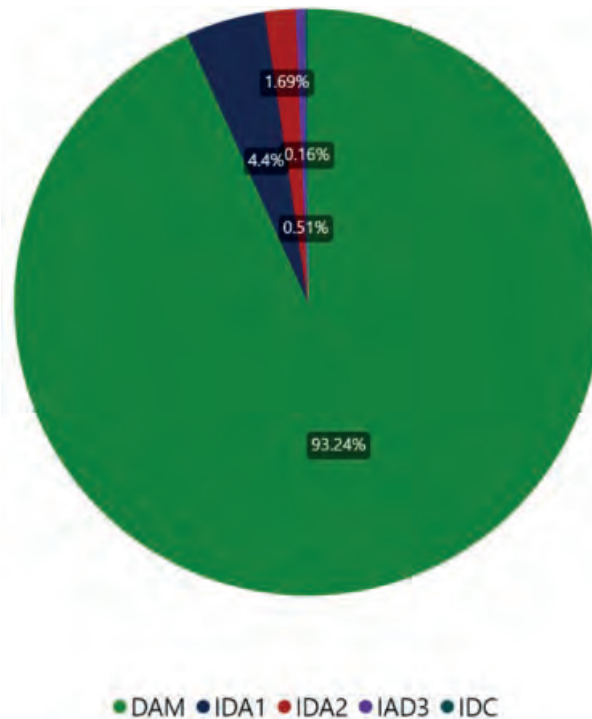


Figure 3 – Market Share by Volume (MWh)

Fuel mix in the DAM

The fuel mix in the DAM is made up of the type of generation that supplies business and domestic customers in Ireland and Northern Ireland, including the role of renewable generation. Figure 4 shows that gas was the predominant fuel used for generation in the DAM across the year with 55.75% of metered generation. Wind made up 31.67% with 6.42% coal and 3.22% peat. The remaining generation was made up of hydro, biomass, distillate and oil.

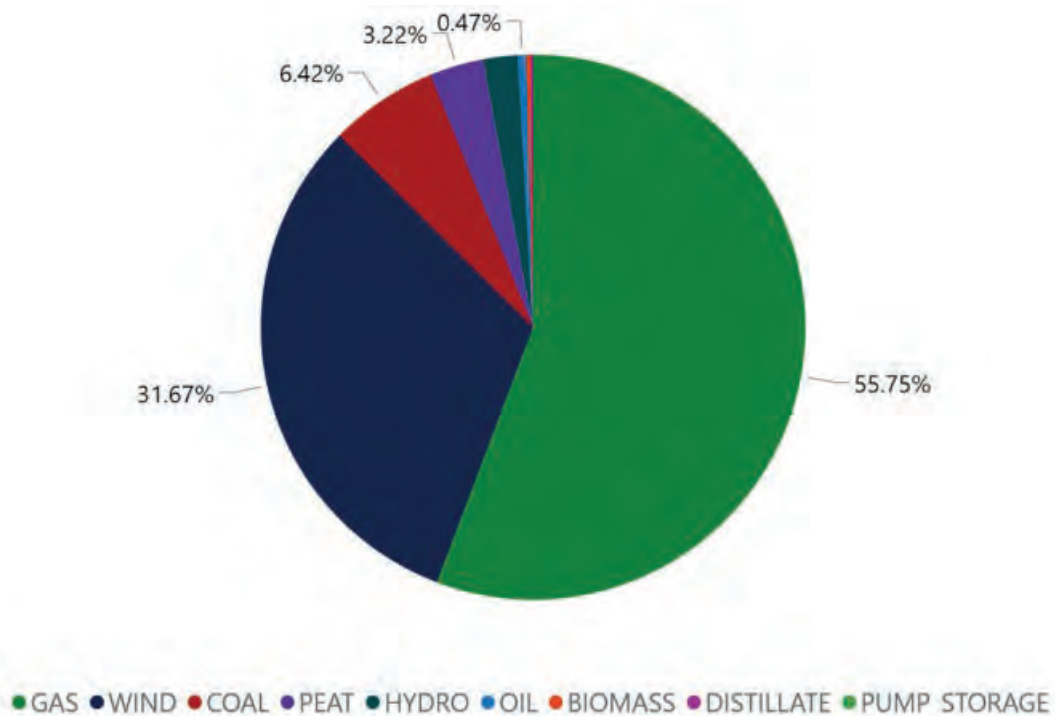


Figure 4 – Metered Generation by Fuel Mix

Small scale generation, generating power less than 10MW, does not have to participate directly in the market. The fuel mix figures outlined in Figure 4 does not therefore include many of the small scale generators across the island. This generation is however captured in the overall fuel mix figures for the year as described later in this report

Wind and the day ahead market

DAM prices have been significantly impacted by the level of wind on the system and the forecast of wind at the day ahead stage. Figure 5 shows that the level of wind can vary significantly over the year, having an important influence on the fuel mix and price formation. This graph of daily DAM price against the daily aggregated wind forecast, shows the volatility of wind and its impact on the level and volatility of prices. Periods of high wind (columns) are associated with a reduction in DAM prices and likewise periods of low wind are associated with an increase in DAM prices.

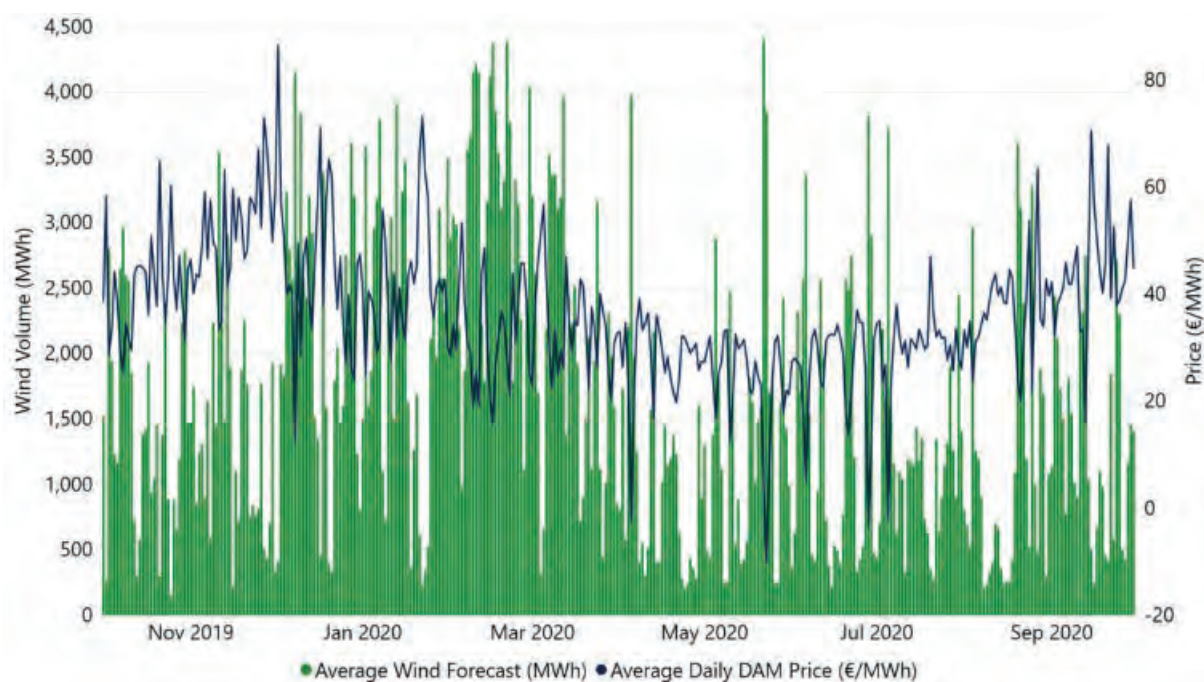


Figure 5 – Average Daily Wind Forecast and Average Daily DAM Price

Lower prices can be directly correlated with high wind, while higher prices can be observed in periods when the level of wind is reduced. Figure 6 illustrates the relationship between prices and the forecast level of wind across the year, highlighting the highest and low prices observed in the day-ahead market during the year.

High Price-Low Wind				Low Price-High Wind			
Date	Time	Price (€/MWh)	Wind Forecast (MWh)	Date	Time	Price (€/MWh)	Wind Forecast (MWh)
19-Dec-19	17:00	€ 203.25	386.48	23-May-20	05:00	-€ 41.09	4018.93
21-Dec-19	17:00	€ 200.00	117.64	23-May-20	04:00	-€ 39.97	4039.58
22-Jan-20	17:00	€ 196.79	178.02	23-May-20	06:00	-€ 33.52	4013.54
21-Sep-20	18:00	€ 192.84	457.67	23-May-20	03:00	-€ 29.81	4064.35
15-Sep-20	18:00	€ 176.22	140.06	23-May-20	05:00	-€ 28.11	2034.74

Figure 6 - DAM Prices and Forecast Wind Periods

The table shows that highest prices are all occurring at evening peak demand (17:00 & 18:00) with the lowest prices overnight where demand is on the system is lower.

Price comparison

Many factors impact on prices, including levels of demand, wind, fuel prices, carbon prices, power plant availability and the flow of power into and out of the market through interconnection with GB. Figure 7 compares the seven day rolling average DAM price 2019/20 with the DAM price in 2018/19. Over 2019/20 the average DAM price has decreased (35.97%) compared to the same period in 2018/19.

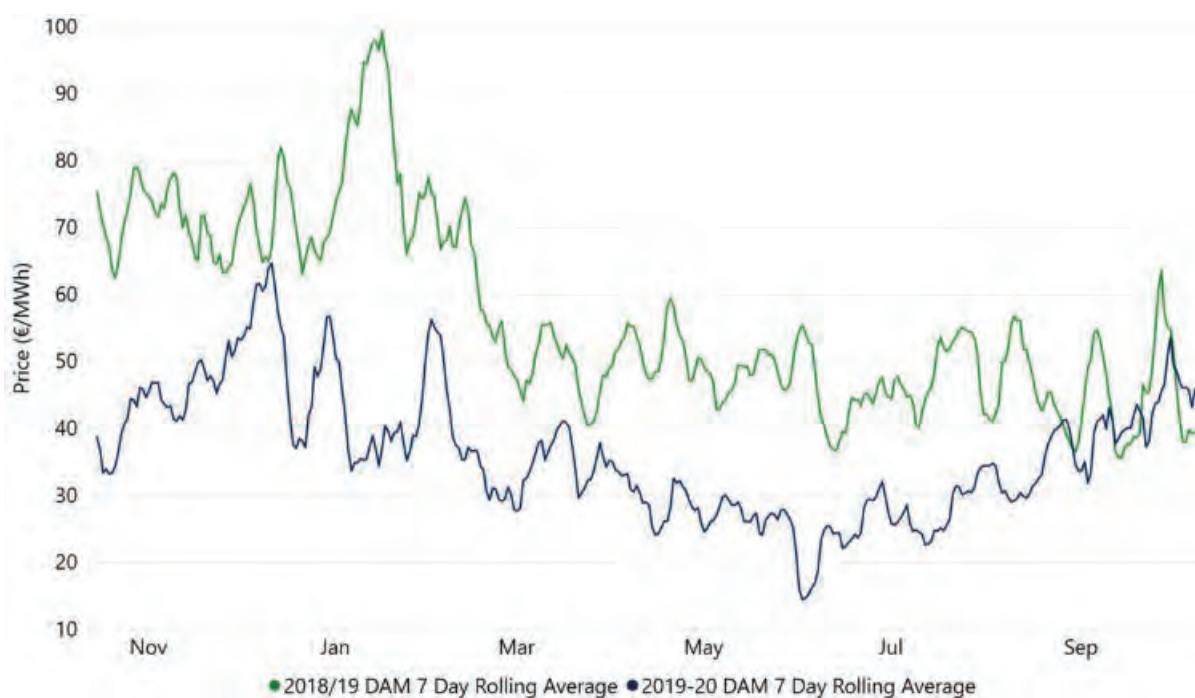


Figure 7 – DAM Price 7 Day Rolling Average 2018/19 and 2019/20

This decrease has been primarily driven by a decrease in fuel costs across long periods of the year, lower demand during much of Q2 in 2020 as a result of COVID 19 and higher levels of wind.

Intraday market

The Intra-Day markets have allowed market participants to refine their market position by buying or selling nearer to real time, when power is generated and consumed. This assists market participants to balance their generation or consumption with their contracted position so that any imbalance between them is not subject to potential charges in the balancing market.

Volumes however have been relatively low, and have generally declined through the IDA1, IDA2 and IDA3, and the Intra-Day Continuous (IDC) market. The IDA1 and IDA2 are coupled markets with GB, which means prices are formed alongside the GB market, while the IDA3 and IDC are local SEM-only markets. The IDC market, unlike the other intra-day markets is not an auction in which all trades in a particular period are cleared at a single price, but involves buyers and sellers posting volumes and prices on an order book visible to the market that are cleared by sellers and buyers accepting the volumes and prices offered. The IDA1 auction accounted for 4.4% of the total ex-ante market by volume, the IDA2 auction accounted for 1.69%, the IDA3 auction for 0.51% and the Intra-Day Continuous market (IDC) for 0.16%. While volumes fall, average prices have shown a tendency to rise during the Intra-Day timeframe as it became closer to real time, with average prices in IDA1 being €35.88, IDA2 €42.11 and IDA3 €47.15 and the IDC €42.54. The total value of these markets over the year has been €66.3M in IDA1; over €29.8M in IDA2; €9.9M in the IDA3 and over €12m in the IDC market. Overall, we saw lower prices in the IDA1 and the IDA2 with the higher prices in IDA 3 and IDC. Prices in all markets generally move in a similar direction. Figure 8 below shows this trend across the year.

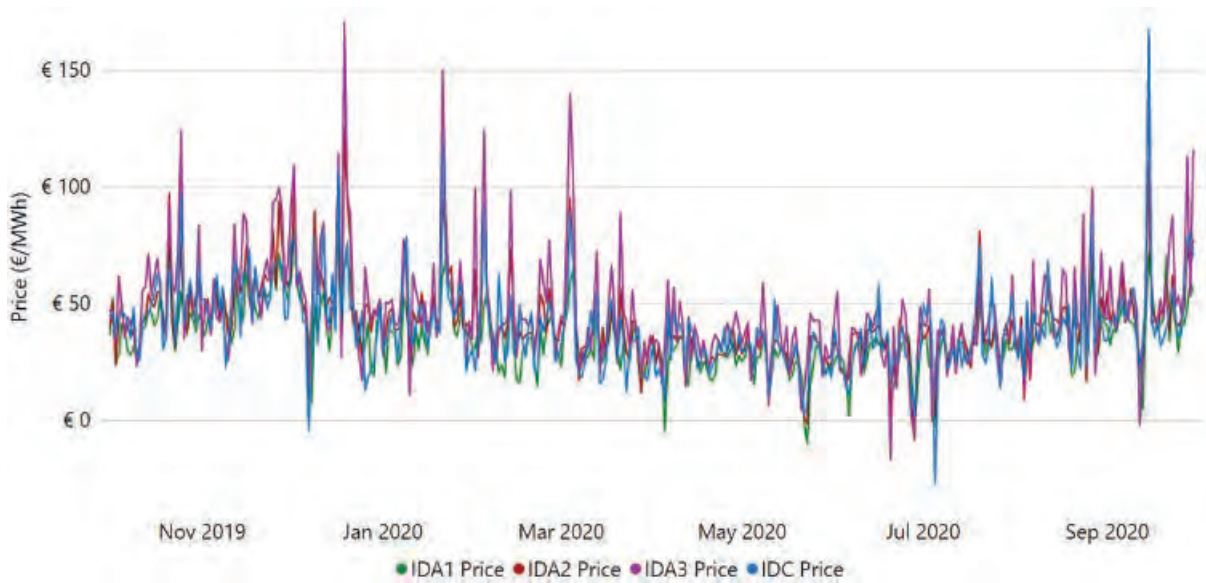


Figure 8 – Intra-Day Market Average Daily Prices

Balancing Market

The balancing market is designed to ensure levels of supply meet the level of demand in real time. If for example, the level of demand is higher than expected, the market operator might instruct a generator with available capacity to increase their output.

Balancing market prices show relatively higher volatility in the market in terms of prices.

Figure 9 below shows the Imbalance Settlement Price across the year.

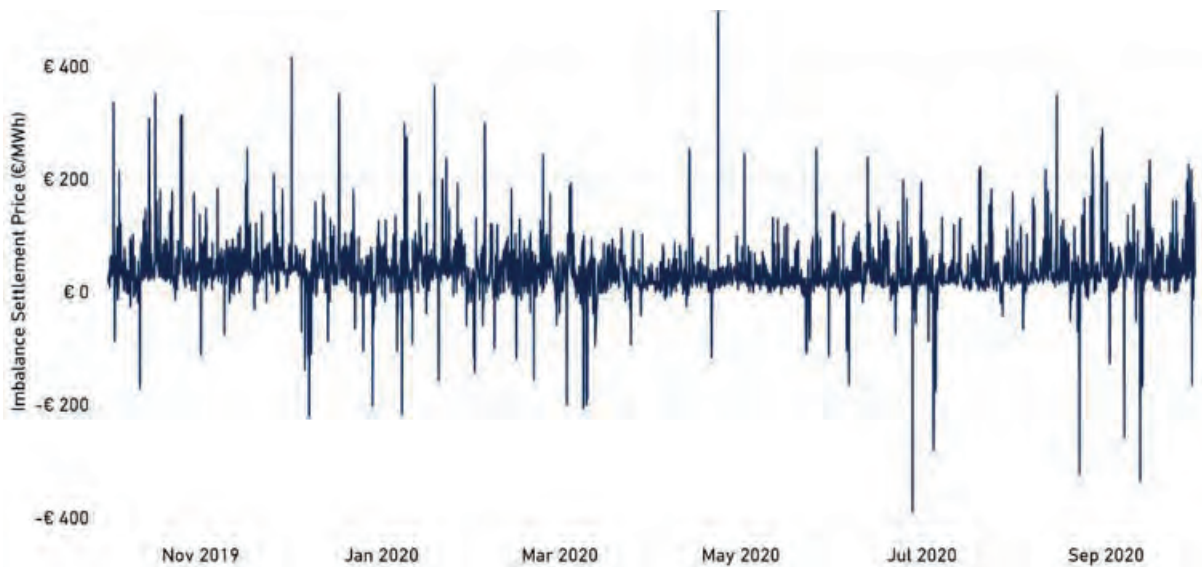


Figure 9 – Imbalance Settlement Price

The graph above highlights the volatility seen across the balancing market with a highest settlement price of €495.59 and a lowest of -€390.13. The average price across the year is €37.09 which brings it to a similar level to the other markets in the SEM.

Supplier behaviour

The SEM continues to provide Suppliers with a competitive environment in which to purchase energy for their retail offerings to final consumers. Over the period suppliers have continued to directly participate across the markets, where in the previous arrangements a single buyer represented the demand side of the market. The market arrangements have continued to enable suppliers the ability to play a role in setting prices instead of being price takers. Suppliers have freedom to participate on a voluntary basis in the different market timeframes, with mandatory participation required only in the balancing market, where they are required discharge their obligation to be balance responsible. This means suppliers must balance their offtake of power with their contracted demand.

In the second year of operation suppliers have accurately calculated their customers' demand and sought to provide for this mainly in the DAM, which has accounted for the majority of volumes traded before balancing. The four Intra-day markets have facilitated further participation through three auctions and a continuous trading market, providing flexibility to refine their position in light of changing circumstances.

The new arrangements have continued to facilitate supplier purchases of energy at regulated prices in the forward market through directed contracts, which are sold in advance of the Day Ahead and Intra-day markets. These contracts enable suppliers to lock-down the price they will have to pay in the SEM. This ability of suppliers to hedge their purchase price has been enhanced through the availability of Financial Transmission Rights (FTRs), sold by the interconnectors that connect the SEM with the wholesale market in Great Britain. FTRs are contracts that allow their purchasers to receive the difference between the wholesale price of energy in the SEM and GB markets, so that the prices paid by suppliers in the SEM can be linked to the wholesale price in GB.

Suppliers also ensure that there is adequate energy generation capacity in the market through funding regular payments to generators who have been successful in auctions to supply their capacity. This mechanism in turn protects suppliers from very high energy prices (those above a strike price) that may occur in some periods. This requires that those generators qualifying for capacity payments pay a charge that remunerates suppliers for the costs that exceed this strike price.

5. Interconnectors

The SEM is connected to the electricity market in Great Britain via two interconnectors. The Moyle Interconnector is a sub-marine cable running between Scotland and Northern Ireland with a maximum potential import capacity (Scotland to Northern Ireland) of 450MW and a maximum potential export capacity (Northern Ireland to Scotland) of 500MW.

The East-West Interconnector (EWIC) is a high-voltage direct current sub-marine and subsoil power cable running between Wales and the Republic of Ireland. This provides capacity of 500MW flowing in both import and export directions.

In the SEM, physical flows on Moyle and EWIC Interconnectors are linked to the SEM Day Ahead market and the price difference between it and the DAM price in GB. Where the DAM price in the SEM is higher than in GB, the interconnectors will import power into the SEM. Where the SEM price is lower, for example because there are high levels of wind on the island, the interconnectors will export power to GB.

A common means of graphing this relationship is presented in Figure 10 which charts the interconnector flows. The X-axis shows the difference in DAM 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 volume of the flow and its direction so that in the upper half of the graph, in which values are positive, the Interconnectors are importing into the SEM from GB. In the lower half the negative values indicate an export. Flows in the top left and bottom right quadrant which look to be in the incorrect direction based on flow and DAM price differential are in fact due to changes in flows during the intraday schedules. Prices on the X-axis in chart below are the DAM prices, and these are plotted against actual flows. In the intervening timeframe there are two additional coupled auctions whereby the price differential between the SEM and GB can change, and thus the flows will also change.

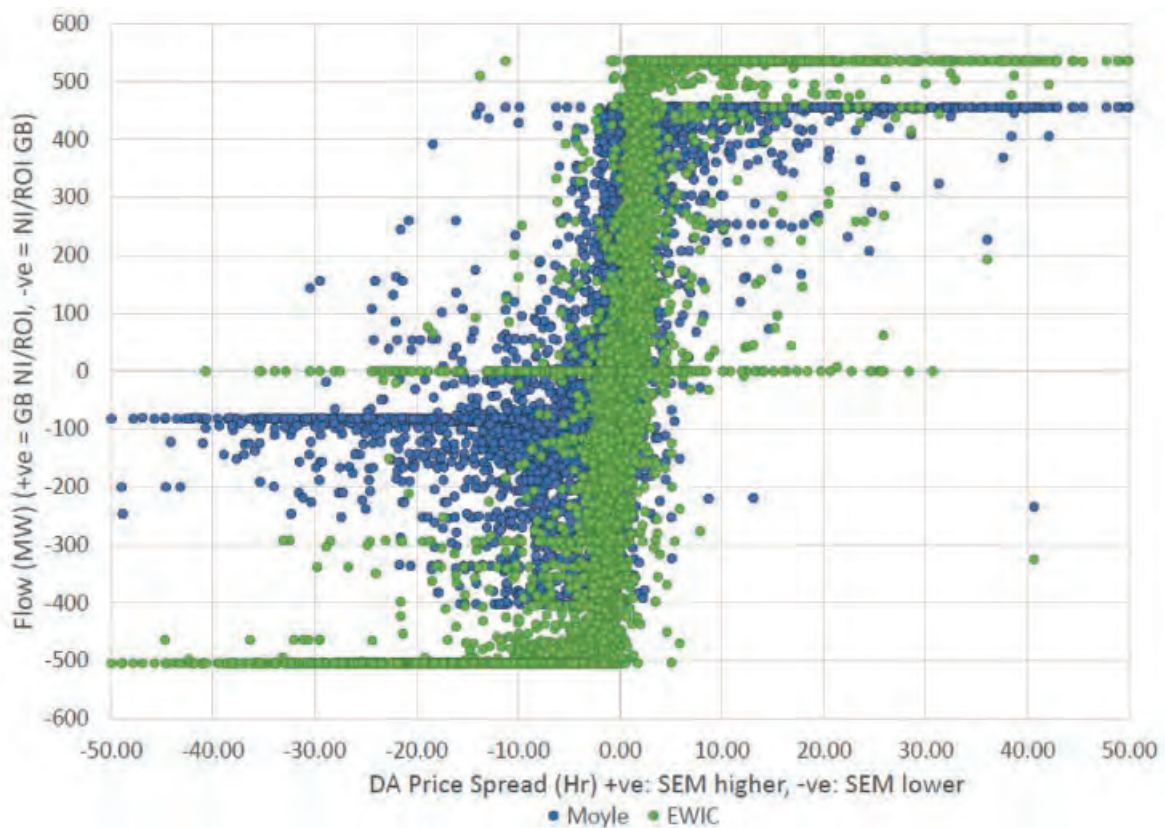


Figure 10 – Interconnector Flows Based on DAM Price Spread

For there to be evidence of efficient trading the scatter graph should show the periods of flow in the upper right of the graph and bottom left. In the upper right quadrant the SEM price is higher than the GB price and the Interconnectors are importing. In the bottom left quadrant the SEM price is lower than the GB price and the interconnectors are exporting.

Efficient flows on the Interconnectors is a key objective of the SEM market design and the pattern shown in Figure 10 shows that flows on Moyle and EWIC across the year flowed overwhelmingly in the correct direction with only a few exceptions.

Ramping constraints, which limit the speed of change in the direction of flow, have not so far resulted in significant flows in the wrong direction and market coupling has been successful in ensuring efficient interconnection between the SEM and GB markets. This has resulted in reduced prices when the price level is higher in the SEM than in GB and higher exports and use of wind power when prices in the SEM are lower than in GB.



6. Forwards market

To manage wholesale electricity price risk and achieve longer-term certainty, forward contracts allow generators and suppliers to contract publicly via Contract for Differences (CfDs). This allows generators to sell a fixed volume for an agreed upon price covering a specific period of time which provides both generators and suppliers with more wholesale price certainty. In the SEM there are regulated and unregulated forward contracts.

Overview of regulated contracts

Directed Contracts (DCs) are currently the only regulated forward contract in the SEM. As part of the Regulatory Authorities' Market Power Mitigation Strategy, DCs are imposed on the incumbent generators with market power in the SEM. The purpose of DCs is to remove the incentives on the incumbent generators to attempt to profit from the exertion of market power. These contracts mitigate market power by reducing the incentive for the market participants to submit bids above competitive levels, or otherwise withhold capacity, to influence current spot prices or future contract prices.

DC subscription windows are typically held every quarter, with DCs being allocated on a rolling basis up to 5 quarters ahead. There are 3 DC products in the market: baseload, mid-merit, and peak. Supply companies can elect to subscribe for any given product for which they are eligible in any particular quarter from the incumbent generator, ESB. A total of 2,642 MW of Directed Contract volumes were bought by market participants of Q42019 to Q32020 product. 1192 MW of these were Baseload volumes, 1,430 MW were Mid-Merit and 20 MW Peak volumes. The average Baseload price for Q42019 - Q32020 was €56.66 whilst the average Mid-Merit price is €63.71. Figures 11 and 12 provide a quarterly breakdown of DC volumes and prices.

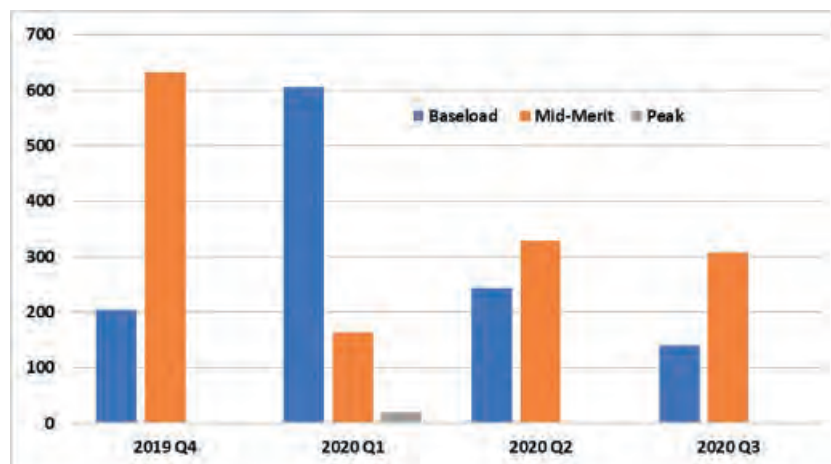


Figure 11: Total Directed Contract Volumes offered by quarter (Q42019 – Q32020)

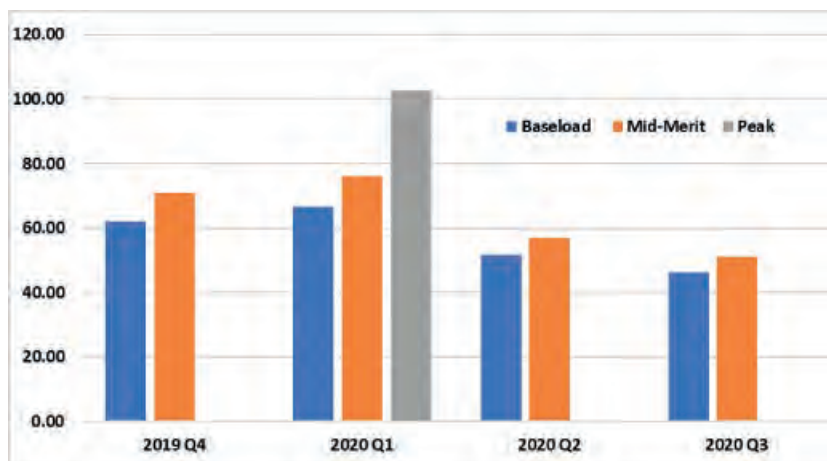


Figure 12: Average Directed Contract price by quarter (Q42019 – Q32020)

Overview of Unregulated Contracts

Generators can offer forward contracts in the SEM which suppliers are free to bid for. The RA's have no direct role in setting the price or volume of these forward contracts, although the RA's do monitor transaction activity. The most common type of forward contract is an Over the Counter (OTC) sale, in which the generator offers the product, setting the volume and the price. With an OTC sale the suppliers have a set window in which to purchase a product. If a supplier makes a bid at the price set by the generator, then they are able to purchase it instantly (i.e. first-come-first-served).

Other hedging options include Financial Transmission Rights (FTRs), and 'Proxy Hedging'. FTRs are a financial instrument that allow the holder to receive the positive difference in the Day Ahead Market (DAM) price between the GB market and the SEM. If the DAM price in one market is higher and one holds an FTR in that direction, then the FTR holder is entitled to that difference. Proxy hedging involves the use of a correlated financial instrument (gas) to hedge a particular risk when a direct hedge (electricity) is not available.



7. Capacity Remuneration Mechanism

The Capacity Remuneration Mechanism (CRM) is designed to ensure that the demand for electricity is always met. The overall aim of the CRM is to ensure security of supply, as well as ensuring that consumers don't pay for more capacity than is needed. The CRM was implemented as part of the revised SEM arrangements which went live on 1 October 2018, and replaced the Capacity Payment Mechanism under the previous arrangements.

Capacity providers sell qualified capacity to the market, based on generation capacity required in a future capacity year. This takes place in the form of capacity auctions. Auctions are normally held by the Transmission System Operators between one and four years ahead of delivery. Capacity providers who are successful in a capacity auction receive a regular capacity payment. This payment assists with funding generation capacity. In return, successful participants have an obligation to refund consumers for any energy prices which rises above a set strike price for each capacity auction.

Participants must submit a bid(s) that specify the volume of capacity being offered and the price sought for that capacity. Bids submitted to an auction are arranged from lowest to highest until the capacity requirement for the specific capacity year is satisfied. The level of capacity required is assessed by the Transmission System Operators in advance of the auction. Capacity that has been bid at a price less than or equal to the last accepted bid is accepted and receives this market clearing price. Capacity that is bid at a price higher than the market clearing price is deemed to have failed to clear the auction and is not paid, unless the capacity is needed to meet a local security of supply need.



Figure 13: CRM auction process



Holders of a capacity contract are expected to be available to provide their agreed generation volumes or load reductions (in the case of demand side units) when required at times of system stress or high demand. If a generator is unable to do this, they risk being exposed to substantial charges.

Capacity Market Code

The Capacity Market Code (CMC) describes the arrangements whereby market participants can qualify for and participate in capacity auctions. It was first published in June 2017 and is regularly reviewed and modified to ensure the efficient and effective operation of the capacity auctions. The most recent, 4th version, was published on 31 July 2020.

CMC Working Groups are convened every two months and have allowed for the progression and implementation of 24 modifications to date. Modifying the CMC has involved the co-operation, commitment and constructive engagement with industry participants.

As a direct result of the CMC modification process the CMC has been updated to implement Supplemental Interim Secondary Trading measures in the absence of a Secondary Trading platform. This resulted in a major update to the CMC and the Capacity Market in general. The introduction of more flexible Secondary Trading arrangements allows for market participants to better manage their risks under the CRM.

Capacity Auctions

To date, six Capacity Auctions have taken place and completed successfully. Three of these took place during 2019-20 and included a T-4, T-1 and T-2 Capacity Auction. The outcomes of these auctions are as follows

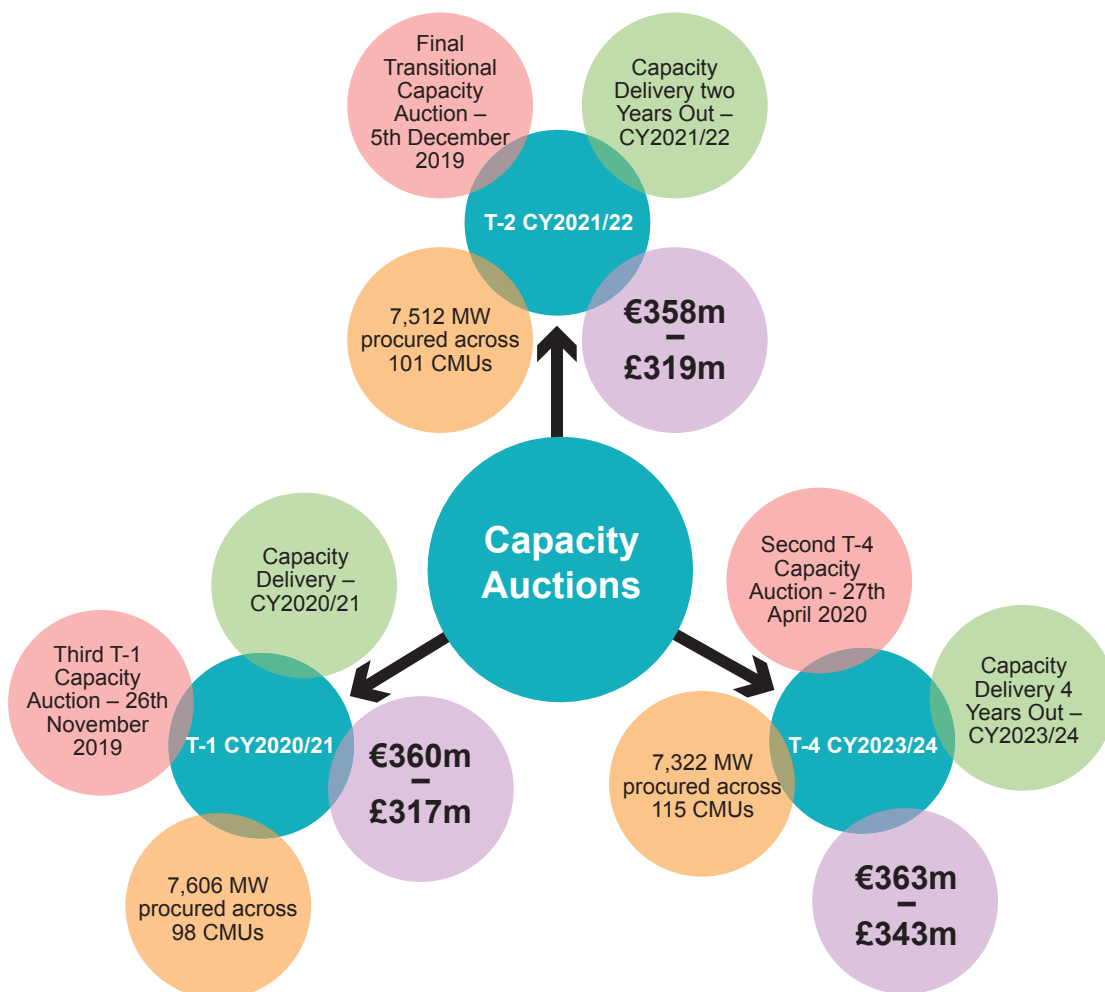


Figure 14: CRM auction results

Within the 2023/24 T-4 auction, 355MW of capacity was awarded for contracts above the clearing price to meet security of supply requirements in Northern Ireland. The average cost of this capacity was £109,451/MW. This second T-4 Capacity auction secured a total of 761MW of new capacity and resulted in the inclusion of more than 44 new capacity market units. A key benefit of the T-4 auction is that it facilitates competition between new and existing generation, to deliver the best outcome for consumers.

As part of the T-4 CY2023/24 Capacity Auction process, the CRM was adapted to take account of the impact of the introduction of the Clean Energy Package. As a result, the CRM was modified to ensure that limits were imposed on existing plant in the SEM through restricted levels of annual running hours (directly relating to CO2 emissions), which take effect from July 2025. This led to the limitations on some plant to contribute towards security of supply.

When compared to the CPM, which had an estimated cost of €546m, the CRM represents an average saving of around €196m across each Capacity auction to date. With six auctions now having taken place, that is a saving of over €1.1billion for consumers.

Work has progressed during the year for a 2024/25 T-4 auction to be held in January 2021. A 'top up' T-1 Capacity auction is also being considered, which would secure additional capacity for 2021-22 if market analysis identified the need. This would account for any changes that have occurred between the completion of the first T-4 Capacity Auction to date. This ensures consumers only pay for generation that is needed to ensure security of supply.



8. DS3 and System Services

The DS3 programme (Delivering a Secure, Sustainable Power System), aims to meet the challenges of operating the electricity system in a secure manner while achieving the renewables targets set in both Ireland and Northern Ireland.

With increasing amounts of variable renewable generation, there is a need to ensure that the power system can continue to be operated securely and sustainably. Through the successful completion of the DS3 Programme the operational limit on non-synchronous generation (ie level of renewable generation that can be on the system) may be increased to 75%.

Our key objective is to ensure that the interests of the all-island customer are protected throughout the programme. It does this through:

- Oversight of TSOs activities;
- Review of the impact and appropriateness of the various options and proposals put forward by the TSOs;
- Making key decisions on TSO proposals/ recommendations which will only be implemented after consultation with industry stakeholders; and
- Ensuring consistency across SEM activities and that the full implication of all actions proposed by the TSOs is considered.

The programme is now in its latter stages and has been a driver in the successful progression of SNSP increases from 50% to 65% since 2015. Facilitating additional renewables on the grid should support lower wholesale energy prices, which achieves a good outcome for consumers as well as supporting Ireland and Northern Ireland's transition to a low-carbon economy. This can already be seen in the day-ahead market where increased wind generation has been placing a downward pressure on prices.

In 2019-2020 a number of significant steps were taken to deliver on the aims of the DS3 Programme. A trial to bring about changes to the rate of change of frequency (RoCoF) commenced in April 2020. As of 30 September 2020 it is expected that this trial will be completed by the end of the calendar year which will allow the commencement of a 70% SNSP trial, with the ultimate aim of carrying out the 75% SNSP trial during 2021. This is a delay to the initial programme timeline which can be largely attributed to ensuring generation compliance with RoCoF requirements. The Covid-19 pandemic also caused knock-on delays to preparations for the trial.

We continue to engage with the TSOs to ensure there are no further delays in closing out the DS3 Programme.

Separately, the System Services workstream aims to improve the technical capability of the generation fleet and the system more generally. This is achieved by defining the capability required by the TSO and appropriately incentivising the delivery of that capability.

Essentially System Services allow participants to provide services which support operating the system with increased renewable penetration through allowing the TSO to deploy units when a frequency deviation occurs. Participants are currently rewarded for their availability through a tariff or a contract.

We have commenced work on developing a framework for System Services to apply beyond the existing contractual arrangements which are currently scheduled to end on 30 April 2023. A Scoping Paper was published on 8 July 2020 (SEM-20-044) which sought the views of stakeholders on how best to develop future arrangements for System Services beyond April

2023. The aim of this project is to deliver a competitive framework for the procurement of System Services, that ensures secure operation of the electricity system with higher levels of non-synchronous generation.

We aim to hold a further, more detailed consultation and to make our decision on the framework in 2021 and will continue to engage with all stakeholders.

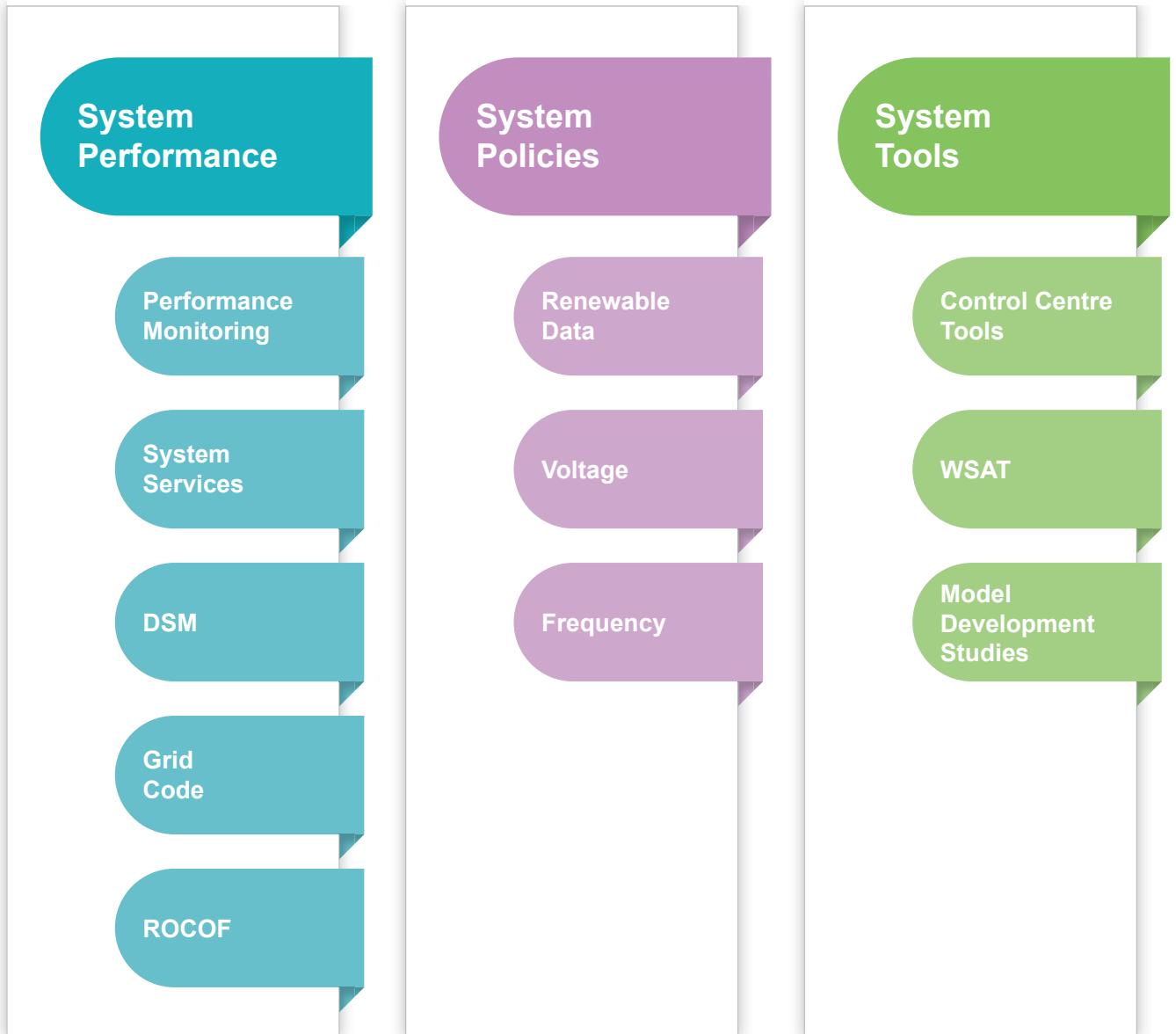


Figure 15: DS3 pillars and workstreams

9. Market Operation

In addition to the trading, capacity and system services elements of the market, we also oversee a number of other areas to ensure the market runs efficiently, effectively and in the best interests of consumers.

Although the TSO's, market operators and market participants are separately licenced by the Regulatory Authorities, we are responsible for overseeing a number of cross-cutting market issues.

SEMO regulation

SEMOpX provides day-ahead and intraday electricity market trading as part of the Single Electricity Market and is subject to a regulated price control as part of the regulatory framework. SEMOpX is governed by a set of rules and operating procedures that set out the obligations on Exchange Members and process for trading on the exchange. A consultation on the SEMOpX price control (covering the period October 2019 – October 2022) was published in November 2019; a subsequent determination followed in March 2020 to outline the ex-ante allowed revenue for SEMOpX for the price control period. Our decision followed re-designation of SEMOpX (a contractual joint venture between EirGrid plc and SONI Ltd) as Nominated Electricity Market Operator in Ireland and Northern Ireland in July 2019.

SEMO is licensed and regulated cooperatively by the CRU in Ireland and the Utility Regulator (UR) in Northern Ireland. A key area of work for the SEMO Regulation team is to work closely with SEMO in relation to projects that require regulatory approval for cost recovery. During 2019/20 we did not approve any further revenues in addition to those which had been approved as part of the existing SEMO price control (which covers the period May 2018 to October 2021). The next SEMO price control review (which is scheduled to take effect on 1 October 2021) commenced in August 2020.

Trading and Settlement Code

In 2019 and 2020, the Trading and Settlement Code Modifications Committee continued its activities in progressing important changes to the Code following review and discussion and a number of dedicated working groups. Overall, 24 Modifications were raised in 2019 and 11 Modifications have been raised so far in 2020. This is a decrease from 38 Modifications in 2018 and reflects the development of the market and the resolution of a number of market issues and improvements to the Code through the Modifications Committee since go-live in late 2018. This work has progressed with the co-operation, commitment and constructive engagement of the industry participants who sit on, and attend as observers, the TSC Modifications Committee and SEMOpX Exchange Committee.

A number of important Modifications were implemented in 2020, for example to ensure compliance with the requirements of State Aid Approval for the Capacity Mechanism associated with DSUs, changes to the application of system operator flags during outage periods and amendments to the Supplier of Last Resort Provisions within the Code. Due to the uncertainty associated with COVID-19 in the first part of 2020, a temporary Modification was also introduced to amend the process for the Market Operator to issue a Suspension Order during the crisis to require RA approval before any Suspension Orders were issued. This involved a temporary monitoring process being established with SEMO to assess credit cover or payment issues in the market and help protect security of supply.

There have also been a small number of Modifications made to the SEMOpX Rules and Procedures, which govern the operation of the day-ahead and intra-day markets. These provided for improvements in the timing of publication of market data, the inclusion of complex orders in the intraday auctions and alignment of operational timelines associated with market coupling with changes made at the European level. Another important change made to the ex-ante markets involved arrangements for multiple GB NEMOs to take part in the coupled cross-border Intraday auctions between GB and SEM.

In late 2018 and 2019, continuous IT releases were required to stabilise the market systems and to manage defects and issues following the new market going live. In 2020, SEMO moved to a regular Bi-Annual Release schedule to implement market Modifications, change requests and address incidents and defects identified. This has allowed important market processes including resettlement to improve and be progressed in a timely manner.

It is expected that following the conclusion of work by the Regulatory Authorities to implement the Electricity Balancing Guidelines and Clean Energy Package, a number of further market Modifications will be required in 2021.

Audits

During the year the 2019 SEMO Trading and Settlement Code (TSC) audit was completed. It included a separate audit on Part C of the TSC (cutover period of SEM Settlement) and report under ISRS4400 Agreed Upon Procedures as opposed to the ISAE3000 Reasonable Assurance Opinion of previous audits. The different approach in reporting in 2019 was to reflect the ongoing 'stabilisation' phase that the audit covered. The RAs worked with the Market Operator to develop the list of Agreed Upon Procedures to audit which were published in Market Audit 2019 Agreed Upon Procedures Information Paper (SEM-19-067) on 28 November 2019. The results of the 2019 audit were published in the Market Report of Factual Findings on 5 June 2020. Further to consultation the decision on the Terms of Reference for the 2020 TSC market audit was published on 10 September 2020.

The introduction of the new market arrangements in October 2018 introduced some new obligations on the TSOs. They are required to carry out an annual audit of the scheduling and dispatch process. Terms of Reference were published on 21 June 2019 with the results of the audit will be published by the end of 2020.

The TSOs are also required to develop the Balancing Market Principles Statement (BMPS) and publish an updated version annually. The BMPS is a restatement of obligations, alongside an explanation of how these obligations are met and is intended to increase awareness and visibility of the TSOs' Scheduling & Dispatch Process. It also provides clarity and certainty to the market on the timing and nature of TSO actions. The 2020 BMPS was published for consultation in 23 July 2020, and the final BMPS was published in 14 October 2020.

Fuel Mix

In September 2020, we published an Information Paper highlighting the 2019 fuel mix and CO₂ emissions on average across the island and for each electricity supplier. It showed that on average across the island, 54% of the electricity supplied from suppliers was from renewable sources, compared to 49% in 2018, continuing a renewables growth trend seen over many years. Related, CO₂ emissions continued a downward trend, falling from 0.291 tonnes per MWh in 2018 to 0.254 tonnes per MWh in 2019. Fuel mix figures do not represent only physical renewable generation, but also tradeable certificates used by suppliers called Guarantees of Origin. These Guarantees of Origin reflect renewable electricity produced in EU/EEA countries, and considerably more are imported into the island than exported.

The relevant figures in the Information Paper are published on bills from suppliers to electricity customers. This provides customers with helpful information on the recent environmental impact of electricity from their supplier compared with the average.

Generator Financial Performance Reporting

In April 2020 we published a Generator Financial Performance Report for the financial year 2018, highlighting the financial performance of generators operating in the SEM. The report detailed on overall increase in revenues, resulting from increased fuel prices and profit margins were consistent with historical trends.

The report also detailed the notable increase in wind generation across the year and decrease in coal generation. This resulted in changes to the overall share of revenue by generation type across the year.

REMIT

The RAs continue to work together to provide for effective implementation of REMIT on the island, in order to improve transparency in the SEM and to detect whether there is potential market abuse, thereby helping to protect consumers.

The SEM was designed to allow the efficient coupling of the wholesale market on the island of Ireland with the wholesale electricity market across Europe through a single marketplace and common rules. The trading arrangements have been designed to achieve this through a liquid DAM on the island coupled with the DAM across Europe and the effective linking of the two through efficient use of the two interconnectors that link Ireland with Wales and Scotland.

Further coupling has been effected in the Intra-day market timeframe and currently two auctions during this time link the SEM to the wholesale market in Great Britain. The design of the SEM allows a market solution to the balancing of the demand and supply of electricity through a balancing market which takes place in real time.

Tariffs

In August 2020 the SEM Committee approved a range of SEM tariffs, including a reduced Imperfections tariff. The reduction was primarily driven by a small over-recovery from the 2019/2020 year compared to a large under-recovery from the 2018/2019 tariff year.

The primary drivers for the costs which affect the imperfections tariff are under review and work is ongoing with the TSOs to help identify where reductions to these drivers can be achieved.

Clean Energy Package

During the year we published a number of papers to respond to the EU's Clean Energy Package (CEP).

We published a roadmap to CEP implementation in December 2019, setting out the seven key areas of work needed to ensure full compliance, focusing in particular on the requirements of the Recast Regulation (2019/943).

Subsequent to this paper, we published a detailed consultation covering a range of areas that relate to Articles 12 and 13 of the Regulation (SEM-20-028). This paper covered a number of important issues relating to future eligibility of units for priority dispatch, how new concepts such as redispatch should be considered in the SEM, and distinctions between market-based and non-market based redispatch should be considered. In the summer of 2020, we published an

information paper (SEM-20-052) setting out a plan of action in dealing with the different elements of the consultation. This information note separated the work into four different streams and work has progressed in line with this timeline. In November 2020 a decision paper on Eligibility for priority dispatch under Article 12 was published and we are progressing further consultation and decision papers to address other areas of this work.

Due to new requirements relating to emissions limits for generators participating in capacity markets, we published an Information Paper in December 2019 (SEM-20-074) outlining the changes needed to comply with the Regulation. This was followed by a Consultation (SEM-20-006) on the parameters for the 2024/25 T-4 Capacity Auction and proposals for the implementation of the CEP. A decision paper (SEM-20-034) was published in June 2020 to finalise the approach for the implementation of the CEP requirements into the T-4 auction.

We undertook a review of Balance Responsibility in Q1 2020 and concluded that the current market arrangements aligned with the requirements in the Regulation. A review was also conducted to assess compliance with the Regulation requirements on Aggregation in the SEM. Following consultation, we confirmed that aggregation does exist in the SEM and that the current market arrangements comply with the Regulation with a decision paper to be published shortly. We also decided to expand the scope of eligibility for intermediary arrangements in the SEM following consultation.

We have actively engaged on topics related to the development of new methodologies that will impact on the operation of the SEM Capacity Market. These methodologies are related to the calculation of value of lost load, cost of new entry and the reliability standard and were approved by ACER in a Decision Paper in October 2020. During 2021, we will be working on implementing these new market parameters into the CRM.

Brexit

Following the result of the 23 June 2016 EU referendum, work has been ongoing to identify the potential implications for the SEM when the UK leaves the European Union. Across the year, the RAs have led an extensive body of work to ensure preparedness for Brexit in close consultation with industry, government and stakeholders across Ireland, the UK and the European Union.

From 1 January 2021, regardless of the outcome of the future partnership negotiations between the EU and the UK, the SEM will continue to operate as an all-island market. Trade between the SEM and the market in Great Britain, through the Moyle and EWIC interconnectors, will also continue, although this trade may be less efficient, as it will no longer be possible for some platforms that currently operate under EU rules to continue to do so.

The SEM Committee has to date taken a number of steps to facilitate future trade between the SEM and the market in Great Britain so as to address this potential loss of efficiency:

1. New arrangements have been put in place, which facilitate greater access for GB participants to the SEM. These arrangements went live in the Intraday Market between the SEM and Great Britain on 4 August 2020.
2. New, more flexible order types have been added to the Intraday Markets between the SEM and Great Britain. These 'complex order' types went live on the 29 September 2020.

In addition to the steps already taken, we, alongside the CRU and UR, will continue to work to minimize the loss of efficiency in trading across the Moyle and EWIC interconnectors. We will continue to work together with Government Departments, Transmission System Operators, Market Operators and relevant market participants to deliver the best possible outcome for consumers.

Market monitoring

The MMU is a joint regulatory unit that is the main monitoring function of the two Regulatory Authorities (RAs). The Unit's role is to monitor the performance of the wholesale market, including compliance with the Bidding Code of Practice (BCoP) and other market rules, and where necessary investigate potential abuse of market power.

This function of the MMU is carried out alongside that of the Agency for the Cooperation of Energy Regulators (ACER) and is provided for by Regulation (EU) No 1227/2011 of 25 October 2011 on wholesale energy market integrity and transparency (REMIT). The monitoring function of the Regulatory Authorities is complemented by the oversight of the Single Electricity Market Operator (SEMO) and SEMOpx which also provide surveillance to ensure the integrity of their exchanges. The purpose of the monitoring of trading activity in wholesale energy products carried out by the MMU is to:

1. Detect and prevent trading based on inside information and market manipulation.
2. Enhance transparency of the SEM and improve market integrity and functioning.
3. Assist identification of barriers to efficiency e.g. low liquidity, and possible improvements to competition in the market.

The MMU has put in place the robust systems and processes required to actively monitor the SEM arrangements. Throughout the year the unit engaged with market participants on a number of key areas including bidding behaviour. The unit has also provided in-depth analysis on a number of market events alongside regular market updates. The MMU publishes a quarterly market monitoring report which provides useful information on the performance of the market.



