



SEM Monitoring Report: Q4 2016

SEM-17-011

February 2017

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2. INTRODUCTION

The Single Electricity Market (SEM) is the term that is used to describe the electricity market for the island of Ireland.

This report provides an overview of the SEM and sets out recent trends in the market in relation to pricing, demand, scheduling and contract prices. It focuses in particular on the wholesale element of electricity prices, which makes up roughly 60% of customers' bills.

The report was prepared by the Market Monitoring Unit (MMU); the MMU resides within the Utility Regulator Northern Ireland, the main monitoring function of the Regulatory Authorities in joint collaboration with the Commission for Energy Regulation (CER). The unit's role is to investigate market power within the SEM and to monitor compliance of market participants with regards to the Bidding Code of Practice (BCoP) and other market rules. Another aspect of the roles and responsibilities of the MMU is to review market prices. This report covers this particular area of the SEM, along with some others; the key areas are:

- An overview of how the market works and key trends observed over the lifetime of the SEM
- Detailed market information on price (System Marginal Price) and quantity (Market Scheduled Quantity and Dispatch Quantity)
- Information on trends in directed contracts which are imposed by the Regulatory Authorities on the incumbent generators with market power in the SEM.

The information in this report is based on data that was provided by the Single Electricity Market Operator (SEMO), except where otherwise indicated.

Any feedback or comments that stakeholders may have should be emailed to:

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3. OVERVIEW

- **Wholesale costs:** Wholesale electricity costs during the fourth quarter of this year increased on those in the third quarter of 2016. Capacity Payments increased to €154m from €104m in Q3 2016.
- **SEM Price (System Marginal Price “SMP”):** SMP increased to €54/MWhr on average for the quarter compared to €37/MWh in Q3.
- **Fuel Price:** Gas prices increased to just under 44 p/therm in Q4 2016 an increase of 42% on Q3 2016. The historically low 2016 gas prices were a key contributor to low wholesale prices during most of 2016. This increase in gas price over the quarter has material impact on the SMP, insofar as the trends observed in figure 10 shows the trace of SMP broadly following the fuel price.
- **SEM demand (Market Schedule Quantity “MSQ”):** The average demand for Q4 2016 was 4089 MW and is broadly what is expected for that time of year. The demand in Q3 2016 was roughly 12% lower, by comparison. The share of Interconnector MSQ continued to drop in part due to the outage at EWIC, which returned to commercial operation on 23rd December 2016.
- **Directed Contracts :** On average, the prices of directed contract baseload, mid-merit and peak products for 2017 sold to date are 12-13% lower than those sold for 2016, and 28-33% lower than those sold for 2015. The volumes for 2016 were 10% higher than 2015 and 7% above 2014.

4. SUMMARY

This section provides a high-level analysis of trends that are observed across the main elements of the SEM. The topics are various:

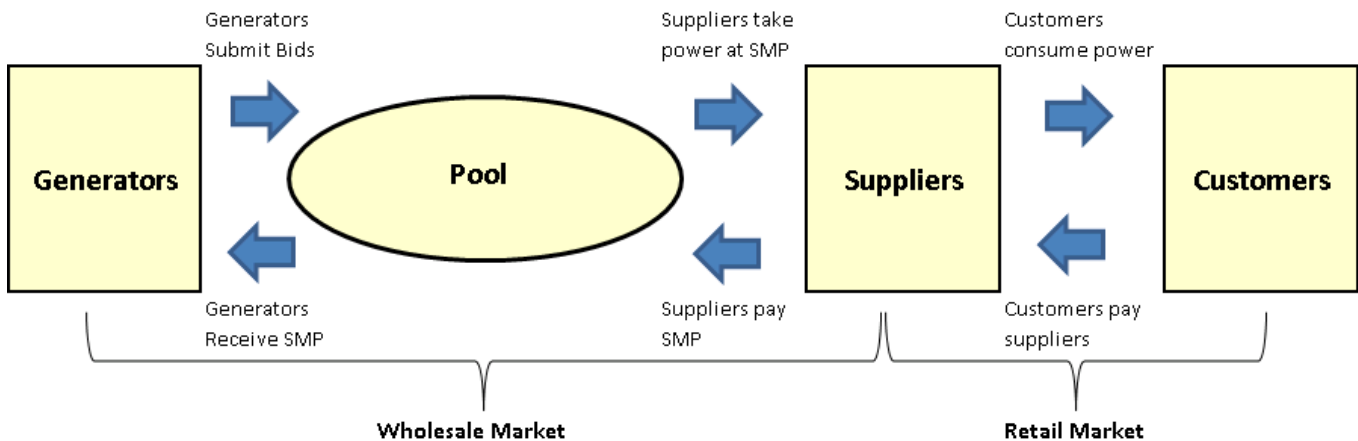
- **Background to the SEM:** This section explains how the market works, and in particular the way in which generators bid to provide the required electricity.
- **Electricity prices:** This section provides a high level breakdown of wholesale energy costs for the previous nine quarters.
- **System Marginal Price (SMP) and Demand:** This section provides information on the SMP and Demand levels since 2010.
- **Within day Energy Prices:** This section shows the average price and demand for each trading period in the previous nine quarters.
- **SMP Shadow Price & Uplift:** SMP can be broken down into two components - the Shadow Price and Uplift. This section looks at the impact of changes on SMP for Q3 2016.
- **Fuel mix:** This section outlines the changes in the type and proportion of fuels that were used for generation over the previous nine quarters.

How the Single Electricity Market works

This section provides a brief overview of how the SEM operates. The SEM is the electricity market for the island of Ireland. It was introduced in November 2007. The SEM is jointly regulated by the Utility Regulator and the Commission for Regulation (referred to in this report as the Regulatory Authorities).

The SEM is a pool market through which all suppliers and generators above a minimum threshold must trade electricity. A market overview is shown below.

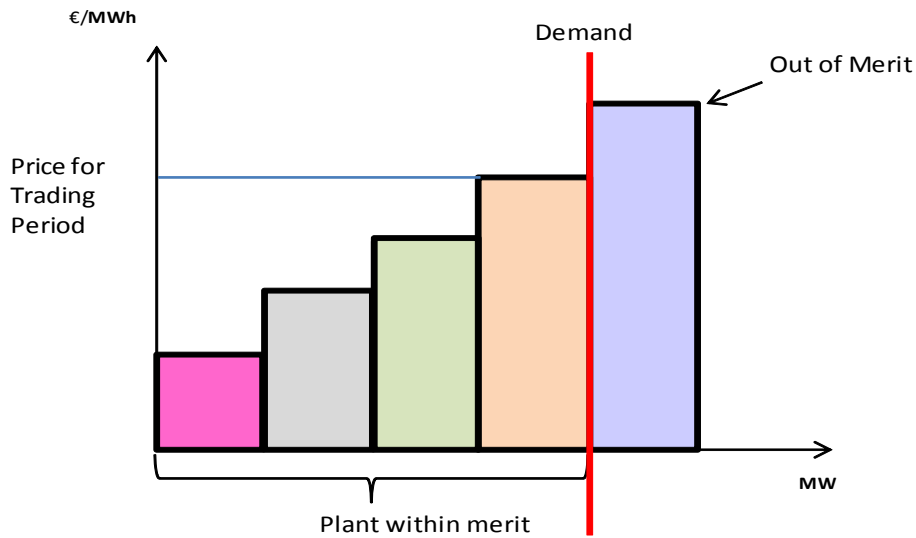
Figure 1: Market Overview



Generators submit bids to the market based on their short run marginal costs (as required by their licences and by the Bidding Code of Practice). These bids are mostly made up of fuel-related costs.

The SMP is determined for each half hour period, based on bids received from generators and customer demand. The SMP and schedule of generation is calculated by SEMO using optimisation software. Broadly speaking, bids that are submitted by the generators are stacked in order, starting with the least expensive, until demand is met. This process is illustrated in Figure 2:

Figure 2: Market Schedule



All generators that are scheduled (run in the market) are paid the same SMP for the energy they produce. Supply companies, which sell electricity to customers, pay the SMP for the electricity their customers consume.

Generators also receive Capacity Payments for any periods that they are available to generate. This contributes towards their fixed, long-term costs.

If there are constraints, a generator may be dispatched in a way that is different from the market schedule in order to balance supply and demand. These generators are said to be either 'constrained on' or 'constrained off'. Generators that are constrained off will pay back a payment and those that are constrained on will receive a payment. This ensures that generators are financially neutral for any differences between the market schedule and actual dispatch.

Settlement of the market is carried out by SEMO. This includes payment to generators and the invoicing of suppliers. The cost of operating SEMO is recovered from suppliers. This is a relatively small contributor to costs and is not covered in this report.

Electricity prices

Electricity prices are made up of a number of different charges, broadly, they are:

- Wholesale costs (around 60%)
- Network costs (around 30%)
- Supplier costs (around 10%)

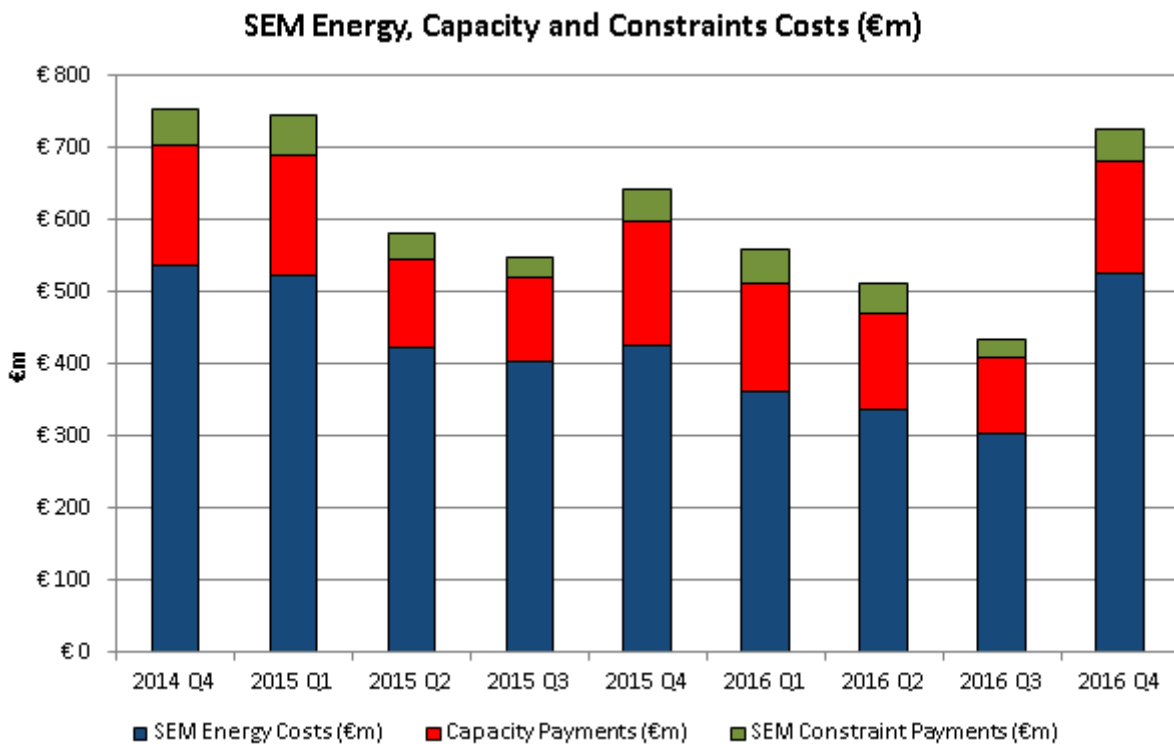
This report focuses on the wholesale element of electricity prices.

The main elements of the SEM wholesale costs are:

- Energy costs – Costs paid to generators for producing electricity
- Capacity costs – Costs paid to generators based on their availability to generate electricity
- Imperfections costs - Costs largely associated with network and system constraints.

The graph below gives a breakdown of these costs. The period covered is from Q4 2014 through Q4 2016.

Figure 3: SEM Costs

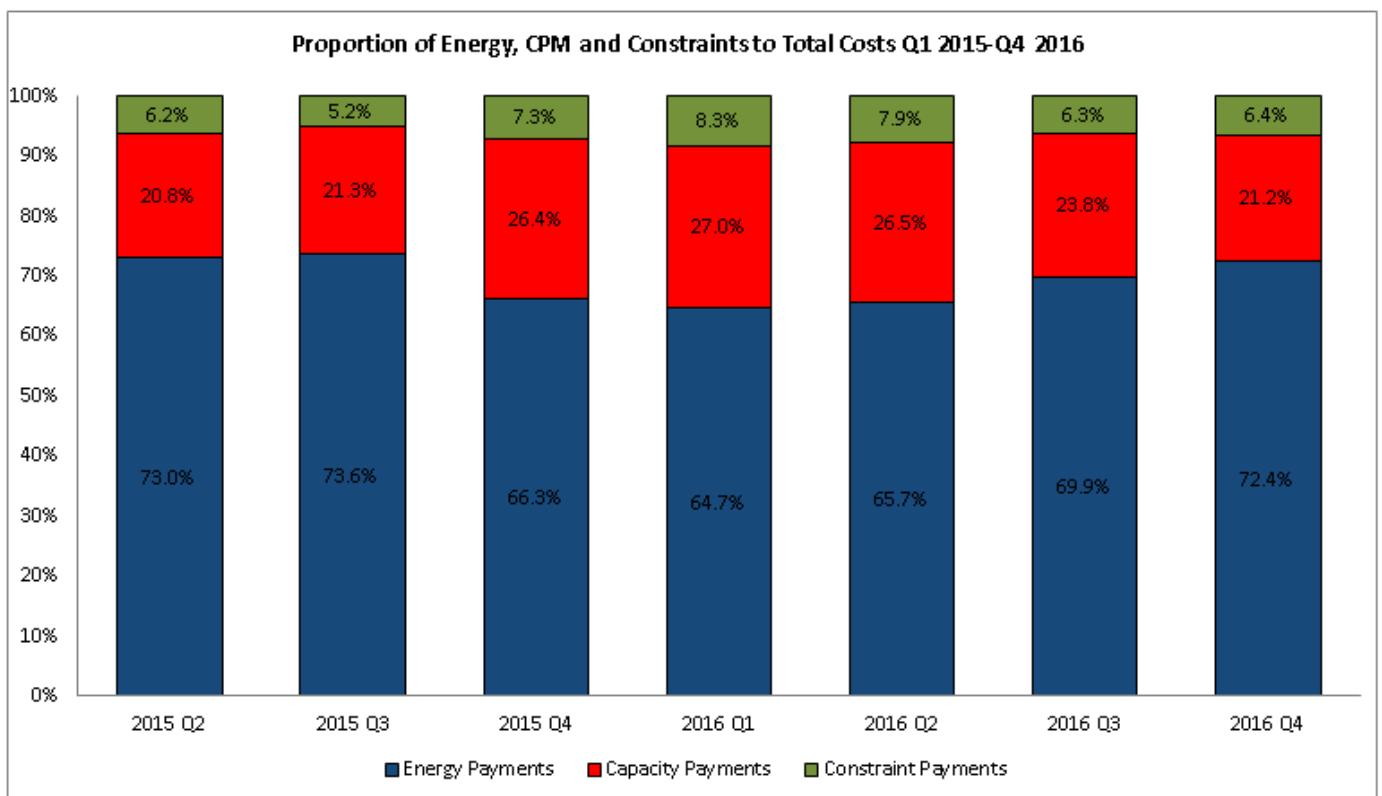


As the following chart shows, energy costs are the largest element of the overall wholesale cost. In the fourth quarter of 2016, 72.4% of total wholesale costs were attributable to energy. Constraints costs are roughly 6% of total energy costs for Q4 2016, broadly similar to the last quarter.

The bar chart below shows the proportion of costs to the total for each quarter costs since Q2 2015.

Energy Costs as a Percentage of Total Wholesale Costs

Figure 4: Total percentage of Energy, Constraints and Capacity Payments.



System Marginal Price and Demand trends

Average SMP for Q4 2016 increased to €54/MWh, which is roughly €17/MWh higher than Q3 2016.

Levels of demand increased from an average of 3608 MW in Q3 2016 to 4089 MW in Q4 2016.

The following figures show the average monthly SMP and the demand recorded in the SEM since 2012.

Figure 5: Mean System Marginal Price

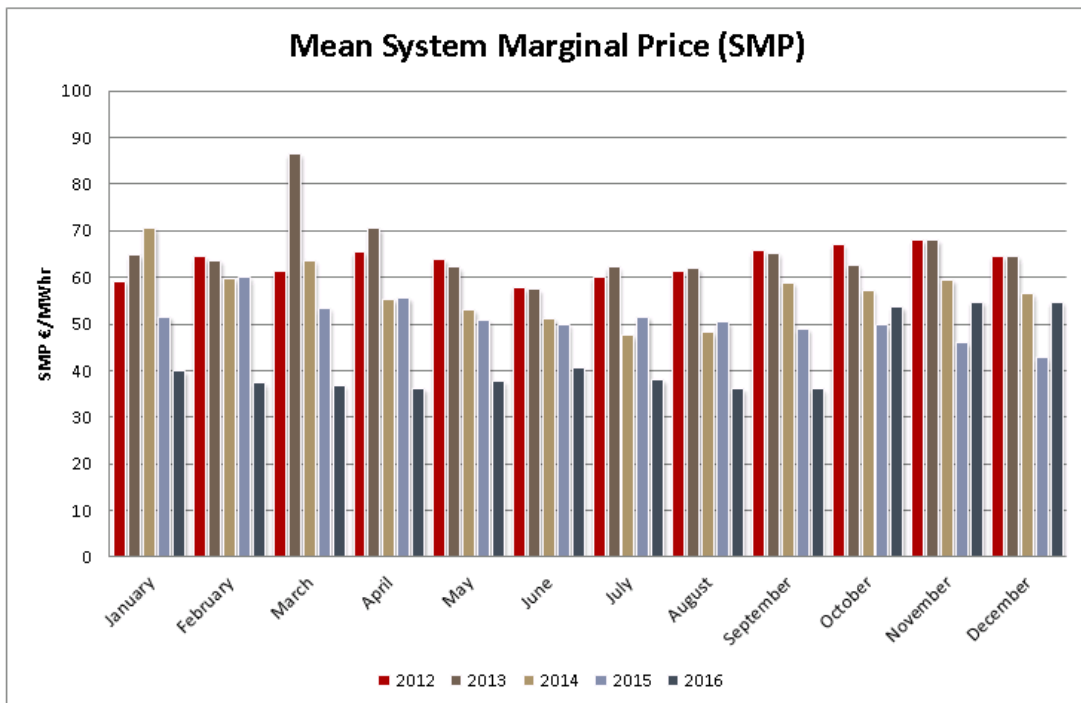


Figure 7: Demand in the Single Electricity Market 2012 - 2016

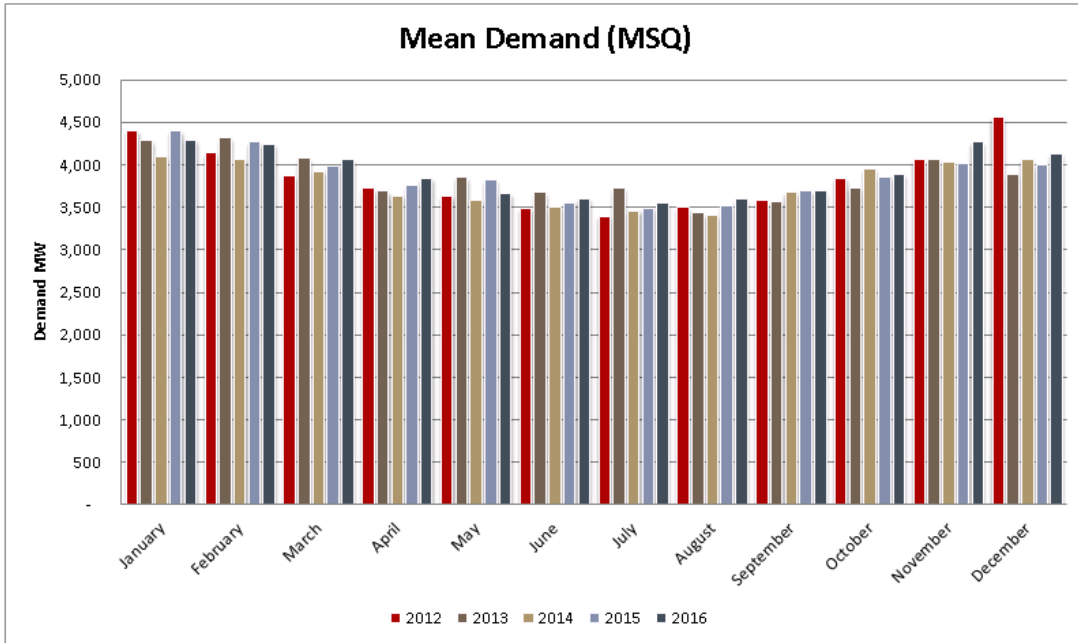
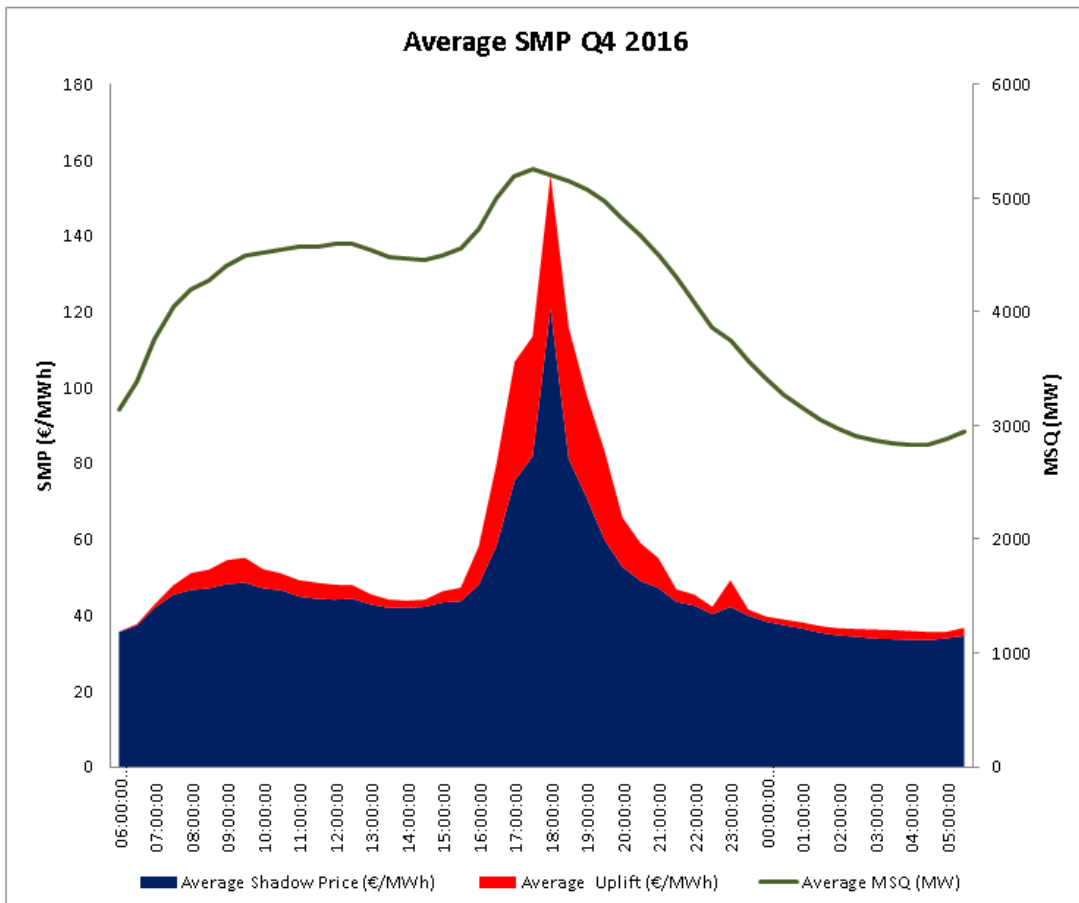


Figure 8: Average SMP Profile during Q4 2016



Share of generation by fuel type (fuel mix)

Figure 8a: Fuel Mix in the Single Electricity Market Q4 2012 – Q4 2016

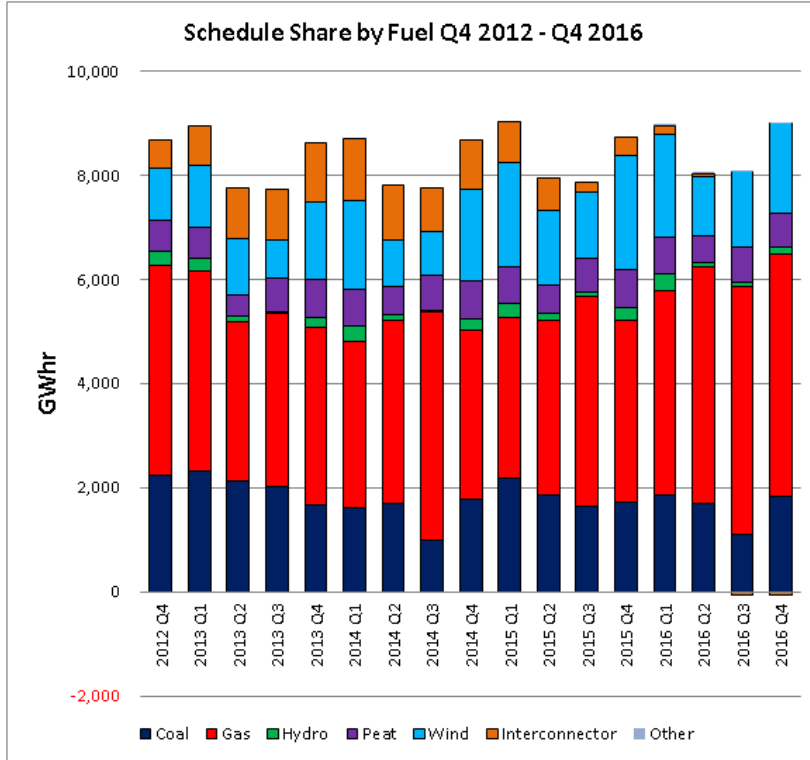
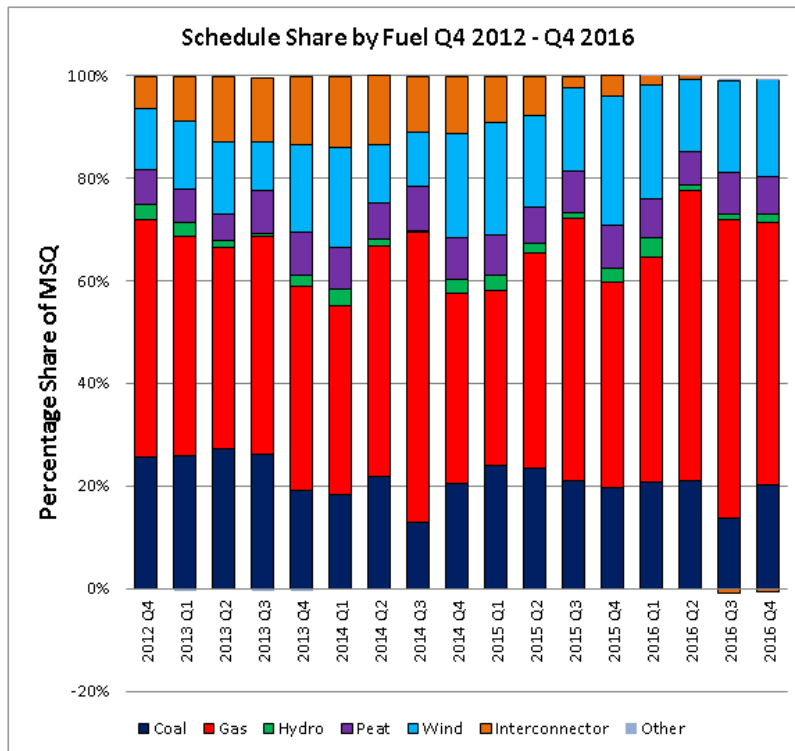


Figure 8b: Fuel Mix in the Single Electricity Market Q4 2012 – Q4 2016



Gas is the most common fuel that is used for electricity production in the SEM. The figure above shows the average percentage of generation by each fuel type and the total demand by fuel type in each quarter since the second quarter of 2012.

A number of trends can be observed:

- Gas has slightly decreased to 50% in Q4 2016.
- Wind share was 18% in Q3 2016. This has increased 19% MSQ in Q4 2016.
- Interconnector share continued to drop due in part, to the outage at EWIC. EWIC returned to commercial operation on 23rd December 2016.

5. DETAILED MARKET INFORMATION

Summary

The following section provides more in-depth information on trends observed across the SEM:

1. **Dashboard.** This section builds on the previous chapter and explores quarterly trends that have been observed.
2. **Energy prices.** This section is presented in two main parts. The first covers the relationship between the SMP and prices in Great Britain (BETTA). The second covers the relationship between SMP and fuel/capacity prices.
3. **Market share.** This section looks at both the Market Schedule Quantity (MSQ³) and Dispatch Quantity (DQ⁴) by company.
4. **Constraints.** Levels of constraints in the SEM have increased considerably over the past nine months. This section analyses the cost to the consumer of constraint payments.
5. **Infra-marginal rent (IMR).** IMR is the difference between the price paid for generation and the cost to produce that generation. Levels of IMR are analysed and trends explained in this section.
6. **Interconnector Flows:** This section analyses the percentage of interconnector flows in the expected profitable direction.

¹ MSQ is the market scheduled quantity of output of all generators in each trading period.

² DQ is the Dispatch Quantity defined as the level of active power dispatched by the relevant transmission system operator in each trading period.

Figure 9: Single Electricity Market dashboard

| Quarterly Averages | Q4 2012 | Q1 2013 | Q2 2013 | Q3 2013 | Q4 2013 | Q1 2014 | Q2 2014 | Q3 2014 | Q4 2014 | Q1 2015 | Q2 2015 | Q3 2015 | Q4 2015 | Q1 2016 | Q2 2016 | Q3 2016 | Q4 2016 | Change From last Quarter |
|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------------------------|
| SMP €/MWh | 67 | 72 | 63 | 63 | 65 | 65 | 53 | 51 | 58 | 55 | 53 | 50 | 46 | 38 | 38 | 37 | 54 | ↑ |
| % Change from previous Quarter | 7% | 8% | -12% | 0% | 3% | 0% | -18% | -3% | 12% | -4% | -4% | -4% | -8% | -17% | 0% | 0% | 47% | ↑ |
| % Change from Quarter, previous year | 11% | 16% | 1% | 1% | -2% | -10% | -16% | -18% | -11% | -15% | -1% | -2% | -20% | -31% | -27% | -27% | 17% | |
| Margin MW | 5552 | 5245 | 5421 | 5337 | 5536 | 5479 | 5073 | 5031 | 5785 | 6278 | 5125 | 5456 | 5233 | 6526 | 5764 | 5486 | 5401 | ↔ |
| % Change from previous Quarter | 9% | -6% | 3% | -2% | 4% | -1% | -7% | -1% | 15% | 9% | -18% | 6% | -4% | 25% | -12% | -5% | -2% | ↔ |
| % Change from Quarter, previous year | 15% | 12% | 16% | 5% | 0% | 4% | -6% | -6% | 4% | 15% | 1% | 8% | -10% | 4% | 12% | 1% | 3% | |
| Demand MW | 3959 | 4132 | 3547 | 3492 | 3884 | 4021 | 3567 | 3506 | 3934 | 4137 | 3586 | 3564 | 3954 | 4155 | 3701 | 3608 | 4092 | ↑ |
| % Change from previous Quarter | 15% | 4% | -14% | -2% | 11% | 4% | -11% | -2% | 12% | 5% | -13% | -1% | 11% | 5% | -11% | -3% | 13% | ↑ |
| % Change from Quarter, previous year | 0% | 2% | -2% | 1% | -2% | -3% | 1% | 0% | 1% | 3% | 1% | 2% | 1% | 0% | 3% | 1% | 3% | |
| Actual Availability MW | 9511 | 9377 | 8968 | 8829 | 9421 | 9500 | 8640 | 8537 | 9719 | 10415 | 8770 | 9020 | 9187 | 10681 | 9465 | 9094 | 9487 | ↔ |
| % Change from previous Quarter | 11% | -1% | -4% | -2% | 7% | 1% | -9% | -1% | 14% | 7% | -16% | 3% | 2% | 16% | -11% | -4% | 4% | ↔ |
| % Change from Quarter, previous year | 8% | 7% | 8% | 3% | -1% | 1% | -4% | -3% | 3% | 10% | 2% | 6% | -5% | 3% | 8% | 1% | 3% | |
| Shadow €/MWh | 50 | 53 | 44 | 44 | 46 | 47 | 37 | 36 | 43 | 41 | 40 | 42 | 38 | 32 | 33 | 27 | 47 | ↑ |
| % Change from previous Quarter | 8% | 6% | -18% | 2% | 4% | 2% | -21% | -3% | 18% | -4% | -1% | 3% | -11% | -23% | -18% | -35% | 74% | ↑ |
| % Change from Quarter, previous year | 10% | 14% | -5% | -4% | -8% | -11% | -15% | -18% | -7% | -13% | 9% | 16% | -11% | -23% | -18% | -35% | 24% | |
| Uplift €/MWh | 16 | 19 | 20 | 19 | 19 | 18 | 16 | 15 | 15 | 14 | 12 | 8 | 8 | 6 | 5 | 10 | 7 | ↓ |
| % Change from previous Quarter | 4% | 13% | 5% | -3% | -1% | -6% | -11% | -3% | -4% | -5% | -13% | -30% | 0% | -20% | -20% | 94% | -30% | ↓ |
| % Change from Quarter, previous year | 14% | 22% | 18% | 19% | 14% | -5% | -20% | -20% | -22% | -21% | -23% | -44% | -45% | -54% | -57% | 18% | -13% | |
| Interconnector (Total) | 245 | 355 | 449 | 443 | 513 | 552 | 439 | 346 | 443 | 366 | 233 | 182 | 152 | 80 | 30 | -70 | -28 | ↓ |
| Moyle | | 205 | 190 | 111 | 197 | 244 | 128 | 65 | 294 | 253 | 202 | 139 | 26 | 35 | -6 | -20 | -17 | ↓ |
| EWIC | | 150 | 259 | 331 | 315 | 307 | 311 | 281 | 149 | 113 | 31 | 43 | 126 | 45 | 36 | -50 | -11 | ↓ |
| % Change from previous Quarter | 12% | 45% | 27% | -1% | 16% | 8% | -20% | -21% | 28% | -17% | -36% | -65% | -16% | -47% | -62% | -330% | -60% | |
| % Change from Quarter, previous year | - | 71% | 39% | 102% | 109% | 55% | 20% | -15% | -53% | -34% | -47% | -76% | -66% | -78% | -87% | -139% | -118% | |
| Wind MW (produced) | 468 | 555 | 502 | 330 | 666 | 783 | 410 | 371 | 801 | 919 | 644 | 583 | 998 | 910 | 525 | 658 | 787 | ↑ |
| % Change from previous Quarter | 27% | 19% | -10% | -34% | 102% | 18% | -48% | -9% | 116% | 15% | -30% | -9% | 71% | -9% | -42% | 25% | 20% | ↑ |
| % Change from Quarter, previous year | -35% | -4% | 32% | -10% | 42% | 41% | -18% | 12% | 20% | 17% | 57% | 57% | 25% | -1% | -18% | 13% | -21% | |

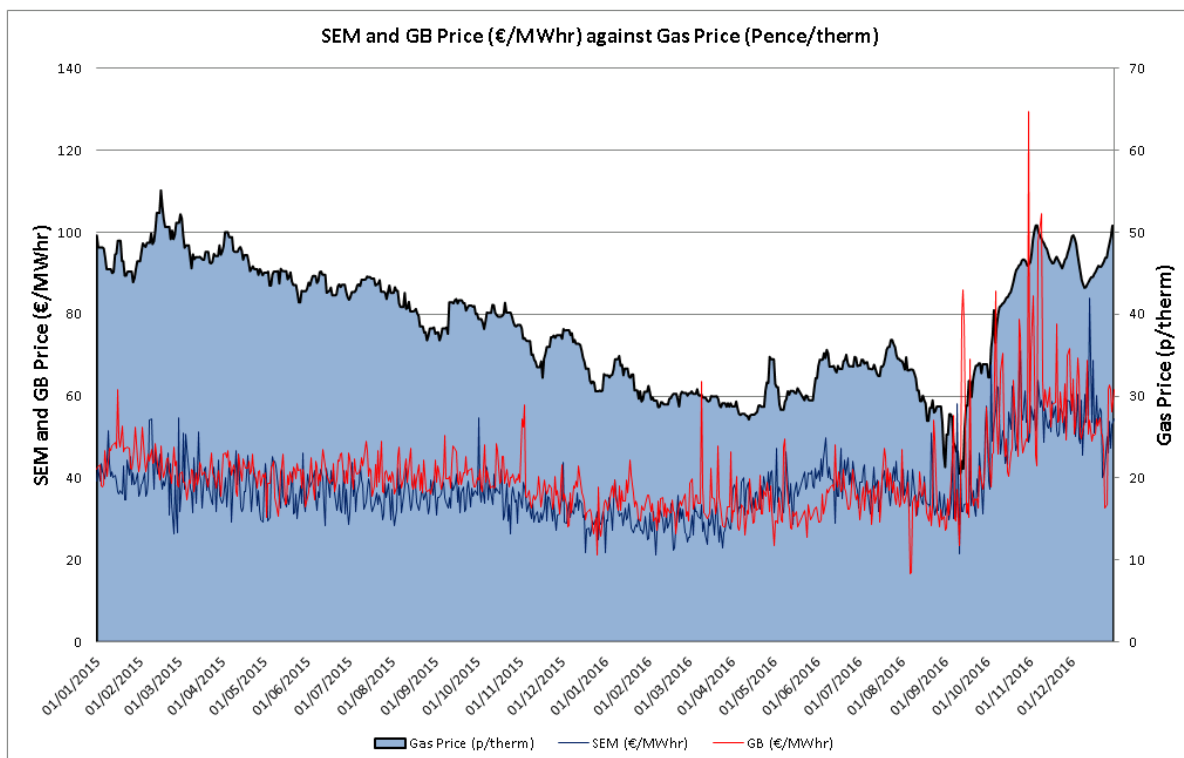
Note: The wind figures presented in this table do not cover production from wind farms which are not part of the SEM.

High Level Summary

- Average SMP was €54/MWhr in Q4 2016. This was an increase of €17/MWh on the third quarter of 2016. In Q4 2015, mean SMP was €46/MWhr.
- Levels of demand have remained generally stable over the past nine quarters, with the usual seasonal fluctuations being observed. Comparing Q4 2016 with the same quarter in 2015 shows a 3% increase.
- Margin levels have largely fluctuated over the last nine quarters; Q4 2016 is a 3% increase on Q3 2016.
- Actual Availability increased by 4% on Q3 2016.
- The Shadow Price has increased in the quarter, from €27/MWh in Q3 2016 to €47/MWh in Q4 2016.
- Average Uplift has decreased over the past quarter from €10/MWh in Q3 2016 to €7/MWh in Q4 2016.

Energy price trends

Figure 10: Price comparison between the Single Electricity Market and BETTA



The SEM prices shown in Fig.6 do not include Capacity Payments made to generators. The units of both the SEM price and the BETTA price are in €/MWhr for ease of comparison. The Gas Price units are pence/therm.

Gas has been dominant in the generation fuel mix since the SEM was established. As a result the profile of electricity prices has tended to follow that of the price of gas. While this continues to be the case today, in general the proportion of gas in the fuel mix has started to decrease.

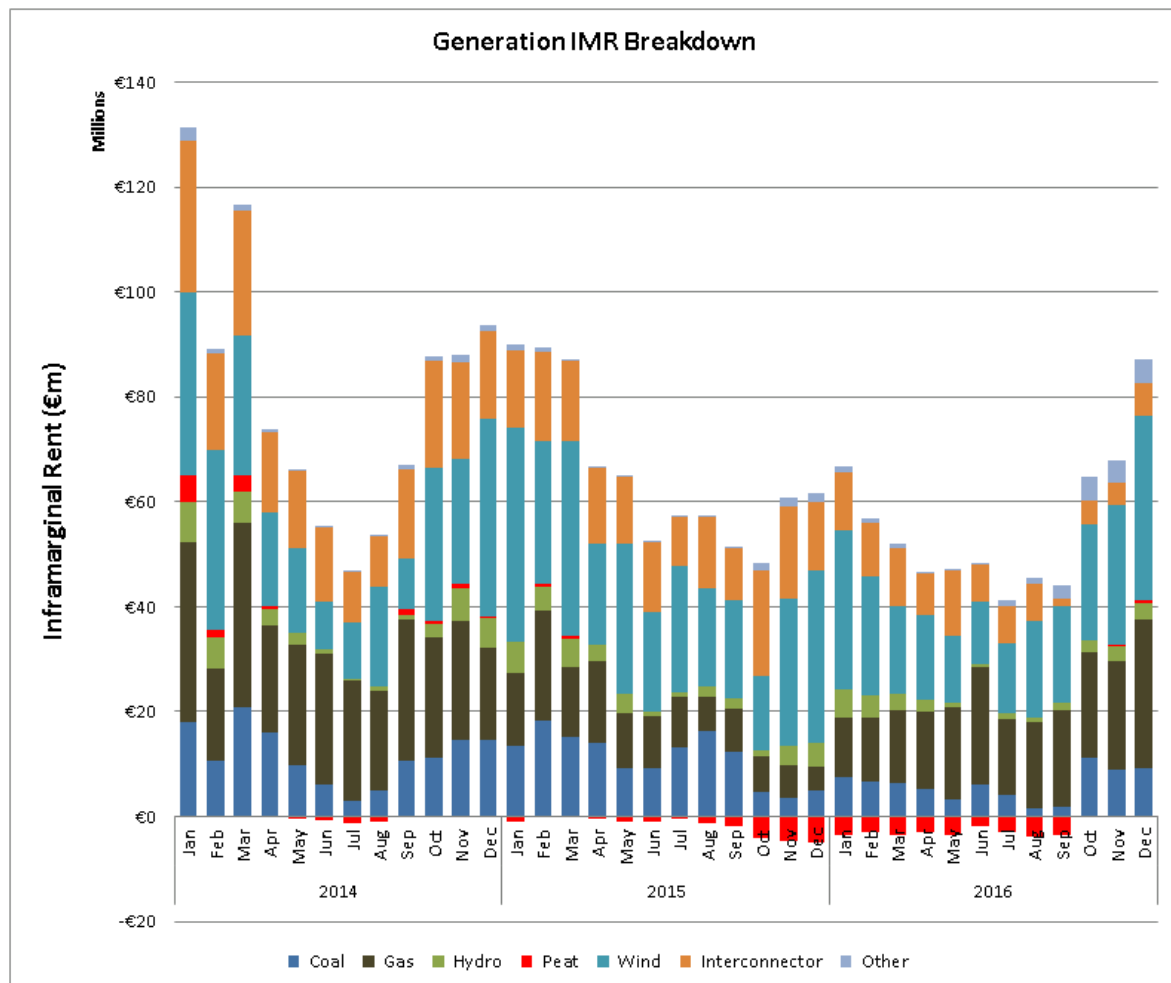
Quarterly average gas price increased from 31 p/therm in Q3 2016, to 44 p/therm in Q4 2016, a 42% increase. This increase will impact on the SMP as the fuel mix is gas dominant within the SEM.

Infra-marginal rent (IMR) trends

IMR is the difference between the price paid for generation and the cost to produce that generation. All scheduled generators whose bids are less than the SMP for the period will earn varying levels of IMR, depending on their bid price.

The following chart shows the levels of IMR received by fuel type.

Figure 12: Quarterly breakdown of Infra Marginal Rent by Fuel Type

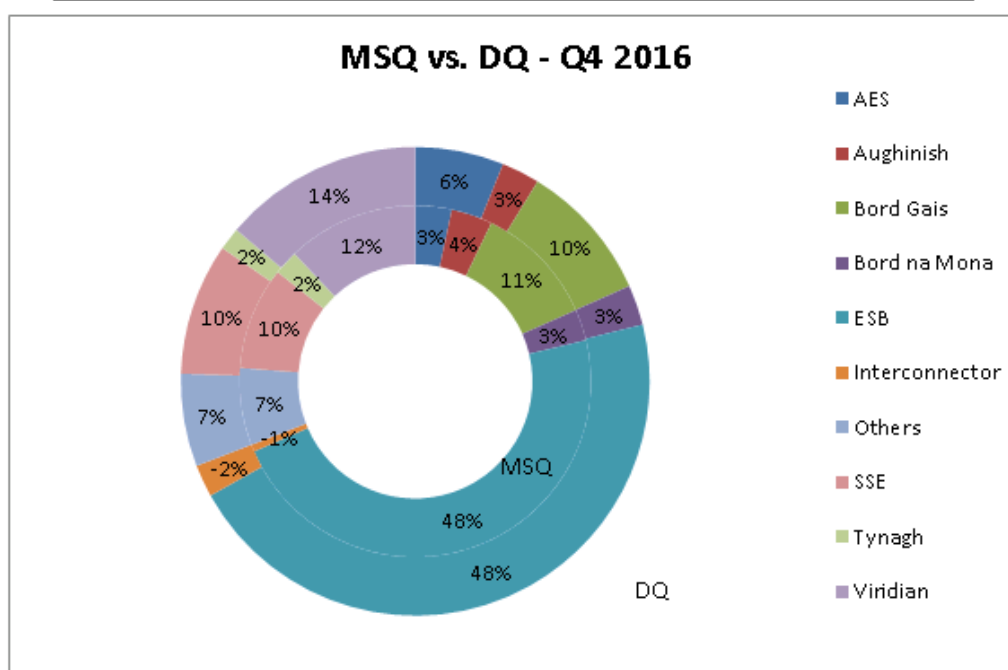


Wind generation makes up a large share of IMR when compared with its percentage of the fuel mix. In the latest quarter (Q4 2016), wind accounted for €55m of IMR which represents 41% of the total.

Gas continued to dominate in IMR earnings; this is unsurprising given the fuel mix seen in figures 8a & b.

Market and Dispatch Share by Owner

| Owner | MSQ - Current Quarter | MSQ % | DQ - Current Quarter | DQ % |
|----------------|-----------------------|-------|----------------------|------|
| AES | 611,792 | 3% | 1,127,930 | 6% |
| Aughinish | 694,405 | 4% | 486,217 | 3% |
| Bord Gais | 2,051,061 | 11% | 1,768,033 | 10% |
| Bord na Mona | 525,478 | 3% | 510,651 | 3% |
| ESB | 8,635,827 | 48% | 8,442,812 | 48% |
| Interconnector | - | -1% | 411,647 | -2% |
| Others | 1,299,901 | 7% | 1,177,082 | 7% |
| SSE | 1,731,311 | 10% | 1,680,890 | 10% |
| Tynagh | 410,903 | 2% | 287,793 | 2% |
| Viridian | 2,205,533 | 12% | 2,546,465 | 14% |
| Total | 18,048,487 | 100% | 17,616,226 | 100% |



The SEM operates on an unconstrained basis and is settled by the SEMO on an ex post basis. This can lead to differences between the market schedule and the real time dispatch of generating units. This is due to the System Operator dispatching generating units in real time under additional constraints that are not included in the market engine.

The pie chart above compares the share of MSQ and DQ by generation owner between the previous eight quarters and the latest quarter.

If there is a difference between the market schedule and the real-time dispatch the System Operators must dispatch generator units in real time under additional constraints not considered by the market engine. Transmission constraints and the need to provide reserve on the network are some of causes. Constraint payments keep generators financially neutral against these differences.

To balance supply and demand, constraining off will always result in generators being constrained on, and vice versa. Units constrained off will pay back a constraint payment and the corresponding units that are constrained on will receive a payment.

6. DIRECTED CONTRACTS

In November 2012 the regulatory authorities published an information note³ on contracting in the SEM from 2007 to 2013. The note provided details about the different contract products offered as well as the volume of contracts sold each year. The note also showed the trends in prices over the past number of years, both in terms of fuels and contracts. This included information on the price and volume of directed contracts sold.

In April 2012 the regulatory authorities published the decision⁴ on the format of directed contracts for 2012/13 and beyond. The decision was to move away from holding directed contract subscriptions on an annual basis⁵ and instead to have rolling quarterly subscriptions..

The tables and figures below provide information on the price and volume of directed contracts subscriptions, using the same format as the contracting report. The information includes the latest subscription round, Round 18, which was held in Sept 2016. Each subsequent quarterly price report will include the latest subscription results.

The contract volumes for Q2 and Q3 2017 show the volume of contracts sold to date and do not represent the full volume of contracts that are likely to be sold for the period. As a result of the DC subscriptions moving to a rolling quarterly schedule, the full volume for each quarterly product (i.e. Baseload Q1 2016) will be sold over a year

Note that since the I-SEM go live date has been extended to May 2018, the additional 3 quarters in the SEM – Q4 17, Q1 18 and Q2 18 – will be offered in additional rounds of Directed Contracts

| Expected Volumes of DCs Offered to Date | | | | | |
|---|---------|---------|---------|---------|---------|
| Q4 2016 | Q1 2017 | Q2 2017 | Q3 2017 | Q4 2016 | Q1 2017 |
| 100% | 100% | 75% | 50% | 100% | 100% |

On average, the prices of directed contract baseload, mid-merit and peak products for 2017 sold to date are 12-13% lower than those sold for 2016, and 28-33% lower than those sold for 2015. The volumes for 2016 were 10% higher than 2015 and 7% above 2014.

³ Contracting in the SEM 2007-2013 – SEM/12/100

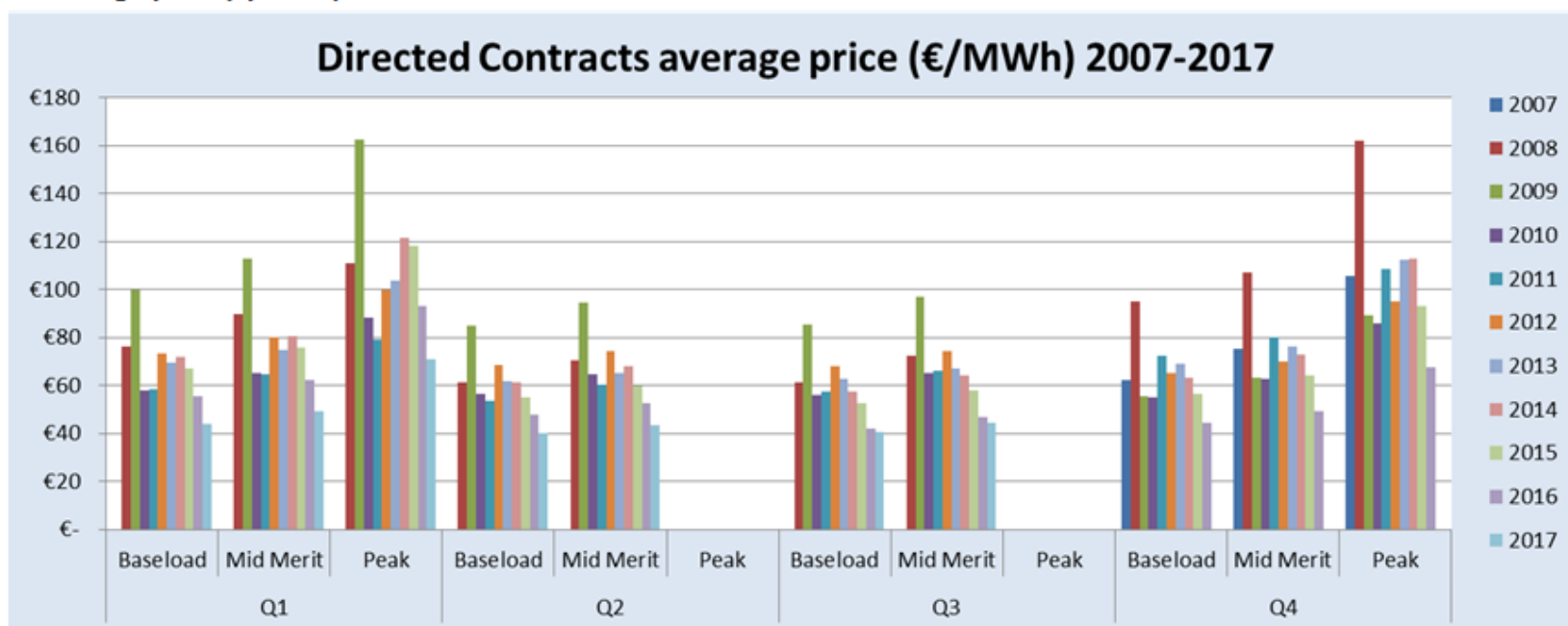
⁴ Directed Contracts Implementation for 2012/'13 and Beyond – SEM/12/026

⁵ Following the traditional tariff year from Q4 in year one to Q3 in year two.

Directed contracts average price (€/MWh), 2007-2017

| DC Average Price (€/MWh), 2007-2017 | | | | | | | | | | | | |
|-------------------------------------|----------|-----------|-------|----------|-----------|------|----------|-----------|------|----------|-----------|-------|
| Year | Q1 | | | Q2 | | | Q3 | | | Q4 | | |
| | Baseload | Mid Merit | Peak | Baseload | Mid Merit | Peak | Baseload | Mid Merit | Peak | Baseload | Mid Merit | Peak |
| 2007 | | | | | | | | | | € 62 | € 75 | € 106 |
| 2008 | € 76 | € 90 | € 111 | € 61 | € 70 | | € 61 | € 72 | | € 95 | € 107 | € 162 |
| 2009 | € 100 | € 113 | € 163 | € 85 | € 95 | | € 86 | € 97 | | € 55 | € 63 | € 89 |
| 2010 | € 58 | € 65 | € 88 | € 57 | € 64 | | € 56 | € 65 | | € 55 | € 62 | € 86 |
| 2011 | € 58 | € 65 | € 79 | € 54 | € 60 | | € 58 | € 66 | | € 72 | € 80 | € 108 |
| 2012 | € 73 | € 80 | € 100 | € 68 | € 74 | | € 68 | € 74 | | € 65 | € 70 | € 95 |
| 2013 | € 69 | € 75 | € 104 | € 62 | € 65 | | € 63 | € 67 | | € 69 | € 76 | € 113 |
| 2014 | € 72 | € 81 | € 121 | € 61 | € 68 | | € 57 | € 64 | | € 63 | € 73 | € 113 |
| 2015 | € 67 | € 76 | € 118 | € 55 | € 60 | | € 52 | € 58 | | € 57 | € 64 | € 93 |
| 2016 | € 56 | € 62 | € 93 | € 48 | € 53 | | € 42 | € 47 | | € 44 | € 49 | € 67 |
| 2017 | € 44 | € 49 | € 71 | € 40 | € 44 | | € 40 | € 44 | | € - | € - | € - |

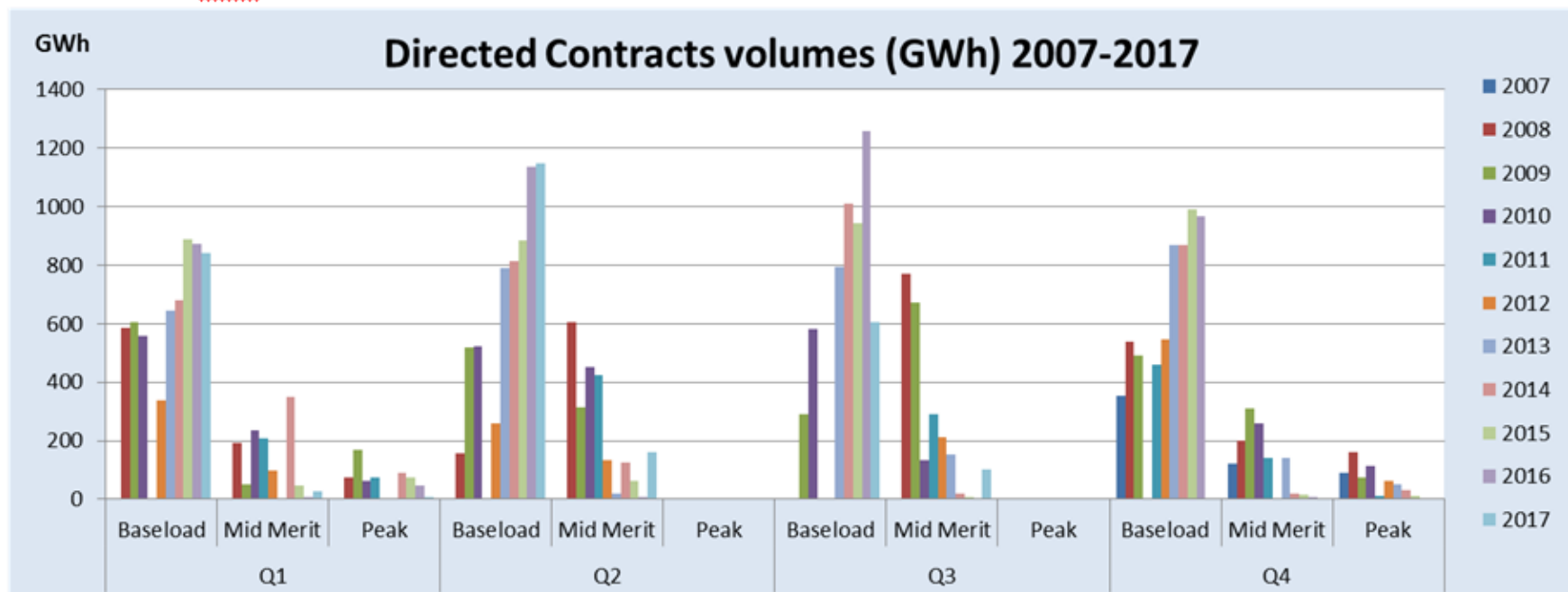
Directed contracts average price (€/MWh)



Directed contracts volumes (GWh), 2007-2017

| DC Volumes (GWh), 2007-2017 | | | | | | | | | | | | | |
|-----------------------------|----------|-----------|------|----------|-----------|------|----------|-----------|------|----------|-----------|------|-------|
| Year | Q1 | | | Q2 | | | Q3 | | | Q4 | | | Total |
| | Baseload | Mid Merit | Peak | Baseload | Mid Merit | Peak | Baseload | Mid Merit | Peak | Baseload | Mid Merit | Peak | TWh |
| 2007 | | | | | | | | | | 352 | 122 | 90 | 0.56 |
| 2008 | 587 | 194 | 76 | 157 | 604 | | - | 769 | | 539 | 199 | 163 | 3.29 |
| 2009 | 605 | 52 | 169 | 518 | 316 | | 291 | 671 | | 492 | 312 | 74 | 3.50 |
| 2010 | 557 | 235 | 62 | 524 | 453 | | 581 | 135 | | - | 259 | 113 | 2.92 |
| 2011 | - | 209 | 73 | - | 423 | | - | 291 | | 462 | 143 | 13 | 1.61 |
| 2012 | 336 | 100 | - | 260 | 134 | | - | 212 | | 546 | - | 61 | 1.65 |
| 2013 | 643 | - | - | 788 | 19 | | 795 | 153 | | 868 | 142 | 51 | 3.46 |
| 2014 | 680 | 350 | 90 | 815 | 126 | | 1,009 | 21 | | 870 | 19 | 33 | 4.01 |
| 2015 | 887 | 47 | 74 | 885 | 62 | | 945 | 7 | | 990 | 15 | 11 | 3.92 |
| 2016 | 871 | 10 | 47 | 1,135 | 7 | | 1,259 | 3 | | 967 | 7 | - | 4.31 |
| 2017 | 843 | 27 | 9 | 1,149 | 160 | | 605 | 101 | | - | - | - | 2.89 |

Directed contracts volumes (GWh)



The graph in Figure 14 illustrates the percentage of times in a month that the Interconnector flows in the expected profitable direction i.e. from GB to SEM if SEM Price is higher and vice versa.

Figure 14 – Profitable Flows

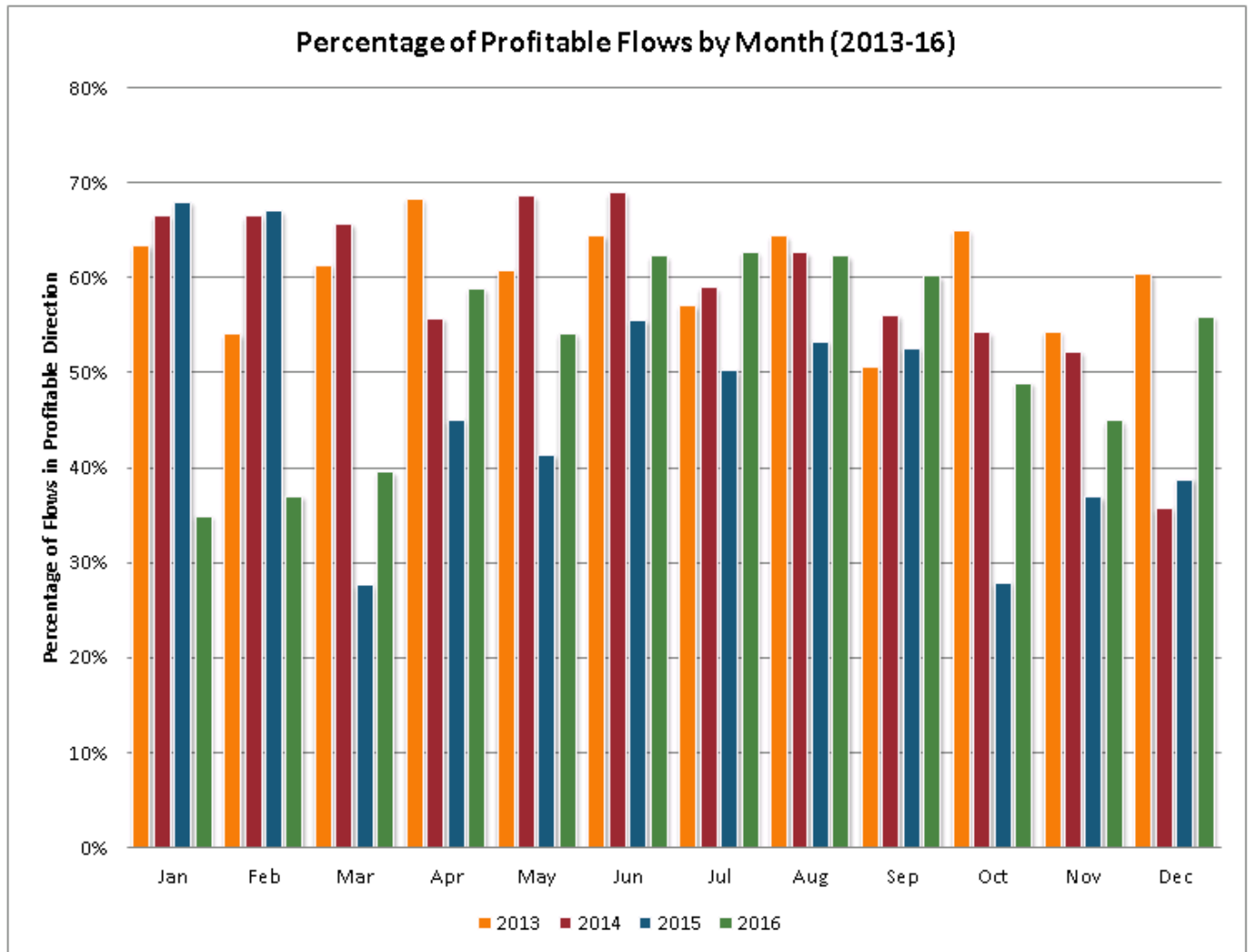


Figure 14 highlights that interconnector flows do not always flow in the profitable direction and at times when these flows *are* in the profitable direction, the available capacity is not always fully utilised.

Early 2016 flows were much lower than in previous years, in the latter portion of the year the percentage of profitable flows returned to near 2013 levels, with the last quarter surpassing those in the same quarter of 2015.