



SEM Monitoring Report: Q2 2016

SEM-16-061

September 2016

1. CONTENTS

1. Contents	2
2. Introduction	3
3. Overview	4
4. SUMMARY	5
How the Single Electricity Market works	6
Electricity prices	8
Energy Costs as a Percentage of Total Wholesale Costs	9
System Marginal Price and Demand trends	10
5. Detailed Market Information.....	16
6. Directed Contracts.....	34
7. Acronyms.....	37

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:

- Kevin Baron at kevin.baron@uregni.gov.uk.

3. OVERVIEW

1. **Wholesale costs:** Wholesale electricity costs during the second quarter of this year were lower than those in the first quarter of 2016. Capacity Payments went down to €135m from €151m in Q1 2016.
2. **SEM Price (System Marginal Prices “SMP”):** SMP stayed at €38/MWhr on average for the quarter, equalling the average wholesale price for Q1 2016. . Wholesale electricity price has decreased from (on average) €72/MWhr in Q1 2013 which is a substantial reduction over that time period (a 64% reduction). This quarterly average is the equal lowest SMP in the history of the SEM.
3. **Fuel Price:** Gas price increased from over 30 p/therm to just over 33 p/therm during the period. The historically low gas price is a key contributor to low wholesale prices.
4. **SEM demand (Market Schedule Quantity “MSQ”):** The average demand for Q2 2016 was 3884 MW and is broadly what is expected for that time of year. The demand in Q1 2016 was roughly 10% higher.
5. **Interconnector Flows.** Flows across the interconnectors continued to fluctuate (on an average Quarterly basis) around the profitable direction. This ‘profitable direction’ is defined as the direction of flow from SEM to GB when there is a positive difference in the SEM price compared to the BETTA price (If the difference is negative, then flows from GB to SEM are deemed profitable).
6. **Fuel mix:** While gas continues to be the dominant fuel in the SEM; wind levels are fluctuating their share of the overall mix whereas Interconnector share has dropped significantly, due to the Interconnector’s availability.
7. **Directed contracts:** On average, the prices of directed contract baseload, mid-merit and peak products for 2017 sold to date are 10-14% lower than those sold for 2016, and 26-34% lower than those sold for 2015. The volumes for 2016 were 10% higher than 2015 and 7% above 2014.
8. **Constraint Payments.** Constraint Payments for Q2 2016 were €40m, this is a 15% decrease on Q1 2016.
9. **Make Whole Payments.** In Q1 2016 a total of €1,085,607 was paid in Make Whole Payments, of which €964,166 was paid out to Interconnector Users. This was roughly €350, 000 more than the previous quarter. The peak occurred in Q3 2014 when €2,238,000 was paid to Interconnector Users.

4. SUMMARY

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

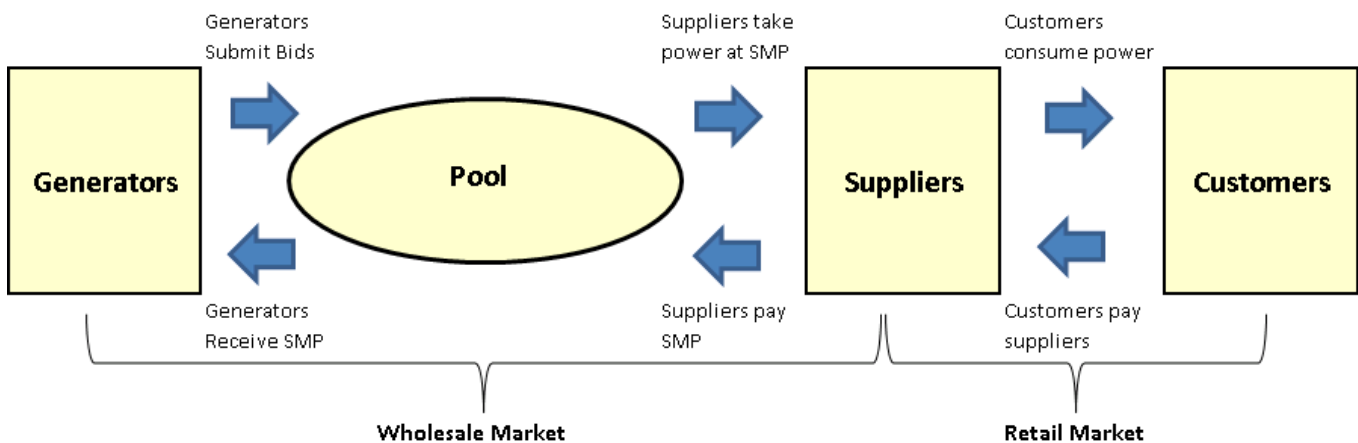
1. **Background to the SEM:** This section explains how the market works, and in particular the way in which generators bid to provide the required electricity.
2. **Electricity prices:** This section provides a high level breakdown of wholesale energy costs for the previous nine quarters.
3. **System Marginal Price (SMP) and Demand:** This section provides information on the SMP and Demand levels since 2010.
4. **Within day Energy Prices:** This section shows the average price and demand for each trading period in the previous nine quarters.
5. **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 Q2 2016.
6. **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.

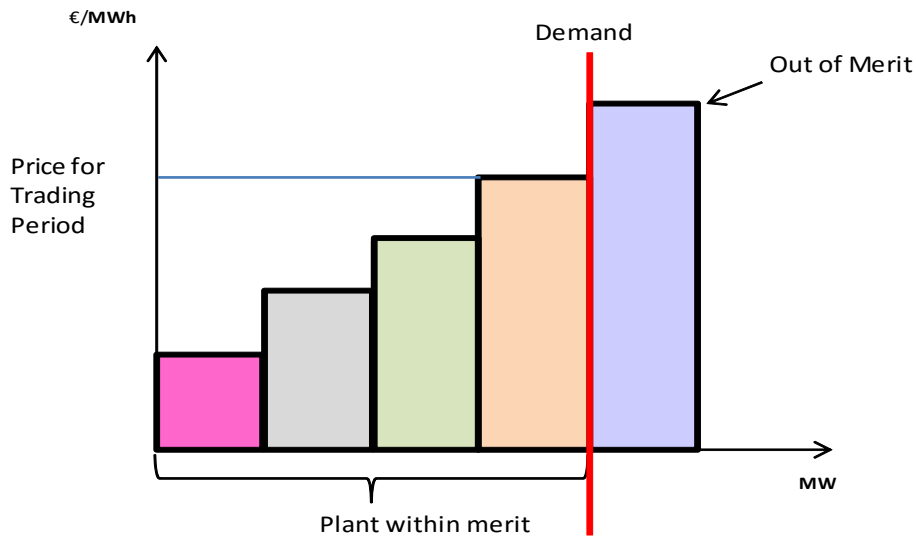
Figure 1: Market Overview



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%)

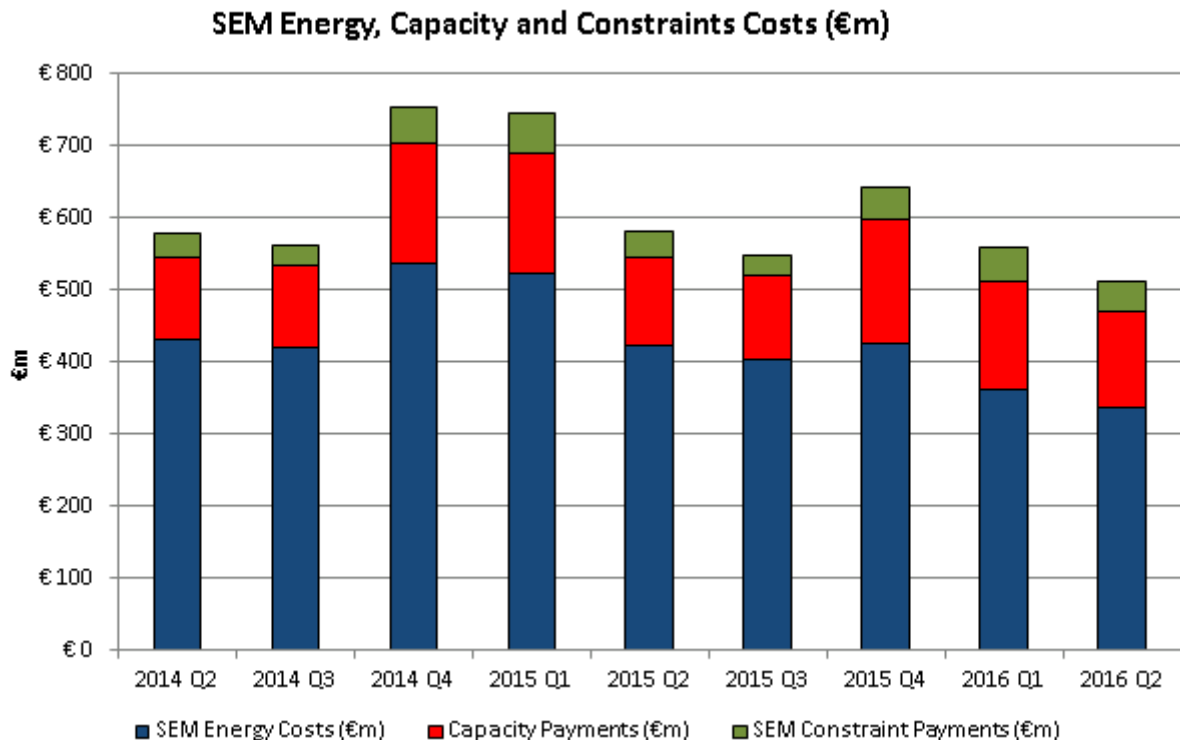
This report focuses on the wholesale element of electricity prices.

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 Q2 2014 through Q2 2016.

Figure 3: SEM Costs



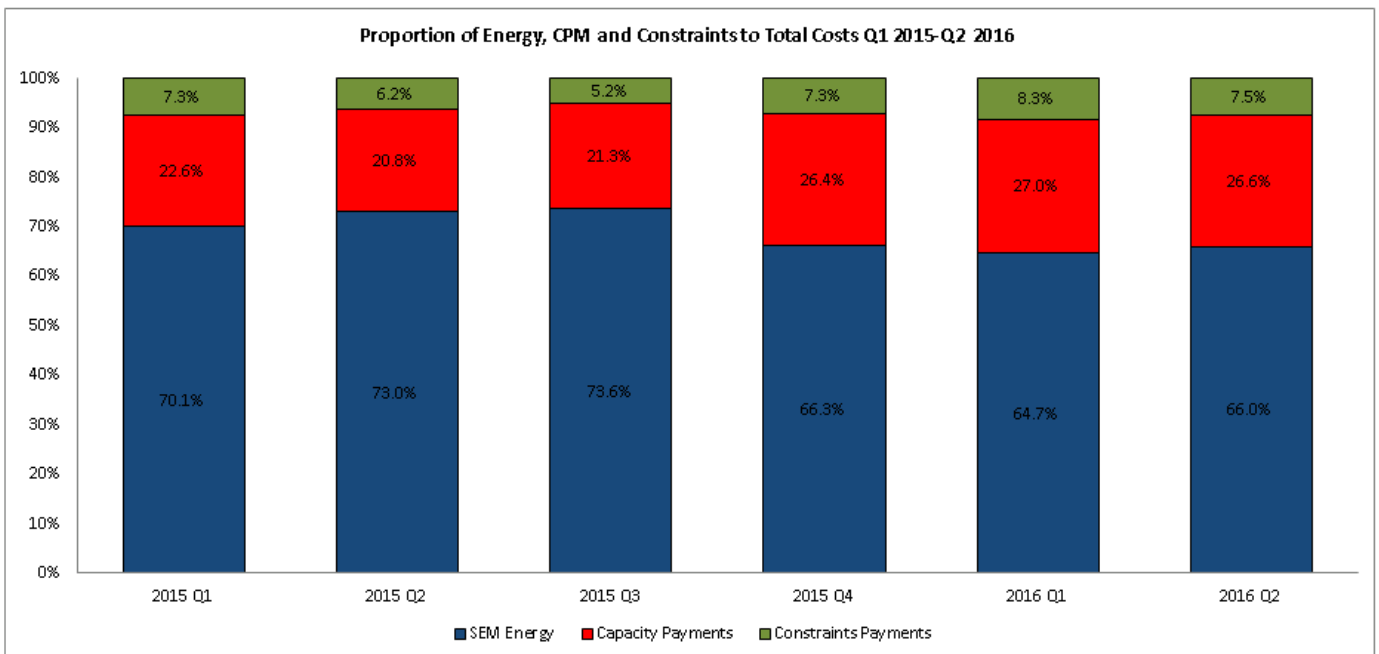
As the following chart shows, energy costs are the largest element of the overall wholesale cost. In the second quarter of 2016, 66% of total wholesale costs were attributable to energy. Constraints costs are roughly 7.5% of total energy costs for Q2 2016, in the last quarter this was around 8.3%.

The bar chart below shows the proportion of costs to the total for each quarter costs since Q1 2015.

Key factors in the costs below include the level of demand, the volume of wind generation, coal prices, carbon prices, generation plant availability and interconnector flows from Great Britain.

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 remained the same in the second quarter as it was for the first (€38/MWh).

Levels of demand decreased from an average of 4155 MW in Q1 2016 to 3884 MW in Q2 2016.

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

Figure 5: System Marginal Price in the Single Electricity Market 2012 - 2016

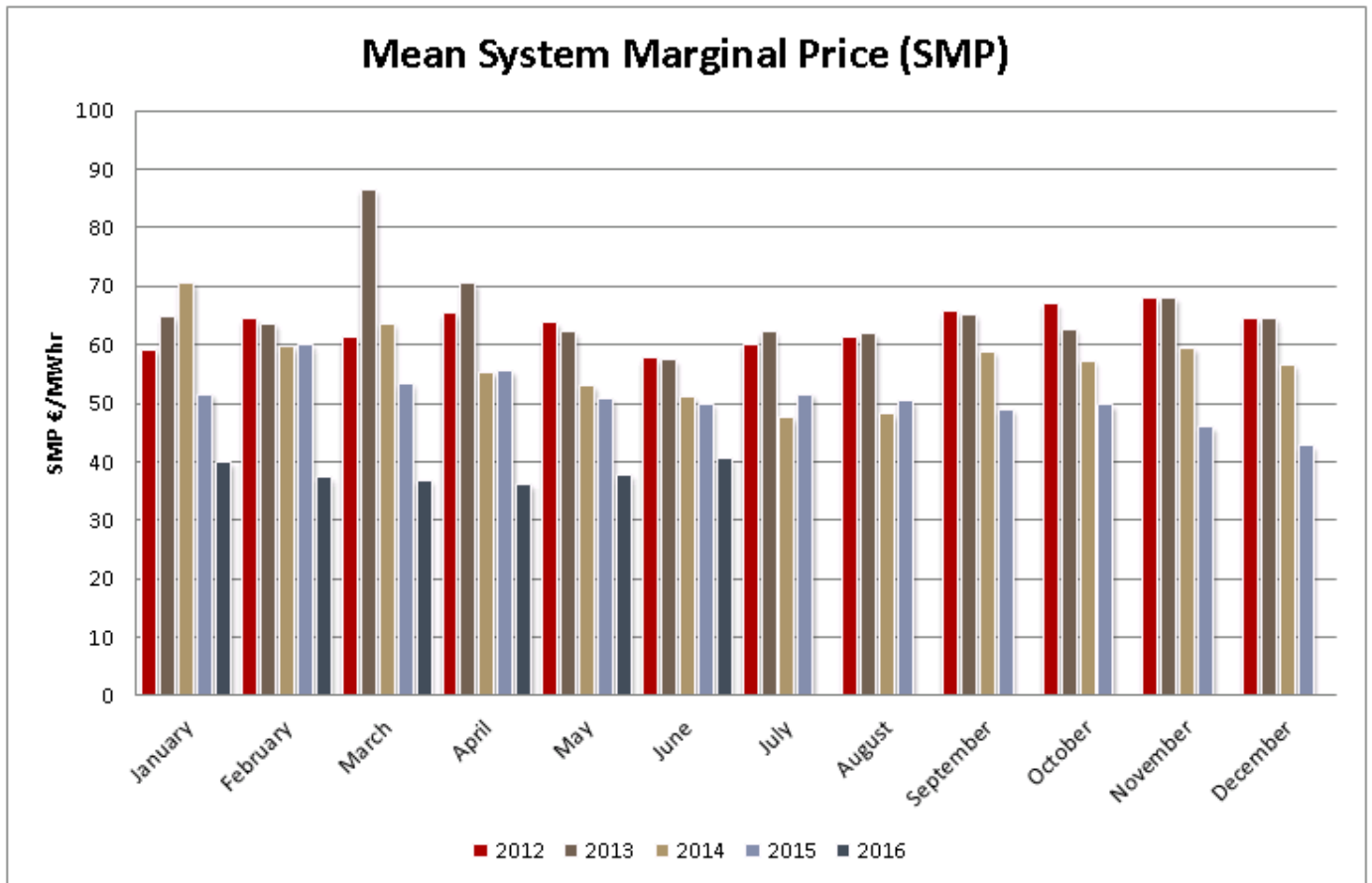
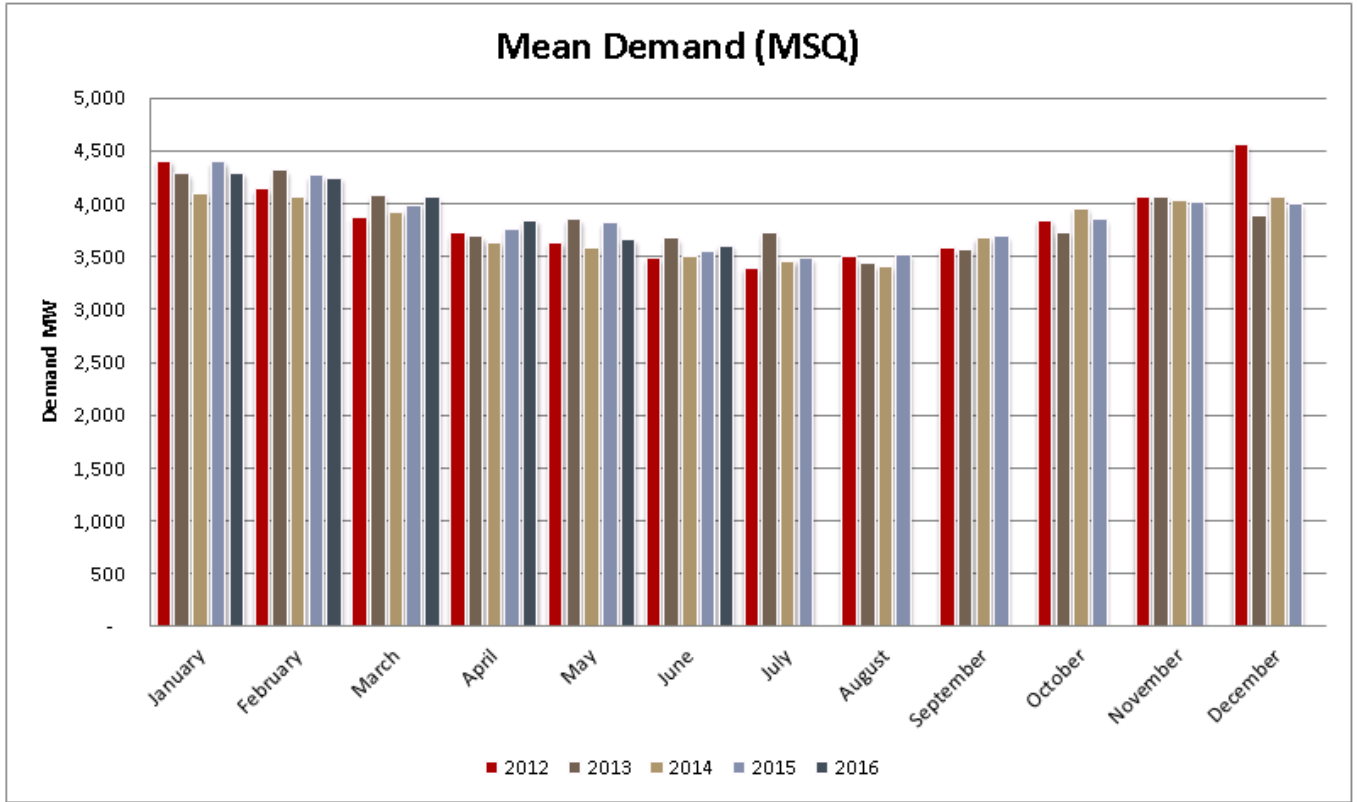


Figure 6: Demand in the Single Electricity Market 2012 - 2016



Analysis of the System Marginal Price

The SMP is made up of the following two components:

- The Shadow Price often reflects the marginal cost of the most expensive generator that is scheduled by SEMO. This makes up the majority of SMP.
- Uplift usually relates to a generator’s Start-Up Costs and No Load costs (i.e. production costs that do not vary with the level of output). Uplift is incurred to ensure that all generators recover these costs over the Trading Day.

The figure below shows the average SMP profile, broken down by Shadow Price and Uplift for the previous quarter:

Figure 7: Average System Marginal Price profile during Q2 2016

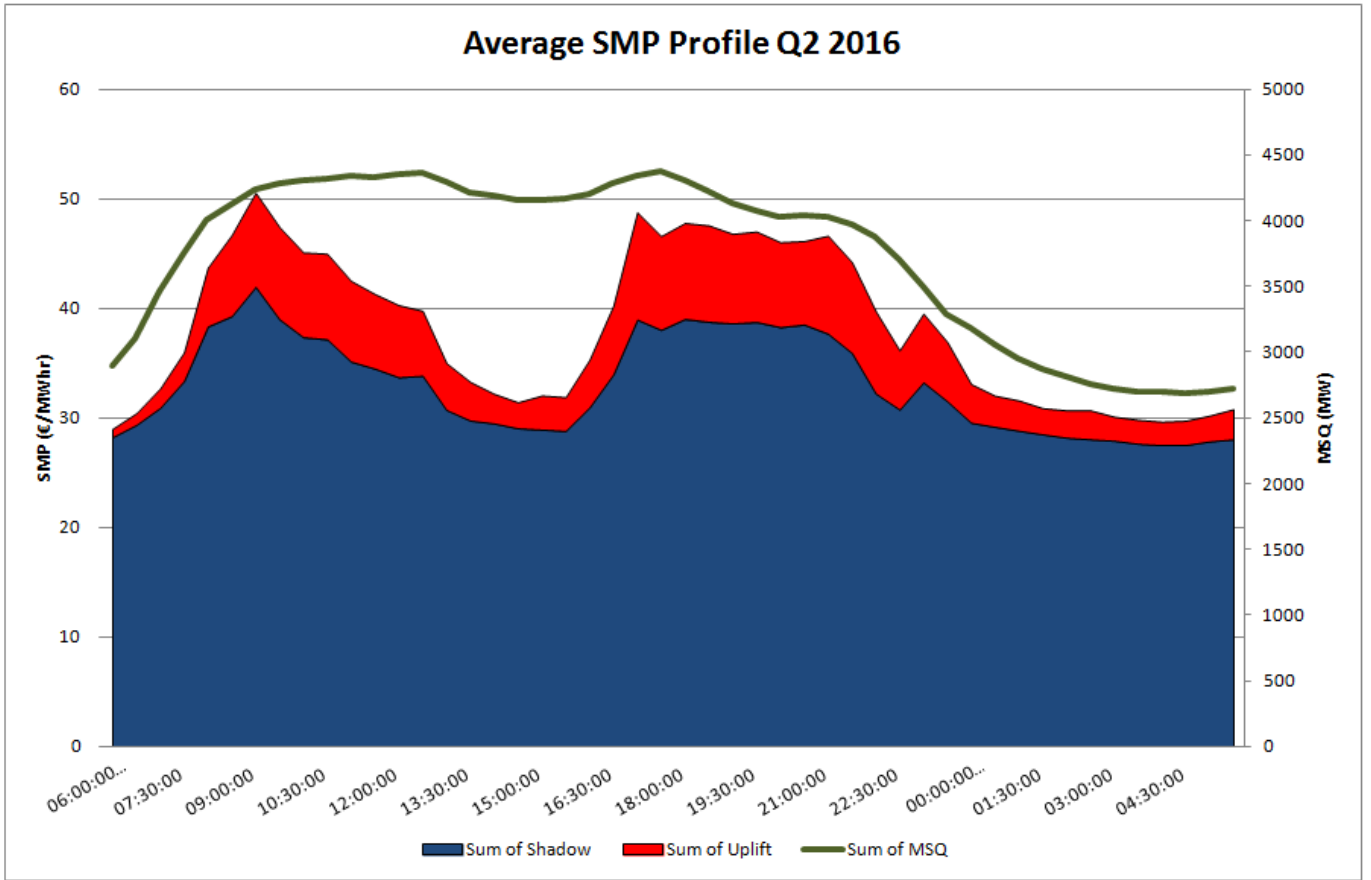
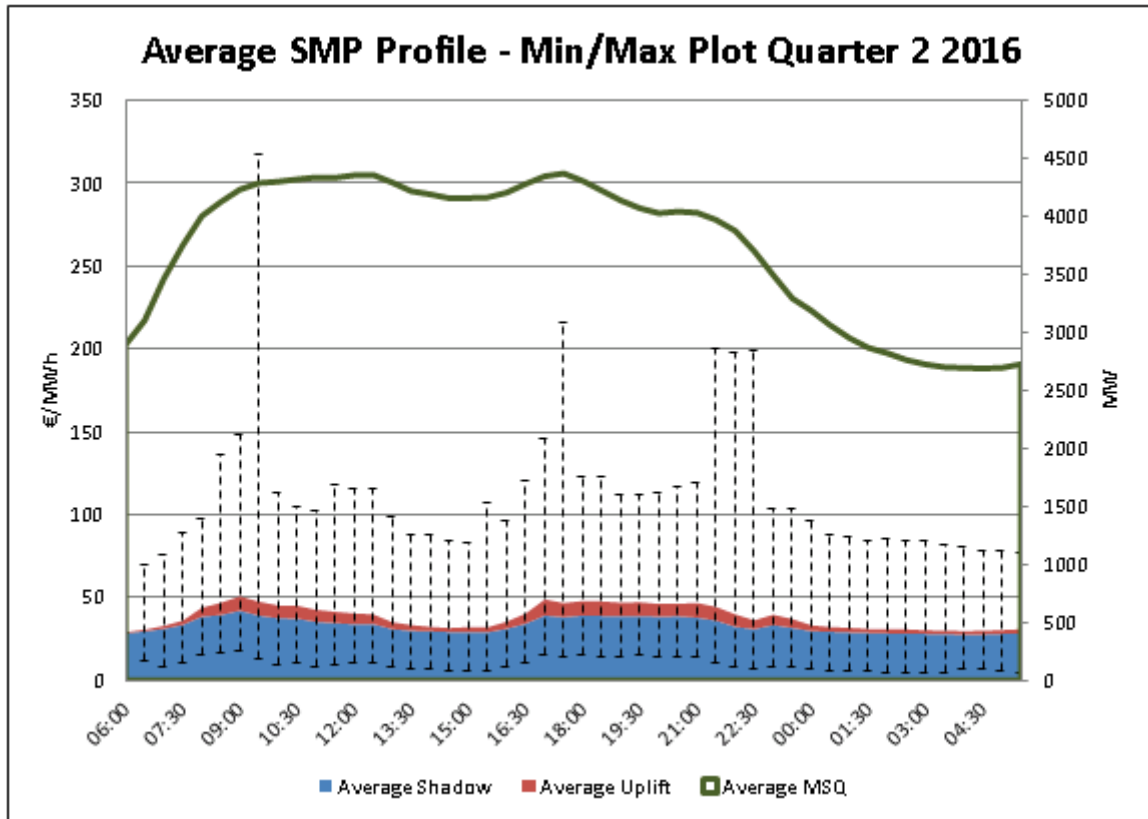


Figure 8: Average System Marginal Price Minimax Plot (Q2 2016)



The above plots show average SMP for Q2 2016 and the associated maximum and minimum values of (average) SMP recorded throughout the Quarter.

Share of generation by fuel type (fuel mix)

Figure 9a: Fuel Mix in the Single Electricity Market Q1 2012 – Q1 2016

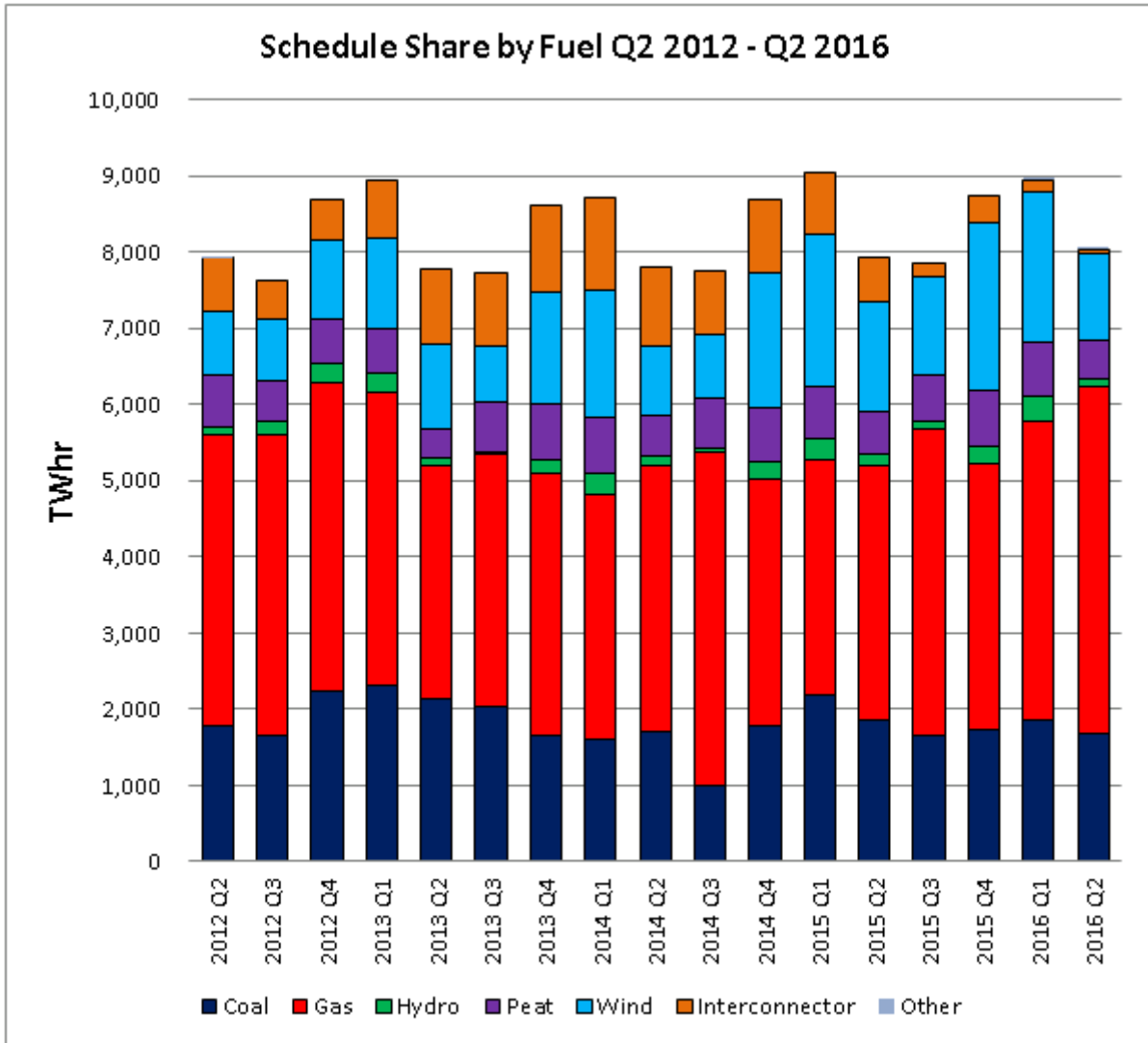
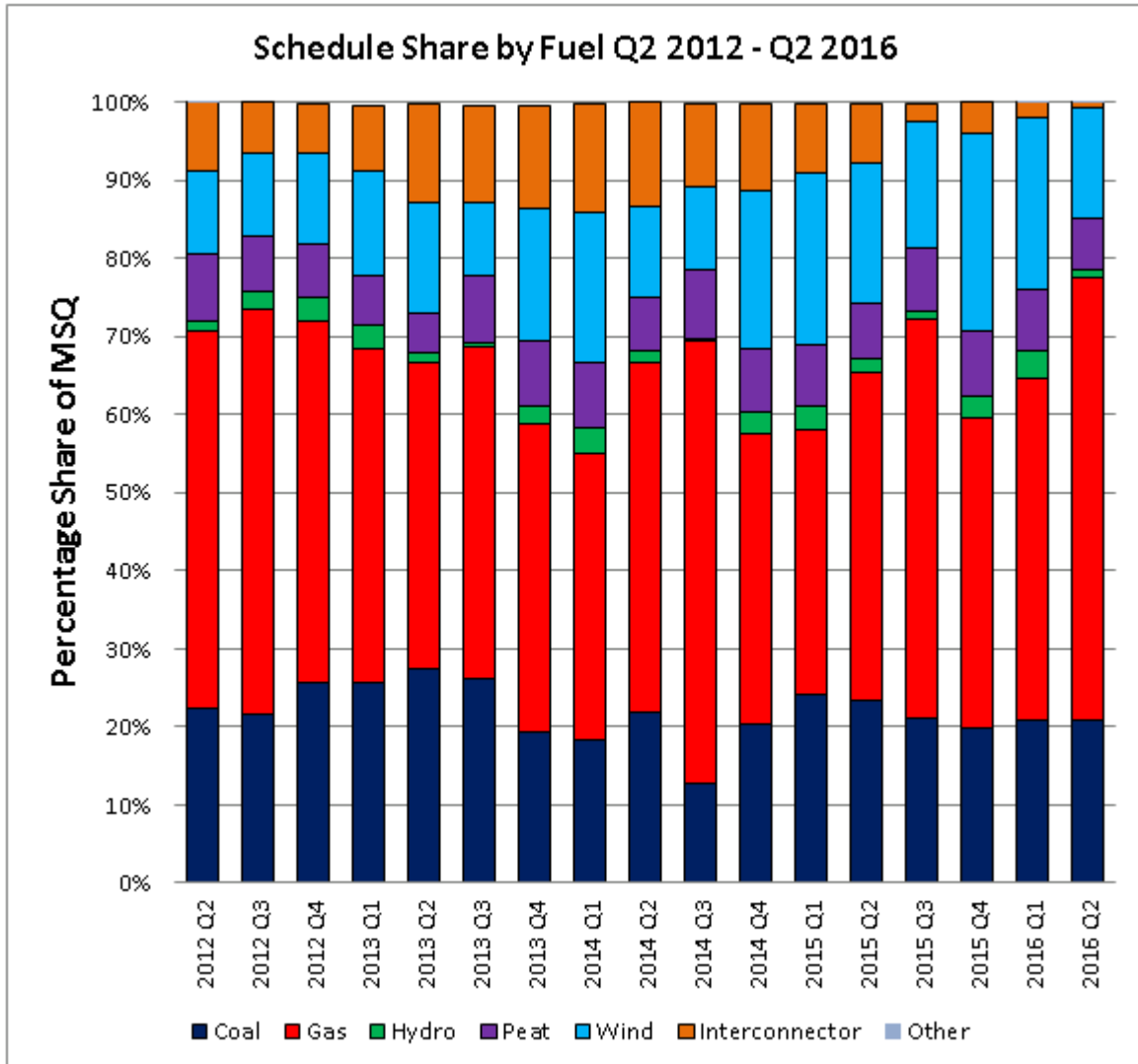


Figure 9b: Fuel Mix in the Single Electricity Market Q2 2012 – Q2 2016



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:

- In Q2 2015, gas represented 42% of the fuel mix. This has increased to 57% in Q2 2016.
- The share of generation provided by Interconnector Units also decreased over the same period, standing at 8% in Q2 2015 decreasing to less than 1% in Q2 2016
- Wind share was 18% in Q2 2015. There was a decrease to 14% MSQ in Q2 2016.
- The peak Market wind was at 12:30 pm on 16 February 2016, this was 2180 MW. The peak Q2 2016 Wind figure in the schedule was 2127 MW at 08:00 1 April 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 10: Single Electricity Market dashboard

Quarterly Averages	Q2 2012	Q3 2012	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	Change From last Quarter
SMP €/MWh	62	62	67	72	63	63	65	65	53	51	58	55	53	50	46	38	38	→
% Change from previous Quarter	1%	0%	7%	8%	-12%	0%	3%	0%	-18%	-3%	12%	-4%	-4%	-4%	-8%	-17%	0%	
% Change from Quarter, previous year	-1%	2%	11%	16%	1%	1%	-2%	-10%	-16%	-18%	-11%	-15%	-1%	-2%	-20%	-31%	-27%	
Margin MW	4677	5105	5552	5245	5421	5337	5536	5479	5073	5031	5785	6278	5125	5456	5233	6526	5764	↓
% Change from previous Quarter	0%	9%	9%	-6%	3%	-2%	4%	-1%	-7%	-1%	15%	9%	-18%	6%	-4%	25%	-12%	
% Change from Quarter, previous year	4%	12%	15%	12%	16%	5%	0%	4%	-6%	-6%	4%	15%	1%	8%	-10%	4%	12%	
Demand MW	3613	3444	3959	4132	3547	3492	3884	4021	3567	3506	3934	4137	3586	3564	3954	4155	3701	↓
% Change from previous Quarter	-11%	-5%	15%	4%	-14%	-2%	11%	4%	-11%	-2%	12%	5%	-13%	-1%	11%	5%	-11%	
% Change from Quarter, previous year	1%	-2%	0%	2%	-2%	1%	-2%	-3%	1%	0%	1%	3%	1%	2%	1%	0%	3%	
Actual Availability MW	8290	8549	9511	9377	8968	8829	9421	9500	8640	8537	9719	10415	8770	9020	9187	10681	9465	↓
% Change from previous Quarter	-5%	3%	11%	-1%	-4%	-2%	7%	1%	-9%	-1%	14%	7%	-16%	3%	2%	16%	-11%	
% Change from Quarter, previous year	3%	6%	8%	7%	8%	3%	-1%	1%	-4%	-3%	3%	10%	2%	6%	-5%	3%	8%	
Shadow €/MWh	46	46	50	53	44	44	46	47	37	36	43	41	40	42	38	32	33	↔
% Change from previous Quarter	-1%	1%	8%	6%	-18%	2%	4%	2%	-21%	-3%	18%	-4%	-1%	3%	-11%	-23%	4%	
% Change from Quarter, previous year	-7%	3%	10%	14%	-5%	-4%	-8%	-11%	-15%	-18%	-7%	-13%	9%	16%	-11%	-23%	-18%	
Uplift €/MWh	17	16	16	19	20	19	19	18	16	15	15	14	12	8	8	6	5	↓
% Change from previous Quarter	8%	-4%	4%	13%	5%	-3%	-1%	-6%	-11%	-3%	-4%	-5%	-13%	-30%	0%	-20%	-20%	
% Change from Quarter, previous year	20%	0%	14%	22%	18%	19%	14%	-5%	-20%	-20%	-22%	-21%	-23%	-44%	-45%	-54%	-57%	
Interconnector (Total)	322	219	245	355	449	443	513	552	439	346	443	366	233	182	152	80	30	↓
Moyle				205	190	111	197	244	128	65	294	253	202	139	26	35	-6	↓
EWIC				150	259	331	315	307	311	281	149	113	31	43	126	45	36	↓
% Change from previous Quarter	55%	-32%	12%	45%	27%	-1%	16%	8%	-20%	-21%	28%	-17%	-36%	-65%	-16%	-47%	-62%	
% Change from Quarter, previous year	4%	91%	-	71%	39%	102%	109%	55%	20%	-15%	-53%	-34%	-47%	-76%	-66%	-78%	-87%	
Wind MW (produced)	379	368	468	555	502	330	666	783	410	371	801	919	644	583	998	910	525	↓
% Change from previous Quarter	-34%	-3%	27%	19%	-10%	-34%	102%	18%	-48%	-9%	116%	15%	-30%	-9%	71%	-9%	-42%	
% Change from Quarter, previous year	-13%	-3%	-35%	-4%	32%	-10%	42%	41%	-18%	12%	20%	17%	57%	57%	25%	-1%	-18%	

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

Commentary

- Mean SMP was €38/MWhr in Q2 2016. This was the same quarterly average as the first quarter of 2016. In Q2 2015, mean SMP was €53/MWhr, this was also the same value as the Q2 2014 figure.
- Levels of demand have remained generally stable over the past nine quarters, with the usual seasonal fluctuations being observed. Comparing Q2 2016 with the same quarter in 2015 shows a 3% increase.
- Margin levels have largely fluctuated over the last nine quarters; Q2 2016 is a 8% increase on Q2 2015. This was driven largely by a decrease in demand and Availability.
- Actual Availability decreased by 11% on Q1 2016. When compared to Q2 2015; there has been an 8% increase.
- The Shadow Price has increased slightly in the quarter, from €32/MWh in Q1 2016 to €33/MWh in Q2 2016.
- Average Uplift has slightly decreased over the past quarter from €6/MWh in Q1 2016 to €5/MWh in Q2 2016.

Energy price trends

The SMP comprises two components – the Shadow Price and Uplift. The monthly SMP since January 2014, broken down by these two elements, is shown below in Figure 9. In Q2 2016, the proportion of Uplift (as a percentage of SMP) has remained almost the same as the previous quarter.

As can be seen, Shadow Price has not fallen below 65% of total SMP on an average basis since 2014.

Figure 11: Average monthly Uplift

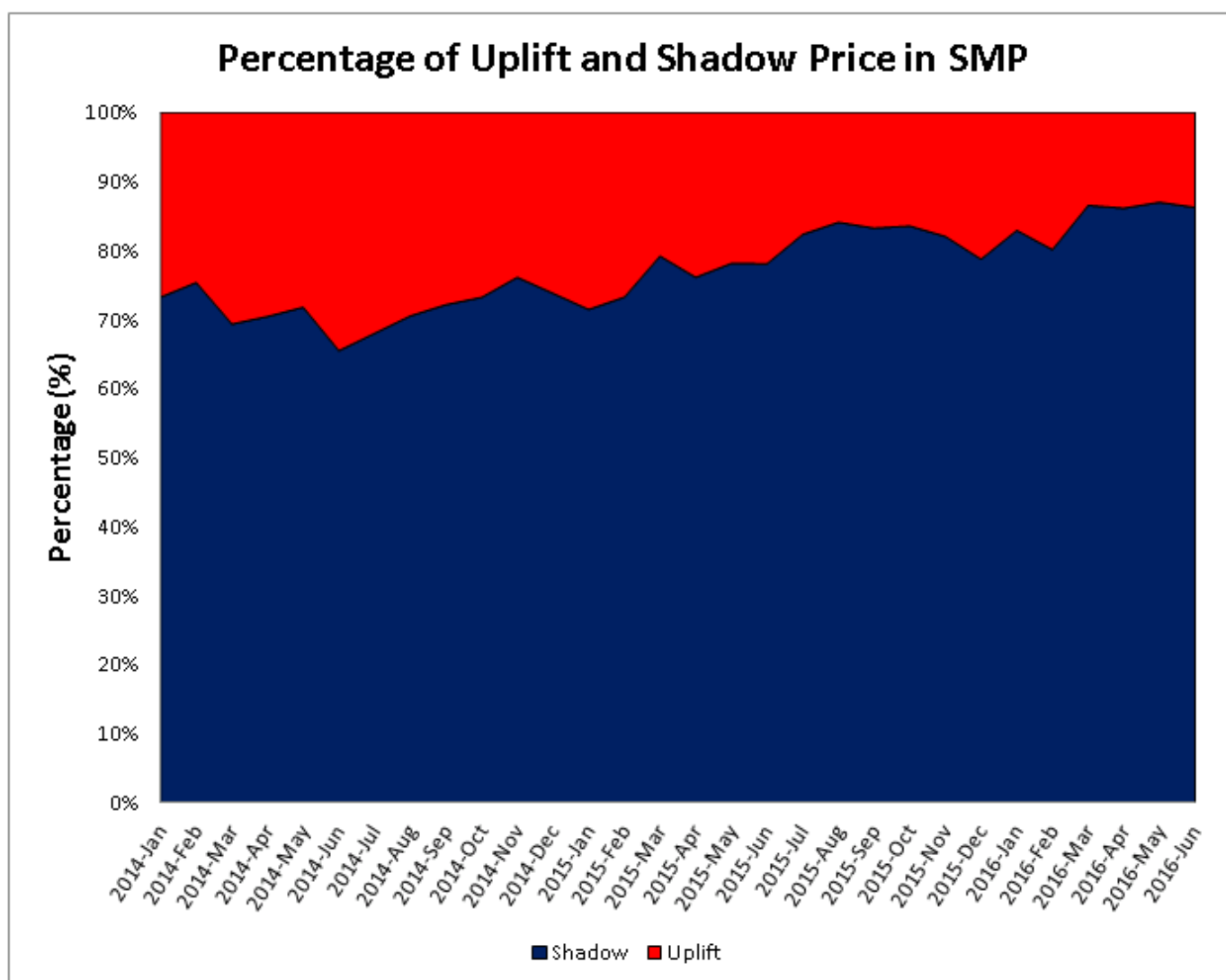
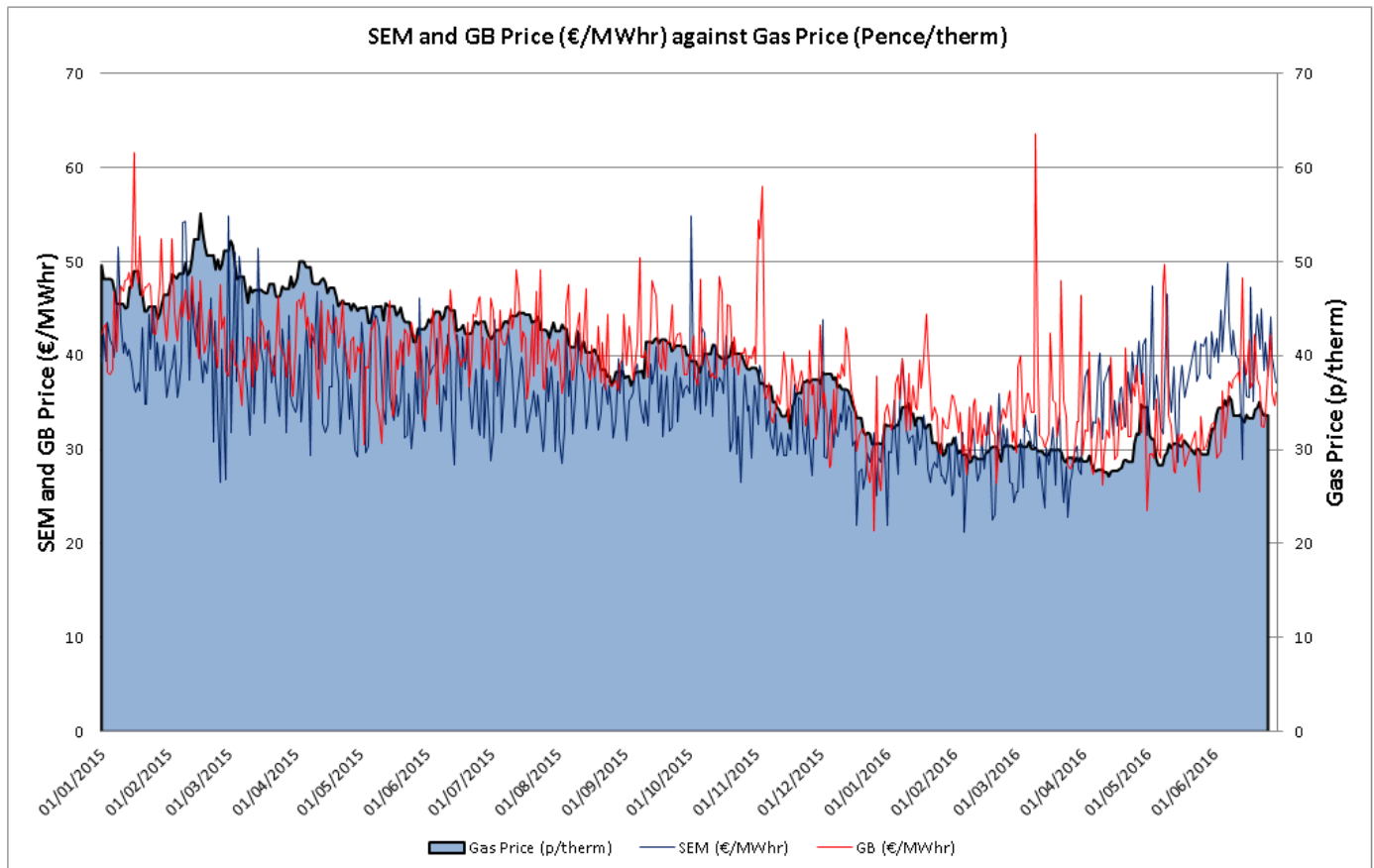


Figure 12: Price comparison between the Single Electricity Market and BETTA

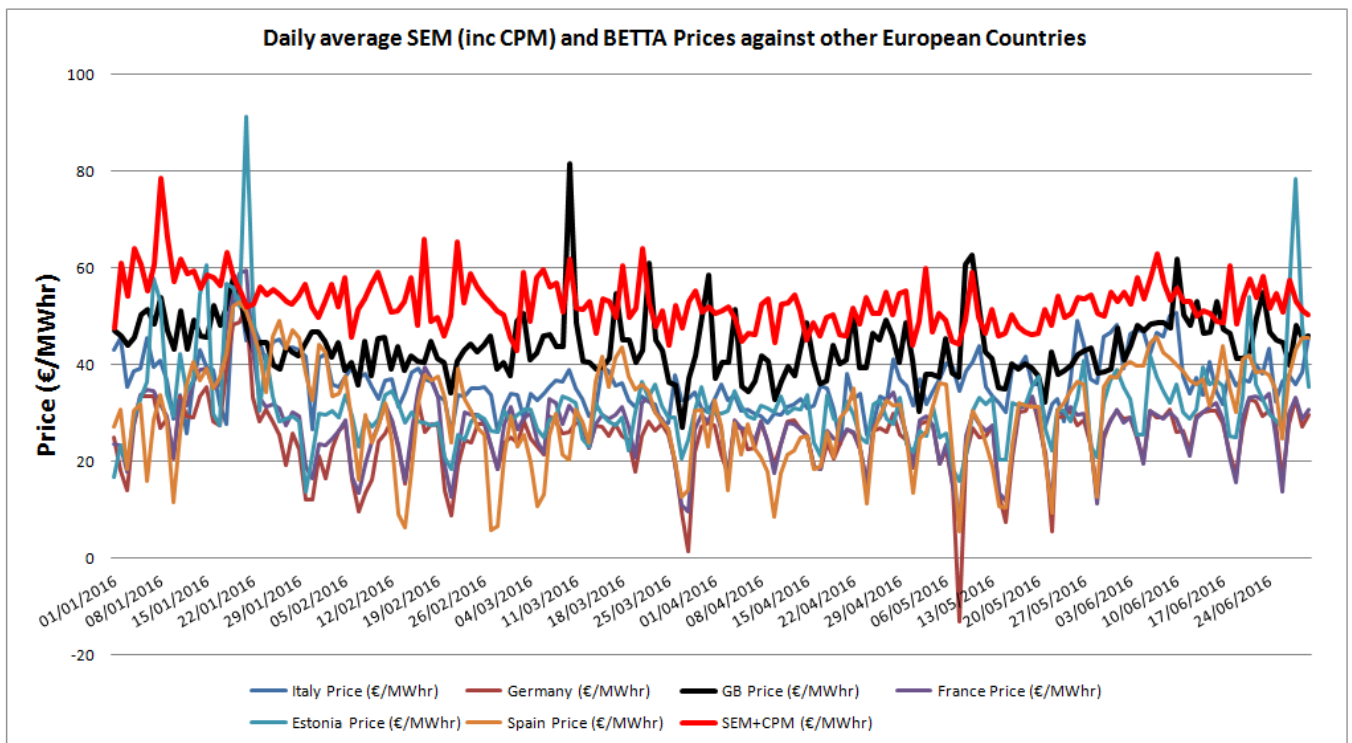


The SEM prices shown in Fig.6 do not include Capacity Payments made to generators. The units of both the SEM price and the BETTA price are in €/MWhr for ease of comparison. The Gas Price units are pence/therm.

In this quarter, prices between the markets appear to have slightly diverged more so than in previous quarters, potentially driving higher Interconnector imports.

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.

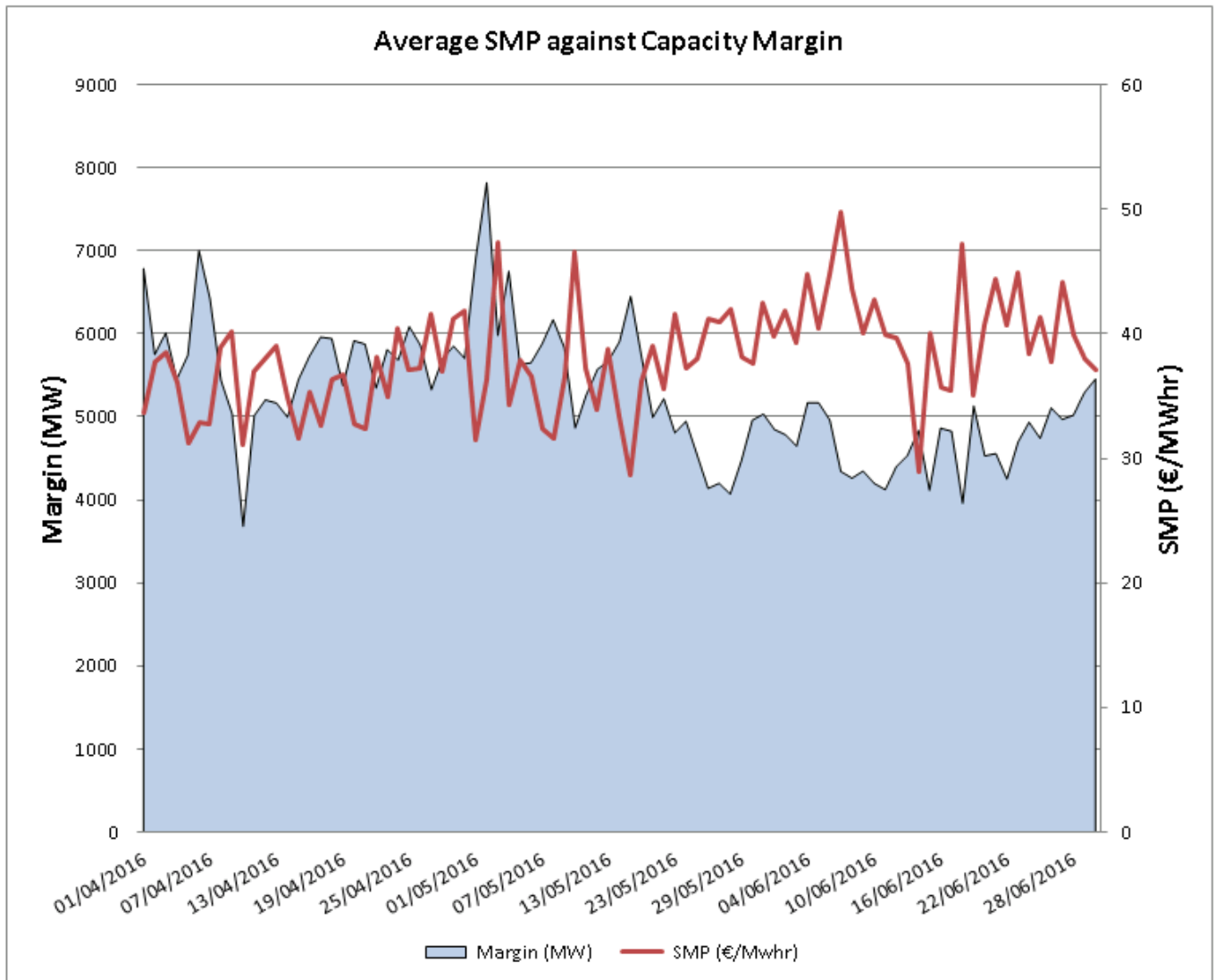
Figure 13: System Marginal and European Price comparison



Source: ENTSO-E Transparency Platform

In Figure 11 above the SEM price (including CPM) is shown for comparison against various European Prices. The BETTA price (black line) is shown.

Figure 14: System Marginal Price and Capacity Margin comparison



Another variable that has a particular impact on the SMP is the capacity margin. This is the amount by which the total available generation exceeds the level of demand in any period. It can be viewed as ‘spare capacity’. The lower the capacity margin the more likely it is there will be a need for more expensive generators to be run in the market. This will have the effect of increasing SMP.

From an all-island perspective there appears to be a healthy capacity margin over the period. The figure above shows that on average there 4,000- 5,000MW of spare generation capacity in the market. Electricity prices and capacity margin in the SEM have displayed signs of an inverted relationship historically. Spikes in SMP have generally occurred at times of lower levels of excess capacity.

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 charts below compare the share of MSQ and DQ by generation owner between the previous eight quarters and the latest quarter.

Figure 15a: Market Schedule Quantity by generation owner
Market Schedule Quantity

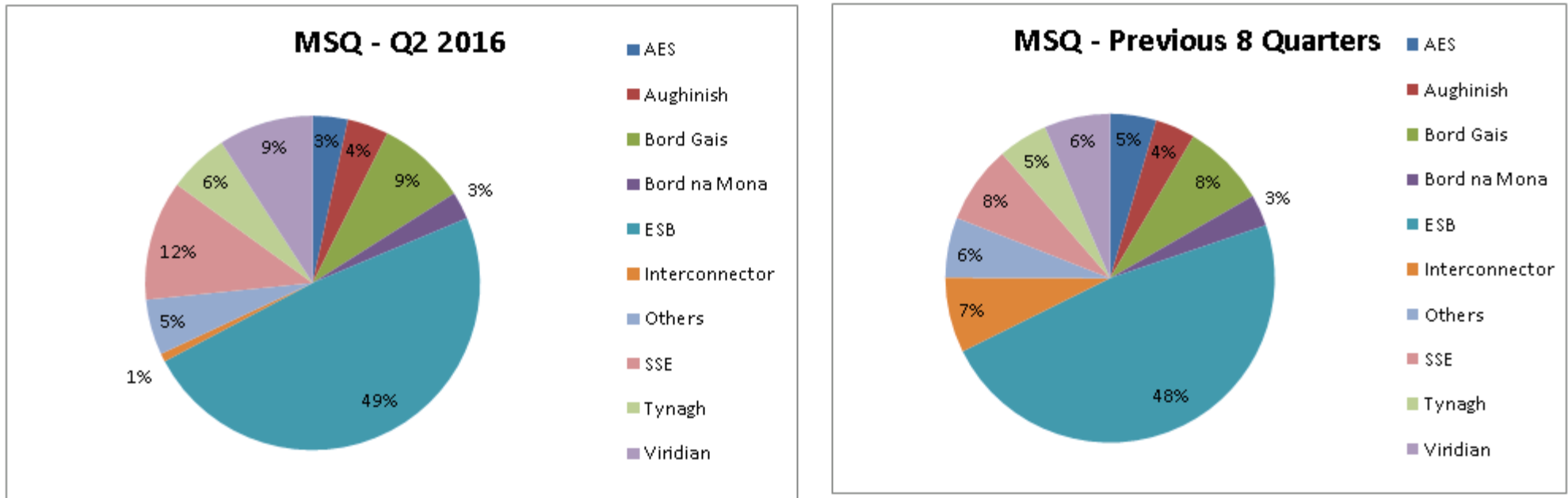
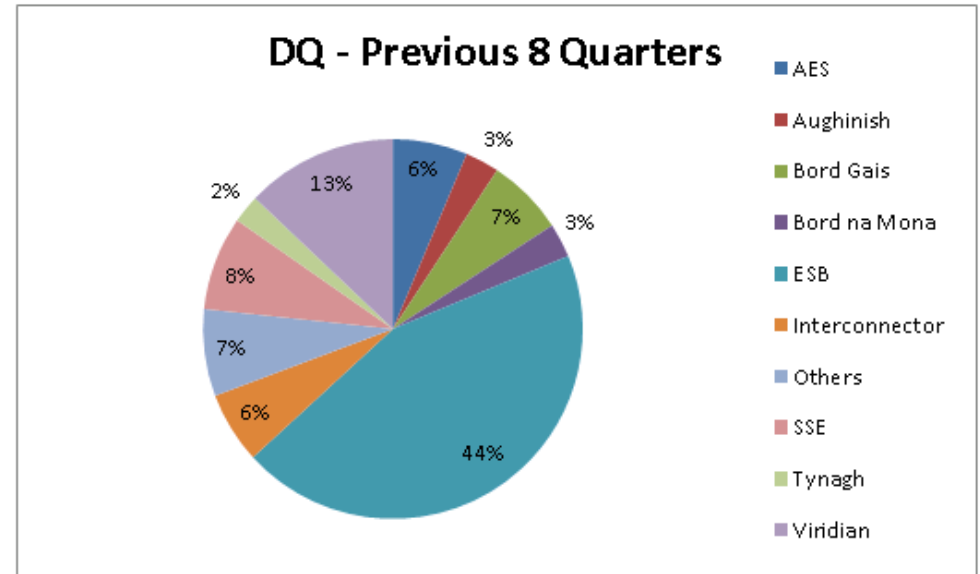
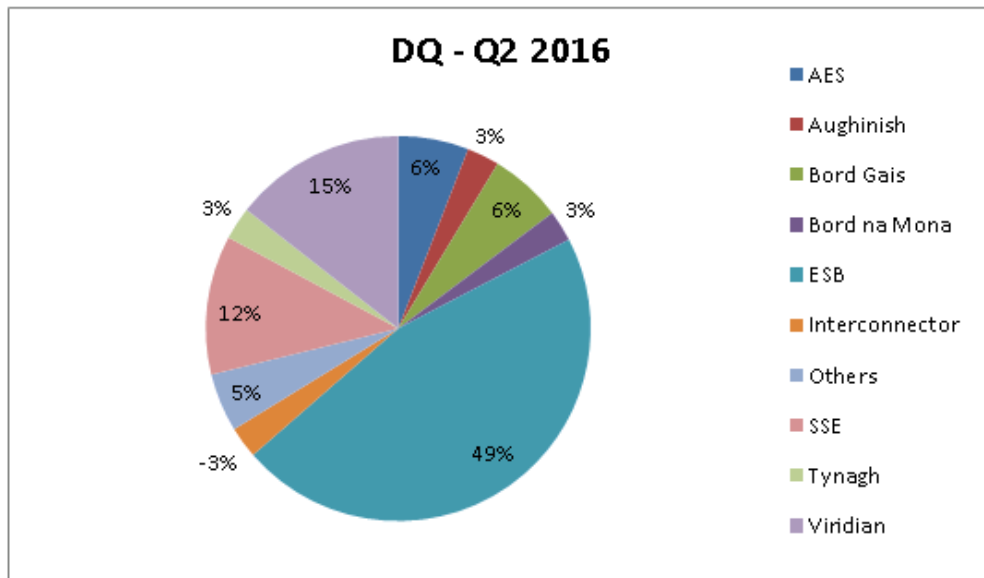


Figure 15b: Dispatch Quantity by generation owner
 Dispatch Quantity

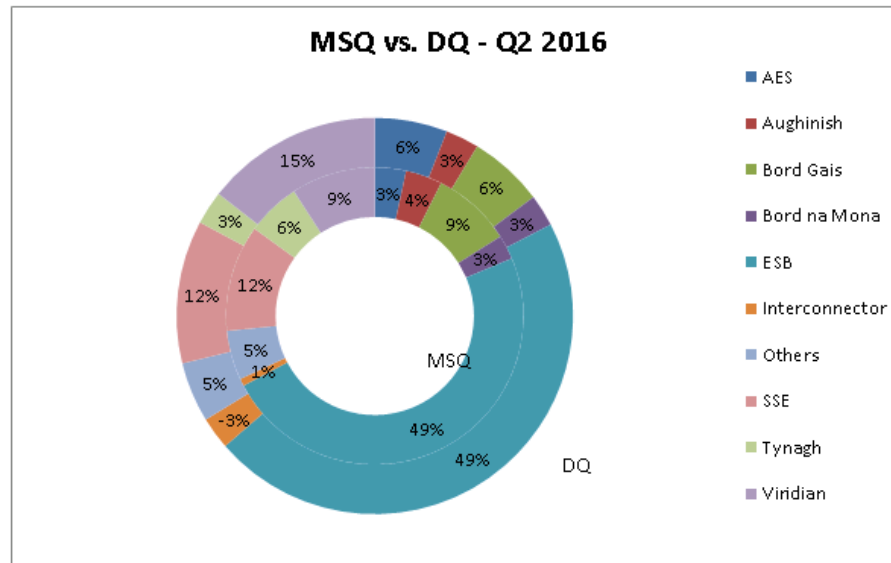


If there is a difference between the market schedule and the real-time dispatch the System Operators must dispatch generator units in real time under additional constraints not considered by the market engine. Transmission constraints and the need to provide reserve on the network are some of causes.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

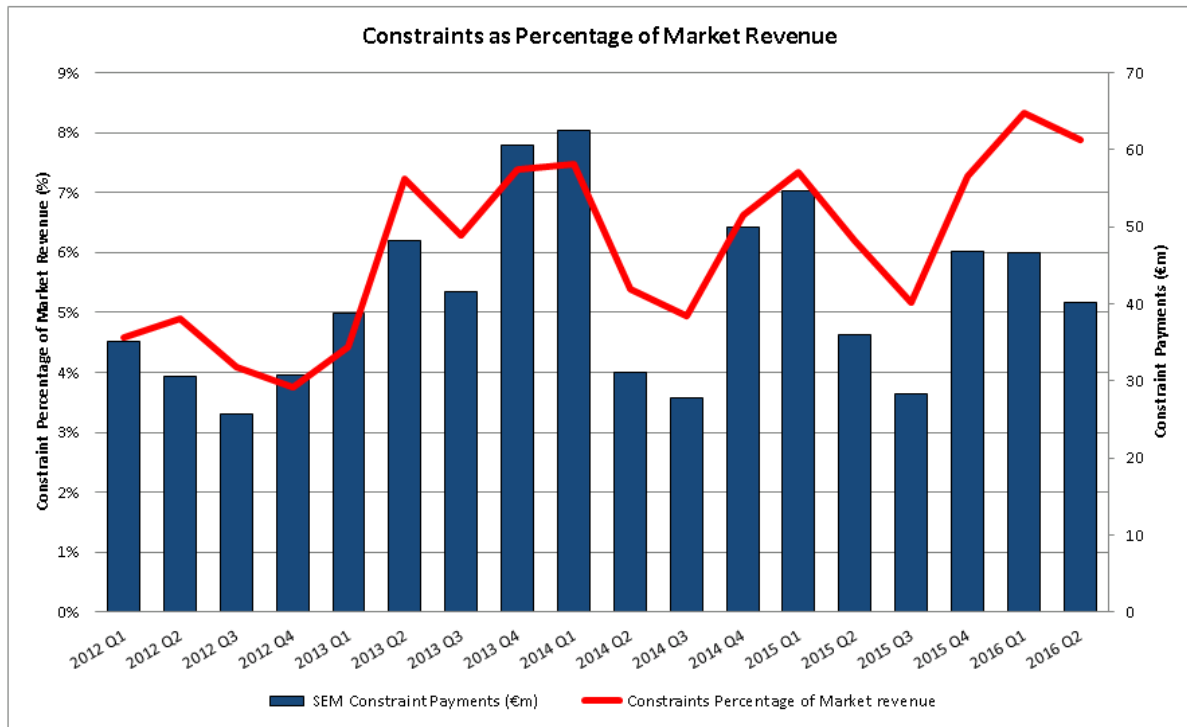
Figure 15c: Q4 2015 Dispatch Quantity versus Market

Owner	MSQ - Current Quarter	MSQ %	DQ - Current Quarter	DQ %
AES	529341	3%	993260	6%
Aughinish	618445	4%	458305	3%
Bord Gais	1349079	9%	1026001	6%
Bord na Mona	412959	3%	436880	3%
ESB	7567719	49%	7757449	49%
Interconnector	123855	1%	-443523	-3%
Others	836575	5%	822086	5%
SSE	1808664	12%	1961064	12%
Tynagh	911343	6%	459673	3%
Viridian	1426921	9%	2421580	15%
Total	15584902	100%	15892773	100%



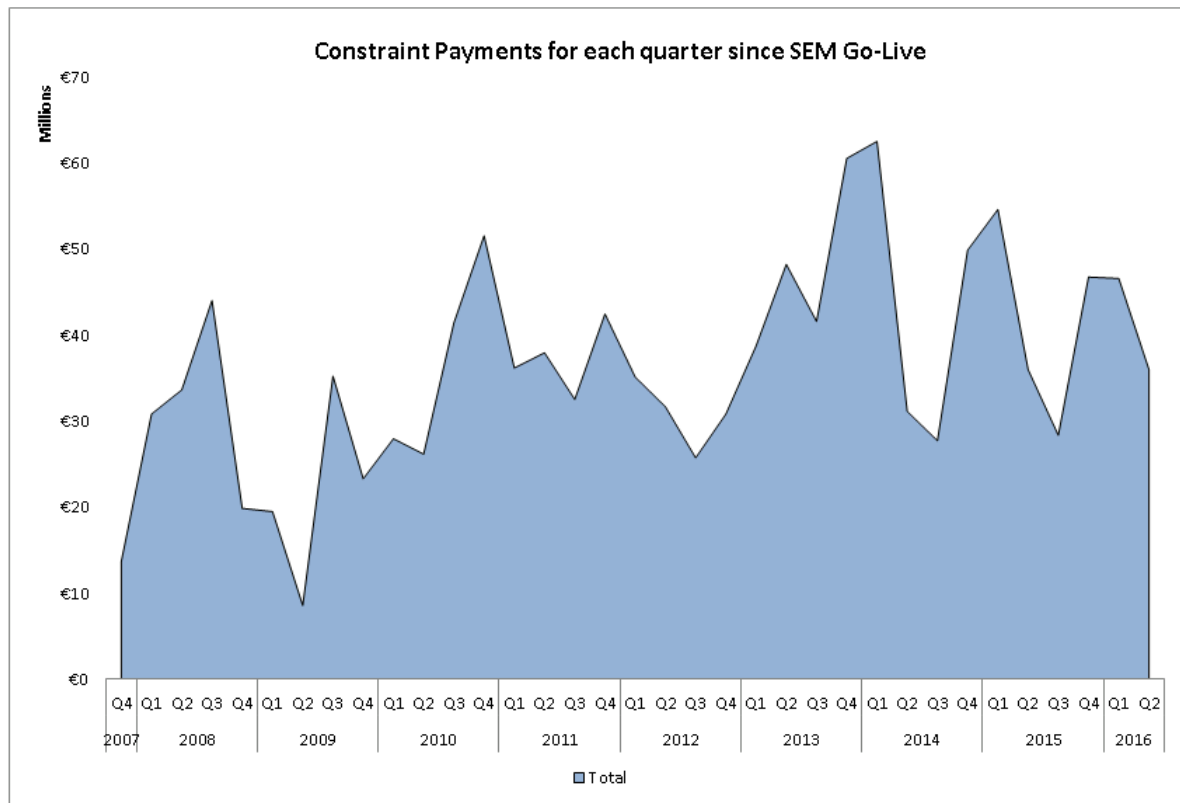
Constraint cost trends

Figure 16: Monthly Constraint Payments and Contribution to Total Energy Payments 2013 – 2016



In Q2 2016, constraints costs relative to energy payments were on average 8% which is equal to the Q1 2016 figure.

Figure 17: Total Quarterly Payments Q4 2007 – Q2 2016



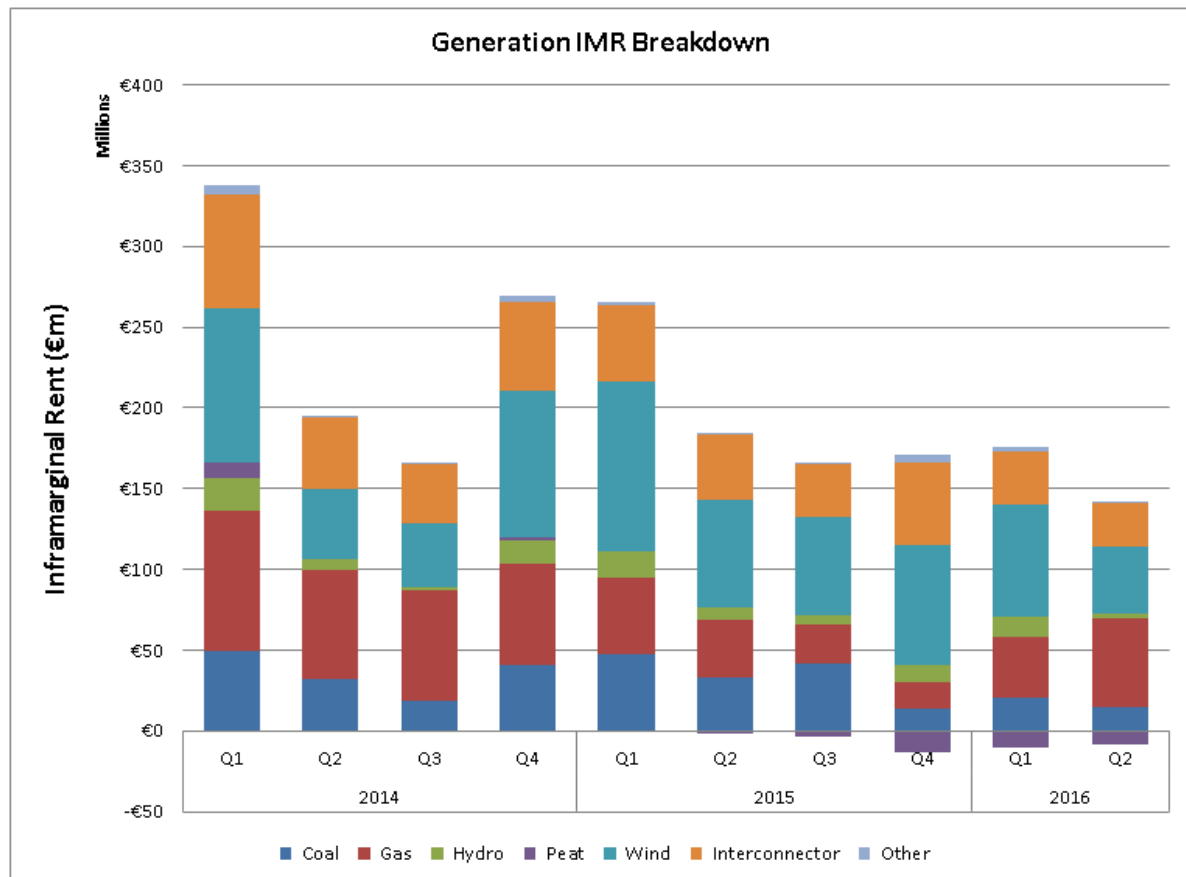
In Q2 2016 total constraints costs were around €40m. Over the last nine quarters, the peak quarterly Constraint Payment figure was that of Q1 2014 which stood at €63m.

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 18: 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 (Q2 2016), wind accounted for €41m of IMR which represents 34% of the total. As can be seen Peat under-recovers production costs during the quarter.

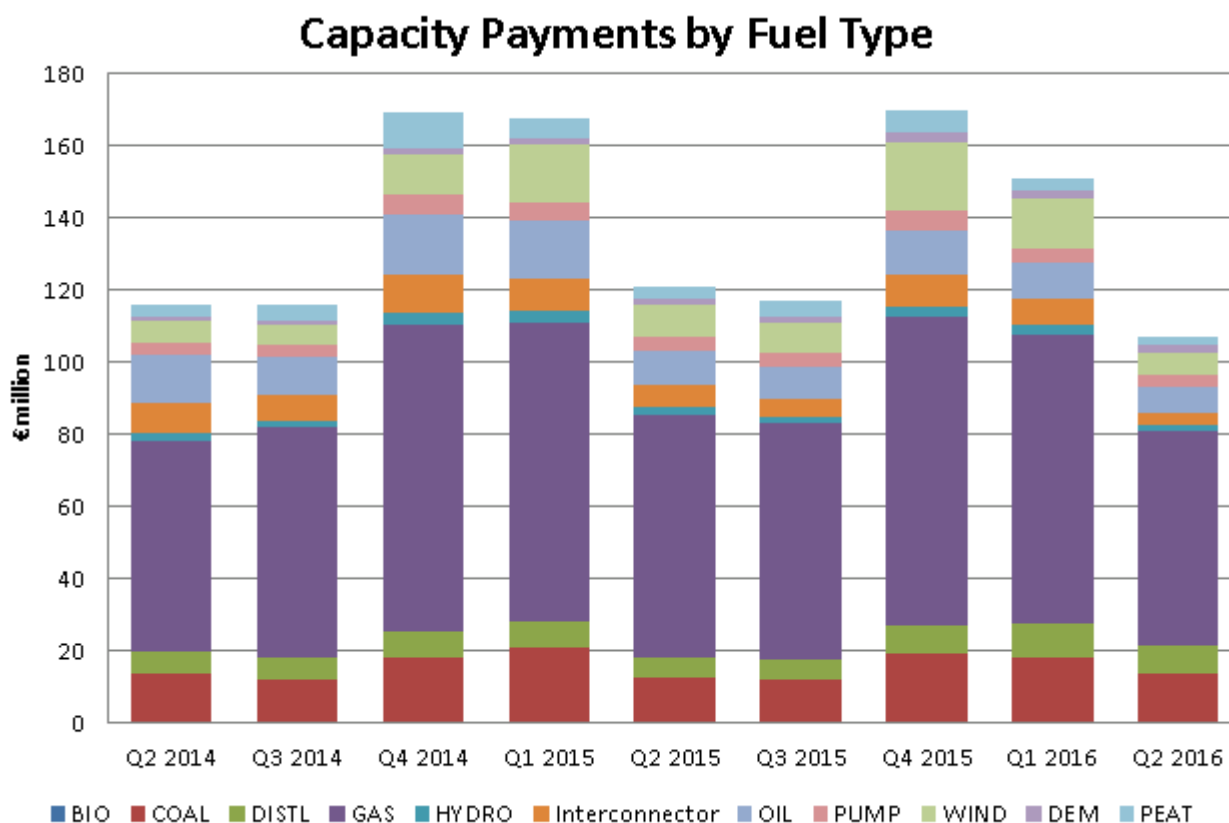
Interconnector IMR reduced from €32.5m in Q1 2016 to €27.2m in Q2 2016. The peak IMR figure was €70.6m in Q1 2014, wind in that quarter earned €96m.

Capacity revenues

All generators receive capacity payments when they are available. These are paid on a monthly basis from a predetermined Annual Capacity Payment Sum, which is €514m for the 2016 Trading Year.

The figure below shows the capacity payments by fuel type for each quarter since Q2 2014.

Figure 19: Quarterly breakdown of Capacity Payments by Fuel Type



The size of the capacity payments reflects both the availability and volume of installed MW capacity of each fuel type. As can be seen, gas generators are the largest recipient of capacity payments. This is because of their high levels of availability and the large volume of gas generation in the SEM.

Interconnector flows

The following figure illustrates the percentage of times in a month that the interconnector flows in the expected profitable direction (i.e. from Great Britain to the SEM if the SEM price is higher and vice versa).

Figure 20: Quarterly Interconnector flows in the profitable direction

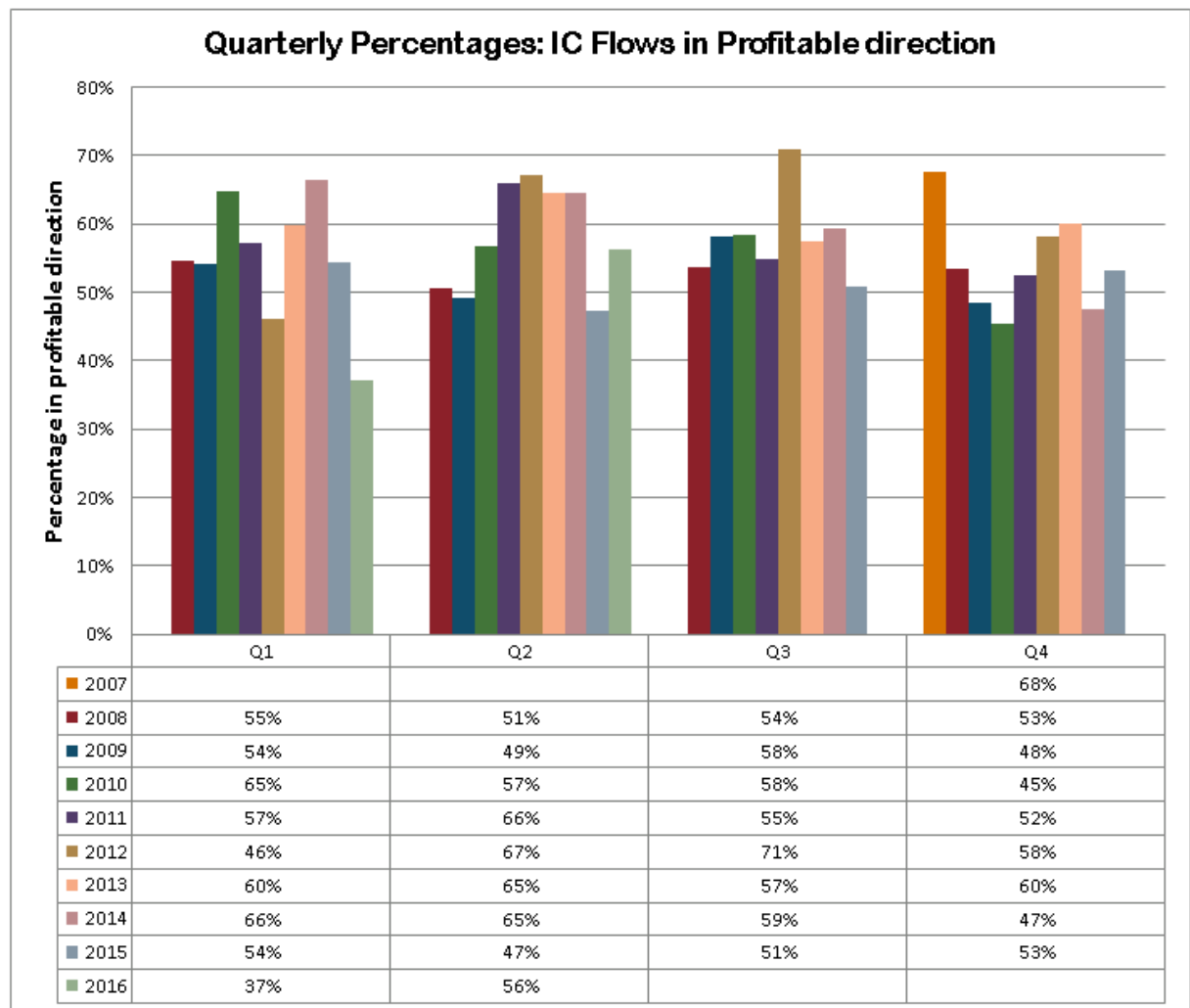
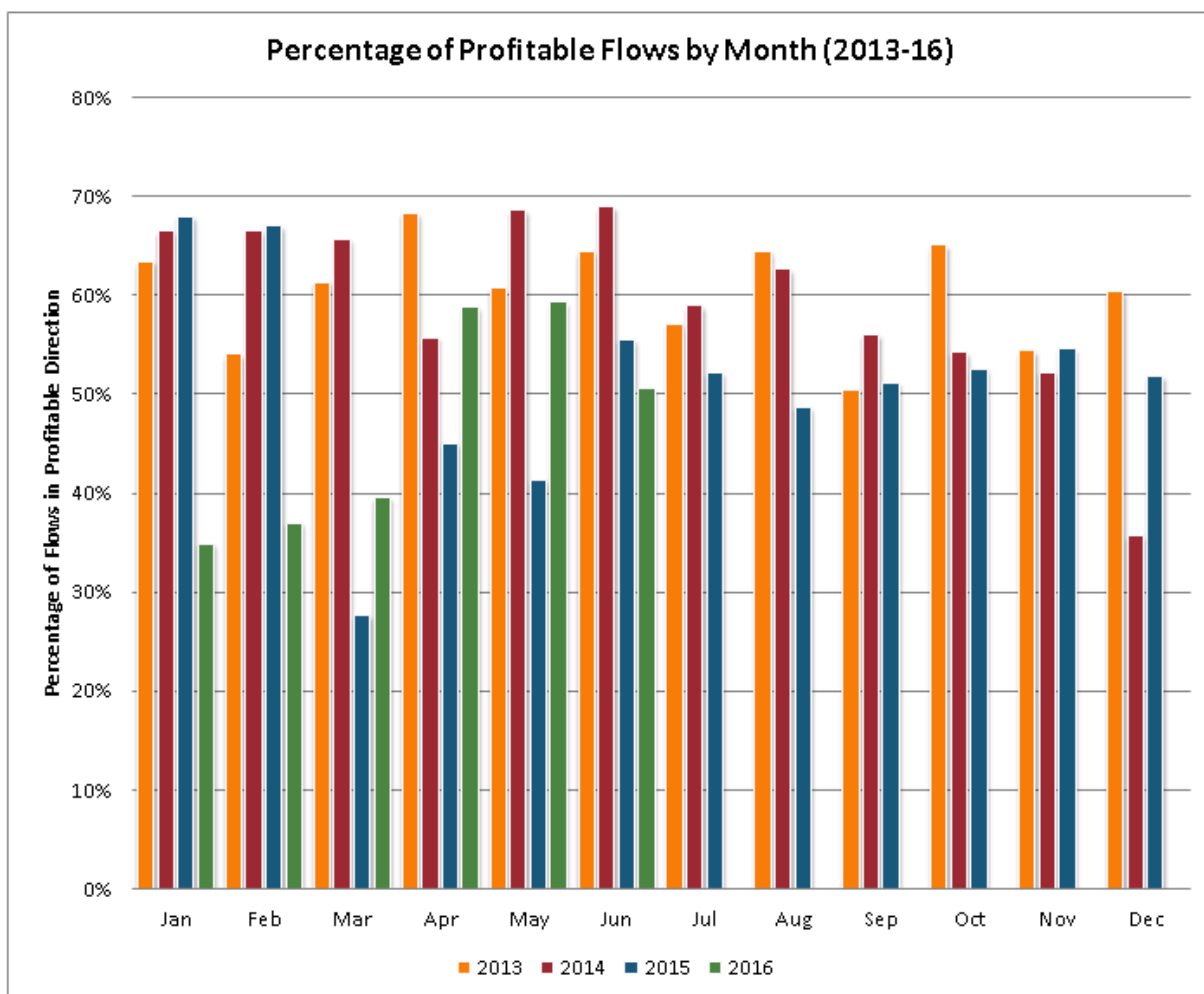


Figure 21: Monthly Interconnector flows in the profitable direction



The figure highlights that interconnector flows do not always flow in the expected profitable direction. There are a number of reasons behind this, including the fact that different structures currently exist in the two markets.

At present the market price in Great Britain is set using an ex ante price, whereas the SEM market is set using ex post prices.

The two sets of prices often differ, which exposes traders to varying degrees of risk. It is expected that these arrangements may change once the I-SEM has been implemented and there is further harmonisation of the markets.

On average the flow of energy in the profitable direction in the second quarter of 2016 was 56%.

Make Whole Payments (MWP) provide a top-up payment for SEM participants when they don't recover all of their production costs within a trading week. The purpose of MWPs is to provide the balance between total energy payments to a generator and the production cost of that generator on a weekly basis. These arrangements are set out in detail in the Trading and Settlement Code.

Figure 22: Make Whole Payments (weekly) Settlement Figures Nov 2007 – June 2016

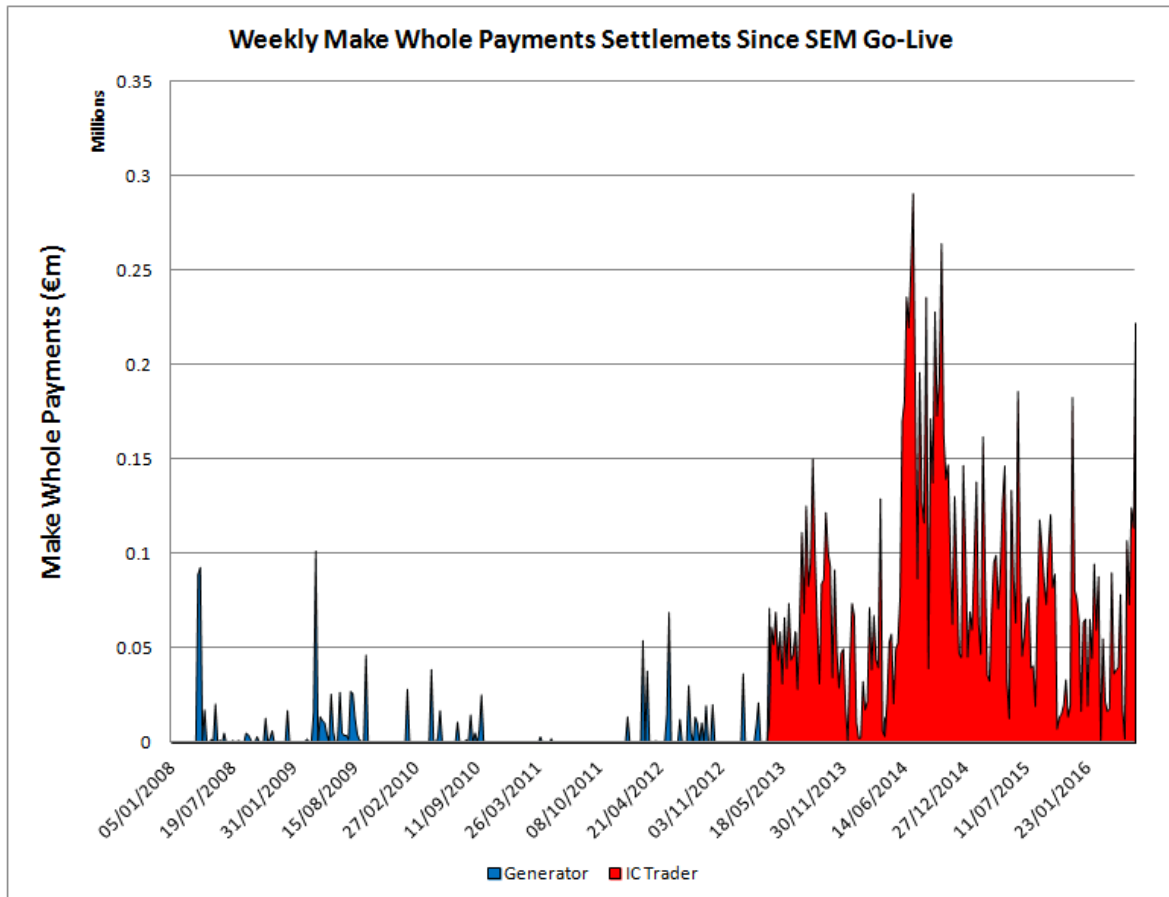
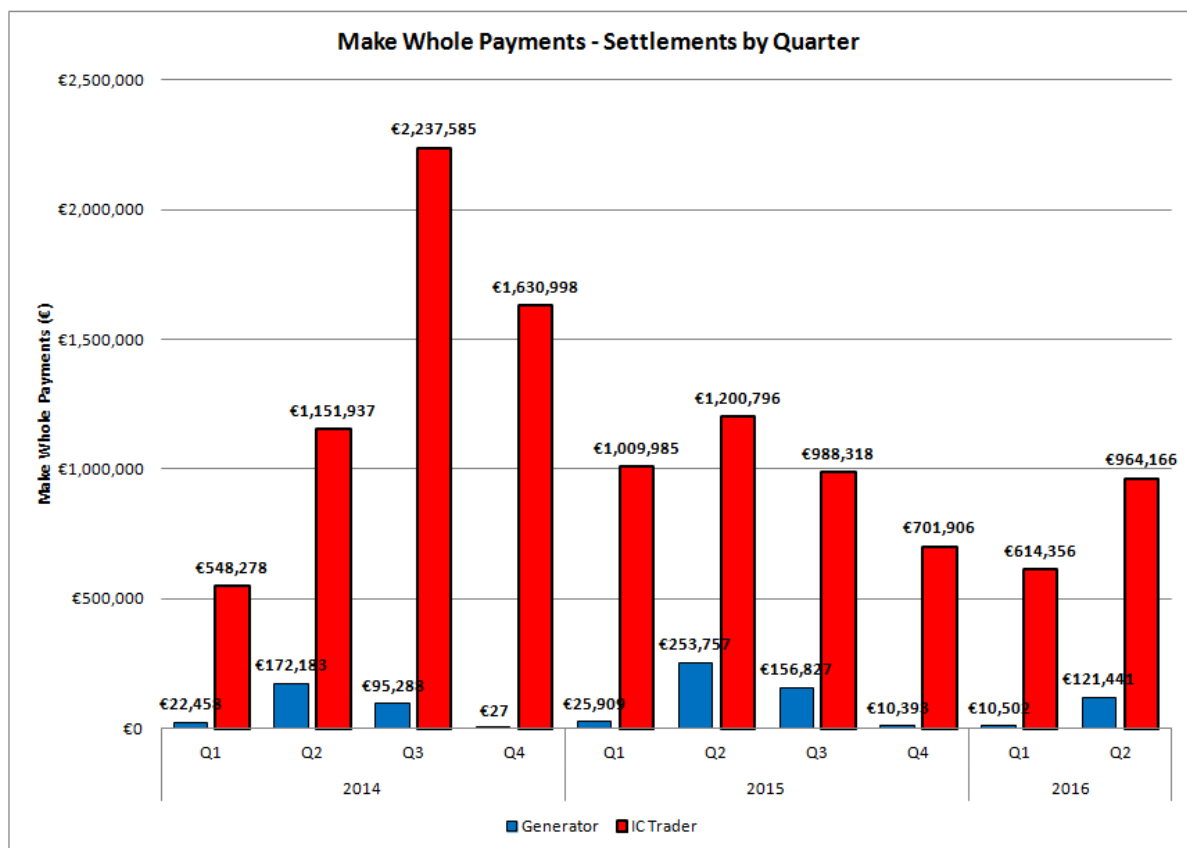


Figure 23: Make Whole Payments Totals by Quarter



The general trend of decreasing Make Whole Payments can be seen. The peak Make Whole Payment of €2.3m occurred in Q3 2015, since then MWP's have decreased a little before increasing to €1.09m in Q2 2016.

6. DIRECTED CONTRACTS

In November 2012 the regulatory authorities published an information note¹ 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 decision² 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 basis³ and instead to have rolling quarterly subscriptions. With the move to quarterly subscriptions, it is appropriate that information on the price and volumes of directed contracts should be provided on a more regular basis than the annual contracting report.

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 16 which was held in March 2016. Each subsequent quarterly price report will include the latest subscription results.

The contract volumes for 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 2017) will be sold over a year. The table below shows the proportion of the expected total directed contracts volumes that have been sold for those years to date.

Expected Volumes of DCs Offered to Date					
Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017
100%	100%	100%	75%	50%	25%

On average, the prices of directed contract baseload, mid-merit and peak products for 2017 sold to date are 10-14% lower than those sold for 2016, and 26-34% 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

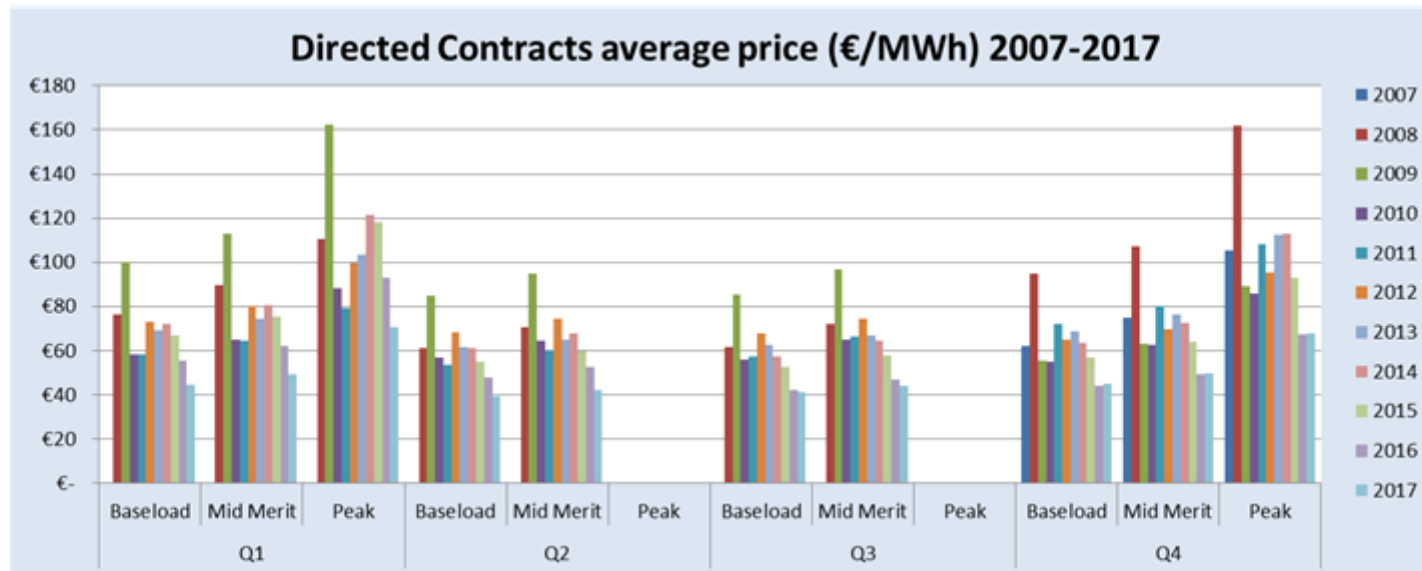
⁴ Directed Contracts Implementation for 2012/13 and Beyond – SEM/12/026

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	€ 39	€ 42		€ 41	€ 44		€ 45	€ 50	€ 68

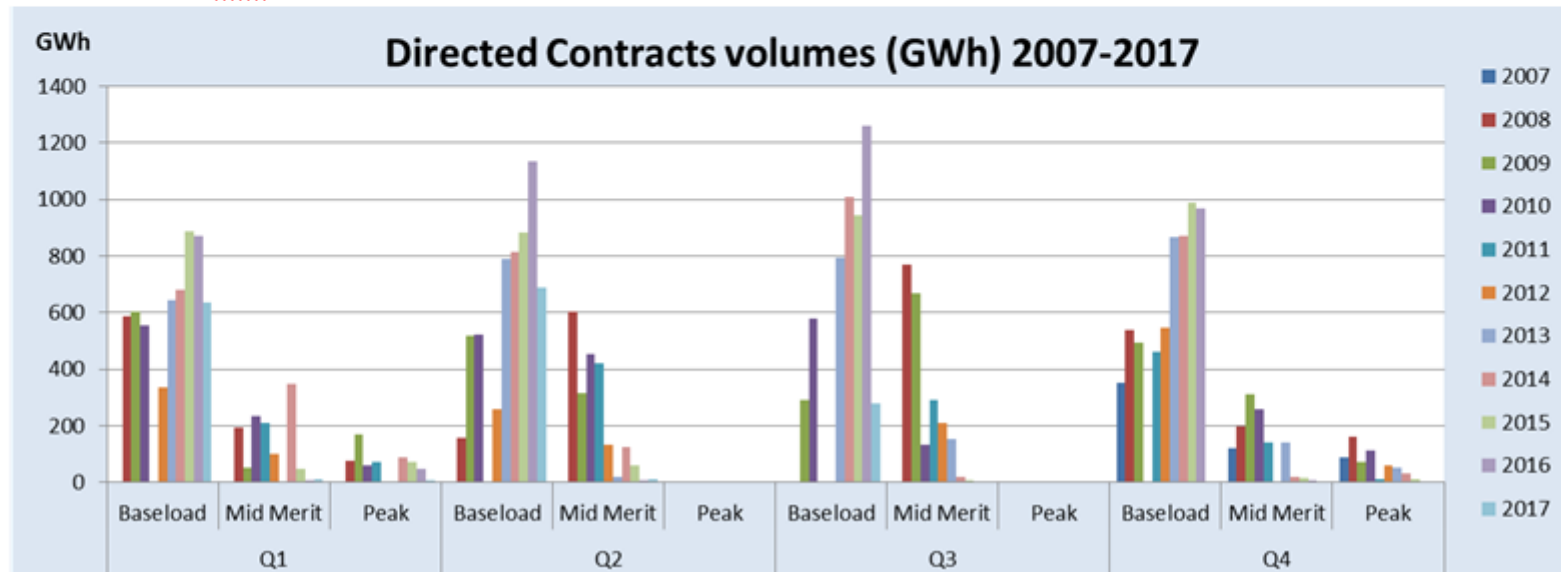
Directed contracts average price (€/MWh)



Directed contracts volumes (GWh), 2007-2017

DC Volumes (GWh), 2007-2017													
Year	Q1			Q2			Q3			Q4			Total TWh
	Baseload	Mid Merit	Peak	Baseload	Mid Merit	Peak	Baseload	Mid Merit	Peak	Baseload	Mid Merit	Peak	
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		1,154	7	-	4.49
2017	638	11	7	689	11		280	-		-	-	-	1.64

Directed contracts volumes (GWh)



7. ACRONYMS

AA	Actual availability
DQ	Dispatch quantity
BETTA	British Electricity Trading and Transport Arrangements
ESB PG	Electricity Supply Board Power Generation
EWIC	East West Interconnector Company
GB	Great Britain
IMR	Infra marginal rent
I-SEM	Integrated Single Electricity Market
MLH	Material level of harm
MSQ	Market scheduled quantity
NI	Northern Ireland
Power NI Energy PPB	PowerNI Energy Power Procurement Business
PQ	Price quantity pair
ROI	(Republic of) Ireland
SEMO	Single Electricity Market Operator
SMP	System marginal price
TSOs	Transmission system operators