The Single Electricity Market: Market update (July - September 2014)

SEM-15-003

January 2015

1. CONTENTS

2. INTRODUCTION

The Single Electricity Market (SEM) is the term that is used to describe the electricity market for the whole 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 around 60% of customers' bills.

The report was prepared by the Market Monitoring Unit. The unit's role is to investigate the exercise of market power, monitor compliance of market participants with the Bidding Code of Practice and other market rules, and review market prices.

The report is structured in three sections:

1. An overview of how the market works and key trends
2. Detailed market information
3. 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.

We intend to publish this report on a quarterly basis. Any feedback or comments that stakeholders may have should be emailed to brian.mulhern@uregni.gov.uk.

3. OVERVIEW

1. **Wholesale costs:** Overall, wholesale electricity costs during the third quarter of this year (Q3 2014) were slightly lower than those in the second quarter of 2014. The slight decrease in costs was largely driven by slightly lower energy and constraints costs in the quarter.

2. **System Marginal Prices (SMP):** Average monthly SMP costs in Q3 2014 increased from slightly under €48/MWh in July 2014 to slightly under €59/MWh in September 2014. A key factor in this increase was increasing wholesale gas prices. Average monthly demand also increased throughout the period.

3. **SEM prices:** SEM prices have continued to follow a similar trend to those in the market in Great Britain (BETTA) and wholesale gas prices.

4. **SEM demand and price levels:** There exists a high correlation between the level of demand and the energy price in the SEM.

5. **Fuel mix:** Gas continues to be the dominant fuel in the SEM, contributing 57% of the fuel mix in Q3 2014. However the overall share of gas in the fuel mix over the past two years has seen a gradual erosion from increasing proportions of energy being provided by wind power and through the interconnector units that connect SEM to BETTA in Great Britain.

6. **Constraint levels:** There has been a steady increase in the cost of constraints in the SEM over the past two years. This can be attributed to a number of reasons that are discussed later in the report. That being said, there has been a reduction in levels throughout Q3 2014 when compared to both the same period in 2013 and Q2 2014.

7. **Directed contracts:** On average, the base load prices for directed contracts in 2014 are marginally lower than those in 2013 (around 3%), while the mid merit and peak prices for the same period are on average higher by 2% and 7% respectively.

4. HOW THE MARKET WORKS AND KEY TRENDS

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. **Breakdown of the SMP:** SMP can be broken down into two main areas - the shadow price and uplift. This section looks at the impact of changes in these two areas on the SMP price for Q3 2014.

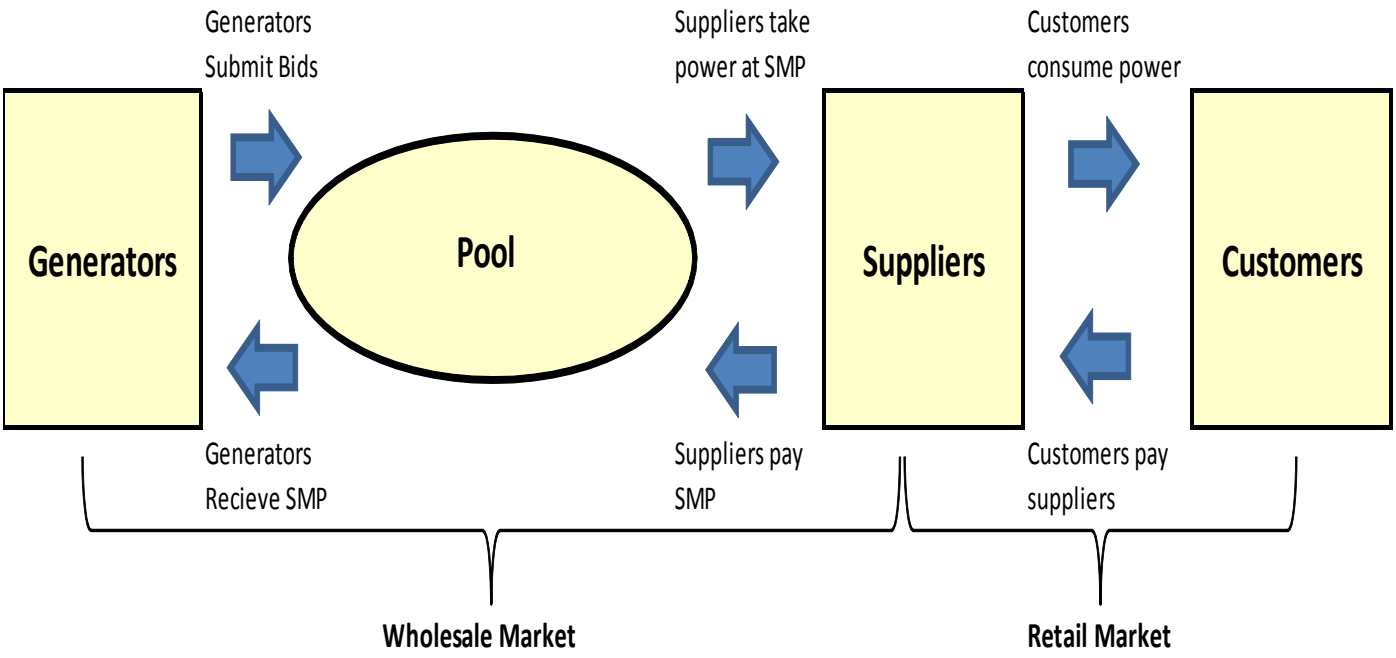
6. **Fuel mix:** This section outlines the changes in the type and proportion of fuels that were used for generation over the previous nine quarters.

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.

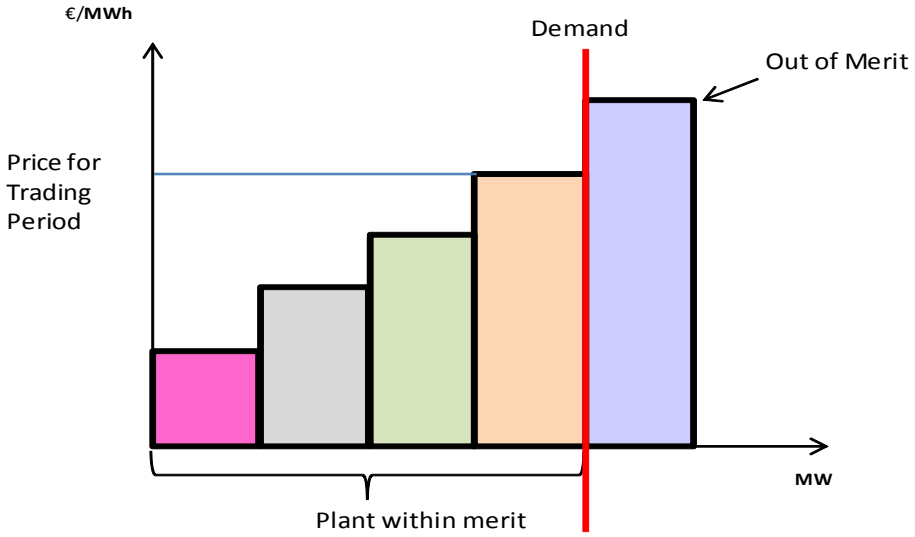
Figure 1: Market Overview



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

The SMP, or market price, is determined for each half hour period, based on bids received from generators and customer demand. The SMP is worked out by the Single Electricity Market Operator (SEMO) using complex computer algorithms. Bids that are submitted by the generators are stacked in order, starting with the least expensive, until demand is met. The SMP, or market price, is then set so that it equates to the price offered by the final generator that needs to be used in order to meet demand (the marginal generator). This process is illustrated in figure2.

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 run. 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 up' or 'constrained down'. Generators that are constrained down will pay back a constraint payment and those that are constrained up will receive a payment. This ensures that generators are financially neutral for any differences between the market schedule and actual dispatch.

Administration of the market is carried out by the Single Electricity Market Operator (SEMO). This includes payment to generators and the invoicing of suppliers. The cost of operating SEMO forms part of the wholesale costs although this is a relatively small contributor to costs so is not covered in this report.

Electricity prices

The electricity prices that consumers pay are made up of a number of different charges. These can be broken down into three main broad categories:

- wholesale costs (around 60%),
- network costs (around 30%), and
- supplier costs (around 10%).

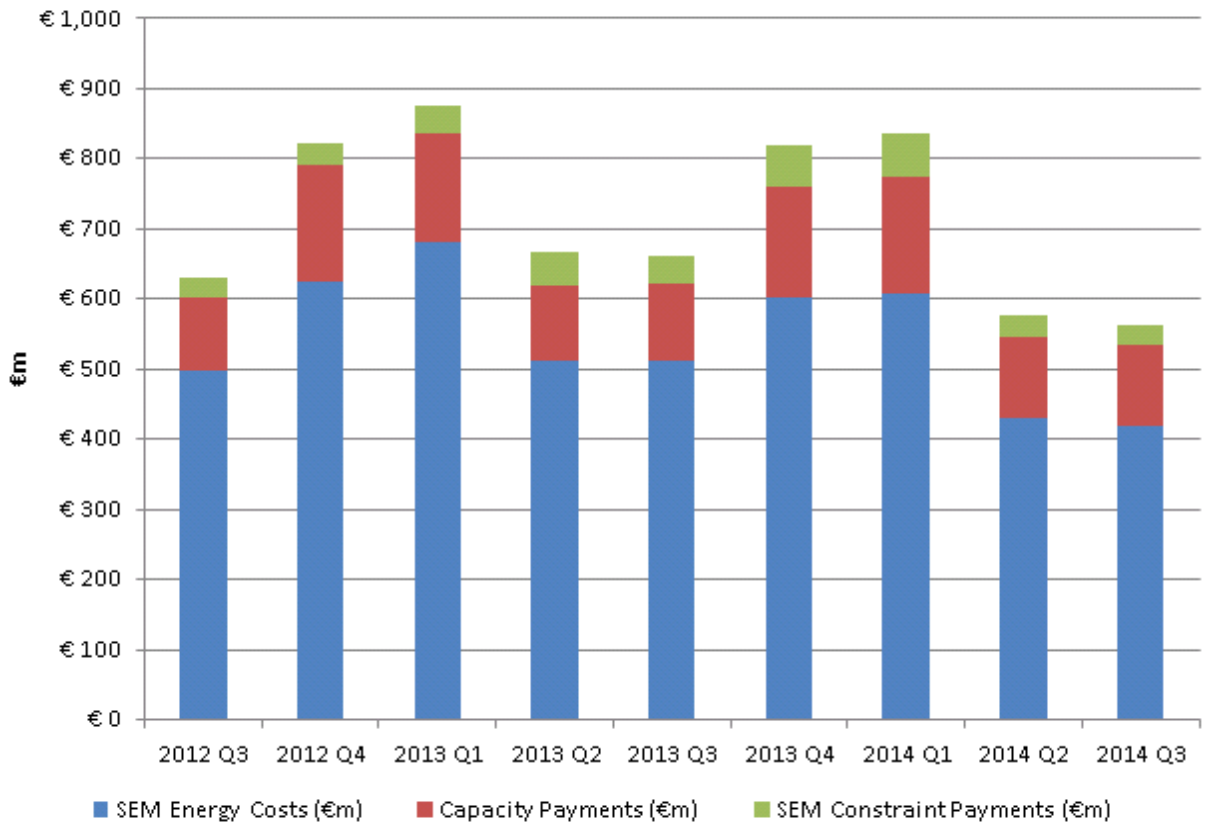
This report focuses on the wholesale element of electricity prices.

The main elements of the SEM wholesale costs are:

- energy costs – these are the costs that are paid to generators for producing electricity;
- capacity costs – these are the costs that are paid to generator companies that are available to generate if requested;
- imperfections costs (or constraints) – these costs are largely associated with network and system constraints.

The graph below gives a breakdown of these costs over the previous nine quarters.

Figure 3: Breakdown of Wholesale Electricity Prices



Energy costs are the largest element of the overall wholesale cost. In the third quarter of 2014, 74% of total wholesale costs were attributable to energy costs. The main driver behind the cost of energy is the price of fuel. As gas is the most common form of fuel that is used to generate electricity in the SEM, the wholesale gas price has a significant impact on energy costs. Other key factors include the level of demand, the volume of wind generation, coal prices, carbon prices, generation plant availability and interconnector flows from Great Britain.

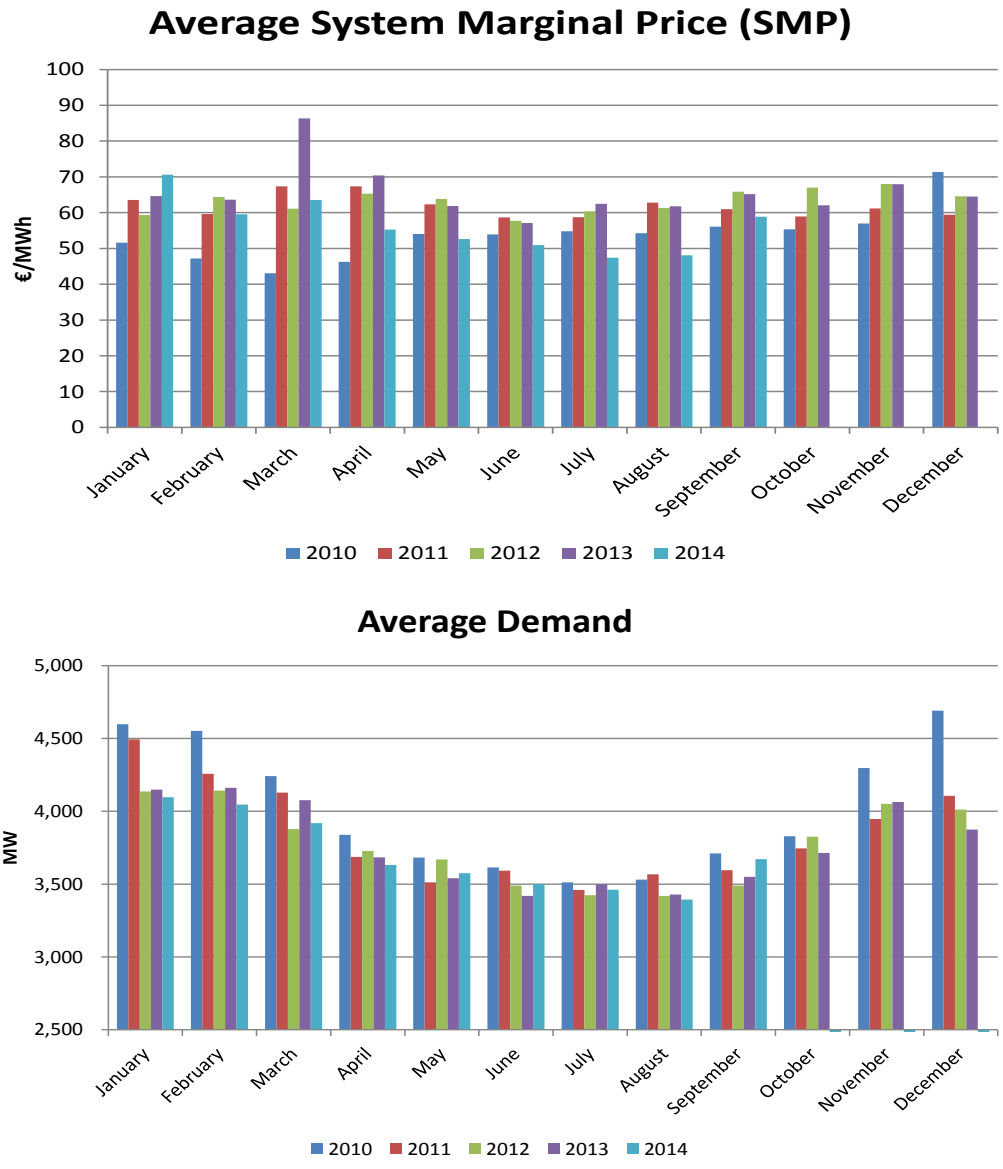
System Marginal Price and Demand trends

Average SMP during the third quarter in 2014 has increased from slightly under €48/MWh in July to slightly under €59/MWh in September.

Levels of demand throughout the third quarter in 2014 have increased from an average of around 3500 MW in July to over 3650 MW in September.

The following figures show the average monthly SMP and the demand recorded in the SEM since 2010.

Figure 4: System Marginal Price and Demand in the Single Electricity Market 2010 - 2014



[1]

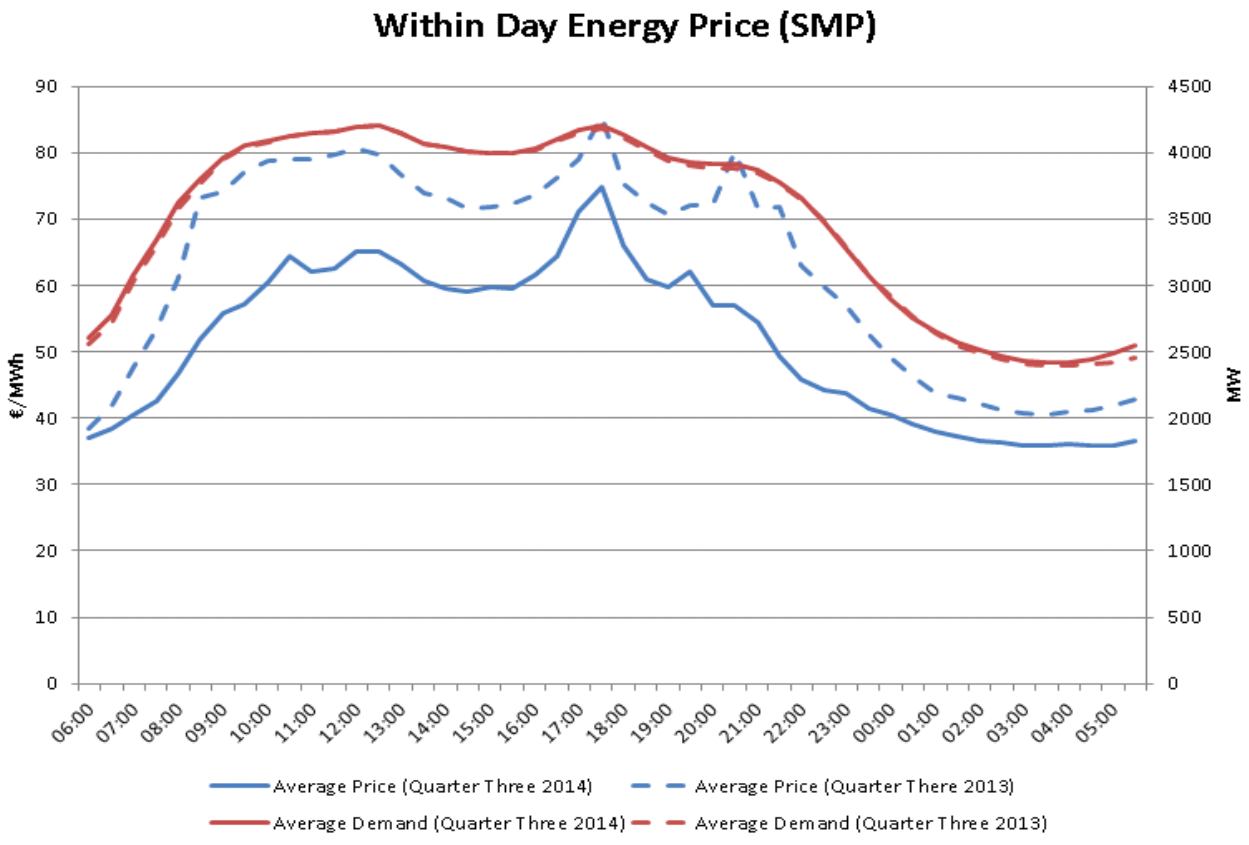
[1] Average Demand is based on Total MSQ for each Month

Within day energy prices

The following figure shows the average 'within day' profile of the generation price over the most recent quarter (Q3 2014) and Q3 2013, as well as the average electricity demand. The within day price is usually highest between the hours of 4pm - 6pm, when electricity demand is at, or near, its highest.

Demand levels observed in 2014 are nearly identical to those in 2013, and display the same patterns. However prices have been observed to be consistently lower in each period in 2014.

Figure 5: Average System Marginal Price Profile Comparision



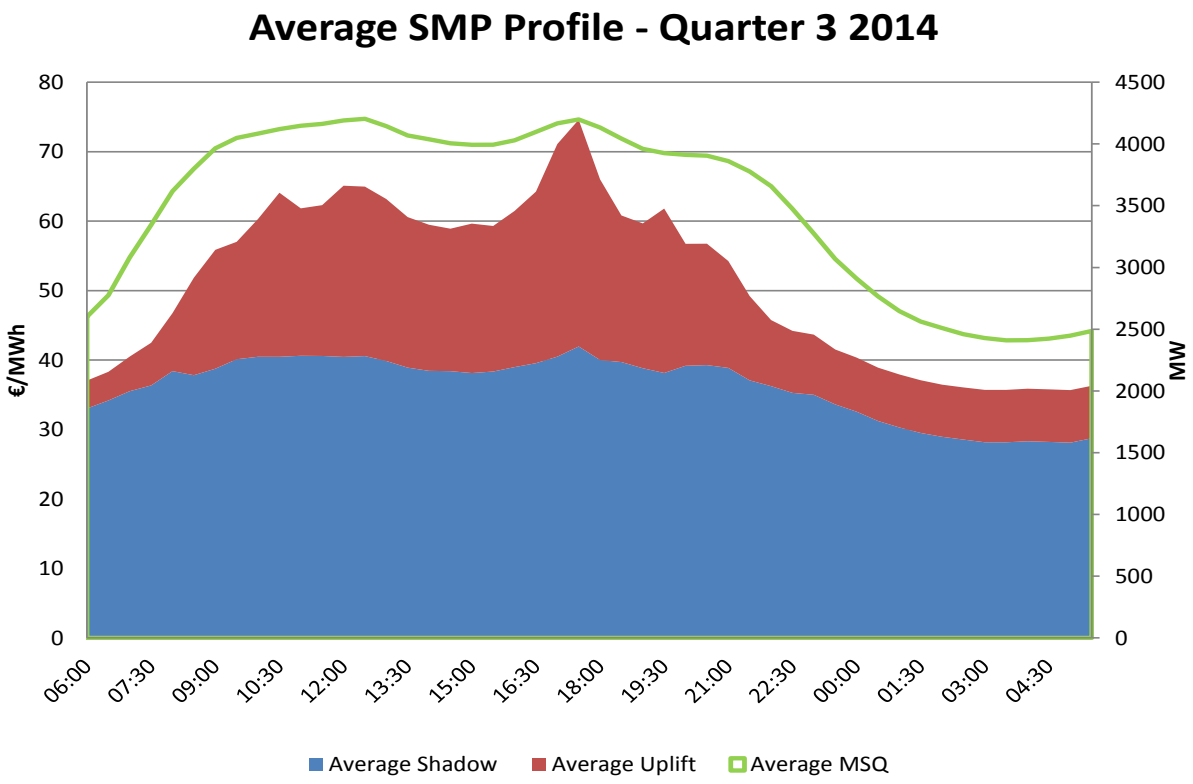
Analysis of the System Marginal Price

The SMP is made up of the following main components:

- The shadow price reflects the marginal cost of the most expensive generator that is scheduled by SEMO. This makes up the majority of the SMP.
- Uplift costs relate to a generator's start up costs and its 'no load' costs (i.e. production costs that do not vary with the level of output). Uplift costs are only incurred if the generator has not recovered these costs through the shadow price received over the period in which it was scheduled.

The figure below shows the average SMP profile, broken down by shadow price and uplift for the previous quarter.

Figure 6: Average System Marginal Price profile during Q3 2014



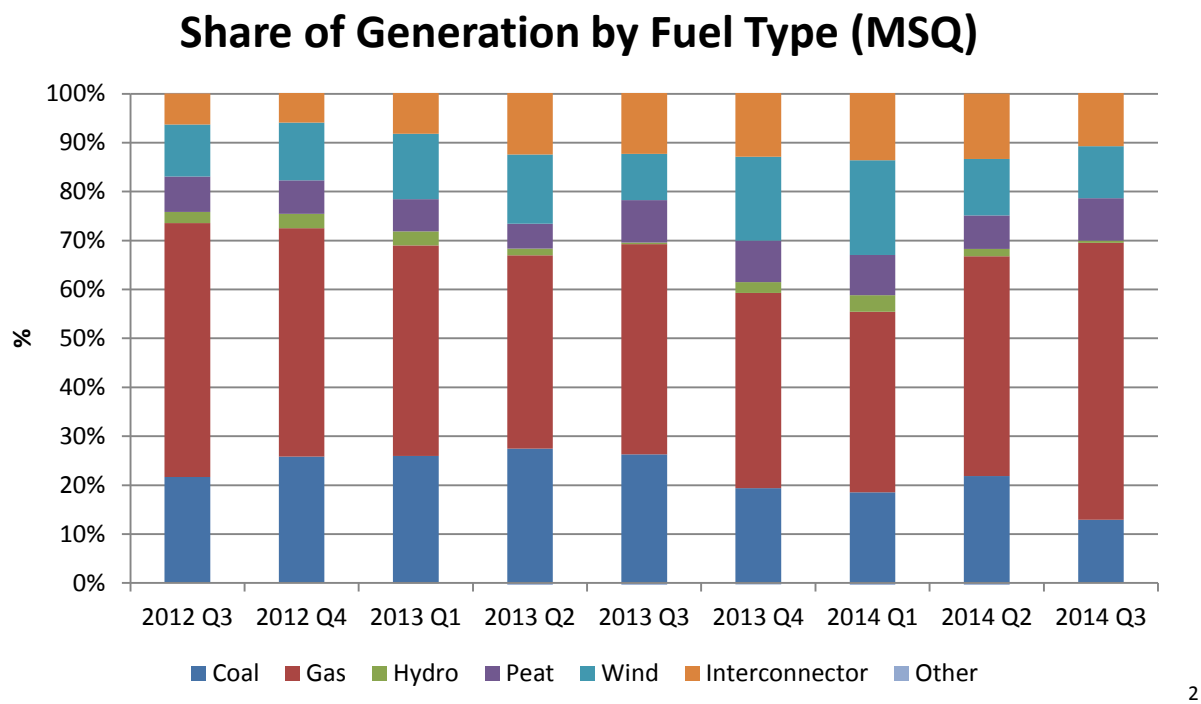
Share of generation by fuel type (fuel mix)

The most common fuel that is used for electricity production in the SEM is gas. The figure below shows the average percentage of generation by each fuel type in each quarter since the third quarter of 2012.

A number of trends can be observed.

- In Q3 2012, gas represented 52% of the fuel mix. This has risen to 57% in Q3 2014.
- The share of fuel provided by interconnector units also increased over the same period, standing at 6% in Q3 2012, rising to 11% in Q3 2014.
- Conversely, the share of fuel provided by wind and coal units decreased between the two periods. However, for wind in particular, this does represent the trend observed over the two year study period.
- The proportions of peat and hydro in the fuel mix have remained generally constant over this period.

Figure 7: Fuel Fix in the Single Electricity Market Q3 2012 – Q3 2014



[2]

[2] The term wind does not include wind farms below the SEM de-minimis threshold of 10MW which are not included in the SEM

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 (MSQ[3]) and dispatch quantity (DQ[4]) 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.

[3] MSQ is the quantity of output of all generators in each trading period before the adjustment is made for transmission losses (as calculated by the MSP software).
[4] DQ is the level of active power dispatched by the relevant transmission system operator in each trading period.

Dashboard

The following section aims to show how the market has behaved over the previous nine quarters.

Figure 8: Single Electricity Market quarterly dashboard

Quarterly Averages	Q3 2012	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014	Q2 2014	Q3 2014	Change From last Quarter	Last 12 months (Q3 2013 - Q2 2014)	Previous 12 months (Q3 2012 - Q2 2013)
SMP €/MWh	62	67	72	63	63	65	65	53	51	↘	61	66
% Change from previous Quarter	0%	7%	8%	-12%	0%	3%	0%	-18%	-3%			
% Change from Quarter, previous year	2%	11%	16%	1%	1%	-2%	-10%	-16%	-18%			
Margin MW	5105	5552	5245	5421	5337	5536	5479	5073	5031	↘	5356	5330
% Change from previous Quarter	9%	9%	-6%	3%	-2%	4%	-1%	-7%	-1%			
% Change from Quarter, previous year	12%	15%	12%	16%	5%	0%	4%	-6%	-6%			
Demand MW	3444	3959	4132	3547	3492	3884	4021	3567	3506	↘	3741	3771
% Change from previous Quarter	-5%	15%	4%	-14%	-2%	11%	4%	-11%	-2%			
% Change from Quarter, previous year	-2%	0%	2%	-2%	1%	-2%	-3%	1%	0%			
Actual Availability MW	8549	9511	9377	8968	8829	9421	9500	8640	8537	↘	9098	9101
% Change from previous Quarter	3%	11%	-1%	-4%	-2%	7%	1%	-9%	-1%			
% Change from Quarter, previous year	6%	8%	7%	8%	3%	-1%	1%	-4%	-3%			
Shadow €/MWh	46	50	53	44	44	46	47	37	36	↘	44	48
% Change from previous Quarter	1%	8%	6%	-18%	2%	4%	2%	-21%	-3%			
% Change from Quarter, previous year	3%	10%	14%	-5%	-4%	-8%	-11%	-15%	-18%			
Uplift €/MWh	16	16	19	20	19	19	18	16	15	↘	18	18
% Change from previous Quarter	-4%	4%	13%	5%	-3%	-1%	-6%	-11%	-3%			
% Change from Quarter, previous year	0%	14%	22%	18%	19%	14%	-5%	-20%	-20%			
Interconnector (Total)	219	245	355	449	443	513	552	439	346	↓	486	317
Moyle			205	190	111	197	244	128	65			
EWIC			150	259	331	315	307	311	281			
% Change from previous Quarter	-32%	12%	45%	27%	-1%	16%	8%	1%	-10%			
% Change from Quarter, previous year	91%	-	71%	39%	102%	109%	55%	20%	-15%			
Wind MW (produced)	368	468	555	502	330	666	783	410	371	↓	547	473
% Change from previous Quarter	-3%	27%	19%	-10%	-34%	102%	18%	-48%	-9%			
% Change from Quarter, previous year	-3%	-35%	-4%	32%	-10%	42%	41%	-18%	12%			

Note: The wind figures presented in this table do not cover production from wind farms which do not sell into the SEM.

Commentary

- The average SMP during Q3 2014 was €51/MWh, €2/MWh lower than in Q2 2014. It also fell by 18% between Q3 2013 and the same quarter in 2014.
- Levels of demand have remained generally stable over the past nine quarters, with the usual seasonal fluctuations being observed.
- There exists a considerable margin of available plant over and above demand levels throughout the previous nine quarters.
- The shadow price has decreased slightly over the past quarter, falling from €37/MWh in Q2 2014 to €36/MWh in Q3 2014.
- Uplift has seen a slight reduction over the past quarter. Average uplift in Q2 2014 was €16/MWh, reducing to €15/MWh in Q3 2014, a decrease of 3%.
- A steady increase in interconnector flows has been observed over the previous nine quarters. This is mainly because the capacity available has increased during the period with the commissioning of the East-West Interconnector (EWIC). Price differentials between the SEM and BETTA have also contributed to increasing levels of imports into the SEM.
- Levels of Interconnector usage decreased by 9% in Q3 2014 due to a scheduled outage on the Moyle Interconnector.

Energy price trends

Energy prices in the SEM are predominantly made up by the SMP in any period. This in turn comprises two components – the shadow price and uplift. The monthly SMP since July 2012, broken down by these two elements, is shown below.

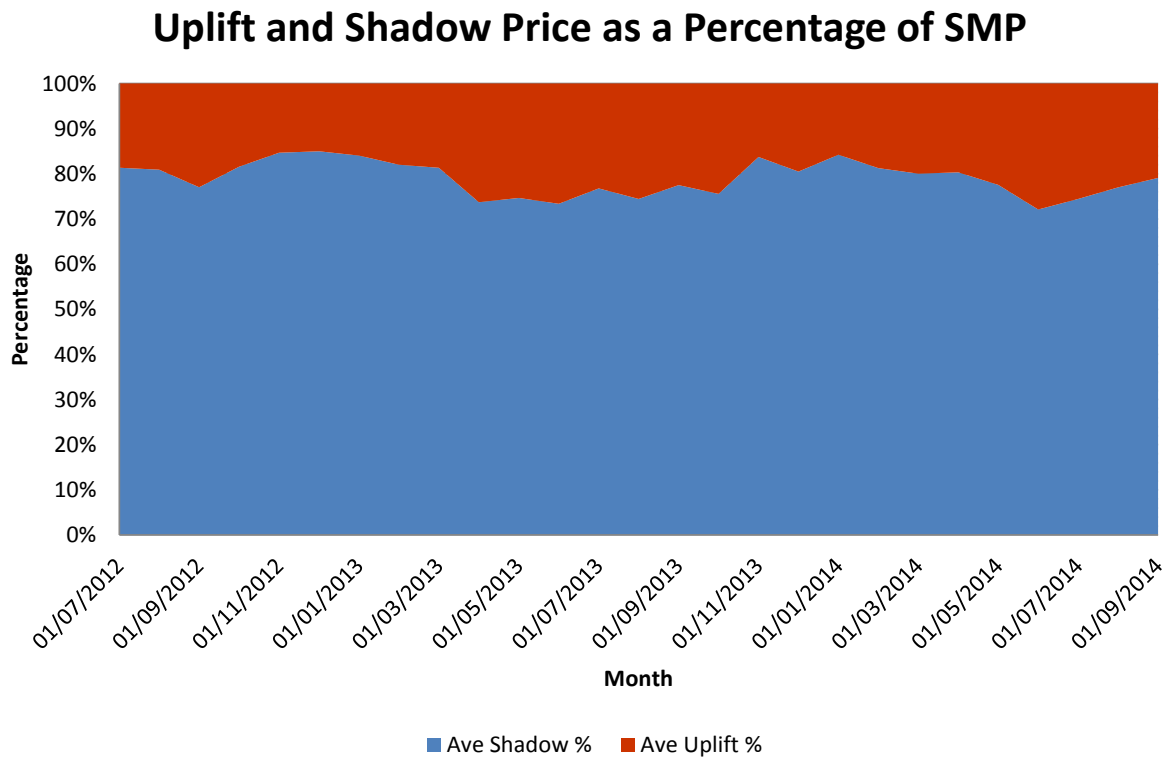
From the figure we can see that the proportion of uplift has increased over the period. This can be attributed to a number of factors.

Since April 2012, increasing levels of wind energy coming onto the network have meant that fewer thermal generators need to be scheduled. This has pushed more expensive units out of the merit order and reduced the shadow price. Higher levels of wind production have also resulted in generators being scheduled for shorter periods, increasing the levels of uplift.

Demand levels have also decreased slightly in the market. As a result, fewer generator units are being scheduled during the period to meet demand. This can result in the need for additional unit(s) being required for short periods throughout the day to cover times of peak demand.

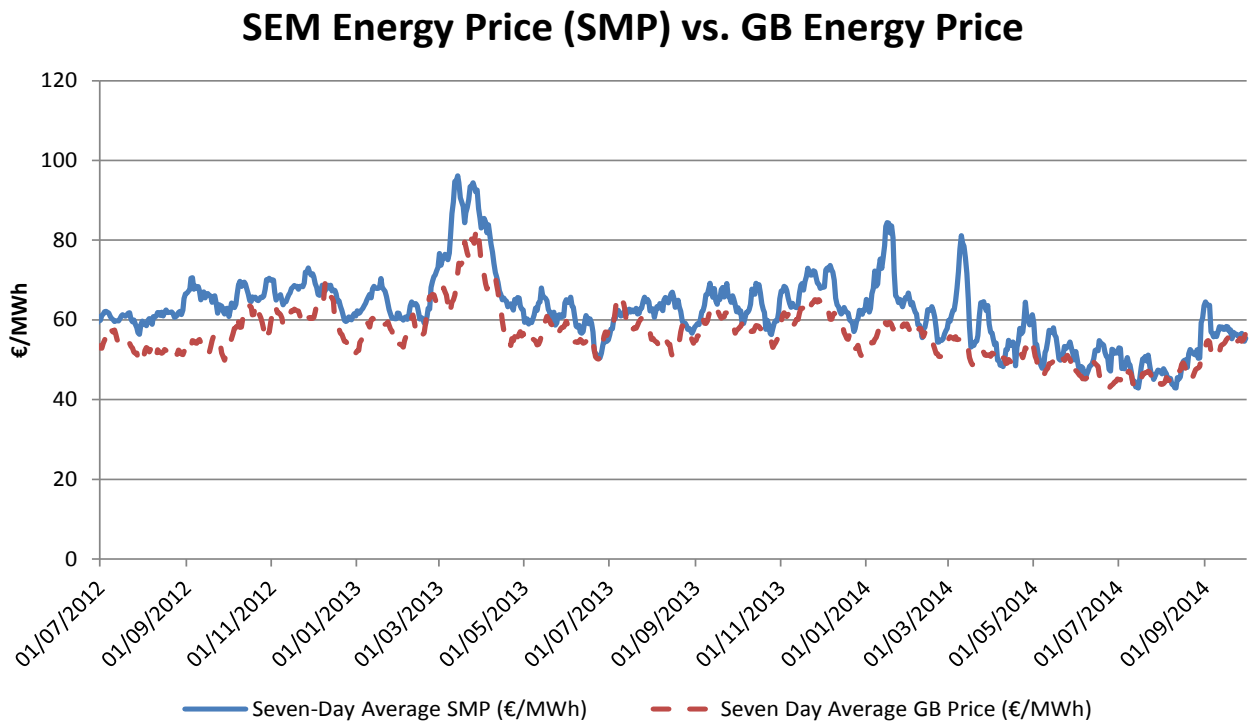
Overall, there are a number of interrelating factors that will result in increasing levels of uplift that ensure that generators recover their start up and no load costs.

Figure 9: Average monthly Uplift



The two interconnectors that operate in the SEM (Moyle and EWIC) are both connected to the network in Great Britain (BETTA).

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



The figure above explores prices in the SEM and BETTA. SEM prices do not include capacity payments made to generators. The profile and trend of historic market prices in both markets is broadly similar, and there is a high degree of correlation between the two. This gives confidence that SEM prices are not unreasonable. However, they have been shown to be consistently higher over the period.

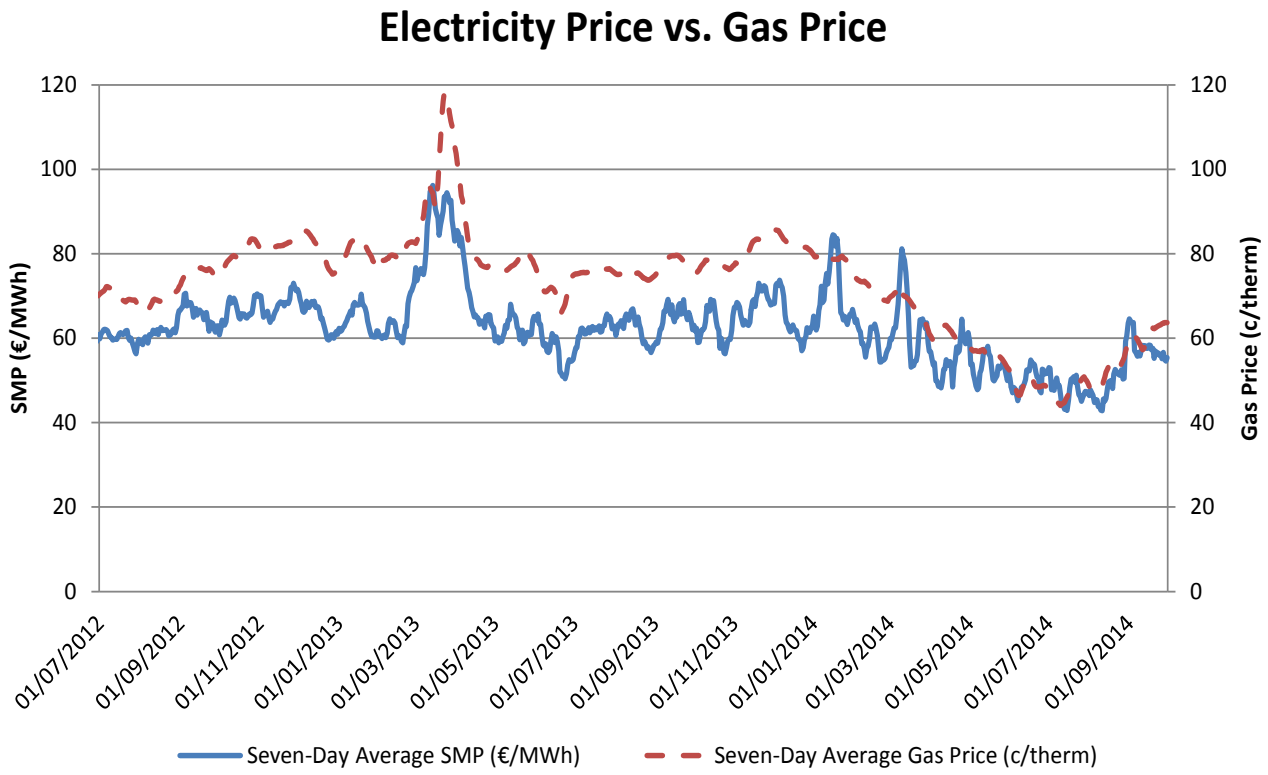
There are a number of reasons for these higher costs. The first is the generation mix that exists in the two markets. In BETTA there is a higher percentage of coal-fired generation in the fuel mix. Coal prices have recently been much lower than gas prices, the primary fuel in the SEM generation mix. The market in BETTA is also much larger than the SEM and there are increased transportation costs for generating plant that operate in the SEM.

That being said the reduction in gas prices in recent months has resulted in a convergence being observed in the two market prices.

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 be eroded.

The figure below shows the relationship between gas prices and electricity price in the SEM.

Figure 11: System Marginal Price and Gas Price comparision



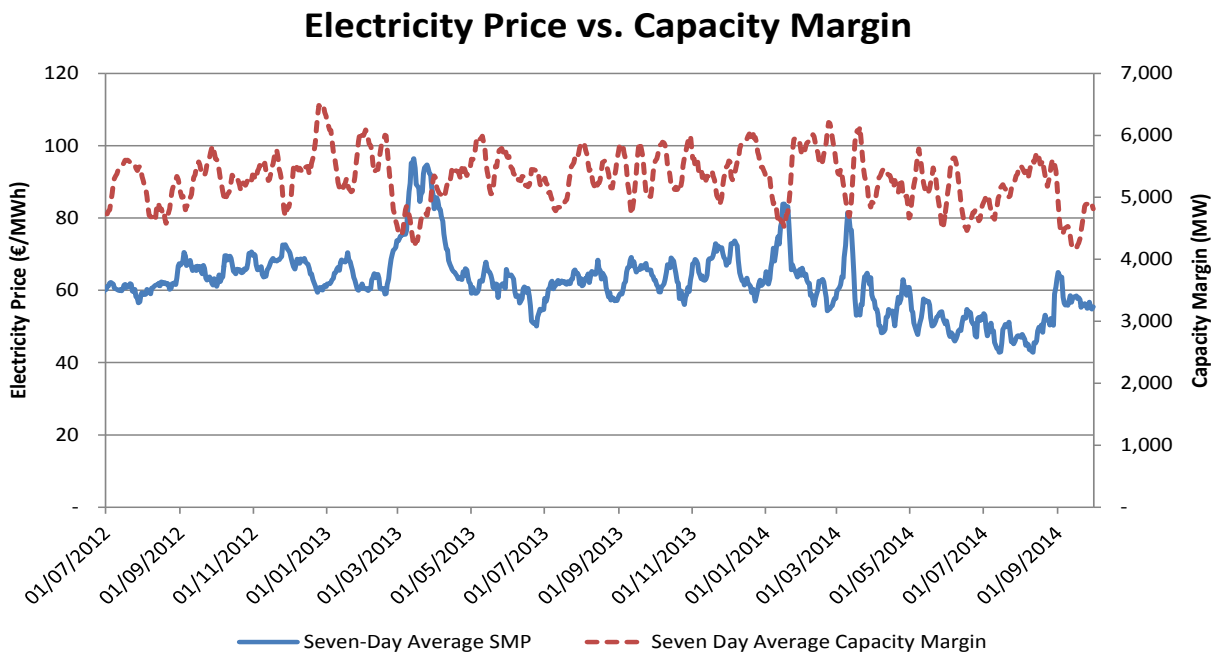
There has been a high correlation between gas and electricity prices throughout the period. Over the previous eight quarters an average correlation co-efficient of 0.69 was recorded, based on average daily SMP. A correlation of 0.69 was also seen in the latest quarter.

In general recent quarters have seen a decrease in the correlation between the Gas price and SMP. This can, in part, be attributed to the rise in other fuel sources, at the expense of gas. However the low gas price observed during Q3 has made gas fired generation more competitive.

Another factor that can have an 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. The lower the capacity margin the more likely it is there will be a need for less efficient generators to be run in the market. This will have the effect of increasing electricity prices.

From an all-island perspective there is a healthy capacity margin. The figure below shows that on average there is close to 5,000MW of spare generation capacity in the market at any one time[5]. Electricity prices and capacity margin in the SEM have displayed signs of an inverted relationship since July 2012. Spikes in SMP have generally occurred at times of lower levels of excess capacity.

Figure 12: System Marginal Price and Capacity Margin comparision



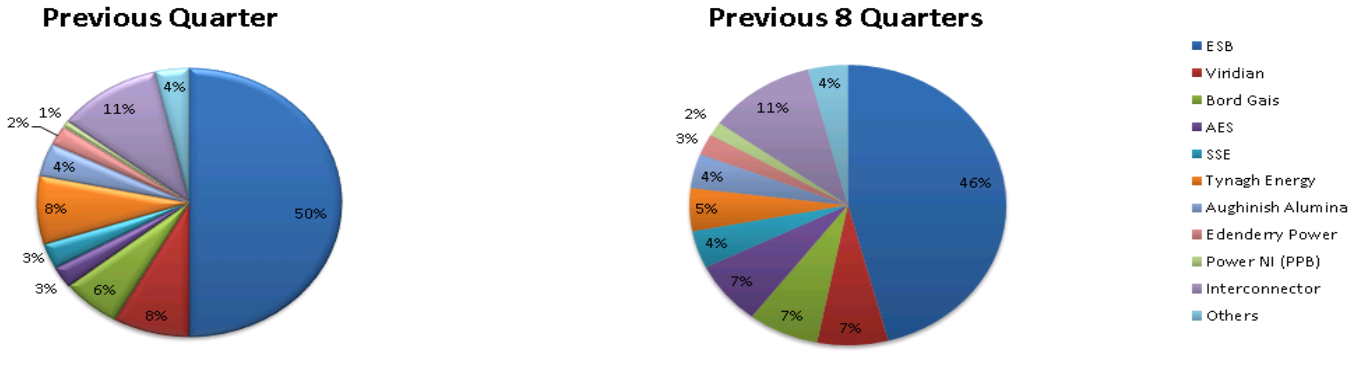
There exists an average correlation coefficient of -0.47 between the electricity margin and the gas price over the previous eight quarters. This increased to -0.61 in the latest quarter (Q3 2014).

[5] Further information on the capacity margin in the SEM is available on the Generation Capacity Statement. The figures provided in this report are average figures and are not representative of the margins during peak demand.

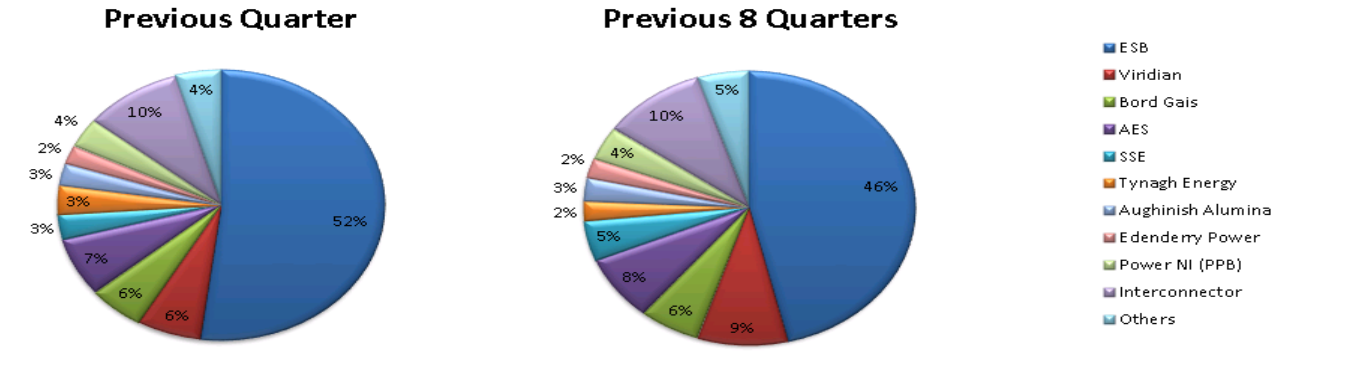
Market share analysis

Figure 13: Market Schedule Quantity and Dispatch Quantity by generation owner

Market Schedule Quantity



Dispatch Quantity



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 were not included in the market engine.

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

By both measurements, the ESB market share has increased in the previous quarter. ESB remains the dominant market participant and, broadly speaking, the profile and make-up of participants remains largely unchanged.

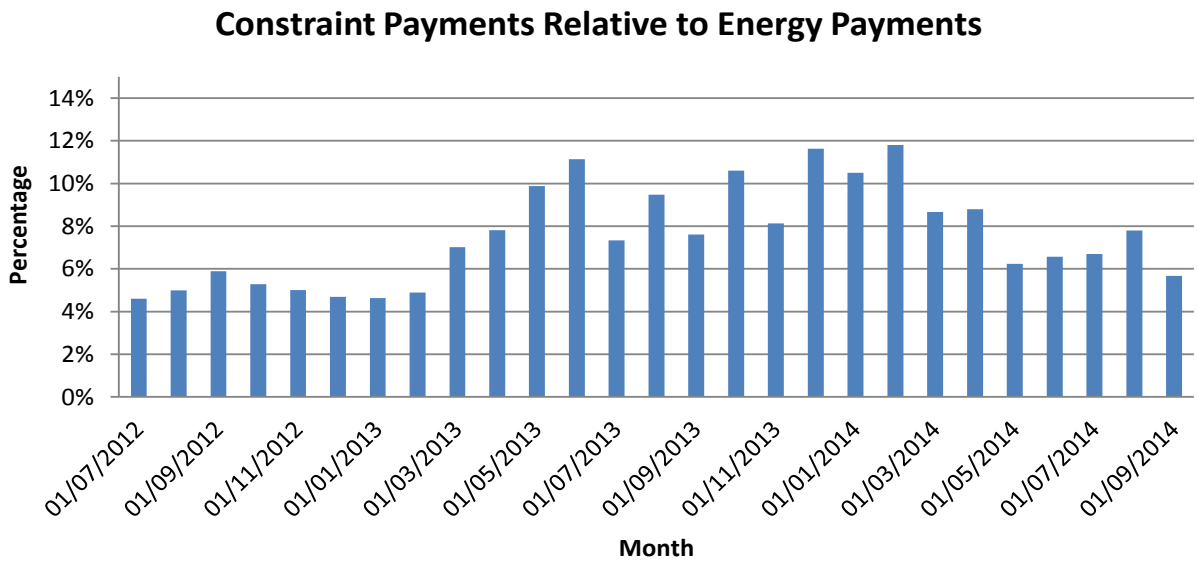
Constraint cost trends

As was explained earlier, there is a difference between the market schedule and the real-time dispatch because system operators must dispatch the generator units in real time under additional constraints that are not considered by the market engine. This could be for a number of reasons, including transmission constraints and the need to provide reserve on the network. Constraint payments serve to keep generators financially neutral as far as any difference between the market schedule and actual dispatch is concerned.

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

The figure below shows the proportion of constraint payments relative to energy payments since July 2012.

Figure 14: Percentage of Constraint Payments relative to Energy Payments 2012 - 2014



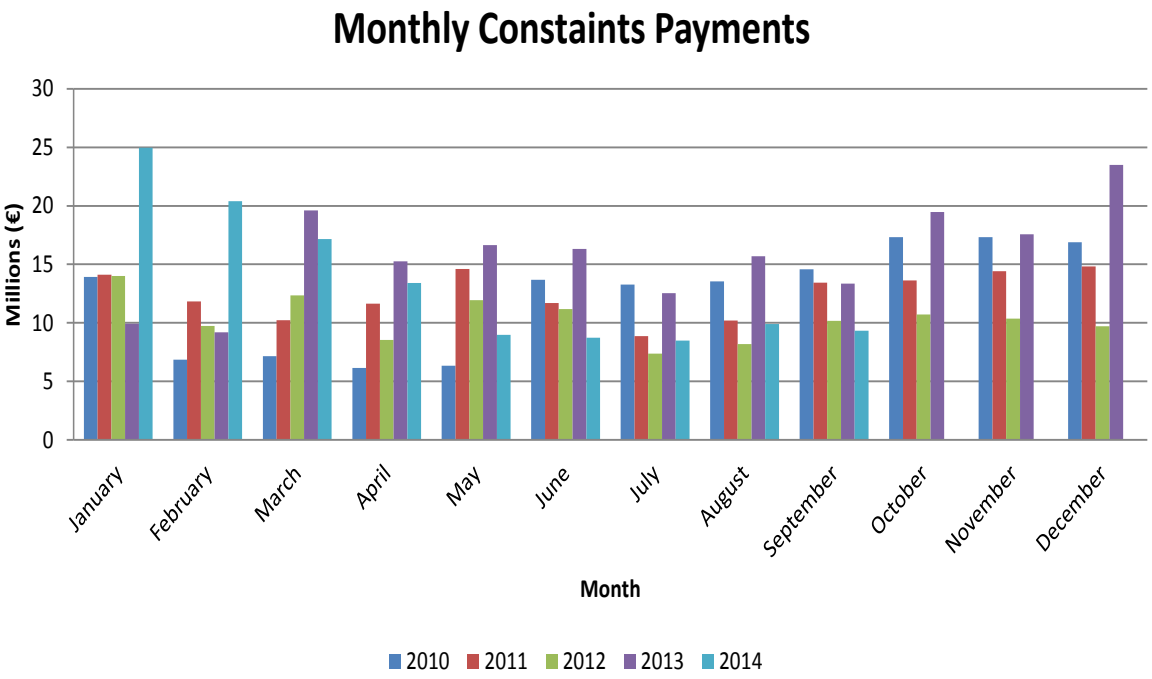
There has been a general increase in the cost of constraints since the start of 2012. In 2012, constraint costs averaged 6% of energy payments. This rose to 8% in 2013 and 9% in the first half of 2014.

However during Q3 2014 constraint costs have remained below those observed in 2013. This could be attributed to a number of reasons such as lower fuel prices that have been observed. This would result in decreasing short run marginal costs paid out to constrained generators.

On a general note the absence of a new North-South Interconnector is currently a constraint to the network. Its construction should result in a lower level of constraints within the SEM.

The figure below shows the value of constraint payments since the start of 2012.

Figure 15: Monthly Constraint Payments 2010 - 2014



Note that further information on the trend and drivers behind constraint payments (imperfections) and curtailment is available from the Eirgrid and SONI websites.

Quarterly Imperfections Cost Report

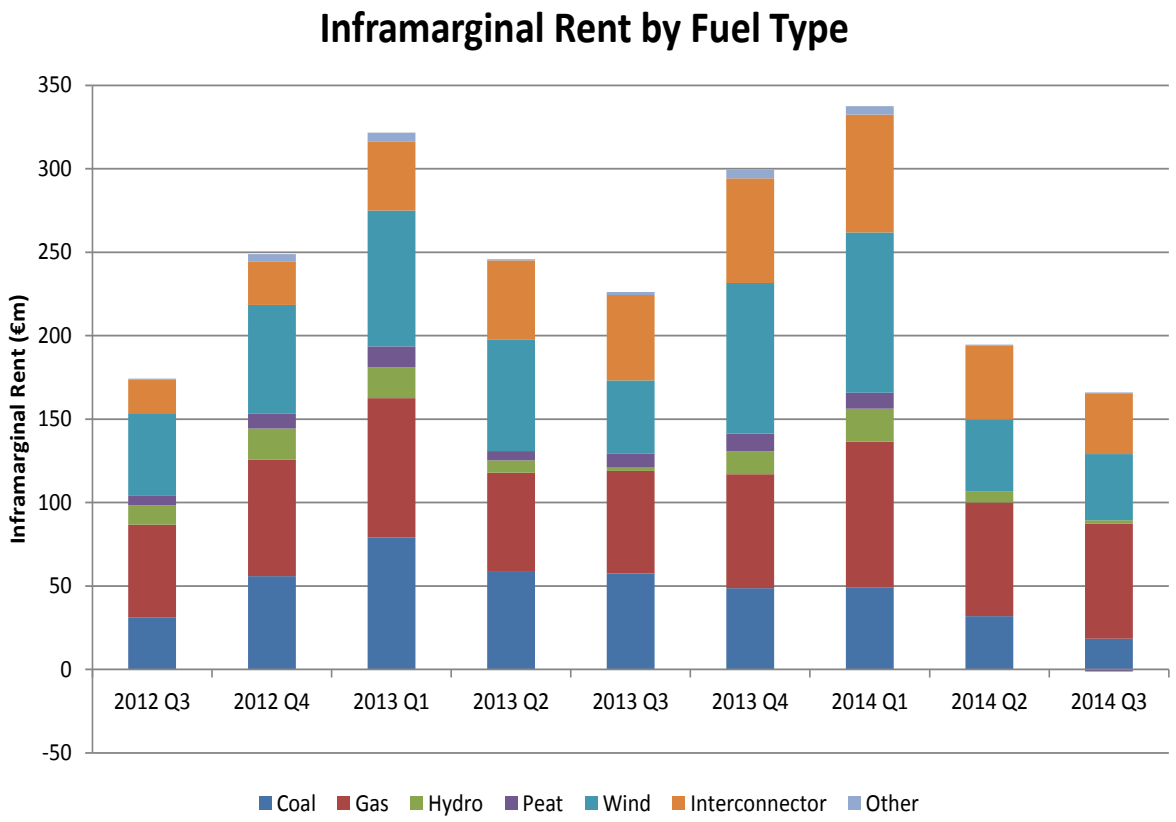
2012 Annual Curtailment Report

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 that submit bids that are less than the SMP for the period will earn varying levels of IMR, depending on their bid price. The plant with the highest running costs that sets the SMP will not earn any IMR for that period.

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

Figure 16: Quarterly breakdown of Infra Marginal Rent by Fuel Type



A number of trends can be observed from this information.

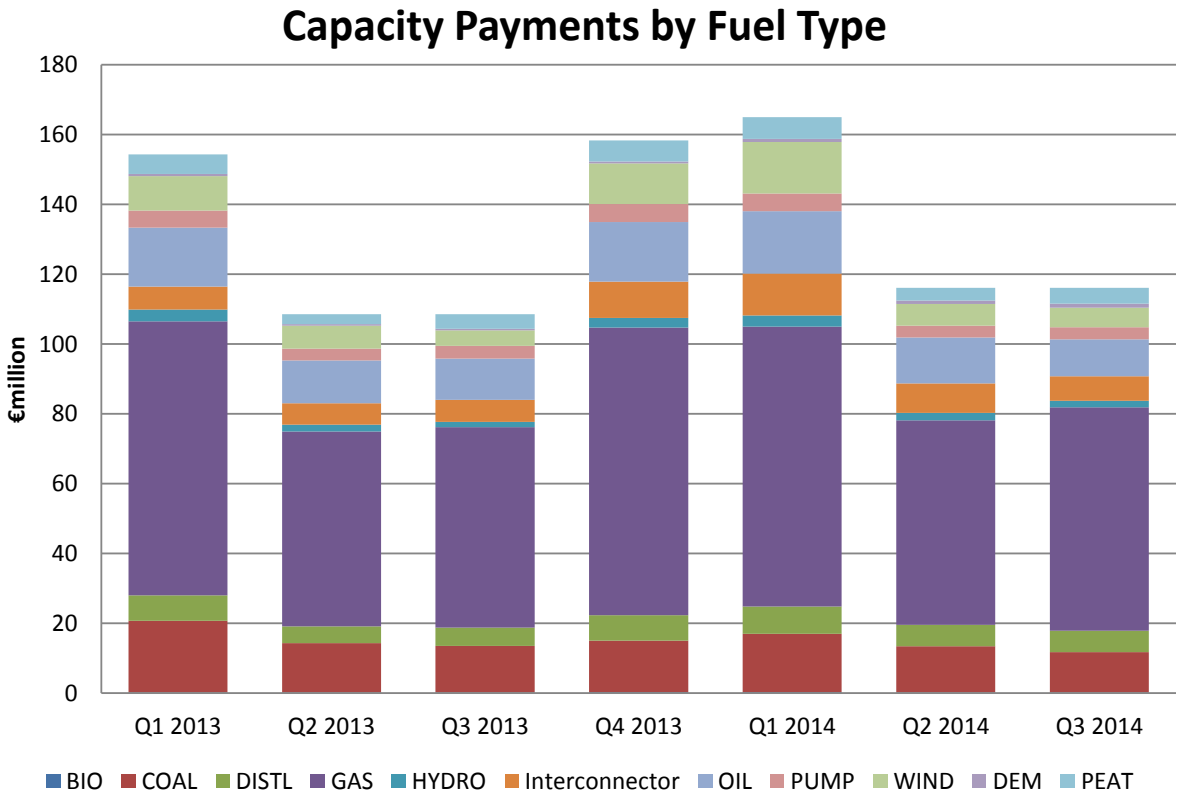
- Wind generation makes up a disproportionate share of IMR when compared with its percentage of the fuel mix. In the latest quarter wind accounted for 24% of IMR, the second largest portion of any fuel type.
- Wind generation only accounted for 11% of the MSQ in that period. This is because wind generation has low variable costs when compared with other fuel types, particularly coal and gas.
- Gas and coal generation accounted for 42% and 11% of IMR respectively. This compares with 57% and 13% of MSQ for the period. This lower IMR compared with wind is because these plants have higher variable costs and in many periods set the price.

Capacity revenues

Generators that do not earn the IMR will receive capacity payments to cover their fixed costs (all generators receive capacity payments when they are available). These are paid on a monthly basis from a predetermined Annual Capacity Payment Sum.

The figure below shows the capacity payments by fuel type for each quarter since the start of 2013.

Figure 17: Quarterly breakdown of Capacity Payments by Fuel Type

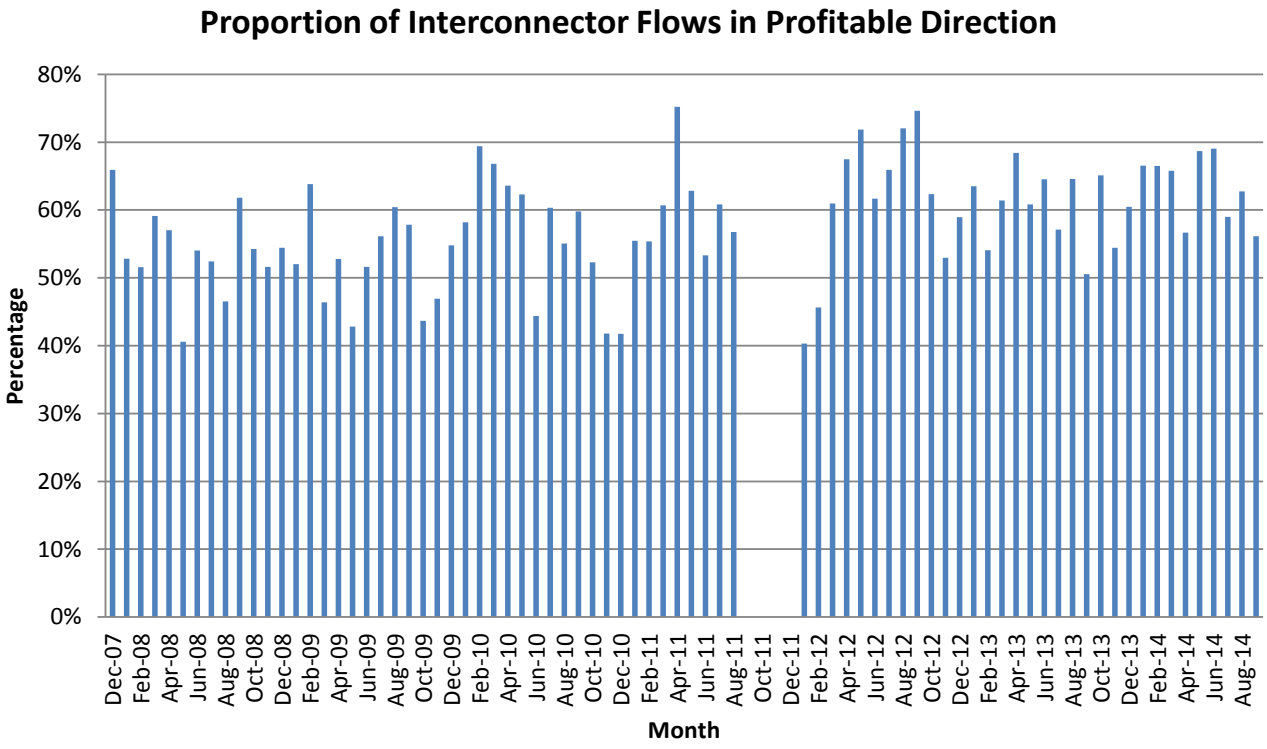


The size of the capacity payments reflects both the availability and volume of MW in capacity of each fuel type. As can be seen, gas generators are the largest recipient of capacity payments. This is because of their high levels of availability and the large volume of gas generation in the SEM. Wind and interconnectors have seen their share of capacity payments increase, in line with increases in their available capacity.

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 18: Monthly portion of 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.

6. DIRECTED CONTRACTS

In November 2012 the regulatory authorities published an information note[6] 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 decision[7] on the format of directed contracts for 2012/13 and beyond. The decision was to move away from holding directed contracts auctions on an annual basis[8] and instead to have rolling quarterly auctions. With the move to quarterly auctions, 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 auctions, using the same format as the contracting report. The information includes the latest round of auctions, which were held in September 2014. Each subsequent quarterly price report will include the latest auction results.

It is worth noting that the contract volumes for 2015 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 the auctions moved to a system of rolling quarterly auctions, the full volume for each quarter will be sold over a period of time. 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 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014	Q2 2014
100%	100%	100%	100%	100%	100%
Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015
100%	100%	100%	75%	50%	25%

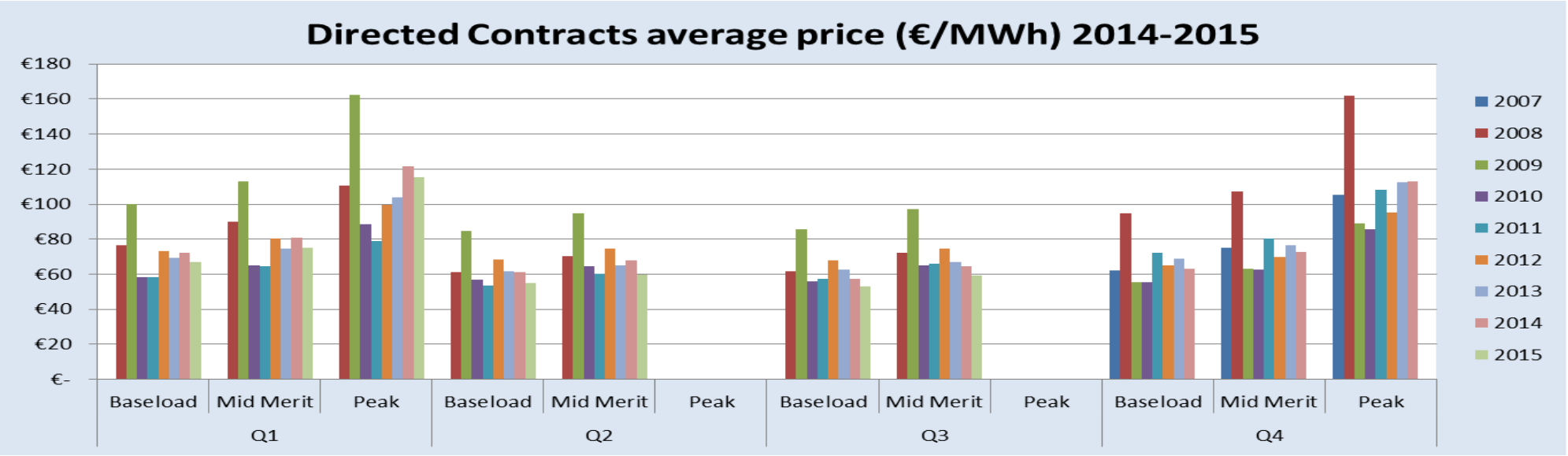
On average, directed contracts base load prices for 2014 are marginally lower (3% lower), than those in 2013, while the mid merit and peak prices for the same period are, on average, higher by 2% and 7% respectively. The volume of directed contracts doubled from 2012 to 2013. This was mainly due to the horizontal integration of ESB's power generation. A similar volume is likely to continue for 2014 although the full volume has yet to be determined through the on-going quarterly directed contracts process.

[6] Contracting in the SEM 2007-2013 – SEM/12/100
[7] Directed Contracts Implementation for 2012/'13 and Beyond – SEM/12/026
[8] Following the traditional tariff year from Q4 in year one to Q3 in year two.

Directed contracts average price (€/MWh), 2007-2015

DC Average Price (€/MWh), 2007-2015															
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		€ 54	€ 60		€ 63	€ 72	€ 106			

Directed contracts average price (€/MWh)



Directed contracts volumes (GWh), 2007-2015

DC Volumes (GWh), 2007-2015													
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	160	3.28
2009	605	52	166	518	317		291	665		492	312	74	3.49
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	690	35		450	-		247	-	-	2.43

Directed contracts volumes (GWh)