Single Electricity Market

Material Level of Harm Assessment for 2012

Information Paper

29 July 2013

SEM-13-048

Contents

1. Introduction

The decision paper SEM-11-084[1], "Monitoring the Divergence of the Market Schedule from Dispatch and the Impact on Consumers" sets out four metrics to be monitored by the Single Electricity Market Committee (the SEM Committee)[2]. These are monitored for the purpose of assessing material harm that can be shown to impact negatively on the ability of the SEM Committee to meet its objectives in the context its overall strategic direction.

The four metrics adopted are as follows:

1. Constraint payments;
2. Proportion of energy payment attributable to constraints;
3. Infra-marginal rents earned through constraint payments, and
4. Constrained running.

This paper sets out high-level findings of this monitoring as well as providing commentary on the trends and an indication of the main drivers behind each metric. The analysis for the first two metrics includes data from 2008 to 2012. Monthly data for 2012 is provided for all four metrics and as the RAs' dataset increases it is expected that annual data will be presented for each metric in future reports.

Further background information is available on the All Island Project website[3].

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[1] http://www.allislandproject.org/en/renewable_current_consultations.aspx?article=892eca3b-6cc5-40cf-a6d8-71d64baba2f9

[2] The SEM Committee is established in Ireland Northern Ireland by virtue of section 8A of the Electricity Regulation Act 1999 and Article 6 (1) of the Electricity (Single Wholesale Market) (Northern Ireland) Order 2007 respectively. The SEM Committee is a Committee of both CER and the Utility Regulator (together the Regulation Authorities) that, on behalf of the Regulatory Authorities, takes any decision as to the exercise of the relevant function of CER or the Utility Regulator in relation to a SEM matter.

[3] http://www.allislandproject.org/en/renewable_current_consultations.aspx?article=892eca3b-6cc5-40cf-a6d8-71d64baba2f9

2. Metric 1 Constraint Payments

A Constraint Payment is made to a Generator when its Dispatch Production Cost differs from its Schedule Production Cost. Where a generator is constrained off such that its Dispatch Quantity is lower than its Market Schedule Quantity, it will receive energy payments for its Market Schedule Quantity and will pay back to the Market Operator a constrained off payment, based on the saving in cost between the dispatch quantity and the market schedule quantity. Where a generator is constrained on such that its Dispatch Quantity is higher than its Market Schedule Quantity, it will receive a constrained on payment from the Market Operator based on the cost of its additional production.

The total additional costs to the market of such constraints can be calculated using publicly available data from SEMO.

The Constraint Payment (CP_y) is calculated as follows:

$$CP_y = \sum_{uh}^{y} CONP_{uh}$$

Where

- $CONP_{uh}$ is the Constraint Payment payable to Generator Unit u for Trading Period h;
- $\sum_{uh}^{y}$ is the sum of all Generating Unities, u, in all trading periods in the year y

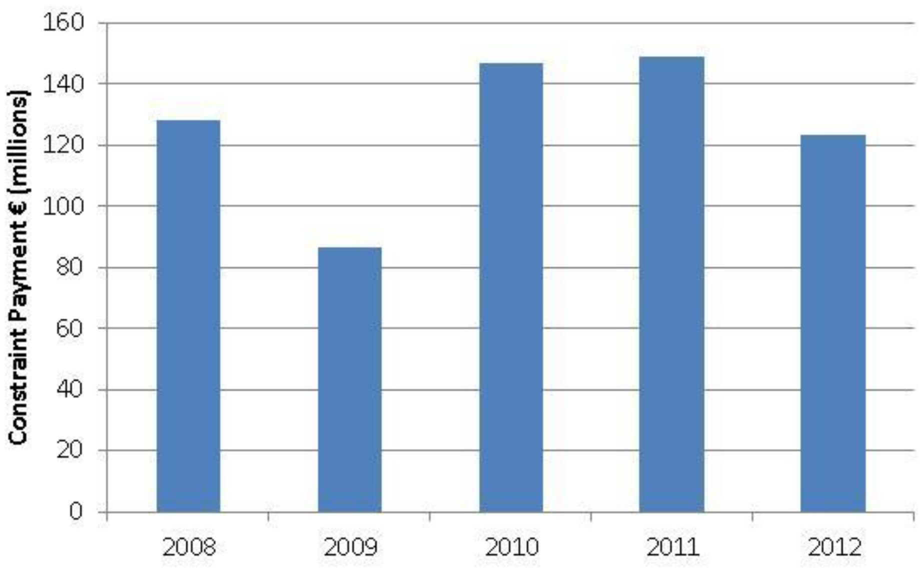

Figure 1: Metric 1 - Constraint payments 2008-2012

Figure 1 highlights the variability of constraint payments from 2008 to 2012. Overall there does not appear to be any significant trend.

There are many variables that may affect the level of constraint payments, including, fuel prices and the relative difference between different fuel prices. For example, in 2009 constraint payments were particularly low due mainly to lower gas prices for that year (gas prices in 2009 were approximately 50% lower than in 2008).

Other factors affecting constraint payments over the years include the level of demand, wind generation, availability of interconnectors and availability of flexible generation such as pumped storage. In particular:

- The lack of availability of pumped storage from summer 2010 until spring 2012 contributed to an increase in the level of constraint payments.
- Over the winter peak in 2010/2011 system demand was significantly greater than forecast due to the very cold temperatures, leading to high constraint payments over this period.
- The availability of the Moyle interconnector will have had an effect on constraints, for example, both lines were unavailable for a number of months in 2011 which contributed to the high constraint payment witnessed in that year.

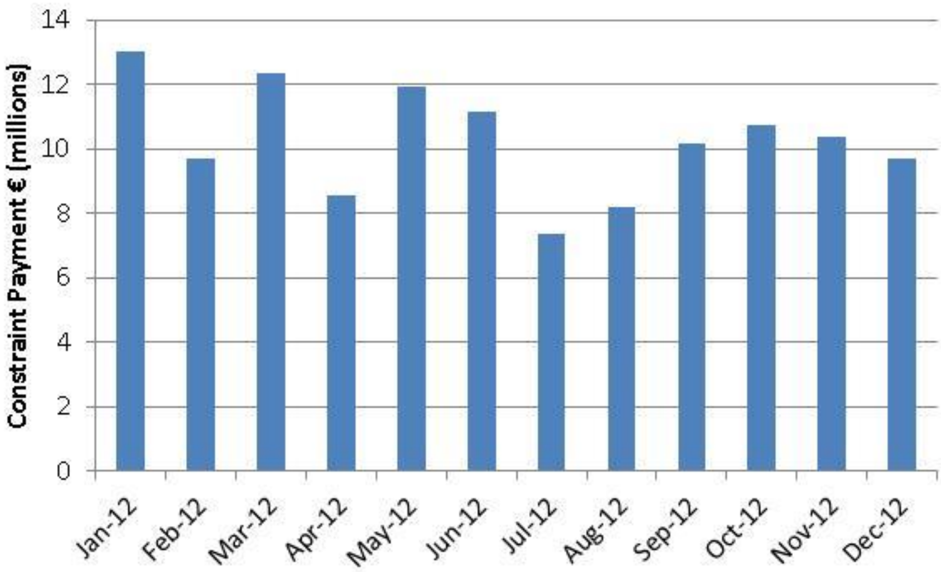

Figure 2: Metric 1 - Constraint payments 2012

Figure 2 shows the monthly constraint payments in 2012. Again there is no strong trend, with the monthly constraint payment figure being relatively volatile and influenced heavily by fuel prices.

In January both lines of the Moyle interconnector were unavailable and there were a number of outages to generation plant that contributed to the high constraint payments in that month.

Other notable drivers of constraint payments in 2012 include:

- A transmission outage in Cork (June 2012);
- Return of Turlough Hill pump storage units (June-August);
- Moyle reduction in reserve costs (no longer the largest single in feed when reduced to one pole) and loss of static reserve (increase in dynamic reserve requirements);
- A reduction in system demand and reduction in fuel prices;
- Testing of the East-West Interconnector.

3. Metric 2 Proportion of Energy Payments attributable to Constraints

This metric measures constraints as a percentage of overall wholesale energy payments. Total suppliers costs are the cost to all suppliers of purchasing electricity at the trading point, which is subsequently passed on customers in NI and ROI i.e. it is the total energy cost (market schedule only) which will have to be paid for by end users.

The Proportion of Energy Payment Attributable to Constraints (PEPAC) is determined by the following formula:

$$PEPAC_y = \frac{\sum_{uh}^{y} CONP_{uh}}{\sum_{uh}^{y} (MSQ_{uh} * SMP)_h}$$

Where

- $CONP_{uh}$ is the Constraint Payment payable to Generator Unit u for Trading Period h;
- MSQ_{uh} is the Market Schedule Quantity for Generator Unit u in Trading Period h;
- SMP_h is the System Marginal Price in Trading Period h; and

$\sum_{uh}^{y}$ is the sum of all Generating Unities, u, in all trading periods in the year y.

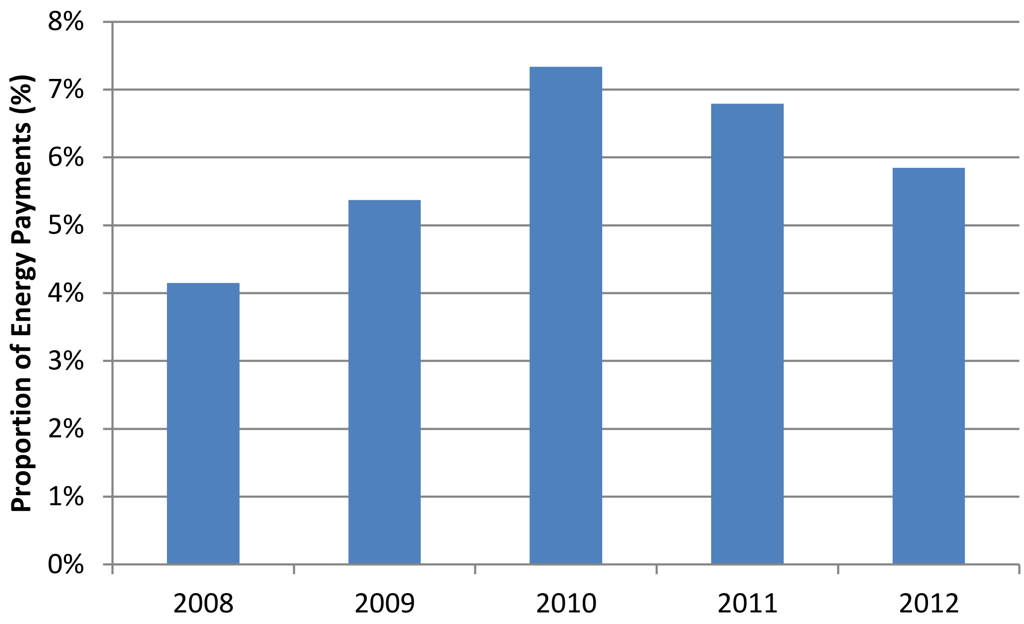

Figure 3: Metric 2 - Proportion of energy payments attributable to constraints 2008-2012

Figure 3 highlights a general increasing trend in the proportion of energy payments attributable to constraints between 2008 and 2010, with a decreasing trend from 2010 to 2012.

In 2008 fuel prices and hence energy payments were high. Therefore while overall constraint payments were relatively high, as a proportion of energy payments they were relatively low. For 2009 the opposite is the case. Constraint payments were significantly lower than other years. However, given the low fuel prices that year, the proportion of energy payments attributed to constraints is more similar to other years.

In subsequent years this metric has also varied due to the same factors outlined for Metric 1, with particularly high results for 2010 and 2011 influenced by pump storage and interconnector availability.

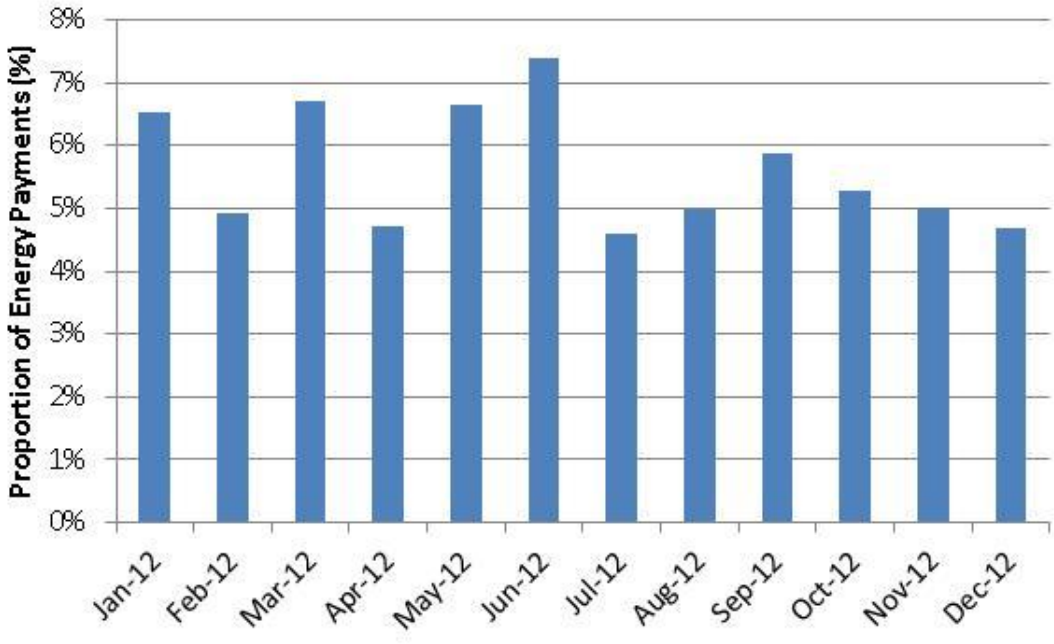

Figure 4: Metric 2 – Proportion of energy payments attributable to constraints 2012

Figure 4 also shows that the results for Metric 2 follow a similar pattern to those for Metric 1 (Figure 2). Although there are some differences, such as a decreasing trend from September onwards as energy payments are increased due to the rise in demand (while constraint payments remain more stable over this time period). Overall the drivers for Metric 2 are similar to those for Metric 1.

4. Metric 3 Infra Marginal Rent as a result of being Constrained Off

When a generator is constrained off it will pay back to the market operator the savings in cost between the dispatch quantity and the market schedule quantity. In this case, it retains any difference between the SMP and the costs which would have been incurred to deliver its Market Schedule (referred to as Infra-marginal rent).

This performance indicator therefore represents an indication of how the market rewards generation that is not run as well as showing the effect of divergence from the market schedule.

Infra-marginal rent as a result of being constrained off is calculated using the following formula:

$$IMR_y = \sum_{uh-CTO}^{y}\left[\left(MSQ_{uh} * SMP_h\right) - \left(GenCosts_{uh} + StartupCosts\right)\right]$$

Where

- MSQ_{uh} is the Market Schedule Quantity for Generator Unit u in Trading Period h;
- SMP_h is the System Marginal Price in Trading Period h;
- Generation and Start up costs cannot be easily defined by an equation. These variables are derived from the Generators Commercial and Technical offers which are published on SEMO website as all the other variables used in this paper (http://www.sem-o.com/marketdata);
- $\sum_{uh-CTO}^{y}$ is the sum of all Generating Unities, u, in all trading periods in the year y which are constrained off in the period h.

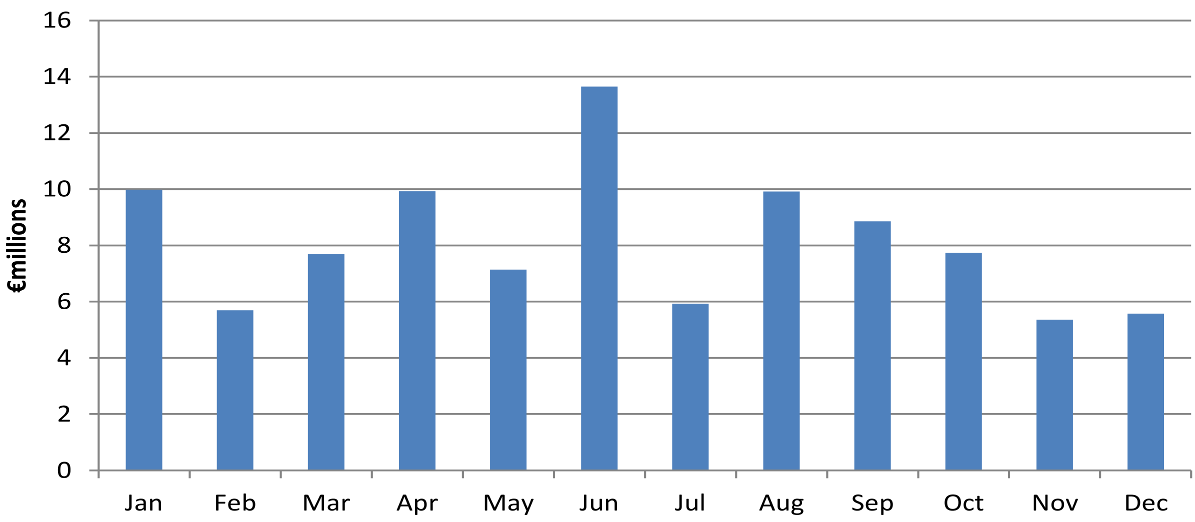

Figure 5: Metric 3 – Infra marginal rent as a result of being constraint off 2012

Figure 5 shows infra marginal rent as a result of being constrained off in 2012. Again overall there is no clear trend, with relatively volatile month on month variations, although from August there is a generally decreasing trend.

In June infra-marginal rent a result of being constrained off is particularly high. This is a result of a high volume of wind generation being constrained off; because the production cost for wind generation is effectively zero, the infra-marginal rent payments are therefore relatively high.

5. Metric 4 Constrained Running by Volume (Divergence)

This metric measures shows how energy volumes differ as a result of deviation from the market schedule. The performance indicator would represent the proportion of energy in the market that has been constrained on-or-off to meet demand at the market level. All data required to calculate this information uses publicly available data from SEMO.

The divergence between the market schedule and dispatch schedule reflects the amount of constrained running in the market and has two impacts. Firstly it results in some plant running in constrained on mode i.e. not receiving IMR for its constrained on running. If this occurs at a significant level over significant periods of time this may have an impact on security of supply. Secondly, it results in some plant being constrained off and receiving infra marginal rents while not contributing to meeting demand.

The Constrained Running by Volume (CRV) variable was determined in accordance with the following formula.

$$CRV_y = \frac{\sum_{uh}^{y}\left[\max\left(MSQ_{uh} - DQ_{uh}, 0\right) + \max\left(DQ_{uh} - MSQ_{uh}, 0\right)\right]}{\sum_{uh}^{y} DQ_{uh}}$$

Where

- MSQ_{uh} is the Market Schedule Quantity for Generator Unit u in Trading Period h;
- DQ_{uh} is the Dispatched Quantity for Generator Unit u in Trading Period h;
- $\sum_{uh}^{y}$ is the sum of all Generating Unities, u, in all trading periods in the year y

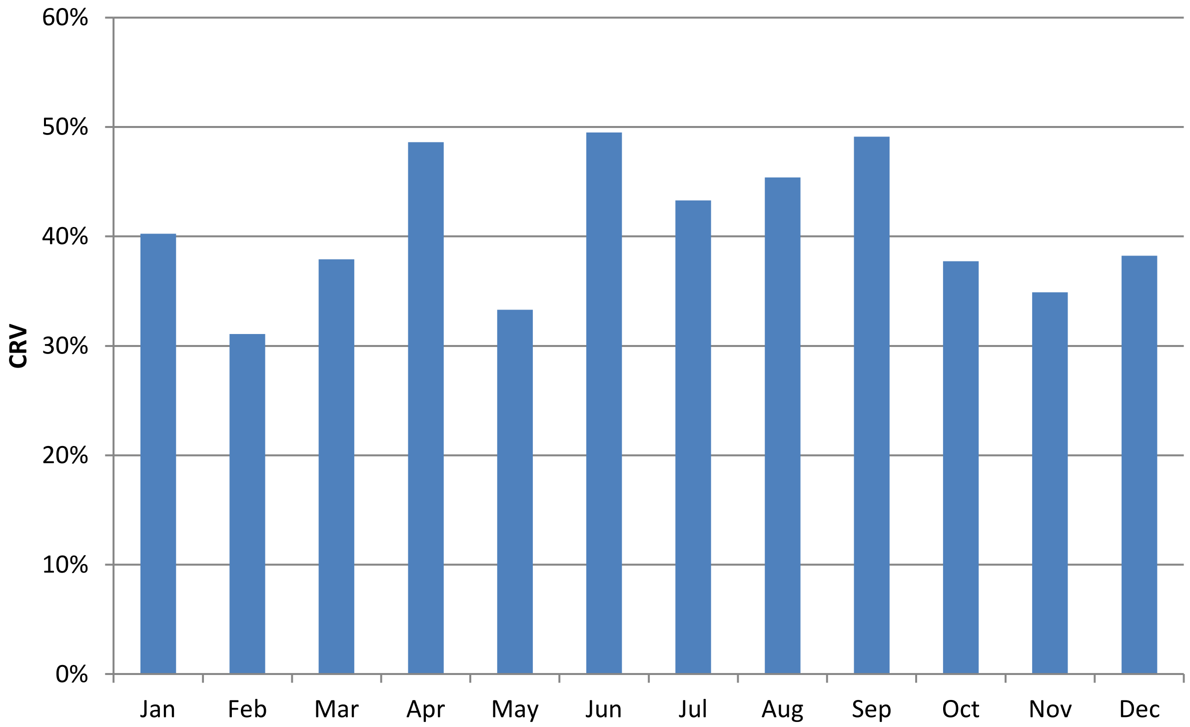

Figure 8: Metric 4 – Constrained running by volume (Divergence)

Figure 8 shows that on average for the year 2012, the dispatch quantity deviates from the market schedule by an average of 40%. Although overall there is no strong trend, the divergence is in general higher during the summer months when demand is lower and the number of generator scheduled outages is greater.

It should be noted that this 'divergence' figure measures the total variance of the dispatch schedule from the market schedule compared to the total dispatched volume i.e. both positively and negatively. In other words, on average 20% of the total dispatch volume in 2012 was different to that of the scheduled volume.

6. Conclusion

In conclusion, the variation in these metrics can be explained by changes to a number of drivers, however overall there does not appear to be any strong or consistent trend. Hence, the SEM Committee does not consider that further analysis is necessitated at this stage, given the findings of this monitoring.

The SEM Committee will continue to monitor each metric and will publish a high level assessment on at least an annual basis.