

Title	MSP Schedule Demand– Final Report
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Executive Summary

In late November 2008, it was discovered that the calculation of the Market Schedule and Pricing (MSP) had been incorrectly implemented. The calculation as implemented included the total quantity of metering for the Interconnector and not the individual quantities for the Interconnector Units as per the Trading & Settlement Code. This error meant the MSP Schedule Demand was incorrect for all Trade Dates from the start of the SEM to Nov 30th 2008.

SEMO advised Participants of this issue and the impact on SEM pricing and scheduling in late November. The issue was presented at the Market Operator User Group meeting of December 2nd 2008. At this time, SEMO proposed a study plan to determine the impact on SEM outcomes.

Two interim reports were completed and presentations were made to Participants at subsequent Market Operator User Group meetings. The final report to Participants was made at a Market Operator Special Topic meeting on March 25th 2009. This document presents this final report.

SEMO have studied 97 Trade Dates covering -

- All Price Spike events;
- All SO-SO Trades;
- A sample of extreme values of Metered Generation on the Interconnector Error Unit, and
- A sample of Case Control studies

The focus of the studies was on erroneous inputs to the MSP software and abnormal outcomes of the software. SEMO have concluded that of the 97 Trade Dates reviewed, 27 were impacted to a level that they would be considered to be above the Settlement Recalculation Threshold of 3%, which would normally require a re-pricing of the SEM.

SEMO have proposed to follow up with Participants via the SEM Conference Call in April 2009 to plan next steps to resolve this issue.

Introduction

The purpose of this document is to provide a final report on the analysis carried out by SEMO with respect to the issues noted in the determination of the Schedule Demand as used in the MSP software.

Two previous interim reports have issued on this issue with focus on Trading Dates which have been previously studied as part of the Dual Rating Modification process and Trading Dates which included SO-SO Trade on the Moyle Interconnector

Background

After very large SO-SO Trades were observed on the Moyle Interconnector in October and November 2008, an investigation was undertaken by SEMO after large Energy Imbalances were noted on the same dates as these SO-SO Trades took place.

After this investigation and following up with the vendor of the SEM central market systems, it was discovered that there was an issue with how the system pre-processes data inputs for the MSP software. With regard to the derivation the Schedule Demand, it was observed that the Actual Output of Interconnector Units was not being correctly applied as per the requirement of section N 32 of the Trading & Settlement Code.

Section N 32 required that the Schedule Demand is calculated as –

1. the Actual Output (AO_{uh}) for all Price Maker Generator Units u that are not Under Test;
2. less the summation of all reductions in Output of any Predictable Price Taker Generator Unit, and any Predictable Price Maker Generator Unit that is Under Test, calculated as the difference between:
 - a. the minimum of Nominated Quantity (NQ_{uh}) and the Availability Profile (AP_{uh}) of the relevant Generator Unit for Trading Period h; and
 - b. the Actual Output (AO_{uh}) of the relevant Generator Unit u for Trading Period h, with increases in Output having the opposite sign;
3. less the summation of all reductions in Output of any Variable Price Taker Generator Unit and any Variable Price Maker Generator Unit that is Under Test, calculated as the difference between:
 - a. the Availability Profile (AP_{uh}) of the relevant Generator Unit u for Trading Period h; and
 - b. the Actual Output (AO_{uh}) of the relevant Generator Unit u for Trading Period h, with increases in Output having the opposite sign;
4. plus an estimate of any reduction in demand in Trading Period h as a consequence of Demand Control as set out in the relevant Grid Code;
5. plus the Dispatch Quantity (DQ_{u'h}) of each Interconnector Residual Capacity Unit u' in Trading Period

Acknowledging points 2, 3 and 4 as part of the requirement, the issue under discussion relates to the implementation around points 1 and 5. The Trading & Settlement Code requirement can be summarised in the following diagram.

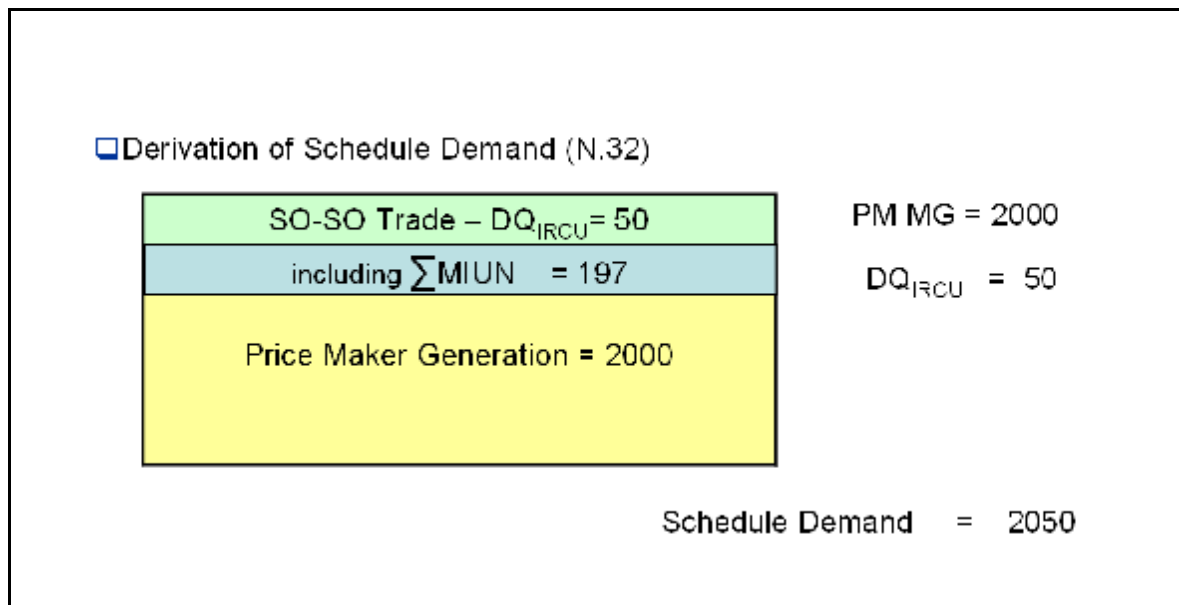


Figure 1 - Derivation of Schedule Demand, N 32

In this demonstration, the Price Maker Generation requirement is 2000 MW. This is seen as the Actual Output of Price Makers (excluding those under Test) which includes the Metered Generation values for the Interconnector Units as required and determined in section 5.85 of the Code (as per Figure 1 above, the Metered Generation for the Interconnector Units is set equal to the Dispatch Quantity for these units, itself set equal to the Modified Interconnector User Nominations). The Dispatch Quantity, in this example a 50 MW import, is then further applied to determine to total Schedule Demand for use in the MSP software. This would lead to a Schedule Demand value of 2050 MW.

This was incorrectly implemented during the build phase of the SEM design. Because the calculated Metered Generation of the individual Interconnector Units is a Settlement function, as a result of the timings of the Trading & Settlement Code, it was not explicitly available for inclusion in the runs of the MSP software (as these are required to be completed before the Settlement software runs can begin). It was incorrectly assumed that the total Metered Generation of the Interconnector itself could be used in place of the sum of the individual calculated Metered Generation values for each of the Interconnector Units. This however did not take into account the total Metered Generation of the Interconnector would also include the quantities for the Interconnector Error Unit as well as quantities represented by SO-SO Trades.

This is demonstrated in Figure 2 below which represents how the system would have calculated the Schedule Demand in the example set in Figure 1 above. Instead of considering all the Price Maker Generation, the system considers first the summed Actual Output of the physical Price Maker plant on the system and does not consider the calculated values for the individual Interconnector Units. In this example, the value is 1803 MW. The total of the Metered Generation on the Interconnector is then added. In this example, this is a total of 250 MW as opposed to the actual requirement per the Code of 197 MW. Then the SO-SO Trade is considered when the Dispatch Quantity for the Interconnector Residual Capacity Unit (IRCU) is added. This provides for a Schedule Demand requirement of 2103 MW. Here, we demonstrate how the Schedule Demand is increased by the inclusion of the total of the Metered Generation on the Interconnector – firstly by double counting the IRCU quantity of 50 MW, and secondly by including a quantity of 3 MW that should be assigned to the Interconnector Error Unit.

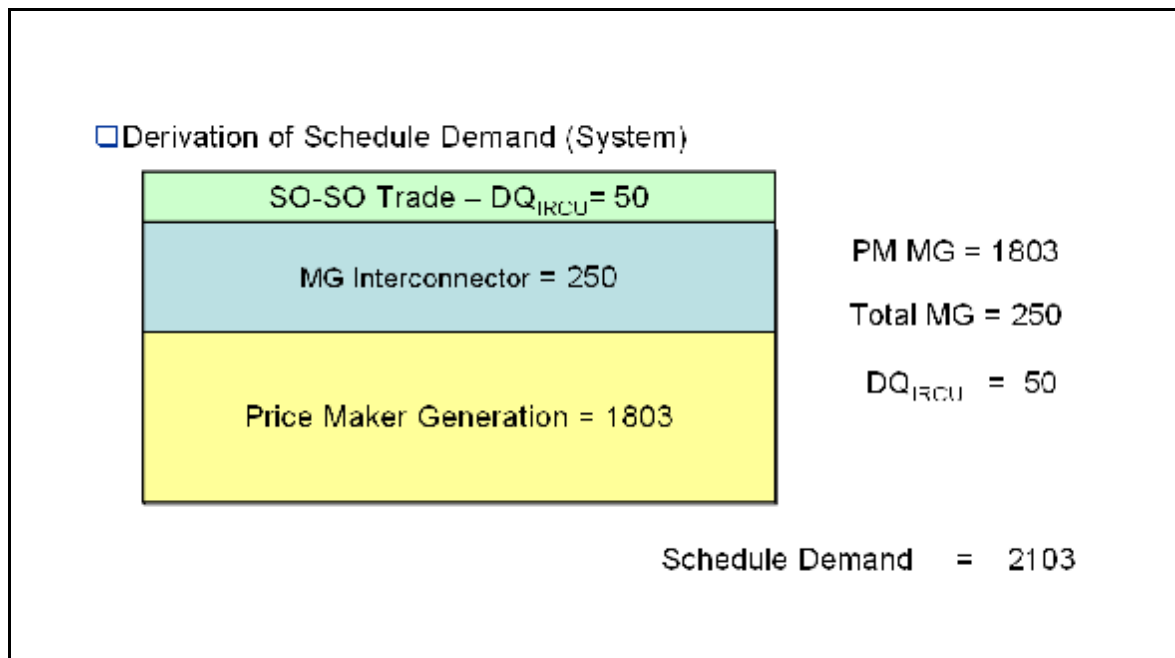


Figure 2 - Derivation of Schedule Demand, SEMO System

Analysis determined that with the full value of Interconnector Metered Generation being included in the Schedule Demand, this meant that on days where SO-SO Trades existed, these trades would be counted twice in the derivation of Schedule Demand - once as Dispatch Quantity

for the IRCU and again as part of the total Interconnector Metered Generation. However, as a result of this on days where no SO-SO Trades existed, the inclusion of the total Interconnector Metered Generation meant that the Metered Generation for the Interconnector Error Units was incorrectly included in the Schedule Demand.

As a result, all pricing runs since the start of the SEM up the implementation of a system work around are affected by this error. This covers all dates between November 1st 2007 and November 30th 2008 which is 396 Trading Days.

Study Approach

SEMO advised Participants of this issue at the Market Operator User Group (MOUG) on December 2nd 2008. At this time, SEMO proposed to undertake a body of analysis to assess the impact on SEM prices and schedules and to indicate the materiality of the issue.

It was proposed that this analysis would be completed by the end of February 2009 and reported to Participants shortly after. Interim progress reports would be made available along the way, with periodic updates through the MOUG and Conference Call forums.

Other commitments resulted in some delays and the final analysis was completed in mid March 2009. Initial findings were reported to Participants through the Conference Call on March 18th 2009 with a MOST (Market Operator Special Topic) meeting held on March 25th.

The final analysis comprised of -

- Complete offline studies for all days with SO Trades;
- Complete offline studies for all days where the Kilroot step into its oil price is a greater MW value than the quantity of the error;
- Complete offline studies for all days which included a Price Spike event;¹
- Offline studies of dates with IEU volumes which are identified as possibly having impact on the SEM;
- Offline studies for other “unaffected” dates for use as control dates;
- Review of the dates studied for the Dual Rating Modification.

In each case, SEMO re-ran the SEM using the MSP software in offline mode and carried out a comparative analysis between the original published schedule (the base-case) and the new study (the re-run case). This comparison followed the methodology as set out in the report issued by SEMO on the calculation and application of the Settlement Recalculation Threshold.

Date Selection

SEMO reviewed all 396 affected dates to determine Trade Dates that would fall under the headings which the study intended to cover. The key areas for review were –

- SO-SO Trades;
- SMP > €300;
- Kilroot step into the oil step less than quantity of the error;
- Abnormal Interconnector Error Unit quantities;

Dates where the first three issues were observed were easily identified. Further work was required to assess what could be classed as an “abnormal” Interconnector Error Unit quantity.

To assess which dates should be included, SEMO reviewed the Metered Generator for the Interconnector Error Unit (MGEU) for all trading periods for all affected dates. Each date was assessed against the following criteria –

- Sum of MGEU across a Trading Day²;

¹ For the purposes of this study only, a Price Spike event was considered to be System Marginal Price greater than €300. This differs from previous considerations where a Price Spike event is a System Marginal Price greater than €500. The reason for this was to maximise the number of case studies.

² Average of MGEU across a Trading Day was also considered but in the review it was observed that the Average dates were the same as the Sum dates. This was therefore not considered further.

- Max value of MGEU (which would be the largest import in a Trading Day);
- Min value of MGEU (which would be the largest export in a Trading Day);
- Standard Deviation of MGEU across a Trading Day;

Once the dates were grouped according to these criteria, the top 20 values under each heading were assigned a value of 1. The bottom 20 values were also assigned a value when reviewing the Sum of the MGEU across a Trading Day. Once the scoring had been applied, the values for all Trading Days were aggregated. Dates were selected for inclusion based on the overall score of the date. The final scoring of dates where the total score was greater than 1 is included in [Appendix 3](#).

Case Control Study dates were selected by reversing the criteria used to assess the “abnormal” Interconnector Error Unit quantity dates. Dates were selected by reviewing criteria –

- The median of the sum of MGEU across a Trading Day (that is, where the value of the sum would trend to zero);
- The lowest Max value of MGEU (which would be the smallest import in a Trading Day);
- The highest Min value of MGEU (which would be the smallest export in a Trading Day);
- The lowest value of Standard Deviation of MGEU across a Trading Day;

Study dates were been identified based on the criteria above. The full list of dates and the reasons for their selection is included in [Appendix 1](#) to this document. They can be summarised in Figure 3 below.

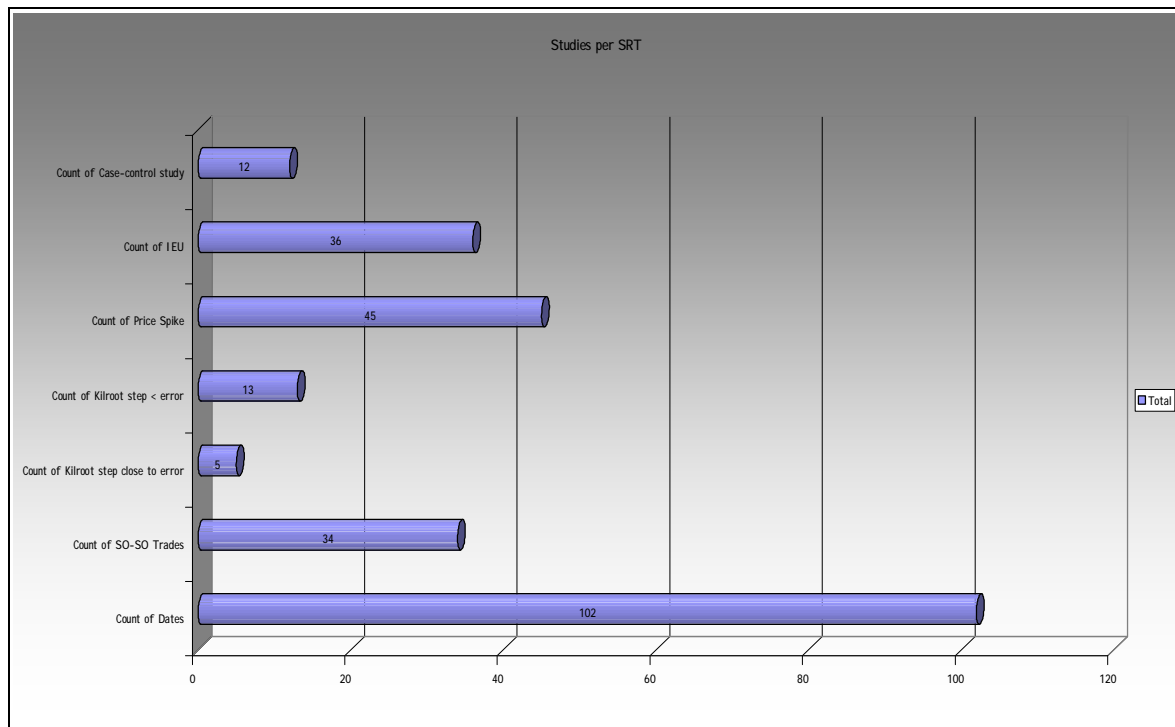


Figure 3 - Count of Studies by issue

The list in Appendix 1 has been updated from the original list in the second Interim Report. This was required after it was found that five dates selected were not appropriate for inclusion in the studies. These five dates were dropped from the list and new dates were selected from the dates in Appendix 3 (status of these is noted as Skipped - later included) -

- 11/05/2008 (Case Control study) - An issue was observed with Commercial Offer Submissions by one Participant. This had resulted in two sets of Commercial Offer Data being valid in the systems for this Participant at this time. This issue was covered in the Monthly Market Operator Report at this time and the Settlement Results were queried by the affected Participant as the two sets of Commercial Offer Data were aggregated in the

Settlement System. The MSP software selected one of the two sets. As this issue was raised as a defect and has since been fixed, it is not certain that the MSP software would use the exact same Commercial Offer Data as used in the original case. As a result, any deviations observed in an analysis of this Trading Day may be caused by the issue of the duplicate Commercial Offer Data and not the incorrect derivation of the MSP Schedule Demand.

- 07/07/2008 (IEU study) – The original “savecase” file for this date is not recoverable. This was caused by an issue with the implementation of replication software by SEMO. This issue was previously identified and processes have been amended to ensure that this no longer recurs. The original “savecase” file guarantees that the MSP software will follow the original program steps and, if no changes were made to the input data, would deliver the same output as the original run. Without a “savecase” file, it is possible that, with the same input data, the MSP software will reach a different solution. As a result, without the “savecase” file, it is considered that SEMO cannot guarantee that any deviations observed in an analysis of this Trading Day are caused by MSP software reaching a different sub-optimal solution and not the incorrect derivation of the MSP Schedule Demand.
- 14/09/2008 (SO-SO Trade study) - The original “savecase” file for this date was corrupted. This was caused by an operational issue. SEMO are putting in place processes to ensure that this no longer recurs. For the same reasons as noted for 07/07/2008 above, it is considered that SEMO cannot guarantee that any deviations observed in an analysis of this Trading Day are caused by MSP software reaching a different sub-optimal solution and not the incorrect derivation of the MSP Schedule Demand.
- 25/10/2008 (IEU study) – An issue was observed with the schedule outputs for this Trading Day. This issue came to light only when assessing this date for inclusion in the studies. It was observed that one Generator Unit had a Market Schedule Quantity which was greater than the Availability of the unit. This was raised as a defect with the system vendor and a fix is being developed. This defect is related to the treatment of the Long Day in the MSP software and does not impact any other Trading Day. However, if it was felt that any deviations observed in an analysis of this Trading Day may be caused by the defect observed and not the incorrect derivation of the MSP Schedule Demand.
- 26/10/2008 (IEU study) – This date was subject to formal Data Query with respect to the availability data used in the MSP software. This Data Query was grouped with a further formal Data Query on 27/10/2008. The operational assumption was that both dates would require a re-run of the MSP software. However, 27/10/2008 subsequently became the subject of a Dispute under the Code. As part of the Dispute Resolution process, 27/10/2008 was re-priced and re-settled³. In the process of addressing this as a Dispute, the fact that the 26/10/2008 was also subject to an upheld Data Query was not considered. As such, the re-pricing and re-settlement of 26/10/2008 has still not been published to Participants. From a study perspective, this date could not form part of the studies as any deviations observed in an analysis of this Trading Day would probably be the result of corrections in respect of the issue under query and not the incorrect derivation of the MSP Schedule Demand.

Process

Once dates were identified for study, priority was assigned to certain issue groups. Priorities assigned as follows -

- Review of data used in studies for the Dual Rated Working Group;

³ It should be noted that two separate Disputes were raised in respect of 27/10/2008. One of these has been resolved amicably to allow re-pricing of the affected Trading Day. The other was referred to the Dispute Resolution Board. A resolution has also been reached on this Dispute.

-
- Review of dates with SO Trade;
 - Review of dates with Price spike events;
 - Review of dates with abnormal IEU quantities and Case control dates

To complete this analysis, original savecase files of the published runs of the SEM for these dates were restored. The inputs to the MSP software were edited in that the value of Interconnector Metered Generation was replaced by the summed quantity of all the Modified Interconnector Unit Nominations for each Interconnector Unit. The result of this change was that the SO-SO Trade was only included once in the calculation and there was no inclusion of the Metered Generation of the Interconnector Error Unit in the calculation.

The MSP software was run using the Langrangian Relaxation in all of these studies with three exceptions. On the exception days, the original schedules were published using the Mixed Integer Programming method. To ensure that the studies were not analysing variances that arose due to using different solvers, the MIP solver was used for these dates in the studies. The affected dates were 19/05/2009, 18/06/2009 and 03/09/2008.

Analysis

A number of sub-groupings have been discussed so far. For the final analysis to be included in this report, it was noted that the number of sub-groupings could be reduced because of the number of instances where a Trade Date would appear under more than one sub-grouping. As such it was noted that

- All studies undertaken for the Dual Rated Working Group were covered under Price Spike heading;
- All studies of Trade Dates where the Kilroot step into its oil range was less than the quantity of error were covered under SO-SO Trades and Price Spike headings;
- Of the five dates where the Kilroot step into its oil range was judged to be close to the quantity of the error, all of these were covered under the Price Spike headings.

Therefore the final analysis will cover

- SO-SO Trades,
- Price Spikes,
- Interconnector Error Unit (abnormal observations, as noted above), and
- Case Control Studies.

Although the dates where the study results were above the Settlement Recalculation Threshold covered all sub-groupings (with the exception of the Case Control studies), it should be observed that each study above the SRT included either a value of SO-SO Trade or a Price Spike in the MSP outcomes in the base case.

SO-SO Trades

The list of dates which were to be included in the analysis are listed in Table 1 - Full List of SO-SO Trades below. This table also notes the extra issues observed on the Trade Dates being studies.

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU
02/11/2007	x					
14/11/2007	x				x	
14/12/2007	x				x	
20/12/2007	x				x	
28/12/2007	x					
20/01/2008	x				x	
21/01/2008	x	x		x	x	
22/01/2008	x					
29/01/2008	x					
30/01/2008	x			x	x	
01/02/2008	x				x	
04/02/2008	x	x			x	
26/02/2008	x				x	x
21/03/2008	x					
29/03/2008	x	x			x	
30/03/2008	x					
31/03/2008	x					x
01/04/2008	x					

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU
22/04/2008	x					
08/05/2008	x					
27/05/2008	x					x
13/06/2008	x	x		x	x	
20/06/2008	x					
10/07/2008	x					x
31/07/2008	x					
20/08/2008	x					x
14/09/2008	x					x
14/10/2008	x			x	x	
15/10/2008	x				x	
19/10/2008	x			x		
15/11/2008	x			x		x
16/11/2008	x			x		x
17/11/2008	x			x		
19/11/2008	x			x		

Table 1 - Full List of SO-SO Trades

Of the dates reviewed, one Trade Date (September 14th) was not completed for reasons as noted above. It is intended to complete an analysis of this date using both the newly created “savecase” and the output files from the original published schedule.

Results Summary

Of the completed 33 Trade Dates, 15 fall above the SRT. It can be noted that -

- 5 of these 15 also had Price Spike event (plus 1 with an SMP greater than €250);
- 5 others had “abnormal” IEU quantities;
- 3 others had SO-SO Trade greater than 1500MW in the Trading Day;

However, there is no observable pattern here as with respect to the 18 Trade Dates that fall below the SRT, we can also note that -

- 7 of these 18 also had Price Spike event;
- 1 other had “abnormal” IEU quantities;
- 2 others had SO-SO Trade greater than 1500MW in the Trading Day;

Findings

Based on the results of the analysis, it was found that on 15 of the 33 dates studied, the application of the correct value of Schedule Demand would have resulted in market outcomes in the SEM that would have differed from the original outcomes by a value greater than the Settlement Recalculation Threshold. Of these dates, five had extremely high volumes of SO-SO-Trade (19th Oct 2008 and the four dates in Nov 2008) which were expected to have impacted on the market outcomes. (Note, the four dates in November 2008 occurred while SEMO was investigating the issue. As a result, SEMO had already arranged for formal Data Queries to be lodged against these dates. These have been assessed and the SEM has been repriced and resettled for these dates.)

SEMO has investigated the study run completed for 14/10/2008 and 15/10/2008 as it would have been our expectation that such significant quantities of SO-SO Trade as appears on these dates

should have driven changes greater than the SRT. We can confirm the findings for these dates are correct. A summary analysis of 14/10/2008 is included in [Appendix 4](#).

Taking the overall study runs completed, this means that 15 of the 33 cases resulted in outcomes that differed by a value greater than the SRT. Excluding the exception cases noted above, this indicates 10 out of 26 cases with normal SO-SO Trade that are above the SRT.

The graphs below demonstrate the issues observed on the SO-SO Trade study runs. Cases above and below the SRT are represented separately.

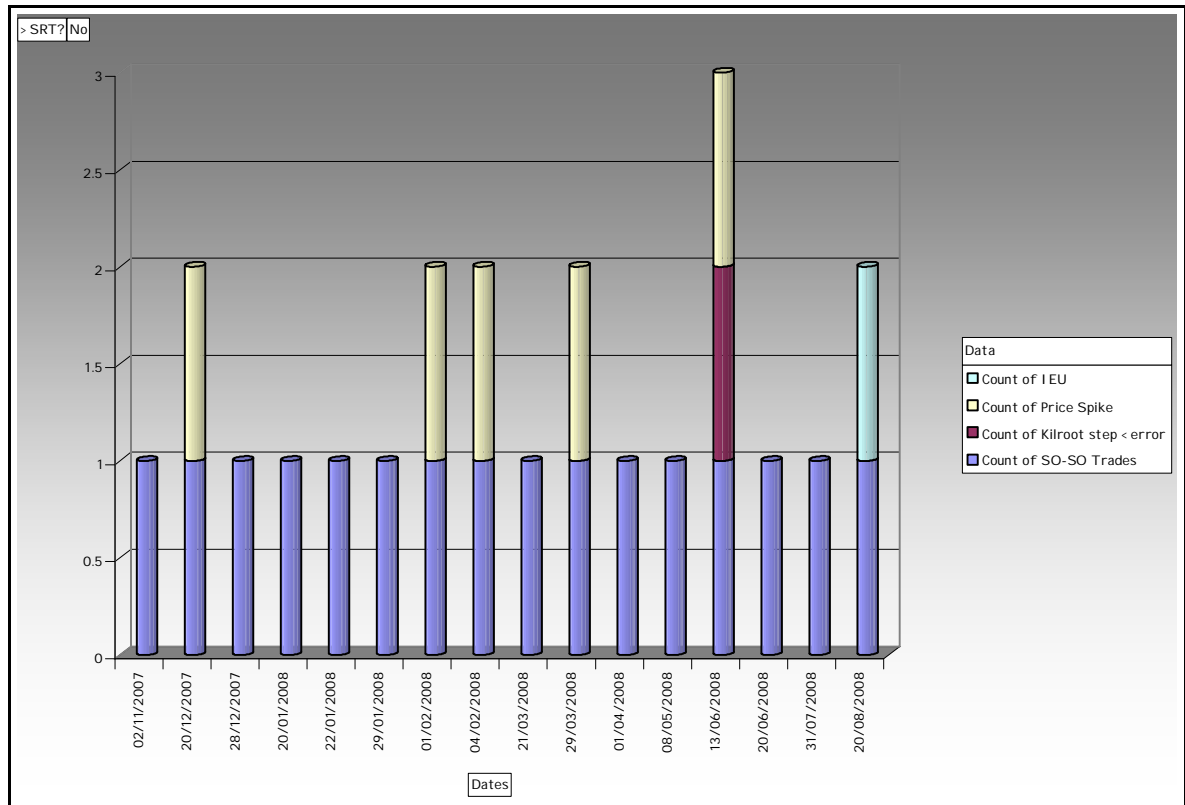


Figure 4 - Study Cases < SRT

In the above graph, it can be noted that of 16 cases that fall below the SRT, in 10 of these cases the only issue observed for this Trade Date was the SO-SO Trade. There was one date considered an issue date for the Metered Generation for the Interconnector Error Unit, 20/08/2008. Although the total quantity of the error on this date would be significant, the individual Trading Period values were not large and as a result may have dampened the impact of the MG for the IEU. Four dates also showed spikes in the System Marginal Price that persisted in the study re-runs. The impact of the SO-SO Trades on these dates was minimal due to the low quantities of SO-SO Trade observed.

June 13th 2008 does appear as an anomaly. However, the SO-SO Trade was limited to 6 Trading Periods only in the daily peak. This caused a reduction in the spike noted in the System Marginal Price on this date. However, a larger value of Uplift was required over more Trading Periods (the SMP in the base case was over €500 for a single Trading Period, whereas the study run produced an SMP of approx €300 for three Trading Periods at the peak). This coupled with no changes to the SMP or the system load outside of the peak meant that the overall impact on the Trading Day is below the SRT.

What can be noticed is that in most instances where the SO-SO Trade is the only observed issue, the date falls below the SRT. This holds true for the excepted dates noted above as demonstrated in the graph below.

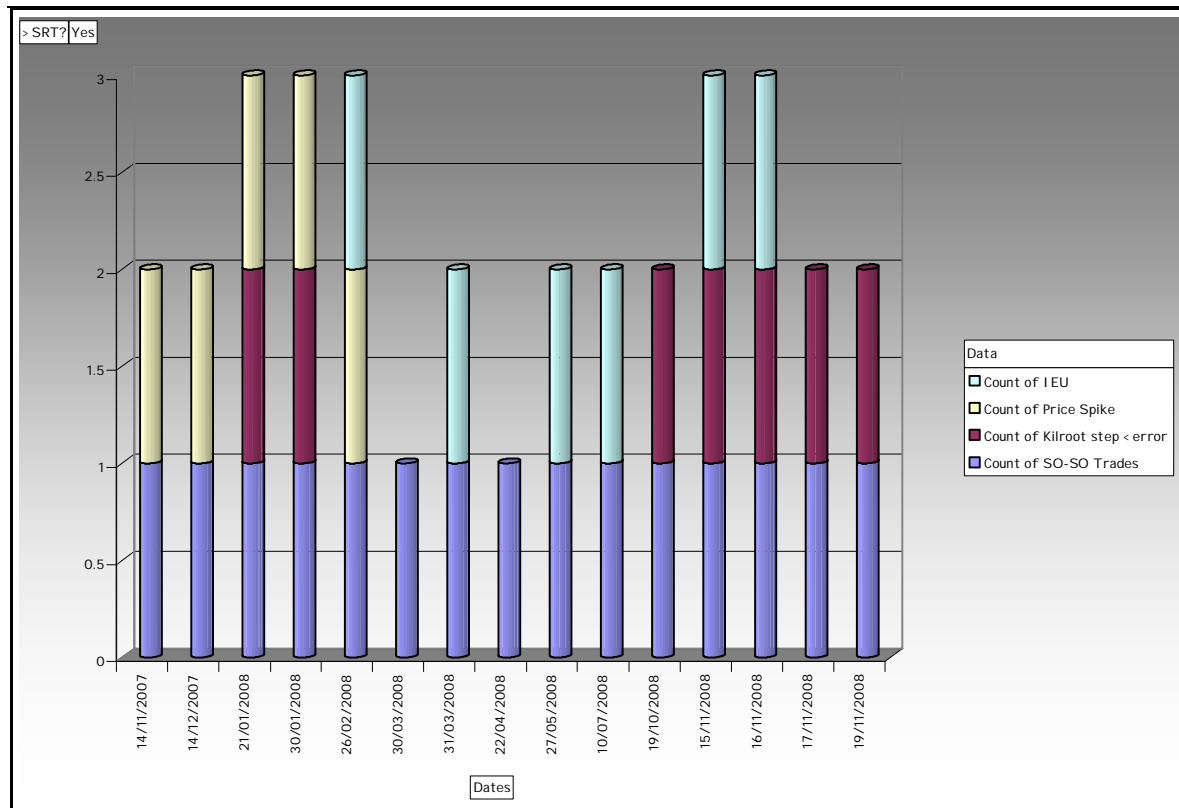


Figure 5 - Study Cases > SRT

In the above graph, it can be noted that of 10 cases that are above the SRT, in only two cases was the SO-SO Trade the only issue observed for this Trade Date. The quantities of the SO-SO Trades were not remarkable on these dates. These results would only echo the comment from the first interim report where it was observed that an outcome only served “to demonstrate how small changes to the Schedule Demand can cause the MSP solver to arrive at a different solution.” In each of these cases, the outcome of the study run was not consistent. Each study involved small decreases to the Schedule Demand. However, one date showed an increase in approximate Generator Revenues while the other date showed a decrease.

The other dates which showed changes above the SRT included other issues as observed above.

The table below summarise the findings of each of the Trade Dates with SO-SO Trade that have been studied.

Dates	Variance	% Variance	Average Price Base Case	Average Price ReRun	Peak SMP Base Case	Peak SMP ReRun	SO-SO Trade Volume	Above SRT
02/11/2007	-€43,485.31	-0.68%	€58.56	€58.93	€102.26	€106.77	7.1260	No
14/11/2007	€760,276.97	8.14%	€77.68	€71.83	€372.82	€211.76	-256.1780	Yes
14/12/2007	€86,848.71	11.07%	€73.37	€60.78	€450.92	€226.22	10.8130	Yes
20/12/2007	-€197,376.29	-1.96%	€79.90	€81.32	€482.74	€482.74	7.9170	No
28/12/2007	-€19,860.32	-0.38%	€52.24	€52.63	€136.58	€151.27	27.0630	No
20/01/2008	-€15,119.80	-0.16%	€73.38	€76.67	€32.80	€32.80	369.9960	No
21/01/2008	€488,138.30	5.52%	€72.58	€69.38	€421.93	€241.85	29.5640	Yes
22/01/2008	-€97,749.02	-1.13%	€71.47	€72.24	€184.20	€235.82	29.1250	No
29/01/2008	€15,246.98	0.15%	€82.37	€82.23	€246.09	€248.14	27.4780	No
30/01/2008	€792,287.42	8.13%	€80.84	€74.73	€417.61	€417.61	37.1900	Yes
01/02/2008	€9,176.03	0.92%	€55.58	€4.73	€414.20	€414.24	35.6670	No

Dates	Variance	% Variance	Average Price Base Case	Average Price ReRun	Peak SMP Base Case	Peak SMP ReRun	SO-SO Trade Volume	Above SRT
04/02/2008	-€107,967.45	-0.94%	€2.33	€3.49	€468.32	€445.76	14.1670	No
26/02/2008	-€370,366.03	-4.39%	€72.64	€76.35	€403.53	€267.53	56.2760	Yes
21/03/2008	-€86,381.56	-1.30%	€7.01	€7.81	€19.03	€205.61	25.8330	No
29/03/2008	-€2,754.06	-0.04%	€74.94	€75.01	€22.77	€22.77	70.8330	No
30/03/2008	€36,518.51	5.97%	€16.31	€103.92	€61.72	€45.97	27.4970	Yes
31/03/2008	€456,648.01	4.27%	€6.81	€2.94	€247.68	€237.42	578.0420	Yes
01/04/2008	€16,890.31	0.21%	€75.63	€75.62	€101.96	€106.28	29.2700	No
22/04/2008	-€269,696.95	-3.19%	€79.14	€81.31	€8.66	€108.90	30.9160	Yes
08/05/2008	€97.42	0.00%	€7.58	€7.71	€134.40	€130.89	143.1250	No
27/05/2008	€1,320,178.55	11.52%	€107.08	€95.62	€245.66	€228.47	-51.9940	Yes
13/06/2008	€189,784.42	1.65%	€13.65	€12.82	€25.70	€298.69	819.0360	No
20/06/2008	€3,644.68	0.04%	€3.43	€3.59	€138.07	€138.09	266.6580	No
10/07/2008	-€423,465.04	-3.31%	€27.86	€32.04	€199.90	€215.88	117.0620	Yes
31/07/2008	€1,329.27	0.76%	€80.15	€79.16	€128.90	€116.71	30.7880	No
20/08/2008	€72,066.75	0.84%	€2.36	€1.83	€22.82	€22.82	59.9160	No
14/09/2008							-19.6200	
14/10/2008	€4,816.90	0.75%	€103.49	€105.44	€405.66	€406.18	2737.2340	No
15/10/2008	€24,314.19	0.21%	€10.45	€10.93	€96.85	€96.46	1583.4560	No
19/10/2008	€490,281.50	8.08%	€5.24	€1.78	€20.55	€68.15	3950.7660	Yes
15/11/2008	€25,585.63	12.29%	€5.92	€1.61	€257.94	€245.45	8899.5860	Yes
16/11/2008	€1,256,499.87	17.73%	€4.88	€7.48	€187.44	€181.93	8072.0420	Yes
17/11/2008	€299,119.14	4.23%	€0.63	€9.37	€181.30	€62.48	3109.2980	Yes
19/11/2008	€33,544.36	8.05%	€8.71	€4.85	€24.02	€12.42	1621.5480	Yes

Table 2 - SO-SO Trades results of analysis

Price Spikes

The list of dates which were to be included in the analysis are listed in Table 3 - Full List of Price Spikes below. This table also notes the extra issues observed on the Trade Dates being studies.

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU
14/11/2007	x				x	
05/12/2007		x			x	
10/12/2007		x			x	
14/12/2007	x				x	
19/12/2007		x			x	
20/12/2007	x				x	
21/12/2007		x			x	
29/12/2007		x			x	
03/01/2008		x	x		x	
05/01/2008		x			x	
10/01/2008					x	
15/01/2008		x		x	x	
16/01/2008					x	
17/01/2008					x	
19/01/2008		x	x		x	

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU
20/01/2008	x				x	
21/01/2008	x	x		x	x	
25/01/2008		x	x		x	
27/01/2008		x			x	
30/01/2008	x			x	x	
01/02/2008	x				x	
04/02/2008	x	x			x	
07/02/2008					x	x
15/02/2008					x	
16/02/2008		x			x	
18/02/2008			x		x	
20/02/2008		x			x	x
26/02/2008	x				x	x
29/02/2008		x			x	
03/03/2008			x		x	
04/03/2008				x	x	x
13/03/2008					x	
19/03/2008		x		x	x	
29/03/2008	x	x			x	
23/04/2008		x			x	
24/04/2008					x	
06/05/2008		x			x	
19/05/2008		x		x	x	
13/06/2008	x	x		x	x	
18/06/2008		x			x	
21/08/2008					x	
03/09/2008					x	x
13/10/2008					x	
14/10/2008	x			x	x	
15/10/2008	x				x	
16/10/2008					x	

Table 3 - Full List of Price Spikes

Of the dates reviewed for the presentations already made, it was observed that a number of other dates met the classification of Price Spike which had not been noted in the original counting. These were as noted in the table below -

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU
20/01/2008	x					
18/02/2008			x			
03/03/2008			x			
24/04/2008						
03/09/2008						x

Table 4 - Dates with Price Spikes previously omitted

These study dates have now been classed a Price Spike dates. This explains the increase in the overall number of Price Spike studies from 41 noted in the MOST presentation to 46. One of the dates noted had previously been considered a Case Control study.

Results Summary

Of the completed 46 Trade Dates, 17 fall above the SRT. It can be noted that -

- 5 of these 17 also had SO-SO Trades as noted above;
- 1 others had “abnormal” IEU quantities (this is 4th March 2008 which has already been corrected under a formal Dispute);
- 1 other with Kilroot step into oil close to error quantity;
- Of remaining 10, 4 had same peak SMP as base-case;

However, as noted with the SO-SO Trades above, there is no observable pattern here as with respect to the 24 Trade Dates that fall below the SRT, we can also note that –

- 7 of these 18 also had SO-SO Trades as noted above;
- 2 others had abnormal IEU quantities (these included dates in November 2008 which have already been corrected under formal Data Queries);
- 2 others with Kilroot step into oil close to error quantity;

Findings

Based on the results of the analysis, it was found that on 17 of the 46 dates studied, the application of the correct value of Schedule Demand would have resulted in market outcomes in the SEM that would have differed from the original outcomes by a value greater than the Settlement Recalculation Threshold.

Observations in the first interim report led to the inclusion of Price Spikes in the study cases. These were considered an “abnormal” outcome as opposed to the other issues which would be “abnormal” inputs to the MSP software. Studies were completed on all Trade Dates affected by the MSP Demand error where the System Marginal Price peaked at a value of greater than €300.

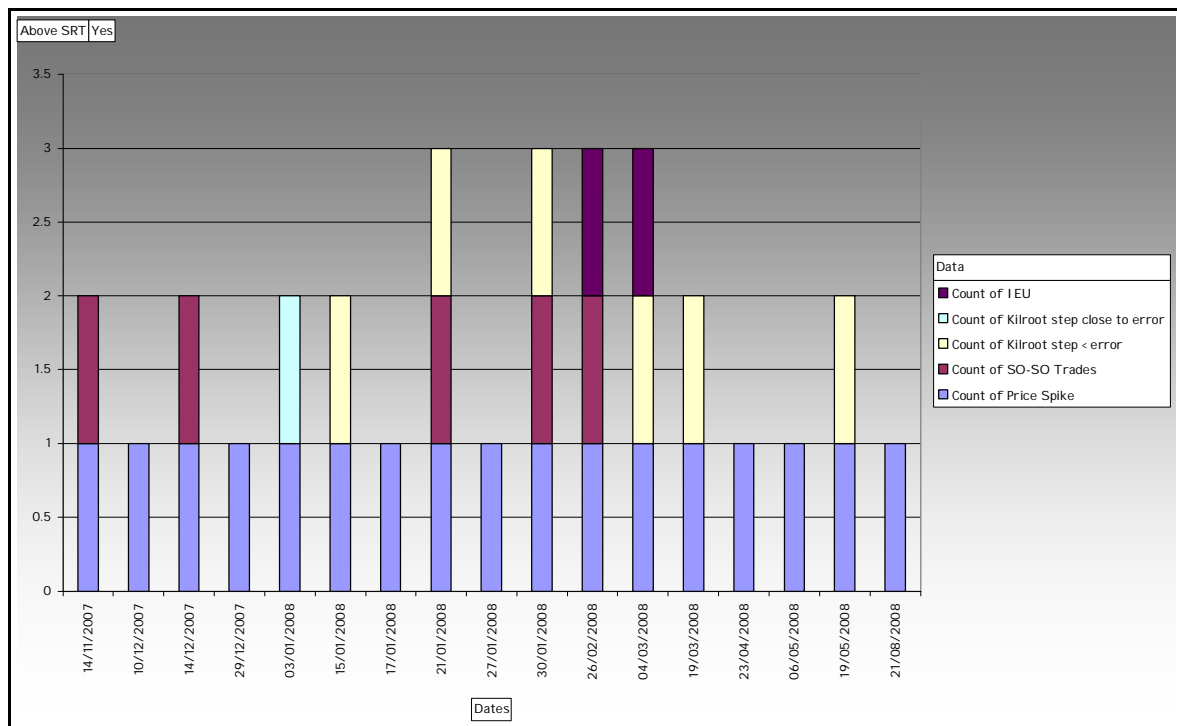


Figure 6 - Study Cases > SRT

As can be noted in figure 6 above, similarly to the SO-SO Trade Date studies, the greater number of dates above the SRT involved more than one issue. However, the same can also be observed with respect to dates below the SRT as in figure 7 below. These outcomes serve to demonstrate how changes to the Schedule Demand can cause the MSP solver to arrive at a different solution.

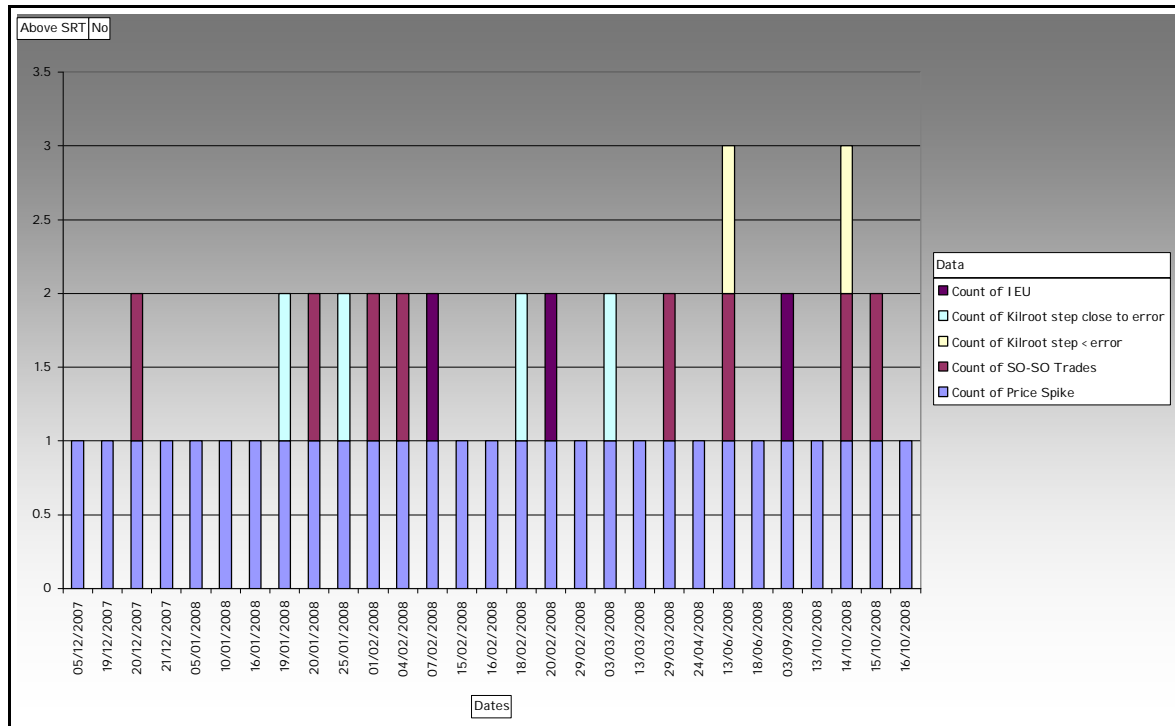


Figure 7 - Study Cases < SRT

Of the eight Trade Dates where the MW quantity of the error was greater than the step by the Kilroot dual rated Generator Unit into its oil step which resulted in Price Spikes, six of these produced changes in the schedule that were above the SRT. On two of these occasions, the peak SMP was still set by the Kilroot unit moving to its oil step. The change to the market revenue was brought about by changes to the frequency of the Price Spikes in the studies.

A total of 13 Trade Dates were studied where the MW quantity of the error was greater than the step by the Kilroot dual rated Generator Unit into its oil step. The remaining five did not cause Price Spikes as a result of lower oil prices towards the latter part of 2009. However, each of the five remaining days also included large quantities of SO-SO Trade. When these dates were studied, it was observed that the oil step of the Kilroot unit was not used as a result of correcting the input data. Although no Price Spikes were observed on these dates, the market changes observed were above the SRT. (The dates involved were 19/10/2008, 15/11/2008, 16/11/2008, 17/11/2008, and 19/11/2008. All of these dates are covered under the SO-SO Trade studies above.)

Based on the results of the analysis, it was found that on 13 of the 46 dates studied, the application of the correct value of Schedule Demand would have resulted in the Price Spikes not occurring in the SEM. Of these 13 dates, 4 of these were among the dates noted above as having a MW error quantity that was greater than the quantity of the Kilroot unit's step into its oil bid. Of these 13 dates, 10 fall above the Settlement Recalculation Threshold.

From this, it can be deduced that the error in the calculation of the MSP Demand, though a contributing factor on certain dates, was not the primary cause of Price Spikes observed in the SEM.

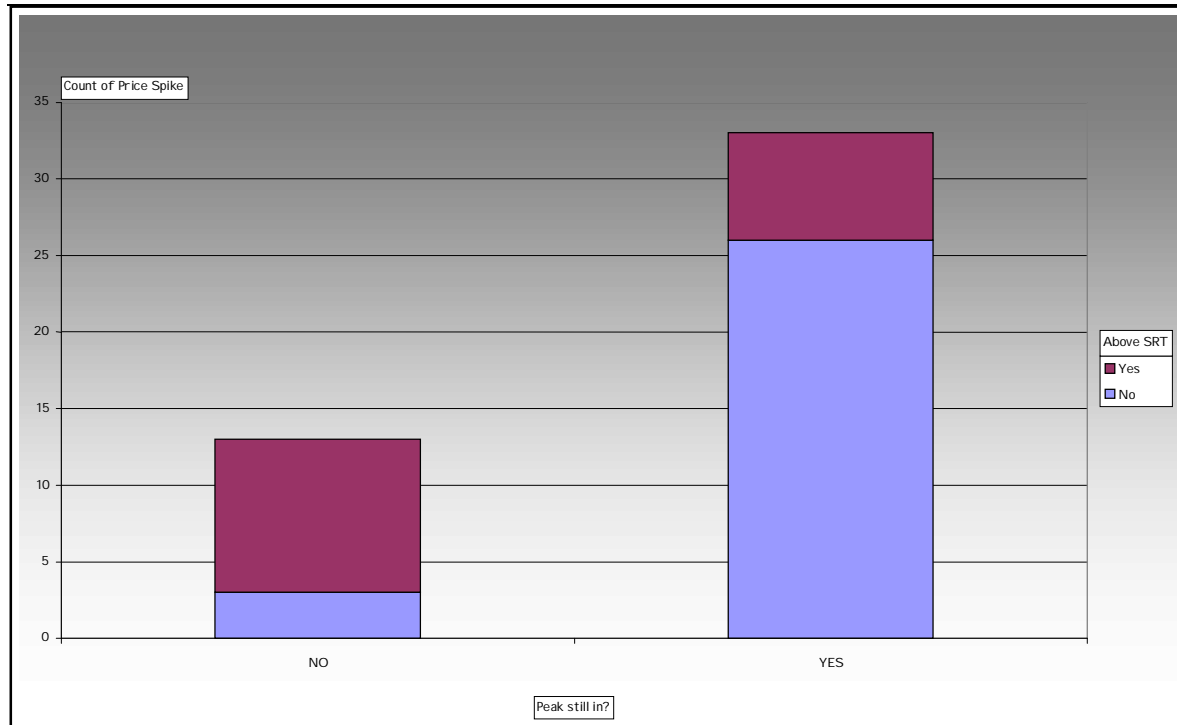


Figure 8 - Study Dates with Price Spike retained

The table below summarise the findings of each of the Trade Dates with Price Spikes that have been studied.

Dates	Variance	% Variance	Average Price Base Case	Average Price ReRun	Peak SMP Base Case	Peak SMP ReRun	Above SRT
14/11/2007	€760,276.97	8.14%	€77.68	€71.83	€72.82	€11.76	Yes
05/12/2007	-€55,369.77	-0.85%	€4.45	€5.12	€82.27	€82.27	No
10/12/2007	€1,967,186.62	-22.67%	€67.11	€79.78	€74.96	€74.96	Yes
14/12/2007	€886,848.71	11.07%	€67.37	€60.78	€450.92	€26.22	Yes
19/12/2007	-€160,898.95	-1.34%	€2.08	€3.84	€77.22	€77.22	No
20/12/2007	-€197,376.29	-1.96%	€79.90	€81.32	€82.74	€82.74	No
21/12/2007	-€8,411.77	-0.10%	€68.35	€68.45	€74.47	€74.47	No
29/12/2007	€577,158.44	8.48%	€64.26	€58.75	€435.63	€435.63	Yes
03/01/2008	€851,070.42	7.23%	€95.03	€88.00	€63.03	€62.92	Yes
05/01/2008	-€155,787.92	-2.12%	€67.48	€68.85	€52.78	€52.78	No
10/01/2008	€75,217.58	0.71%	€3.68	€3.07	€32.52	€32.52	No
15/01/2008	€376,723.02	3.10%	€94.56	€92.26	€26.66	€26.66	Yes
16/01/2008	-€16,599.79	-0.17%	€77.52	€77.70	€28.47	€28.52	No
17/01/2008	-€355,712.15	-3.89%	€76.14	€78.33	€60.30	€21.27	Yes
19/01/2008	-€35,944.01	-0.44%	€73.05	€73.33	€33.64	€33.64	No
20/01/2008	-€15,119.80	-0.16%	€73.38	€7.67	€32.80	€32.80	No
21/01/2008	€488,138.30	5.52%	€72.58	€69.38	€21.93	€41.85	Yes
25/01/2008	€747.73	0.01%	€73.67	€73.67	€30.96	€30.96	No
27/01/2008	€1,267,125.00	16.90%	€74.55	€63.16	€40.19	€19.79	Yes
30/01/2008	€792,287.42	8.13%	€80.84	€74.73	€17.61	€17.61	Yes
01/02/2008	€9,176.03	0.92%	€5.58	€4.73	€14.20	€14.24	No

Dates	Variance	% Variance	Average Price Base Case	Average Price ReRun	Peak SMP Base Case	Peak SMP ReRun	Above SRT
04/02/2008	-€107,967.45	-0.94%	€2.33	€3.49	€168.32	€445.76	No
07/02/2008	€76,821.37	0.94%	€70.02	€69.49	€98.60	€98.60	No
15/02/2008	€2,390.24	0.03%	€69.56	€69.52	€48.57	€48.23	No
16/02/2008	-€91.19	-0.01%	€68.93	€68.93	€32.26	€32.26	No
18/02/2008	-€2,200.54	-0.22%	€79.37	€79.55	€409.67	€409.67	No
20/02/2008	€266,757.14	2.72%	€80.16	€78.46	€15.95	€15.95	No
26/02/2008	-€370,366.03	-4.39%	€72.64	€76.35	€403.53	€267.53	Yes
29/02/2008	-€17,319.82	-1.41%	€72.21	€73.12	€90.98	€90.98	No
03/03/2008	-€8,995.46	-0.09%	€81.07	€81.16	€94.65	€89.86	No
04/03/2008	€559,609.05	4.80%	€93.94	€90.64	€84.47	€32.34	Yes
13/03/2008	-€43,710.21	-0.40%	€87.78	€88.14	€17.87	€17.87	No
19/03/2008	€299,638.01	3.24%	€76.53	€74.87	€439.56	€82.93	Yes
29/03/2008	-€2,754.06	-0.04%	€74.94	€75.01	€22.77	€22.77	No
23/04/2008	€1,187,764.18	8.90%	€120.82	€12.14	€94.56	€52.63	Yes
06/05/2008	€778,495.24	8.43%	€0.32	€3.30	€99.68	€61.91	Yes
19/05/2008	€30,227.82	6.39%	€6.59	€1.18	€25.44	€26.79	Yes
13/06/2008	€189,784.42	1.65%	€13.65	€12.82	€25.70	€98.69	No
18/06/2008	-€10,463.43	-0.11%	€9.41	€0.12	€02.93	€53.58	No
21/08/2008	-€90,372.94	-10.47%	€1.05	€9.26	€51.46	€51.46	Yes
03/09/2008	€3,319.12	0.09%	€8.97	€8.61	€61.35	€86.38	No
13/10/2008	€1,916.74	0.31%	€3.94	€3.78	€30.39	€14.75	No
14/10/2008	€4,816.90	0.75%	€03.49	€05.44	€05.66	€06.18	No
15/10/2008	€2,314.19	0.21%	€10.45	€10.93	€96.85	€96.46	No
16/10/2008	-€14,284.62	-1.14%	€7.44	€8.41	€97.91	€97.91	No

Table 5 - Price Spikes, results of analysis

Interconnector Error Unit

The list of dates which were to be included in the analysis are listed in Table 6 - Full List of abnormal Interconnector Error Unit quantities below. This table also notes the extra issues observed on the Trade Dates being studied.

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU
06/01/2008						X
06/02/2008						X
07/02/2008					X	X
20/02/2008		X			X	X
26/02/2008	X				X	X
04/03/2008				X	X	X
31/03/2008	X					X
10/04/2008						X
01/05/2008						X
27/05/2008	X					X
11/06/2008						X
19/06/2008						X
21/06/2008						X

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU
25/06/2008						x
05/07/2008						x
06/07/2008						x
07/07/2008						x
10/07/2008	x					x
11/07/2008						x
13/07/2008						x
19/07/2008						x
23/07/2008						x
26/07/2008						x
30/07/2008						x
13/08/2008						x
20/08/2008	x					x
30/08/2008						x
03/09/2008					x	x
04/09/2008						x
12/09/2008						x
14/09/2008	x					x
25/10/2008						x
26/10/2008						x
03/11/2008						x
15/11/2008	x			x		x
16/11/2008	x			x		x

Table 6 - Full List of abnormal Interconnector Error Unit quantities

Of the dates reviewed for the MSP Demand studies, the Interconnector Error Unit's Metered Generation was incorrectly included in the MSP Demand for all dates 97 dates included. As such, SEMO adopted the approach set out above to determine what could be classed as an "abnormal" Interconnector Error Unit quantity. In reviewing the data, 32 Trade Dates were selected. Of these, 21 were considered "unique" cases in that each Trade Date had only this issue. 10 further cross-over dates were also selected.

Results Summary

Of the completed 32 Trade Dates, 7 fall above the SRT. It can be noted that -

- 6 of these 17 also had SO-SO Trade, as noted;
- 2 other had Price Spike events;
- 1 date had both SO-SO Trade and Price Spike;

Of the 21 "unique" dates, all of these fall below the SRT.

Findings

The only Trade Dates under this sub-grouping that fall above the SRT have already been documented under the SO-SO Trades and Price Spikes headings.

When reviewing the 21 "unique" cases, the indication is that the inclusion of the Metered Generation for the Interconnector Error Unit, the most pervasive issue as this occurs for all 396 Trade Dates for which the MSP Demand was incorrect, does not appear to be enough in itself to change the outcomes of the SEM by values greater than the SRT.

Figures 9 through to 12 show the values of summed Metered Generation for the Interconnector Error Unit, the maximum import and export by the IEU per Trading Period in a Trade Date and the Standard Deviation of Metered Generation values across the Trade Date. What can be observed from these graphs is that the extreme values are not falling above the SRT.

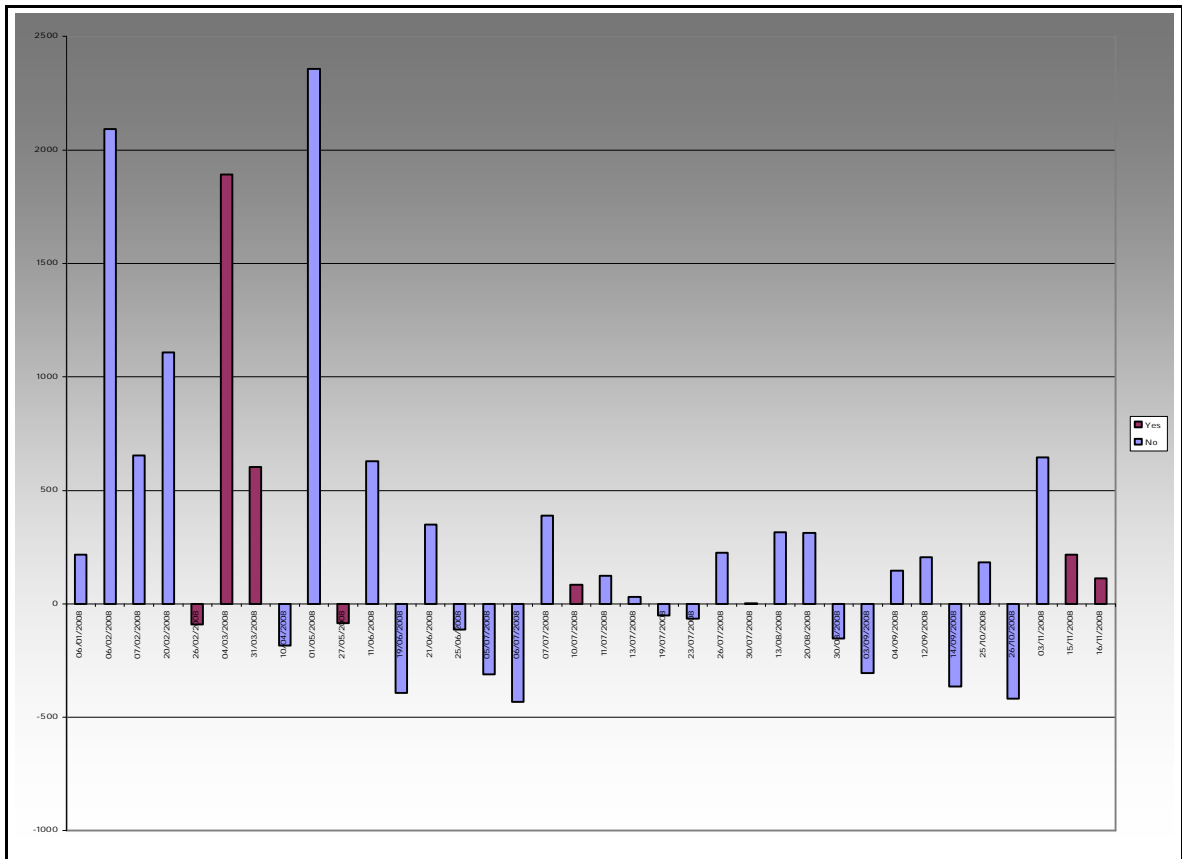


Figure 9 - Summed MG for IEU

In figure 9, of the five highest values of Metered Generation per Trade Day on the Interconnector Error Unit, only one of the five falls above the SRT.

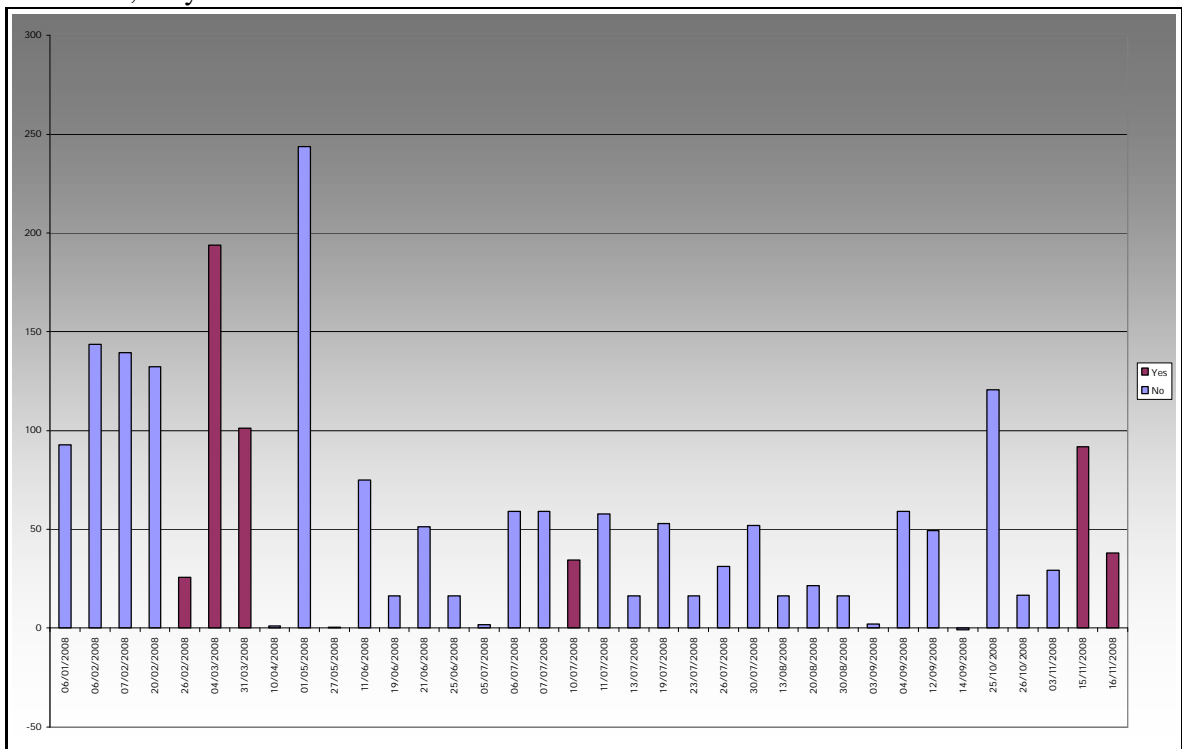


Figure 10 - Max value of MG for IEU, per Trading Period

Equally in figure 10, of the five highest values of import per Trading Period within a Trade Day on the Interconnector Error Unit, only one of the five falls above the SRT.

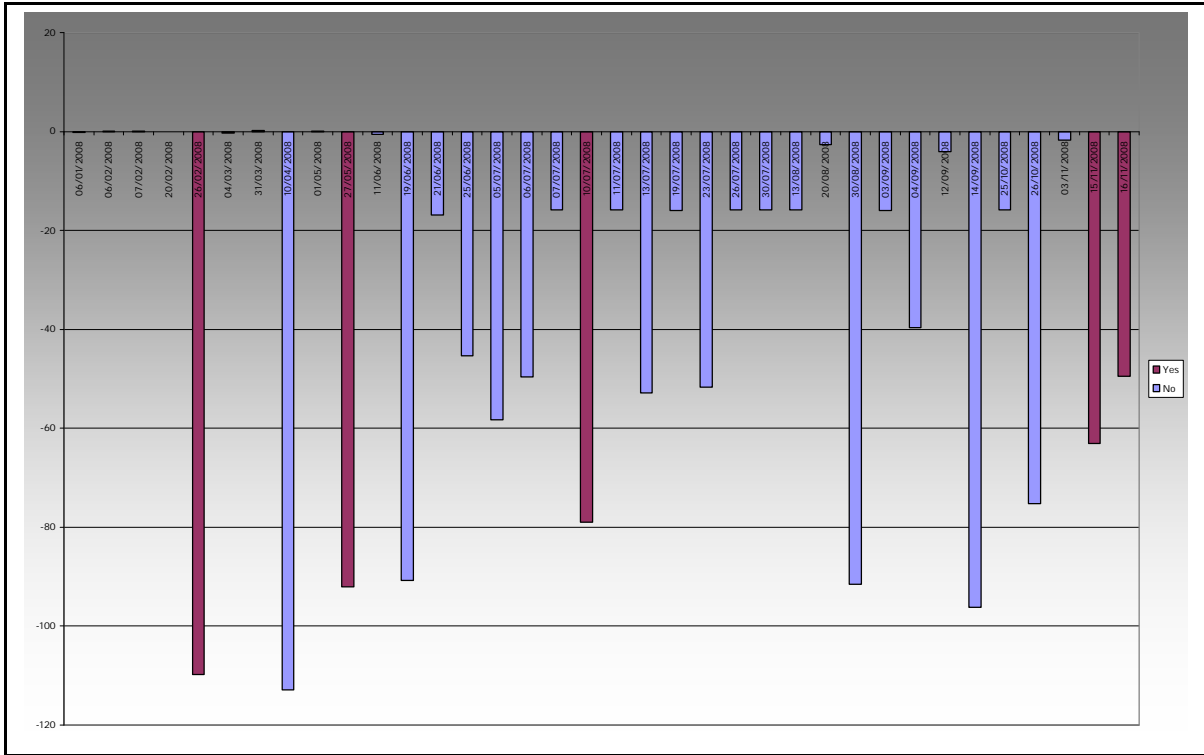


Figure 11 - Min value of MG for IEU, per Trading Period

Equally in figure 11, two of the five highest values of export per Trading Period within a Trade Day on the Interconnector Error Unit fall above the SRT, though of 15 events where the quantity is greater than 40MW, only five are above the SRT.

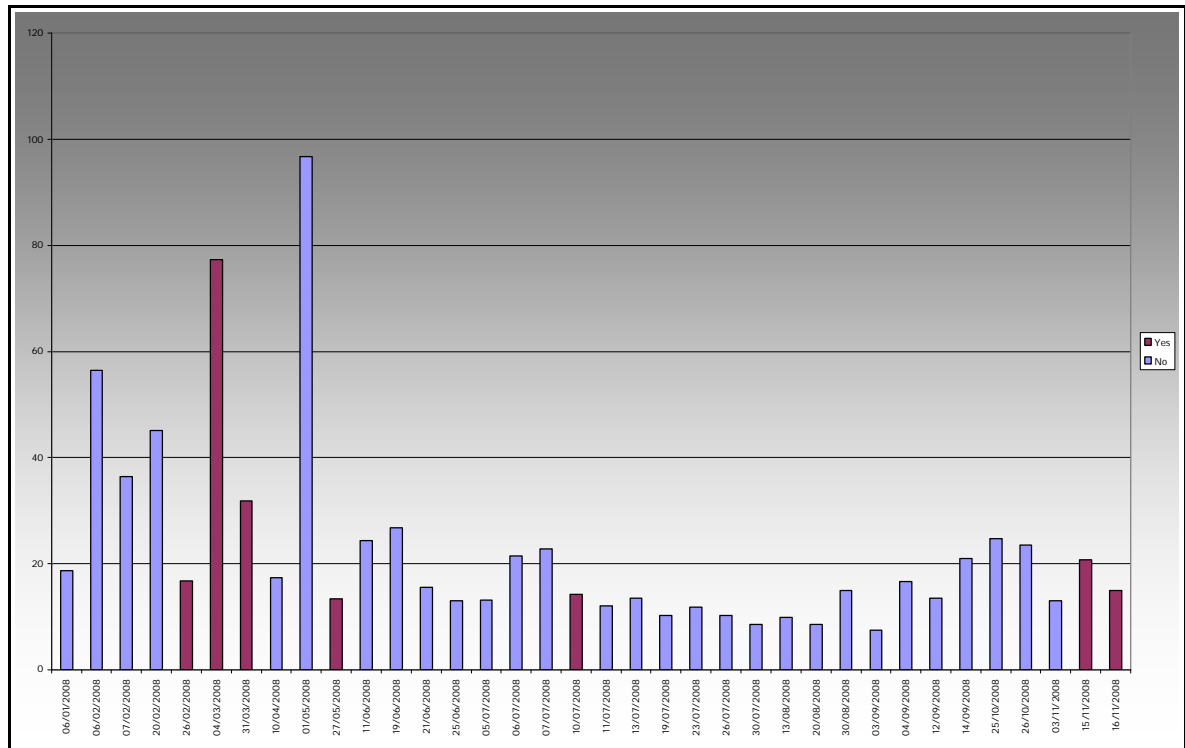


Figure 12 - Standard Deviation of MG for IEU, across Trade Date

Equally in figure 12, of the five highest values of Standard Deviation across a Trade Day on the Interconnector Error Unit, only one of the five falls above the SRT.

The table below summarise the findings of each of the Trade Dates with abnormal quantities of Metered Generation for the Interconnector Error Unit that have been studied.

Dates	Variance	% Variance	Sum MG of IEU	Max MGEU	Min MGEU	StdDev MGEU	Above SRT
06/01/2008	-€6,087.30	-0.08%	215.5960	92.9320	-0.2040	18.6848	No
06/02/2008	-€23,621.43	-2.29%	2093.4100	143.6000	0.0720	56.4977	No
07/02/2008	€76,821.37	0.94%	654.9660	139.4800	0.0720	36.3878	No
20/02/2008	€266,757.14	2.72%	1107.6240	132.4720	0.0120	45.1476	No
26/02/2008	-€370,366.03	-4.39%	-91.6180	25.6280	-109.8020	16.7915	Yes
04/03/2008	€59,609.05	4.80%	1892.8340	193.8920	-0.2240	77.2820	Yes
31/03/2008	€456,648.01	4.27%	602.3960	101.2320	0.3000	31.8470	Yes
10/04/2008	-€24,327.08	-0.25%	-184.6200	1.0120	-112.9260	17.4109	No
01/05/2008	-€81,367.52	-0.88%	2357.0620	243.9520	0.0720	96.7938	No
27/05/2008	€1,320,178.55	11.52%	-85.2940	0.3620	-92.1280	13.3220	Yes
11/06/2008	€89,527.18	0.77%	628.6820	75.0600	-0.5580	24.3028	No
19/06/2008	-€40,003.46	-0.45%	-393.7920	16.3400	-90.7880	26.7706	No
21/06/2008	€4,566.77	0.06%	348.9740	51.3000	-16.8800	15.5892	No
25/06/2008	€71,321.59	0.80%	-112.1760	16.2800	-45.3100	12.9972	No
05/07/2008	-€32,901.70	-0.45%	-311.0500	1.6760	-58.2980	13.1039	No
06/07/2008	€501.63	0.01%	-432.4100	59.2000	-49.5900	21.4639	No
07/07/2008			387.5960	59.2000	-15.8000	22.7621	
10/07/2008	-€423,465.04	-3.31%	83.4300	34.4600	-78.9640	14.2603	Yes
11/07/2008	-€61,533.58	-0.61%	122.8080	57.7800	-15.8600	12.0060	No
13/07/2008	€2,318.14	0.03%	29.0680	16.3400	-52.8400	13.5226	No
19/07/2008	€1,236.38	0.02%	-51.4300	52.9180	-15.8800	10.1919	No
23/07/2008	€196,739.21	2.47%	-63.9480	16.2600	-51.6280	11.7563	No
26/07/2008	-€1,649.83	-0.02%	226.1840	31.2700	-15.8000	10.3112	No
30/07/2008	€211,312.20	2.78%	2.1840	52.0100	-15.8000	8.6023	No
13/08/2008	€32,866.02	0.41%	314.7620	16.2800	-15.8000	9.8970	No
20/08/2008	€72,066.75	0.84%	312.5520	21.6500	-2.6220	8.5494	No
30/08/2008	€23,020.26	0.31%	-153.6720	16.2000	-91.5960	14.9404	No
03/09/2008	€9,319.12	0.09%	-305.1200	1,9480	-15.8800	7.4259	No
04/09/2008	€13,974.06	0.14%	144.6180	59.2000	-39.5980	16.6129	No
12/09/2008	-€17,753.58	-0.95%	205.1020	49.2600	-4.0140	13.5493	No
14/09/2008			-364.7480	-0.8000	-96.2600	21.0379	
25/10/2008			183.7600	120.5400	-15.8000	24.6670	
26/10/2008			-417.4420	16.5400	-75.1900	23.5090	
03/11/2008	€8,713.94	0.18%	645.8000	29.1400	-1.6980	13.0054	No
15/11/2008	€25,585.63	12.29%	215.2800	91.8000	-63.0380	20.8050	Yes
16/11/2008	€1,256,499.87	17.73%	112.6240	37.9000	-49.5180	14.9130	Yes

Table 7 - Interconnector Error Unit, results of analysis

Case Control Studies

The list of dates which were to be included in the analysis are listed in Table 8 - Full List of Case Control Studies below. This table also notes the extra issues observed on the Trade Dates being studies.

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU	Case-control study
09/03/2008							X
03/05/2008							X
11/05/2008							X
23/05/2008							X
15/06/2008							X
16/06/2008							X
17/06/2008							X
29/07/2008							X
05/08/2008							X
21/09/2008							X
09/10/2008							X

Table 8 - Full List of Case Control Studies

Of the dates reviewed for the presentations already made, one Trade Date (April 24th) has since been noted to have included a maximum System Marginal Price of over €400. This date has now been classed as a Price Spike date and is no longer included in the Case Control observations. As such, only 10 Case Control studies have been completed and not the 12 as originally selected.

Results Summary

Of the completed 10 Trade Dates, it can be noted that all of the dates studied fall below the value of the Settlement Recalculation Threshold.

Findings

Each of the Case Control Studies did also include values relating to the Metered Generation for the Interconnector Error Unit in the original base cases. As such, this further supports the findings noted above with respect to the Interconnector Error Unit *“the indication is that the inclusion of the Metered Generation for the Interconnector Error Unit ... does not appear to be enough in itself to change the outcomes of the SEM by values greater than the SRT.”*

It should be noted that the Case Control studies included a Trade Date where the sum of the Metered Generation for the Interconnector Error Unit was 271MW for the Trade Date. Also included were Trade Dates which had a maximum export of over 40MW and a maximum import of over 35MW.

The table below summarises the findings of each of the Trade Dates selected as Case Control Studies that have been studied.

Dates	Variance	% Variance	Average Price Base Case	Average Price ReRun	Sum MG of IEU	Max MGEU	Min MGEU	StdDev MGEU	Above SRT
09/03/2008	-€8,474.15	-0.50%	€7.72	€8.15	15.9100	0.5980	0.2320	0.0762	No
03/05/2008	-€7,576.27	-0.13%	€7.89	€7.97	4.8560	0.1520	0.0720	0.0340	No
11/05/2008					11.2560	0.2720	0.1920	0.0342	
23/05/2008	€10,414.84	0.14%	€6.46	€6.41	271.0480	16.3400	-0.0620	7.6083	No
15/06/2008	€1,097.37	0.02%	€8.21	€8.21	31.3020	31.3180	-2.9080	4.5491	No
16/06/2008	-€9,338.77	-0.48%	€101.97	€102.29	-0.4420	0.6000	-3.8420	0.6534	No
17/06/2008	€5,004.38	0.55%	€4.08	€3.03	0.5200	1.5960	-0.9840	0.3065	No

Dates	Variance	% Variance	Average Price Base Case	Average Price ReRun	Sum MG of IEU	Max MGEU	Min MGEU	StdDev MGEU	Above SRT
29/07/2008	€0,421.99	0.80%	€76.58	€75.89	-2.9600	16.3400	-45.0600	9.6833	No
05/08/2008	€7,251.51	0.76%	€76.26	€75.66	31.5320	37.4800	-15.8600	9.8703	No
21/09/2008	-€13,127.51	-0.17%	€94.42	€94.49	-41.4540	-0.8000	-0.9400	0.0326	No
09/10/2008	€38,619.00	1.93%	€67.64	€66.29	-41.4540	-0.8000	-0.9400	0.0286	No

Table 9 - Case Control Studies, results of analysis

Conclusion

As noted above, all Trade Dates that fall above the SRT included either a quantity of SO-SO Trade included as an input to the MSP Demand or a Price Spike as an outcome of the MSP software run. There is also the indication that, excepting Price Spike events, with respect to the MSP Demand error, multiple issues are generally required to cause the market error to be above the SRT. Figure 13 below shows that off 27 Trade Dates that fell above the SRT only nine of these featured only a single issue (that issue being either the SO-SO Trade or a Price Spike outcome).

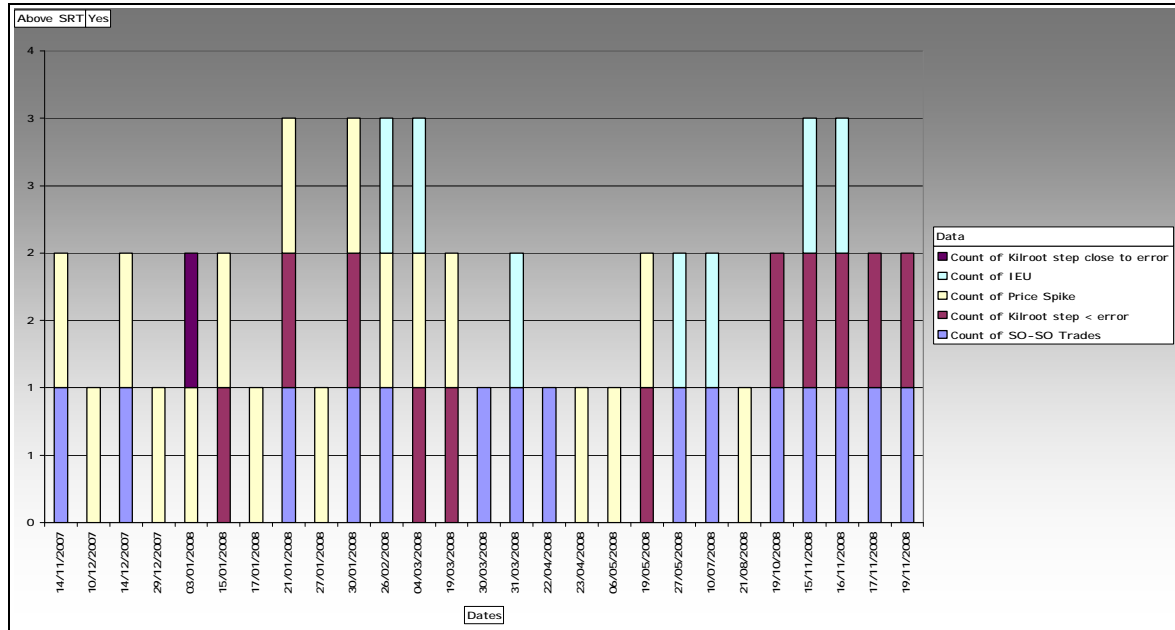


Figure 13 - All study dates > SRT

Similarly, figure 14 below shows that of the 70 study dates that fell below the SRT, only 17 involved multiple issues. It should also be noted that on 14 out of 29 occasions the presence of a Price Spike alone did not result in the market changes on the Trade Date being greater than the SRT.

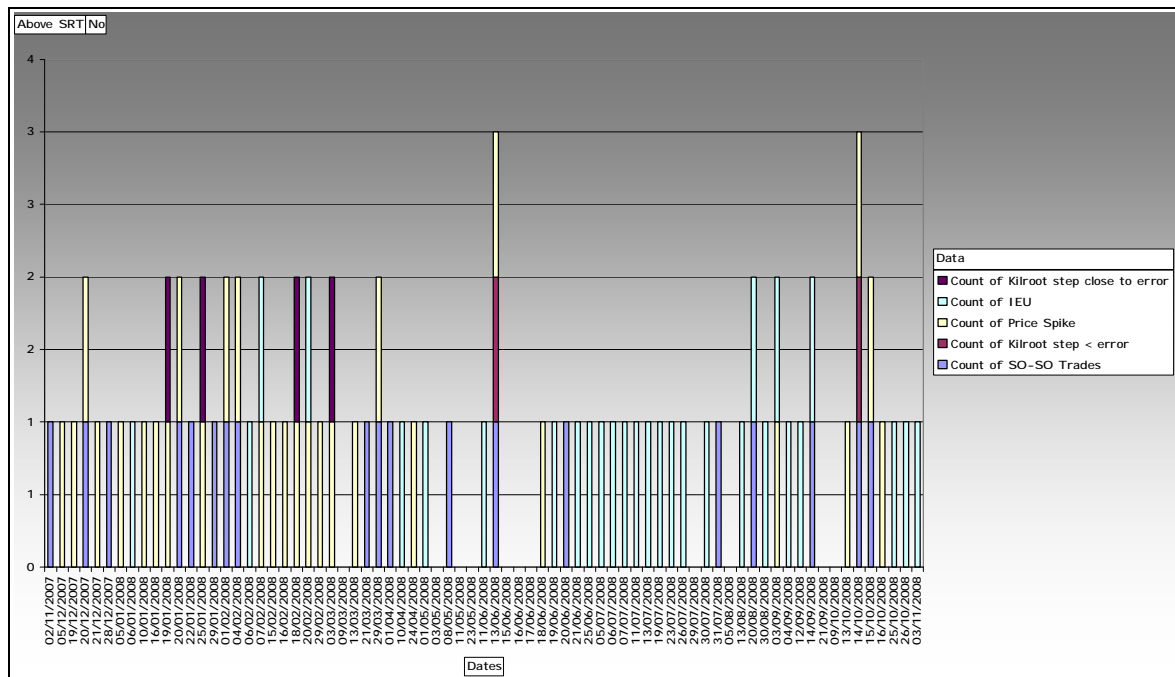


Figure 14 - All study dates < SRT

Figure 15 below shows the values of the variance between the base case solution and the study case solution, in each case expressed as a percentage of the base case. As the value is calculated as the difference between the base case and the new study case, positive values of percentage variance represent how much higher the base case is to the study case. As such, positive values shown below represent a reduction in the market revenues under a proposed re-pricing.

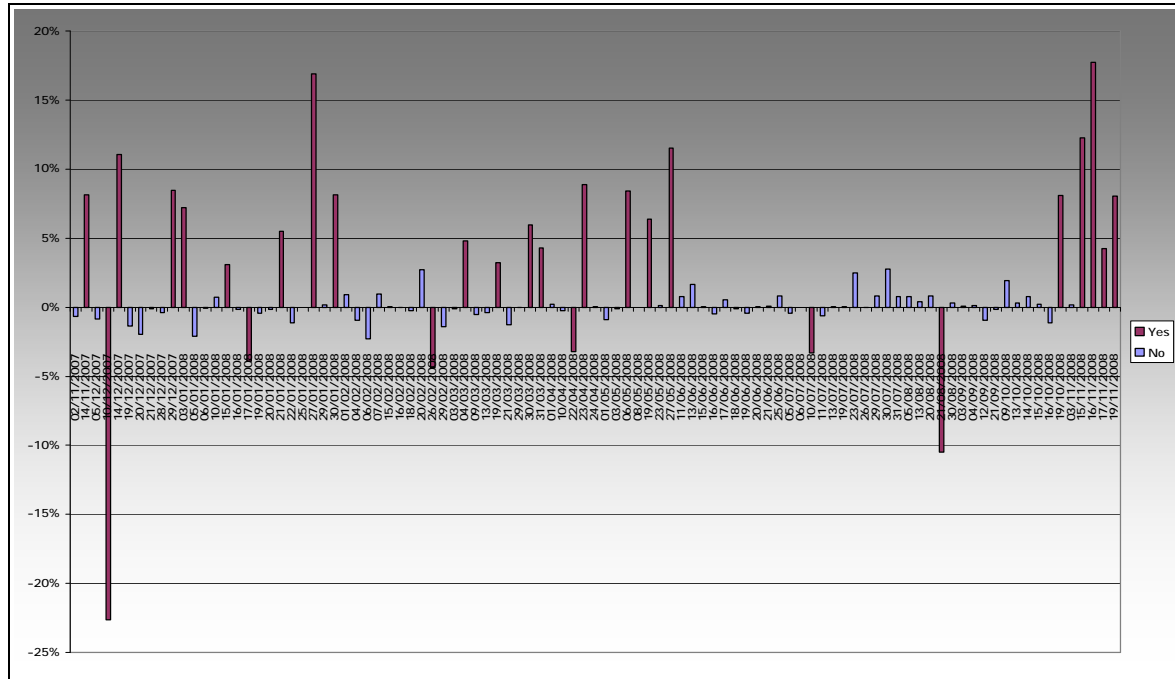


Figure 15 - Values of SRT for all Study Dates

As can be observed from the above graph, the general trend is that the results of the study cases have lower market revenues than the original cases. This is in line with expectations as the error in the calculation of the MSP Demand in most instances led to an increase in the MSP Demand. This in turn would lead to an increase in Market Schedule Quantities for Generators. Correcting the inputs to the MSP Demand will in these instances reduce the total Market Schedule Quantities for Generators.

It should be noted that although we refer to market revenues, because the correction of the MSP Demand value will directly impact the Market Schedule Quantities of Generators, Generator payments may be more obviously affected. Supplier charges are based on Metered Demand which remains unchanged through all this (this also applies to the Jurisdictional Error Supplier Units whose quantities are calculated from Metered Demand and Metered Generation values). As such, Supplier charges are impacted only in so far as the System Marginal Price changes.

The total value of the difference between the base case and study case for all Trade Dates reviewed is €11,099,356. For dates that fall below the SRT, the total value of these dates is €2,417. That is, the dates that fall above the SRT represent 99.98% of the noted value of the variances. Table 10 below shows the value of the variances, including the value for dates that have already been re-priced.

Below SRT	€2,417.86
Above SRT - Not Re-priced	€7,422,580.37
Above SRT – Re-priced	€3,674,358.05
Grand Total	€11,099,356.28

Table 10 - Value of Variance

SEMO has now completed the studies as proposed to Participants at the Market Operator User Group on December 2nd 2009. The results of these studies can be summarised as follows –

	Below SRT	Above SRT	Grand Total
SO-SO Trades	18	15	33
Kilroot step close to error	4	1	5
Kilroot step < error	2	11	13
Price Spike	29	17	46
Abnormal IEU quantity	25	7	32
Case-control study	10	-	10
<i>Dates Studied</i>	70	27	97

Table 11 - Summary of Results

97 Trade Dates have been studied out of the 396 impacted.

Of the 97, 66 contained issues which are exclusive to these dates (SO-SO Trades and Price Spikes) and do not occur on any of the other 330 Trade Dates which are impacted. The 27 dates which fall above the SRT are all in this group of cases.

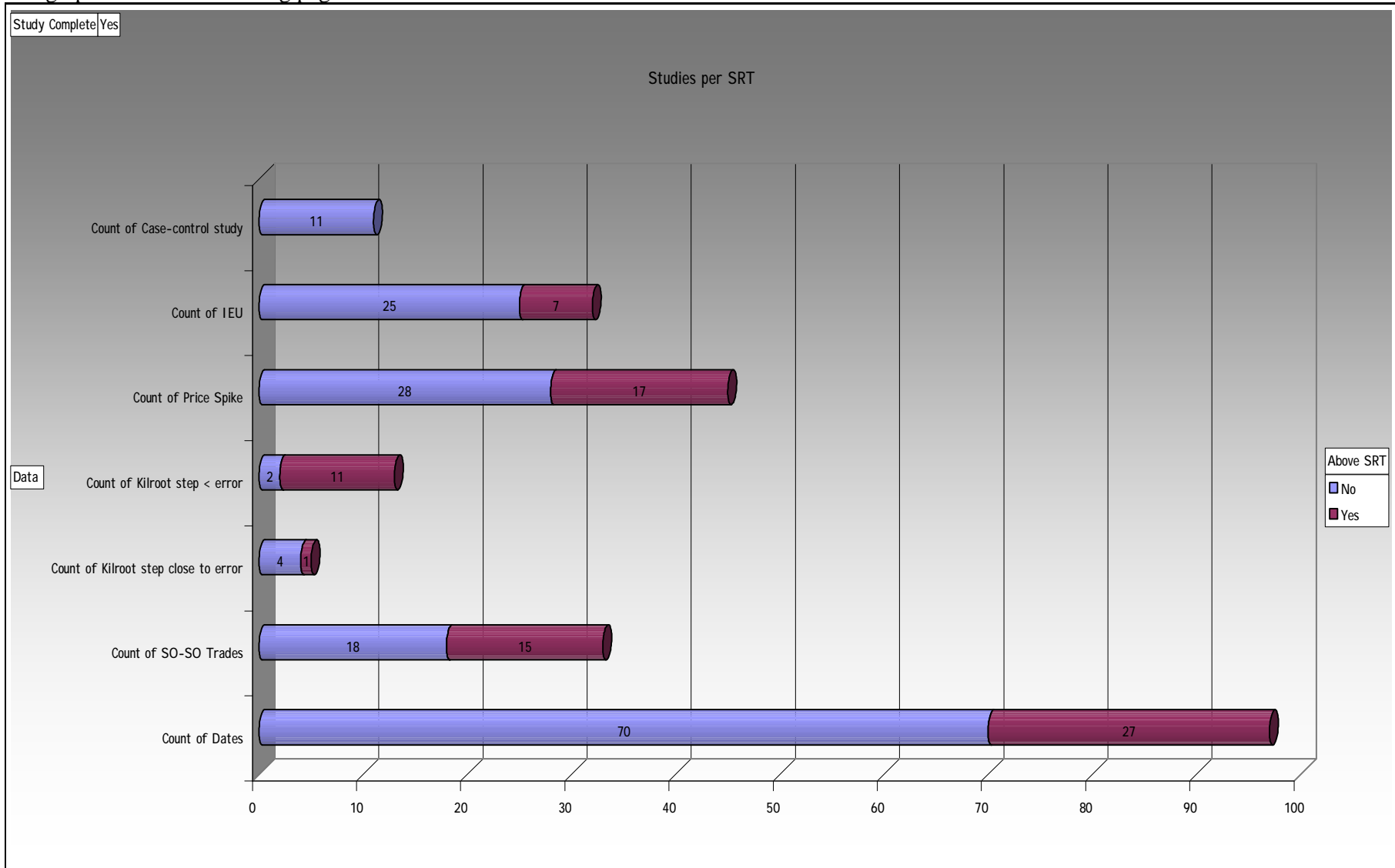
The remaining 31 Trade Dates that were studied, representing explicitly the “unique” Interconnector Error Unit issue and the Case Control Studies, can be considered a sample of the remaining 330 Trade Dates which are impacted

Of the 97 Trade Dates studied, which included all Price Spike events, all SO-SO Trade events and a sample of dates with IEU issues, 27 dates fall above the Settlement Recalculation Threshold. Of these 27, five have already been separately corrected under formal Data Queries and a formal Settlement Dispute. As such, this leaves 22 Trade Dates which are at issue.

SEMO believes that the variance between the corrected market outcomes as demonstrated in the studies warrant that only the Trade Dates where the variance is greater than the Settlement Recalculation Threshold should be repriced. SEMO recognises that for dates that are beyond the timetable for queries as set out in the Code a further Code modification will be required and will take action to raise such a modification.

SEMO proposes that next steps in the resolution of this matter are discussed at the April 2009 SEM Conference Call.

The graph below the following page demonstrates the issues as studies and the number of dates under each issue that are above the SRT.



Appendix 1 – Study Dates Identified

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU	Case-control study
02/11/2007	x						
14/11/2007	x				x		
05/12/2007		x			x		
10/12/2007		x			x		
14/12/2007	x				x		
19/12/2007		x			x		
20/12/2007	x				x		
21/12/2007		x			x		
28/12/2007	x						
29/12/2007		x			x		
03/01/2008		x	x		x		
05/01/2008		x			x		
06/01/2008						x	
10/01/2008					x		
15/01/2008		x		x	x		
16/01/2008					x		
17/01/2008					x		
19/01/2008		x	x		x		
20/01/2008	x				x		
21/01/2008	x	x		x	x		
22/01/2008	x						
25/01/2008		x	x		x		
27/01/2008		x			x		
29/01/2008	x						
30/01/2008	x			x	x		

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU	Case-control study
01/02/2008	x				x		
04/02/2008	x	x			x		
06/02/2008						x	
07/02/2008					x	x	
15/02/2008					x		
16/02/2008		x			x		
18/02/2008			x		x		
20/02/2008		x			x	x	
26/02/2008	x				x	x	
29/02/2008		x			x		
03/03/2008			x		x		
04/03/2008				x	x	x	
09/03/2008							x
13/03/2008					x		
19/03/2008		x		x	x		
21/03/2008	x						
29/03/2008	x	x			x		
30/03/2008	x						
31/03/2008	x					x	
01/04/2008	x						
10/04/2008						x	
22/04/2008	x						
23/04/2008		x			x		
24/04/2008					x		
01/05/2008						x	
03/05/2008							x
06/05/2008		x			x		

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU	Case-control study
08/05/2008	x						
11/05/2008							x
19/05/2008		x		x	x		
23/05/2008							x
27/05/2008	x					x	
11/06/2008						x	
13/06/2008	x	x		x	x		
15/06/2008							x
16/06/2008							x
17/06/2008							x
18/06/2008		x			x		
19/06/2008						x	
20/06/2008	x						
21/06/2008						x	
25/06/2008						x	
05/07/2008						x	
06/07/2008						x	
07/07/2008						x	
10/07/2008	x					x	
11/07/2008						x	
13/07/2008						x	
19/07/2008						x	
23/07/2008						x	
26/07/2008						x	
29/07/2008							x
30/07/2008						x	
31/07/2008	x						

Dates	SO-SO Trades	Dual Rating Study	Kilroot step close to error	Kilroot step < error	Price Spike	IEU	Case-control study
05/08/2008							x
13/08/2008						x	
20/08/2008	x					x	
21/08/2008					x		
30/08/2008						x	
03/09/2008					x	x	
04/09/2008						x	
12/09/2008						x	
14/09/2008	x					x	
21/09/2008							x
09/10/2008							x
13/10/2008					x		
14/10/2008	x			x	x		
15/10/2008	x				x		
16/10/2008					x		
19/10/2008	x			x			
25/10/2008						x	
26/10/2008						x	
03/11/2008						x	
15/11/2008	x			x		x	
16/11/2008	x			x		x	
17/11/2008	x			x			
19/11/2008	x			x			
Total Days	34	23	5	13	46	36	11

Table 12 - List of study dates (dates not completed highlighted)

Appendix 2 – Error MW compared to Dual Rated Generator step into Oil

TRADE DATE	DELIVERY HOUR	DELIVERY INTERVAL	Marginal Generator Unit	SMP	MW Into Oil Bid Step	SO-SO Trade	MGEU MW
19/12/2007	18	2	GU_500060	477.22	8.194	0	-0.094
19/12/2007	19	1	GU_500060	477.22	3.676	0	0.566
20/12/2007	18	1	GU_500070	482.74	3.632	0	0.072
21/12/2007	18	2	GU_500070	474.47	29.274	0	0.072
21/12/2007	19	1	GU_500060	474.47	22.202	0	-0.034
29/12/2007	18	2	GU_500070	435.63	3.275	0	0.152
29/12/2007	19	1	GU_500070	435.63	23.534	0	0.132
03/01/2008	12	1	GU_500060	460.98	7.583	0	0.672
03/01/2008	18	2	GU_500060	463.03	1.556	0	0.112
03/01/2008	19	1	GU_500060	463.03	0.659	0	0.628
05/01/2008	18	2	GU_500060	452.78	14.293	0	0.072
10/01/2008	18	2	GU_500060	432.52	4.399	0	1.054
15/01/2008	18	1	GU_500060	326.66	1.258	0	1.232
15/01/2008	19	1	GU_500060	326.66	0.087	0	1.152
15/01/2008	20	1	GU_500060	326.66	3.656	0	1.466
16/01/2008	18	2	GU_500060	328.47	14.195	0	1.032
17/01/2008	18	2	GU_500060	360.3	6.188	0	0.844
19/01/2008	19	1	GU_500060	333.64	1.67	0	-0.134
20/01/2008	12	1	GU_500060	332.8	2.031	0	0.072
21/01/2008	18	2	GU_500070	421.93	1.393	29.564	9.338
25/01/2008	18	2	GU_500070	430.96	16.077	0	-0.088
25/01/2008	19	1	GU_500070	430.96	1.959	0	0.408
27/01/2008	13	2	GU_500070	440.19	16.837	0	0.132
27/01/2008	14	1	GU_500070	440.19	17.634	0	0.072
30/01/2008	12	2	GU_500070	417.61	7.419	26.79	0.58
30/01/2008	13	1	GU_500070	417.61	23.538	0	0.232
01/02/2008	19	1	GU_500070	414.2	7.827	0	0.186
04/02/2008	18	2	GU_500070	468.32	3.065	0	1.164

TRADE DATE	DELIVERY HOUR	DELIVERY INTERVAL	Marginal Generator Unit	SMP	MW Into Oil Bid Step	SO-SO Trade	MGEU MW
07/02/2008	19	1	GU_500070	398.6	24.041	0	0.392
15/02/2008	19	2	GU_500070	348.57	22.934	0	0.212
16/02/2008	19	1	GU_500060	332.26	7.323	0	0.072
16/02/2008	19	2	GU_500060	332.26	12.455	0	0.132
18/02/2008	19	2	GU_500070	409.67	1.497	0	-0.14
20/02/2008	19	1	GU_500070	415.95	18.496	0	0.012
20/02/2008	19	2	GU_500070	415.95	4.045	0	0.072
26/02/2008	20	2	GU_500070	403.53	3.515	0	0.488
29/02/2008	20	1	GU_500070	390.98	9.972	0	0.472
03/03/2008	20	1	GU_500060	394.65	1.957	0	0.362
04/03/2008	20	1	GU_500060	384.47	0.559	0	0.598
04/03/2008	20	2	GU_500060	384.47	14.785	0	0.538
13/03/2008	20	1	GU_500060	417.87	5.976	0	0.928
19/03/2008	20	2	GU_500060	439.56	0.045	0	0.848
29/03/2008	20	1	GU_500060	422.77	26.398	0	0.104
23/04/2008	9	1	GU_500060	494.56	13.146	0	0.072
23/04/2008	9	2	GU_500070	494.56	32.526	0	0.072
23/04/2008	10	1	GU_500060	494.56	9.462	0	0.132
23/04/2008	10	2	GU_500060	494.56	30.82	0	0.072
06/05/2008	22	2	GU_500070	499.68	5.798	0	0.212
19/05/2008	18	1	GU_500070	525.44	0.025	0	0.272
13/06/2008	12	1	GU_500060	525.7	5.17	150.074	0.398
21/08/2008	12	2	GU_500070	551.46	1.461	0	-0.86
13/10/2008	20	1	GU_500070	430.39	11.775	0	-1.192
14/10/2008	18	1	GU_500060	405.66	6.016	300.248	0.8
14/10/2008	18	2	GU_500060	405.66	12.678	300.248	0.8
15/10/2008	20	1	GU_500060	404.72	18.559	0	-0.268
16/10/2008	20	1	GU_500060	397.91	5.578	0	-0.31
18/10/2008	19	2	GU_500060	299.85	2.163	0	-0.826
19/10/2008	19	2	GU_500060	220.55	27.39	100	0

TRADE DATE	DELIVERY HOUR	DELIVERY INTERVAL	Marginal Generator Unit	SMP	MW Into Oil Bid Step	SO-SO Trade	MGEU MW
21/10/2008	9	1	GU_500070	289.24	2.53	0	-1.434
21/10/2008	19	2	GU_500070	289.24	8.554	0	0.108
22/10/2008	19	2	GU_500060	224.35	40.615	0	0.102
22/10/2008	20	1	GU_500060	224.35	24.259	0	-0.102
28/10/2008	18	2	GU_500060	225.62	39.109	0	-15.86
30/10/2008	18	2	GU_500070	337.15	33.02	0	-0.846
31/10/2008	18	2	GU_500060	289.12	10.56	0	-0.16
01/11/2008	18	2	GU_500060	260.93	4.982	0	-15.8
03/11/2008	18	2	GU_500060	204.22	21.945	0	-0.818
03/11/2008	19	2	GU_500070	200.57	9.797	0	-1.356
04/11/2008	18	2	GU_500060	200.78	34.352	0	-0.74
05/11/2008	18	2	GU_500070	265.05	12.53	0	-0.776
07/11/2008	18	2	GU_500070	211.03	3.426	0	-0.8
08/11/2008	18	2	GU_500060	201.3	34.816	0	-15.86
08/11/2008	19	1	GU_500070	201.3	32.19	0	-15.8
09/11/2008	18	2	GU_500060	164.81	11.016	0	-0.94
10/11/2008	18	1	GU_500060	157.22	1.882	0	-0.858
10/11/2008	19	1	GU_500060	173.84	8.017	0	-0.892
11/11/2008	18	2	GU_500060	189.79	26.857	0	0.256
11/11/2008	19	1	GU_500070	189.79	29.653	0	-1.862
12/11/2008	18	1	GU_500070	233.53	1.559	0	-0.958
12/11/2008	18	2	GU_500060	233.93	23.934	0	-0.598
14/11/2008	18	2	GU_500070	217.88	21.449	0	-1.296
15/11/2008	18	2	GU_500070	257.94	8.952	425	1.14
16/11/2008	18	2	GU_500070	187.44	9.256	450	18.792
16/11/2008	19	1	GU_500070	178.88	13.374	450	26.384
16/11/2008	19	2	GU_500070	178.88	7.83	450	26.52
16/11/2008	20	2	GU_500070	178.88	5.122	450	26.52
17/11/2008	18	1	GU_500070	178.88	19.248	0	-0.906
17/11/2008	18	2	GU_500070	181.3	13.693	0	-0.8

TRADE DATE	DELIVERY HOUR	DELIVERY INTERVAL	Marginal Generator Unit	SMP	MW Into Oil Bid Step	SO-SO Trade	MGEU MW
19/11/2008	18	1	GU_500060	213.95	19.36	280	0.52
19/11/2008	18	2	GU_500060	224.02	30.804	278.148	2.452
20/11/2008	18	1	GU_500070	200.74	9.037	0	-0.8
20/11/2008	18	2	GU_500070	200.74	29.64	0	-0.74
22/11/2008	18	2	GU_500060	234.17	36.346	0	-0.938
22/11/2008	19	1	GU_500060	234.17	11.694	0	-15.8

Appendix 3 – MGEU Assessment - Scoring Results

Trade DATE	Sum of MGEU_MW	Max of MGEU_MW	Min of MGEU_MW	Std Dev of MGEU_MW	SUM	MAX	Min	Std Dev	Total	Status
06/07/2008	-432.41000000	59.20000000	-49.59	21.46387523	1	1	1	1	4	Done
15/11/2008	215.28000000	91.80000000	-63.038	20.80496280	1	1	1	1	4	Done
06/01/2008	215.59600000	92.93200000	-0.204	18.68475788	1	1		1	3	Done
06/02/2008	2093.41000000	143.60000000	0.072	56.49771019	1	1		1	3	Done
07/02/2008	654.96600000	139.48000000	0.072	36.38784823	1	1		1	3	Done
20/02/2008	1107.62400000	132.47200000	0.012	45.14755042	1	1		1	3	Done
04/03/2008	1892.83400000	193.89200000	-0.224	77.28199649	1	1		1	3	Done
31/03/2008	602.39600000	101.23200000	0.3	31.84700134	1	1		1	3	Done
01/05/2008	2357.06200000	243.95200000	0.072	96.79382037	1	1		1	3	Done
11/06/2008	628.68200000	75.06000000	-0.558	24.30276859	1	1		1	3	Done
19/06/2008	-393.79200000	16.34000000	-90.788	26.77059960	1		1	1	3	Done
21/06/2008	348.97400000	51.30000000	-16.88	15.58915812	1	1		1	3	Done
07/07/2008	387.59600000	59.20000000	-15.8	22.76210742	1	1		1	3	Pulled
04/09/2008	144.61800000	59.20000000	-39.598	16.61293819		1	1	1	3	Done
14/09/2008	-364.74800000	-0.80000000	-96.26	21.03790319	1		1	1	3	Pulled
26/10/2008	-417.44200000	16.54000000	-75.19	23.50903432	1		1	1	3	Pulled
26/02/2008	-91.61800000	25.62800000	-109.802	16.79148191			1	1	2	Done
05/07/2008	-311.05000000	1.67600000	-58.298	13.10390097	1		1		2	Done

Trade DATE	Sum of MGEU_MW	Max of MGEU_MW	Min of MGEU_MW	Std Dev of MGEU_MW	SUM	MAX	Min	Std Dev	Total	Status
30/08/2008	-153.67200000	16.20000000	-91.596	14.94037230			1	1	2	Done
12/09/2008	205.10200000	49.26000000	-4.014	13.54931688	1	1			2	Done
25/10/2008	183.76000000	120.54000000	-15.8	24.66697005		1		1	2	Pulled
28/12/2007	75.38400000	53.47200000	-0.208	7.74927408		1			1	Done
15/01/2008	-3.30800000	2.34600000	-43.5	6.43388999			1		1	Done
29/03/2008	79.27400000	48.87600000	-0.304	7.47175420		1			1	Done
10/04/2008	-184.62000000	1.01200000	-112.926	17.41085828			1		1	Done
23/05/2008	271.04800000	16.34000000	-0.062	7.60826181	1				1	Skipped
27/05/2008	-85.29400000	0.36200000	-92.128	13.32203401			1		1	Done
09/06/2008	213.33800000	16.28000000	-0.964	7.27891593	1				1	Skipped
10/06/2008	214.63600000	16.28000000	-0.356	7.25284396	1				1	Skipped
22/06/2008	-243.63000000	16.32000000	-15.88	7.73668768	1				1	Skipped
25/06/2008	-112.17600000	16.28000000	-45.31	12.99720623			1		1	Skipped - later included
10/07/2008	83.43000000	34.46000000	-78.964	14.26029476			1		1	Done
11/07/2008	122.80800000	57.78000000	-15.86	12.00603111		1			1	Done
13/07/2008	29.06800000	16.34000000	-52.84	13.52261278			1		1	Skipped - later included
14/07/2008	-234.25000000	1.90600000	-15.86	6.75556672	1				1	Skipped
19/07/2008	-51.43000000	52.91800000	-15.88	10.19191482		1			1	Done
20/07/2008	-189.36000000	0.70200000	-15.88	6.17078718	1				1	Skipped
23/07/2008	-63.94800000	16.26000000	-51.628	11.75625988			1		1	Skipped - later included
26/07/2008	226.18400000	31.27000000	-15.8	10.31120541	1				1	Skipped - later included
28/07/2008	-205.02600000	-0.27400000	-15.86	6.35126967	1				1	Skipped
29/07/2008	-2.96000000	16.34000000	-45.06	9.68328745			1		1	Done
30/07/2008	2.18400000	52.01000000	-15.8	8.60231985		1			1	Skipped - later included
06/08/2008	-236.30600000	-0.80000000	-15.86	6.70208947	1				1	Skipped

Trade DATE	Sum of MGEU_MW	Max of MGEU_MW	Min of MGEU_MW	Std Dev of MGEU_MW	SUM	MAX	Min	Std Dev	Total	Status
07/08/2008	-209.62200000	-0.60800000	-15.88	6.32290215	1				1	Skipped
13/08/2008	314.76200000	16.28000000	-15.8	9.89696217	1				1	Skipped
14/08/2008	-258.55600000	9.69000000	-15.88	7.25661907	1				1	Skipped
16/08/2008	-253.91400000	-0.74000000	-15.88	6.83821501	1				1	Skipped
17/08/2008	-252.17400000	-0.07000000	-15.88	6.85735147	1				1	Skipped
19/08/2008	-220.72000000	-0.60000000	-15.86	6.53887730	1				1	Skipped
20/08/2008	312.55200000	21.65000000	-2.622	8.54936049	1				1	Skipped
25/08/2008	304.83800000	16.34000000	-0.902	8.07268085	1				1	Skipped
03/09/2008	-305.12000000	1.94800000	-15.88	7.42587092	1				1	Skipped
13/09/2008	-206.50400000	16.34000000	-15.88	7.17755435	1				1	Skipped
21/09/2008	-41.45400000	-0.80000000	-0.94	0.03263116				1	1	Skipped
22/09/2008	-265.82600000	-0.45000000	-15.88	7.00621062	1				1	Skipped
09/10/2008	-41.45400000	-0.80000000	-0.94	0.02858256				1	1	Skipped
15/10/2008	-56.27600000	16.40000000	-58.788	8.87977457			1		1	Done
03/11/2008	645.80000000	29.14000000	-1.698	13.00540844	1				1	Skipped
09/11/2008	-269.15400000	0.17600000	-15.88	6.97233230	1				1	Skipped
13/11/2008	-188.72000000	0.29400000	-15.88	6.18035655	1				1	Skipped
16/11/2008	112.62400000	37.90000000	-49.518	14.91304389			1		1	Done
17/11/2008	-148.24400000	16.54000000	-63.66	12.10064648			1		1	Done

Appendix 4 – Trade Dates by Issue

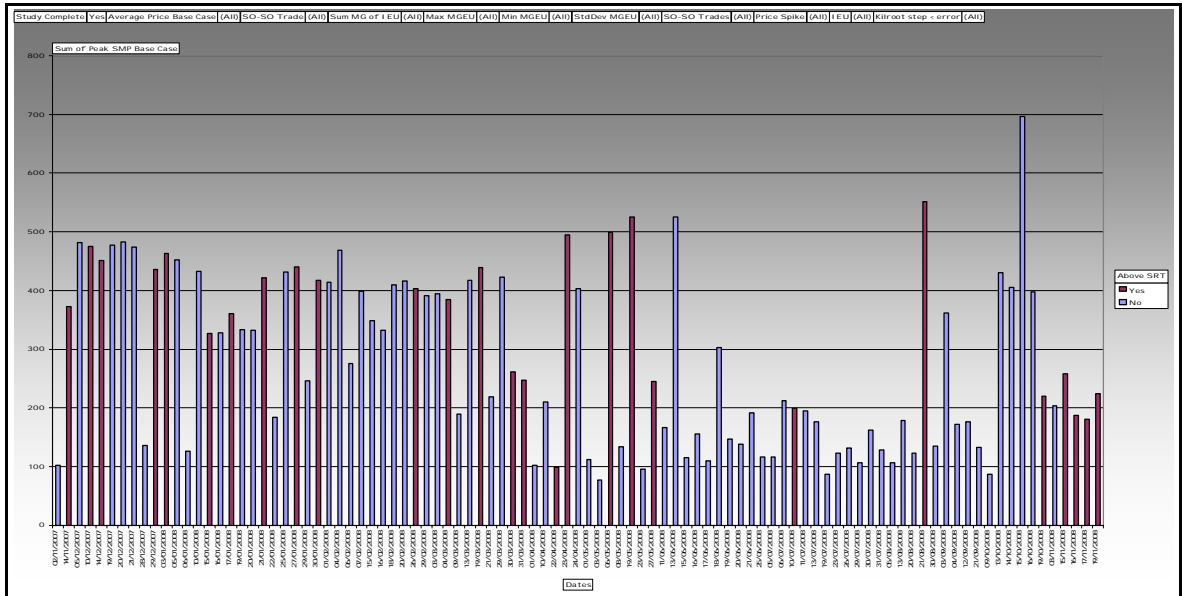


Figure 16 - Peak System Marginal Price

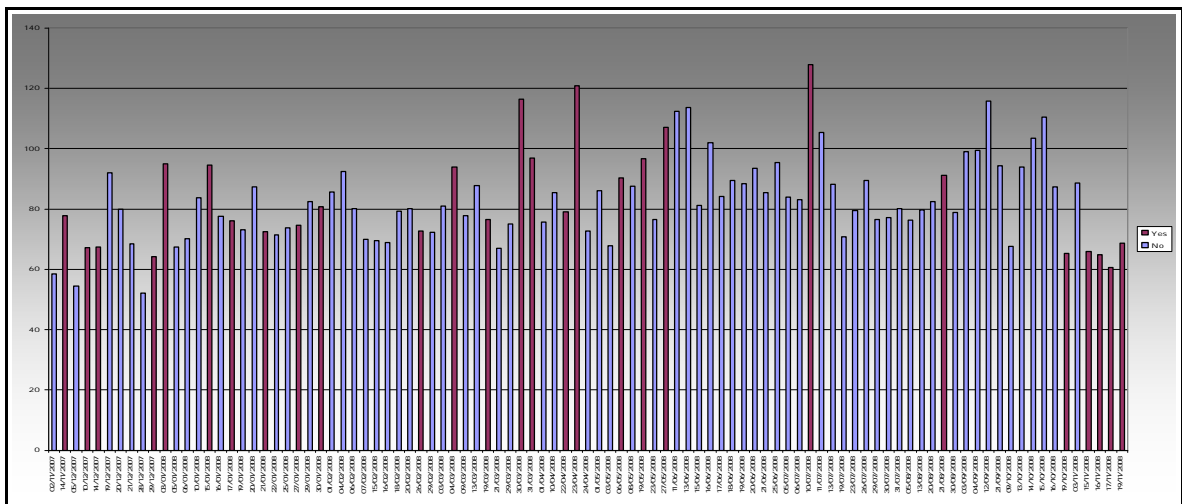


Figure 17 - Average Daily System Marginal Price

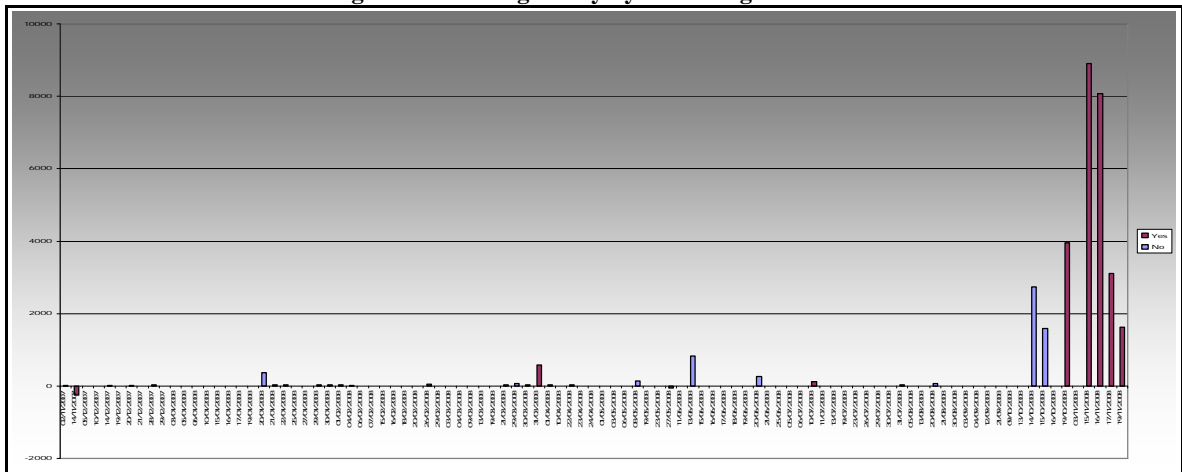


Figure 18 - Quantity of SO-SO Trade

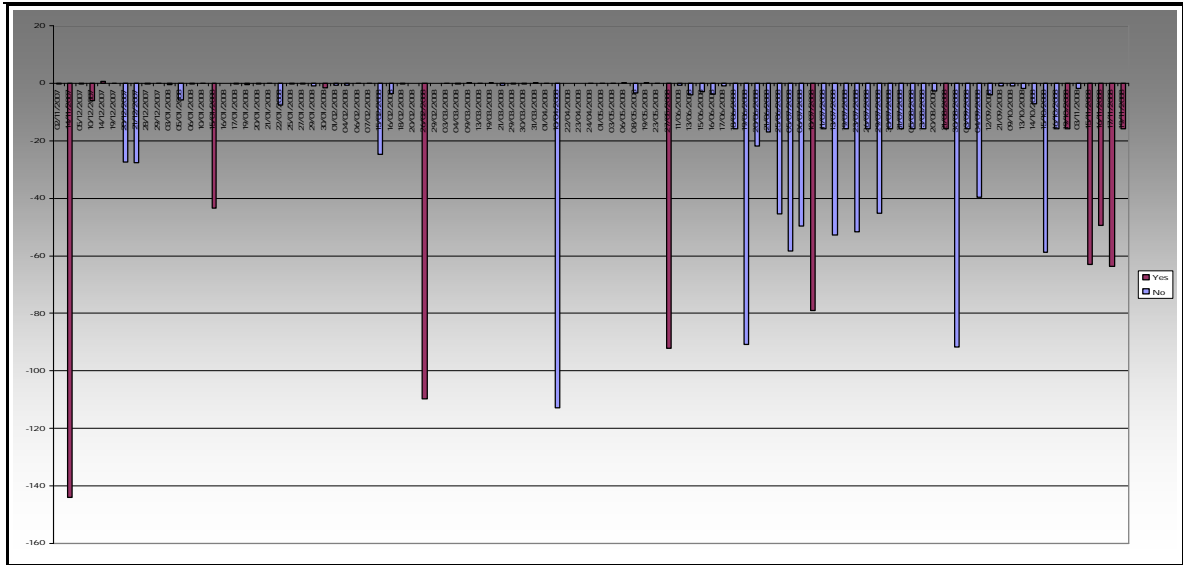


Figure 19 - MG for IEU, Export

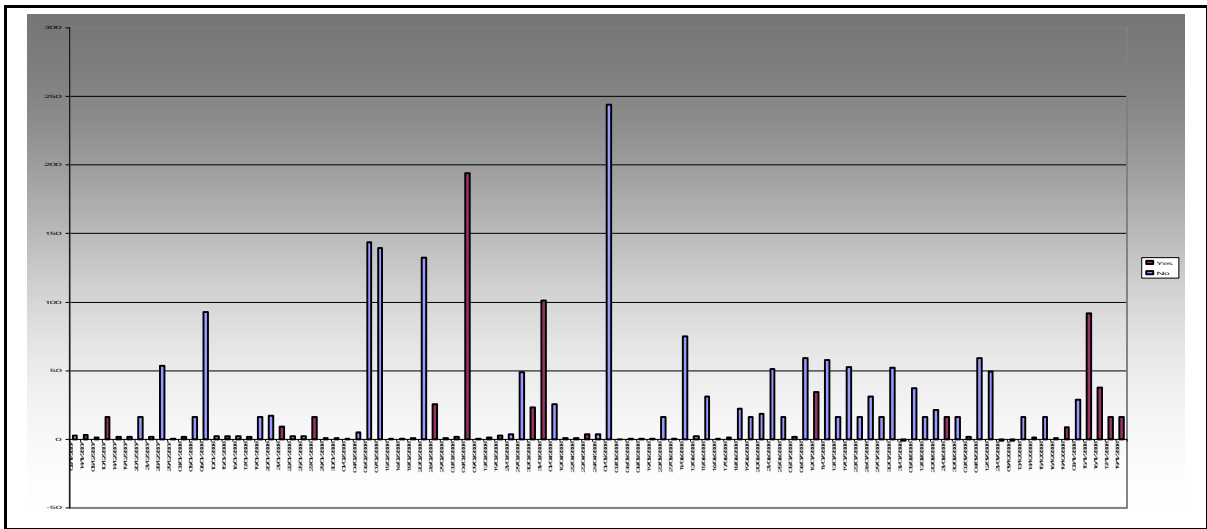


Figure 20 - MG for IEU, Import

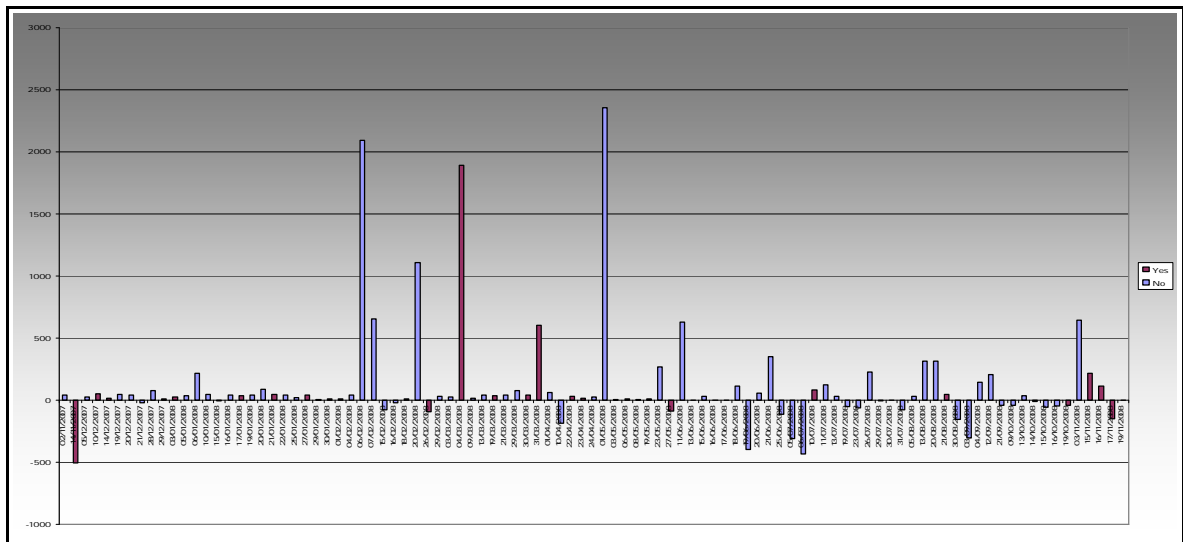


Figure 21 - Summed Daily MG for IEU

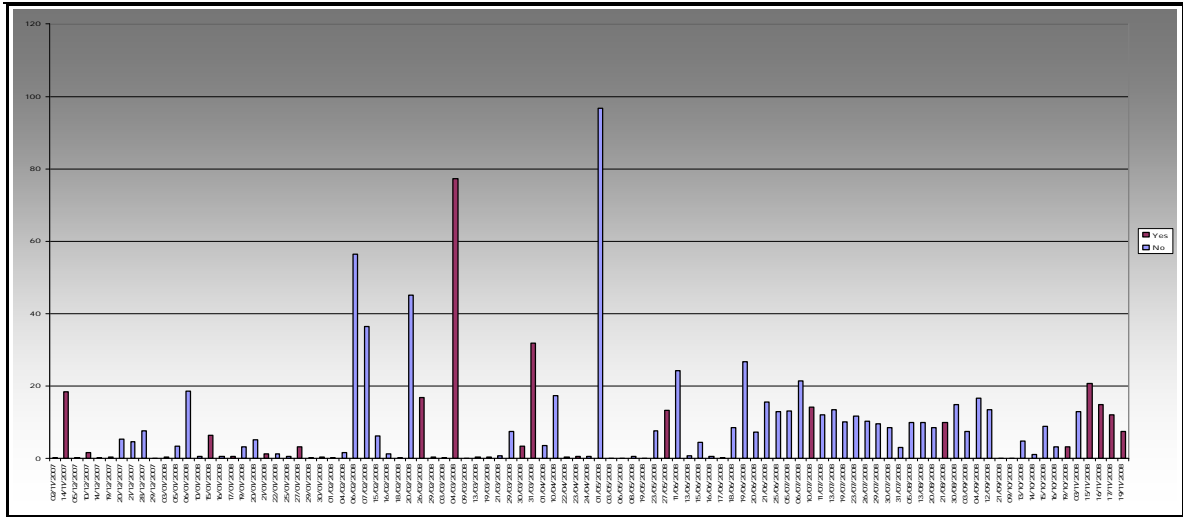


Figure 22 - Standard Deviation of MG of IEU

Appendix 4 – 2008.10.14 Summary

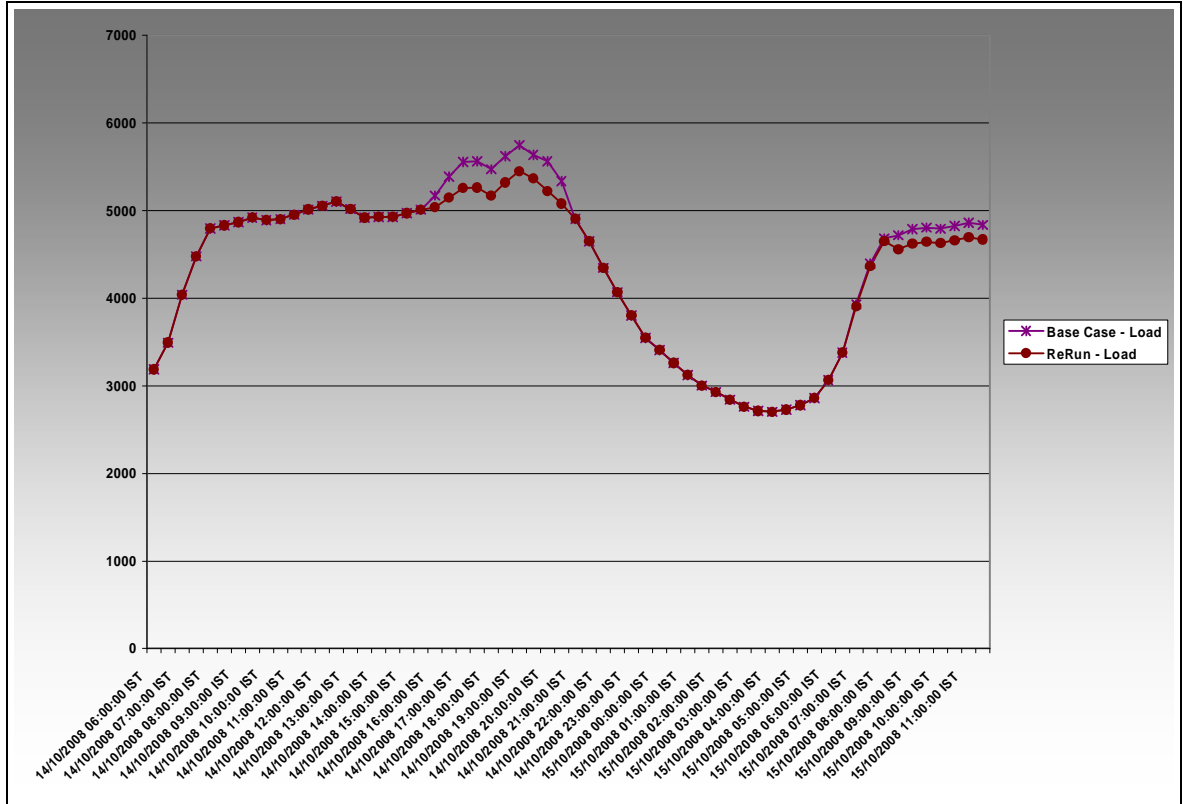


Figure 23 -System Load values

As can be noted above, the comparison of the two runs shows that the Schedule Demand values differ significantly across the peak period where the SO-SO Trade had originally been incorrectly included.

The change to the Schedule Demand requirement meant the solver had a smaller peak load to meet. As such, the commitment engine of the MSP software would come up with a different unit commitment status.

Figure 24 below shows the commitment status of Generators based on the base case with the higher load quantity. Figure 25 shows the status of Generators based on the corrected quantity.

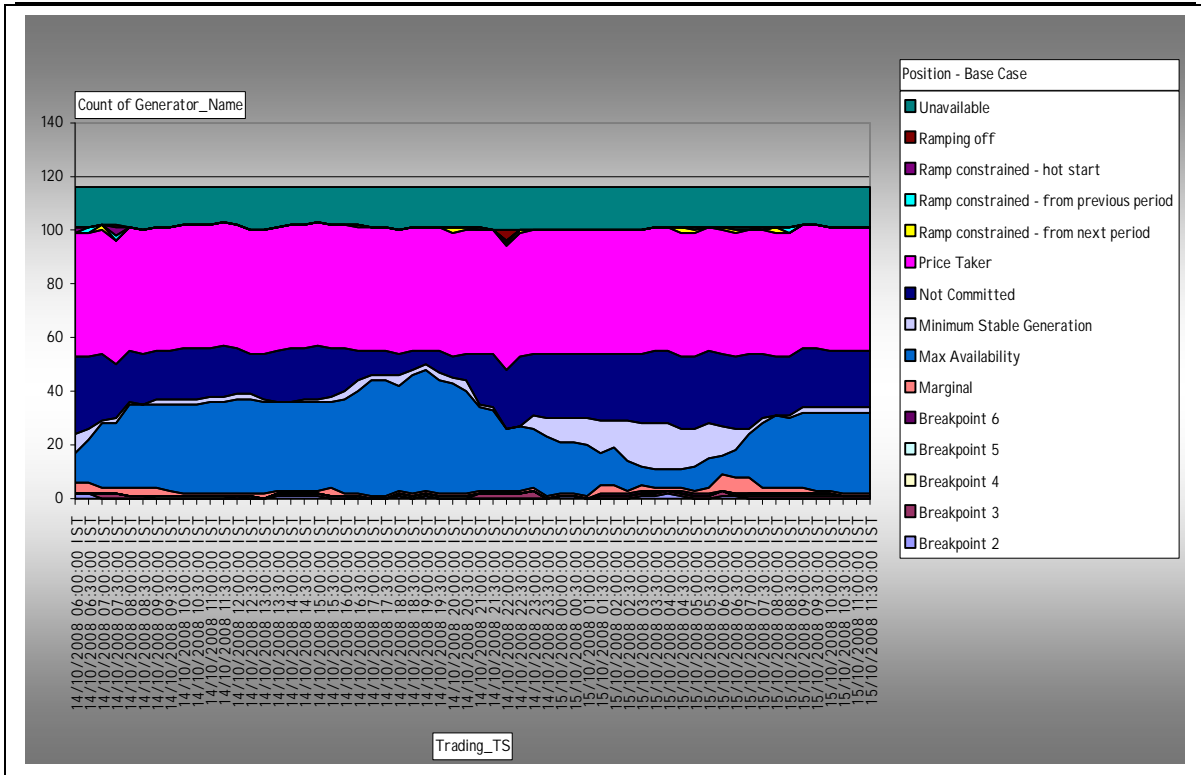


Figure 24 - Commitment Status, Base Case

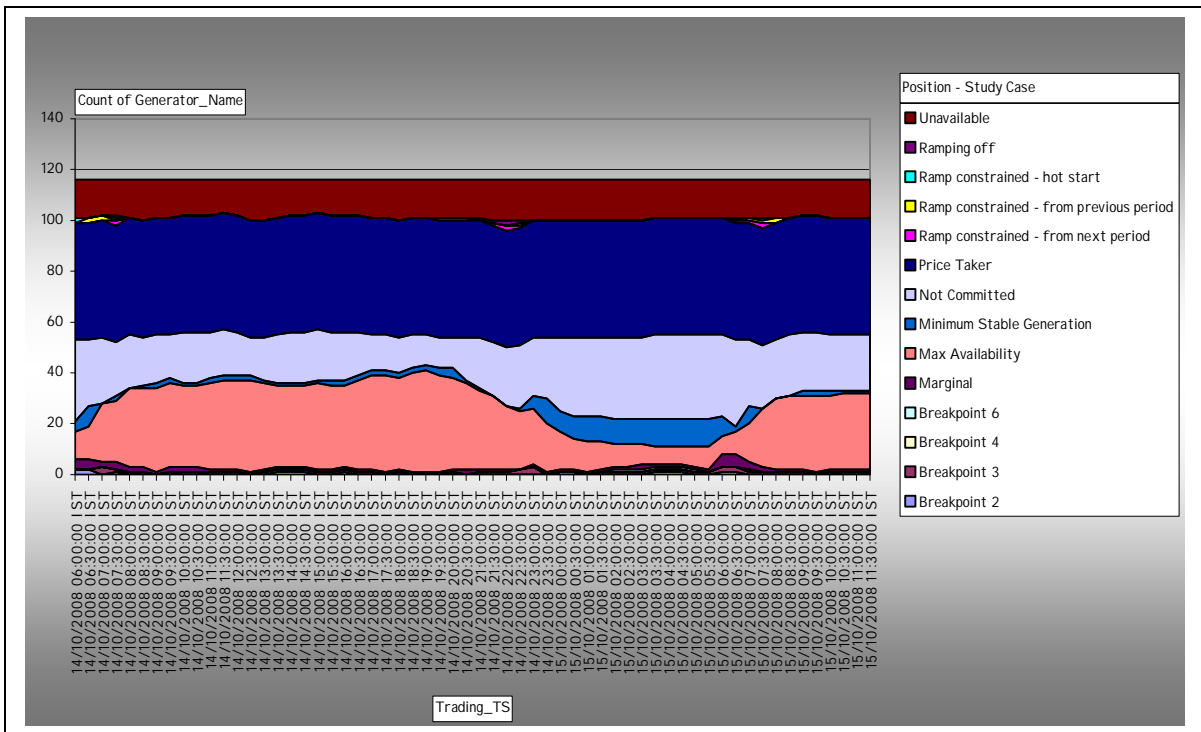


Figure 25 - Commitment Status, Study Case

While the two solutions look similar, there is a clear difference in how units are managed by the software with the reduction in the quantity of Schedule Demand. This is particularly notable in the number of units that are not committed in each schedule.

Figure 26 below compares the number of uncommitted units between the two schedules.

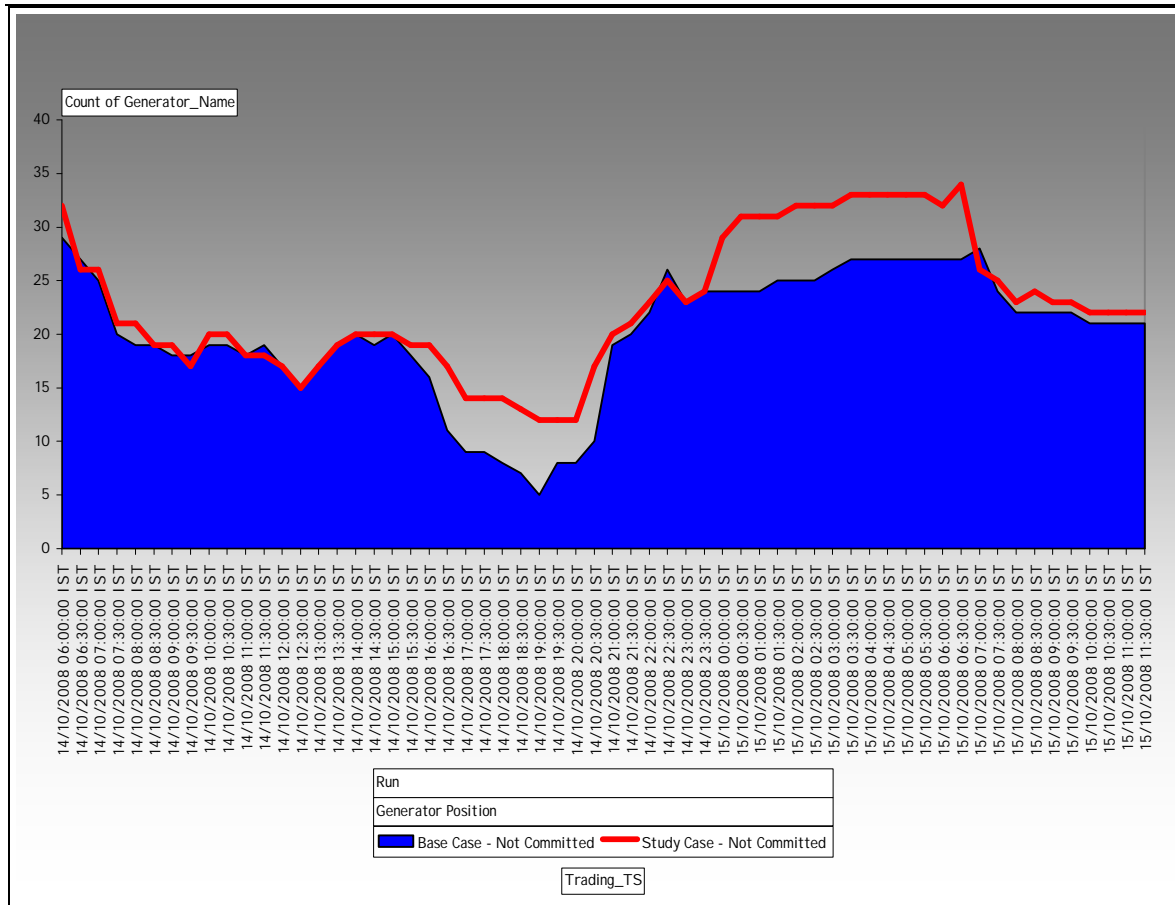


Figure 26 - Uncommitted Units - Base Case v Study Case

The graph above clearly demonstrates substantial differences in the output of the MPS software based on the corrected Schedule Demand. While there is a clear variance over the peak with a larger number of Generator Units not being committed in the study case, there are other variances throughout the day where the solver elected to use a different set of units because of the change in the peak demand.

The size of the change has led to a number of other changes to the commitment decision even where the Schedule Demand is not impacted in a significant way.

The most noticeable of these is a 09:00AM where the study case meets a slightly higher Schedule Demand than the base case (the study case is 0.41MW higher due to the MG for the IEU) with less Generators committed. Because fewer Generators are available in this Trading Period, this puts an expensive Generator into a marginal position with the following price outcome.

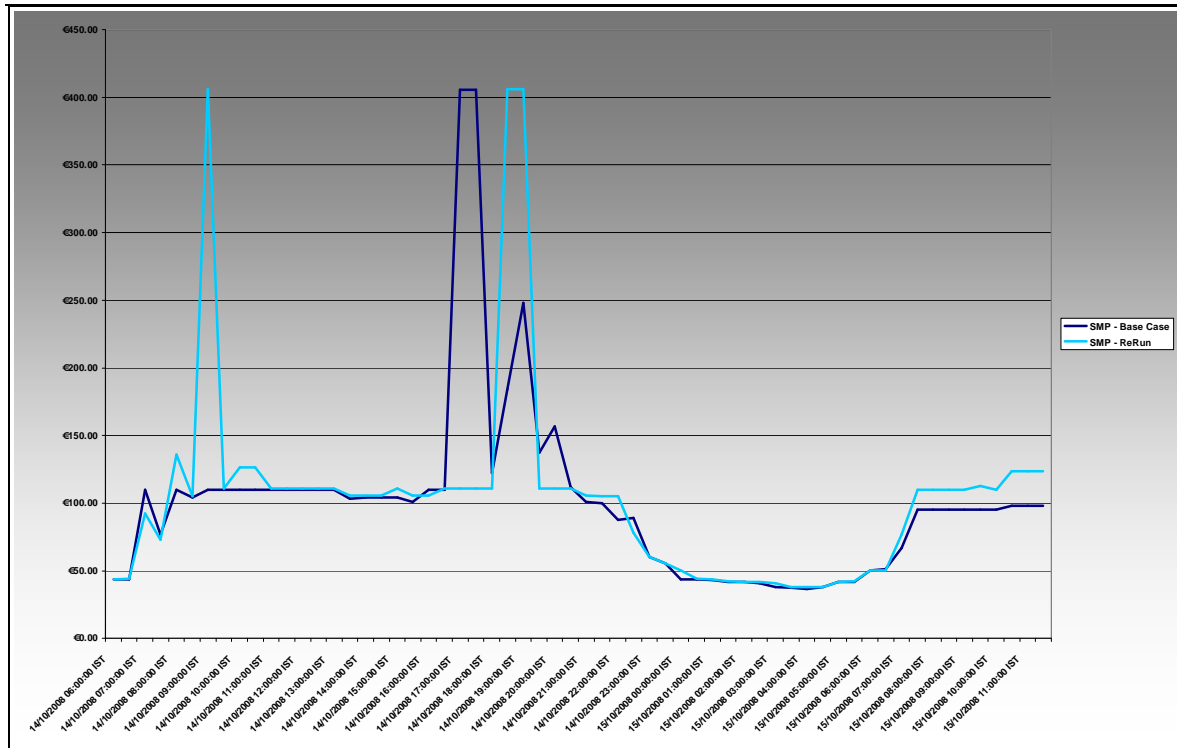


Figure 27 - SMP - Base Case v Study Case

The extra peak SMP therefore means that the revenue will increase in the morning. However, because the Market Schedule Quantities of Generators have been reduced because of the reduction in the Schedule Demand, then the revenue across the peak will be reduced as demonstrated below –

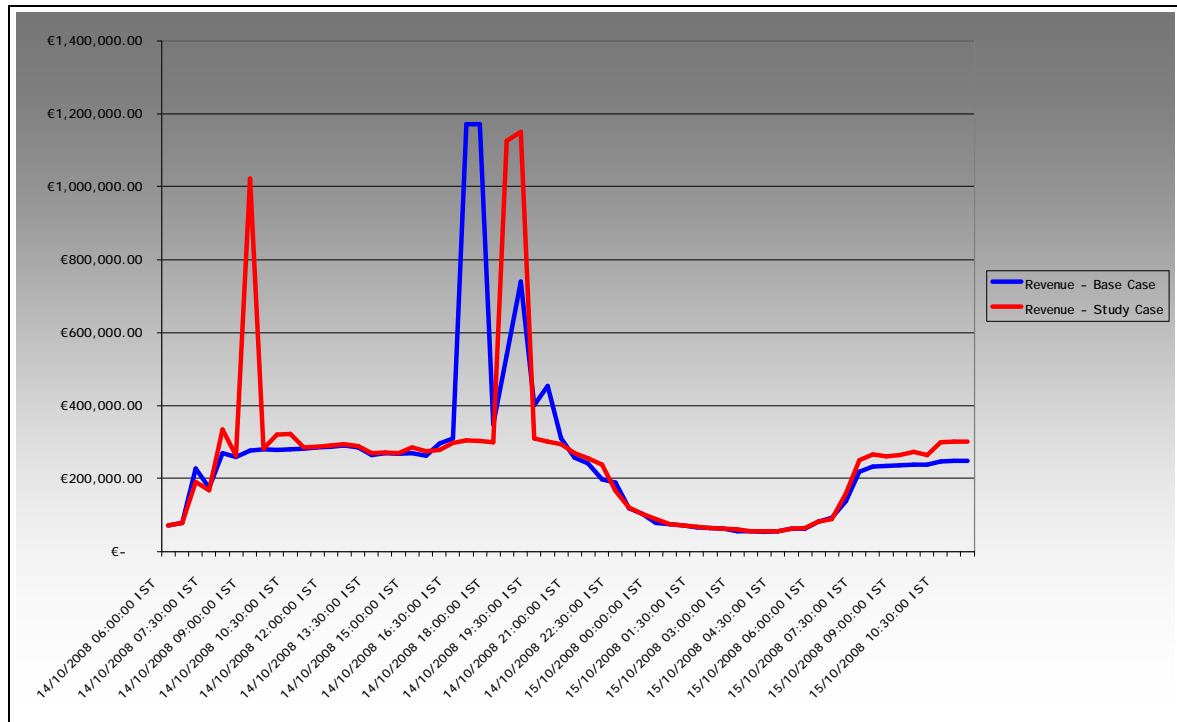


Figure 28 - Revenue, Base Case v Study Case

As a result, when it comes to compare the market revenue between the two runs, the decrease in the Schedule Demand compensates for the increase in the SMP, giving only a small change in revenue which falls below the SRT.

In summary,

- Reduction in Schedule Demand;
- Reduction in Market Schedule Quantities;
- Reduction in number of units committed;
- Increase in SMP values at key times;
- Decrease in Production Costs;
- Decrease in Market Revenue;

Approx Generator Revenues per Trading Day	Base Case	ReRun	Variance	% Variance
	€ 12,560,985.26	€ 12,466,168.36	€ 94,816.90	0.75%
Average SMP	€ 103.49	€ 105.44		
Max SMP	€ 405.66	€ 406.18		
Production Costs	€ 6,614,739.40	€ 6,400,945.40		

Figure 29 - Summary of outcomes