P253 Assessment Procedure Analysis

During the P253 Assessment Procedure the Modification Group conducted the following analysis:

1. **Error in Credit Calculation**
2. **Sensitivity analysis of error in Credit Calculation**
3. **Impact of Bank Holidays on the Credit Calculation**
4. **Scottish Bank Holidays**
5. **Further analysis on the Bank Holiday solution**
6. **How quickly are D0268 'Half Hourly Meter Technical Details' flows are sent under the current arrangements?**
7. **Hand Read Half Hourly Meters**
8. **What happens when GSP Group take tends to zero?**
9. **Link between Embedded Generation and Errors in Credit Checking**
10. **Why Does Estimation Break Down for Embedded Generation?**
11. **Is Embedded Generation Behaving Consistently Across the Country?**
12. **Potential Central System Alternatives**
13. **Proposed Modification – Benefit Analysis**
14. **Alternative Modification/P265 – Benefit Analysis**

Error in Credit Calculation

Overview

Analysis carried out by the Issue 38 group determined that the estimation of Interim Information (II) Run metered volumes for SVA BM Units becomes increasingly less accurate as the level of embedded generation increases. The P253 Modification Group requested further analysis to illustrate the impact on Parties created by the inaccuracies in II data.

In this document all data relates to Supplier ID, not BSC Party ID.

Conclusions

The data presented in this document suggests that the error in the Credit Calculation is not an immaterial one. Financially, the greatest impact is on the larger Suppliers. The largest percentage impact is on smaller Suppliers with embedded generation. These Parties tend to lodge less credit cover in relative terms and so are more likely to notice the impact on their Credit Cover Percentage.

Part 1 - Impact across all Supplier IDs

To ascertain the potential impact on Parties, we have taken Supplier BM Unit metered volumes at the II run and latest run type and used this to determine the percentage change between the two runs and the estimated financial impact. The months that have been chosen for analysis are June 2009 and October 2009.

Supplier IDs have been anonymised but to give an idea of the impact on different classes of Supplier, the Supplier IDs have been grouped into the following categories (based on Generation Capacity and Demand Capacity data):

Group 1. Supplier IDs with no generation capacity and a relatively large demand capacity

Group 2. Supplier IDs with no generation capacity and a relatively small demand capacity

Group 3. Supplier IDs with generation capacity and a relatively large demand capacity

Group 4. Supplier IDs with generation capacity and a relatively small demand capacity

The percentage change in metered volumes has been calculated by taking the daily aggregated BM Unit metered volume at the latest run type minus the volume at the II run type and then dividing this by the latest run type volume.

The estimated financial impact has been calculated by taking the daily aggregate metered volume of each Supplier BM Unit at the latest run type minus the daily aggregate metered volume at the II Run and multiplying this value by the daily average System Buy Price. This gives an approximate value for the 'false' credit cover requirement that would be eliminated if II data were as exact as that in later runs.

The data in the following tables has been sorted by the Daily Average Financial Impact column. A negative financial value indicates that the value of the latest run type metered volume was lower than the II run metered volume, hence an over estimation of the amount of credit required.

Table 1: Impact for the month of June 2009

	Supplier ID	Percentage change between II Metered Volume and Latest Run Type Metered Volume over the month of June 2009 Average %	Minimum %	Maximum %	Finanacial Impact over the month of June 2009 Daily Average	Sum Total
Group 1	1.a	2.30	-50.25	44.31	-£40,622	-£1,218,648
	1.b	0.63	-30.02	33.19	-£290	-£8,701
	1.c	-1.47	-36.27	25.35	£6,066	£181,977
	1.d	-7.56	-184.68	32.58	£21,531	£645,916
	1.e	-2.96	-43.51	26.79	£22,851	£685,521
	1.f	-4.27	-79.85	52.56	£23,503	£705,093
	1.g	-0.41	-30.38	21.83	£28,834	£865,008
	1.h	-3.64	-52.71	25.19	£29,998	£899,939
	1.i	-5.16	-43.29	22.96	£47,078	£1,412,327
	1.j	-6.76	-46.46	20.98	£58,903	£1,767,101
	1.k	-12.45	-154.37	16.67	£37,681	£1,130,437
	1.l	-3.49	-35.24	23.58	£81,427	£2,442,818
	1.m	-4.63	-45.46	22.62	£130,368	£3,911,032
Group 2	2.a	2.22	-36.00	22.20	-£6,240	-£187,201
	2.b	3.09	-37.49	29.95	-£4,159	-£124,757
	2.c	1.25	-44.12	35.42	-£2,366	-£70,988
	2.d	38.81	-18.82	100.00	-£425	-£12,757
	2.e	-10.96	-53.00	36.06	-£409	-£12,259
	2.f	-21.20	-129.61	37.28	£0	£12
	2.g	-4.65	-33.47	26.16	£104	£3,119
	2.h	-3.35	-44.25	22.97	£4,270	£128,111
	2.i	-8.08	-45.38	21.29	£11,274	£338,220
	2.j	-7.88	-48.28	22.35	£16,630	£498,910
	2.k	-5.49	-39.55	21.35	£19,732	£591,966
Group 3	3.a	2.12	-45.74	66.70	-£104,362	-£3,130,851
	3.b	41.46	-1052.69	7772.35	-£89,467	-£2,684,023
	3.c	13.43	-1027.24	3051.38	-£87,546	-£2,626,376
	3.d	1.65	-38.31	20.34	-£76,571	-£2,297,132
	3.e	8.86	-805.31	537.88	-£47,159	-£1,414,775
	3.f	-0.50	-57.41	40.76	-£9,778	-£293,333
	3.g	-2.51	-92.53	40.08	£51,650	£1,549,515
Group 4	4.a	-14.36	-667.14	710.27	-£118,552	-£3,556,551
	4.b	121.04	-6818.56	44036.93	-£5,648	-£169,443
	4.c	76.32	-2121.51	14791.91	-£4,814	-£144,409
	4.d	5.89	-40.12	60.10	-£1,076	-£32,276
	4.e	3.13	-406.62	1505.44	£435	£13,035

Table 2: Impact for the month of October 2009

		Percentage change between II Metered Volume and Latest Run Type Metered Volume over the month of October 2009			Finanacial Impact over the month of October 2009	
	Supplier ID	Average %	Minimum %	Maximum %	Daily Average	Sum Total
Group 1	1.m	2.88	-77.91	34.93	-£129,472	-£4,013,637
	1.k	14.81	-19.55	100.00	-£44,308	-£1,373,540
	1.L	1.99	-83.65	35.09	-£74,684	-£2,315,208
	1.l	3.31	-77.52	36.40	-£44,959	-£1,393,729
	1.j	2.19	-80.93	34.61	-£37,873	-£1,174,055
	1.f	3.25	-33.64	25.78	-£15,144	-£469,452
	1.d	-2.71	-74.79	66.36	-£14,630	-£453,541
	1.e	-0.15	-23.92	29.14	-£10,928	-£338,770
	1.h	-2.00	-99.11	31.70	-£7,775	-£241,029
	1.c	-1.53	-83.98	32.28	£3,400	£105,409
	1.b	-5.86	-41.79	34.83	£7,285	£225,826
	1.a	-13.80	-252.33	32.48	£85,734	£2,657,749
	1.g	-9.02	-118.46	37.16	£337,242	£10,454,493
Group 2	2.k	1.24	-87.31	35.07	-£17,160	-£531,959
	2.j	3.32	-75.40	40.37	-£11,808	-£366,050
	2.h	4.07	-81.11	36.00	-£8,387	-£260,007
	2.i	3.88	-83.15	40.93	-£7,365	-£228,310
	2.d	46.34	-46.32	100.00	-£5,282	-£163,738
	2.b	0.94	-85.45	37.37	-£2,005	-£62,146
	2.g	10.86	-56.97	51.59	-£552	-£17,117
	2.e	0.31	-71.87	30.36	-£144	-£4,467
	2.f	19.54	-2.66	54.15	-£1	-£20
	2.c	-1.68	-83.19	27.39	£642	£19,897
	2.a	-7.03	-115.77	22.58	£11,602	£359,674
Group 3	3.b	22.48	-5012.81	3946.68	-£121,380	-£3,762,784
	3.g	3.42	-83.77	51.20	-£88,977	-£2,758,275
	3.c	-0.52	-757.15	663.02	-£10,887	-£337,511
	3.d	-4.45	-143.28	28.84	£9,168	£284,193
	3.e	-3.49	-3358.08	2026.14	£30,630	£949,537
	3.f	-16.51	-129.68	36.74	£67,096	£2,079,972
	3.a	-14.25	-2238.99	58.14	£175,122	£5,428,769
Group 4	4.a	-37.34	-8211.18	586.42	-£94,111	-£2,917,442
	4.c	-6.65	-8782.23	2041.64	-£1,710	-£53,014
	4.b	83.88	-3855.92	10137.10	-£1,185	-£36,750
	4.d	3.99	-77.10	38.14	-£593	-£18,378
	4.e	-8.76	-171.32	116.13	£344	£10,675

Part 2 – Yearly estimated difference in run data across a selection of Supplier IDs

To create the following charts, daily total metered volumes for a selection of Suppliers has been taken at the II run and latest run type between January 2009 and December 2009. These volumes have been multiplied by the daily average System Buy Price to give a financial value. To create an approximation of the Credit Calculation, the data shown is a 22 day rolling sum.

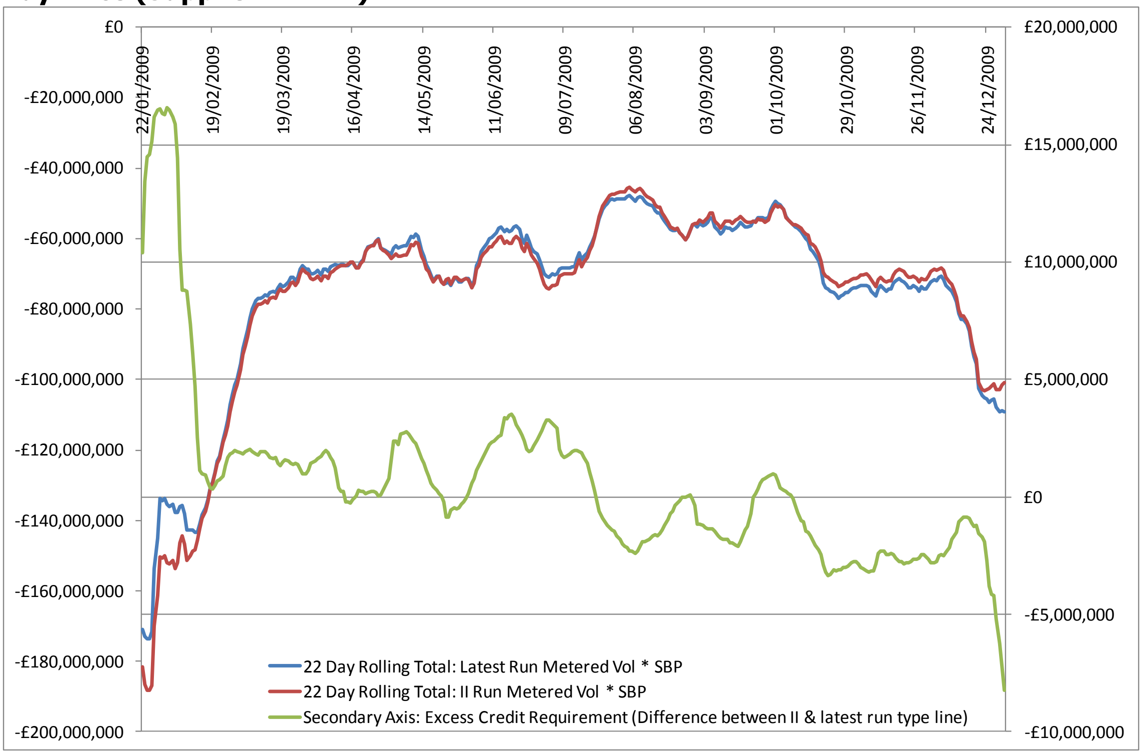
The difference between the II and latest run type values in each chart indicate the level of inaccuracy in the Credit calculation, this is represented by the green line in the charts.

In the following charts a negative value on the y-axis indicates that the Supplier ID as a whole is consuming energy and positive implies that it is exporting energy.

Supplier IDs from Group 1

(Supplier IDs with no generation capacity and a relatively large demand capacity)

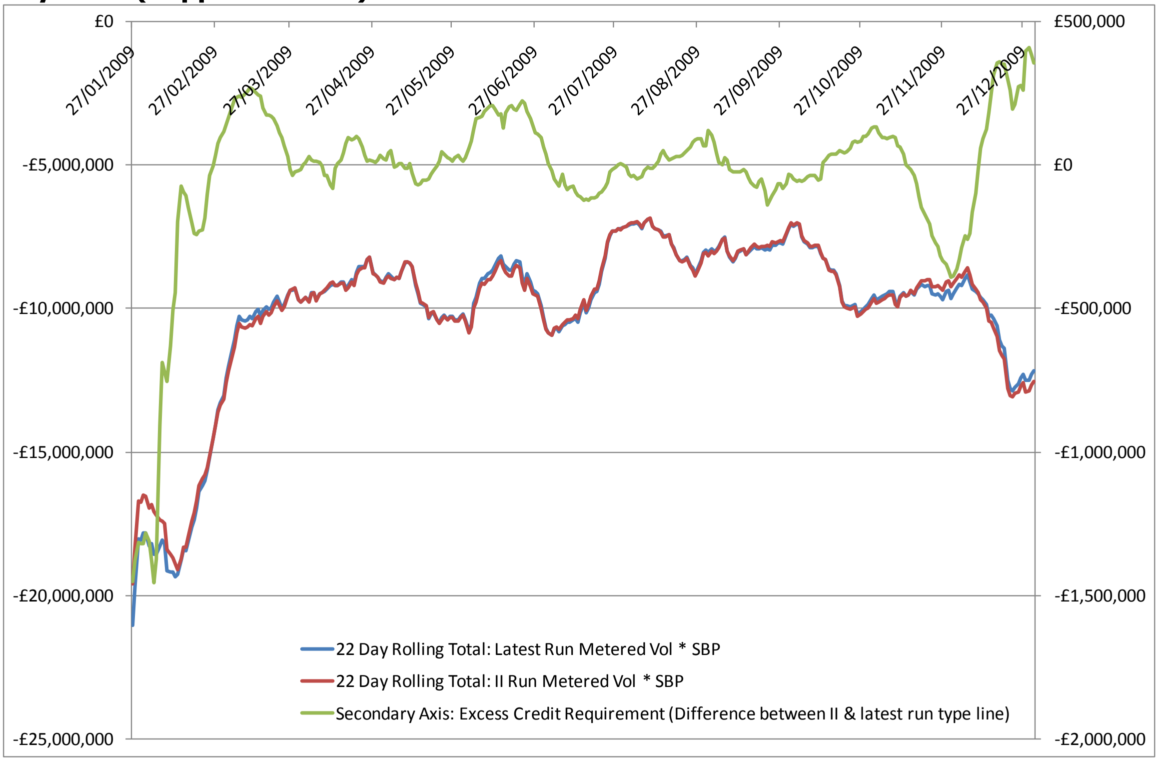
Figure 1: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 1.m)



In the above chart the red line represents the II run estimated consumption for this Supplier ID and the blue line represents the latest run type consumption. The difference between the red and blue lines represents the error in the credit calculation. Where the red line is below the blue line it indicates an over estimation of the Supplier's consumption and hence over estimation of the credit cover requirement.

To make it easier to determine the magnitude of this error, the green line (against the secondary y-axis) shows the difference between the II run and latest run type consumption. The large error in the credit calculation towards the start of this chart is due to the use of the Christmas holiday in the II run reference period.

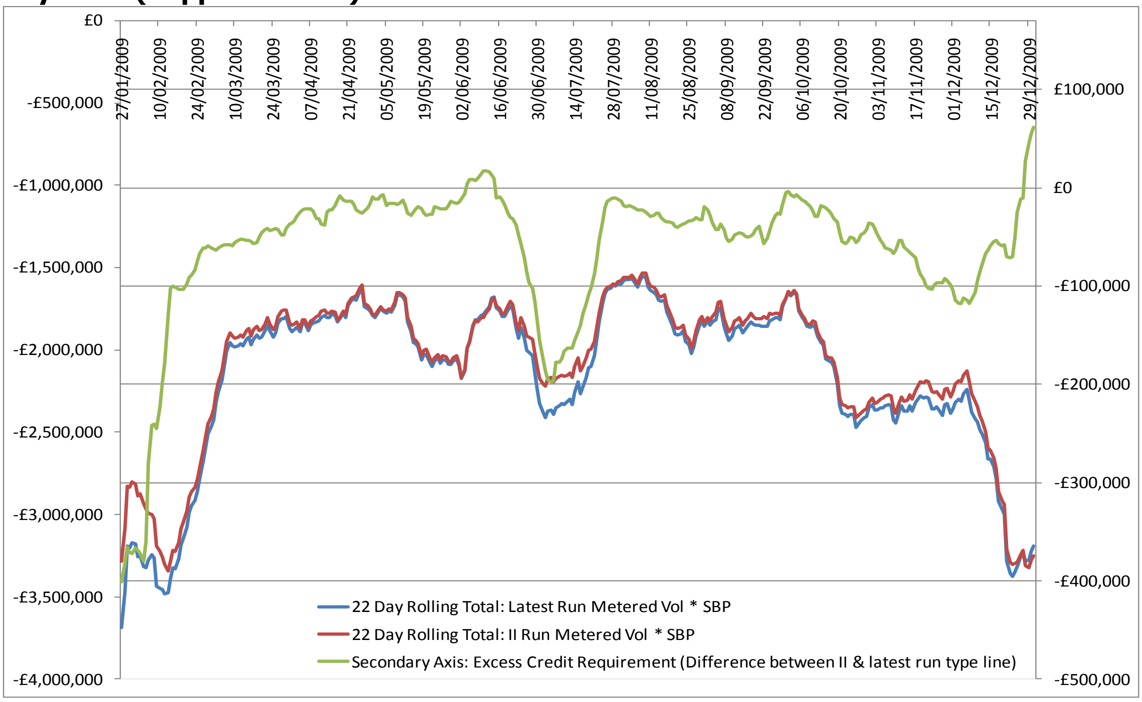
Figure 2: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 1.C)



Supplier IDs from Group 2

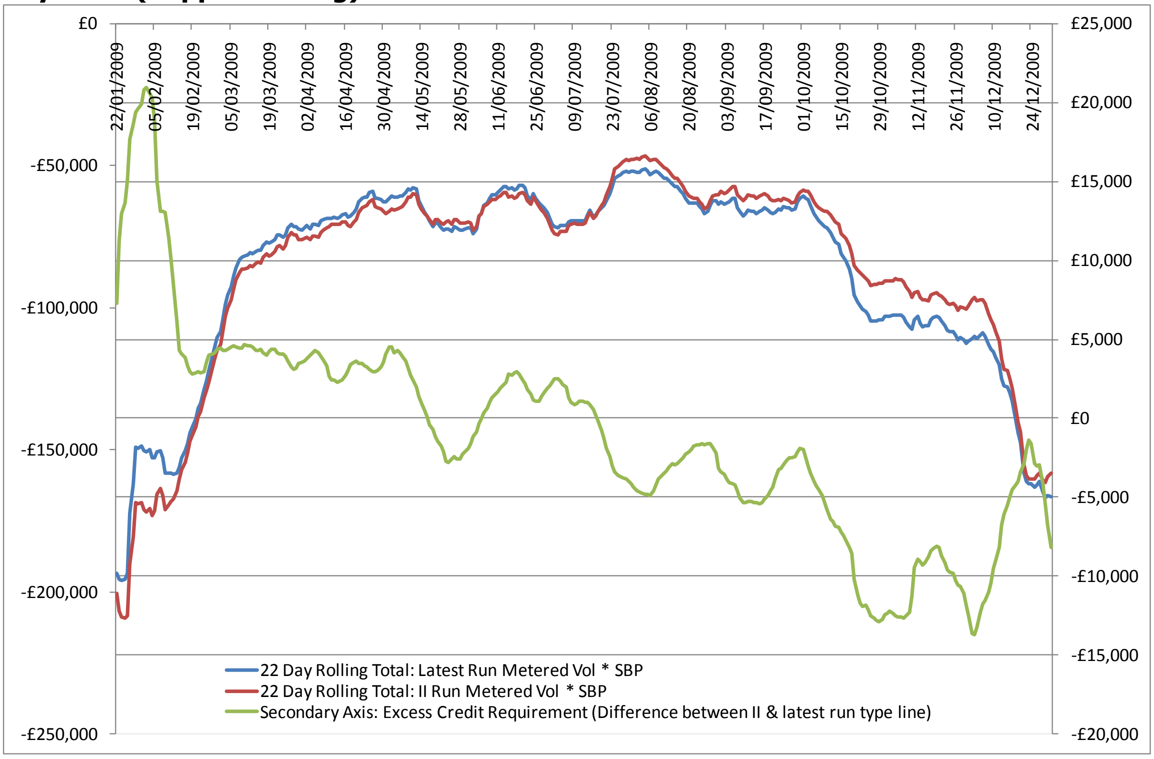
(Supplier IDs with no generation capacity and a relatively small demand capacity)

Figure 3: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 2.b)



The credit requirement for the above Supplier ID appears to be for the most part under estimated.

Figure 4: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 2.g)



Supplier IDs from Group 3

(Supplier IDs with generation capacity and a relatively large demand capacity)

Figure 5: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 3.c)

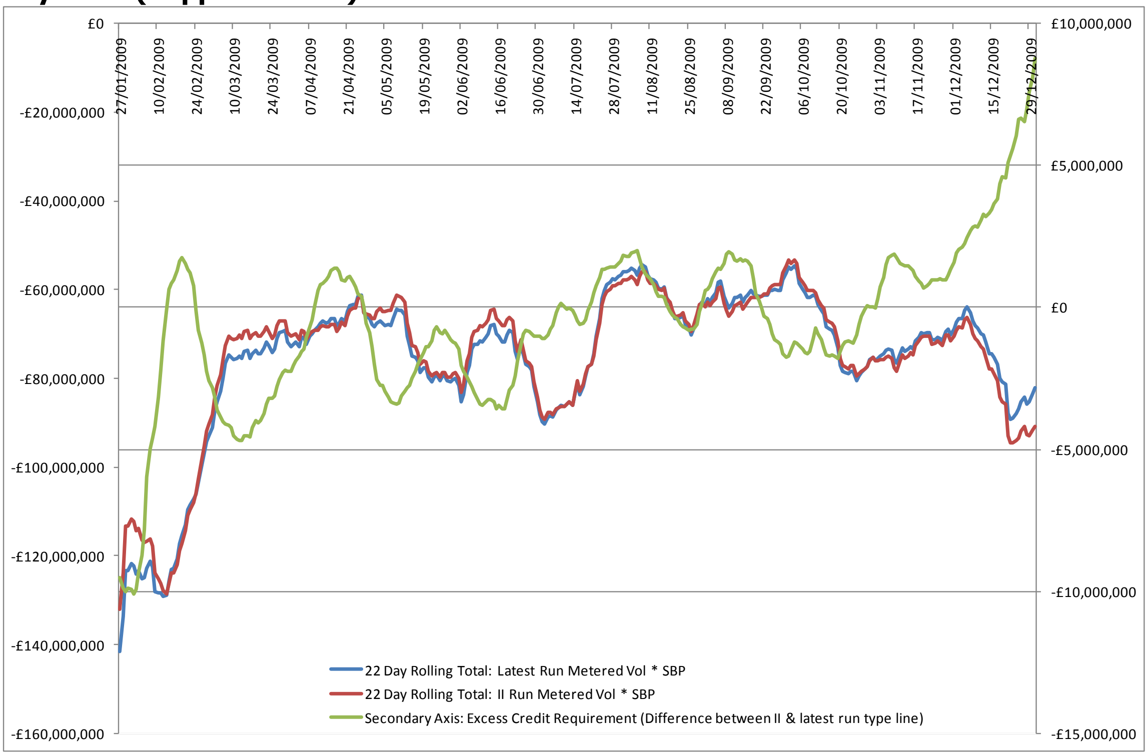
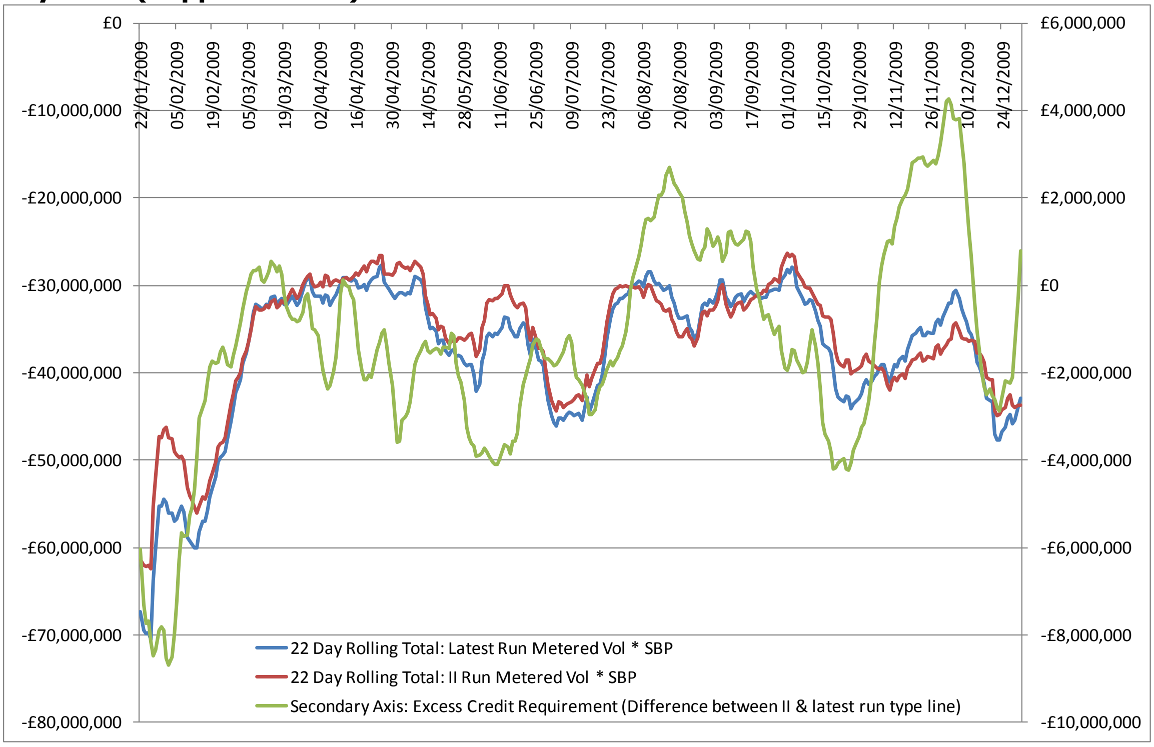


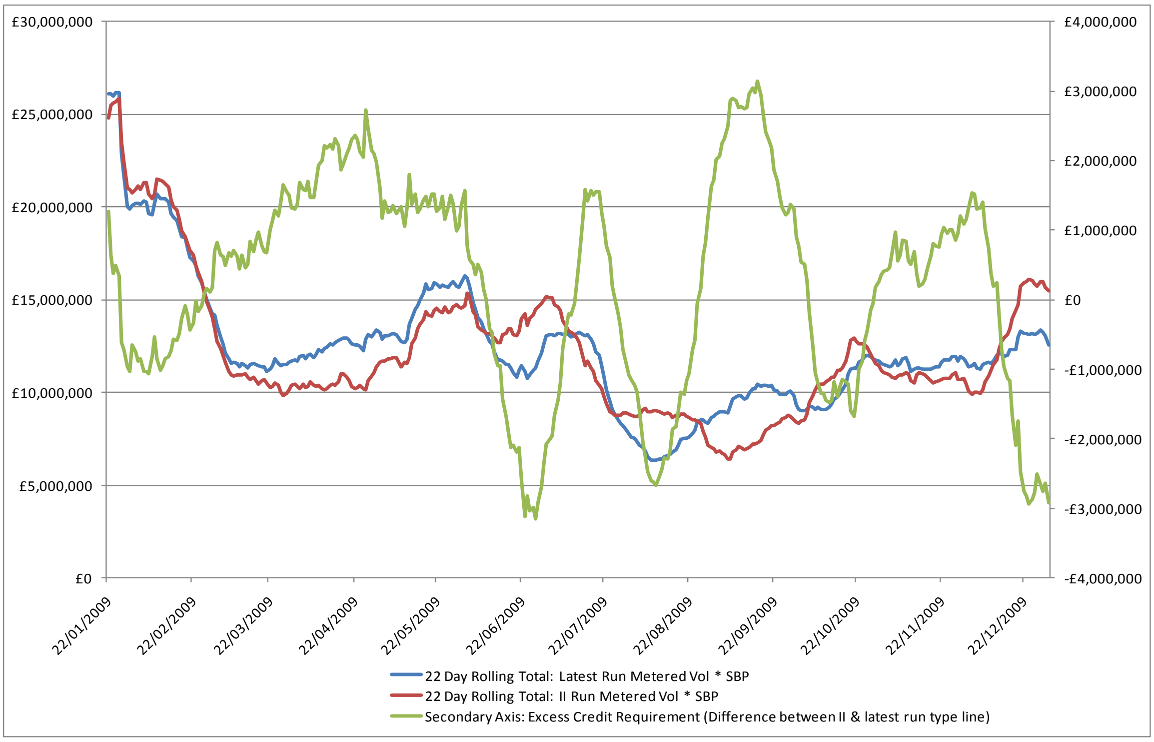
Figure 6: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 3.b)



Supplier IDs from Group 4

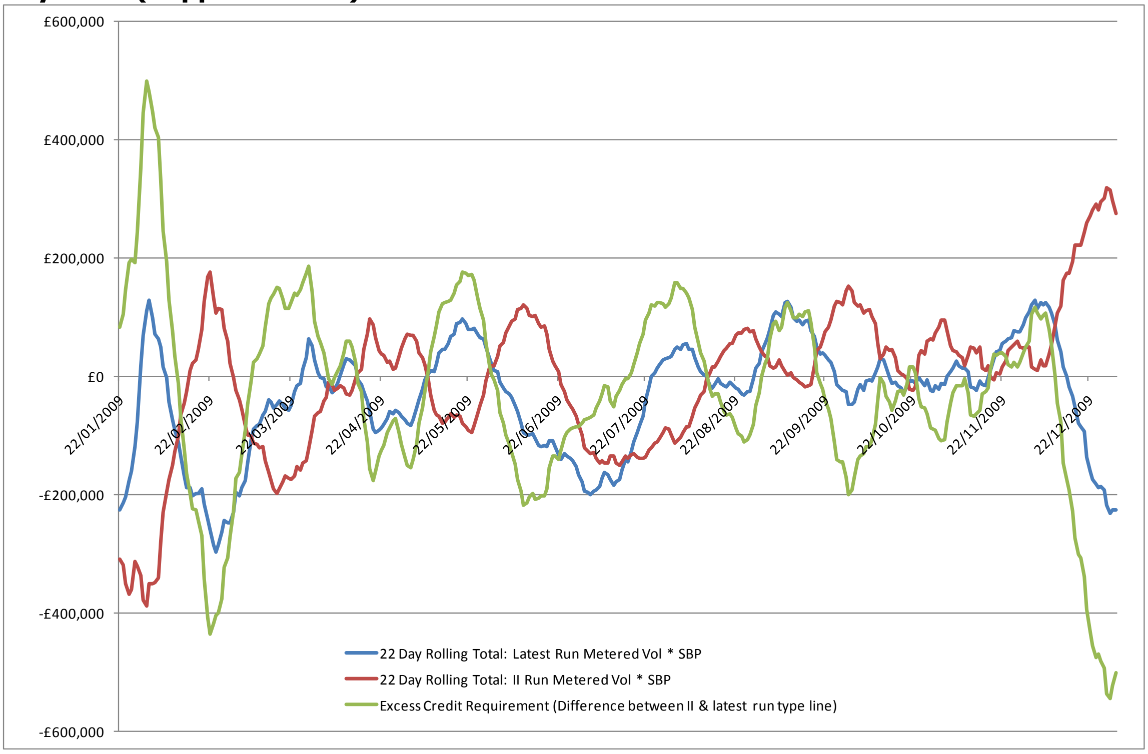
(Supplier IDs with generation capacity and a relatively small demand capacity)

Figure 7: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 4.a)



The positive values on the primary y-axis indicate that the above Supplier ID is a net exporter of energy.

Figure 8: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 4.b)



This Supplier ID switches between being a net importer and a net exporter.

Figure 9: Twenty-Two Day Rolling Sum of Daily Total Metered Volume * Daily Average System Buy Price (Supplier ID 4.e)

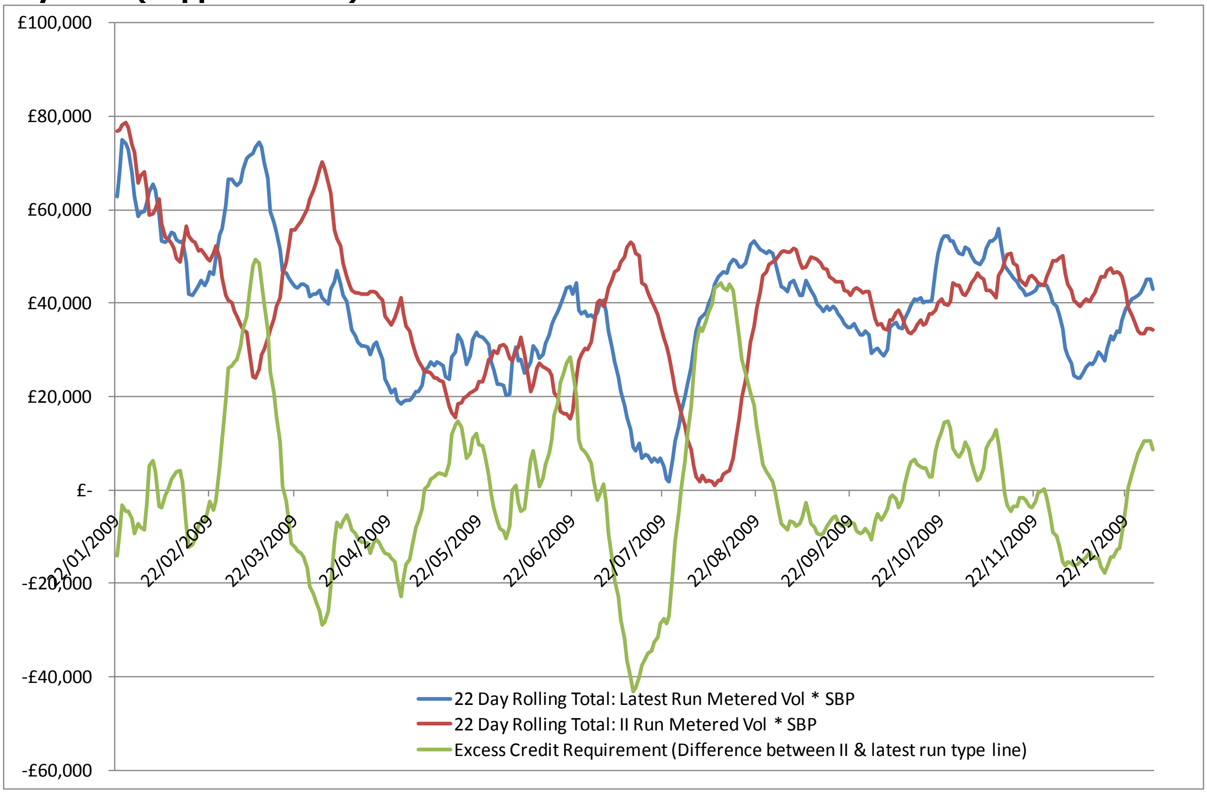
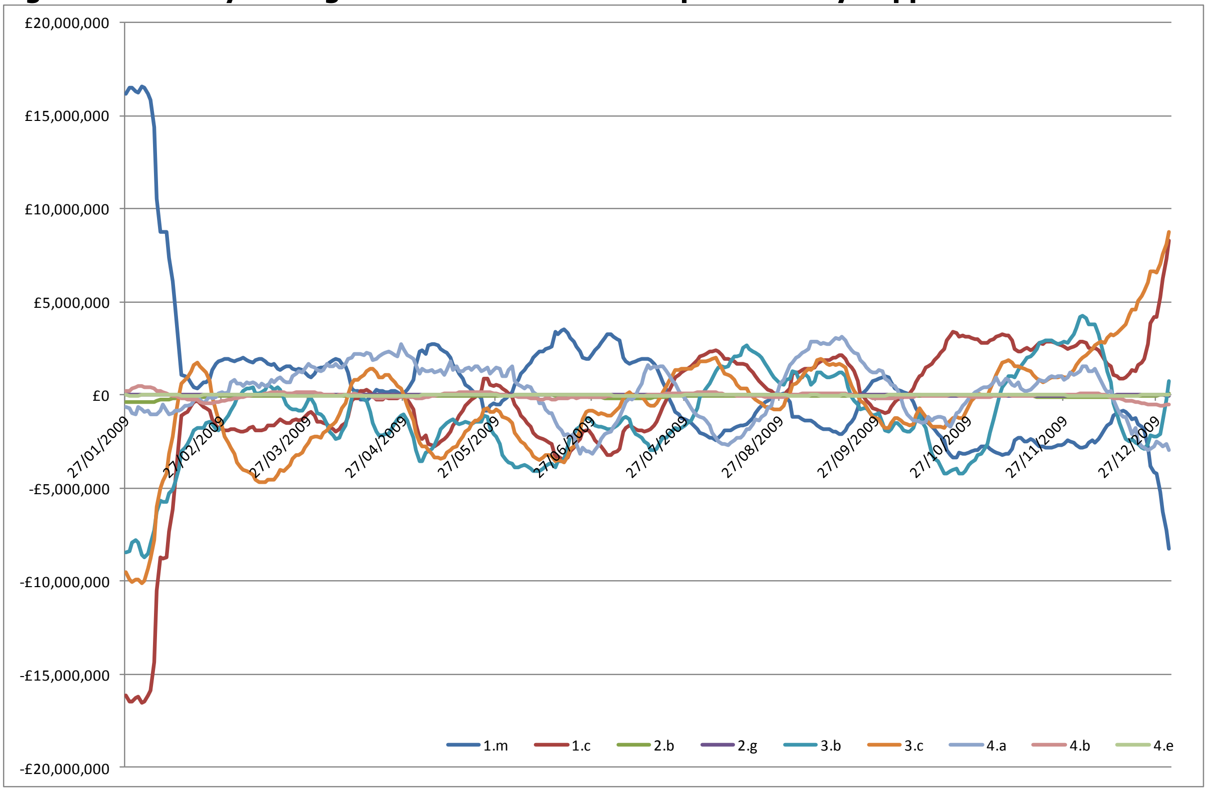


Figure 10: 22 Day Rolling Sum of Excess Credit Requirement by Supplier ID



Sensitivity analysis of error in Credit Calculation

Overview

If Supplier metered data was collected in time for the Interim Information (II) run then it is likely that this data would not be as accurate as Settlement Information (SF) run data as the earlier the data is collected, the more of it will be estimated. This document seeks to determine whether latest run type data offset by a certain percentage (to account for the increased use of estimates) would be more accurate than the currently used II data.

Note, due to system archiving SF run data is not available for use in this analysis, hence the use of latest run type data.

Methodology

The following charts are based on data for a selection of Supplier IDs. The charts have been created by taking the difference between II run metered volumes and latest run type metered volumes multiplied by System Buy Price (SBP) to give a financial estimate of the error in the credit calculation at II run.

This value has been compared to the latest run type metered volume minus a latest run volume adjusted by a certain percentage (+/- 1%, 2% and 5%) multiplied by SBP. These values are intended to represent 'real' metered data with high levels of estimates.

To simulate the credit calculation the charts show a twenty two day rolling sum. Those lines which are closest to the x-axis represent the least level or error in the credit calculation.

Conclusions

From the following charts it is clear that for small Suppliers with embedded generation, latest run type data adjusted by as much as 5% to 10% is closer to actual metered volumes than II run data. For larger Suppliers the percentage adjustment is somewhat lower at less than 5%, although this may represent a much larger value in financial terms.

Figure 11: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 1.f

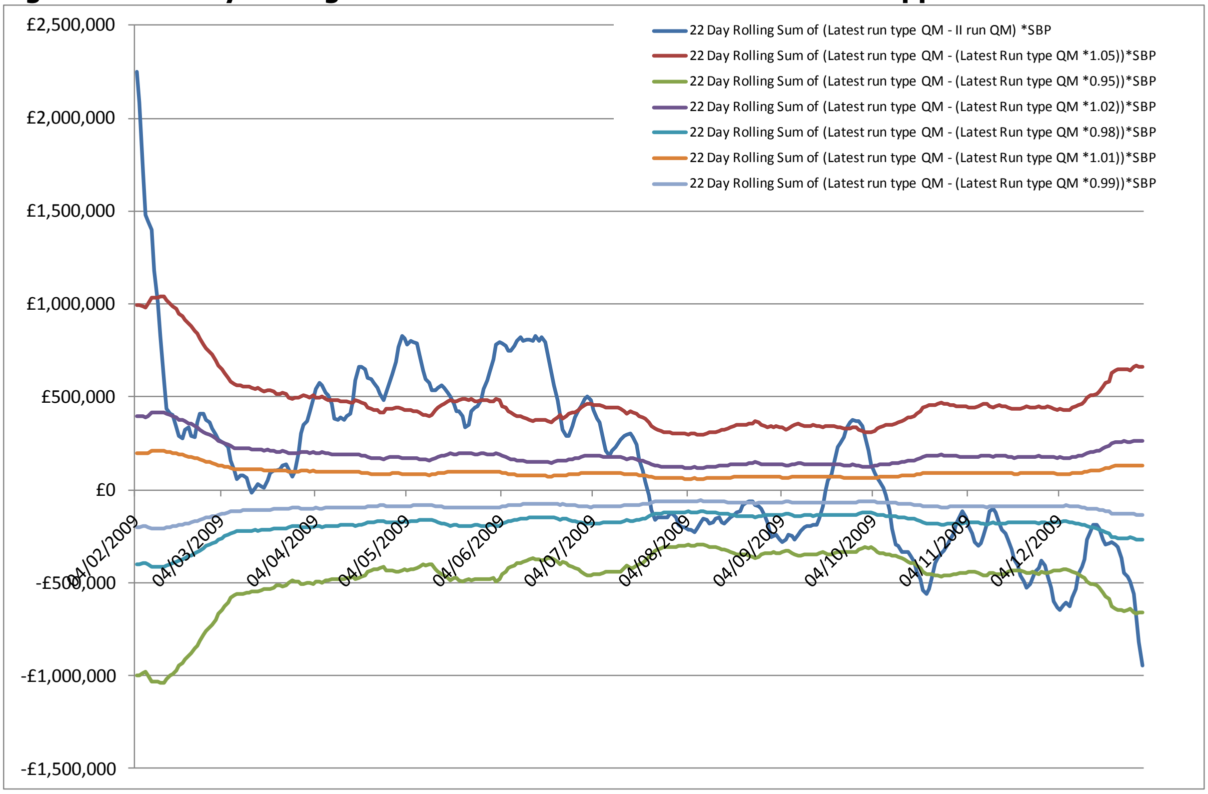


Figure 12: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 1.l

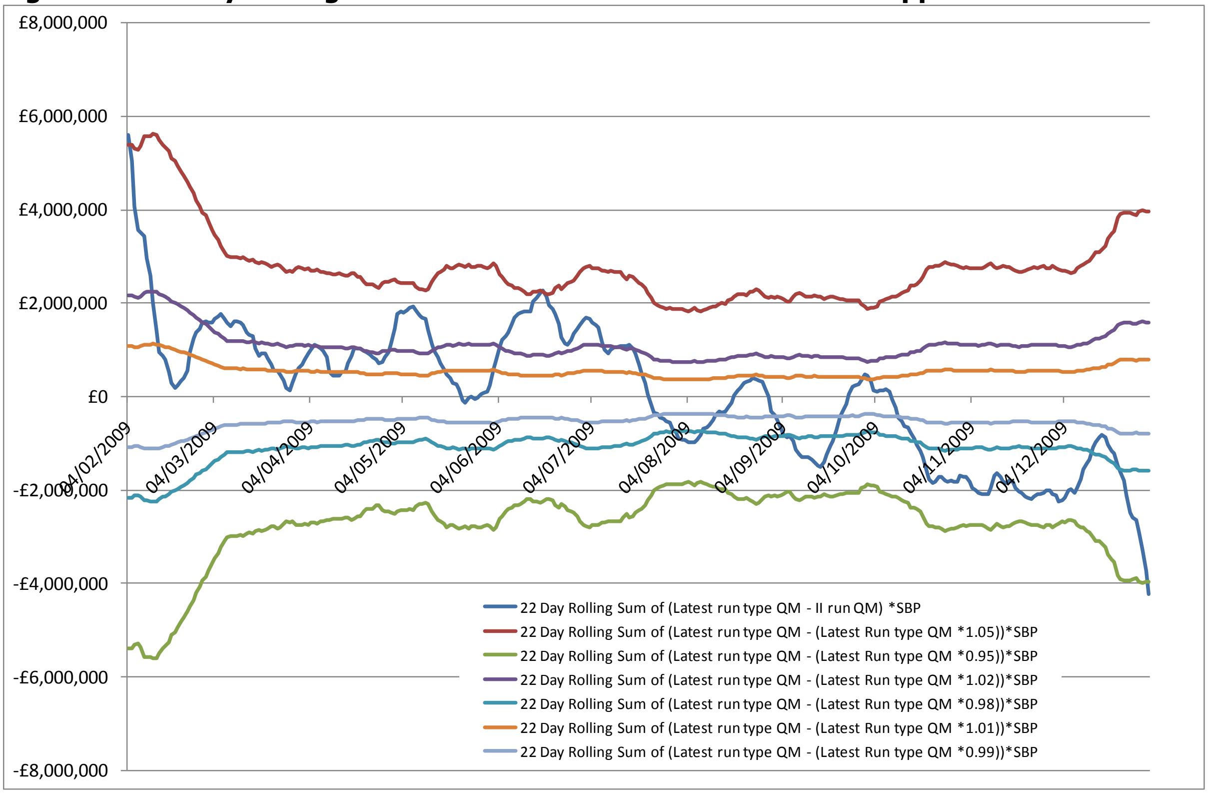


Figure 13: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 2.k

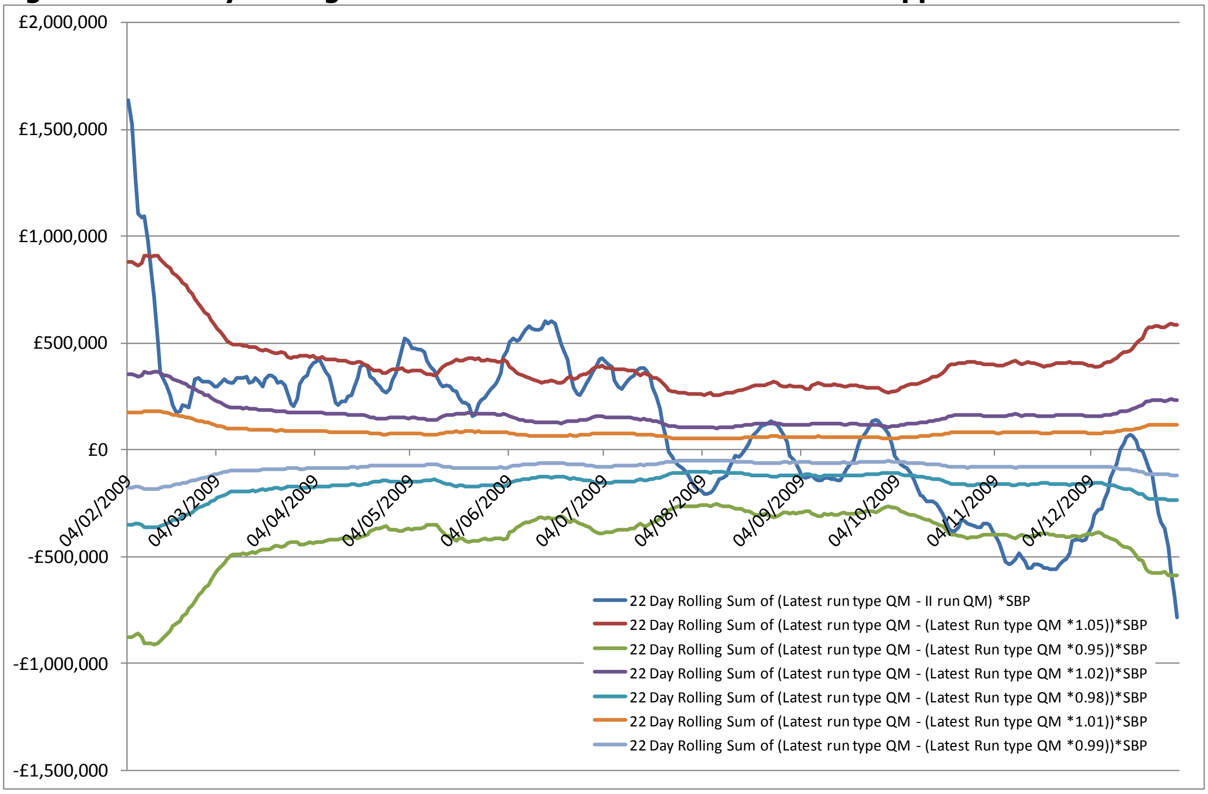


Figure 14: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 3.d

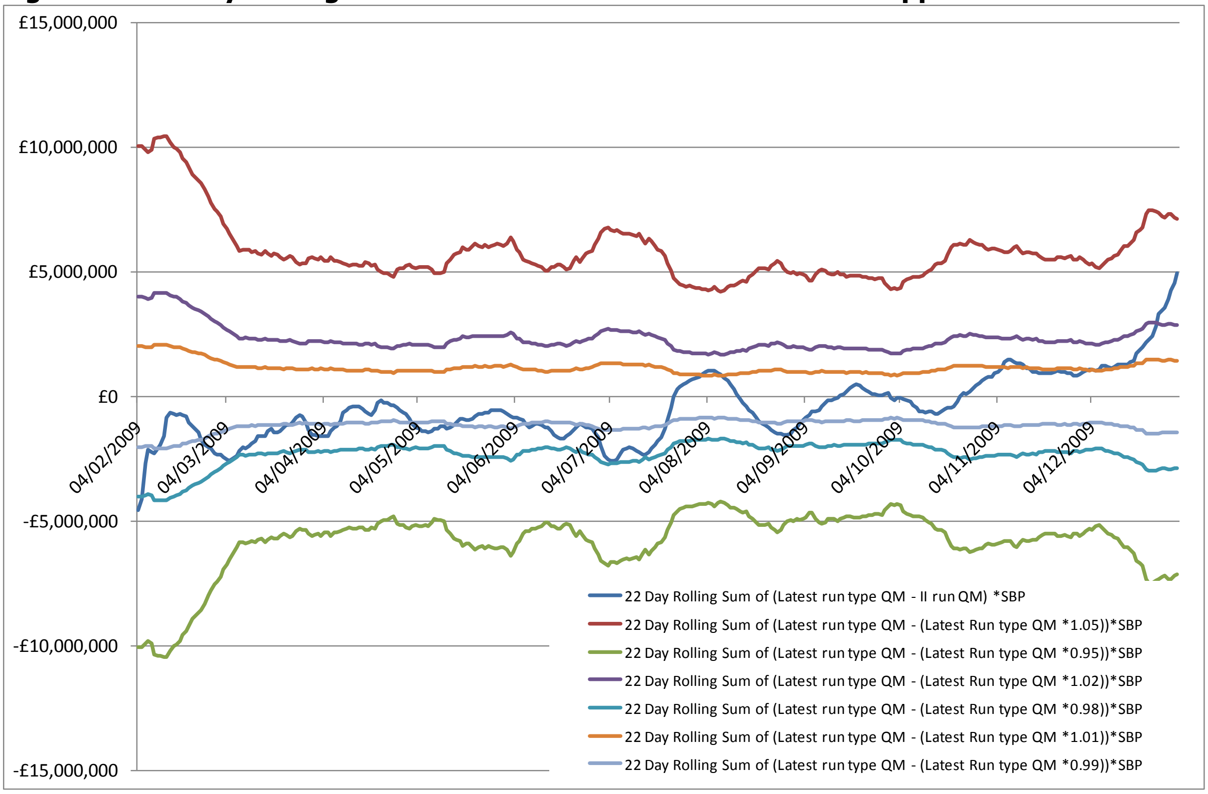


Figure 15: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 4.a (+/- 1%, 2% & 5%)

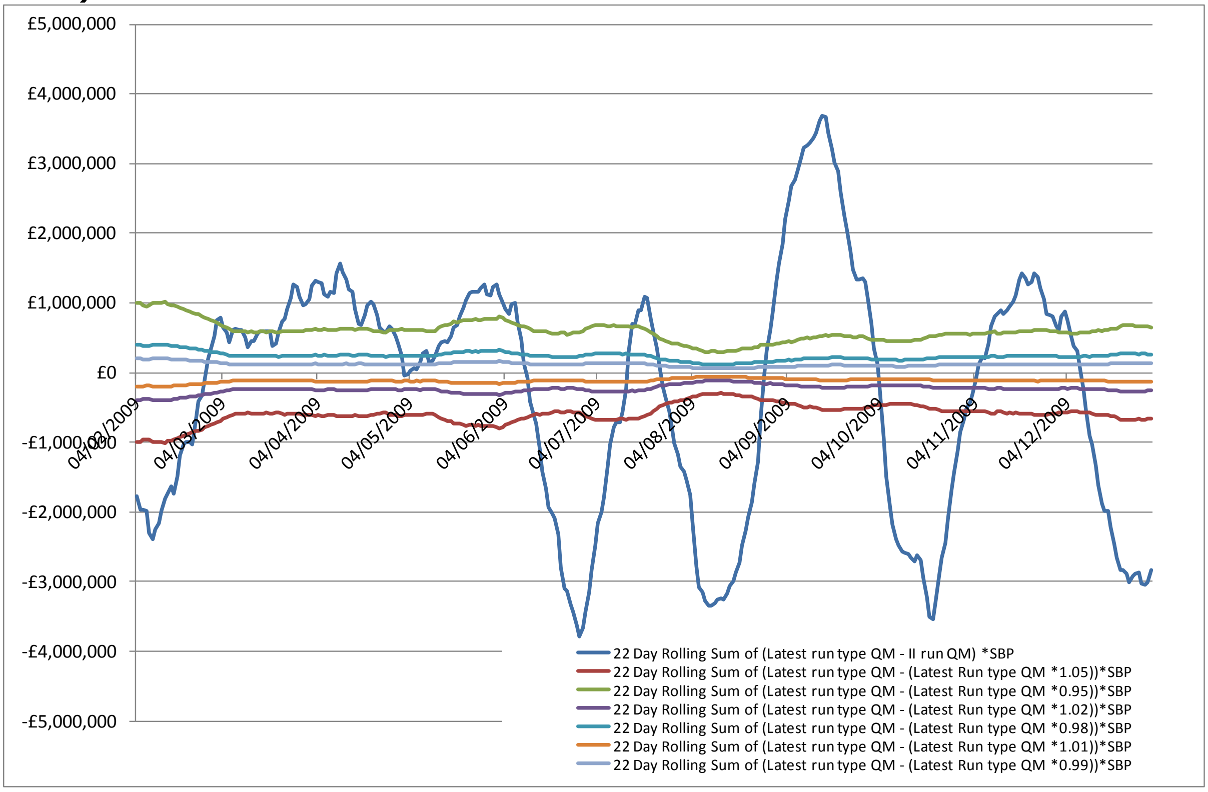


Figure 16: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 4.a (+/- 10% & 20%)

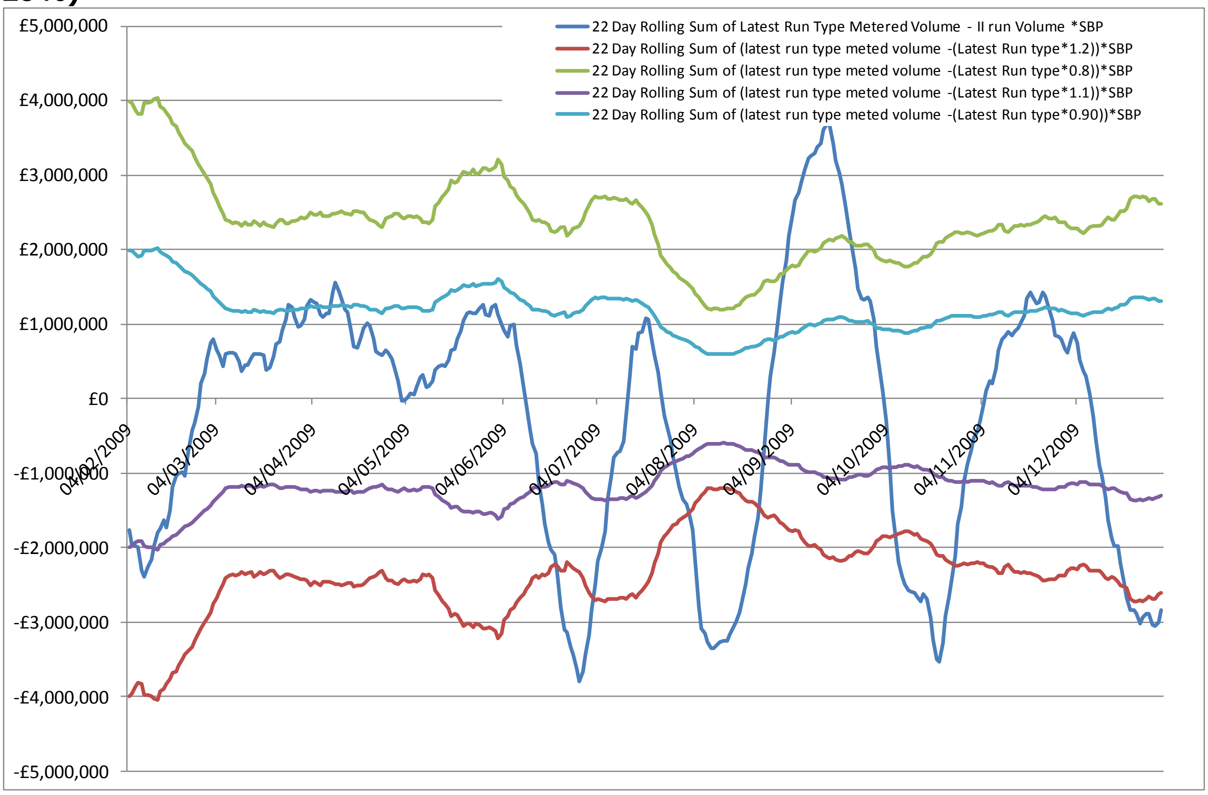


Figure 17: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 4.c (+/- 1%, 2% & 5%)

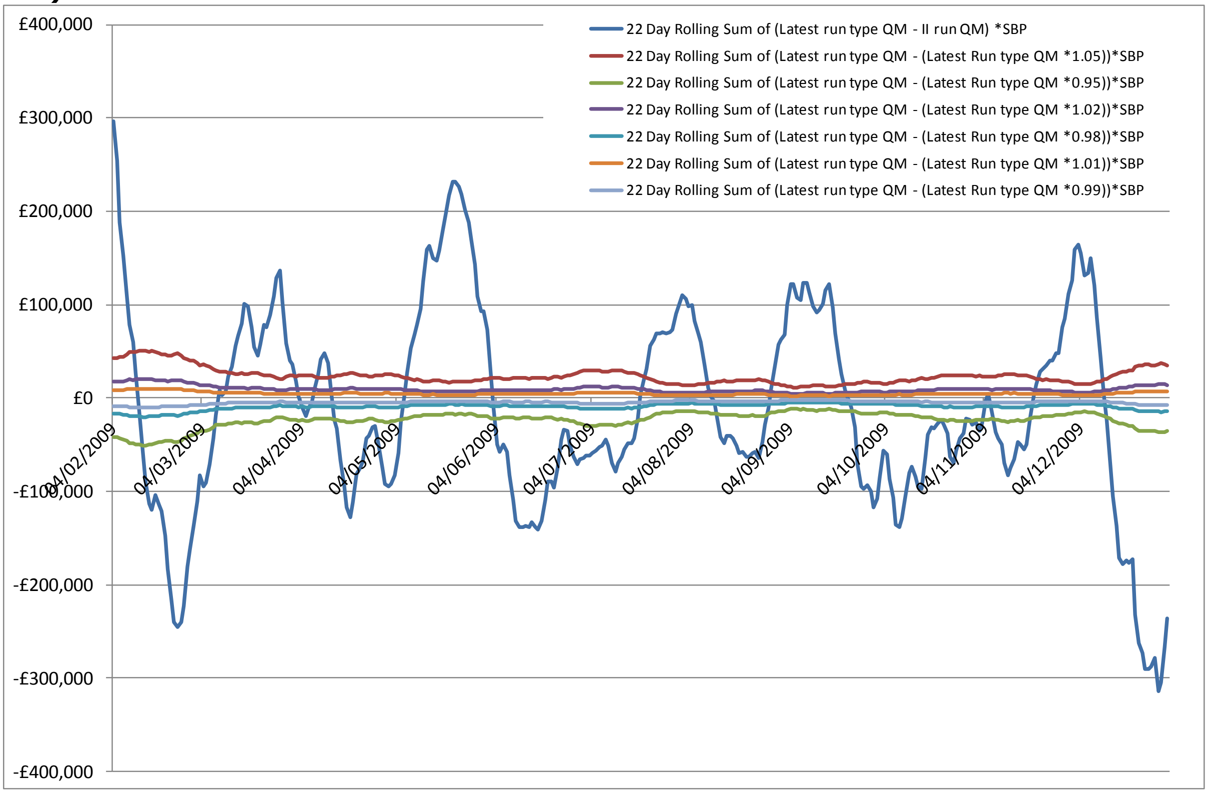
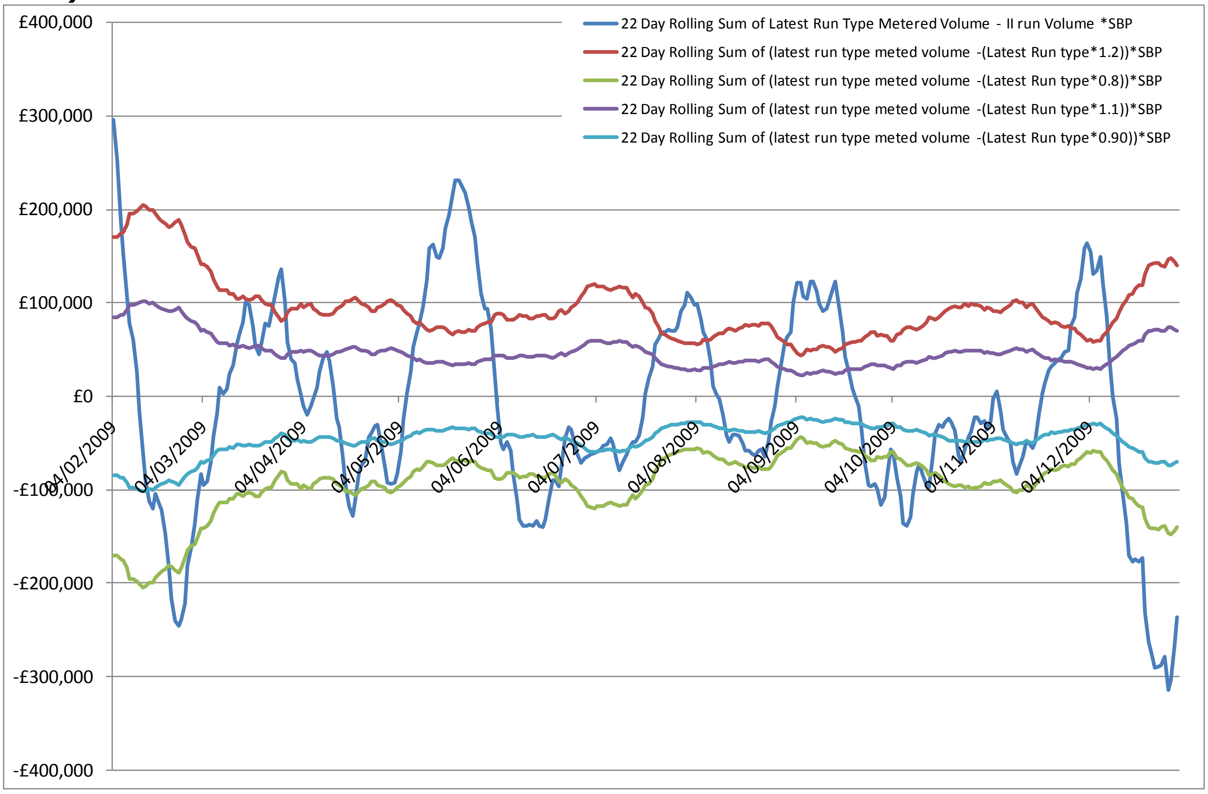


Figure 18: 22 Day Rolling Sum Error in the Credit Calculation for Supplier ID 4.c (+/- 10% & 20%)



Impact of Bank Holidays on the Credit Calculation

Overview

This document looks at the impact of bank holidays on the credit calculation by taking data for a number of Supplier IDs over the 31 August 2009 bank holiday and Christmas 2009 period. The charts demonstrate that bank holidays have a clear impact on the credit calculation.

Method

The following charts have been produced by subtracting the daily aggregate II run metered volume from the latest run type volume for number of Supplier IDs. This value represents the level of error in the credit calculation that occurs due to the II run volumes being less accurate than those of later run types.

One of the suggested methods of reducing the impact of bank holidays on the credit calculation is to use the latest Sunday that has passed SF as the reference day (rather than the latest like day). This in theory should reflect the reduced demand that occurs on bank holidays. The charts also show the impact this would have on the credit calculation.

Conclusions

It can be seen from the charts below that not only is the credit calculation affected on bank holiday Settlement Dates, but also Settlement Dates 21 days after the bank holiday, i.e when the bank holiday becomes the reference day.

The use of a Sunday as the reference day, rather than a 'like' day does reduce the error in the calculation for the August 2009 bank holiday. For the Christmas period the method is slightly less successful. If this solution were introduced, then an alternative for the bank holiday when it becomes the reference day would also need to be considered.

Part 1 – 31 August Bank Holiday

In the following charts the bank holiday adjusted II volume has been calculated using Sunday 9 August 09 as the reference day for the 31 August 09 bank holiday. The actual credit calculation uses Monday 10 August 09 as the reference day.

Figure 19: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 1.c)

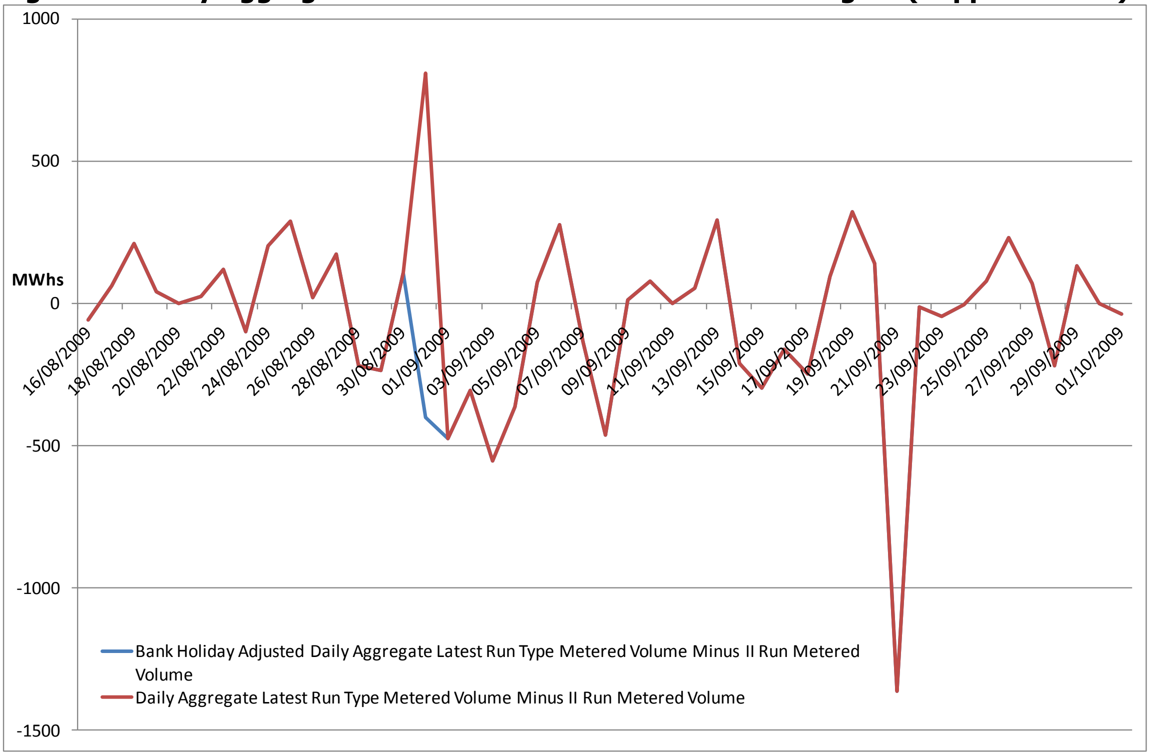


Figure 20: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 1.m)

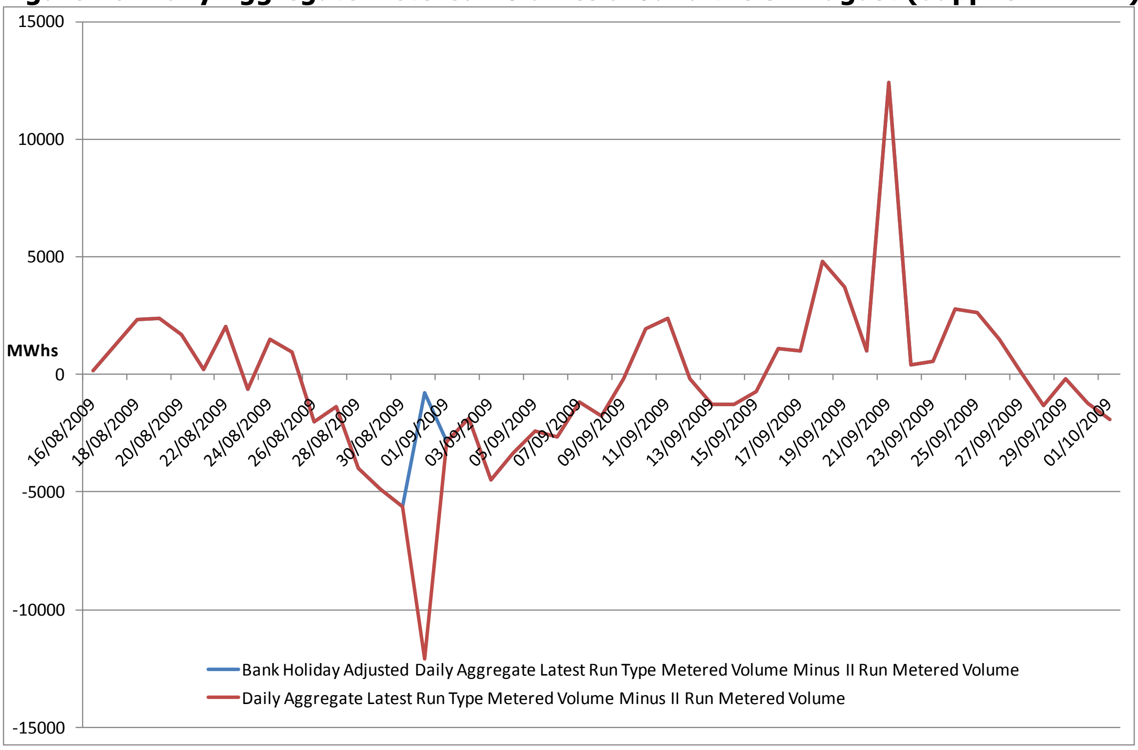


Figure 21: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 2.b)

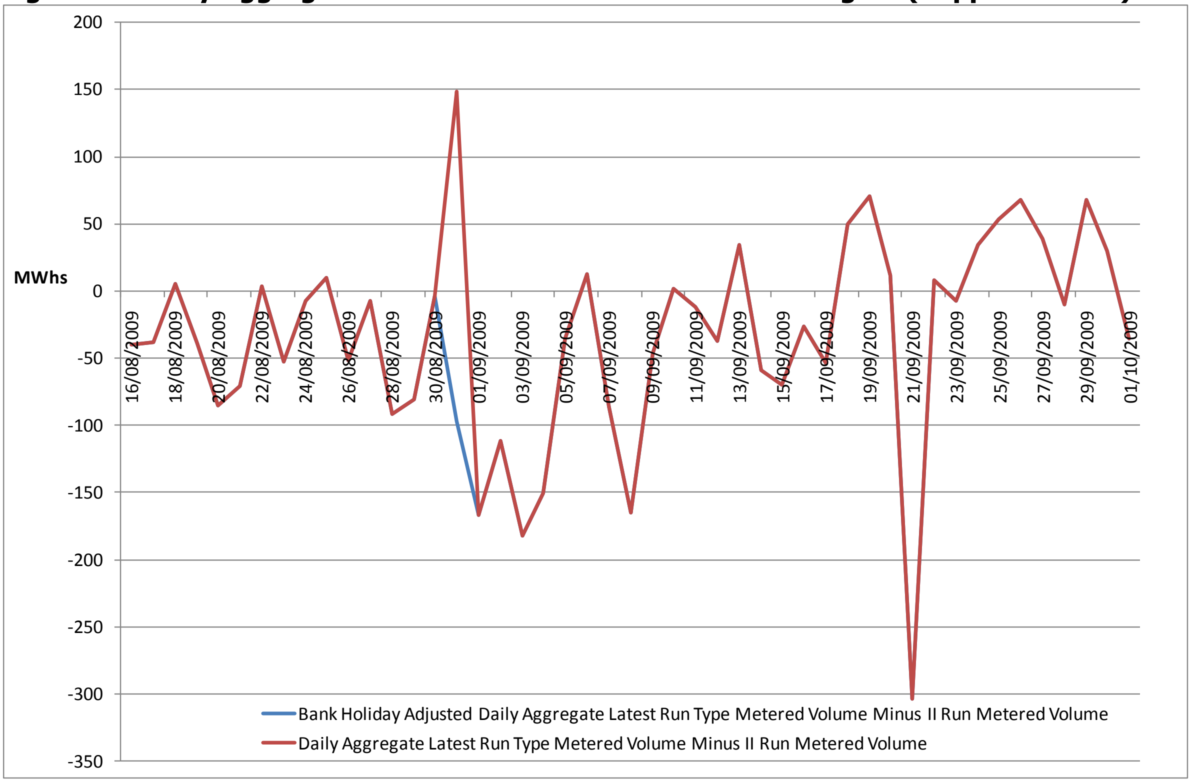


Figure 22: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 2.d)

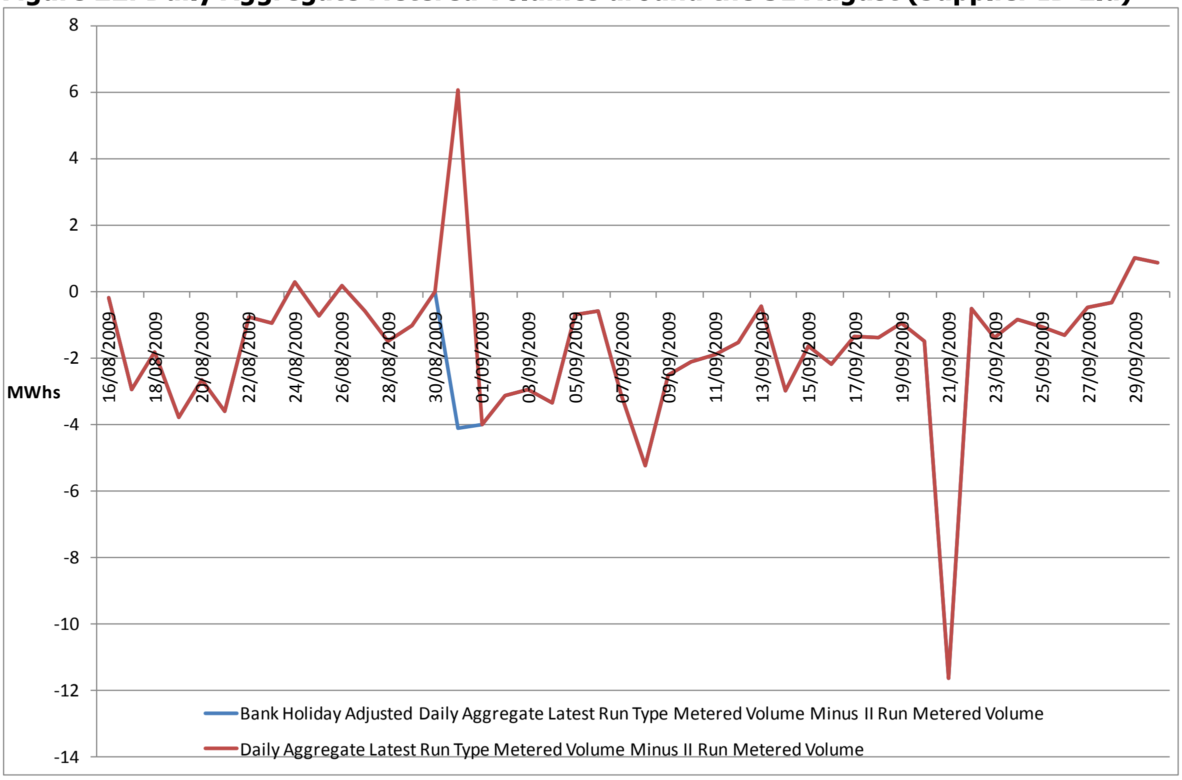


Figure 23: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 2.g)

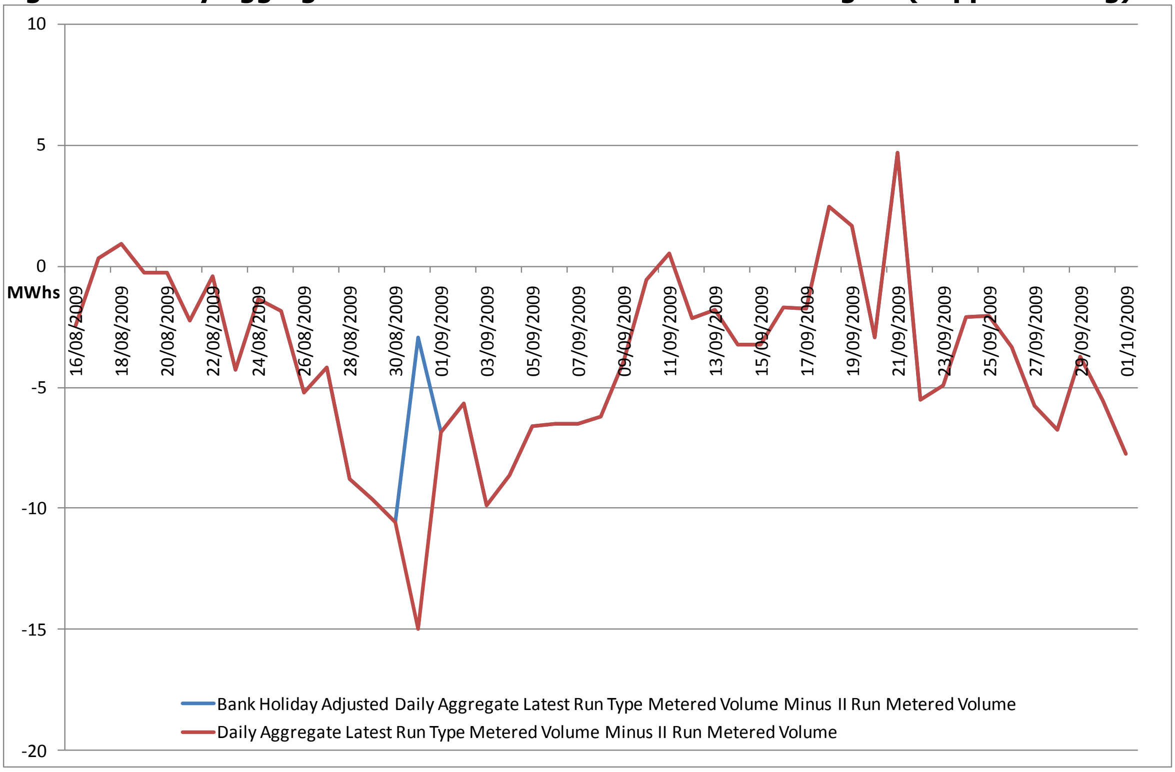


Figure 24: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 3.b)

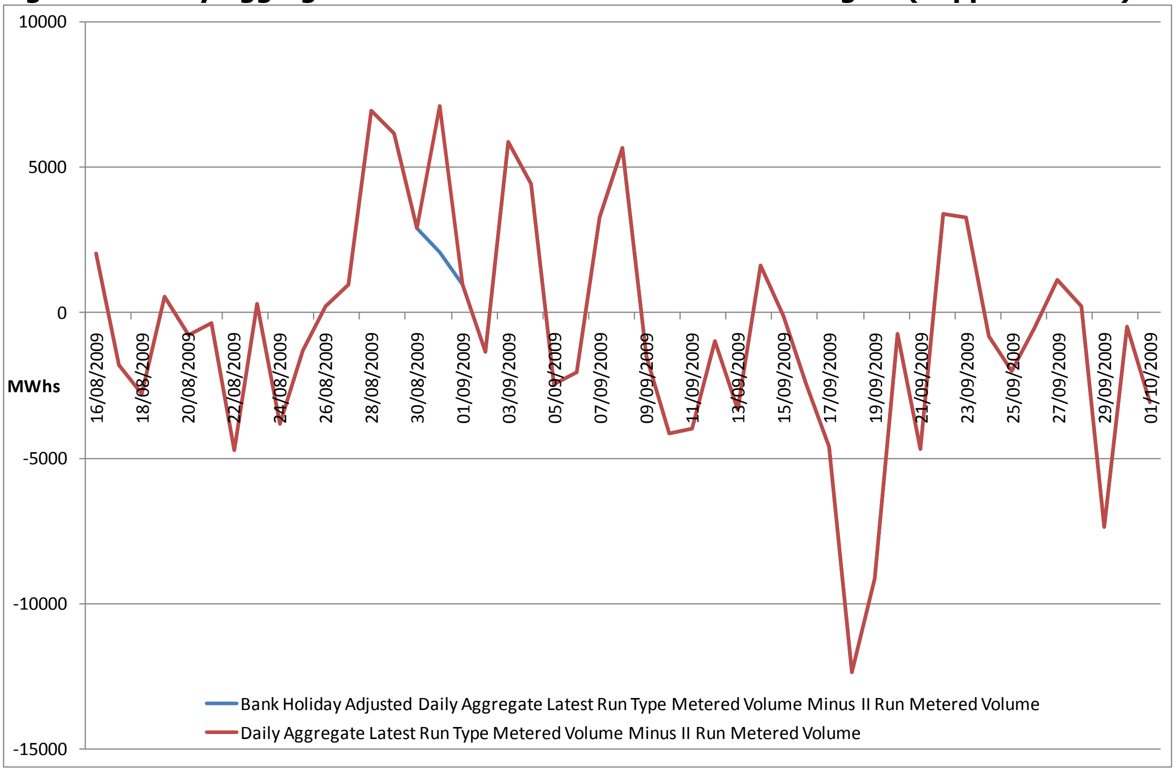


Figure 25: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 3.c)

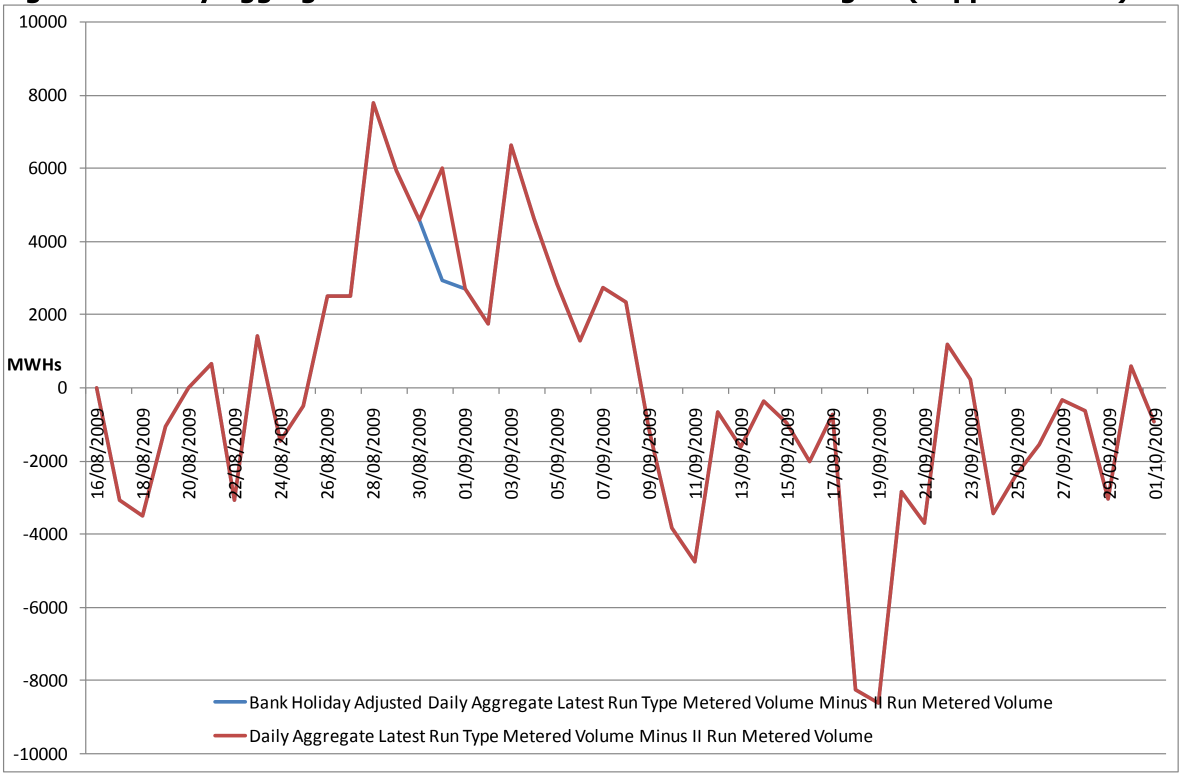
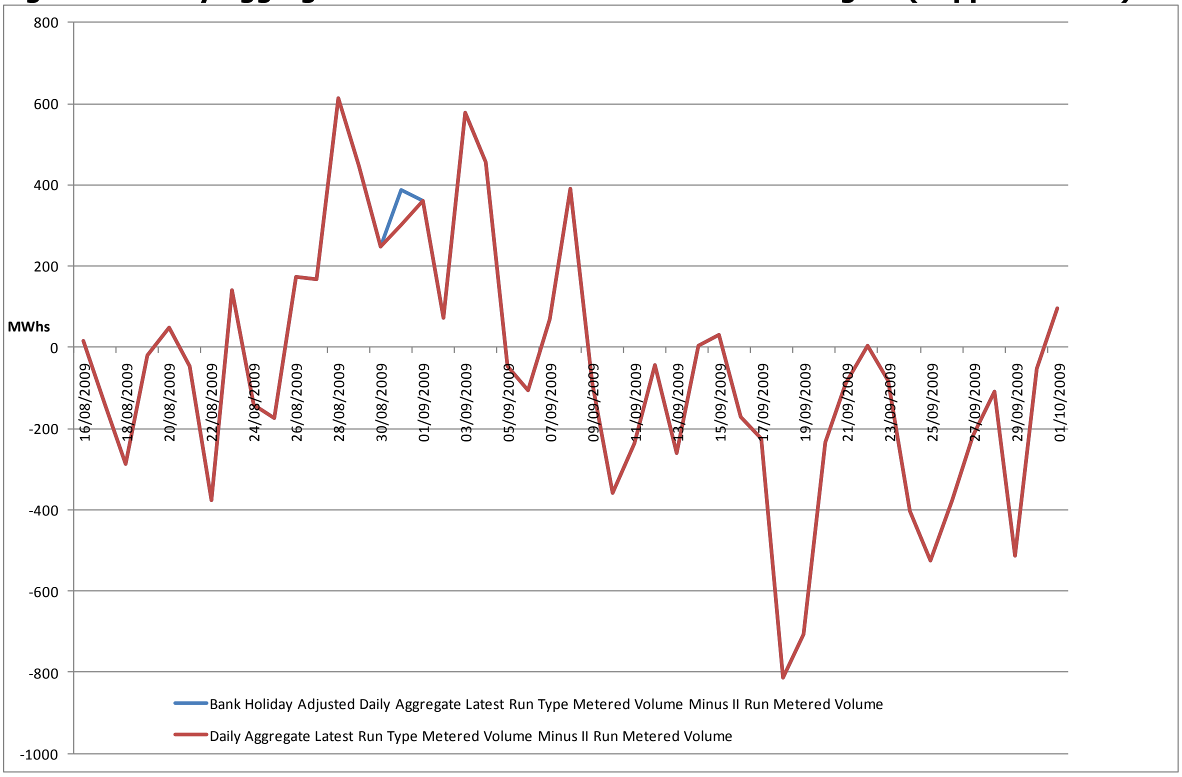


Figure 26: Daily Aggregate Metered Volumes around the 31 August (Supplier ID 4.b)



Part 2 – Christmas 2009

In the following charts the bank holiday adjusted II volume has been calculated using the latest Sunday to pass SF as the reference day:

Bank Holiday	**Actual Reference Day**	**Reference Day Used in Bank Holiday adjusted data**
Christmas Day Bank Holiday: 25 December 2009 (Friday)	Friday 4 December 09	Sunday 29 November
Boxing Day Bank Holiday: 28 December 2009 (Monday)	Monday 7 December 09	Sunday 6 December
New Year's Day: 1 January 2010 (Friday)	Friday 11 December 09	Sunday 6 December

Figure 27: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 1.c)

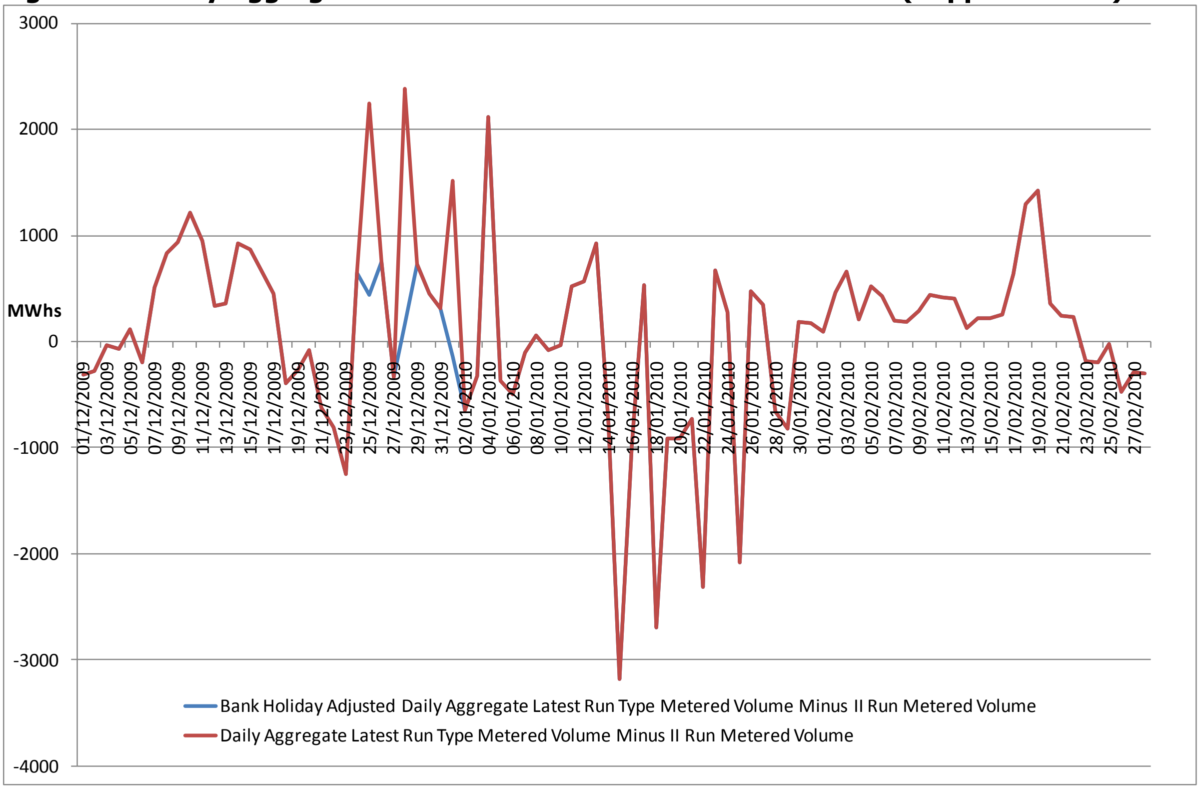


Figure 28: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 1.m)

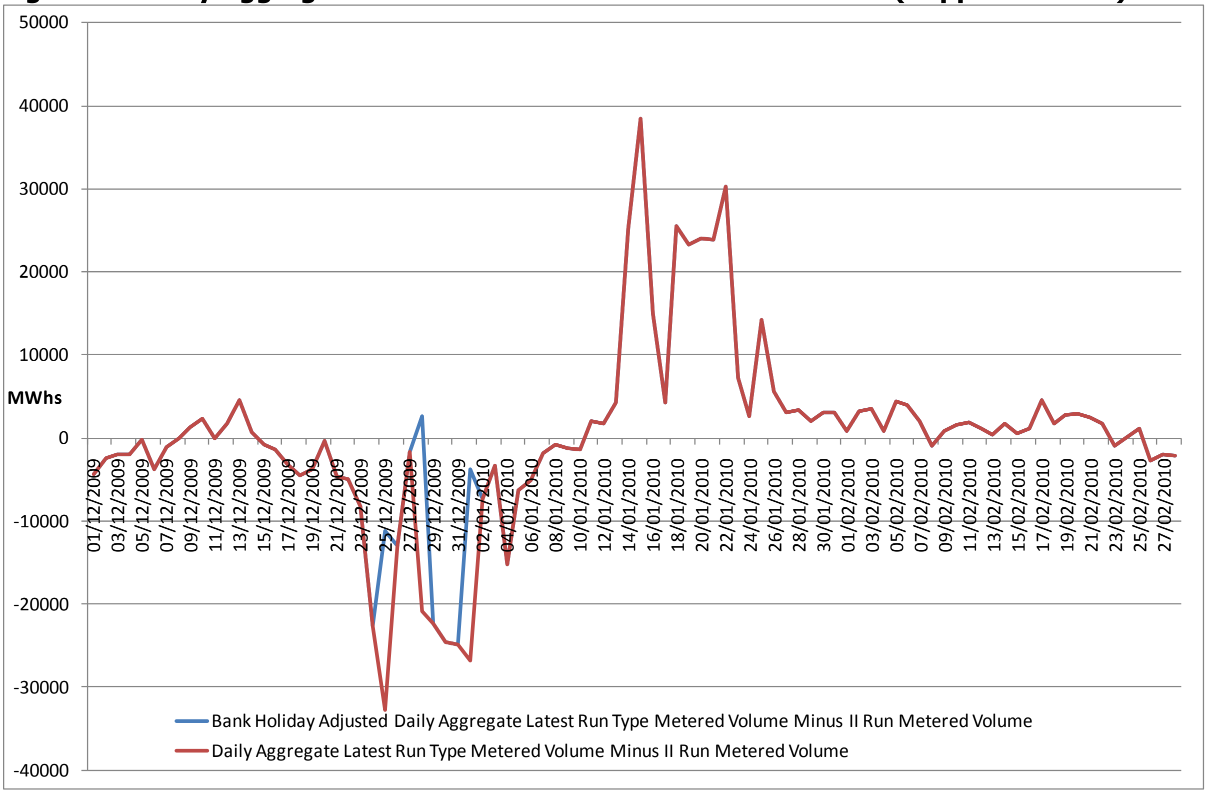


Figure 29: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 2.b)

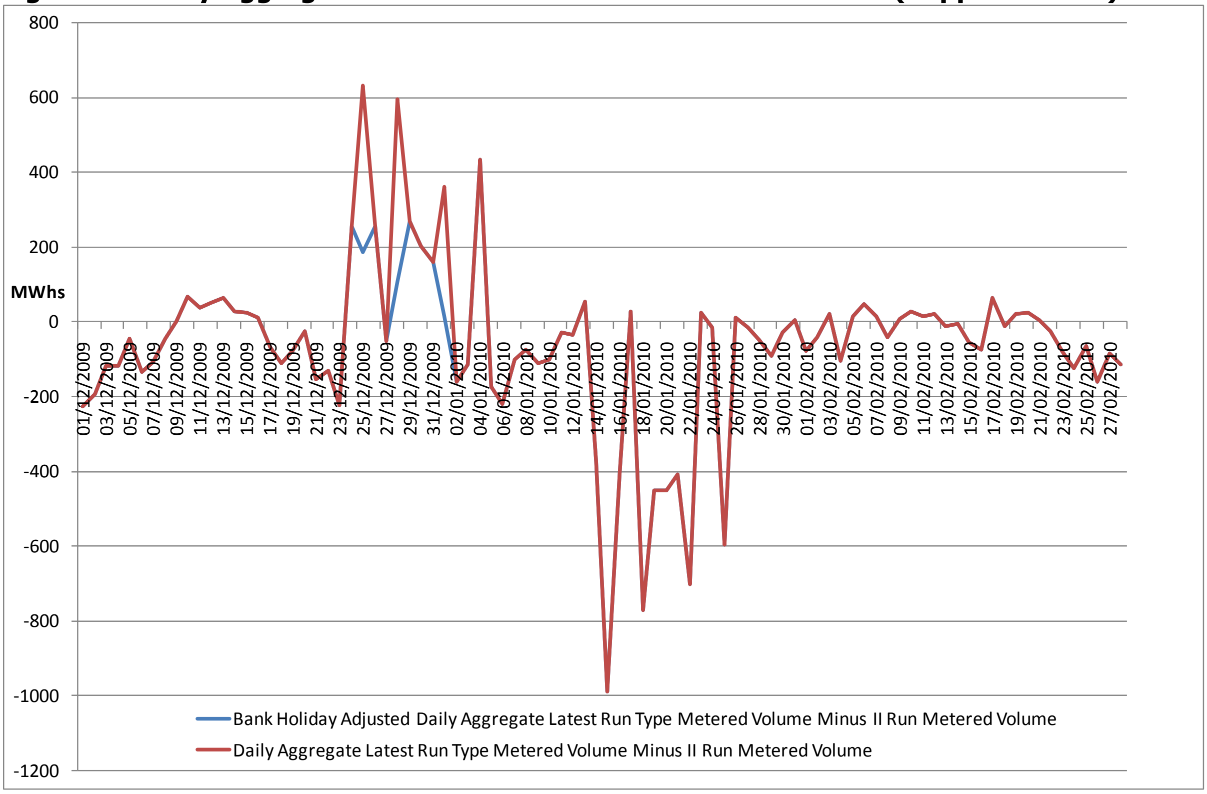


Figure 30: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 2.d)

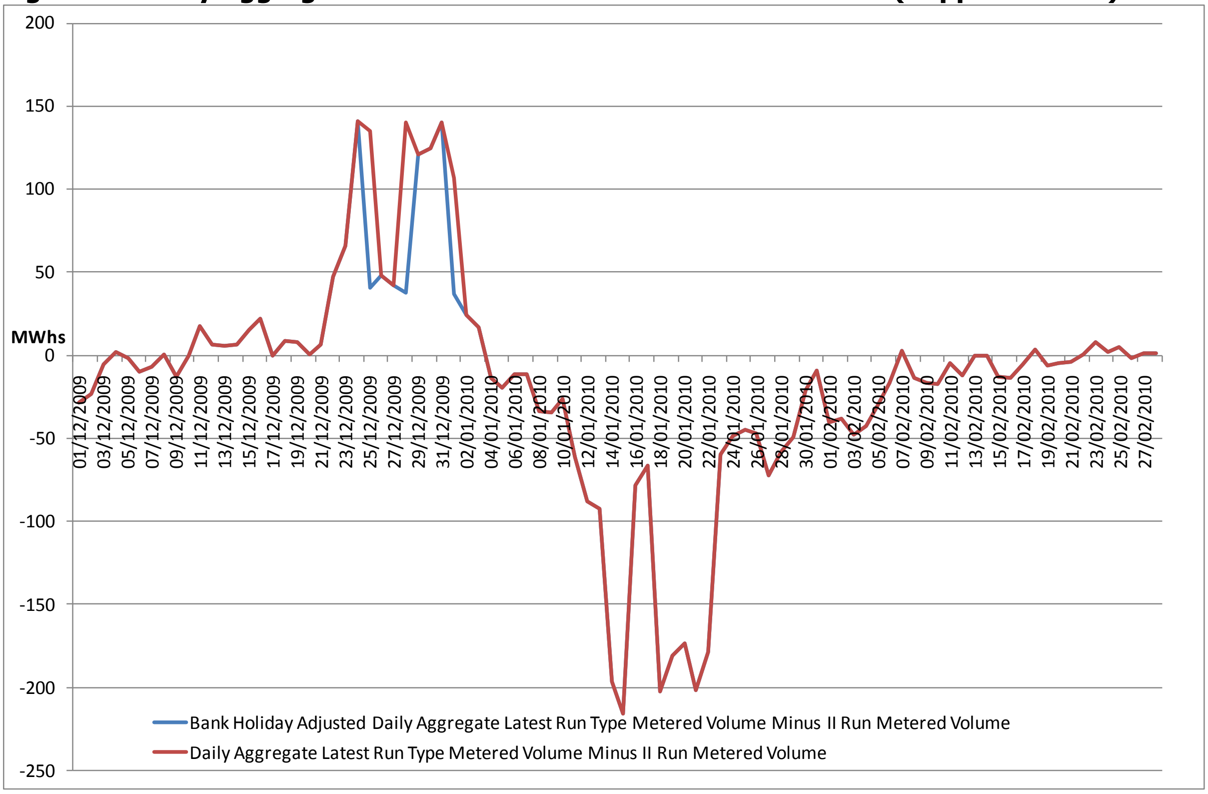


Figure 31: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 2.g)

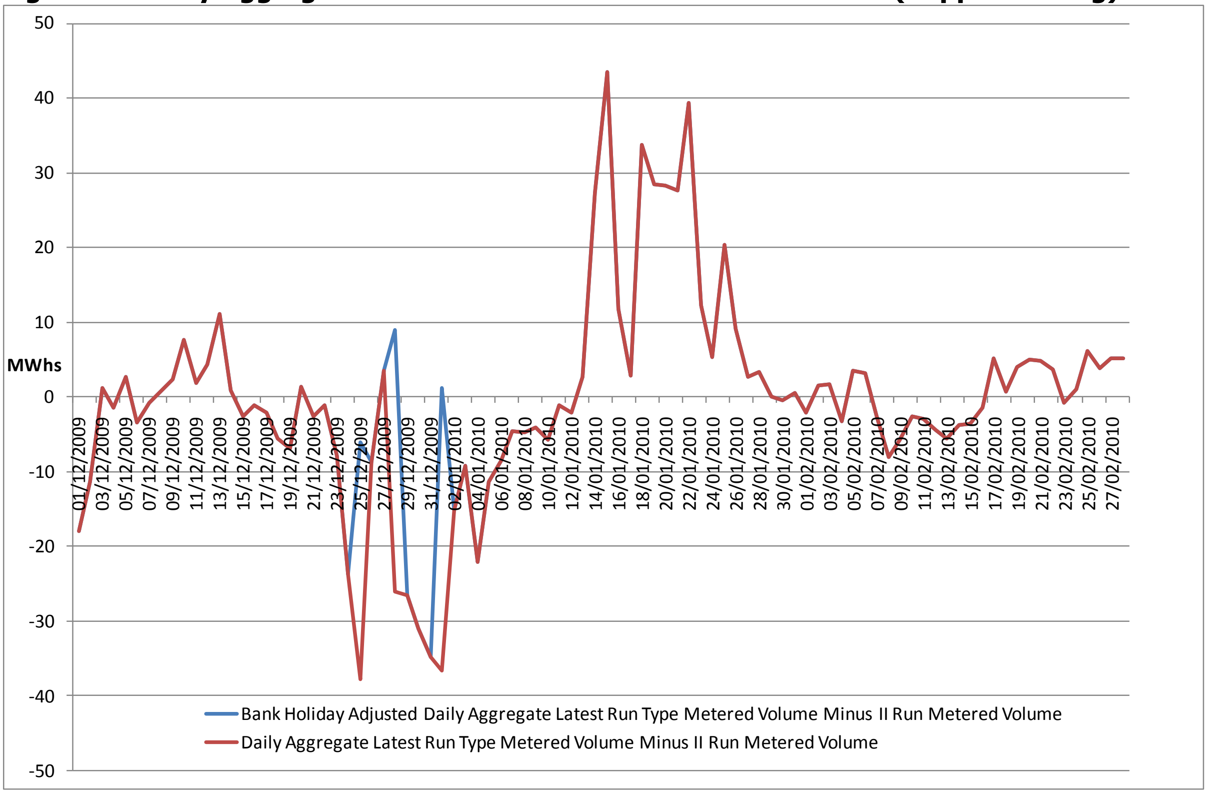


Figure 32: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 3.b)

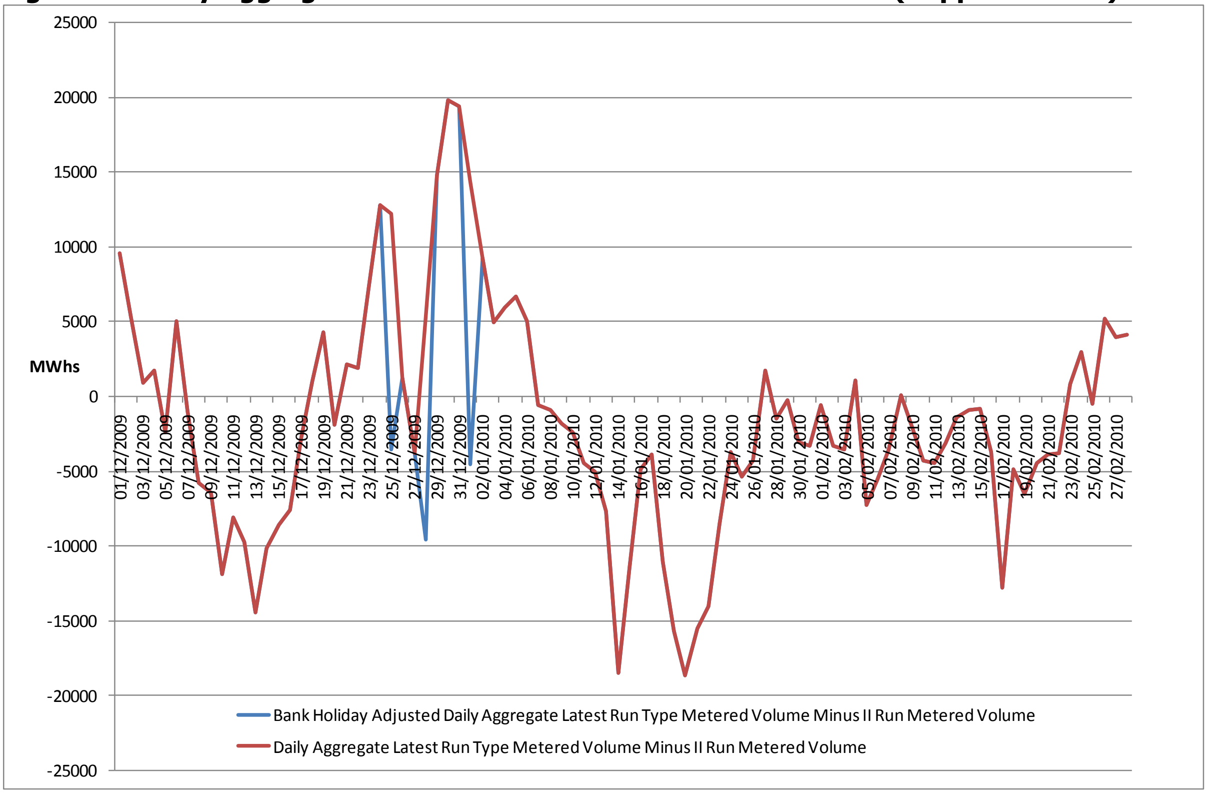


Figure 33: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 3.c)

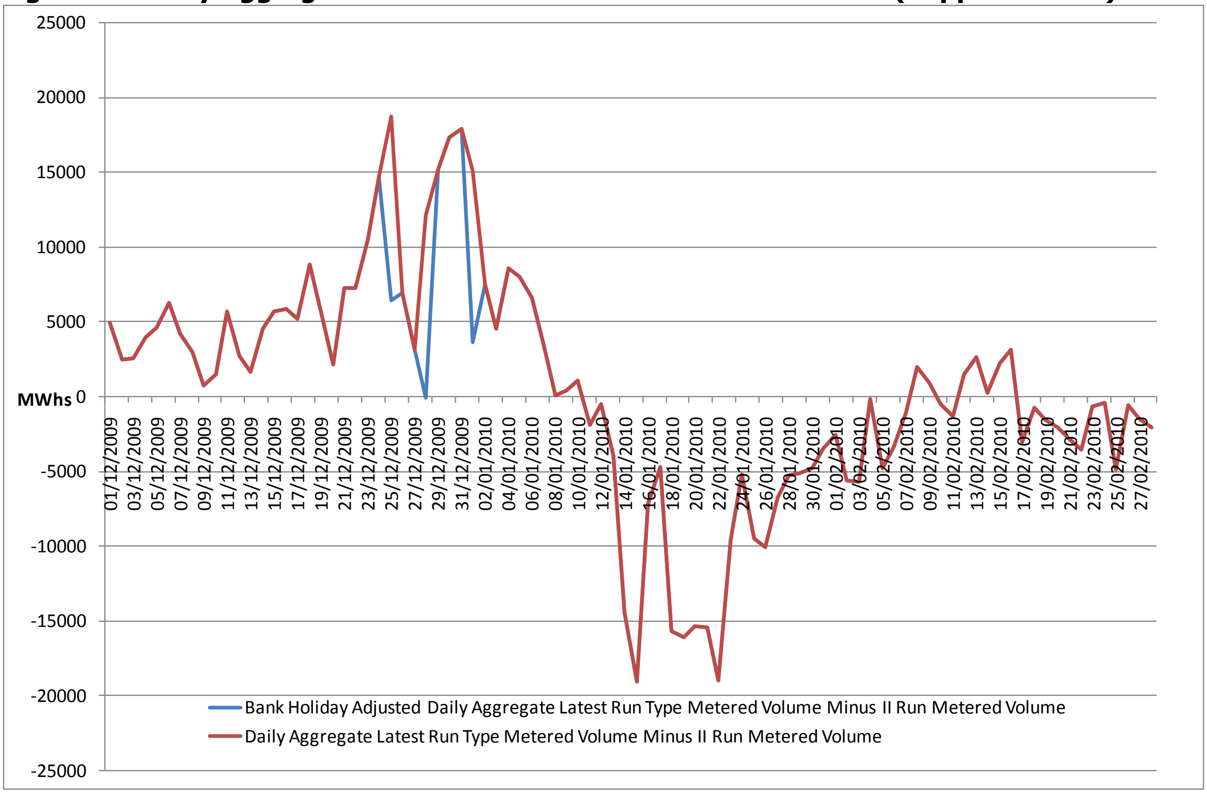
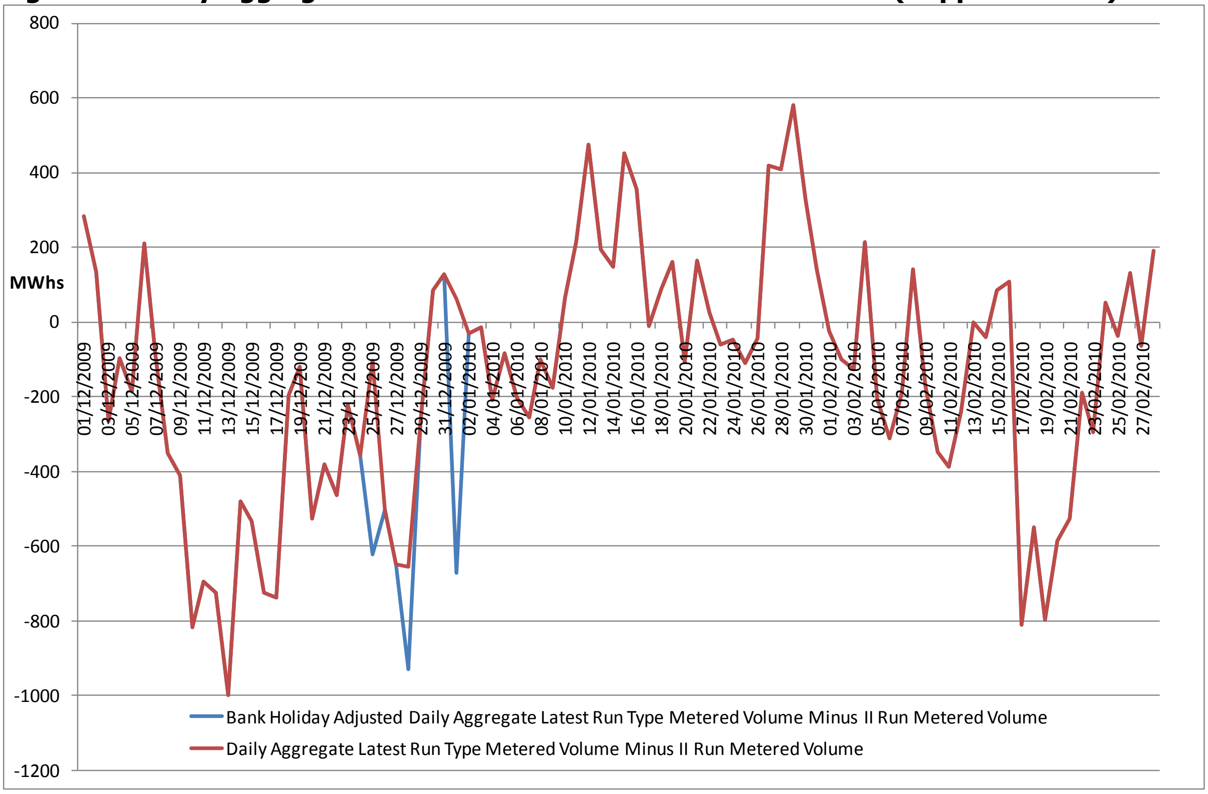


Figure 34: Daily Aggregate Metered Volumes over Christmas 2009 (Supplier ID 4.b)



Scottish Bank Holidays

Overview

Scottish Bank holidays differ from those in England and Wales. This document aims to demonstrate whether the impact of this can be seen in the credit calculation. The following tables show UK bank holidays – those shown in red differ between England and Scotland.

2009/10 Bank Holiday Dates England & Wales
New Year's Day - 1 January 2010
Good Friday - 2 April 2010
Easter Monday - 5 April 2010
May Day Bank Holiday - 3 May 2010
Spring Bank Holiday - 31 May 2010
Summer Bank Holiday - 30 August 2010
Christmas Day Bank Holiday - 27 December 2010
Boxing Day Bank Holiday - 28 December 2010
New Year's Day - 1 January 2009
Good Friday - 10 April 2009
Easter Monday - 13 April 2009
May Day Bank Holiday - 4 May 2009
Spring Bank Holiday - 25 May 2009
Summer Bank Holiday -31 August 2009
Christmas Day Bank Holiday - 25 December 2009
Boxing Day Bank Holiday - 28 December 2009

2009/10 Bank Holiday Dates Scotland
New Year's Day - 1 January 2010
Second of January - 4 January 2010
Good Friday - 2 April 2010
May Day Bank Holiday - 3 May 2010
Spring Bank Holiday - 31 May 2010
Summer Bank Holiday - 2 August 2010
St Andrews Day - 30 November 2010
Christmas Day Bank Holiday - 27 December 2010
Boxing Day Bank Holiday - 28 December 2010
New Year's Day - 1 January 2009
Second of January - 2 January 2009
Good Friday - 10 April 2009
May Day Bank Holiday - 4 May 2009
Spring Bank Holiday - 25 May 2009
Summer Bank Holiday - 3 August 2009
St Andrews Day - 30 November 2009
Christmas Day Bank Holiday - 25 December 2009
Boxing Day Bank Holiday - 28 December 2009

Methodology

To create the following charts data has been taken for a period around August 2009 for a selection of Supplier IDs. In August there is a bank holiday in Scotland on 3 August 2009 and in England on 31 August 2009. Interim Information (II) run metered volumes have been subtracted from latest run type metered volumes at a daily aggregated BM Unit level to determine the error in the credit calculation.

If the bank holiday error affects Scotland on different days to the rest of the UK we would expect to see a spike in error for Scottish BM Unit data on 3 August 2009 and 24 August 2009 and for other BM Unit data on 31 August 2009 and 21 September 2009.

Conclusions

From the charts below it is clear that the error in the II run volumes affects data for English and Welsh BM Units. For data relating to Scottish BM Units it is difficult to discern if there is an impact, there are several reasons why this might be the case. For instance,

- Does the level of embedded generation in Scotland mask any increased error levels around bank holidays?
- Do nationwide businesses with offices in Scotland follow English bank holiday rather than Scottish ones, thus dimming the effect of the Scottish bank holidays?

Given the lack of conclusion on this initial set of analysis, it would be advisable to carry out additional analysis on the impact of Scottish bank holidays if the Modification Group were to pursue a solution which involved amending the credit calculation reference days for bank holidays.

Figure 35: Daily Average Latest Run Type Metered volume minus II Run Metered Volume by GSP Group for Supplier ID 1.m

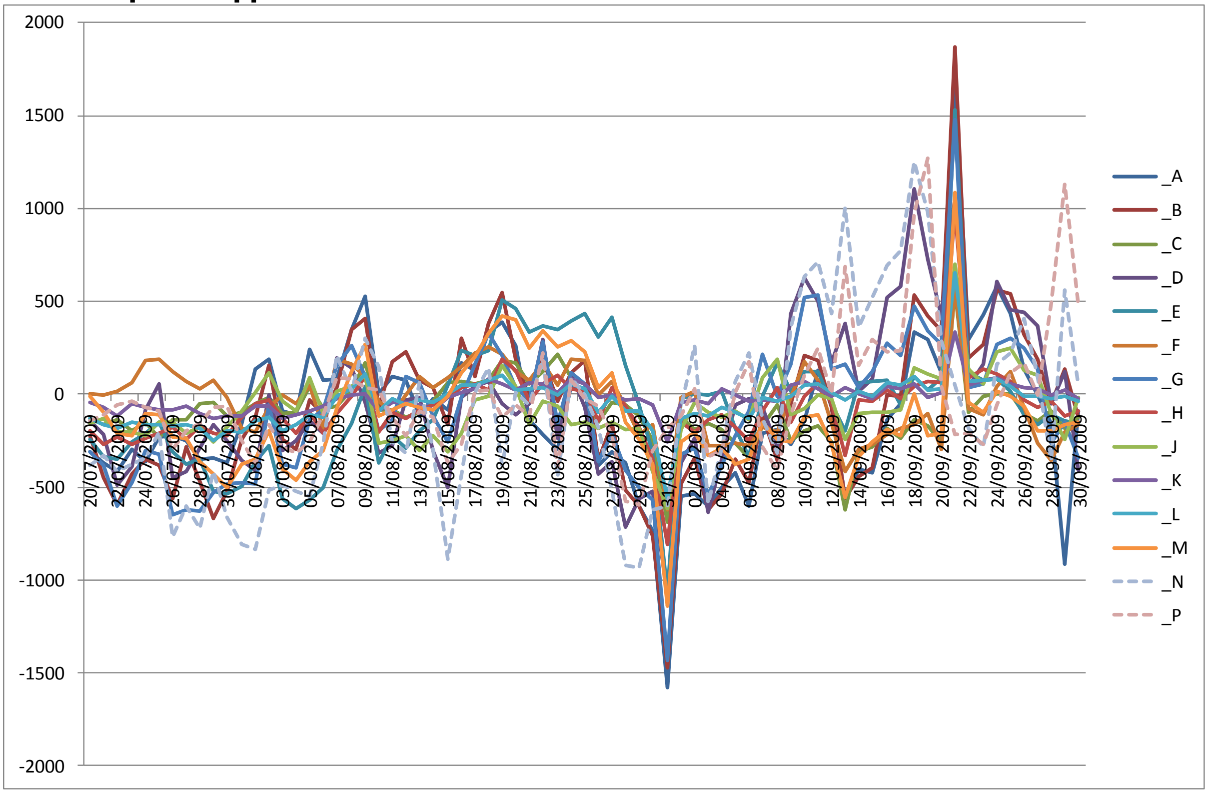


Figure 36: Daily Average Latest Run Type Metered volume minus II Run Metered Volume by location for Supplier ID 1.m

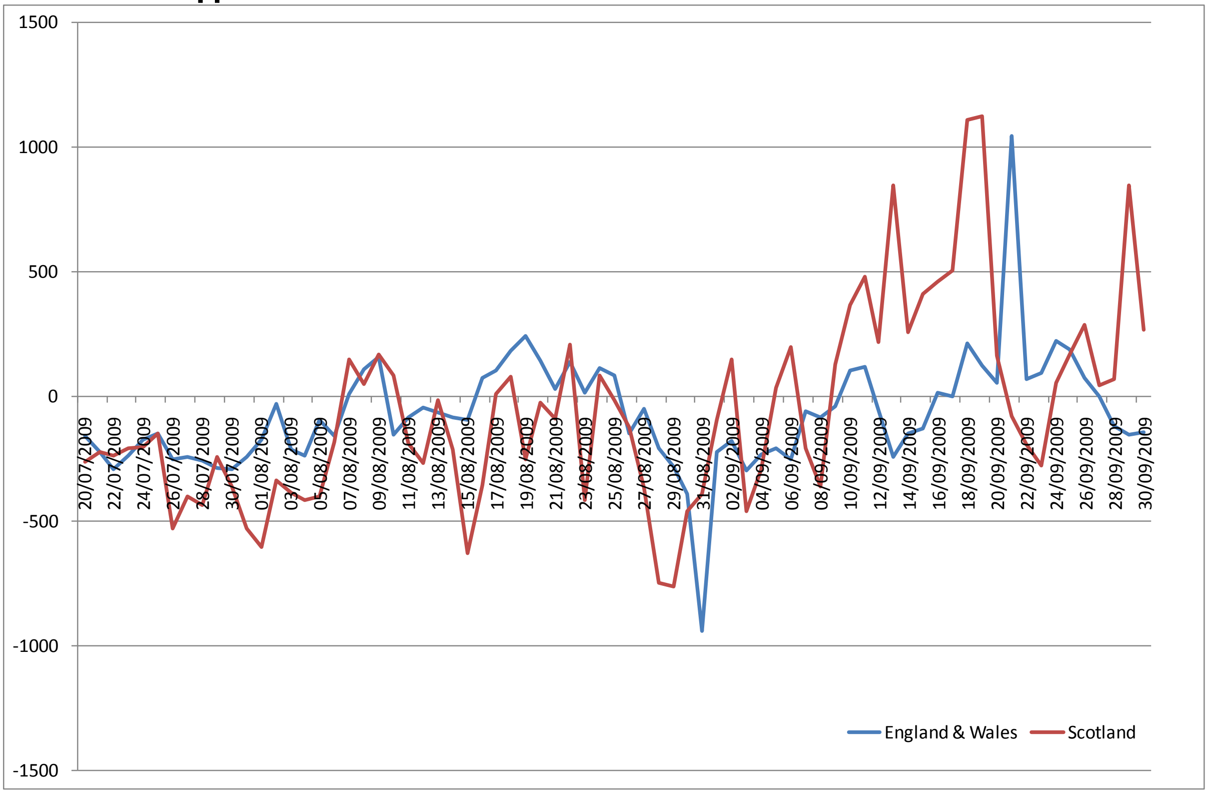


Figure 37: Daily Average Latest Run Type Metered volume minus II Run Metered Volume by GSP Group for Supplier ID 2.b

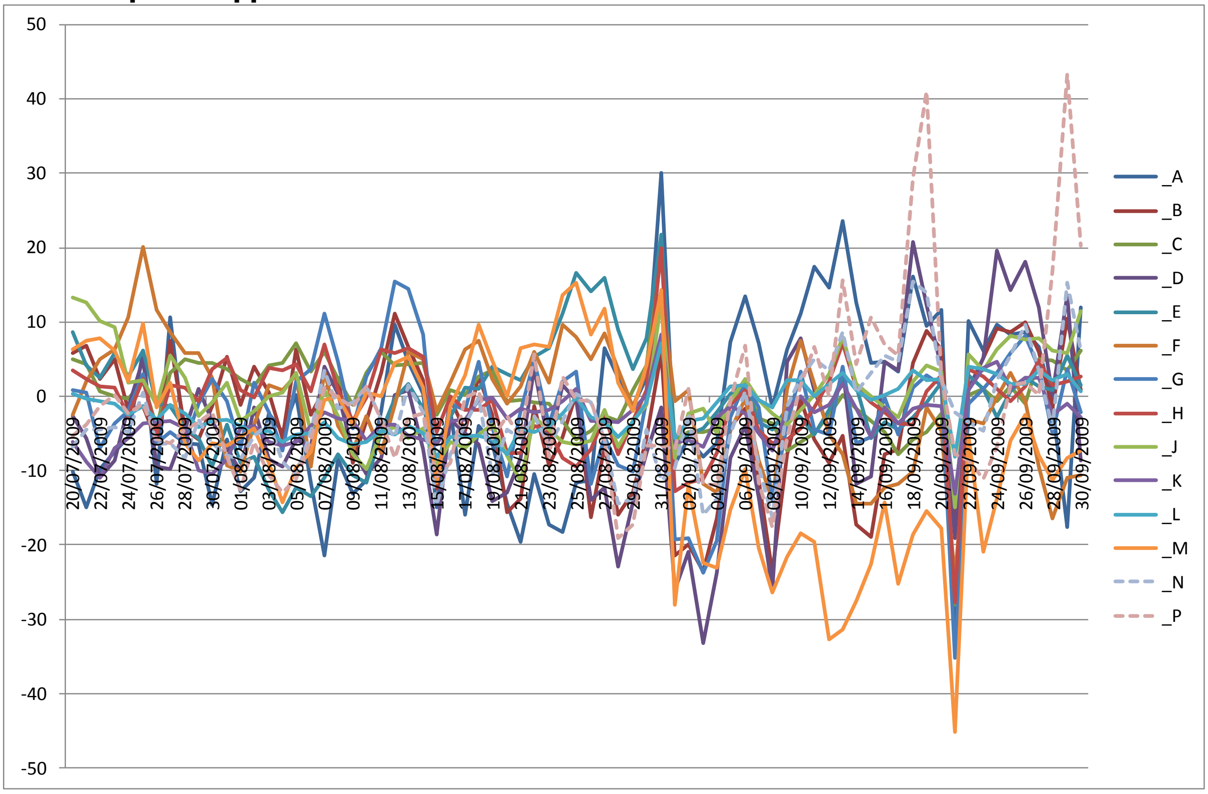


Chart 4. Daily Average Latest Run Type Metered volume minus II Run Metered Volume by location for Supplier ID 2.b

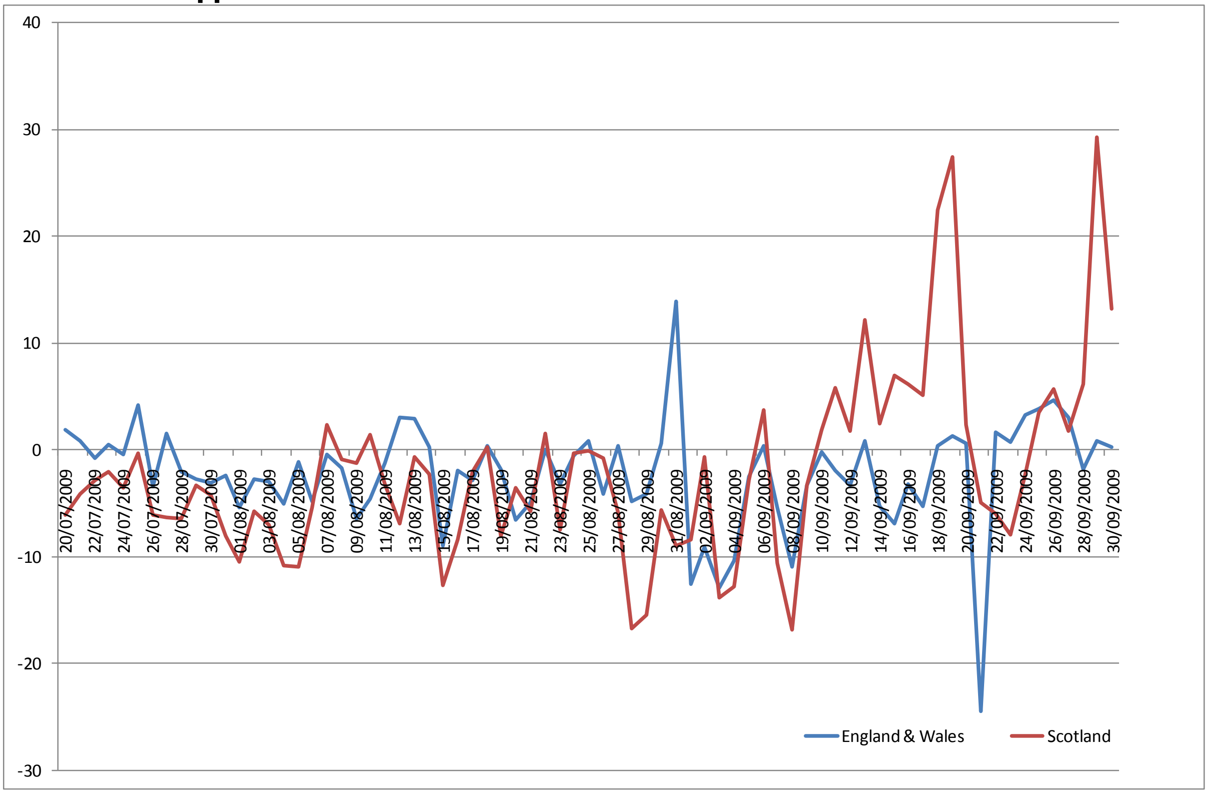


Figure 38: Daily Average Latest Run Type Metered volume minus II Run Metered Volume by GSP Group for Supplier ID 3.b

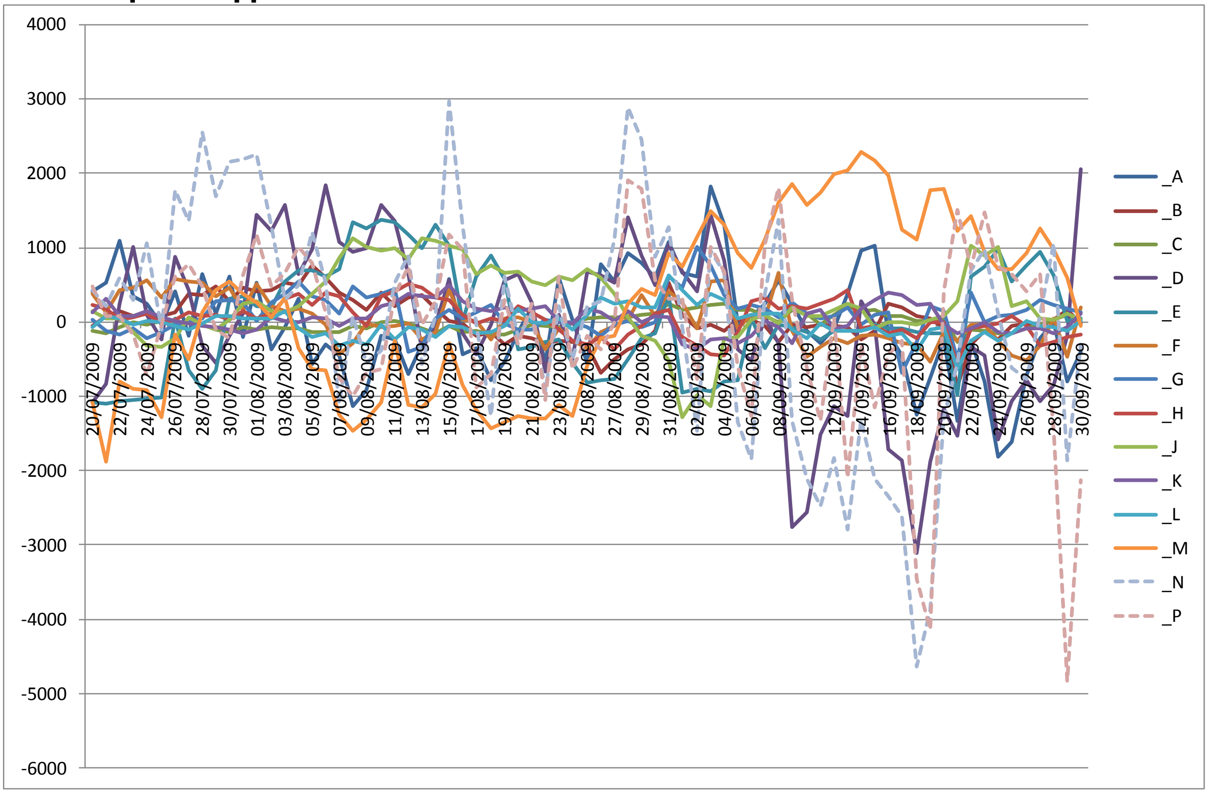


Figure 39: Daily Average Latest Run Type Metered volume minus II Run Metered Volume by location for Supplier ID 3.b

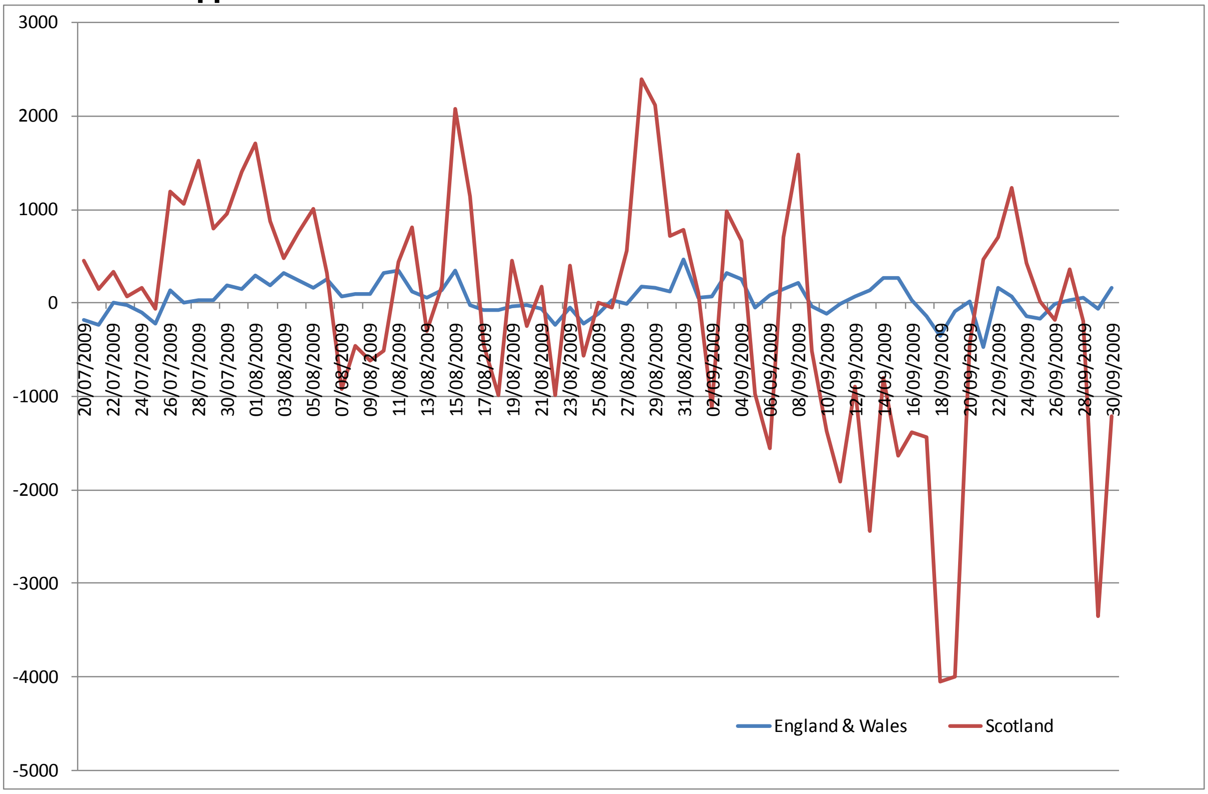


Figure 40: Daily Average Latest Run Type Metered volume minus II Run Metered Volume by GSP Group for Supplier ID 4.b

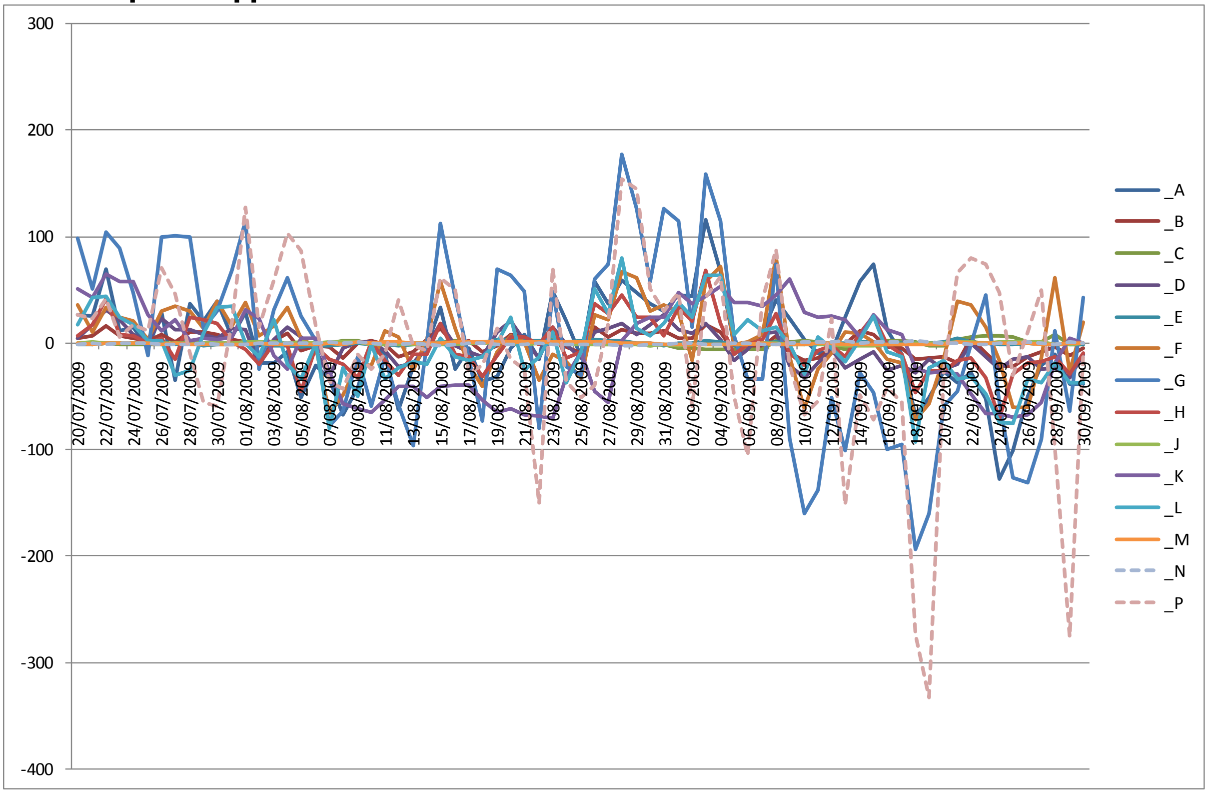
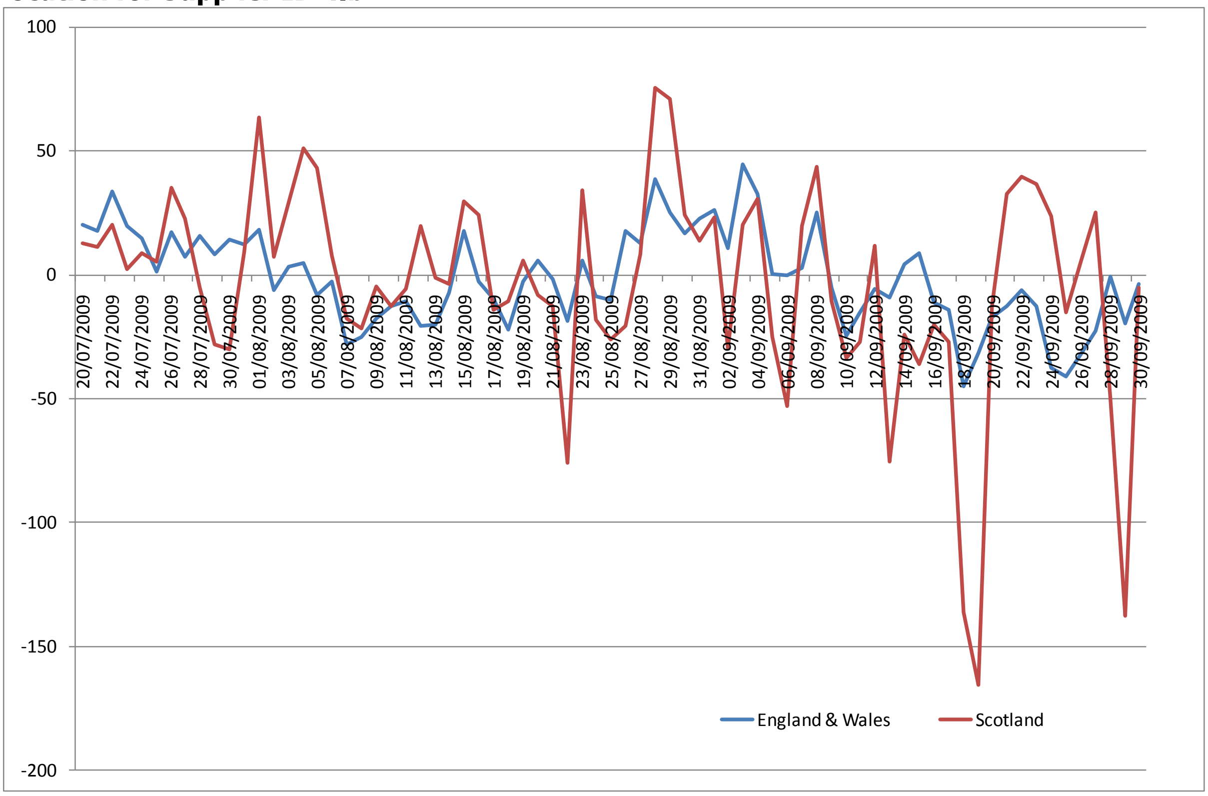


Figure 41: Daily Average Latest Run Type Metered volume minus II Run Metered Volume by location for Supplier ID 4.b



Further analysis on the Bank Holiday solution in potential Alternative 1a

Overview

This document provides further analysis on the Bank Holiday solution as detailed in potential Alternative 1a. Under this potential alternative:

- Where a Settlement Date is a Bank Holiday, the credit calculation would use the latest Sunday to pass the Settlement Final (SF) Run as the reference day when calculating Interim Information (II) Run metered volumes for the Settlement Date;
- Bank Holidays would not be used as a reference day in the Credit Calculation, as a substitute the latest like day to pass SF that is not a Bank Holiday would be used;
- These rules would be applied to all English, Welsh and Scottish Bank Holidays.

For more details on this solution please refer to the P253 Draft Solution to Identify Requirements Document.

Methodology

To ascertain the impact of this proposed alternative solution on the credit calculation, the level of error in the current calculation method has been calculated by subtracting the daily aggregate II run metered volume from the latest run type volume for number of Supplier IDs. This value represents the level of error in the credit calculation that occurs due to the II run volumes being less accurate than those of later run types.

Alternative II run values have then been calculated using the proposed solution and from these the level of error has been determined. This data has been plotted on the following charts to demonstrate the impact of the proposed solution on the accuracy of the credit calculation.

Conclusions

Analysis prepared for the P253 Modification Group meeting on 2 July 2010 showed English and Welsh Bank Holidays have a clear impact on the level of error in the credit calculation, however, Scottish Bank Holidays did not appear to have a visible impact. This previous analysis demonstrated that using a Sunday as the reference day for English and Welsh Bank holidays did reduced the level of error in the Credit Calculation. This is further supported by the following charts.

The analysis presented in the following charts also suggests:

- Avoiding the use of English and Welsh Bank Holidays as reference days leads to improved estimation of II Run metered volumes;
- The impact of Scottish Bank Holidays is not particularly discernable in the level of error in the Credit Calculation and therefore the proposed solution does not appear to significantly improve the accuracy of the calculation around Scottish Bank Holidays;
- By treating all Bank Holidays the same, the level of error in the Credit Calculation is increased on Scottish Bank Holidays. This is because, under proposed solution 1a, on Settlement Dates which are Bank Holidays in Scotland a Sunday is being used as the reference day, which negatively impacts the II Run calculations for the rest of the country.

Based on the data presented in this it document can be concluded that P253 Proposed Solution 1a would not improve the accuracy of the credit calculation and would potentially increase the level of error around Scottish Bank holidays.

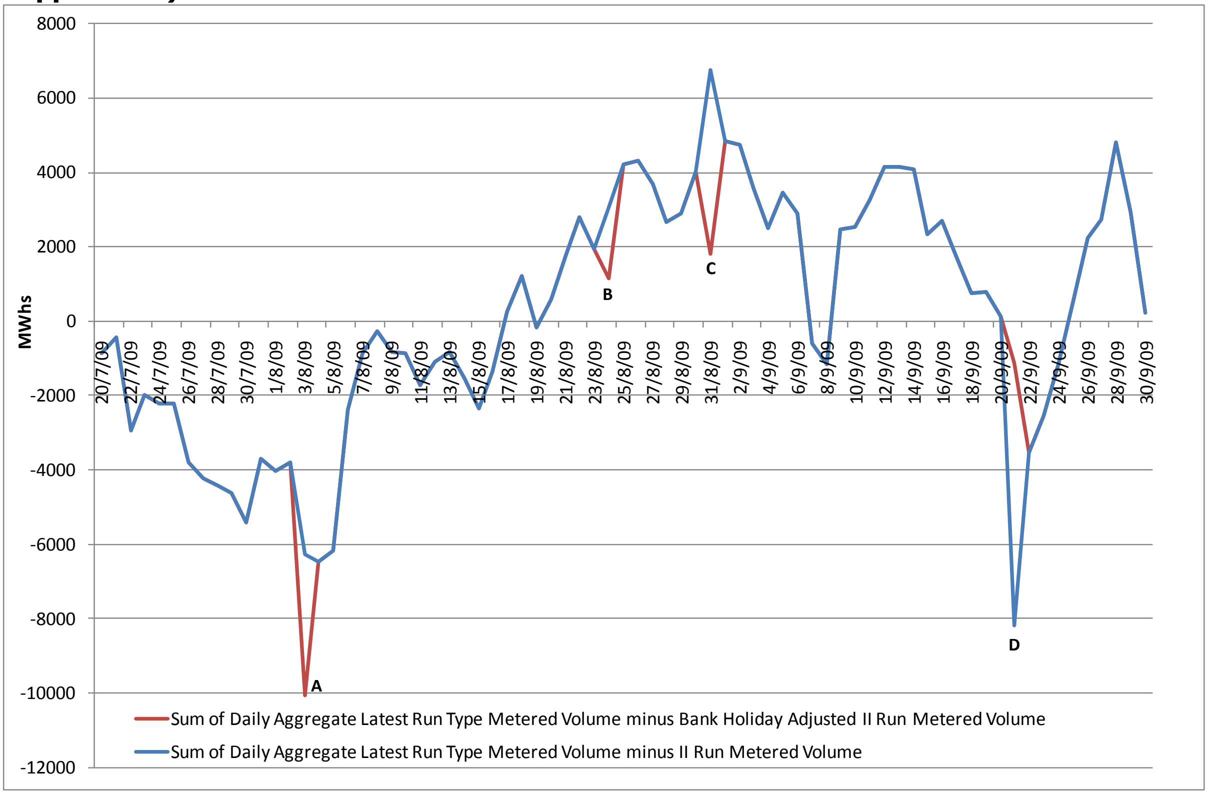
Analysis: Part 1 – August 2009

To create the following charts data has been taken for a period around August 2009 for a selection of Supplier IDs. In August there is a bank holiday in Scotland on 3 August 2009 and in England on 31 August 2009.

Bank Holiday adjusted II Run metered volumes have been calculated for four Settlement Dates: two where the Settlement Day is a Bank Holiday and two where the reference day is a Bank Holiday. The following table shows the alternative reference day used in this calculation (these have been determined using the proposed solution methodology).

Settlement Date	**II Run Reference Day**	**Bank Holiday Adjusted II Run Reference Day**
Monday 3 August 2009 (Scottish Bank Holiday)	Monday 13 July 2009	Sunday 12 July 2009
Monday 24 August 2009	Monday 3 August 2009 (Scottish Bank Holiday)	Monday 27 July 2009
Monday 31 August 2009 (England & Wales Bank Holiday)	Monday 10 August 2009	Sunday 9 August 2009
Monday 21 September 2009	Monday 31 August 2009 (England & Wales Bank Holiday)	Monday 24 August 2009

Figure 42: Daily Aggregate Metered Volumes around August 2009 (Aggregated data for four Supplier IDs)



The above chart shows the Latest Run Type metered volume minus the II Run metered volume aggregated across four Supplier IDs (charts for these individual Supplier IDs are shown below). The blue line represents actual data and the red line shows Bank Holiday adjusted data. The closer the line is to zero, the more accurate the estimation of II Run metered volumes. A negative value indicates an overestimation of the II Run metered volume and a positive value indicates an underestimation.

Point A on the chart indicates Monday 3 August 2009, which is a Bank Holiday in Scotland. On this Settlement Date the Bank Holiday adjusted II Run metered volume has been calculated using the latest Sunday to have passed SF. This is intended to reflect the reduced demand that occurs on Bank Holidays. However, as the Bank Holiday only occurs in Scotland the use of a Sunday as the reference day results in an increase in the level of error in the credit calculation as Sunday is not an appropriate reference day for the rest of the country.

Point B represents Monday 24 August 2009, which is when the Scottish Bank Holiday becomes the reference day. Bank Holiday adjusted metered volumes have calculated by using a non-Bank Holiday Monday. The adjusted values appear to give a marginally better estimation of II Run metered volumes, however, in the following charts (which show data for individual Supplier IDs) this is not always the case.

Point C indicates Monday 31 August 2009 which is a Bank Holiday in England and Wales. The Bank Holiday adjusted metered volumes provide a more accurate estimation of the II Run metered volumes.

Point D represents Monday 21 September 2009, which is when the English Bank Holiday becomes the reference day. The Bank Holiday adjusted data here is clearly more accurate than the unadjusted data.

Figure 43: Daily Aggregate Metered Volumes around August 2009 (Supplier ID 1.g[1])

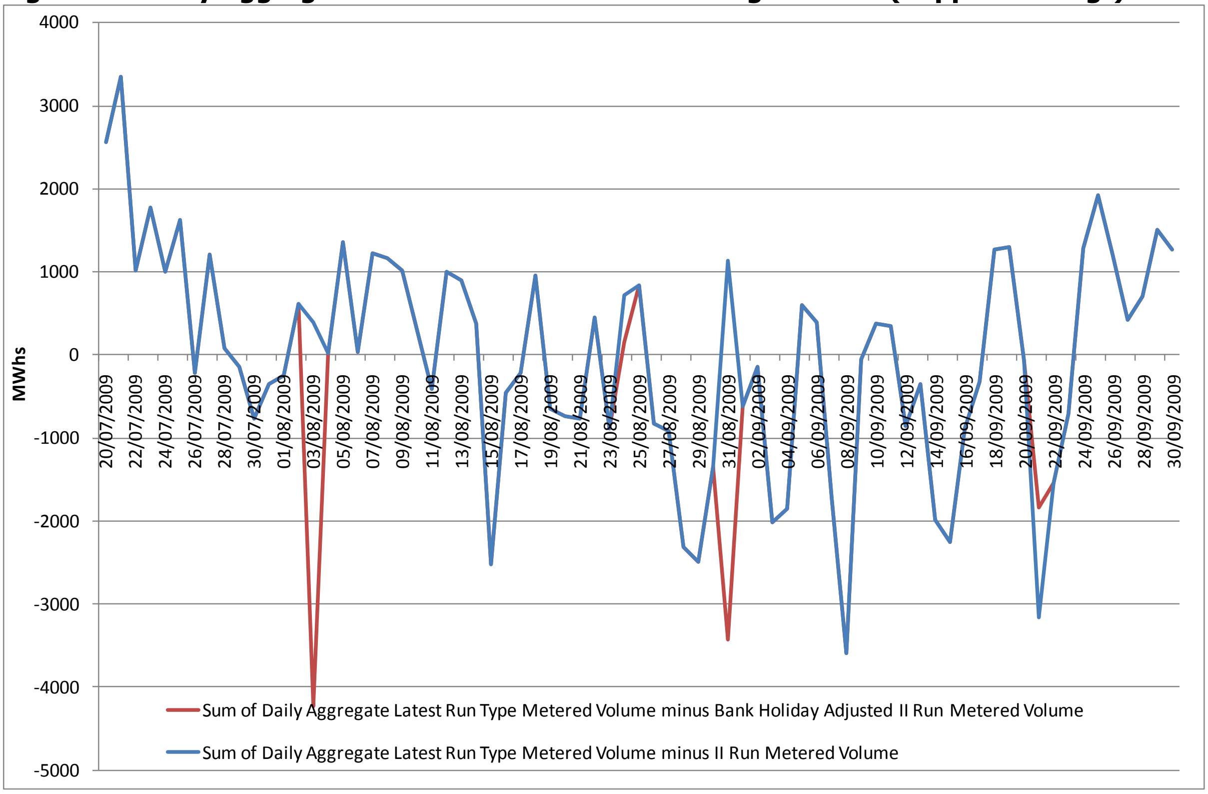
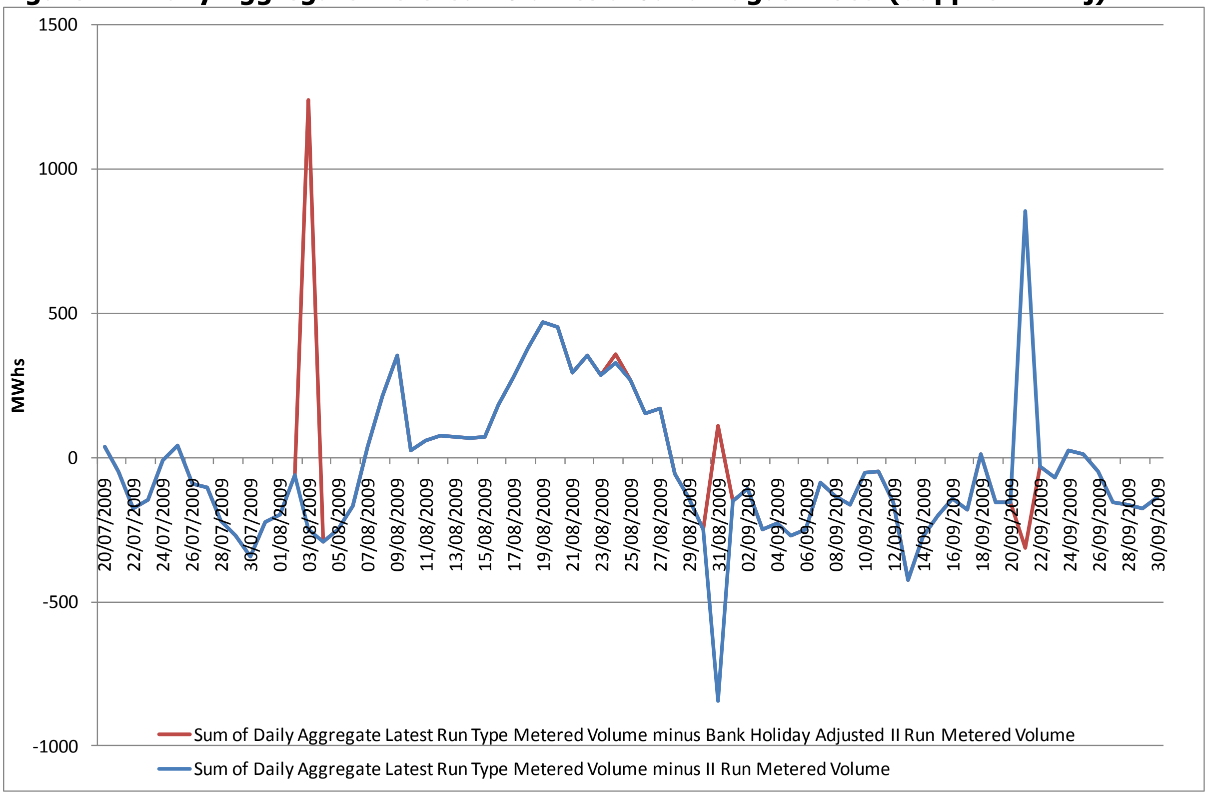
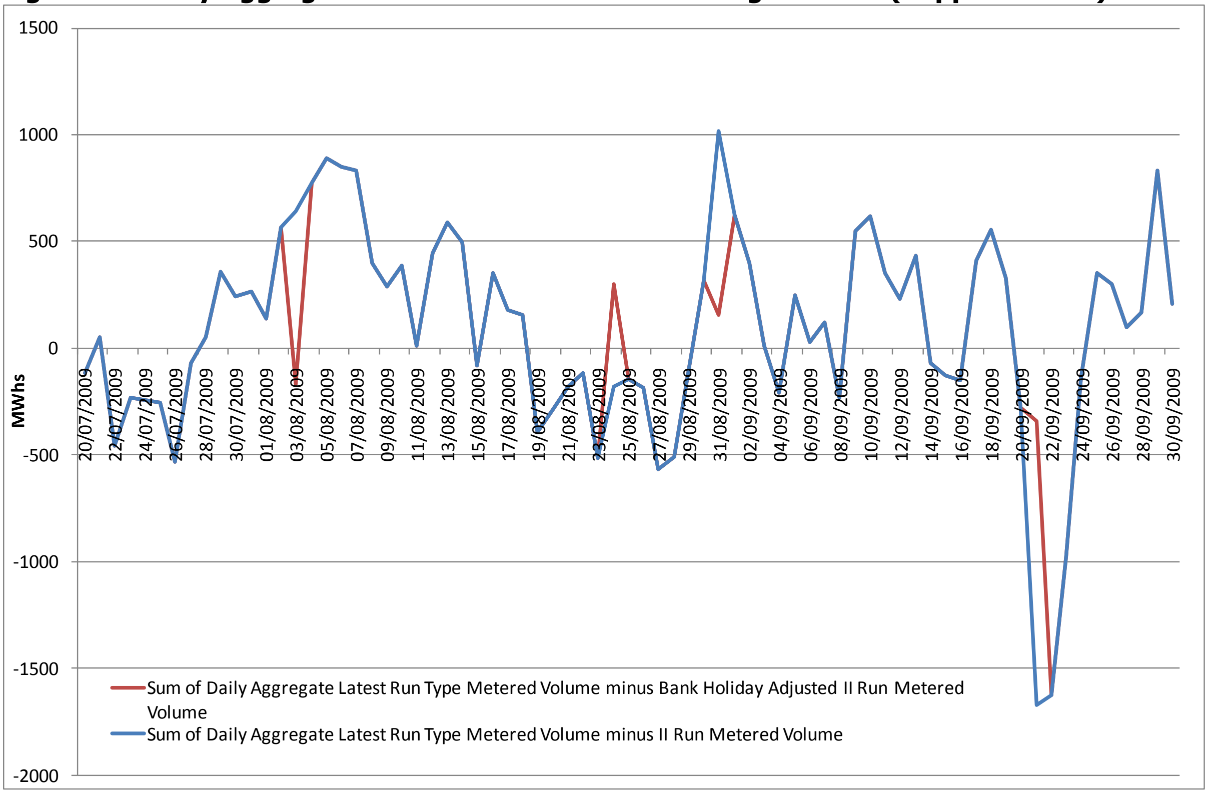


Figure 44: Daily Aggregate Metered Volumes around August 2009 (Supplier ID 2.j)



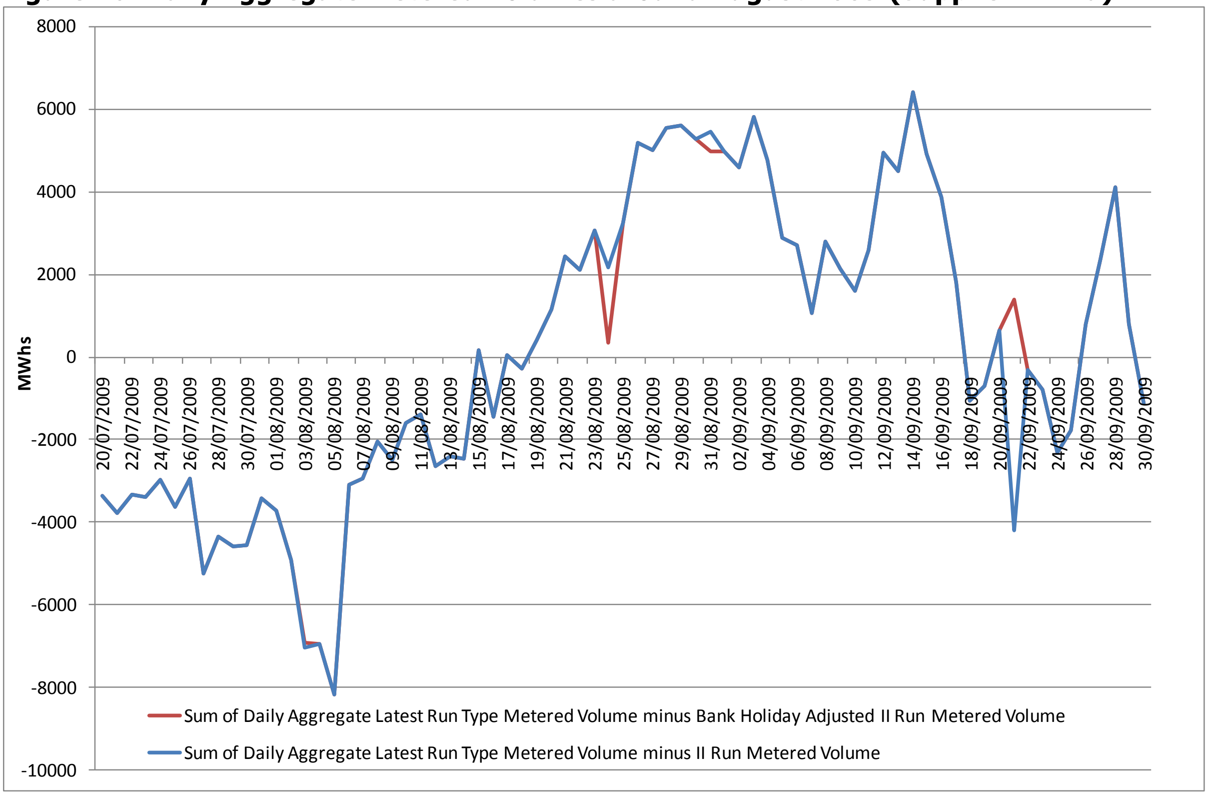
[1] The Supplier IDs used in this document tie up with those used in the analysis produced for the first P253 Modification Group meeting.

Figure 45: Daily Aggregate Metered Volumes around August 2009 (Supplier ID 3.f)



In the above chart the large downwards spike on 22 September is unrelated to the Bank Holiday and occurs because the II run metered volume for this Supplier ID's BM Unit in _M GSP Group is significantly different to the SF run metered volume.

Figure 46: Daily Aggregate Metered Volumes around August 2009 (Supplier ID 4.a)



Analysis: Part 2 – St-Andrews Day 2009

In the above charts it appears the treating all Bank Holidays in the same manner actually increases the level of error in the credit calculation around Scottish Bank Holidays. To further demonstrate this, the following charts look at the impact of the proposed solution around St-Andrew's Day which is a Bank Holiday in Scotland but not England and Wales.

The following table details the reference days used to calculate II Run metered volumes.

Settlement Date	**II Run Reference Day**	**Bank Holiday Adjusted Reference Day**
Monday 30 November 2009 (St-Andrew's Day)	Monday 9 November 2009	Sunday 8 November 2009
Monday 21 December 2009	Monday 30 November 2009 (St-Andrew's Day)	Monday 23 November 2009

In each of the following charts it is clear that proposed solution 1a does not improve the accuracy of the Credit calculation.

Figure 47: Daily Aggregate Metered Volumes around St-Andrew's Day 2009 (Aggregated data for four Supplier IDs)

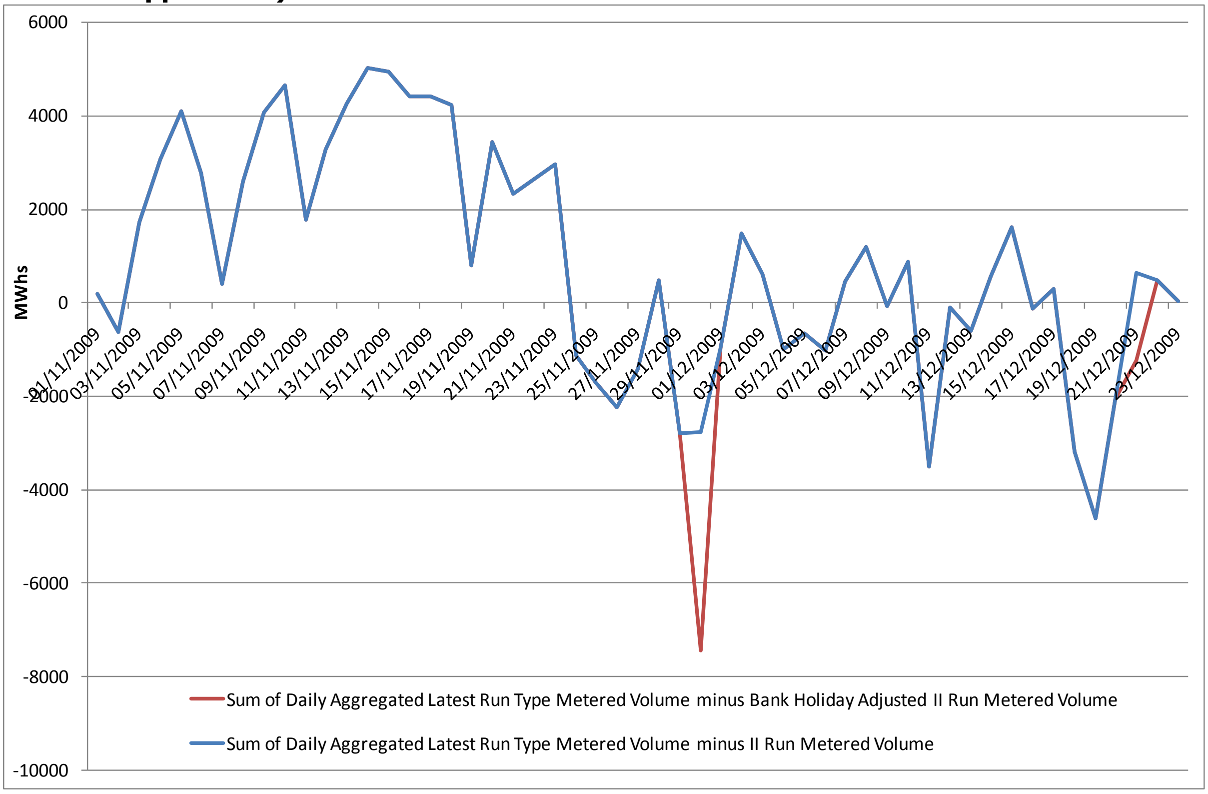


Figure 48: Daily Aggregate Metered Volumes around St-Andrew's Day 2009 (Supplier ID 1.g)

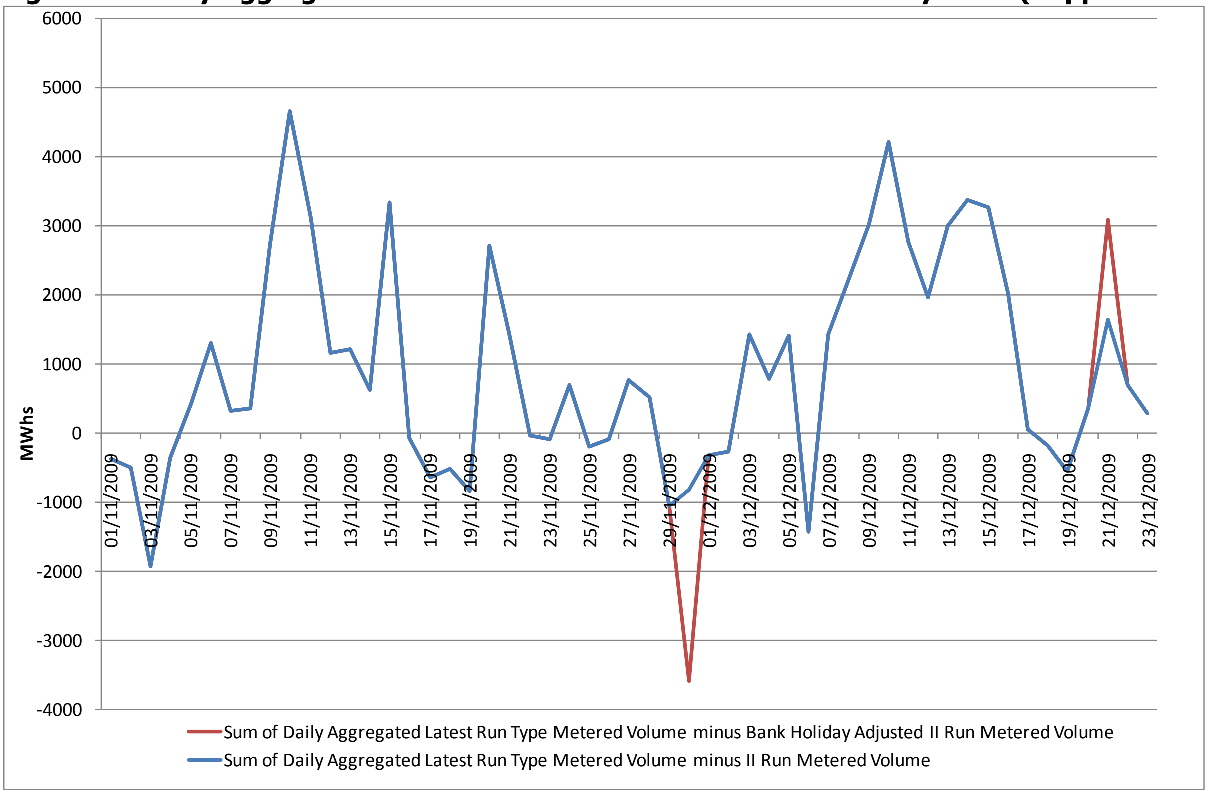


Figure 49: Daily Aggregate Metered Volumes around St-Andrew's Day 2009 (Supplier ID 2.j)

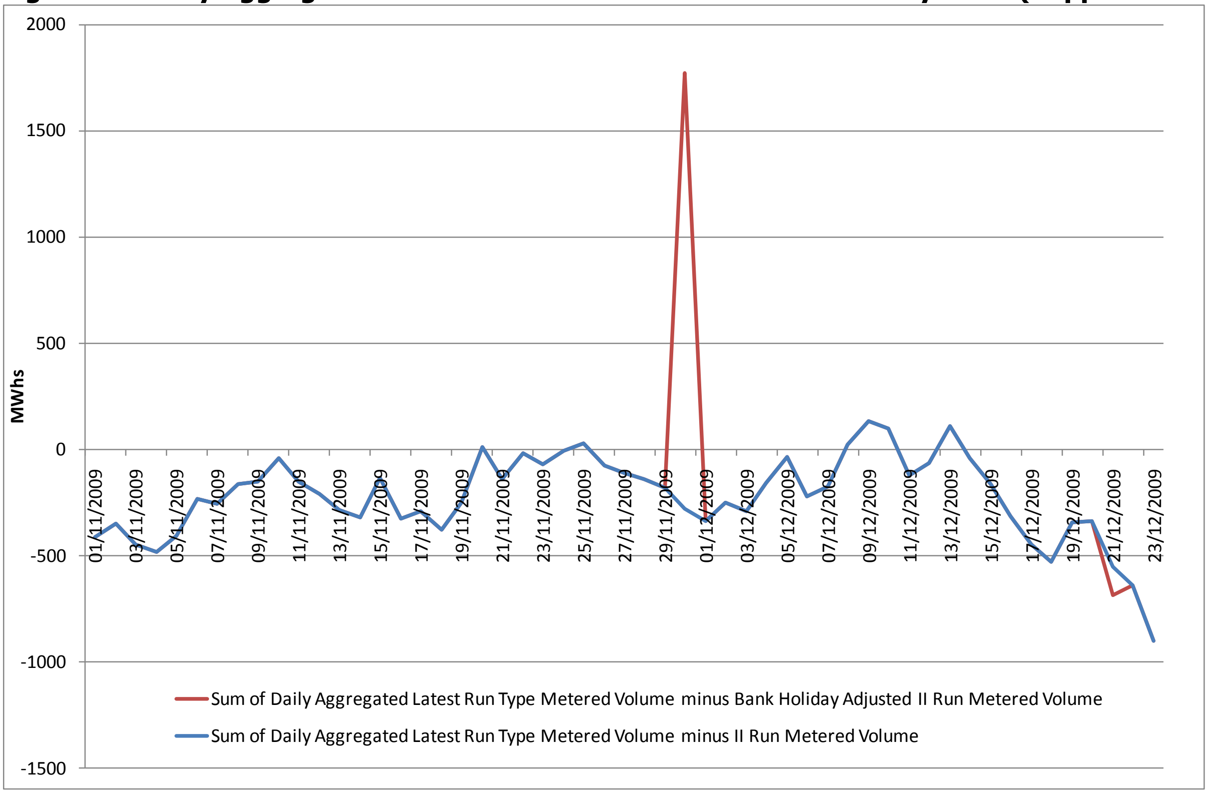


Figure 50: Daily Aggregate Metered Volumes around St-Andrew's Day 2009 (Supplier ID 3.f)

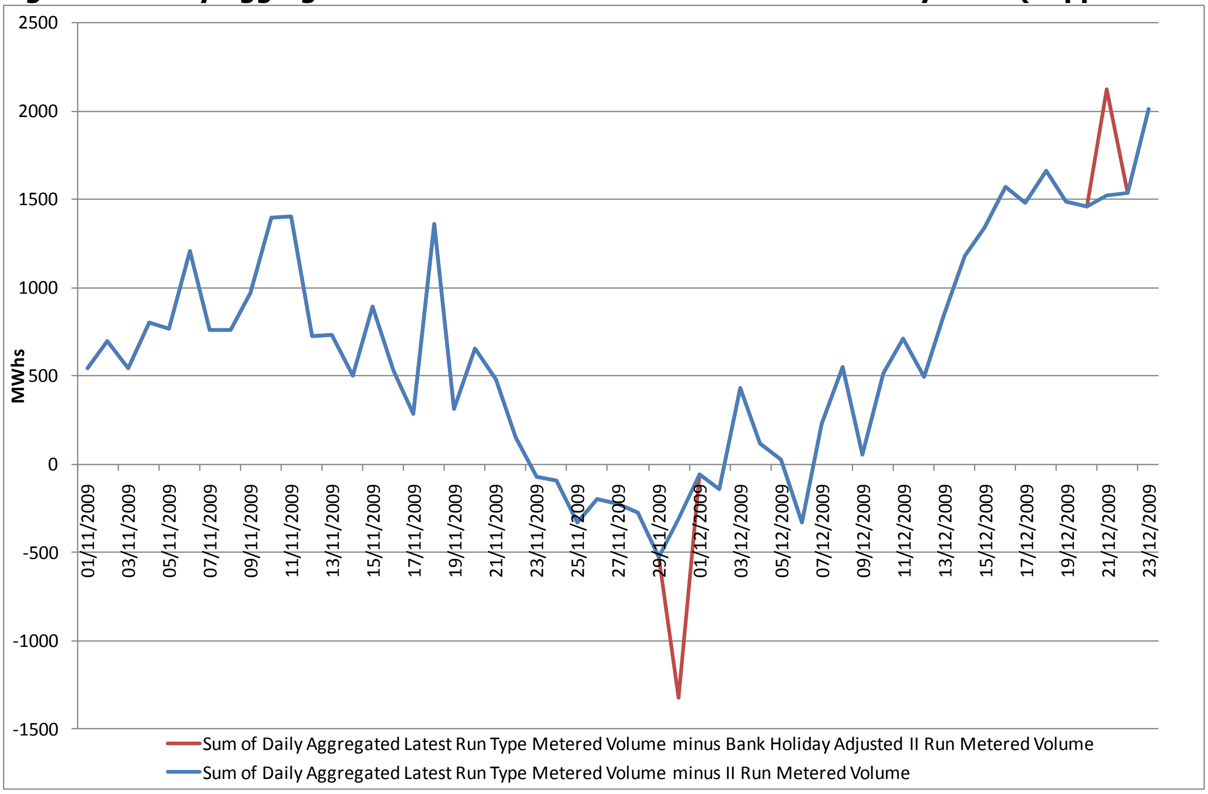
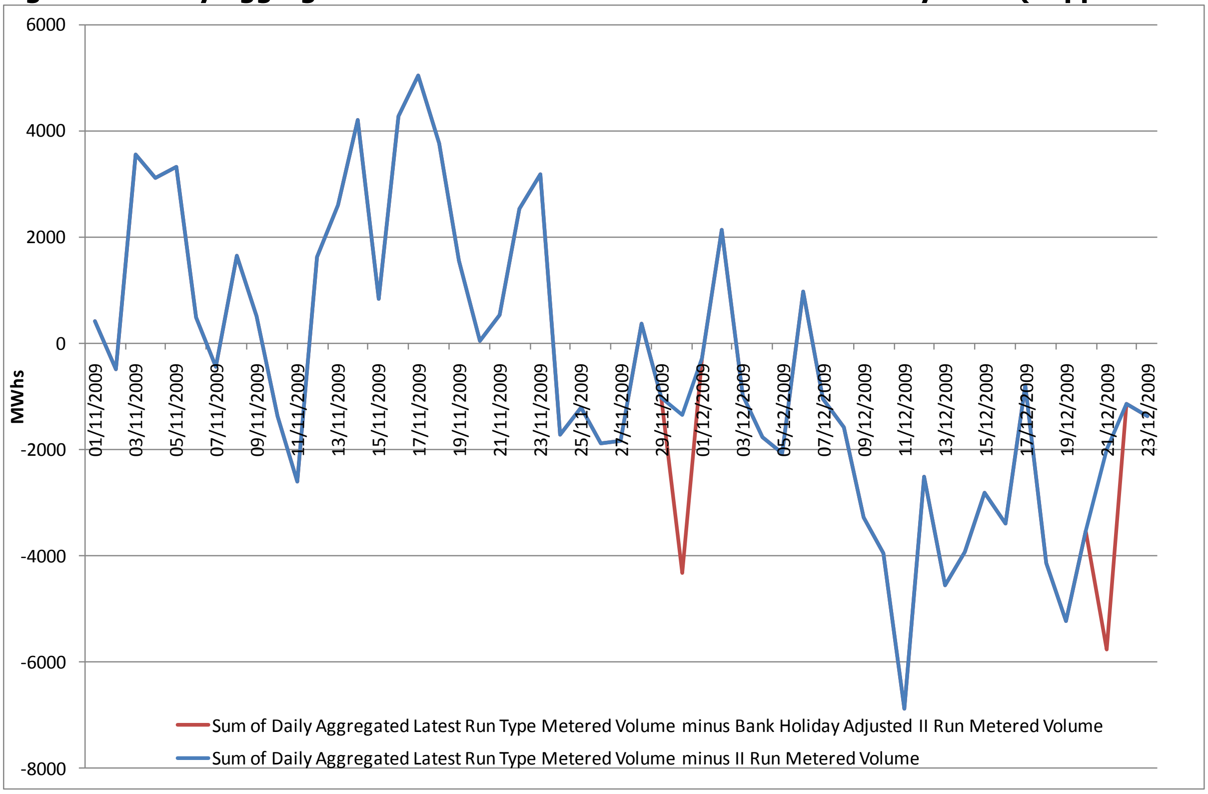


Figure 51: Daily Aggregate Metered Volumes around St-Andrew's Day 2009 (Supplier ID 4.a)



How quickly are D0268 'Half Hourly Meter Technical Details' flows are sent under the current arrangements?

The P253 Modification Group asked ELEXON to look in to how quickly D0268 'Half Hourly Meter Technical Details' flows are sent under the current arrangements. I.e. on change of Supplier, how many sites can the Half Hourly Data Collector dial on Day 1.

Unfortunately PARMS does not contain the data we need. The following PARMS Serials utilise D0268s:-

- HM06 which attempts to check for quality i.e. the number of times a D0268 need to be sent before a proving test is successful;
- HM04 measures when a D0268 is sent by HHMOA to the HHDC. This serial measures % received within both +5 and +15 wds of the EFD of the HHDC appointment detailed in the D0148 received by the HHMOA plus the number of requests received , D0148, and the number unresolved (pending);
- HM05 measures when a D0268 is sent by HHMOA to the new HHMOA. This serial measures % received within both +5 and +15 wds of the EFD of the HHDC appointment detailed in the D0170 received by the HHMOA plus the number of requests received , D0170, and the number unresolved (pending);
- HM03 CP1325 – Nov 2010 Release will remove this Serial.
- SP04 measures that CoMC has been successful within the 3 month window.

None of the above will provide us with data to determine how many sites that the HHDC can dial on day 1 although HM04 tells us the % of D268's sent to the HHDC within either 5 or 15 WD's from the HHDC EFD for each MOA/Supplier relationship. This does not tell us whether the D0268's were successfully loaded into HHDC which HM06 provides. It should be noted that neither HM04 or HM06 provide data at MPAN level.

Hand Held Half Hourly Meters

On average, **1.05%** of SVA Half Hourly Meters are permanently hand read. The maximum percentage of permanent hand read meters for a Half Hourly Meter Operator (HHMO) is 4.61%. This minimum percentage is 0.13%.

Table 3: Percentage of SVA Half Hourly Meters which are permanently hand read

HHMO	Total HH MPANs	Hand read HH MPANs	% hand read
A	9,741	13	0.13
B	10,200	85	0.83
C	9,784	37	0.38
D	20,336	61	0.30
E	8,569	139	1.62
F	9,030	377	4.17
G	25,000	50	0.20
H	15,003	28	0.19
I	9,571	441	4.61
Total	**117,234**	**1,231**	**1.05**

Conclusion

The percentage of hand read SVA Half Hourly Meters in low (1.05%). This suggests that there would be relatively little impact on receiving Half Hourly Meter reads from permanent hand read Meters.

What happens when GSP Group take tends to zero?

The method used to estimate Metered Volumes for Supplier BM Units in the Interim Information (II) Run can give rise to inaccurate estimates. This is particularly evident when the percentage change in Group Supply Point (GSP) Group Take (from the equivalent day three weeks previously – the reference day) is not reflective of changes in individual Suppliers' positions. This is more likely to occur in situations when the previous GSP Group Take (GSPGT) value is close to zero.

Example 1 – Similar GSP Group Take for current and reference Settlement Periods

Let's assume there are four Suppliers in a GSP Group. The GSP Group take for a single Settlement period is -1000 MWh (the GSP Group is Offtaking), with BMU metered volumes as follows:

Table 4: GSP Group Take in an example GSP Group for a Settlement Period

BM Unit	BMU Metered Volume	Percentage share of GSP Group Take
BMU 1	-150 MWh	15%
BMU 2	-200 MWh	20%
BMU 3	-600 MWh	60%
BMU 4	-50 MWh	5%
GSP Group Take	**-1000 MWh**	**100%**

This Settlement Period will be used to determine the II Run Metered volumes for a Settlement Period approximately 3 weeks later. Let's say that the GSP Group Take for the Settlement Period (3 weeks later) that we are looking at is -800 MWh.

BMU's 1 - 4 will be allocated the following Metered Volumes (Current GSP Group Take * (Proportion of Previous GSP Group Take):

BMU 1 (Estimated Metered Volume) = -800 * (-150/-1000) = -120 MWh

BMU 2 (Estimated Metered Volume) = -800 * (-200/-1000) = -160 MWh

BMU 3 (Estimated Metered Volume) = -800 * (-600/-1000) = -480 MWh

BMU 4 (Estimated Metered Volume) = -800 * (-50/-1000) = -40 MWh

When GSPGT for the previous period is similar to the reference period and not approaching zero we do not see erroneously large estimates and each of the BM Units are allocated a reasonable proportion of the current periods GSPGT.

Example 2 – GSP Group Take for reference Settlement Period approaches zero

The problem arises when the GSPGT for the current period is high with the GSPGT for the reference period tends towards zero. In the example below, the GSPGT for the current period is -800 MWh and the GSPGT for the reference day is close to zero, (-1 MWh):

Table 5: GSP Group Take in an example GSP Group for a Settlement Period where reference day GSP Group Take tends towards zero

BM Unit	BMU Metered Volume	Proportion of GSP Group Take (BMUX/GSPGT) *100%
BMU 1	-200 MWh	20,000%
BMU 2	-100 MWh	10,000%
BMU 3	349 MWh	-34,900%
BMU 4	-50 MWh	5,000%
GSP Group Take	**-1 MWh**	**100%**

The following Metered volumes are calculated for the respective BMU's:

BMU1 (Estimated Metered Volume) = -800 * (-200/-1) = -160,000 MWh

BMU2 (Estimated Metered Volume) = -800 * (-100/-1) = -800,000 MWh

BMU3 (Estimated Metered Volume) = -800 * (349/-1) = 279,200 MWh

BMU4 (Estimated Metered Volume) = -800 * (-50/-1) = -40,000 MWh

The above estimation method therefore assumes that the GSPGT for the current period would be made up of the following BMU Metered volumes:

Table 6: Metered Volumes using a GSP Group Take which is tending towards zero

BM Unit	BMU Metered Volume
BMU 1	-160,000 MWh
BMU 2	-800,000 MWh
BMU 3	279,200 MWh
BMU 4	-40,000 MWh

The above figures calculated using the current estimation process provide erroneously large values when the GSPGT is close to zero i.e. (The size of the error is inversely proportional to the size of the GSP Group Take) which means that it increases very rapidly as the GSP Group Take approaches zero.

Further Analysis for P253

This note describes the further analysis we've done in order to complete the remaining actions from P253 meeting 2:

- Investigate link between errors at II and embedded generation
- Investigate a potential central systems alternative that uses average data for weeks 3 to 7 rather than just data for week 3 (in order to smooth out peaks and troughs)
- Investigate a potential central systems alternative that makes use of additional data from SVAA (i.e. the breakdown of Import and Export for each BM Unit)

Summary of Findings

The key findings of this analysis can be summarised as follows:

- Total embedded generation in a GSP Group is much more variable (and hence harder to predict) than demand. For this reason, embedded generation leads to decreased accuracy in credit checking for all Supplier BM Units in the GSP Group. This issue is likely to become more serious as the volume of embedded generation increases over time.
- None of the potential central systems alternatives we investigated address this fundamental issue. At best they make minor improvements to the overall accuracy of credit checking, and solve the specific problems that arise when GSPGT is close to zero.

Link between Embedded Generation and Errors in Credit Checking

The following table compares (for October 2009) the level of error in each GSP Group with the level of embedded generation:

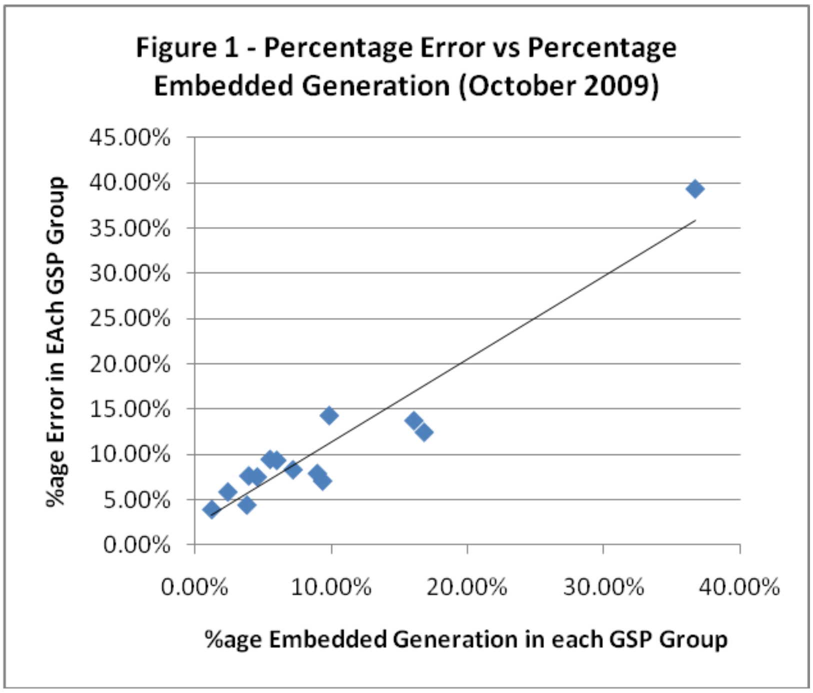
Table 7 – Error in Credit Checking vs Level of Embedded Generation (October 2009)		
GSP Group	**Level of Error[2]**	**Level of Embedded Generation[3]**
_A	7.96%	8.97%
_B	9.40%	6.00%
_C	3.99%	1.23%
_D	13.78%	16.07%
_E	7.57%	4.56%
_F	12.50%	16.83%
_G	8.36%	7.19%
_H	4.48%	3.80%
_J	9.51%	5.51%
_K	7.70%	3.95%
_L	5.92%	2.41%
_M	7.13%	9.36%

[2] This is the sum across all Supplier BM Units and Settlement Periods of the absolute value of the error ($|QM_{ij} – QM^{AtII}_{ij}|$), divided by the sum across all BM Units and Settlement Periods of $|QM_{ij}|$.

[3] This is the total volume of Export in the GSP Group, expressed as a percentage of the total volume of Import.

Table 7 – Error in Credit Checking vs Level of Embedded Generation (October 2009)		
GSP Group	**Level of Error[2]**	**Level of Embedded Generation[3]**
_N	14.34%	9.85%
_P	39.30%	36.72%

It can be seen from Table 1 that the level of error tends to be higher in GSP Groups with higher levels of embedded generation. Figure 1 shows the same data in graphical form (as a scatter plot with best fit line):



Why Does Estimation Break Down for Embedded Generation?

Figure 2 below shows (for each Settlement Period, summed across all BM Units in GB) the total change between the current day and the reference day (i.e. D-21) in three separate components of energy: HH Import, HH Export and NHH:

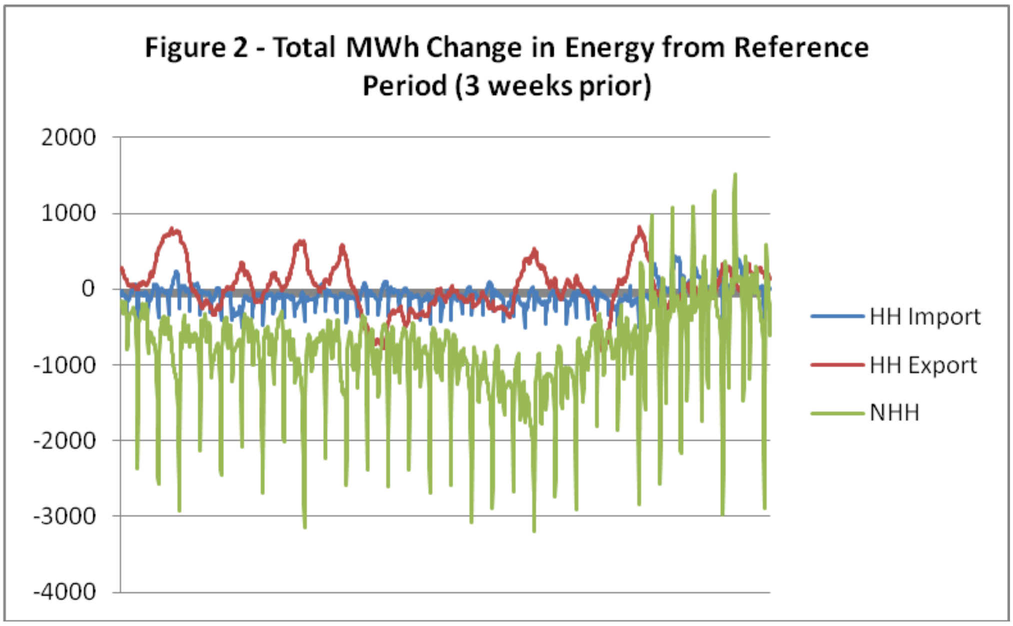
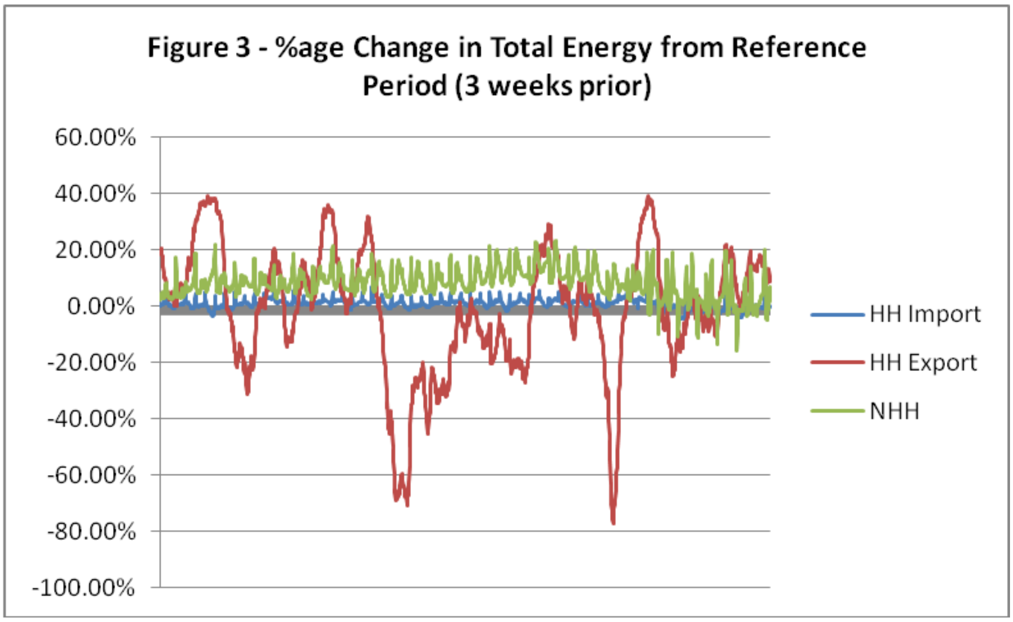


Figure 3 shows the same data, but with the change in each component expressed as a percentage rather than an absolute MW figure. This shows that the changes in HH Export are (relatively speaking) much larger than those in HH Import:

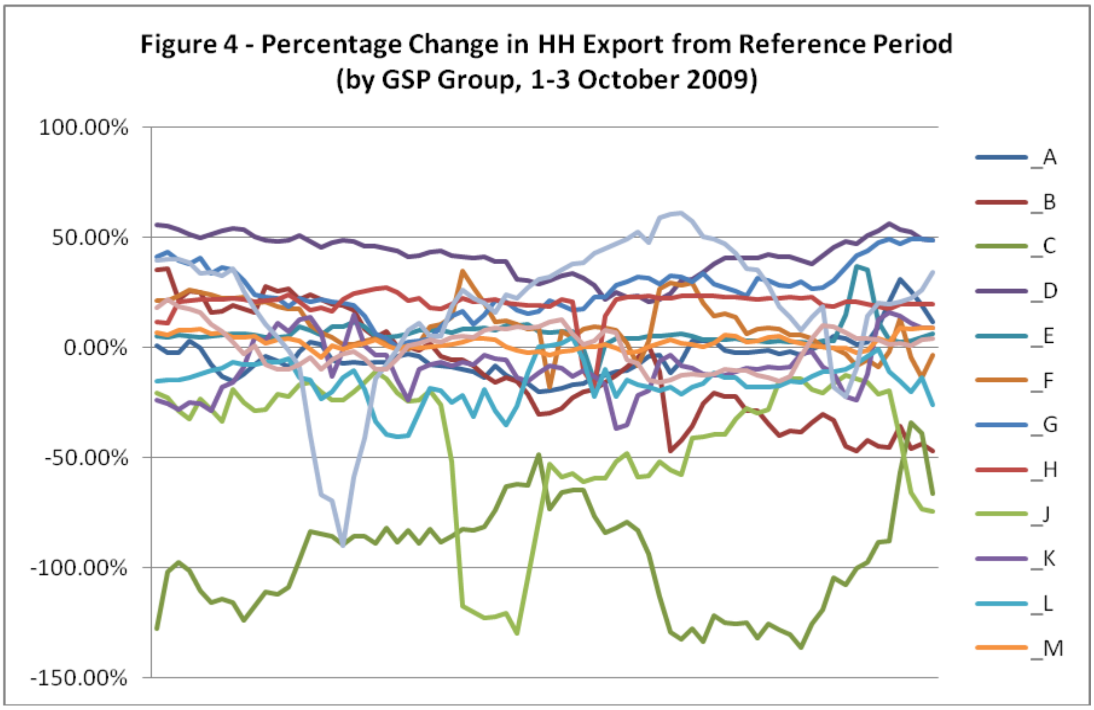


We believe that figures 2 and 3 explain why the current estimation method does not handle embedded generation well. The current method assumes that changes in Metered Volumes since the reference period will apply uniformly across all BM Units in the GSP Group, but this does not apply to embedded generation.

Is Embedded Generation Behaving Consistently Across the Country?

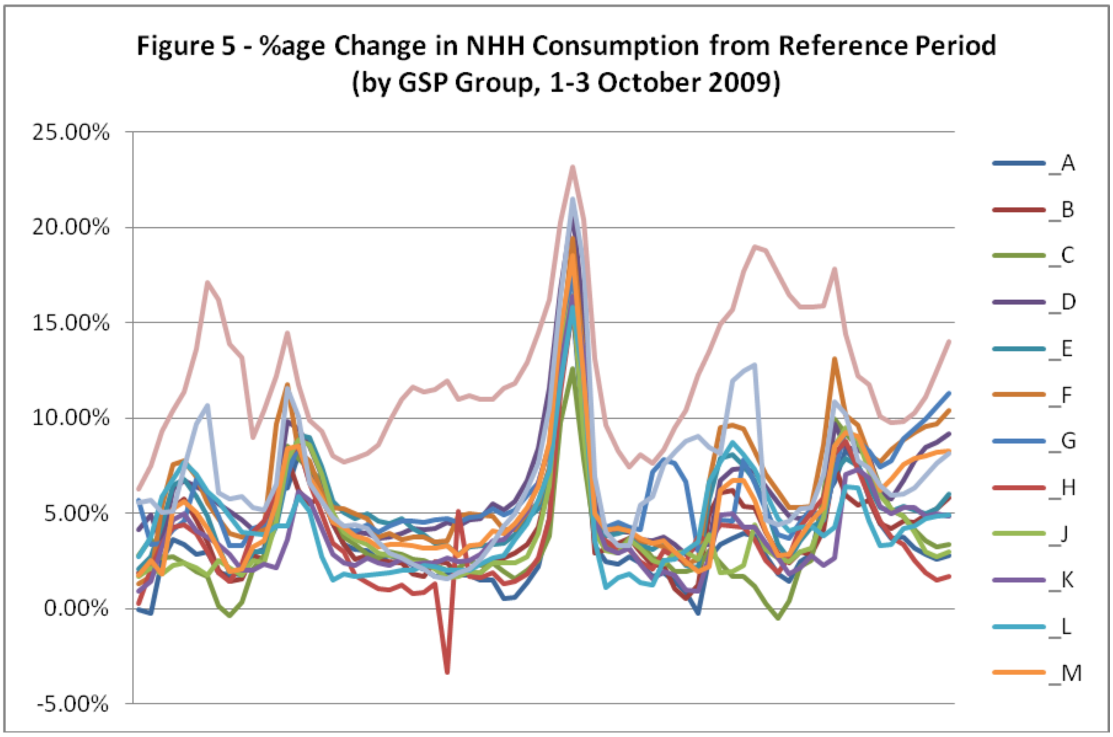
The analysis above shows that changes in embedded generation (compared to the reference period 3 weeks previously) are very different to those in demand. We have also investigated whether the changes in embedded generation show similar trends across the country as a whole.

Figure 4 below shows the percentage change in embedded generation (compared to three weeks previously) for each Settlement Period in the first three days of October 2009:



The data in Figure 4 appears fairly random – volumes of embedded generation have increased in some GSP Groups and decreased in others, with very little evidence of systematic correlations between GSP Groups. This suggests that predicting changes in embedded generation is intrinsically hard, and probably requires detailed site-level information.

For purposes of comparison, Figure 5 shows the equivalent data for NHH consumption. The percentage changes are not only smaller, but appear much less random, with clear trends evident across all GSP Groups:



Potential Central System Alternatives

The apparent unpredictability of embedded generation (see analysis above) suggests that it may be difficult to obtain significantly better estimates through improvements to the current estimation process in central systems. However, for purposes of comparison we have carried out modelling of four possible algorithms:

- **The Current Method** – apply an adjustment factor to the Metered Volumes from the reference period so that their total matches the current GSP Group Take
- **Using Five Weeks of Historic Data** – use data from the five most recent available weeks (rather than just one) in order to smooth out peaks and troughs. This option was suggested at the last Modification Group meeting.
- **The Issue 38 Method** – this is a variant of the current method that the Issue 38 Group examined. Rather than applying an adjustment factor to the previous Metered Volumes, the change in GSP Group Take (since the reference Settlement Period) is allocated among BM Units in proportion to the absolute size of their Metered Volume.
- **Enhanced Issue 38 Method** – this is the potential central systems solution we mentioned at the last meeting, which can be seen as a variant of the Issue 38 method. The change in GSP Group Take is allocated among BM Units in proportion to the total absolute value of their Import and Export (as opposed to the Issue 38 method, which allocates in proportion to the absolute value of the net Metered Volume).

Full details of each algorithm (including equations and examples) are included in Appendix 1. The following table summarises the results of the analysis (which was based on October 2009 data):

Table 8 – Comparison of Potential Central Systems Alternatives (for Settlement Days in October 2009)

GSP Group	Current Method	Using Five Weeks of Historic Data (Variant 1)[4]	Using Five Weeks of Historic Data (Variant 2)	Issue 38 Method	Enhanced Issue 38 Method
_A	7.96%	8.41%	8.39%	7.75%	7.88%
_B	9.40%	9.32%	9.24%	9.10%	8.79%
_C	3.99%	4.93%	4.92%	3.99%	3.99%
_D	13.78%	12.88%	12.53%	13.42%	12.19%
_E	7.57%	9.19%	9.14%	7.55%	7.52%
_F	12.50%	13.28%	13.30%	12.14%	12.22%
_G	8.36%	8.40%	8.34%	8.30%	8.04%
_H	4.48%	4.55%	4.53%	4.42%	4.39%
_J	9.51%	9.96%	9.91%	9.34%	9.24%
_K	7.70%	7.15%	7.12%	7.65%	7.62%
_L	5.92%	7.23%	7.20%	5.92%	6.03%
_M	7.13%	7.80%	7.79%	7.21%	7.31%
_N	14.34%	15.29%	14.99%	13.95%	13.12%
_P	39.30%	40.79%	32.96%	29.12%	22.84%

[4] See Appendix A for details of the two variants of this technique that we modelled.

In summary, none of the new methods we tested appear to resolve the underlying accuracy issue. Their accuracy appears to be (at best) only slightly higher than the current method (except possibly in North Scotland, where all of them seem somewhat better than the current method).

Although this is disappointing, it does seem consistent with the idea that embedded generation is intrinsically hard to predict. It may be that using actual data for embedded generation (i.e. including HHDCs and HHDAs in the II run as per P253 Proposed) is the only option that addresses this.

The one advantage that the alternative methods of estimation do have over the current approach is that they seem to work better in North Scotland i.e. they are more robust to very high levels of embedded generation. There would therefore be some benefit in progressing one of these options (if P253 Proposed was not progressed).

Explanation of Estimating Methods

To illustrate the different methods, consider a hypothetical GSP Group containing just three BM Units:

	BM Unit 1	**BM Unit 2**	**BM Unit 3**	**GSPGT [5]**
Current Period	Unknown Values to be Estimated			300 MWh
3 Weeks Previously	Import = 700 Export = 100 QM = -600	Import = 800 Export = 750 QM = -50	Import = 50 Export = 600 QM = 550	100 MWh
4 Weeks Previously	Import = 500 Export = 100 QM = -400	Import=700 Export = 850 QM = 150	Import = 50 Export = 400 QM = 350	-100 MWh
5 Weeks Previously	Import = 900 Export = 300 QM = -600	Import = 900 Export = 850 QM = -50	Import = 50 Export = 500 QM = 450	200 MWh
6 Weeks Previously	Import = 900 Export = 300 QM = -600	Import = 800 Export = 750 QM = -50	Import = 50 Export = 450 QM = 400	250 MWh
7 Weeks Previously	Import = 700 Export = 300 QM = -400	Import = 700 Export = 600 QM = -100	Import = 50 Export = 400 QM = 350	150 MWh

Current Method

The current method applies an adjustment factor to the QM values from three weeks ago, in order to ensure that their total matches the new GSP Group Take. In the case of the example the adjustment factor is (300 / 100 = 3.0), giving the following estimates:

	BM Unit 1	**BM Unit 2**	**BM Unit 3**
Estimated QM Values	QM = -1800	QM = -150	QM = 1650

The equation for this estimation method is:

$$QM_{ij} = GSPGT_j * QM_{ij'} / GSPGT_{j'}$$

[5] In this Appendix we are using the SVA sign convention for GSPGT i.e. Import is positive and Export is negative.

Using Five Weeks of Data

The idea of this option is to apportion the GSP Group Take based on five weeks of data rather than one (in order to mitigate the impact of peaks and troughs). We considered two different interpretations of this. The first is to apportion the GSP Group Take based on the average share of GSPGT over those five weeks:

$$QM_{ij} = GSPGT_{j} * (QM_{ij'} / GSPGT_{j'} + QM_{ij''} / GSPGT_{j''} + QM_{ij'''} / GSPGT_{j'''} + QM_{ij''''} / GSPGT_{j''''} + QM_{ij'''''} / GSPGT_{j'''''}) / 5$$

where $QM_{ij'}$, $QM_{ij''}$, $QM_{ij'''}$, $QM_{ij''''}$ and $QM_{ij'''''}$ are the Metered Volumes in the corresponding period 3, 4, 5, 6 and 7 weeks ago.

The second is to apportion the GSP Group Take based on the total share over the five weeks:

$$QM_{ij} = GSPGT_{j} * (QM_{ij'} + QM_{ij''} + QM_{ij'''} + QM_{ij''''} + QM_{ij'''''}) / (GSPGT_{ij'} + GSPGT_{ij''} + GSPGT_{ij'''} + GSPGT_{ij''''} + GSPGT_{ij'''''})$$

In the case of the example, these two variants give the following results:

	BM Unit 1	BM Unit 2	BM Unit 3
Using Five Weeks of Data (Variant 1)	QM = -604	QM = -187	QM = 491
Using Five Weeks of Data (Variant 2)	QM = -1300	QM = -50	QM = 1050

In practice, the analysis for October 2009 shows little difference in accuracy between the two variants:

Issue 38 Method

The method we assessed for Issue 38 apportions the change in GSPGT since the reference period (i.e. 200 MWh in the case of the example) between the BM Units in proportion to the absolute size of their Metered Volume. The equation for this is as follows[6]:

$$QM_{ij} = QM_{ij'} - (GSPGT_{j} - GSPGT_{j'}) * |QM_{ij'}| / \Sigma |QM_{ij'}|$$

In the case of the example, this gives the following results:

	BM Unit 1	BM Unit 2	BM Unit 3
Estimated QM Values	QM = -700	QM = -58.33	QM = 458.33

Enhanced Issue 38 Method

This method is similar to the Issue 38 method, but allocates the change in GSPGT in proportion to the gross total of Import and Export for each BM Unit:

$$QM_{ij} = QM_{ij'} - (GSPGT_{j} - GSPGT_{j'}) * (|Import_{ij'}|+|Export_{ij'}|) / \Sigma (|Import_{ij'}|+|Export_{ij'}|)$$

In the case of the example, this gives the following results:

	BM Unit 1	BM Unit 2	BM Unit 3
Estimated QM Values	QM = -653.33	QM = -153.33	QM = 506.66

Note that (compared to the previous method) more of the change has been allocated to BM Unit 2 (which has a low net Metered Volume, but large amounts of both Import and Export).

[6] The minus sign in the equation arises because we are using the SVA sign convention for GSPGT, but the CVA sign convention for Metered Volumes.

Analysis of the benefits of the Proposed Modification

Overview

This document seeks to place a financial value on the benefit to BSC Parties of modifying the Credit Calculation, as proposed under the P253 Proposed Modification. The analysis seeks to determine:

- The amount that Parties whose Credit Cover requirement is overestimated will be able to save on their letter of credit costs under the Proposed Modification; and
- The amount of potentially unsecured trading charges that would be removed under P253.

Methodology

The approach taken to calculating these benefits is as follows:

- Firstly, the error in the credit calculation was calculated at a Daily Aggregated BM unit level by taking Latest Run Metered Volume minus II Run Metered Volume. The data used covered a one year period running from 1 April 2009 and 31 March 2010.
- Supplier BM Units were then mapped to Party IDs, taking Metered Volume Reallocation Notifications (MVRNs) into account. The data was then summed to give the total error in the credit calculation for each Party ID. (Note, Parties that have been trading for less than a year have been excluded from these calculations).
- A 22 day rolling sum of the difference between latest run type and II run metered volume was then calculated for each Party ID. This is intend to give an approximation of the error in the credit calculation for each Settlement Date.
- A revised Energy Indebtedness value for each Settlement Date was then calculated by subtracting the 22 day rolling sum for each Party and Settlement Date from the actual Energy Indebtedness value at Settlement Period 48 on that day.
- It was assumed each Party has the same credit cover percentage of 50% - i.e. each Party has double the credit cover of their Energy Indebtedness. Using this assumption, the maximum amount of credit cover required over the year for each Party was calculated:
  - under current arrangements; and
  - under the Proposed Modification.
- These values were in MWhs, so to convert them to Pounds they were multiplied by the Credit Assessment Price (CAP), which is £50/MWh.
- The difference between maximum credit cover required for each Party was then determined by comparing the amount required under the current arrangements and under the Proposed Modification.

We then split the analysis into three Parts:

Part 1- for Parties whose Energy Indebtedness (and therefore credit cover) reduces under the Proposed Modification (the overestimated Parties):

It was assumed all credit lodged is in the form of letters of credit and the cost of credit is 1% of the letter of credit per year. Based on this assumption the reduction in the cost of credit per year for each overestimated Party and over the market was determined.

Part 2- for Parties whose Energy Indebtedness (and therefore credit cover) increases under Proposed Modification (the underestimated Parties):

The maximum amount by which credit cover has been under estimated was calculated. Assuming a Party enters administration at that point, this shows what money would have been lost from a Party which is under estimated.

Part 3- for all Parties:

Assume that a Party becomes unable to pay its Trading Charges and thus allows the amount owed to be taken out of its credit cover. This continues until the Party diminishes its credit cover to the point where it enters Credit Default (and potentially Section H Default). If this co-insides with a point where the credit calculation is significantly under estimating the Party's Energy Indebtedness, then the Party could continue to diminish its credit cover beyond the point where it should have entered Credit Default. This would expose the industry to unsecured debts.

Part three of this analysis seeks to determine the potential cost to the industry should a Party enter Section H Default in such circumstances. To do this the maximum credit cover underestimation over the year for each Party has been determined.

Conclusions

Part 1: the value of Credit Cover that could have been removed under the P253 calculation was estimated to be £15,413,809. Assuming that the cost of credit for a letter of credit is 1% per year, this would represent a total annual saving of **£154,138** for those Parties with Energy Indebtedness that is currently overestimated**.**

Part 2: for those Parties for which the amount of credit cover required was under estimated using the current credit calculation, the average underestimation was **£234,481**. This would be the average amount that the industry might lose should one of these Parties enter administration.

Part 3: if a Party were to diminish its credit cover prior to entering Section H Default at a point when the error in the credit calculation was most favourable to that Party (i.e. the calculation was underestimating its credit requirement) then the average exposure to the industry would be **£2,990,091.**

Table 9: Maximum Required Credit Cover between the Period 22 April 2009 and 31 March 2010

	Maximum Required Credit Cover	Maximum Required Credit Cover under P253 calculation	How much Credit Cover could be removed?
Party ID 1	£0	£61,861	-£61,861
Party ID 2	£38,967	£20,553	£18,414
Party ID 3	£162,453	£161,267	£1,185
Party ID 4	£210,293	£1,211,611	-£1,001,318
Party ID 5	£265,541	£660,991	-£395,450
Party ID 6	£560,798	£529,302	£31,497
Party ID 7	£2,357,903	£2,191,806	£166,097
Party ID 8	£10,373,227	£8,310,884	£2,062,342
Party ID 9	£10,981,887	£7,878,154	£3,103,733
Party ID 10	£12,325,909	£8,782,827	£3,543,082
Party ID 11	£15,526,216	£15,568,057	-£41,842
Party ID 12	£25,398,215	£27,947,391	-£2,549,176
Party ID 13	£25,961,790	£25,514,522	£447,268
Party ID 14	£28,971,631	£28,563,923	£407,708
Party ID 15	£37,105,930	£36,675,063	£430,867
Party ID 16	£62,960,361	£57,758,747	£5,201,615
Sum Total	**£233,201,119**	**£221,836,957**	**£11,364,162**

The above table shows the maximum required credit cover under the current and proposed credit calculations (assuming that each Party wants to keep its credit cover percent at 50%). The final column shows the difference between these two values and represents the amount of Credit Cover that could be removed by each Party ID. Note, Party ID 1 had a consistently negative energy indebtedness over this period and would therefore not have been required to lodge credit cover under the current calculation. Negative values indicate that additional credit cover would be required.

Table 10: Parties that could Reduce Their Credit Cover

	How much Credit Cover could be removed?	Finacial Saving (with cost of credit at 1%)
Party ID 2	18,414	184
Party ID 3	1,185	12
Party ID 6	31,497	315
Party ID 7	166,097	1,661
Party ID 8	2,062,342	20,623
Party ID 9	3,103,733	31,037
Party ID 10	3,543,082	35,431
Party ID 13	447,268	4,473
Party ID 14	407,708	4,077
Party ID 15	430,867	4,309
Party ID 16	5,201,615	52,016
Sum Total	**£15,413,809**	**£154,138.09**

The above table shows only the Parties from Table 1 which could reduce their credit cover under the P253 calculation and it also shows the value of Credit Cover that could have been removed. Assuming that the cost of credit for a letter of credit is 1%, this would represent a saving of **£154,138.**

Table 11: Parties with Credit Cover under Requirement

	Maximum Credit Cover Under Requirement over the year	Average Credit Cover Under Requirement Over the year
Party ID 1	-£211,566	-£50,495
Party ID 11	-£4,197,251	-£85,096
Party ID 12	-£7,859,136	-£891,539
Party ID 4	-£592,615	-£85,107
Party ID 5	-£297,990	-£60,169
Sum Total	**-£13,158,558**	**-£1,172,407**
Average	**-£2,631,712**	**-£234,481**

The above table shows the maximum and average Credit Cover under requirement for each of the Parties with a negative value in column three of Table 1. The average amount by which the Credit Calculation is under estimated by for these Parties is **£234,481**. This would be the average amount that the industry might potentially lose should one of these Parties enter administration.

Table 2: Maximum Underestimation of Credit Cover Requirement

	Maximum underestimation in the Credit Calculation over the year
Party ID 3	-£4,003
Party ID 2	-£52,511
Party ID 1	-£211,566
Party ID 5	-£297,990
Party ID 6	-£302,180
Party ID 7	-£414,429
Party ID 4	-£592,615
Party ID 10	-£1,616,806
Party ID 15	-£3,256,976
Party ID 9	-£4,074,737
Party ID 11	-£4,197,251
Party ID 8	-£4,359,997
Party ID 14	-£4,600,946
Party ID 16	-£7,593,769
Party ID 12	-£7,859,136
Party ID 13	-£8,406,541
Average	**-£2,990,091**

The above table shows the maximum under estimation in each Party's credit calculation over the year. This provides an indication of the potential exposure to the industry, as a result of the inaccuracy of the current credit calculation, should one of these Parties diminish its Credit Cover before entering Section H Default. The average across all Parties is **£2,990,091.**

Analysis of P253 Alternative

For the avoidance of doubt any reference to P253 alternative is equivalent to referring to P265 which is the alternative to P253.

1. Overview

This document seeks to place a financial value on the benefit that BSC Parties would gain by modifying the Credit Calculation in line with P253 Alternative (P265). In summary, the findings are that P265 offers only very modest benefits over the current baseline (and therefore significantly less benefits than the Proposed). For the period analysed (i.e. BSC Year 2009/10) the results were as follows:

- The total excess Credit Cover required from Parties as a result of errors in the II estimation process would be **£14.9m** under P265 (compared to **£15.4m** under the current baseline). Section 2 below provides further details of this analysis.
- For those Parties whose Credit Cover requirement was too low (due to errors in the II estimation process), the average under-estimation across the year was **£185k** under P265 (compared to **£260k** [7] under the current baseline). Section 3 below provides further details of this analysis.
- The average across all Parties of how much unsecured debt they would have if they went into Default with the minimum allowable Credit Cover at the worst possible point in the year was **£2.70m** under P265 (compared to **£2.99m** under the current baseline). Section 4 below provides further details of this analysis.

2. Analysis of Excess Credit Cover

In order to assess the extent to which Parties are required to post excess Credit Cover, we analysed historical data for BSC Year 2009/10, and calculated three different Indebtedness values for each Supplier Party on each Settlement Day:

- The **baseline indebtedness** that was calculated for them at the time, using the current BSC rules. This indebtedness value will have been affected by the errors in the II estimation process (i.e. the defect P253 is seeking to correct), and so will not be a completely accurate indication of the Party's true indebtedness.
- The **P253 Proposed indebtedness**, which we calculated by adjusting the baseline indebtedness for the errors in the II Metered Volumes. For example, suppose that a Party's baseline indebtedness was 40,000 MWh. However, this was based on II Metered Volumes that summed to -100,000 MWh (over the 22 days whose AEI values contributed to the baseline indebtedness), whereas the correct Metered Volumes were known to be -110,000 MWh. The P253 Proposed indebtedness would therefore be 50,000 MWh.
- The **P253 Alternative indebtedness**, which is what the indebtedness would have been if P265 had been implemented.

The equations for calculating these values were therefore as follows:

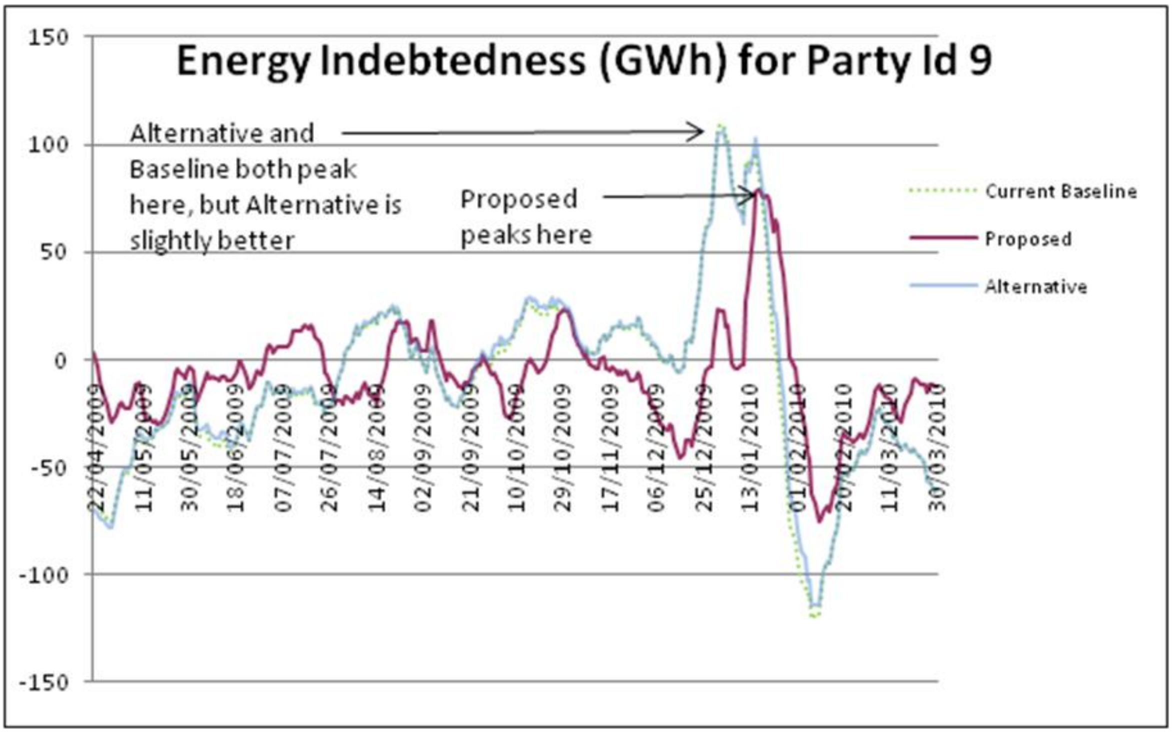
> P253 Proposed indebtedness = Baseline Indebtedness + II Metered Volumes – Accurate Metered Volumes

[7] There are some minor differences between the 'current baseline' figures in this document, and those previously presented to the Group. This is because our analysis uses data from the latest Reconciliation as a proxy for SF data, and therefore re-running the analysis has picked up some new data. Most of the differences are very small – the biggest one seems to be Party Id 11, who has flipped from having to put up slightly more Credit Cover under P253 (in the original analysis) to being able to put up slightly less. This means Party Id 11 is no longer included in the average under-estimation for Parties whose Credit Requirements are too low, pushing the average up from £234k in the original analysis to £260k in this revised analysis.

P253 Alternative Indebtedness = Baseline Indebtedness + II Metered Volumes – P253 Alternative Metered Volumes

For example, Figure 1 below shows these three different Indebtedness values for Party Id 9. The baseline indebtedness and the P265 Indebtedness are so close together on the graph that for most of the year it is difficult to distinguish the two. (I've made one line semi-transparent and the other dotted in an attempt to enable them both to be seen).

Figure 1 – Indebtedness Values for Party Id 9



Because the P253 indebtedness represents the 'true' indebtedness at SF, we have compared both the current baseline and the P253 Alternative to the Proposed. For purposes of calculating excess Credit Cover we have considered the maximum indebtedness value over the whole year. For example, in the case of Party Id 9, the baseline Indebtedness and P253 Alternative indebtedness both have their maximum on 3 October, while the Proposed indebtedness has a lower maximum two weeks later. This means that both the current baseline and P253 Alternative would force this Party to post additional unnecessary Credit Cover. In order to convert these energy values to Credit Cover, we applied the current CAP value of £50/MWh, and divided by a target Credit Cover Percentage of 50%.

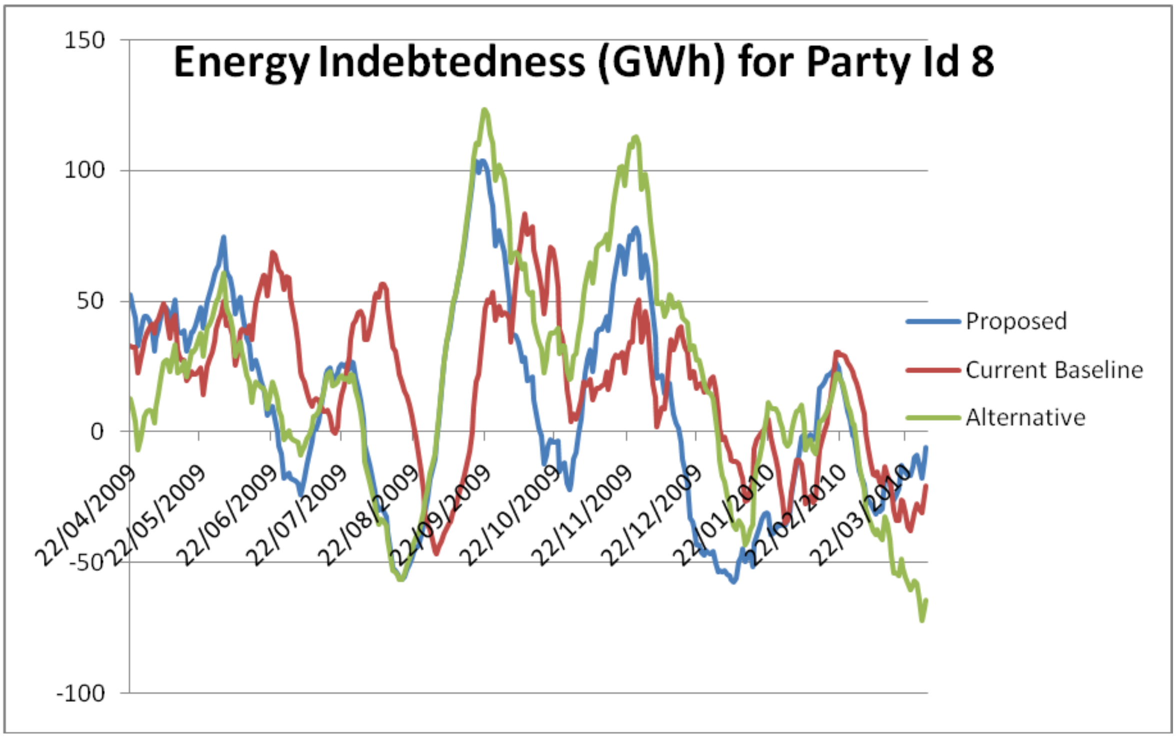
This gives the following results for the excess Credit Cover required under the current baseline and P253 Alternative:

Table 1 – Maximum Required Credit Cover between 22 April 2009 and 31 March 2010			
Party	**'Accurate' Credit Cover Requirement (as determined under P253 Proposed)**	**Increase (or Decrease) in Credit Cover Due to Defects in Current Baseline**	**Increase (or Decrease) in Credit Cover Due to Defects in P253 Alternative**
Party ID 1	£62,387	-£63,561	-£67,007
Party ID 2	£20,544	£18,423	£20,971
Party ID 3	£161,165	£1,288	£1,271
Party ID 4	£1,219,650	-£1,009,358	-£809,476

Table 1 – Maximum Required Credit Cover between 22 April 2009 and 31 March 2010			
Party	**'Accurate' Credit Cover Requirement (as determined under P253 Proposed)**	**Increase (or Decrease) in Credit Cover Due to Defects in Current Baseline**	**Increase (or Decrease) in Credit Cover Due to Defects in P253 Alternative**
Party ID 5	£659,792	-£394,251	-£319,655
Party ID 6	£530,137	£30,661	£8,668
Party ID 7	£2,190,335	£167,569	£180,328
Party ID 8	£8,346,962	£2,026,264	£3,981,853
Party ID 9	£7,921,005	£3,060,882	£2,695,760
Party ID 10	£8,772,758	£3,553,150	£3,154,557
Party ID 11	£15,195,799	£330,416	£2,332,472
Party ID 12	£27,940,141	-£2,541,927	-£1,681,076
Party ID 13	£25,501,528	£460,263	£249,602
Party ID 14	£28,504,812	£466,819	£754,995
Party ID 15	£36,872,528	£233,402	-£305,107
Party ID 16	£57,816,418	£5,143,943	£1,516,461

An example of a Party who would have to post more Credit Cover under P253 Alternative than under the baseline is Party Id 8, whose Indebtedness was significantly over-estimated by P253 Alternative from September 2009 to February 2010:

Figure 2 – Indebtedness Values for Party Id 8



The total excess Credit Cover (i.e. summing only across those Parties with a positive value in Table 1) is £15.4m for the current baseline and £14.9m for P253 Alternative.

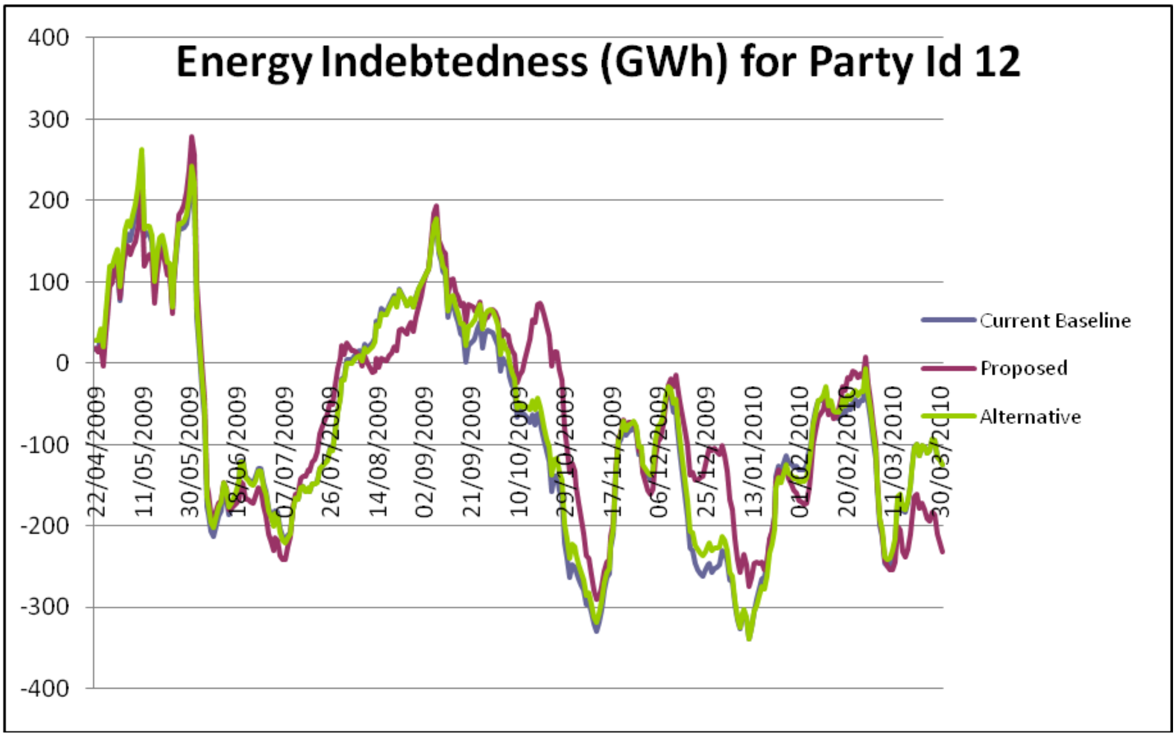
3. Analysis of Parties with Credit Cover Under Requirement

For the four Parties whose Credit Cover (based on peak indebtedness) is too low under the current baseline, we calculated the average (over the year) of the deficit. The results were as follows:

Table 2 – Parties with Credit Cover Under Requirement		
Party	**Average Credit Cover Under Requirement (Current Baseline)**	**Average Credit Cover Under Requirement (P253 Alternative)**
Party ID 1	-£50,230	-£52,755
Party ID 4	-£83,630	-£91,725
Party ID 5	-£59,133	-£64,950
Party ID 12	-£848,499	-£530,257
AVERAGE	**-£260,373**	**-£184,922**

The following graph (showing indebtedness for Party 12) may help to clarify the meaning of these figures. The first column of numbers represents the average difference between the red line (Proposed) and the blue line (current baseline); while the second column represents the average difference between the red line (Proposed) and the green line (Alternative). The graph shows that (on average) the Alternative indebtedness figures are slightly closer to the Proposed than the baseline figures are, and therefore the Alternative slightly mitigates the defect in the current baseline (as shown by the figures in Table 2):

Figure 3 – Indebtedness values for Party Id 12



Note that the numbers in Table 2 have been converted from energy to £ by applying the Credit Assessment Price of £50/MWh.

4. Maximum Underestimation of Credit Cover Requirements

Finally, we calculated the maximum under-estimation of Credit Cover requirements for each Party (as opposed to the average described above). This represents a worst-case for the risk posed to Parties by the errors in the estimation process (i.e. the loss that would be incurred if a Party went into Default at the worst possible point in the year):

Table 3 – Maximum Underestimation Over Year		
Party	**Average Credit Cover Under Requirement (Current Baseline)**	**Average Credit Cover Under Requirement (P253 Alternative)**
Party ID 3	-£3,926	-£4,021
Party ID 2	-£52,521	-£50,649
Party ID 1	-£211,671	-£214,323
Party ID 5	-£298,525	-£211,983
Party ID 6	-£308,739	-£263,555
Party ID 7	-£408,101	-£355,053
Party ID 4	-£586,659	-£442,777
Party ID 10	-£1,635,498	-£1,154,593
Party ID 15	-£2,773,028	-£2,777,838
Party ID 9	-£4,051,305	-£3,661,000
Party ID 11	-£4,148,856	-£3,947,786
Party ID 8	-£4,355,329	-£4,555,860
Party ID 14	-£4,633,432	-£4,606,321
Party ID 12	-£7,760,294	-£7,022,851
Party ID 16	-£8,199,827	-£5,745,205
Party ID 13	-£8,539,887	-£8,134,795
AVERAGE	**-£2,997,975**	**-£2,696,788**