

P304 – WORKGROUP'S INITIAL PAR100 ANALYSIS

EXECUTIVE SUMMARY

National Grid raised [P304 'Reduction in PAR from 500MWh to 250MWh'](#) to progress the outcomes of Ofgem's [Electricity Balancing Significant Code Review](#) (EBSCR). This Modification proposes to reduce the Price Average Reference (PAR) value from 500MWh to 250MWh to make imbalance prices (cash-out prices) more marginal when they are calculated using the Main Price. As part of its assessment of P304, the Workgroup have requested that ELEXON conduct extensive analysis using PAR values of 100MWh, 250MWh and 350MWh.

Further information on this Modification can be found on the [P304 page](#) of the ELEXON website or in the P304 Assessment Consultation, to which this document is attached.

Summary of the initial PAR100 Analysis results

This document details the potential impacts on imbalance prices due to a reduction in PAR from 500MWh to 100MWh using historic data going back to 2010 (post [P217](#) implementation). ELEXON have also run the Settlement Trading Charge calculation using PAR100 imbalance prices to study the impacts across different BSC Parties. **Please note that this analysis does not take into account behavioural changes.**

Our analysis shows that, compared to PAR250, PAR100 will further sharpen the Main Price when the period Net Imbalance Volume (NIV) is greater than 100MWh or less than -100MWh. This means that there will be an increase in System Buy Price (SBP) when the System is short and a decrease in System Sell Price (SSP) when the System is long.

The Main Price will not be affected for Settlement Periods with a NIV between +/- 100MWh inclusive. This supports the intention of Ofgem's EBSCR Decision, to make the Main Price a more accurate signal of scarcity in the market.

We have applied PAR100 imbalance prices to BSC Parties' historical Imbalance Volumes to assess the impacts of both Imbalance Charges and Residual Cashflow Reallocation Cashflow (RCRC) on BSC Parties. The findings are similar to that of the PAR250 analysis, such that Parties with large Credited Energy Volumes will benefit from larger RCRC. Independent Suppliers (small Suppliers) are more likely to be impacted by higher imbalance prices. However the net daily impact is below £260 (more than double the impact of PAR250) for 97% of Suppliers.

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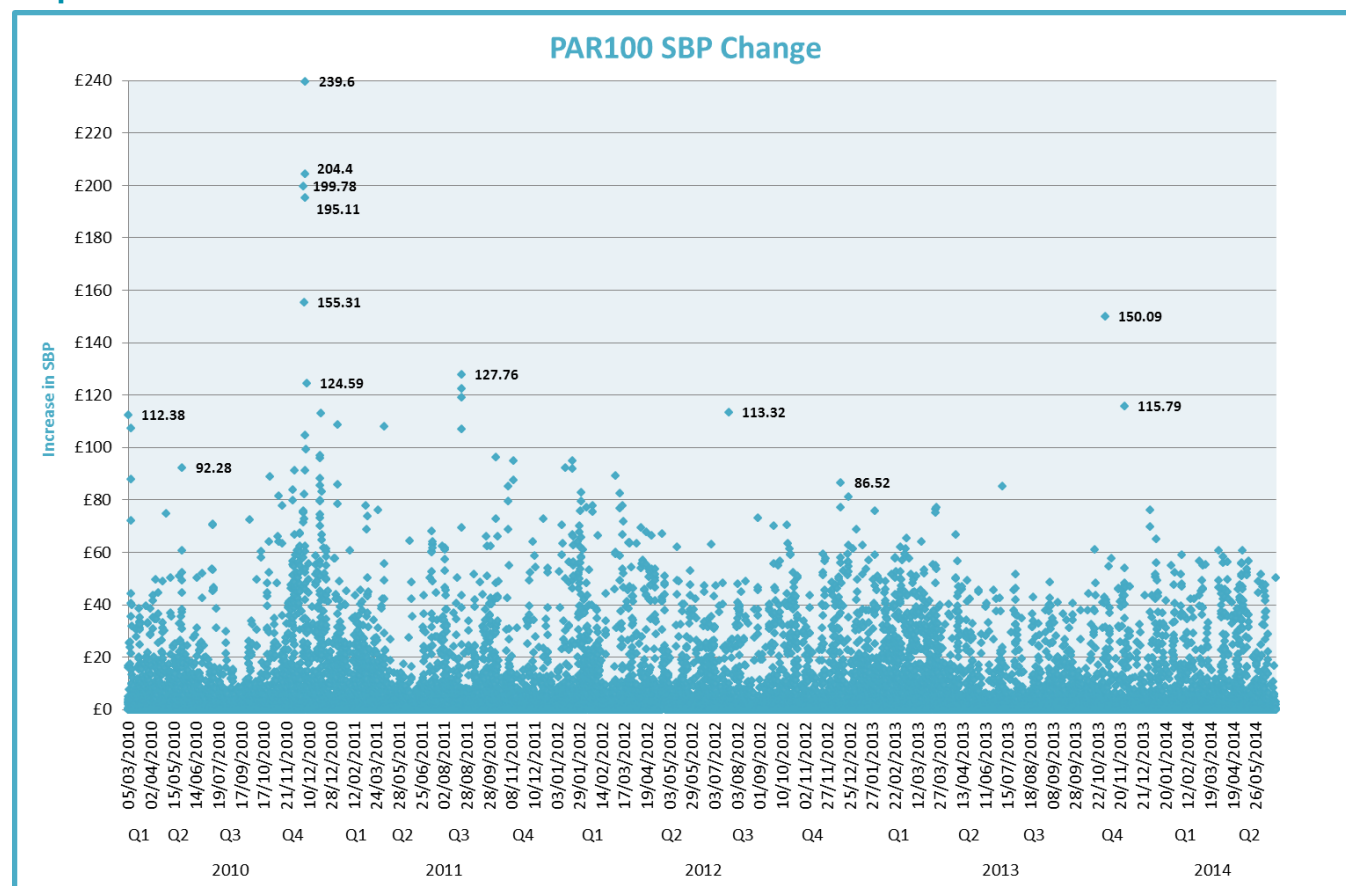
PAR100 MAIN PRICE IMPACT ANALYSIS

Increase in System Buy Price as a Result of PAR100

Graph 1 below shows that there are more Settlement Periods with large increases in SBP in 2010, especially during the winter period. The maximum SBP increase was £239.60.

Throughout the analysis period, SBP remained unchanged in 34.88% of the total Settlement Periods where SBP was the Main Price (i.e. the system was short). This percentage has decreased by 27.1 percentage points compared to PAR250. This suggests that more Settlement Periods would be impacted if PAR is reduced from 250MWh to 100MWh.

Graph 1

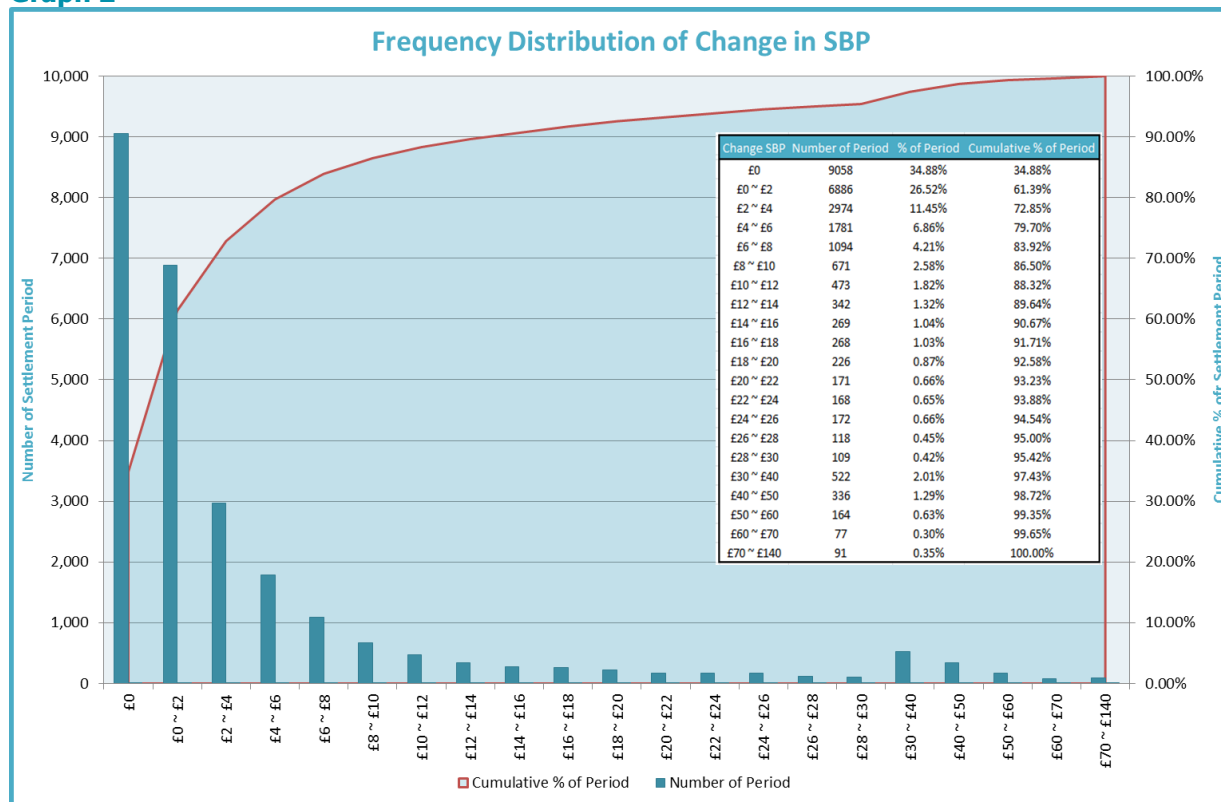


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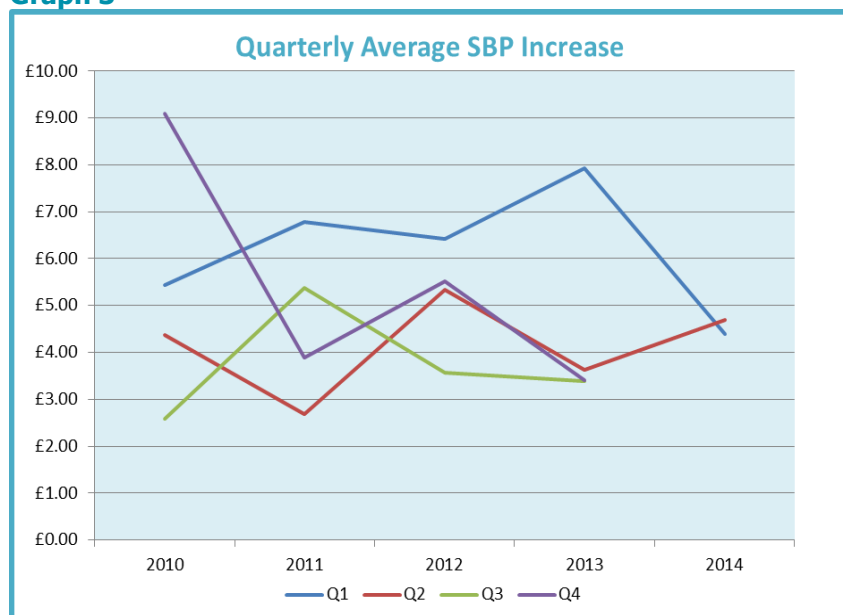
Frequency Distribution of the SBP Increase

Graph 2 shows the cumulative frequency distribution of the SBP Increase as a Result of PAR100. Around 80% of the Periods were impacted by less than £6, with around 90% of the Periods being impacted by less than £16.

Graph 2



Graph 3

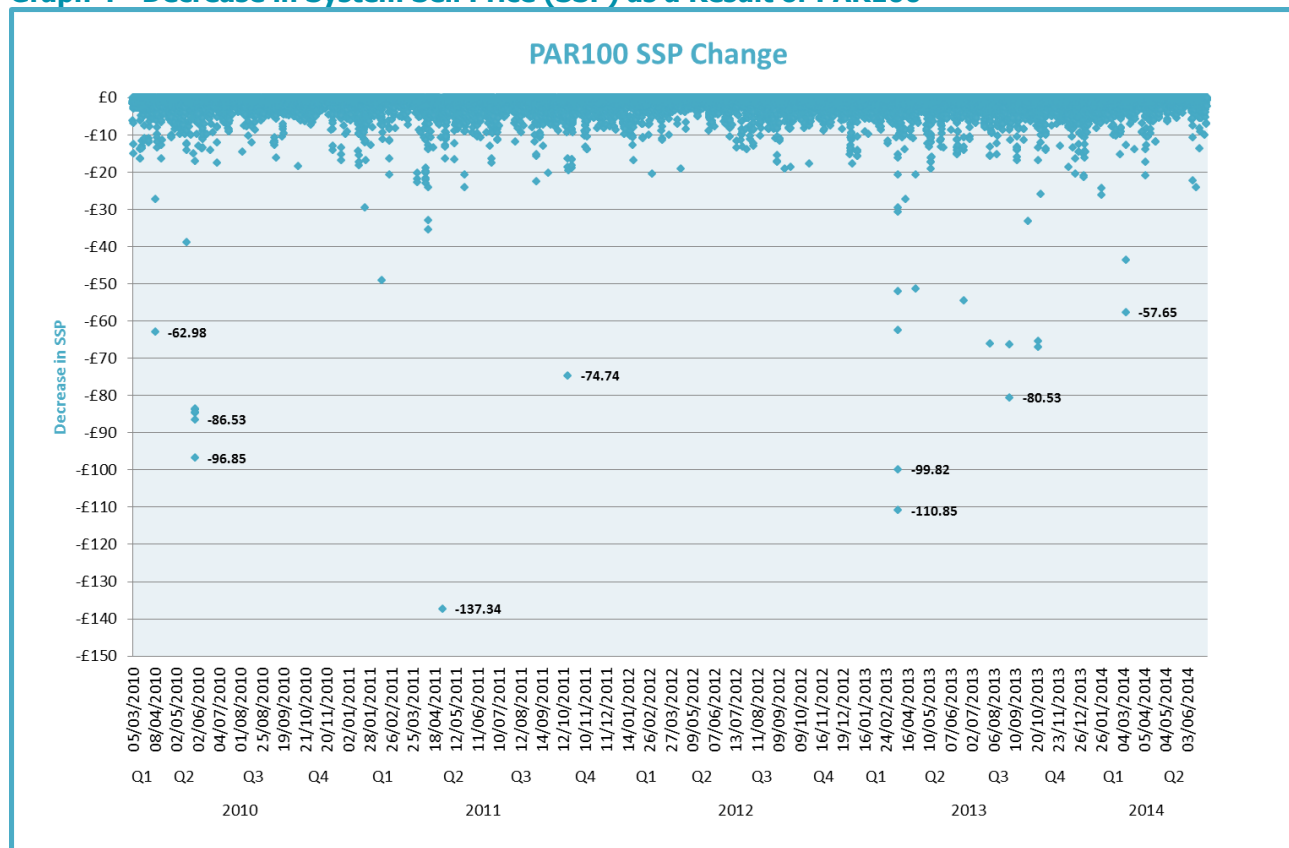


Quarterly Average Increase in SBP

As shown in Graph 3, the average SBP increase in quarter 1 (Calendar Year) was higher than those of other quarters during most of the analysis period. The largest average SBP increase occurred in quarter 4 of 2010. The average impact on SBP in the 2013/14 winter period was lower than those in previous winters.

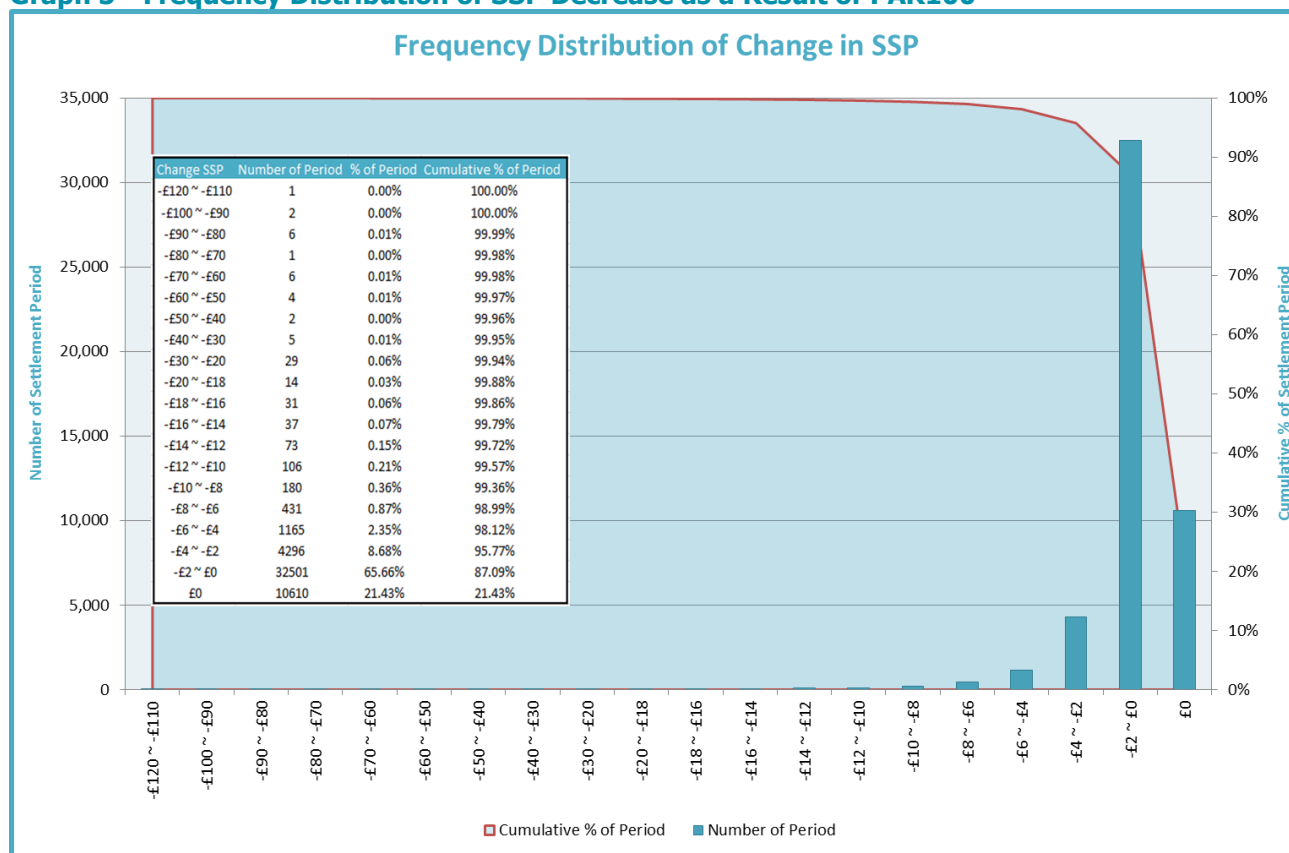
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Graph 4 - Decrease in System Sell Price (SSP) as a Result of PAR100

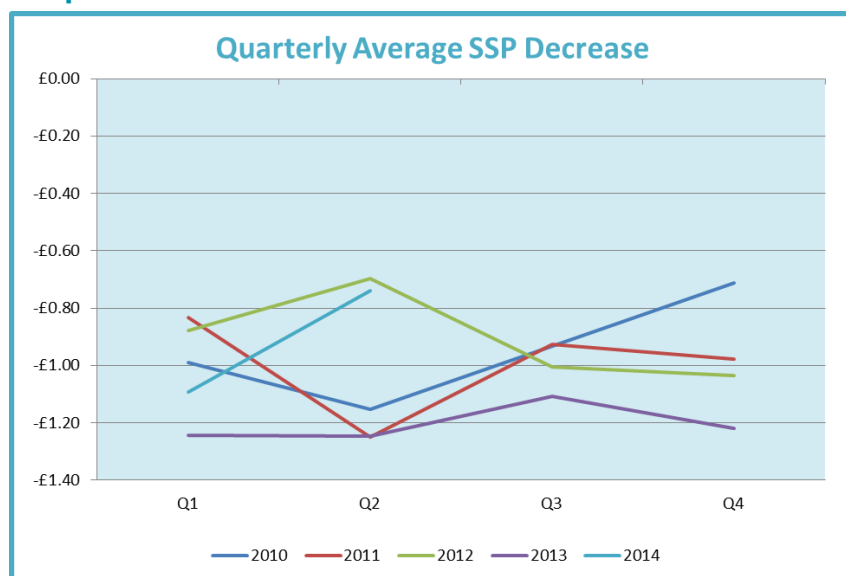


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Graph 5 - Frequency Distribution of SSP Decrease as a Result of PAR100



Graph 6



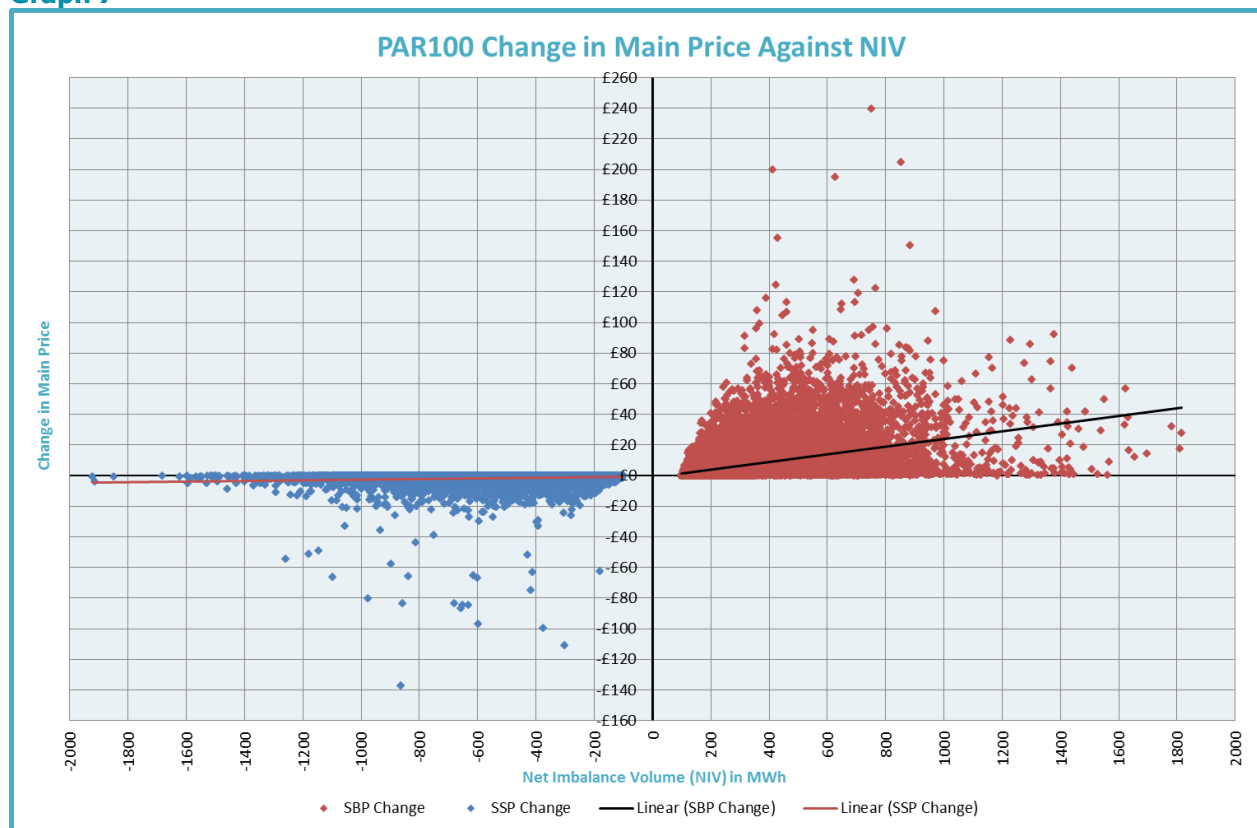
Quarterly Average Decrease in SSP

Throughout the analysis period, SSP remained unchanged in 21.43% of the Settlement Periods where SSP was the Main Price (i.e. the system was long). This percentage has decreased by 25.65 percentage points showing that more Settlement Periods were affected when reducing PAR from 250MWh to 100MWh. The cumulative percentage suggests that around 95% of the Periods were impacted by less than -£4. The maximum decrease in SSP was -£137.34 which occurred in Q2 of 2011. Graph 6 suggests that the average changes in SSP are more volatile in Q2.

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Change in Main Price against Transmission System Net Imbalance Volume

Graph 7



Graph 7 shows the effectiveness of PAR100 (i.e. sharpened Main Price) when NIV is large in both directions. The best fit line of SBP suggests that SBP increases when NIV increases. The graph also shows a visible trend that PAR100 reduces SSP when NIV gets smaller however the best fit line is not as steep as that of SBP. We note that this graph shows similar trend to the one provided for PAR250. The main difference is that PAR100 will impact more Settlement Periods and the impacts on Main Price for certain Settlement Periods will be more significant.

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PAR100 PARTY TRADING CHARGE IMPACT ANALYSIS

We have run the Imbalance Charge and RCRC calculations using PAR100 imbalance prices to assess the impact on different types of trading Parties. This will allow ELEXON and the Workgroup to determine whether any particular types of trading Party will be more heavily affected by sharpened price signals. We note that PAR100 has resulted in higher Imbalance Charge payments for all BSC Parties, especially during Q4 of 2010 and Q1 of 2013 when SBP increased more significantly (see graph 3). This would effectively increase the total RCRC given.

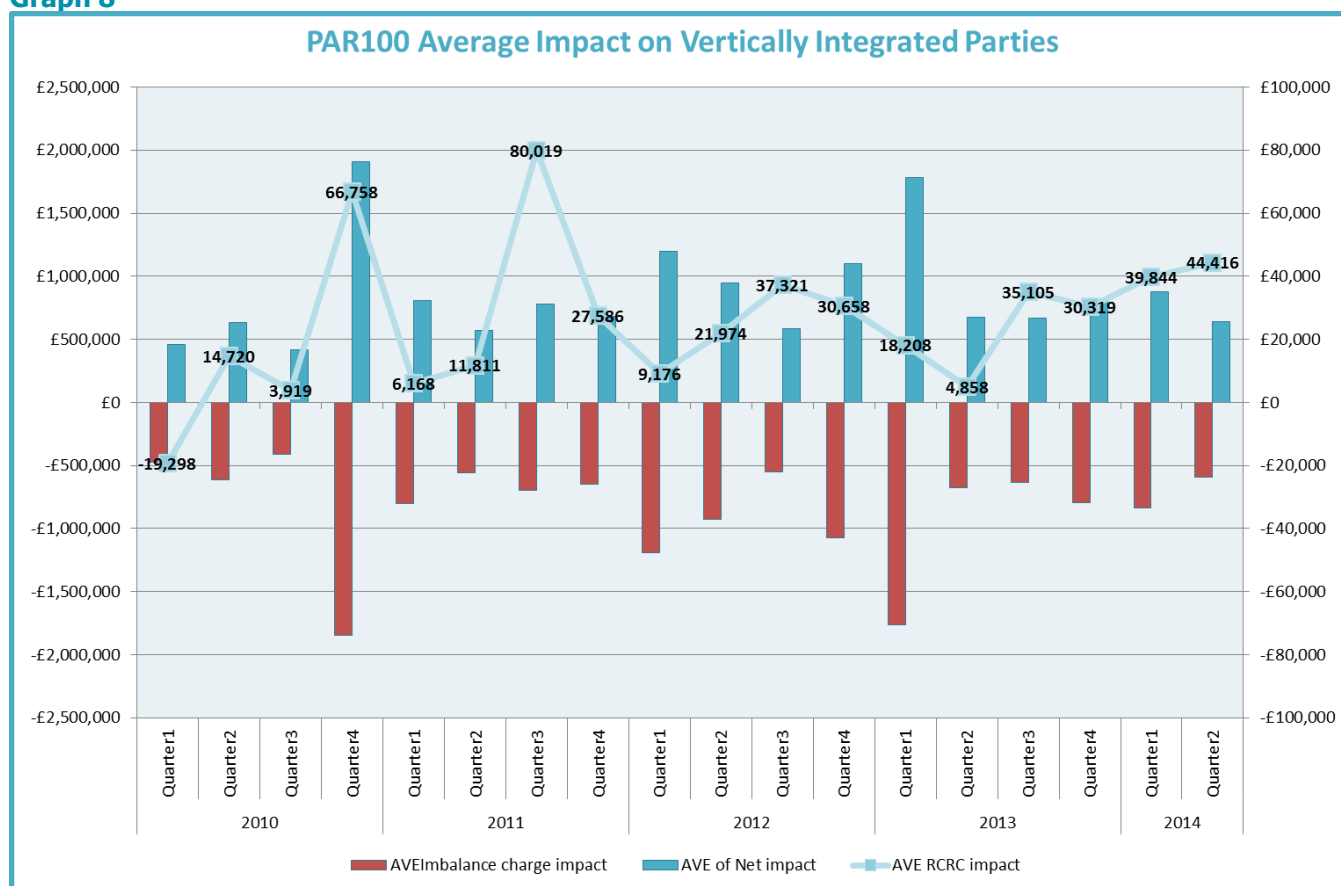
The Reverse Price remains unchanged and would benefit Parties with large Credited Energy Volumes¹. Under the current dual pricing system, reducing PAR would have more impact on Parties with small Credited Energy Volumes as their receivable RCRC does not sufficiently cover the additional imbalance cost arising from sharpened imbalance prices.

Table 3 – BSC Party Grouping

Group
Vertically Integrated
Independent Generator - Thermal
Independent Generator - Wind
Independent Suppliers

Average PAR100 Impact on Vertically Integrated Parties

Graph 8



Graph 8 shows the quarterly average impact on Trading Charges for vertically integrated Parties as a result of PAR100. Each individual vertically integrated Party includes both their Supplier and generator businesses. There

¹ RCRC is net Imbalance Charge payment to be redistributed back to Parties which amount is proportional to the amount of Credited Energy in BSC Parties' trading accounts. Large Trading Parties would therefore receive more money from RCRC because they have more Credited Energy Volumes.

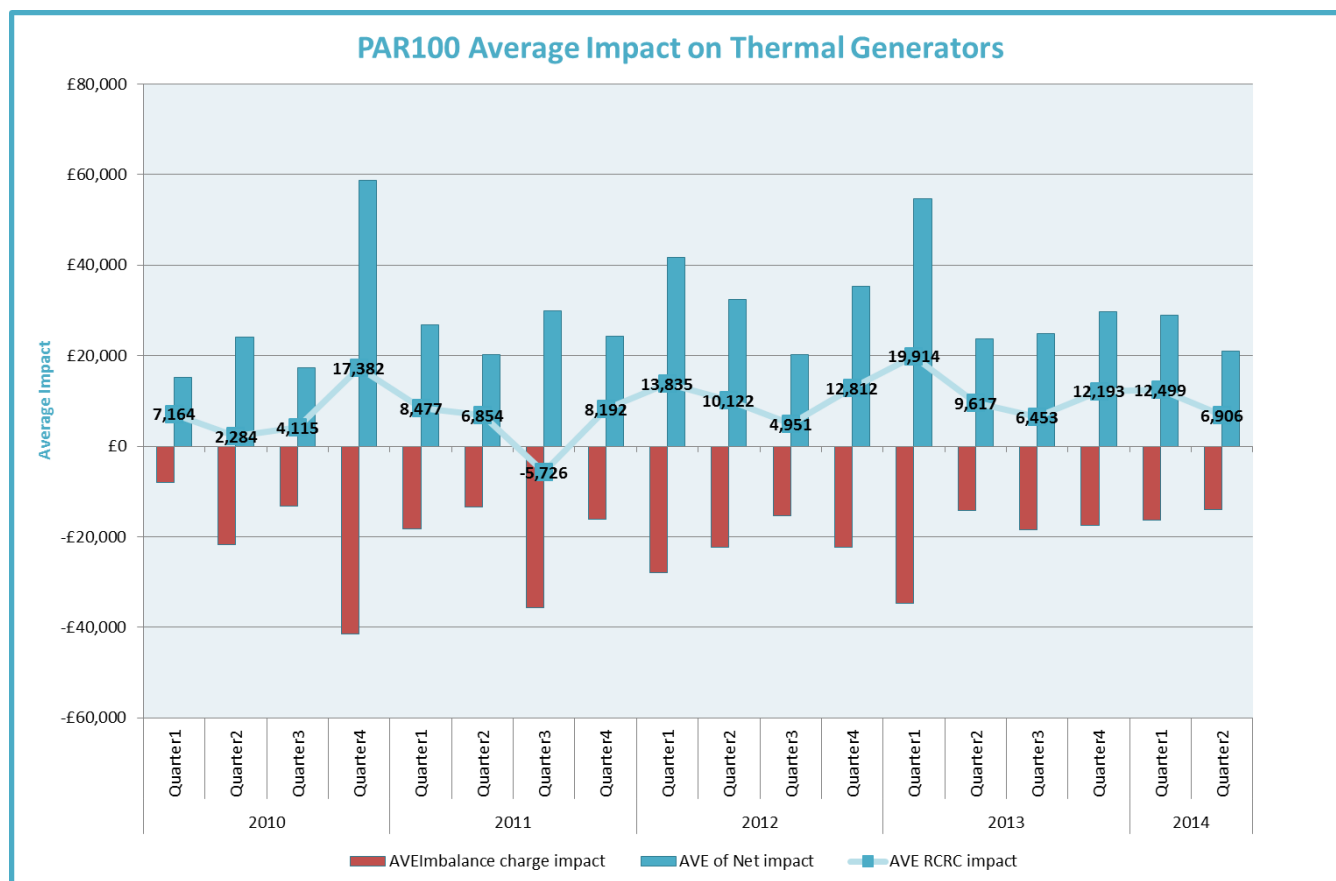
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was a negative impact in Q1 of 2010 only. The higher Imbalance Charge was due to sharpened imbalance prices paid by vertically integrated Parties and was netted off by higher RCRC payment. This has resulted in a net gain for vertically integrated Parties in the majority of Settlement Periods. In comparison to PAR250, the overall net gain was larger due to higher RCRC payments as a result of higher Main Price/Reverse Price spread.

Average PAR100 Impact on Independent Thermal Generators

Graph 9 shows the quarterly average impact on Trading Charges for independent thermal generators as a result of PAR100. Overall, independent thermal generators would gain in the majority of periods, which is due to a combination of better energy balancing from more predictable station exports and higher receivable RCRC based on large Credited Energy Volumes. Similar to vertically integrated Parties, PAR100 would favour independent generators due to higher RCRC in comparison to PAR250.

Graph 9

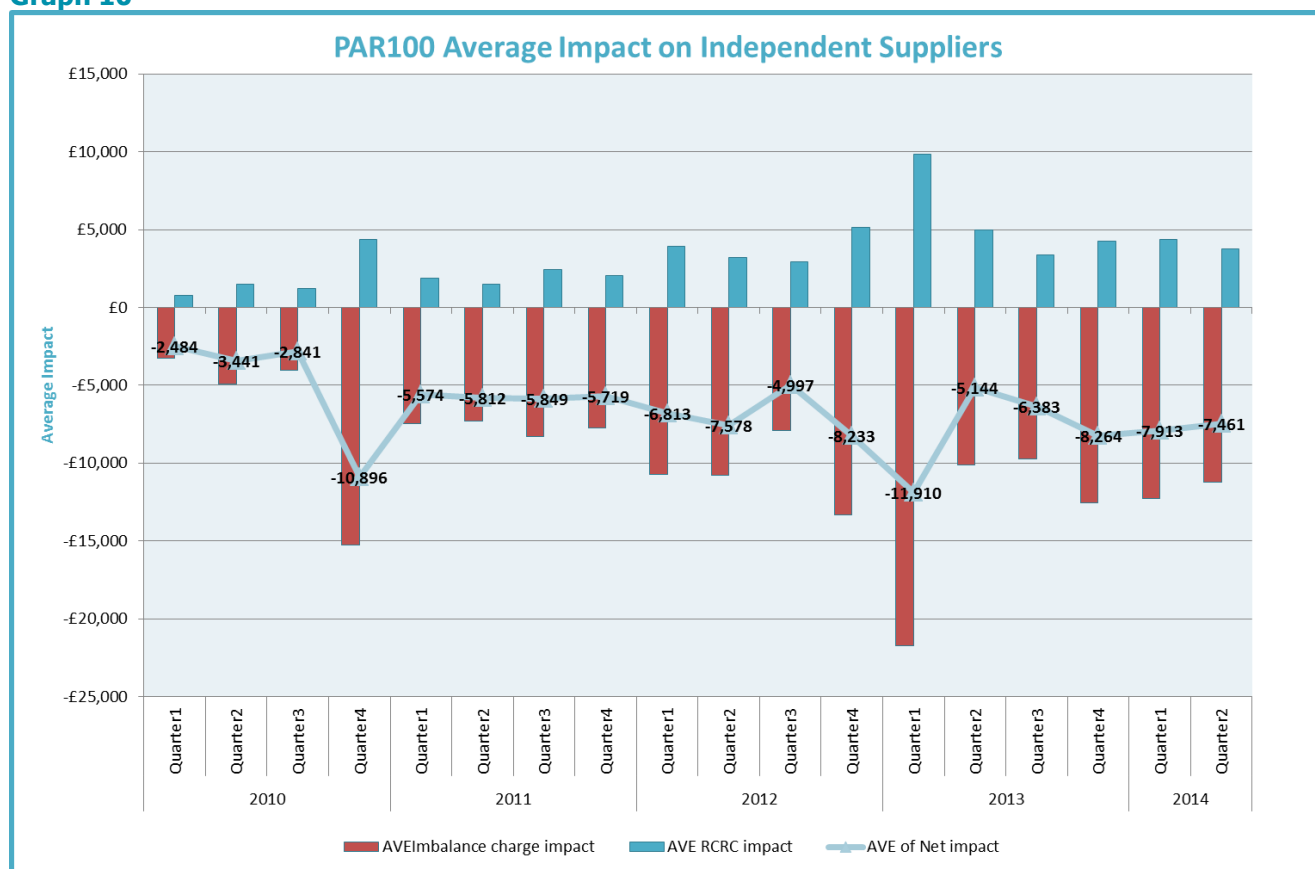


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Average PAR100 Impact on Independent Suppliers

Graph 10 shows the quarterly average impact on Trading Charges for independent Suppliers as a result of PAR100. Unlike the other types of Parties, the receivable RCRC for independent Suppliers does not outweigh the additional Imbalance Charges incurred due to sharpened cash-out prices. Independent Suppliers are more likely to be exposed to Imbalance Charges than generators as it is harder for them to predict the consumption of customers. Independent Suppliers also had less Credited Energy Volumes in their trading accounts compared to vertically integrated players and big generators and hence would receive less RCRC. Comparing to PAR250, PAR100 would enlarge this impact on independent Suppliers due to higher cash-out price spread.

Graph 10



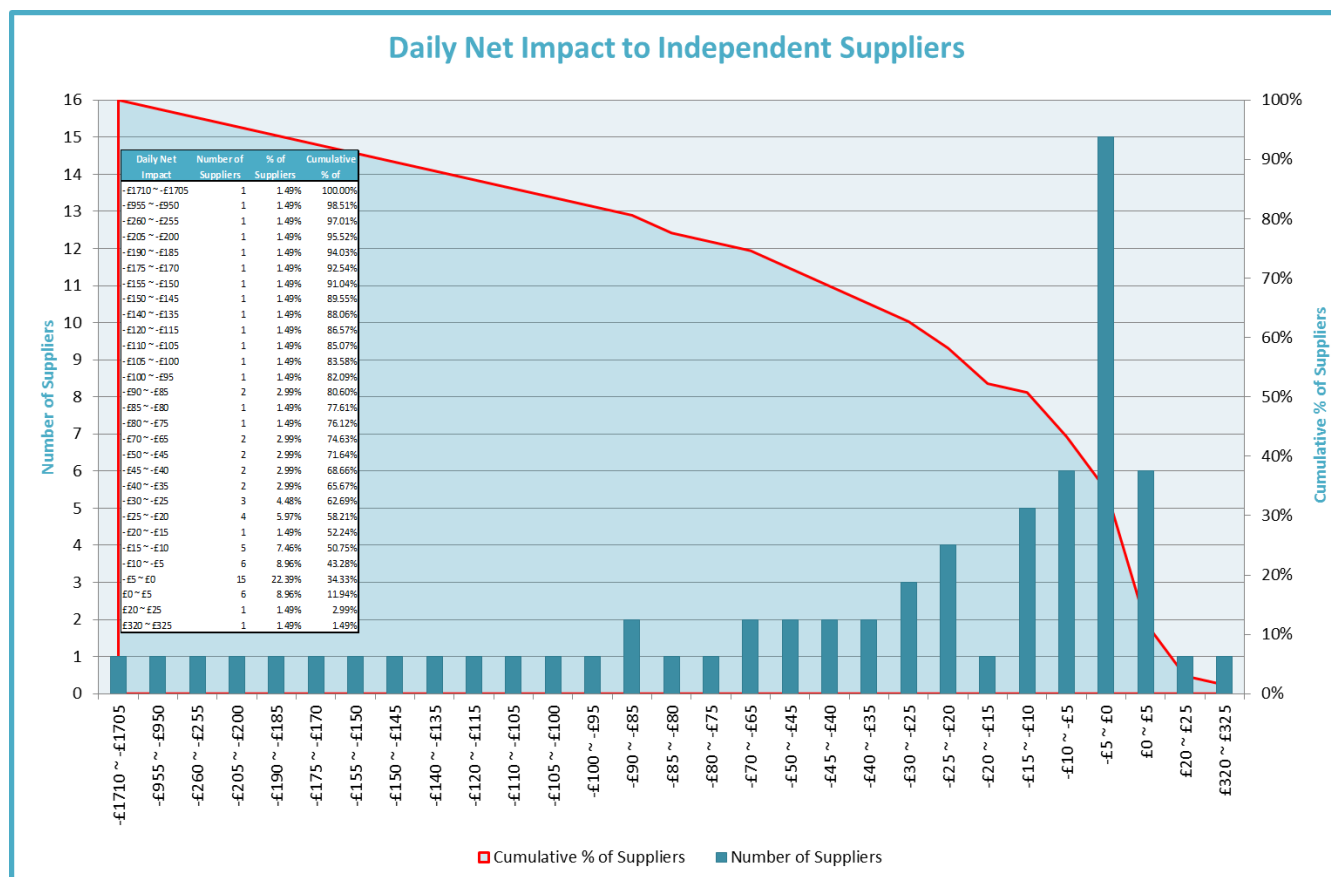
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Daily Net Impact on Independent Suppliers

We have looked into the daily net impact for independent Suppliers as shown in Graph 11. Among all the active independent Suppliers (some BSC Parties are registered as Suppliers but had no energy consumption in the past four years, they are excluded from the impact analysis), around 97% of the Suppliers had a daily net impact of less than £260. Two Parties had a daily impact of £954 and £1708 respectively, however this was due to the Parties having large Imbalance Volumes during a few specific days/Settlement Periods when the cash-out prices were significantly sharpened by PAR100.

Note that the impact on independent wind generators is not shown in this analysis as the impact is minimal, except for quarter 3 2013 which was due to the abnormal charge of a particular Party (see PAR250 analysis for information).

Graph 11



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APPENDIX 1: THE MAIN PRICE CALCULATION WITH DIFFERENT PAR VALUES

This is an example of the System Sell Price (Main Price) calculation for Period 30 on 31/08/2013, and here we demonstrate how different PAR values would impact the final price calculation. PAR is an imbalance pricing parameter which determines the maximum volume of most expensive priced energy balancing actions to be volume averaged to calculate the Main Price. The smaller the PAR values, the more marginal the price will be (hence we will take less cheap balancing actions when calculating the Main Price).

The below table shows all the PAR500 adjusted balancing actions that the live SSP of -£11.48/MWh was calculated based on. When PAR decreases to 350MWh, we exclude more cheap balancing actions (i.e. tightening our selection box in the below table) to calculate the SSP, this effectively sharpens the SSP to -£30.48. As PAR decreases further to 250MWh, the SSP drops to -£53.29/MWh and eventually to -£78/MWh when PAR equals 100MWh.

BOA	Date	Period	BMU	PAR Adjusted Volume	Price	TLM	TLM Adjusted Volume	BOA Final Cost	PAR			
BID	20130831	30	T_WHILW-1	-15.476	-78	0.9909	-15.335	1196.12	P A R	P A R	P A R	P A R
BID	20130831	30	T_CLDSW-1	-13.687	-78	0.9909	-13.562	1057.84				
BID	20130831	30	T_GRIFW-1	-13.437	-78	0.9909	-13.314	1038.48				
BID	20130831	30	T_GRIFW-2	-13.437	-78	0.9909	-13.314	1038.48				
BID	20130831	30	T_WHILW-1	-13.15	-78	0.9909	-13.03	1016.36	5 3 2 0	5 3 2 0	5 3 2 0	1 0 0 0
BID	20130831	30	T_BLLA-1	-13.15	-78	0.9909	-13.03	1016.36				
BID	20130831	30	T_WHILW-1	-12.3	-78	0.9909	-12.188	950.68				
BID	20130831	30	T_WHILW-2	-12.3	-78	0.9909	-12.188	950.68				
BID	20130831	30	T_GORDW-1	-11.853	-78	0.9909	-11.745	916.1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
BID	20130831	30	T_CLDNW-1	-10.265	-78	0.9909	-10.172	793.38				
BID	20130831	30	T_WHILW-2	-8.856	-78	0.9909	-8.775	684.49				
BID	20130831	30	T_WHILW-1	-8.834	-78	0.9909	-8.753	682.76				
BID	20130831	30	T_CLDCW-1	-7.626	-78	0.9909	-7.557	589.42				
BID	20130831	30	T_WHILW-2	-7.246	-78	0.9909	-7.18	560.03				
BID	20130831	30	T_GORDW-1	-4.249	-78	0.9909	-4.21	328.42				
BID	20130831	30	T_HADHW-1	-2.657	-78	0.9909	-2.633	205.35				
BID	20130831	30	T_CLDCW-1	-2.371	-78	0.9909	-2.349	183.22				
BID	20130831	30	T_TDBNW-1	-2.201	-78	0.9909	-2.181	170.08				
BID	20130831	30	T_HADHW-1	-2.174	-78	0.9909	-2.154	168.01				
BID	20130831	30	T_TDBNW-1	-1.02	-78	0.9909	-1.011	78.82				
BID	20130831	30	T_CLDCW-1	-0.693	-78	0.9909	-0.687	53.58				
BID	20130831	30	E_BETHW-1	-3.042	-76	0.9909	-3.014	229.06				
BID	20130831	30	M_CAS-GAR01	-5.1	-50	0.9909	-5.053	252.67				
BID	20130831	30	M_CAS-GAR01	-3.9	-50	0.9909	-3.864	193.22				
BID	20130831	30	M_CAS-BEU01	-0.908	-50	0.9909	-0.9	45				
BID	20130831	30	M_CAS-BEU01	-0.483	-50	0.9909	-0.479	23.94				
BID	20130831	30	T_DRAXX-1	-18.375	20	0.9909	-18.207	-364.14				
BID	20130831	30	T_DRAXX-4	-17.625	20.1	0.9909	-17.464	-351.03				
BID	20130831	30	T_DRAXX-3	-17.625	20.5	0.9909	-17.464	-358.01				
BID	20130831	30	T_LOAN-2	-52.125	26.5	0.9909	-51.649	-1368.7				
BID	20130831	30	T_LOAN-2	-37.5	26.5	0.9909	-37.158	-984.68				
BID	20130831	30	T_LOAN-4	-64.764	27.5	0.9909	-64.172	-1764.74				
BID	20130831	30	T_RUGPS-7	-7.708	30	0.9909	-7.638	-229.14				
BID	20130831	30	T_RUGPS-6	-7.708	30	0.9909	-7.638	-229.14				
BID	20130831	30	T_RUGPS-7	-1.581	30	0.9909	-1.566	-46.99				
BID	20130831	30	T_RUGPS-6	-1.581	30	0.9909	-1.566	-46.99				
BID	20130831	30	T_RATS-3	-9.208	31	0.9909	-9.124	-282.85				
BID	20130831	30	T_RATS-2	-7.75	31.1	0.9909	-7.679	-238.82				
BID	20130831	30	T_RATS-2	-3.333	31.1	0.9909	-3.303	-102.72				
BID	20130831	30	T_ABTH8	-12.5	34.01	0.9909	-12.386	-421.24				
BID	20130831	30	T_PEHE-1	-19.816	37	0.9909	-19.635	-726.5				
BID	20130831	30	T_PEHE-1	-17.174	37	0.9909	-17.017	-629.63				
BID	20130831	30	T PEHE-1	-13.211	37	0.9909	-13.09	-484.33				
PAR500				-500		0.9909	-495.43	5687.58				-11.48
PAR350				-350		0.9909	-346.80	10570.95				-30.48
PAR250				-250		0.9909	-247.72	13200.87				-53.29
PAR100				-100		0.9909	-99.09	7728.79				-78.00