nationalgrid

Stage 03: Workgroup Report

Connection and Use of System Code

(CUSC)

CMP243

‘a fixed Response Energy Payment option for all generating technologies’

What stage is this document at?

01	Initial Written Assessment
02	Workgroup Consultation
03	Workgroup Report
04	Code Administrator Consultation
05	Draft CUSC Modification Report
06	Final CUSC Modification Report

CMP243 aims to allow all generators, regardless of technology type, the option of choosing whether their Response Energy Payment is based on the current methodology or a fixed value initially suggested at £0/MWh. The fixed value is now suggested to be a market derived price.

This document contains the discussion of the Workgroup which formed in June 2015, responses to their consultation and the Workgroup’s final Conclusions.

Published on: **24th February 2016**

Medium Impact:
Generators

The Workgroup concludes:
All options are better than the baseline, however the Workgroup had differing views on the best option with three Workgroup members voting for the Original, three voting for WACM1 and one voting for the Baseline.

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Any Questions?

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About this document

This document is the Workgroup Report which details the final conclusions of the CMP243 Workgroup and also contains the responses received to their Workgroup Consultation. An electronic version of this document and all other CMP243 related documentation can be found on the National Grid website via the following link: http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/CUSC/Modifications/CMP243/

Document Control

Version	Date	Author	Change Reference
0.1	12th January 2016	Code Administrator	Workgroup Report for Workgroup comment
0.2	18th January 2016	Code Administrator	Workgroup Report for further Workgroup comment
0.3	25th January 2016	Code Administrator	Workgroup Report to CUSC Panel
0.4	22nd February 2016	Code Administrator	Workgroup Report for further Workgroup comment
0.5	24th February 2016	Code Administrator	Workgroup Report to CUSC Panel

1 Summary

1.1 CMP243 was proposed by Drax Power and was submitted to the CUSC Modifications Panel for their consideration on 29th May 2015.

1.2 The Proposer clarified the defect of CMP243 as being increased volatility and uncertainty around the Market Index Price (MIP) which, due to a more diverse mix of technologies on the system which have different marginal costs, drives volatility in the Response Energy Payment (REP) made to Frequency Response (FR) providers. The current methodology for payment is better suited to a time where renewable generation on the system was sparse and the marginal costs of generators were similar. However, in recent years there has been a large increase in renewable technologies connecting to the system, some of which, like wind and solar, have negative marginal costs. This impact will increase in future years. The diverse range of marginal costs for generators on the system is likely to drive increased volatility and uncertainty around the MIP as the MIP is determined by the marginal source of generation. Fundamentally this means that the MIP no longer acts as a good proxy for FR providers' marginal costs. This means the MIP may not cover the cost of FR utilisation, increasing the frequency and significance of loss making FR provision. This increasing price volatility risk will most likely have an effect on the Holding Prices submitted by generators which may lead to some generators pricing themselves out of the market.

1.3 CMP243 was raised following a similar Modification (CMP237 'Response Energy Payment for Low Fuel Cost Generation') to expand the defect to cover the increased volatility and uncertainty around the Market Index Price (MIP). The relationship between CMP243 and CMP237 is explained in more detail within paragraphs 2.21-2.23 of this Report. The CMP243 Workgroup have made references to the CMP237 Proposal throughout this Report, for further information the CMP237 Final CUSC Modification Report is available on the National Grid website[1].

1.4 The Proposer originally proposed that all generators regardless of technology type should have the option of choosing whether their REP is based on the current methodology, or a REP fixed at a suggested value of £0/MWh. A fixed price will eliminate the volatility and uncertainty associated with the MIP. The reduction in price risk to parties will better facilitate competition and efficient system operation. The Proposer was open to suggestions from the Workgroup to fix the REP at a different price if they felt it was more appropriate.

1.5 It was subsequently decided that a market based price is preferable to £0/MWh. It was clarified that this would only apply to the generators which were not covered under CMP237 'Response Energy Payment for Low Fuel Cost Generation' i.e. those WITH a fuel cost. It is also suggested that the REP is set ahead of the date when Holding Prices are submitted.

1.6 The Proposer clarified that the Original Proposal would be a REP based on the month ahead wholesale power baseload price. This would be set 10 days ahead of the requirement to submit Holding Prices. There is no option to revert to the current REP (MIP). The Workgroup also agreed that there should be two Workgroup Alternate CUSC Modifications (WACMs) based on Option 2 and Option 3 within paragraph 2.36 of this document.

1.7 At the Workgroup meeting on 13th January 2016 the Workgroup voted on the Original and the two WACMs by assessing them against the Applicable CUSC Objectives. The Workgroup voted by majority that all options are better than the baseline, however had differing views on the best option with three Workgroup members voting for the Original, three voting for WACM1 and one voting for the Baseline.

Workgroup Analysis

1.8 The Ofgem Representative requested analysis to demonstrate the benefits of CMP243. National Grid subsequently provided some data on average accepted total Holding Price

[1] CMP237 Report on National Grid website; http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/CUSC/Modifications/CMP237/

(shown in Figure 3). In addition and specifically, the Ofgem Representative wished to see analysis demonstrating the impact of MIP volatility on FR Holding Prices, in particular that a relationship existed such that increased volatility of the MIP would translate into higher Holding Prices.

1.9 The Workgroup Report illustrates that MIP volatility has been increasing over time (please see Figure 1). Moreover, considering the future change to the generation mix with increasing renewables penetration, the MIP will almost certainly become more volatile and unpredictable in the future. Figure 2 in the Workgroup Report suggests that average accepted Holding Prices have tended to increase over the first half of the decade (2010s).

1.10 Further analysis was undertaken by the Proposer after the Workgroup vote of the FR holding price submissions (those accepted and not accepted). This analysis revealed that Holding Price submissions have tended to increase over the past five years. However, a limited number of very high Holding Price submissions (£1000s +) tended to have a disproportionate impact of the monthly submitted Holding Price totals. Too much 'noise' was observed in the data. As such the Proposer did not believe that any useful conclusions could be drawn from analysis of submitted Holding Price data. The Proposer further believed that there was no further effective analysis that could be undertaken to test the relationship between the volatility of the MIP and Holding Price submissions.

1.11 The Proposer stated that Annex 4 of the Workgroup Report illustrating the higher risk associated with the MIP for FR providers compared to a fixed REP price, demonstrated that Holding Price submissions are likely to be lower where the price of the REP is fixed in advance of the delivery month compared to when the price of the REP is only known ex post after any FR utilisation. This view reflects basic economic and market principles that reduced unmanageable risks (in the presence of effective competition) will translate into reduced prices and thus costs to consumers. The Proposer is of the view that provision of FR is highly competitive.

1.12 The CMP243 Workgroup Report was originally presented to the CUSC Modifications Panel on 29th January 2016. At this meeting, the CUSC Panel chose not to accept the Workgroup Report on the basis that the Ofgem representative raised concerns about the insufficient level of analysis within the Workgroup Report. The CUSC Panel sent the Workgroup Report back to the Workgroup and requested that the Ofgem representative explicitly states the required additional analysis to be included within the Workgroup Report to enable Ofgem to make a decision. The Panel requested the Workgroup to reconvene to consider Ofgem's request and report back to the CUSC Panel at their meeting on 26th February 2016.

1.13 The Workgroup reconvened via teleconference on 19th February 2016 to consider the request of analysis circulated via email by the Ofgem representative. It was specifically requested that the Workgroup consider providing;

- Further analysis to show that there is a clear defect (regression analysis to show there is a relationship between increased volatility in the MIP and increased HPs)
- Analysis to show the proposed change will meet the objectives (show that reduced volatility will reduce HPs)
- More detailed narrative surrounding the analysis already provided within the Workgroup Report.

1.14 Within the Workgroup meeting, the Ofgem representative explained their request for analysis and how he thought this would strengthen the case for CMP243 to be implemented. The Proposer explained that in his view, the idea of primarily focusing analysis on Holding Prices to justify a change is essentially flawed as MIP volatility is just one of many factors which impact changes in holding prices. Other influencing factors would include such things as maintenance, competition, delivery failure, fuel prices, efficiency, plant damage etc. Therefore it is impossible to isolate the impact of MIP volatility on holding prices. Another Workgroup member noted that the analysis being requested by Ofgem would not be possible to provide as the modification is based on a principle and a future state which it is trying to avoid. In his view, uncertainty in the market clearly leads to increased Holding Prices and the more volatile the MIP is, the more uncertainty there will be. The National Grid

representative noted that the MIP volatility shown within Fig.1 of this report only increases after September 2014 and therefore regression analysis would not reveal any new evidence volatility remains at a similar level Jan 2010 – Sept 2014. He agreed that this modification is based on a principle and it is trying to make a change to prevent an impact of increased MIP volatility in the future, rather than trying to fix a problem that high MIP volatility may have already caused.

1.15 The rest of the Workgroup shared the views of those stated above and agreed that further analysis would not add anything to what was already provided within the report. The Workgroup agreed to add to the narrative surrounding the analysis already provided to help strengthen the case of CMP243.

Workgroup Conclusion

1.16 At their meeting on 13th January 2015, the Workgroup voted by majority that the Original and both WACMs better facilitate the CUSC Objectives than the baseline however were split on their view of the best option. Three Workgroup members thought that the Original option was the best; three members thought that WACM1 was the best and one member thought that neither option better facilitated the CUSC Objectives and therefore voted for the Baseline.

2 Workgroup Discussions

Volatility of the Market Index Price

2.1 Mandatory FR payments are currently based on the Market Index Price (MIP). This was suited to a system which was mainly dominated by gas and coal plant, however, since the methodology was agreed the system has changed significantly with more renewable generation such as wind and solar, entering the system. This impact will increase in future. This change in generation mix increasingly drives volatility of the MIP. The Proposer originally presented a graph to the Workgroup which illustrated the increase of volatility in the MIP from May 2014 to January 2015. It was questioned whether the MIP volatility was a recent issue or whether the Proposer could provide a graph which shows the volatility over a longer period of time. The Proposer produced the graph below; illustrating the increase of volatility in the MIP from January 2010 to January 2015. It was recognised by the Workgroup that the graph clearly shows an increase in MIP volatility from September 2014 onwards. The Workgroup noted that CMP243 aims to prevent the impact of a recent increase in MIP volatility which they felt would continue into the future.

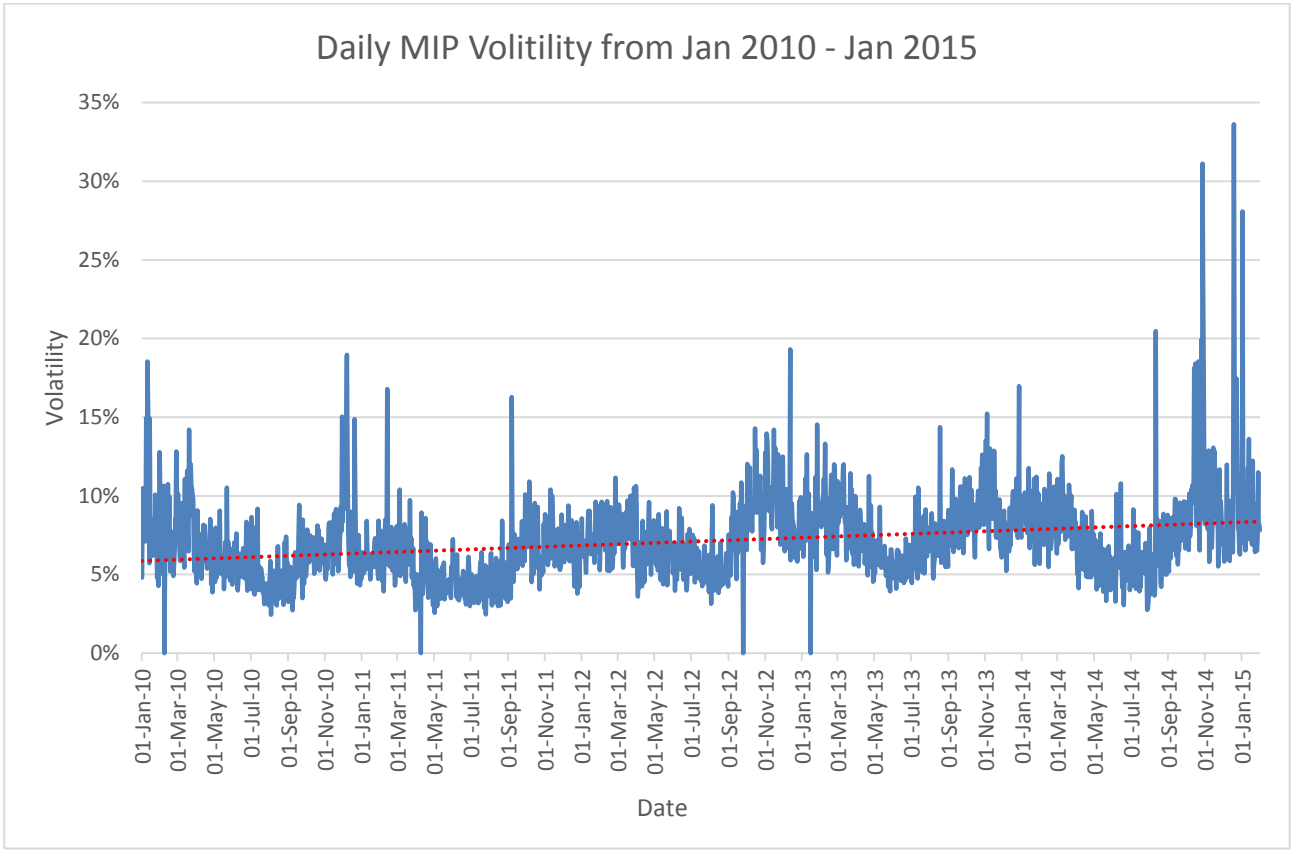


Fig.1 – Daily MIP volatility from January 2010 – January 2015

2.2 The increase in the volatility in the MIP is an issue for FR providers as they cannot predict what their MIP will be when providing FR. The increase in volatility and uncertainty of the MIP make it a less suitable method of reflecting the marginal costs of FR providers. The Proposer noted that this creates an increase in risk for FR providers that FR provision will be loss making. Providers will factor this risk into their Holding Payments, potentially pricing themselves out of the market. Historical average accepted holding prices 2011-2015 have increased over this period as shown in Figure 2 below. The Workgroup recognised that there are a number of potential reasons for this effect, but they felt that the increase in MIP volatility will have placed some upward pressure on holding prices. This in-turn negatively impacts the System Operator (SO) and there will be less participation in the market giving them less choice of FR providers thereby driving up costs. Measures to increase FR provision participation are important

as National Grid expects that the FR requirement will increase by 30-40% in the next five years (System Operability Framework, November 2015). The National Grid representative also provided a graph showing the Average Accepted Holding Prices by month over four charging years (April – March), this is shown below in Figure 3. It was recognised that this graph does not clearly show an increase in average accepted total holding prices over the four years, however referring back to Figure 1, it was noted that there is only a significant increase in volatility over the last few months the data was taken from. Therefore there would not be a clear increase in Holding Prices in Figure 3. Moreover, as numerous factors influence holding price submissions, the impact of MIP volatility cannot be observed in isolation from accepted holding prices.

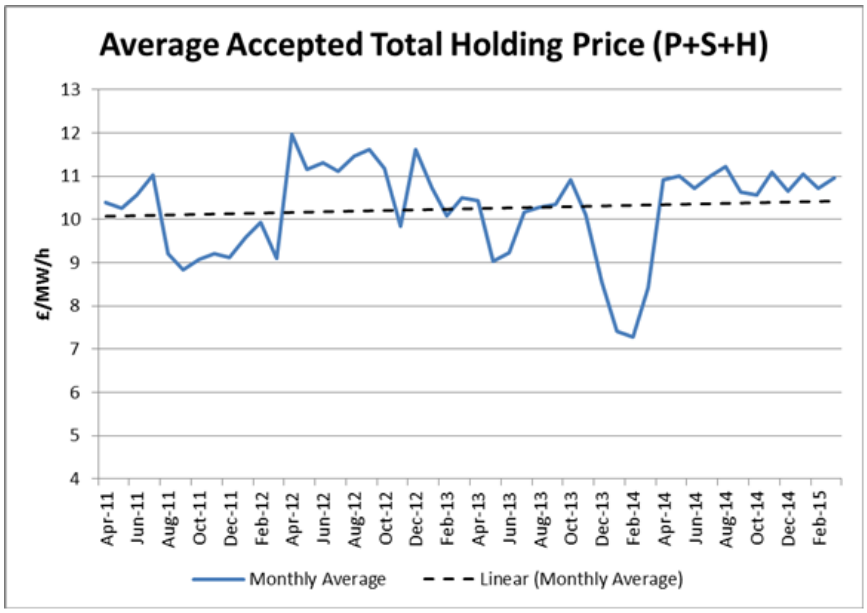


Figure 2 - Average Accepted Total Holding Price (P+S+H) 2011 – 2015

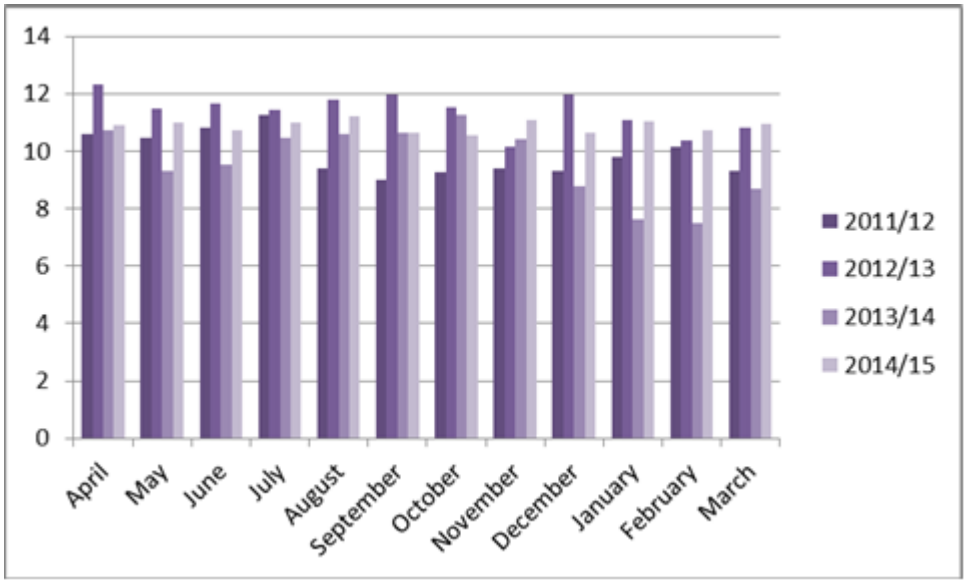


Figure 3 – Average Accepted holding prices by month 2011/12 – 2014/15

2.3 The National Grid representative also presented a graph showing the frequency of Submitted Holding Prices for three separate months (November 14, May 15 and August 15). This is shown below as Figure 4. He noted that in more recent months there has been a small reduction in the submissions of prices around £11-£13/MW/h and an increase in submissions around £8/MW/h. However he advised that this may be a seasonal effect and National Grid would need to do a lot more analysis to identify any trends in holding price submissions. The Workgroup were happy for just this graph to be included within the Workgroup report.

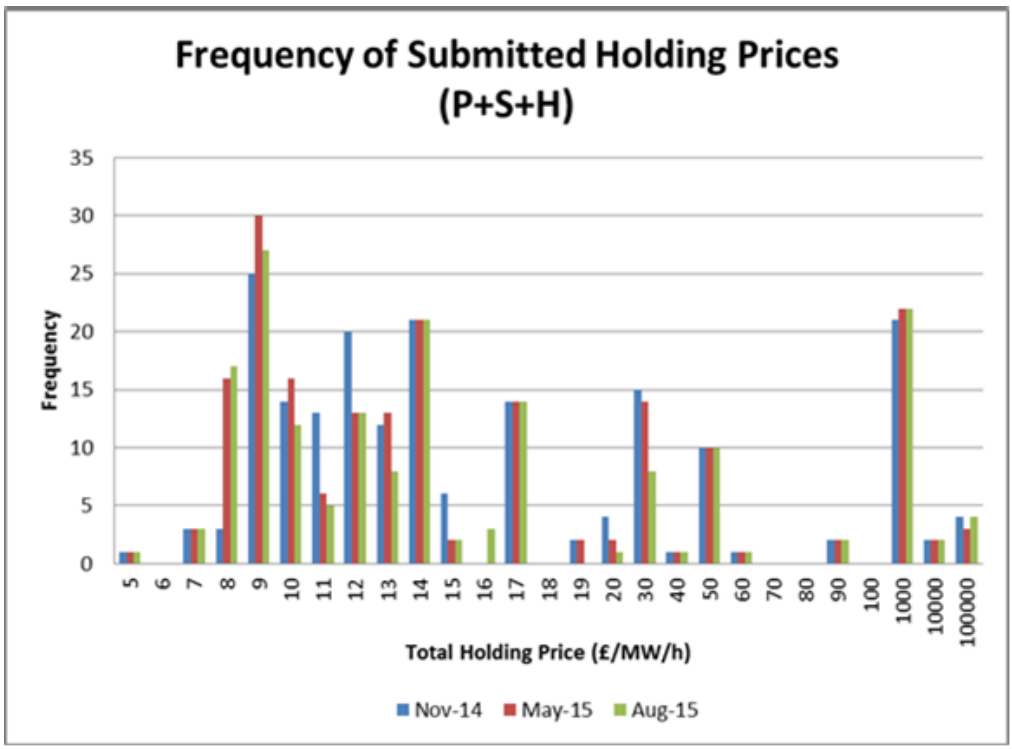


Figure 4 – Frequency of Submitted Holding Prices (P+S+H)

2.4 Under the related CMP237 'Response Energy Payment for Low Fuel Cost Generation' Modification Proposal, the Proposer (National Grid Electricity Transmission Plc) presented three graphs which showed that the majority of plant providing primary, secondary and high FR are pricing themselves at less than £10/MWh. However, a proportion of these are submitting prices higher than £10/MWh and even higher than £100/MWh, the majority of which were identified as being wind plant. One CMP237 Workgroup member noted that although there is a large amount of wind generation pricing themselves high, there are other (non-wind) generation types providing prices as high as wind. The CMP243 Workgroup felt that these graphs were relevant to the CMP243 Proposal and are therefore included below under Figures 5, 6 and 7;

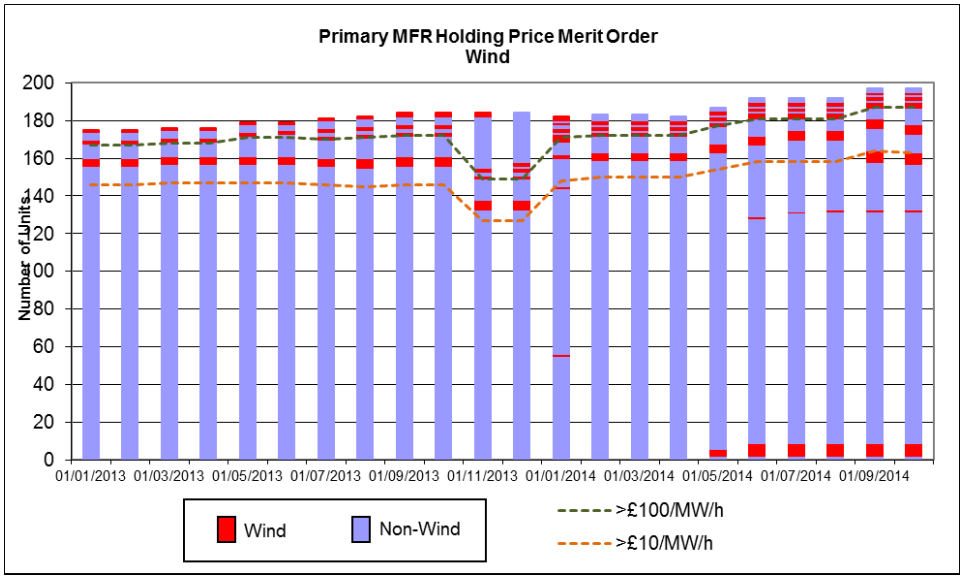


Fig. 5 - Wind holding price for Primary frequency response

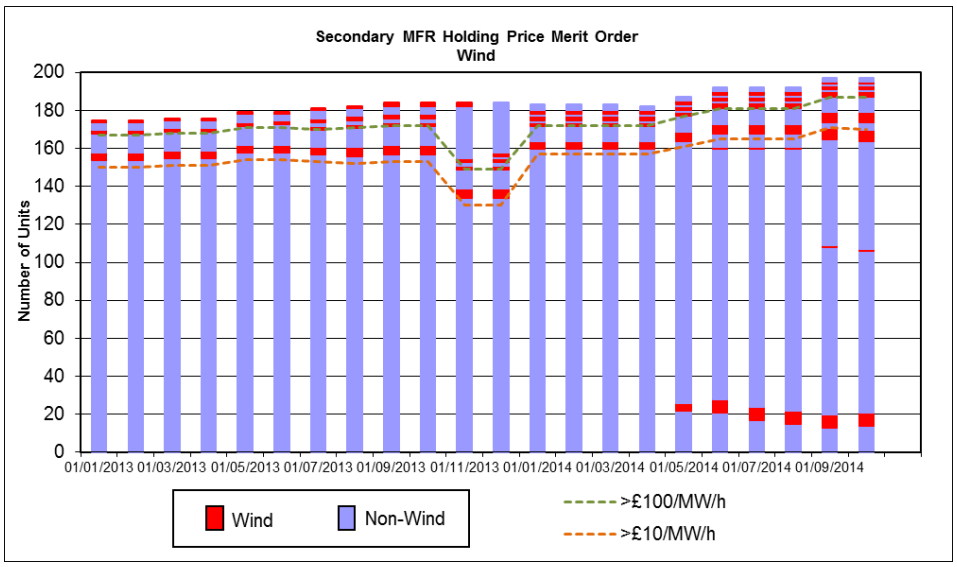


Fig. 6 - Wind holding prices for Secondary frequency response

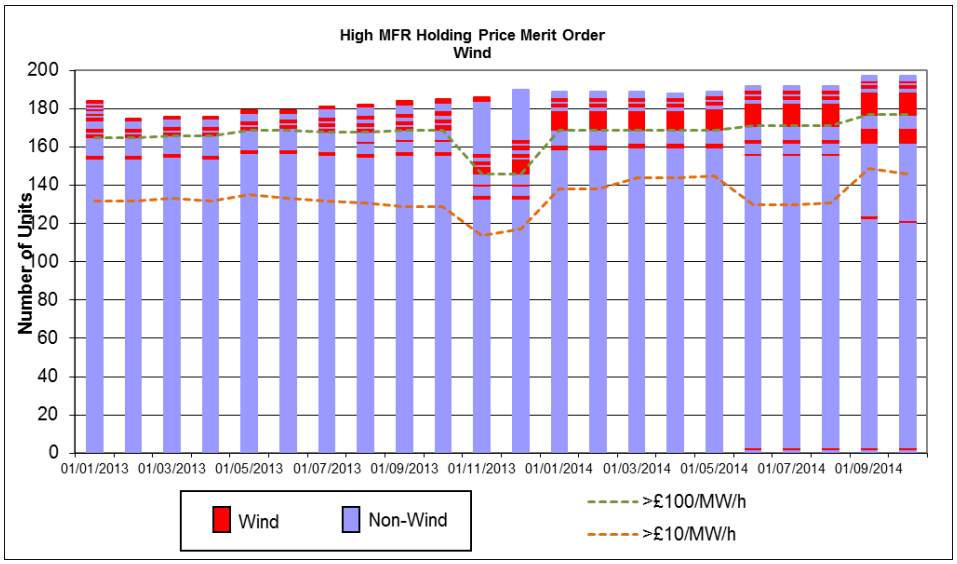


Fig. 7 - Wind holding prices for High frequency response

Original Proposal

2.5 It was suggested that there should be an option to fix the REP ahead of Holding Prices being submitted. The Proposer was not sensitive on what the price should be however suggested a value of £0/MWh within the CUSC Modification Proposal form. It was subsequently decided that a market based price is preferable to £0/MWh. It was clarified that this would only apply to the generators which are not covered under CMP237 'Response Energy Payment for Low Fuel Cost Generation' i.e. those WITH a fuel cost. It was further clarified during the workgroup that this should also include interconnectors and demand sites. The Proposer suggested setting the REP ahead of providing Holding Prices, preferably at ten days ahead, however was open for suggestions from the Workgroup.

2.6 In June 2015, Drax Power presented at the Balancing Services Standing Group (BSSG) to sense if there was an appetite for allowing providers to choose any price for the REP. The Proposer advised that there was not much appetite for this and that they were not planning on raising a modification in addition to CMP243 to suggest this change.

2.7 The Workgroup discussed the materiality of CMP243 and the Proposer presented their initial analysis to the Workgroup on the materiality of FR through a number of graphs shown below and in Annex 4. Each graph shows the difference between the assumed marginal cost and the MIP multiplied by the high or low FR multiplier over the averaged day in May 2015. The first graph shows clean dark low response in May 2015 and

shows the losses for providing low FR overnight which should be similar for both gas and coal (assuming that their marginal costs are similar).

2.8 The Drax representative noted that large gains and losses will be made when a generator's marginal cost deviates far from the MIP. This is a common occurrence in a market with a diverse generation mix and this issue is expected to intensify. Further, as the generation on the system continues to diversify we can envisage that the extreme periods, where the MIP deviates significantly from the average, will become increasingly more commonplace. Therefore the graphs shown may be an underestimate of future scenarios.

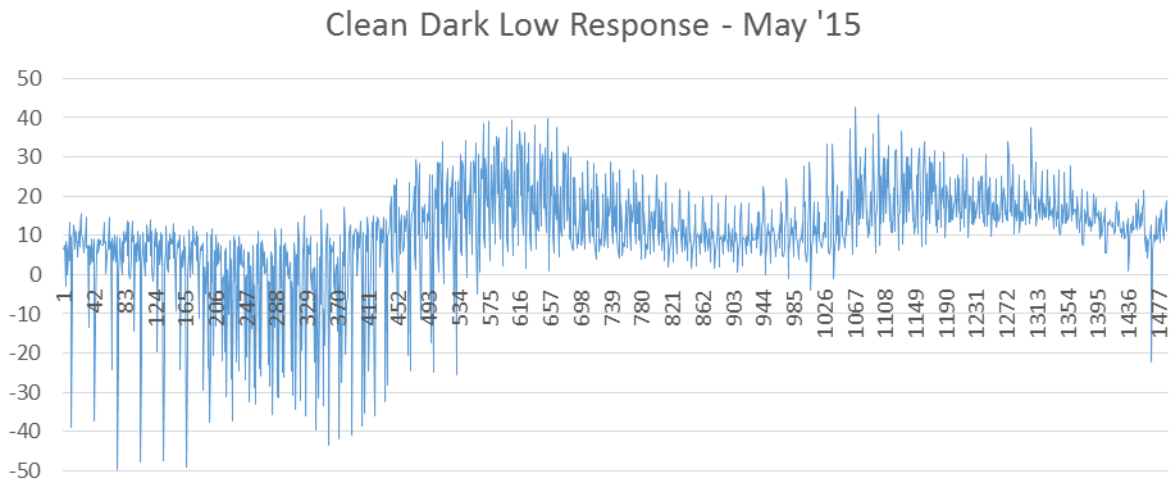


Fig.8 – Clean Dark Low Response – May 2015

2.9 It can be seen that providing high FR overnight has an increased potential of making larger profit margins than during the day. The opposite can be said for low FR where larger profit margins are more likely during the day than overnight. Providing high FR during the day could result in some generators being left out of pocket by up to £50/MWh.

2.10 Some Workgroup members noted that if Generators Physical Notification (PN) themselves on overnight they will see that they will be making a loss and will have the choice not to run.

2.11 The Proposer noted that within the second graph (for clean dark high response – shown below), there are less losses on the high FR side however there is still the potential for losses.

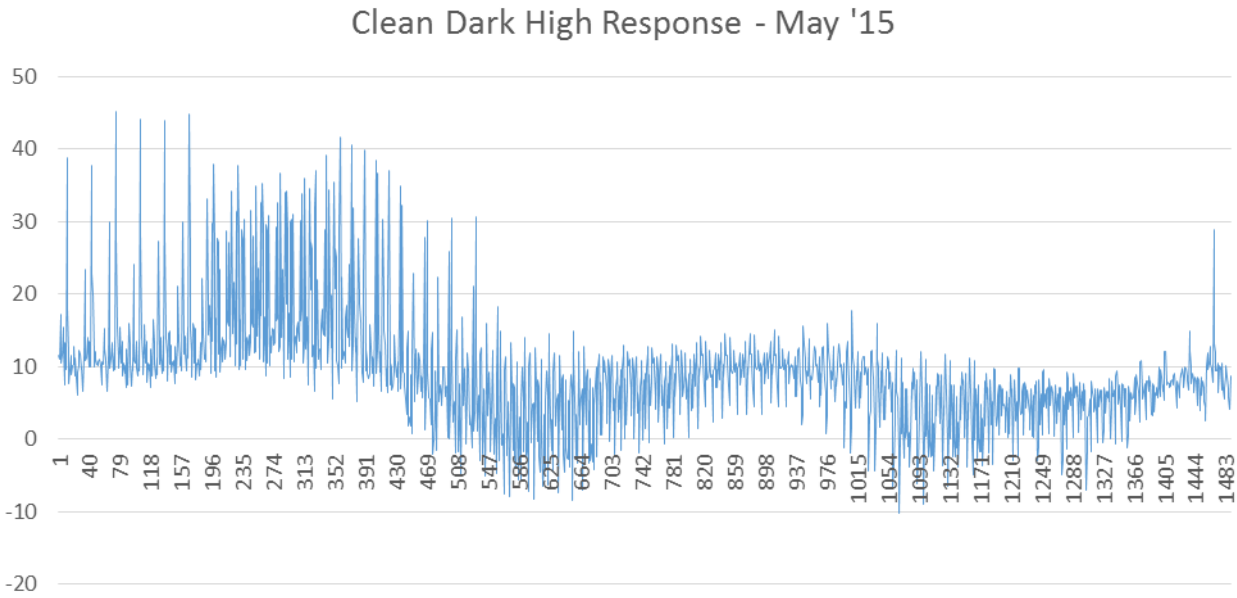


Fig.9 – Clean Dark High Response – May 2015

2.12 The overall conclusion from this analysis is that FR providers (specifically coal and gas plant) face a significant risk of loss making activity where the MIP deviates significantly from the plant's marginal cost. This is more likely to occur in future as the generation mix changes and means the MIP is no longer a good proxy for a FR provider's marginal cost.

2.13 It was noted that there is also a large group of units who are prepared to run below their marginal costs at a loss because there would be a much greater cost with them shutting down, this is what drives the overnight prices.

2.14 The Proposer also did some analysis on how plant are being utilised and presented a graph to the Workgroup showing different generators and how much they were utilised before the first week of May 2015, simply showing the period of time they were used. This indicates that there is no predictable pattern of FR utilisation and as a result it is difficult for FR providers to know when they will be utilised. This makes it even more difficult for FR providers to know what price they are likely to receive or pay when utilised for FR.

2.15 During previous industry discussions surrounding FR (CMP237 and BSSG/CBSG) it was suggested that generators do not provide equal measures of high and low FR. Therefore generators running baseload and peaking generators will not benefit equally for providing FR. Further, the Drax representative stated that their models predict that more units are utilised for FR during the night than during the day. Therefore certain plant may only be utilised for FR at certain points thereby increasing the chance of baseload and peak plant being improperly remunerated with respect to one another.

2.16 It was questioned whether there would be any disbenefit to generators that only come on for a short period if volatility is reduced. A Workgroup member noted that the original purpose of the MIP is that you would roughly get the cost of power, however this may not adequately compensate a generator if the trading price does not match their marginal cost. It was noted that there are some extreme examples where Open Cycle Gas Turbine (OCGT) plants have been brought on at around £180/MW, however when this happens the SO would look for other plants who are better designed for providing FR.

2.17 The Workgroup agreed that the Drax analysis demonstrates that there is a case for change, however advised Drax that Ofgem would probably like to see more than one month for the analysis to demonstrate this is more of a consistent issue. The Workgroup agreed that similar analysis is produced for two additional months (a typical summer month – August, and a typical winter month - November) taken from the previous year. This was subsequently produced. Please see Annex 4. This analysis substantiated the initial conclusion that FR providers face a significant risk of loss making activity where

the MIP deviates from a provider's marginal cost. Instances occur with significant frequency and are expected to occur with increasing frequency in the future.

2.18 A Workgroup member presented a graph to show how and when two power stations provided FR. A lot of the time, there was very little FR provided, and the FR that is provided generally nets itself out. It was suggested that if the REP was set to one price, these generators would be indifferent to it, however the Workgroup member noted that would not be the case for all.

2.19 The same workgroup member presented an Excel chart showing that across their whole portfolio they were net 61MWh short and would need to pay back for this. He explained that day and night prices would not be so easy to calculate, and that peak and off peak would be more appropriate. Peak would be Mon-Fri 7am-7pm and off peak would be Mon-Fri 7pm-7am as well as Saturday and Sunday. It was suggested that this be used as equivalent to a day/night comparison. He advised that for their units, they deliver a lot more FR over night as demand is lower and there is more need for FR. He questioned whether the Workgroup would want to reflect the true marginal cost or a month ahead price. If the Workgroup were to look at the true marginal cost, this would need to include factors like the start-up costs etc. which would be different to the incremental marginal cost which the Proposer is looking at.

2.20 The Proposer and the Workgroup discussed the issues surrounding the defect and the proposed solution. It was clarified that the defect of CMP243 centred around three issues which should be addressed, these were;

1. FR providers do not know what price they will get paid until after the event;
2. There is volatility in the MIP; and.
3. There is a risk of extreme prices (both high and negative).

2.21 The Proposer suggested setting the REP ahead of providing Holding Prices, preferably at ten days ahead, however was open for suggestions from the Workgroup.

2.22 It was noted that due to the volatility in the MIP, many FR providers have to pay to provide the service at times of negative prices. The Workgroup agreed that this should not be the case in any instance. There are generally two options for FR providers, some decide to run after seeing that they will face negative prices, whereas other providers will be asked to run and have no choice but to pay the negative prices.

Interaction with CMP237 'Response Energy Payment for Low Fuel Cost Generation'

2.23 CMP237 'Response Energy Payment for Low Fuel Cost Generation' was proposed by National Grid Electricity Transmission Plc in September 2014. CMP237 seeks to take into account the different costs of generators with low or zero energy costs through the calculation of the Response Energy Payment.

2.24 Following the Workgroup Consultation for CMP237, the Workgroup identified a wider defect to the Proposal and sought views on this through a second Workgroup Consultation. After receiving guidance from the CUSC Panel, the Workgroup were not able to widen the defect of CMP237 and decided to progress with the Original defect and raise a subsequent modification covering this wider defect (CMP243). The CMP243 Workgroup have identified some similarities within the solutions to CMP237 and CMP243 including categorisation of generators into 'fuel cost' and 'no fuel cost' as shown below in Table 1. Whilst CMP237 and CMP243 are similar, they are not dependent on each other in anyway.

2.25 The CMP237 Final CUSC Modification Report was submitted to the Authority in August 2015. The Authority have stated that as they consider CMP237 and CMP243 to be largely related, they will wait until CMP243 is submitted to themselves before making a decision on either Modification.

2.26 The Workgroup agreed that it would be sensible to have one REP rather than a choice of two or a selection of prices as this would be extremely difficult for National Grid in terms of despatch optimisation. The National Grid representative agreed that this would be simpler to implement for the SO.

2.27 CMP243 would ONLY apply to generators with a fuel cost. The CMP237 Workgroup had already categorised types of generators into 'fuel cost' and 'no fuel cost', which the respondents to the CMP237 consultations generally agreed with. The Workgroup felt that it would be best to use this categorisation of generators for CMP243 focusing on providing a solution for those with a fuel cost, not covered by CMP237. This would provide consistency with the solutions presented to the Authority under CMP237. The table developed by the CMP237 Workgroup is shown below:

Fuel Cost	No Fuel Cost
Gas	Onshore Wind
Coal	Offshore Wind
Oil	Solar
Nuclear	Tidal
Biomass	Wave
Electricity Storage Technologies (inc. pumped storage, batteries)	
Hydro	
Interconnectors	
Demand	

Table 1 – Generators split into Fuel Cost and No Fuel Cost categories

2.28 The Workgroup considered whether to include interconnectors and demand within the table of generators which CMP243 applies to. It was agreed that interconnectors and demand are effectively fuel cost for FR and therefore CMP243 would apply to them and therefore these were added to the table above after CMP237 was sent to the Authority.

Potential options for change

2.29 The Workgroup expanded on the Original Proposal and discussed what potential options and alternatives could be provided for CMP243

2.30 The Workgroup agreed that it could be a possibility to collar the current REP at a certain amount (suggested at £0MW/h) to avoid negative prices. Whilst not really addressing the defect of volatility, it would negate some of the impacts of volatility. The Workgroup also noted that the issue is not just with negative prices, but high prices too, therefore suggesting a potential cap on the REP at a certain value.

It was suggested that one option would be to have a month-ahead price which is set ten days ahead of submitting Holding Prices and is based on for the wholesale baseload month ahead power price.

2.31 It was suggested that there could be a day-time price and a night-time price as some providers are more suited to providing response at certain times of day, hence this could be more cost reflective.

2.32 The Workgroup considered a similar option where there would be a month ahead price, set ten days ahead of submitting Holding Prices, however, it would include both a peak price and an off-peak price. It was suggested that this would be more cost reflective for those plant providing FR for extended peak and overnight.

2.33 Another option the Workgroup considered was to have a single price month ahead based on a weighted average of all the periods - i.e. extended peak, overnight, baseload

etc. The Workgroup asked the National Grid representative to conduct analysis to calculate how this would be weighted, however after further discussion this option was not taken forward as it was not clear what weighted average should be used, and only Peak and Baseload prices were available on a month ahead basis. The Workgroup also considered two options which would remain on the current methodology. One would set prices day ahead and the other would introduce a cap and collar to avoid extreme prices as a result of a volatile MIP. A summary of the initial five options are highlighted below;

1. Month ahead price – set on base load
2. Month ahead price – two prices, peak and off-peak
3. Month ahead price – weighted average of all periods
4. Current methodology – prices set day ahead
5. Current methodology – cap and collar.

2.34 Following discussions around each of the potential options for changes, the Proposer reiterated the defect of the modification which is that providers of FR do not know what they would be getting paid as there is volatility in the market, the MIP is not a good proxy for FR providers' marginal cost and the risk of extreme high and negative prices.

2.35 The Workgroup considered the options and whether these should result in less volatile prices or whether they should eliminate negative prices. The Proposer clarified that they would prefer having a month ahead price and would support this option the most out of the options identified by the Workgroup, noting the benefit of this option being that it would provide more certainty of the REP.

2.36 A Workgroup member noted that even if you know what your price will be month ahead, you will have no idea whether you will get called on to provide FR or not. He doubted that this would put a generator in a more beneficial position to what they are in under the baseline. The Proposer replied that while the volume risk would remain with FR providers, the price risk would be eliminated. As such the Proposer believes this represents a significant improvement on the Baseline.

2.37 In terms of options which include optionality for generators to remain on the current MIP based REP, the Workgroup agreed that a suitable approach would be to have an option once a year to select either the current baseline REP method or the CMP243-based REP methods (however, the workgroup changed its mind following further consideration as discussed in para 2.55).

2.38 The Workgroup suggested one possible cap and collar would be +50% and -20%, however it was questioned as to how those figures could be justified to Ofgem.

2.39 The Workgroup agreed that it would be worth asking within the Workgroup Consultation whether smaller parties would prefer the certainty of the one month ahead price or the cap and collar and how these options would help them.

2.40 The Workgroup agreed on 4 potential options which they would look to do some analysis on. A Workgroup member noted that generally the more certainty a generator can have with their REP price, the lower their risk premiums within their Holding Price. If competitive pressures are removed because everyone is getting the same price, generators would be able to reduce their Holding Prices as the risk of extreme prices is being removed. The Workgroup came up with the following options:

Option 1 – Baseload wholesale month ahead price

Option 2 – Peak and off peak wholesale month ahead price, peak in 7am-7pm weekdays and off-peak is the rest.

Option 3 – Peak wholesale month ahead price.

Option 4 – Existing MIP method with a cap and a collar. Collar is £0 and cap is 2x baseload wholesale month ahead price.

2.41 The Proposer later circulated several graphs to the Workgroup which extended his analysis from the second Workgroup meeting (included within Annex 4). Each graph in Annex 4 - Appendix 1, 2, 3 and 4 shows the difference between the proxy marginal cost and the peak, baseload, and peak/off peak energy price in Aug '14, Nov '14, and May '15. Annex 4 - Appendix 5 shows the difference between the proxy marginal cost and the REP (MIP multiplied by the high or low FR multiplier) over the averaged day in Aug '14, Nov '14, and May '15 with a cap of £60/MWh and collar of £20/MWh on the MIP. The Workgroup discussed each of the graphs and how each of the options differs from each other.

2.42 The main conclusions of this analysis are that options which use a fixed month ahead wholesale price reduce the risk of loss making FR provision in periods where the MIP deviates significantly from a provider's marginal cost. A cap and collar on the MIP only mitigates the risk of loss making activity where there is a small price difference between the cap and collar i.e. a low price cap and high price collar. Rather than grapple with the difficulties associated with setting appropriate price caps and collars, the benefits of CMP243 can be fully and more simply achieved by using a fixed price option. Where a fixed price approach is used this reduces the risks associated with the MIP better facilitating competition and allowing for keener pricing of Holding Payments.

2.43 It was suggested that the cap and collar option would require coming up with figures for the cap and collar which would require justification. The Workgroup agreed to include this option within the Workgroup Consultation for comment from the industry however at this point felt it was not as practical an option as the others suggested. The Proposer felt that it would be difficult to decide what the cap and collar should be and did not consider this to be a practical option.

2.44 It was recognised that there is more certainty under both the baseload and the peak options as a generator would know what price they would get and they can factor this into their prices. The Proposer noted that it would be simpler to go for an option with just one price, such as baseload or peak rather than the option with two different prices (peak and offpeak). However, the Proposer still felt that the peak and offpeak option was still an improvement on the baseline.

2.45 Another Workgroup member felt that by having both peak and offpeak prices, this represents two different groups of generators.

2.46 The Workgroup generally agreed that it would be difficult to decide on figures for the cap and collar and that it may be arbitrary. The benefit of the month ahead options is that generators know what they are getting, particularly for baseload and peak and therefore can reflect this in their prices.

2.47 The Proposer noted that they would consider supporting options 1-3 because parties will no longer need to take account of the volatile and unpredictable MIP. A FR provider will only need to take a view of the quantity of high and low FR it expects to provide. Based on the numbers presented the Proposer would expect that FR providers would be able to submit FR Holding Prices at a discount to those currently submitted. This would represent an increase in efficiency. The peak/off-peak option would be more helpful if a generator can submit two holding prices, one for peak, and the other for off-peak. As such the Proposer considers the peak/off-peak option to be slightly inferior to the baseload and peak options.

2.48 Prices were calculated using data provided from the Intercontinental Exchange (ICE) website[2], however the workgroup discussed using other indices such as Platts and were interested in getting industry views on which index to use. Prices are shown in the table below.

£/MWh	Baseload	Peak + Offpeak	Peak	Existing MIP w/ cap & collar

[2] https://www.theice.com/market-data/ice-indices

		7am-7pm weekdays	Remaining times		Cap	Collar
Nov-2014	47.56	55.71	43.49	55.71	95.12	0
May-2015	42.72	45.93	42.10	45.93	85.44	0
Aug-2015	41.53	45.68	39.55	45.68	83.06	0

Table 2 – Prices for Baseload, Peak & Off-peak, Peak and Cap & Collar

Offpeak prices were calculated using the formula provided by the Proposer:

Baseload value = 24 hours*days in the month*Baseload price [£/MWh] = **x**
Peak value = 12 hours*week days in the month*Peak price [£/MWh] = **y**
Off Peak hours = (weekdays in the month*12 hours)+(weekend days in the month*24 hours) = **h**
Off Peak price (£/MWh) = **(x-y)/h**

2.49 It was suggested to have a graph which showed the difference between the actual MIP as applied for the REP currently and what it would be under each of the four options to help the industry to compare the options. The Workgroup agreed that the 10th business day of the month should be used for the data when doing the analysis. This would give FR Providers notice of the REP price ahead of Holding Price submission.

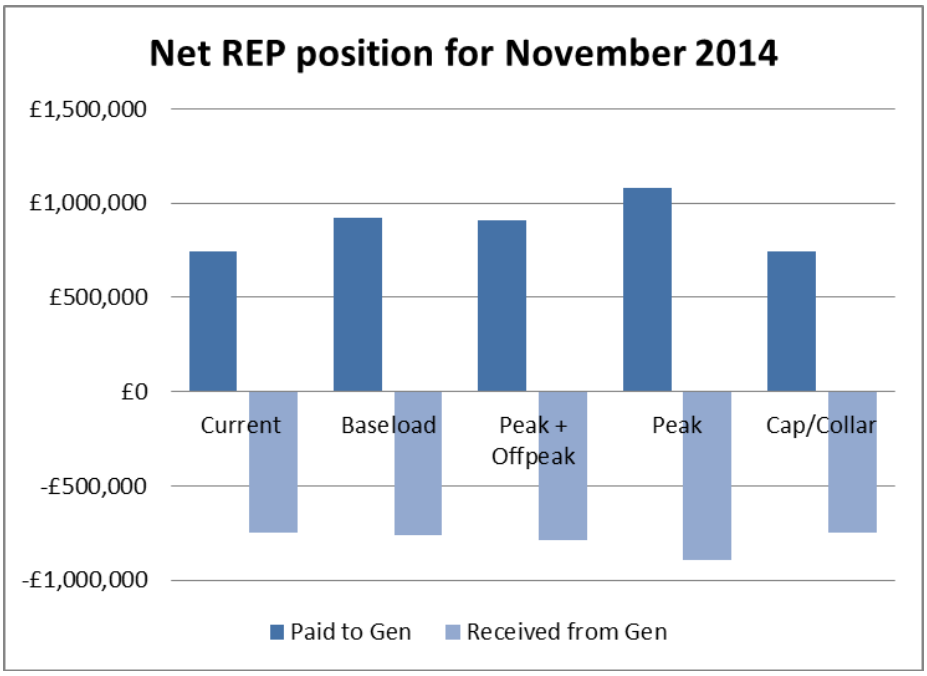


Fig.10 – Net REP position for November 2014

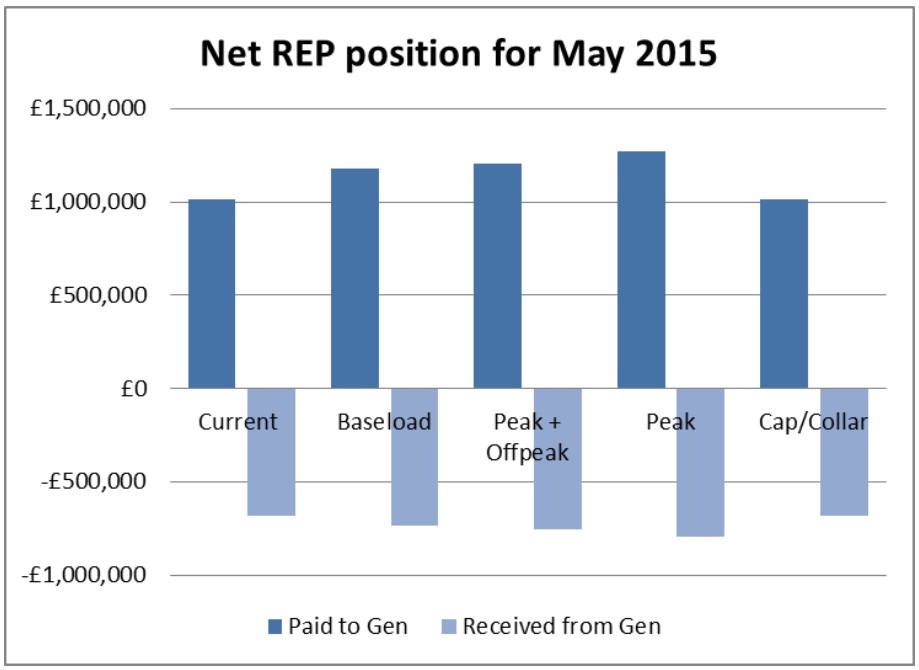


Fig.11 – Net REP position for May 2015

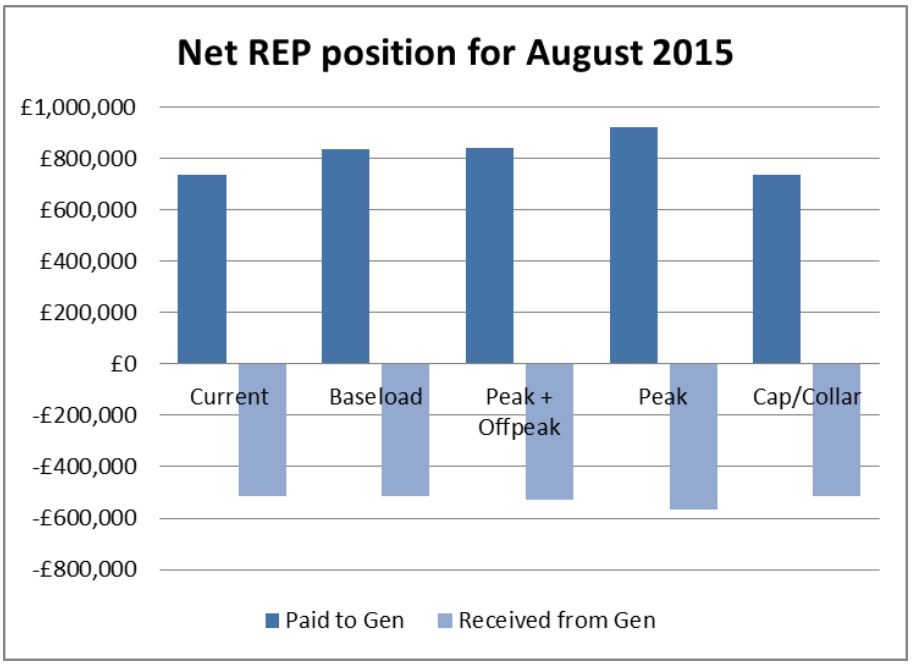


Fig.12 – Net REP position for August 2015

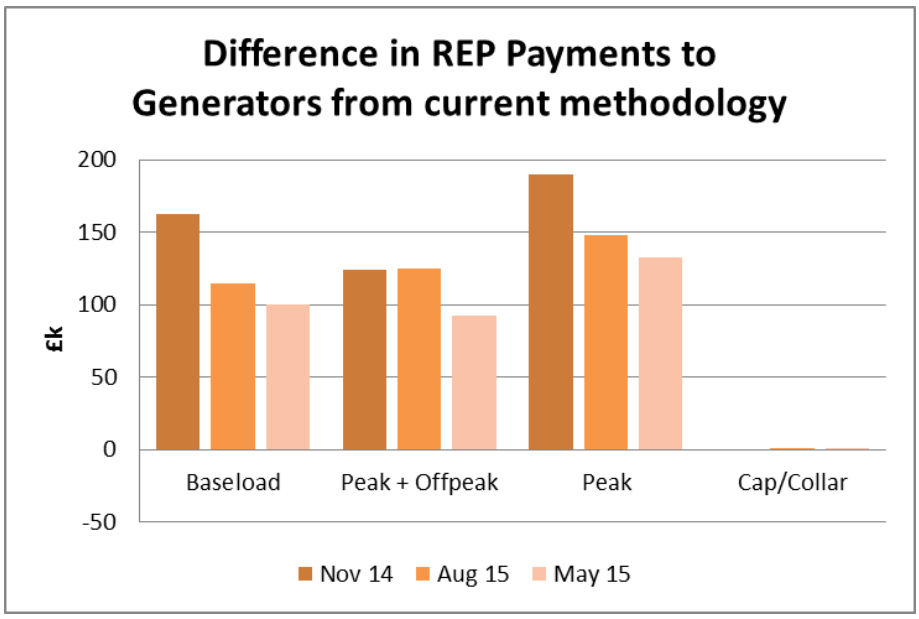


Fig.13 – Difference in REP Payments to Generators from current methodology

2.50 The National Grid representative presented his analysis. He showed the associated payments for each month in respect of the response energy volumes for mandatory FR, noting that the baseload, peak and peak/off-peak figures were slightly greater in terms of the amounts being paid out, and that this was also reflected in the overall net spend. He also explained that the figures related to the cap and collar option are almost identical to the current methodology as the cap and collar are rarely hit.

2.51 It was suggested that as these figures were not too dissimilar to the current methodology, that they proposed solution would not cause a significant cost to consumers. Moreover, the small increase in costs will to some extent reflect the losses made by FR providers in periods where the MIP deviates significantly from FR providers' marginal costs. These losses are minimised by CMP243 solutions. Losses made by FR providers under the current REP cannot be considered a consumer 'benefit'. However, a net benefit would be achieved with only a very small discount in FR Providers Holding Prices. This effect was subsequently analysed (please see Annex 7). The Workgroup considered that each of the suggested options would not seem to have any detriment or benefit to consumers, although it was also noted that assessment of this effect may be undertaken through a potential Impact Assessment conducted by the Authority, rather than by the workgroup itself.

2.52 When considering whether to include optionality within the final options, the Workgroup considered CMP243's similarity to CMP237. At the CUSC Modifications Panel on 28th August 2015, the Ofgem representative informed the Panel that they would be delaying a decision on CMP237 until the Final CUSC Modification Report for CMP243 was received. The Workgroup therefore agreed that there should be similarities between the two modifications in terms of the options provided to the Authority, therefore making sure that there is an 'optionality' option i.e. to remain and/or switch to the current MIP based REP included within CMP243. However, the Workgroup agreed to include a question within the Workgroup Consultation to ask parties if they valued the optionality.

Consideration of Workgroup Consultation responses

2.53 The Workgroup considered each of the responses received to the Workgroup Consultation when deciding which options should be included within the final Workgroup Report as formal WACMs.

2.54 The Ofgem representative advised that the Workgroup may want to extend their analysis to support the arguments for the Original and each of the WACMs agreed. The

Workgroup agreed that they should undertake further analysis to be included within the Workgroup Report to assist the Authority in making their decision on CMP243.

2.55 The Proposer subsequently presented analysis to illustrate how much (as a percentage) the holding price would need to fall to offset the increased REP costs illustrated in Fig. 9 The analysis can be seen in full alongside the Workgroup Report on the National Grid website[3]. The conclusions from this analysis suggest only a small reduction in holding prices (3%-5% approximately depending on CMP243 solution) is required to offset the modelled cost increase. This appears to be commensurate with the risk associated with the MIP. Reductions in this magnitude to the holding price appear achievable under the CMP243 solutions.

Original Proposal

2.56 After considering responses received to the Workgroup Consultation, the Proposer clarified what would be included within the Original Proposal for CMP243. He stated that the Original Proposal would be Baseload wholesale month ahead price (as described as Option 1 within the Workgroup Consultation in paragraph 2.36). The Proposer also noted that this would not include any optionality to revert back to the previous REP and would be set as a single REP. This decision was made following concerns raised by the National Grid representative that the ability to revert to the current REP would increase the difficulty the SO faces in optimising the system. The Proposer also felt that the REP should be set ten days ahead of Holding Prices and therefore this is included within the Original Proposal.

2.57 The Workgroup also agreed that there should be two WACMs in addition to the Original Proposal, these are outlined within Section 3 of this report.

[3] http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/CUSC/Modifications/CMP243/

3 Workgroup Alternatives

Workgroup Alternatives

3.1 After considering the responses to the Workgroup Consultation, the Proposer clarified what the Original Proposal would be (detailed within paragraph 2.54 of this document) and the Workgroup agreed that there should be two WACMs as well as the Original Proposal.

3.2 WACM 1 was proposed by Simon Lord and is based on Peak and Off Peak wholesale month ahead price and does not include the option to revert back to the existing REP. Four out of seven Workgroup members supported this option as being put forward as an official WACM.

3.3 WACM 2 was proposed by Guy Phillips and is based on Peak wholesale month ahead price. Again, four out of seven Workgroup members supported this option as being put forward as an official WACM.

3.4 As there was no support for the previously discussed Option 4 – Cap and collar, the Workgroup did not support this option as becoming an official WACM.

All options considered by the Workgroup

3.5 For clarification, the Original and both WACMs are outlined below;

Original Proposal – Baseload wholesale month ahead price

WACM1 – Peak and off-peak wholesale month ahead price, peak is 7am-7pm weekdays and off-peak is the rest.

WACM2 – Peak wholesale month ahead price.

3.6 None of the options include the option to revert back to the existing REP and would set the REP ten days ahead of Holding Prices being submitted.

4 Impact and Assessment

Impact on the CUSC

4.1 Changes to Section 4

Impact on Greenhouse Gas Emissions

4.2 None identified.

Impact on Core Industry Documents

4.3 None identified.

Impact on other Industry Documents

4.4 None identified.

5 Proposed Implementation and Transition

5.1 In terms of implementation and transition, the Workgroup agreed to keep CMP243 similar to CMP237 and to have 3 full months after implementation within the CUSC to introduce the practical application of the changes.

6 Workgroup Consultation Responses

6.1 The Workgroup Consultation closed on 24th November 2015 and received three responses. A summary of these responses can be found below; the full responses are included within Annex 6.

Respondent	Question 1: Do you believe that that proposed original or any of the potential options for change better facilitate the Applicable CUSC Objectives?	Question 2: Do you support the proposed implementation approach?	Question 3: Do you have any other comments?
ENGIE	Options 2, 3 and 4 all have merit in that they potentially better facilitate the Objectives. Option 1 (Baseload) is worse than the existing baseline. Option 2 (peak and off peak) seems to give the lowest additional cost and is our preferred option.	Yes	We support to remove the short term volatility of response energy price. The solution should aim to be cost neutral from the customer's perspective and it is unfortunate that the month ahead options seem to add cost.
Scottish Power	We believe Option 2 (peak and off-peak) meets Objective (b). the increased certainty of response energy pricing and reduction in potential volatility will encourage greater competition. Participants will be able to reduce risk contingencies within submitted prices, and new entrants will have greater incentive to participate as their risk exposure will be reduced.	Yes	No
SSE	All options better facilitate Applicable Objectives (a) and (c). Option 2 (Peak and off-peak) in our view, reflects the market situation as of both these types are active in the market	Yes	No

7 Views

7.1 The Workgroup believe that their Terms of Reference has been fully considered. Two Workgroup Alternative CUSC Modifications were raised, these are outlined within paragraph 3.5 of this document. At their meeting on 13th January 2015, the Workgroup voted by majority that the Original and both WACMs better facilitate the CUSC Objectives than the baseline however were split on their view of the best option. Three Workgroup members thought that the Original option was the best, three members thought that WACM1 was the best and one member thought that neither option better facilitated the CUSC Objectives and therefore voted for the Baseline.

For reference, the CUSC Objectives are;

(a) the efficient discharge by the Licensee of the obligations imposed on it by the Act and the Transmission Licence;

(b) Facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the sale, distribution and purchase of electricity;

(c) Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency.

Workgroup Vote

7.2 Details of the vote are as follows;

Vote 1: Whether each proposal better facilitates the Applicable CUSC Objectives;

Original Proposal

Workgroup member	Applicable CUSC Objective			Overall
	(a)	(b)	(c)	
Simon Lord	Neutral	No	Neutral	No
Cem Suleyman	Yes	Yes	Neutral	Yes
Adam Sims	Neutral	Yes	Neutral	Yes
Chris Proudfoot	Yes	Yes	Yes	Yes
Andy Raffan	Yes	Yes	Yes	Yes
Lin Gao	Neutral	No	Neutral	No
John Tindal	Yes	Yes	Neutral	Yes

WACM1

Workgroup member	Applicable CUSC Objective			Overall
	(a)	(b)	(c)	
Simon Lord	Neutral	Yes	Neutral	Yes
Cem Suleyman	Yes	Yes	Neutral	Yes
Adam Sims	Neutral	Yes	Neutral	Yes
Chris Proudfoot	Yes	Yes	Yes	Yes
Andy Raffan	Yes	Yes	Yes	Yes
Lin Gao	Neutral	No	Neutral	No
John Tindal	Yes	Yes	Neutral	Yes

WACM2

Workgroup member	Applicable CUSC Objective			Overall
	(a)	(b)	(c)	
Simon Lord	Neutral	Yes	Neutral	Yes
Cem Suleyman	Yes	Yes	Neutral	Yes
Adam Sims	Neutral	Yes	Neutral	Yes
Chris Proudfoot	Yes	Yes	Yes	Yes
Andy Raffan	Yes	Yes	Yes	Yes
Lin Gao	Neutral	No	Neutral	No
John Tindal	Yes	Yes	Neutral	Yes

Vote 2: Whether each WACM better facilitates the Applicable CUSC Objectives than the Original Modification Proposal;

WACM1

Workgroup member	Applicable CUSC Objective			Overall
	(a)	(b)	(c)	
Simon Lord	Neutral	Yes	Neutral	Yes
Cem Suleyman	No	No	Neutral	No
Adam Sims	Neutral	Yes	Neutral	Yes
Chris Proudfoot	No	No	No	No
Andy Raffan	Yes	Yes	Yes	Yes
Lin Gao	Neutral	Yes	Neutral	Yes
John Tindal	No	No	Neutral	No

WACM2

Workgroup member	Applicable CUSC Objective			Overall
	(a)	(b)	(c)	
Simon Lord	Neutral	Yes	Neutral	Yes
Cem Suleyman	No	No	Neutral	No
Adam Sims	Neutral	No	Neutral	No
Chris Proudfoot	No	No	No	No
Andy Raffan	Yes	Yes	Yes	Yes
Lin Gao	Neutral	Yes	Neutral	Yes
John Tindal	No	No	Neutral	No

Vote 3: which option is considered to BEST facilitate achievement of the Applicable CUSC Objectives. For the avoidance of doubt, this includes the existing baseline as an option.

Workgroup member	BEST Option
Simon Lord	WACM1
Cem Suleyman	Original
Adam Sims	WACM1
Chris Proudfoot	Original
Andy Raffan	WACM1
Lin Gao	Baseline
John Tindal	Original

7.3 The Workgroup were asked to provide commentary on why they voted as above. Commentary received is as below;

Cem Suleyman – *I believe that all the CMP243 options (Original, WACM1 and WACM2) are better than the baseline against ACO a) and b). The Current MIP used to set the REP is highly volatile and unpredictable and will become increasingly so in future reflecting the change in the generation mix. This means that the MIP no longer represents a good proxy for a FR provider's marginal cost. Using the MIP to set the REP will result in in an increased probability of FR providers making a loss when utilised for FR. This will damage and limit competition for FR provision making it more difficult for the SO to meets its FR obligations. Moreover it is likely to put upward pressure on holding prices and in extreme lead to market exit.*

By setting the price of the REP ahead of holding price submissions (using month ahead wholesale prices), FR providers have certainty of the price for FR utilisation and are no longer subject to MIP volatility and unpredictability. This will provide FR providers with better means to minimise loss making FR provision. This will better facilitate effective competition, encouraging greater FR provision and improving the ability for the SO to manage the transmission system frequency. Moreover, there is likely to be scope for keener pricing of FR holding payments.

In terms of which of the three options is best, essentially there are two main options. Those which adopt one price for FR utilisation (the Original and WACM2) and one with two prices (WACM1). I consider that the options with a single price are slightly superior to the dual price option as the dual price option will add a slightly increased level of complexity to the pricing of FR provision. In a single price option, a FR provider only needs to have an understanding ahead of time of the net amount of FR utilisation (low FR minus high FR). Under WACM1 the FR provider in addition to this needs to also have an understanding of when FR utilisation will occur in peak and off peak periods respectively. As such WACM1 is slightly more complex in terms of pricing FR provision compared to the Original and WACM2.

In terms of the relative merits between the Original and WACM2, there is not an awful lot to choose between the two options. The Original is very slightly better than WACM2 in that a baseload price will cover all trading periods whereas WACM2 will only cover the peak trading period. So in conclusion, the Original is the best option but by only a small margin compared to WACM2.

Annex 1 – CMP243 CUSC Modification Proposal Form

CUSC Modification Proposal Form CMP243

nationalgrid

Connection and Use of System Code (CUSC)

Title of the CUSC Modification Proposal

A fixed Response Energy Payment option for all generating technologies

Submission Date

19 May 2015

Description of the Issue or Defect that the CUSC Modification Proposal seeks to address

All licensed generators are obliged to provide the mandatory Frequency Response (FR) service as required by the Grid Code. Currently, when instructed to provide FR, a generator is paid an hourly Holding Payment and is paid or pays a Response Energy Payment (REP) for net energy delivery per settlement period.

Generators submit individual Holding Prices on a monthly basis whilst the universally-applied REP is defined in the CUSC and is designed to reflect the energy cost incurred or saved from service provision, which includes the associated cost of fuel. The REP is based on Market Index Price (MIP) with different ratios: -0.75 for High Frequency and 1.25 for Low Frequency. The negative sign for High Frequency indicates that the REP is made by generators, as it is anticipated that the generator has saved money by not using as much fuel.

The current model for FR payment is outdated and better suited to a time where renewable generation on the system was sparse and the marginal costs of generators were similar. Presently the marginal costs of generators are very different, with some generators having negative marginal costs. For example, wind and solar generators have negative marginal costs as these technologies have no fuel cost associated with the production of electricity. In addition these types of generation receive low carbon support e.g. ROCs for every unit of electricity generated i.e. the value of a ROC represents the opportunity cost for these generators.

The increase in negative marginal cost renewable generation connected to the system will lead to increased volatility and uncertainty around the MIP. This effect will tend to increase the volatility of the MIP as the MIP is determined by the marginal source of generation. The marginal source of generation will vary throughout the day as demand fluctuates. As different technologies have significantly different marginal costs, this will drive increased volatility of within day prices. For example, during the day when demand is relatively high, a conventional generator will likely be the marginal source of generation and will set the MIP. As conventional generators have positive marginal costs, this will likely result in a positive MIP. In addition, as conventional generators will increasingly operate for a limited number of hours, the requirement to recover fixed costs in a limited number of hours will lead to increases in MIP prices, specifically at peak times. Conversely, in low demand periods (such as overnight), a wind

generator may be the marginal source of power. As this will have a negative marginal cost, the MIP will likely go negative. Indeed traded power prices have gone negative on a number of occasions in April and May 2015.

This trend of increasingly volatile MIPs will be accentuated by proposed changes to the cash-out price arrangements. By making cash-out prices more marginal, the impact of more marginal cash-out prices can be expected to impact the volatility of the MIP.

This increasing price volatility risk will most likely have an effect on the holding fees submitted by generators and some generators may price themselves out of the market. This is because generators cannot anticipate the volatility of the MIP and thus are uncertain of the costs associated with being utilised to provide FR.

As such, the current REP calculation is an inefficient way to manage this risk and will have a detrimental effect on National Grid's ability to efficiently procure FR. This increased cost will eventually be passed on to the end consumer.

Description of the CUSC Modification Proposal

We propose that all generators regardless of technology type should have the option of choosing whether their REP is based on the current methodology, or a REP fixed at a suggested value of £0/MWh. A Workgroup may wish to consider fixing the REP at a different price if they felt it was more appropriate.

We consider this modification proposal to be straightforward and of minimal cost.

We believe that all generators, regardless of technology type, should have the option of fixing the price of their REP. Allowing generators this option will allow them to better manage the risks noted above. This will also likely maximise the quantity of plant providing cost effective FR. This will both improve the SO's procurement and utilisation of FR (thus ensuring more efficient system operation), as well as maximising effective competition between providers of FR. Both impacts will benefit end consumers.

Impact on the CUSC

Changes would be required to section 4.

Do you believe the CUSC Modification Proposal will have a material impact on Greenhouse Gas Emissions? Yes / No

No

Impact on Core Industry Documentation. Please tick the relevant boxes and provide any supporting information

BSC ☐

Grid Code ☐

STC ☐

Other ☐
(please specify)

This is an optional section. You should select any Codes or state Industry Documents which may be affected by this Proposal and, where possible, how they will be affected.

Urgency Recommended: Yes / No

No

Justification for Urgency Recommendation

N/A

Self-Governance Recommended: Yes / No

No

Justification for Self-Governance Recommendation

N/A

Should this CUSC Modification Proposal be considered exempt from any ongoing Significant Code Reviews?

N/A

Impact on Computer Systems and Processes used by CUSC Parties:

Low impact on:

- Generator frequency response pricing processes

Medium impact on:

- National Grid administration of Frequency Response Price Submission process
- National Grid and Generator Settlement processes

Details of any Related Modification to Other Industry Codes

CMP237: This modification addressed the disparity between the payments received for FR for non-fuel cost generation.

It is proposed that the REP calculation be retained for conventional generators or generators that have a fuel cost (e.g. fossil fuel or biomass). For all other generators the REP would be settled at £0/MWh. This will ensure that generators are not penalised by the cost of changing their energy output in providing FR, whether that change involves a fuel cost or not. We would like to emphasise that the new modification we are proposing rectifies a separate defect to that which CMP237 is concerned with, although the solution is similar and would be compatible with solving the CMP237 defect.

Justification for CUSC Modification Proposal with Reference to Applicable CUSC Objectives:

Our proposal will better facilitate Applicable CUSC Objectives (a) and (b) for the following reasons.

Against Objective (b), allowing generators this option (£0/MWh REP) will allow them to better manage the risk associated with the volatility of the MIP. By allowing generators to eliminate the price risk associated with the MIP, generators will be able to more keenly price the provision of FR. This will maximise the quantity of plant providing cost effective FR and thus effective competition.

Against Objective (a), by facilitating effective competition for FR, the proposal will increase the number of options available to the SO for FR provision. As a result this will improve the SO's procurement and utilisation of the service, thus ensuring more efficient system operation.

Both impacts will benefit end consumers by more efficiently procuring and utilising FR.

Please tick the relevant boxes and provide justification:

☒ (a) the efficient discharge by The Company of the obligations imposed upon it by the Act and the Transmission Licence

☒ (b) facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the sale, distribution and purchase of electricity.

☐ (c) compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency.
These are defined within the National Grid Electricity Transmission plc Licence under Standard Condition C10, paragraph 1.

Objective (c) was added in November 2011. This refers specifically to European Regulation

2009/714/EC. Reference to the Agency is to the Agency for the Cooperation of Energy Regulators (ACER).

Additional details

Details of Proposer: (Organisation Name)	Drax Power Limited
Capacity in which the CUSC Modification Proposal is being proposed: (i.e. CUSC Party, BSC Party or "National Consumer Council")	CUSC Party
Details of Proposer's Representative: Name: Organisation: Telephone Number: Email Address:	 Cem Suleyman Drax Power Limited 01757 612338 cem.suleyman@drax.com
Details of Representative's Alternate: Name: Organisation: Telephone Number: Email Address:	 Joseph Underwood Drax Power Limited 01757 612736 joseph.underwood@drax.com
Attachments (Yes/No): No **If Yes, Title and No. of pages of each Attachment:**	

Contact Us

If you have any questions or need any advice on how to fill in this form please contact the Panel Secretary:

E-mail cusc.team@nationalgrid.com

Phone: 01926 653606

For examples of recent CUSC Modifications Proposals that have been raised please visit the National Grid Website at http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/CUSC/Modifications/Current/

Submitting the Proposal

Once you have completed this form, please return to the Panel Secretary, either by email to jade.clarke@nationalgrid.com and copied to cusc.team@nationalgrid.com, or by post to:

Jade Clarke
CUSC Modifications Panel Secretary, TNS
National Grid Electricity Transmission plc
National Grid House
Warwick Technology Park
Gallows Hill
Warwick
CV34 6DA

If no more information is required, we will contact you with a Modification Proposal number and the date the Proposal will be considered by the Panel. If, in the opinion of the Panel Secretary, the form fails to provide the information required in the CUSC, the Proposal can be rejected. You will be informed of the rejection and the Panel will discuss the issue at the next meeting. The Panel can reverse the Panel Secretary's decision and if this happens the Panel Secretary will inform you.

Annex 2 – CMP243 Terms of Reference

nationalgrid

Workgroup Terms of Reference and Membership
TERMS OF REFERENCE FOR CMP243 WORKGROUP

CMP243 aims to allow all generators, regardless of technology type, the option of choosing whether their Response Energy Payment (REP) is based on the current methodology or a fixed value suggested at £0/MWh.

Responsibilities

1. The Workgroup is responsible for assisting the CUSC Modifications Panel in the evaluation of CUSC Modification Proposal **243 'a fixed Response Energy Payment option for all generating technologies'** tabled by Drax Power at the CUSC Modifications Panel meeting on 29th May 2015.

2. The proposal must be evaluated to consider whether it better facilitates achievement of the Applicable CUSC Objectives. These can be summarised as follows:

Applicable CUSC Objectives

(a) the efficient discharge by the Licensee of the obligations imposed on it by the Act and the Transmission Licence;

(b) Facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the sale, distribution and purchase of electricity;

(c) Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency.

3. It should be noted that additional provisions apply where it is proposed to modify the CUSC Modification provisions, and generally reference should be made to the Transmission Licence for the full definition of the term.

Scope of work

4. The Workgroup must consider the issues raised by the Modification Proposal and consider if the proposal identified better facilitates achievement of the Applicable CUSC Objectives.

5. In addition to the overriding requirement of paragraph 4, the Workgroup shall consider and report on the following specific issues:

a) Does CMP243 apply both to generators who are available for frequency response provision through being run by the market and those that become available to provide frequency response through being run pursuant to an offer acceptance by the SO.
b) Consider potential interaction with CMP237.
c) Implementation

d) Review draft legal text

6. The Workgroup is responsible for the formulation and evaluation of any Workgroup Alternative CUSC Modifications (WACMs) arising from Group discussions which would, as compared with the Modification Proposal or the current version of the CUSC, better facilitate achieving the Applicable CUSC Objectives in relation to the issue or defect identified.

7. The Workgroup should become conversant with the definition of Workgroup Alternative CUSC Modification which appears in Section 11 (Interpretation and Definitions) of the CUSC. The definition entitles the Group and/or an individual member of the Workgroup to put forward a WACM if the member(s) genuinely believes the WACM would better facilitate the achievement of the Applicable CUSC Objectives, as compared with the Modification Proposal or the current version of the CUSC. The extent of the support for the Modification Proposal or any WACM arising from the Workgroup's discussions should be clearly described in the final Workgroup Report to the CUSC Modifications Panel.

8. Workgroup members should be mindful of efficiency and propose the fewest number of WACMs possible.

9. All proposed WACMs should include the Proposer(s)'s details within the final Workgroup report, for the avoidance of doubt this includes WACMs which are proposed by the entire Workgroup or subset of members.

10. There is an obligation on the Workgroup to undertake a period of Consultation in accordance with CUSC 8.20. The Workgroup Consultation period shall be for a period of 3 weeks as determined by the Modifications Panel.

11. Following the Consultation period the Workgroup is required to consider all responses including any WG Consultation Alternative Requests. In undertaking an assessment of any WG Consultation Alternative Request, the Workgroup should consider whether it better facilitates the Applicable CUSC Objectives than the current version of the CUSC.

    As appropriate, the Workgroup will be required to undertake any further analysis and update the original Modification Proposal and/or WACMs. All responses including any WG Consultation Alternative Requests shall be included within the final report including a summary of the Workgroup's deliberations and conclusions. The report should make it clear where and why the Workgroup chairman has exercised his right under the CUSC to progress a WG Consultation Alternative Request or a WACM against the majority views of Workgroup members. It should also be explicitly stated where, under these circumstances, the Workgroup chairman is employed by the same organisation who submitted the WG Consultation Alternative Request.

12. The Workgroup is to submit its final report to the Modifications Panel Secretary on 17th September 2015 for circulation to Panel Members. The final report conclusions will be presented to the CUSC Modifications Panel meeting on 25th September 2015.

Membership

13. It is recommended that the Workgroup has the following members:

Role	Name	Representing
Chairman	Ian Pashley	Code Administrator
*National Grid Representative**	Adam Sims	National Grid
*Industry Representatives**	Cem Suleyman	Drax
	Andy Raffan	Scottish Power
	Simon Lord	GDF Suez
	Garth Graham	SSE
	Christopher Proudfoot	Centrica
	Guy Phillips	E.ON
Authority Representatives	Jonathan Bryson	Ofgem
Technical secretary	Jade Clarke	Code Administrator
Observers		

NB: A Workgroup must comprise at least 5 members (who may be Panel Members). The roles identified with an asterisk in the table above contribute toward the required quorum, determined in accordance with paragraph 14 below.

14. The Chairman of the Workgroup and the Modifications Panel Chairman must agree a number that will be quorum for each Workgroup meeting. The agreed figure for CMP242 is that at least 5 Workgroup members must participate in a meeting for quorum to be met.

15. A vote is to take place by all eligible Workgroup members on the Modification Proposal and each WACM. The vote shall be decided by simple majority of those present at the meeting at which the vote takes place (whether in person or by teleconference). The Workgroup chairman shall not have a vote, casting or otherwise. There may be up to three rounds of voting, as follows:

- Vote 1: whether each proposal better facilitates the Applicable CUSC Objectives;
- Vote 2: where one or more WACMs exist, whether each WACM better facilitates the Applicable CUSC Objectives than the original Modification Proposal*;*
- Vote 3: which option is considered to BEST facilitate achievement of the Applicable CUSC Objectives. For the avoidance of doubt, this vote should include the existing CUSC baseline as an option.

The results from the vote and the reasons for such voting shall be recorded in the Workgroup report in as much detail as practicable.

16. It is expected that Workgroup members would only abstain from voting under limited circumstances, for example where a member feels that a proposal has been insufficiently developed. Where a member has such concerns, they

should raise these with the Workgroup chairman at the earliest possible opportunity and certainly before the Workgroup vote takes place. Where abstention occurs, the reason should be recorded in the Workgroup report.

17. Workgroup members or their appointed alternate are required to attend a minimum of 50% of the Workgroup meetings to be eligible to participate in the Workgroup vote.

18. The Technical Secretary shall keep an Attendance Record for the Workgroup meetings and circulate the Attendance Record with the Action Notes after each meeting. This will be attached to the final Workgroup report.

19. The Workgroup membership can be amended from time to time by the CUSC Modifications Panel.

Appendix 1 – Indicative Workgroup Timetable

The following timetable is indicative for CMP243

5th June 2015	Deadline for comments on Terms of Reference / nominations for Workgroup membership
W/C 15th June	Workgroup meeting 1
W/C 29th June	Workgroup meeting 2
6th July 2015	Workgroup Consultation issued for 1 week Workgroup comment
13th July 2015	Deadline for comment
16th July 2015	Workgroup Consultation published
13th August 2015	Deadline for responses
W/C 17th August 2015	Workgroup meeting 3
W/C 24th August 2015	Workgroup meeting 4
1st September 2015	Circulate draft Workgroup Report
8th September 2015	Deadline for comment
17th September 2015	Submit final Workgroup Report to Panel
25th September 2015	Present Workgroup Report at CUSC Modifications Panel

Post-Workgroup modification timetable

30th September 2015	Code-Administrator Consultation published
21st October 2015	Deadline for responses
26th October 2015	Draft FMR published
2nd November 2015	Deadline for comments
19th November 2015	Draft FMR issued to CUSC Panel
27th November 2015	CUSC Panel Recommendation vote
10th December 2015	Final CUSC Modification Report submitted to Authority

The Workgroup have since requested three one month extensions to the Workgroup timetable and therefore will now report back to the CUSC Panel in December 2015.

Annex 3 – Workgroup attendance register

A – Attended
X – Absent
O – Alternate
D – Dial-in

Name	Organisation	Role	03/07/2015	20/08/2015	21/09/2015	07/12/2015	13/01/2016
Ian Pashley	National Grid	Chair	A	A	O	O	O
Jade Clarke	Code Administrator	Technical Secretary	A	A	A	A	A
Cem Suleyman	Drax Power	Proposer	A	A	A	A	D
Adam Sims	National Grid	Workgroup member	A	O	A	A	A
Simon Lord	GDF Suez	Workgroup member	A	A	D	D	D
Garth Graham	SSE	Workgroup member	A	A	D	X	O
Andy Raffan	Scottish Power	Workgroup member	D	A	D	D	A
Christopher Proudfoot	Centrica Energy	Workgroup member	A	X	X	A	A
Guy Phillips	E.ON	Workgroup member	X	A	X	A	O
Jonathan Bryson	Ofgem	Workgroup member	A	O	O	O	O

Annex 4 – Drax Analysis on Different REP options and the Impacts on Generator Profitability

Different REP Options and the Impacts on Generator Profitability

Currently, Frequency Response (FR) energy payments are based on the Market Index Price (MIP). The analysis presented in Appendix 1 shows the within-day variation of gross profit margins made (averaged through the months of August '14, November '14, and May '15) per 1 MWh by the average coal and gas power plants providing FR. The MIP for May 2015 were retrieved from the *Elexon Portal*. A proxy for marginal cost was derived from the month ahead baseload price and clean spark and dark spreads for Aug '14, Nov '15, and May '15. This data was retrieved from *Spectrometer* reports. The variation in profit margins made for high FR were calculated by taking the proxy marginal cost for fuel and subtracting the MIP multiplied by 0.75. The variation in profit margins made for low FR were calculated by taking the MIP multiplied by 1.25 and subtracting the proxy marginal cost for fuel.

It can be seen that providing high FR overnight has an increased potential of making larger profit margins than during the day. The opposite can be said for low FR where larger profit margins are more likely during the day than overnight. Providing high FR during the day could result in some generators being left out of pocket by up to £50/MWh.

During previous industry discussions surrounding FR (CMP237 and BSSG/CBSG) it was suggested that generators do not provide equal measures of high and low FR. Therefore generators running baseload and peaking generators will not benefit equally for providing FR. Further, Drax models predict that more units are utilised for FR during the night than during the day. Therefore certain plant may only be utilised for FR at certain points thereby increasing the chance of baseload and peak plant being improperly remunerated with respect to one another.

Large gains and losses will be made when a generator's marginal cost deviates far from the MIP. This is a common occurrence in a market with a diverse generation mix and this issue is expected to intensify. Further, as the generation on the system continues to diversify we can envisage that the extreme periods, where the MIP deviates significantly from the average, will become increasingly more commonplace. Therefore the graphs in Appendix 1 may be an underestimate of future scenarios.

Appendix 2, 3, and 4 shows the gross profit margins made per 1 MWh by the average coal and gas power plants providing FR if the MIP were replaced with that month's peak, baseload, and peak/off-peak energy price respectively.

The month ahead wholesale prices used in the graphs shown in Appendices 2, 3, and 4 are taken from the Drax wholesale market price database on the 14th of the month ahead of the FR delivery month. So for example the month ahead baseload price for August 2014 is the price of this product on 14 July 2014. Peak periods are 7-7 on weekdays. The baseload, peak and off-peak prices for the three months analysed are shown in table 1 below.

Product	**May 15**	**November 14**	**August 14**
Baseload (£/MWh)	42.98	47.72	34.83
Peak (£/MWh)	46.11	55.84	39.72
Off-Peak (£/MWh)	41.38	43.66	32.33

Table 1: Shows the baseload, peak, and off-peak wholesale power prices for three months.

The off-peak power price is calculated as follows:

$$x = 24hours \times Days\ in\ Month \times Baseload\ Power\ Price$$

$$y = 12hours \times Weekdays\ in\ Month \times Peak\ Power\ Price$$

$$z = (12hours \times Weekdays\ in\ Month) + (Weekend\ days\ in\ Month \times 24hours)$$

$$Offpeak\ Power\ Price = \frac{x - y}{z}$$

Where $x, y,$ and z are the baseload value, peak value, and the off-peak hours respectively.

Of the fixed price month-ahead options (those shown in Appendices 2, 3, and 4), peak and baseload both seem reasonable as both will provide increased predictability allowing parties to price their holding price more competitively with lower risk. This is because parties will no longer need to take account of the volatile and unpredictable MIP. A FR provider will only need to take a view of the quantity of high and low frequency response it expects to provide. Based on the numbers presented Drax would expect that FR providers would be able to submit FR Holding Prices at a discount those currently submitted. This would represent an increase in efficiency. The peak/off-peak option would be more helpful if a generator can submit two holding prices, one for peak, and the other for off-peak. As such Drax considers the peak/off-peak option to be slightly inferior to the baseload and peak options.

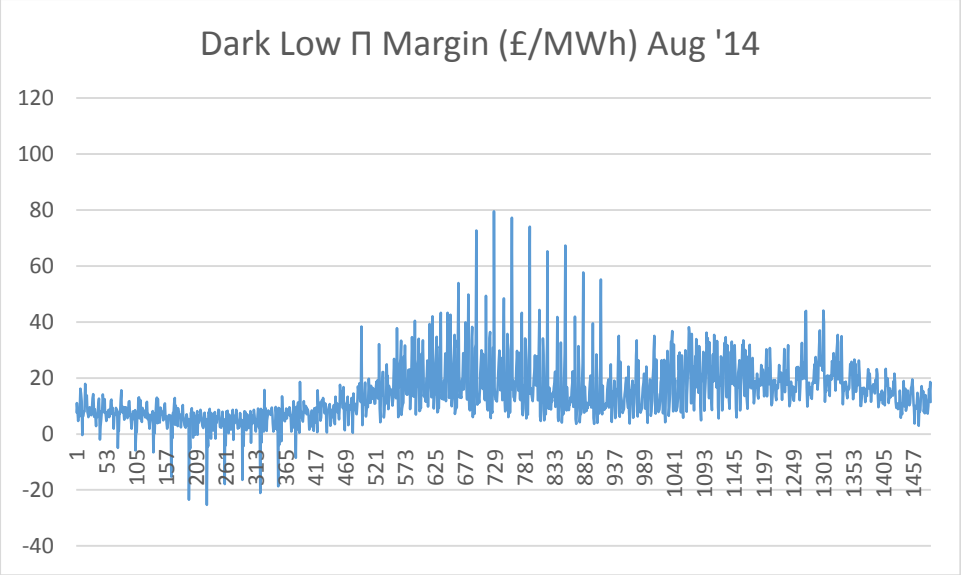
Appendix 5 shows the within-day variation of gross profit margins made (averaged through the months of August '14, November '14, and May '15) per 1 MWh by the average clean coal and clean gas power plants providing FR if a cap and collar of £60/MWh and £20/MWh had been applied to the MIP (when the 1.25 and 0.75 multipliers are applied this increases/decreases the cap and collar to £75/MWh and £15/MWh respectively).

The initial cap and collar decided by the workgroup (£0/MWh and 2*baseload power price) only captured a handful of settlement periods. It was decided that the cap and collar should be narrowed in order to capture more settlement periods (shown in Appendix 5). However, this still didn't alleviate the defect adequately. To get an adequate solution one would need to continually increase the collar and reduce the cap by which stage it makes more sense to fix the REP in line with Baseload, Peak and Peak/Off-Peak options. Overall, Drax believes this should be removed as a potential option for change going forward.

Appendix 6 shows the utilisation of 55 different generators through the first week in May '15. This comes from Drax internal models. The graphs show that there are numerous different utilisation patterns. A generator can only be assumed to be properly compensated for FR if it is utilised for FR equally through the day and night. The graphs in appendix 1 and 6 show that most generators are not properly remunerated for FR utilisation.

Appendix 1

Each graph in Appendix 1 shows the difference between the proxy marginal cost and the REP (MIP multiplied by the high or low FR multiplier) over the averaged day in Aug '14, Nov '14, and May '15.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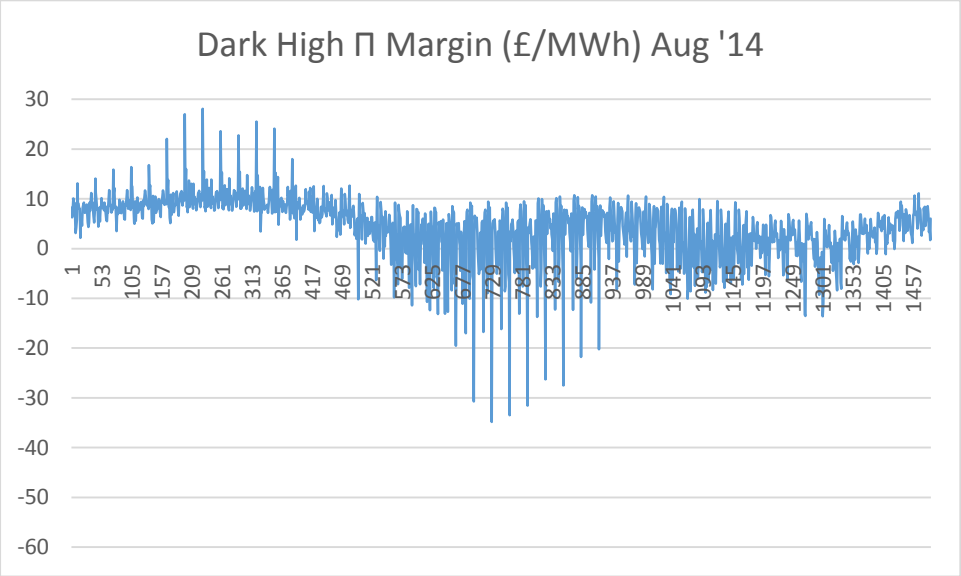
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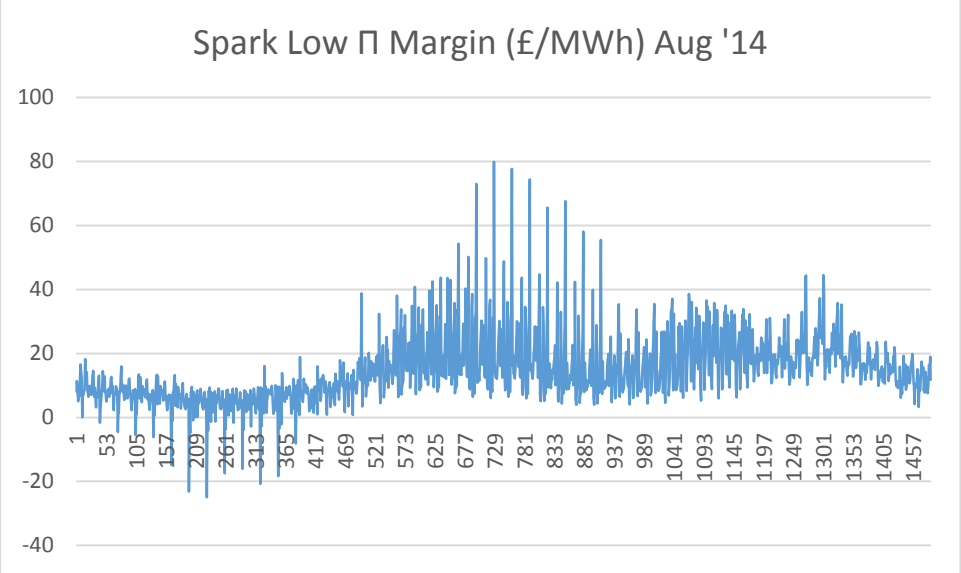
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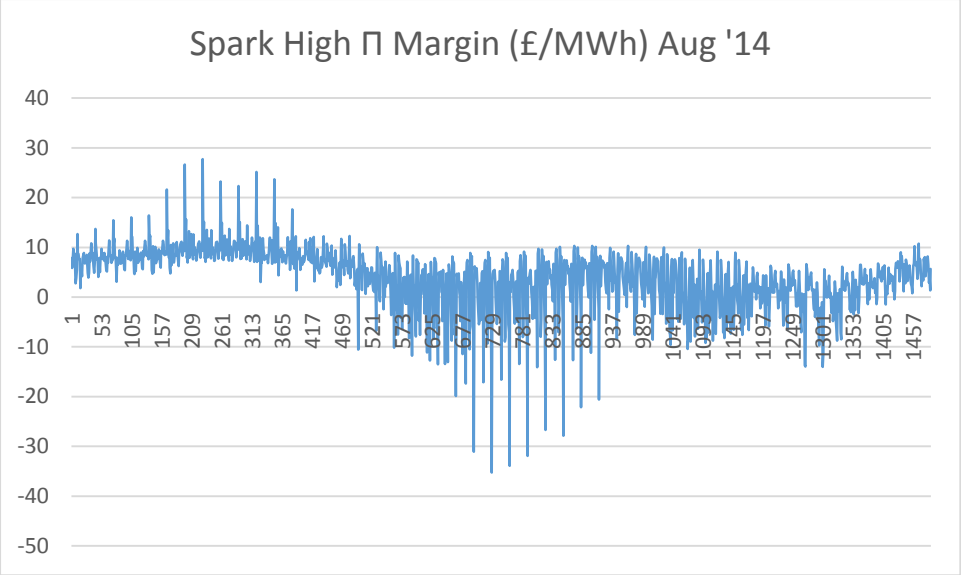
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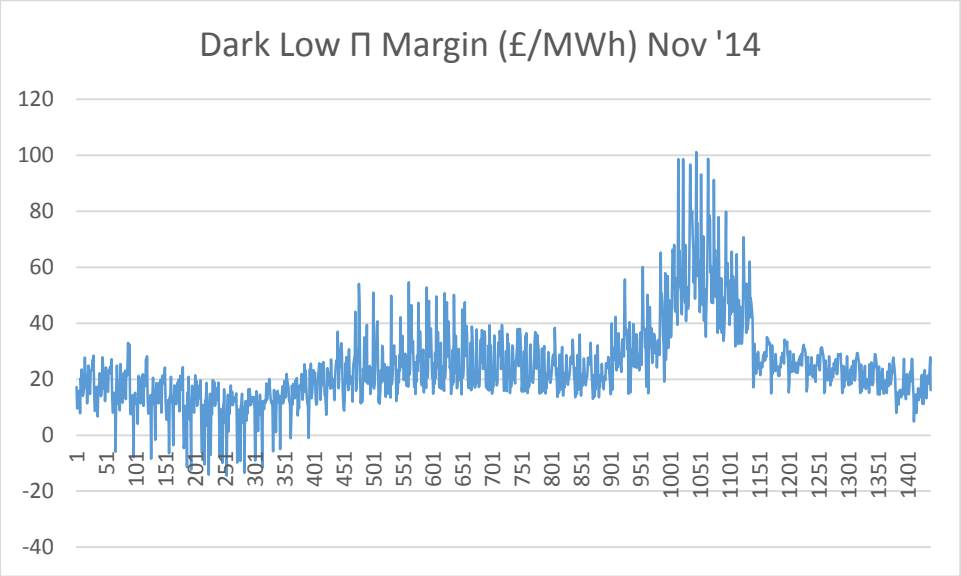
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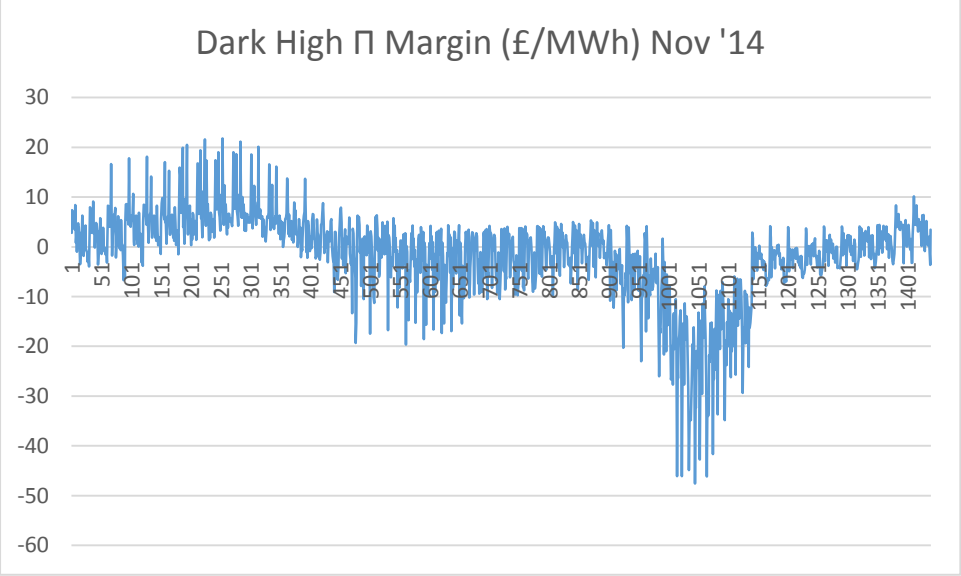
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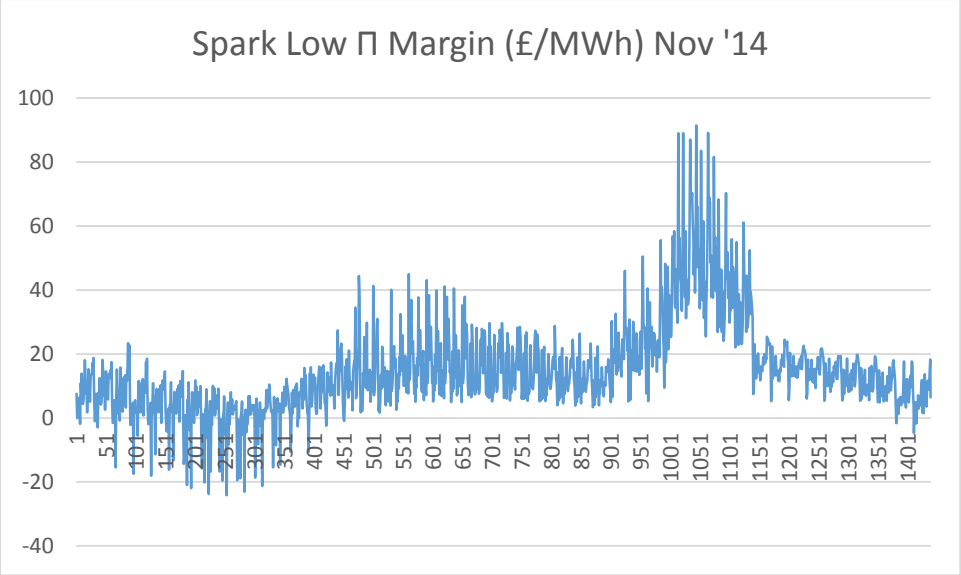
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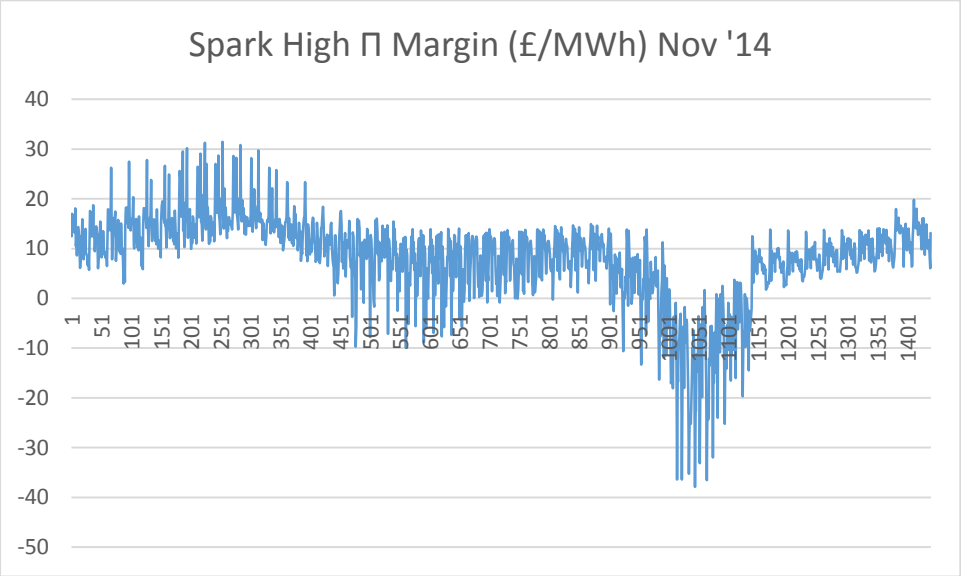
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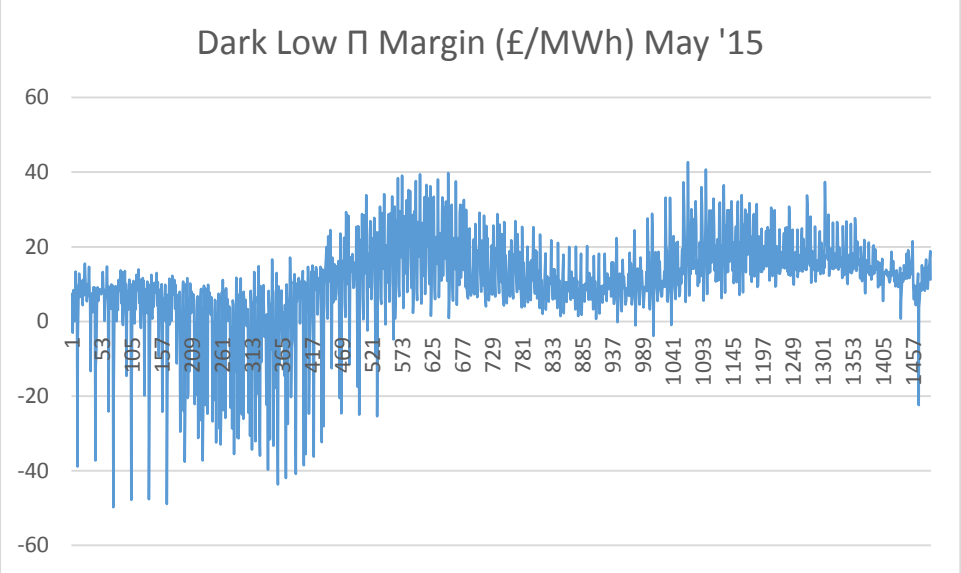
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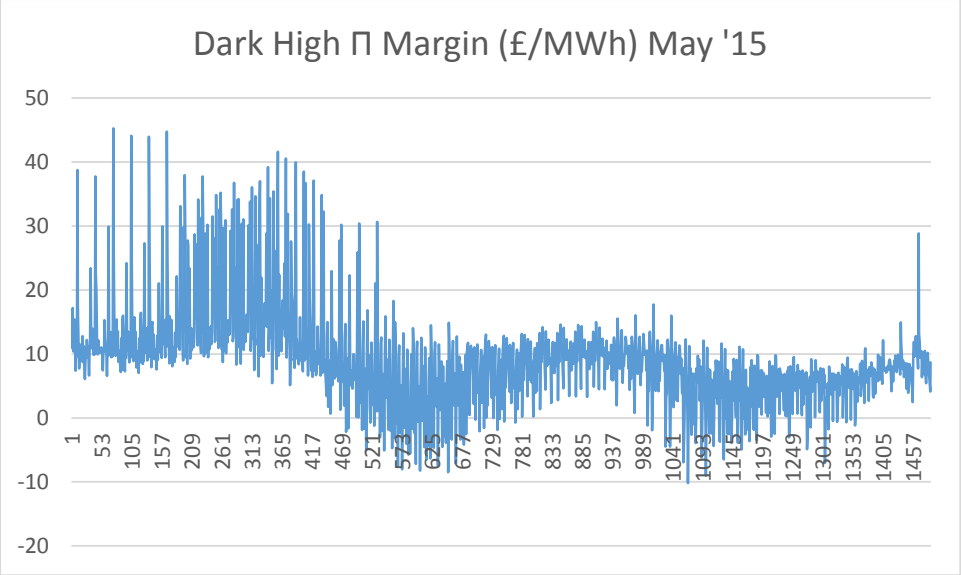
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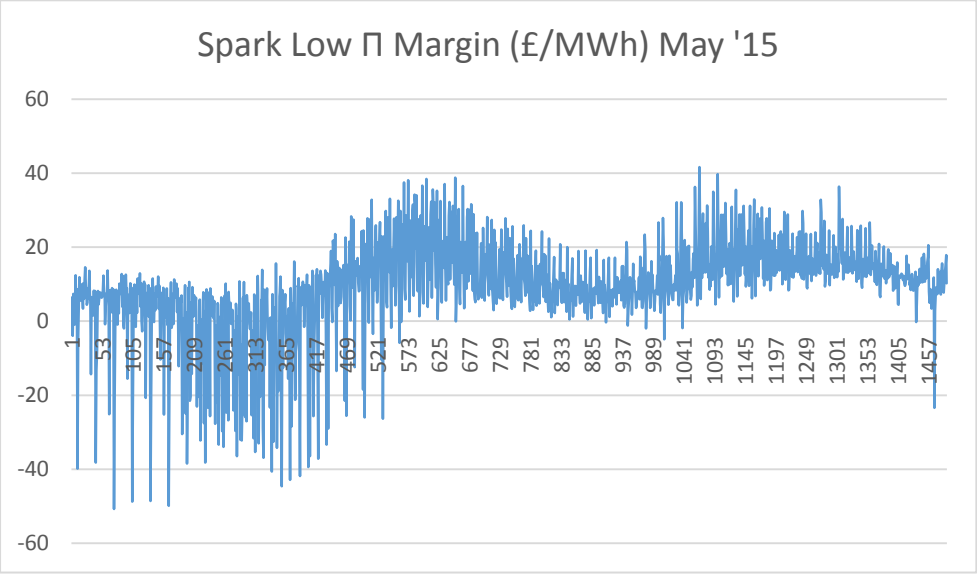
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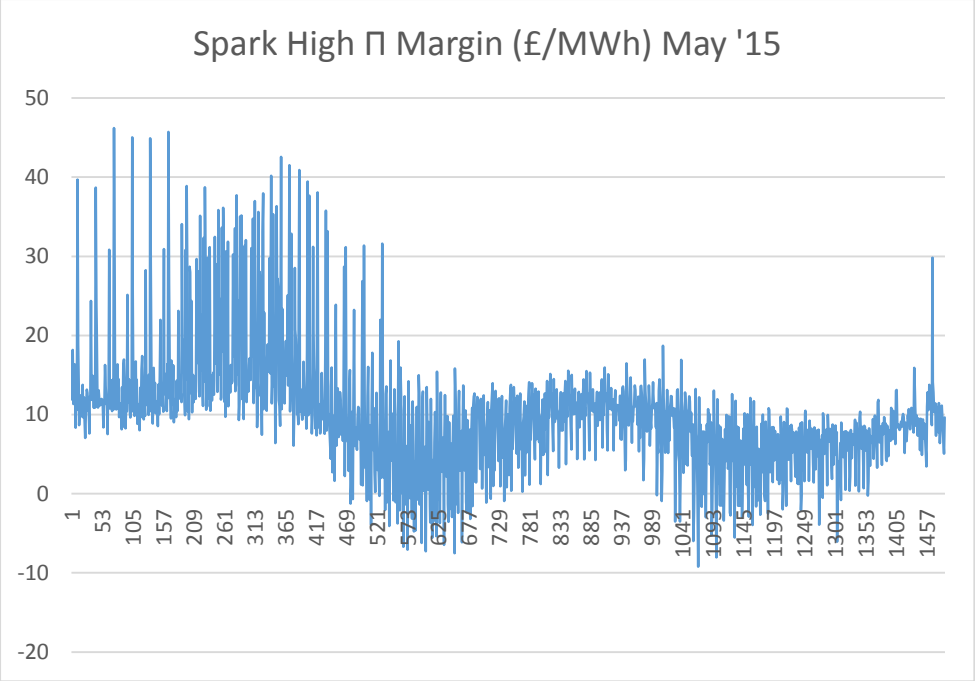
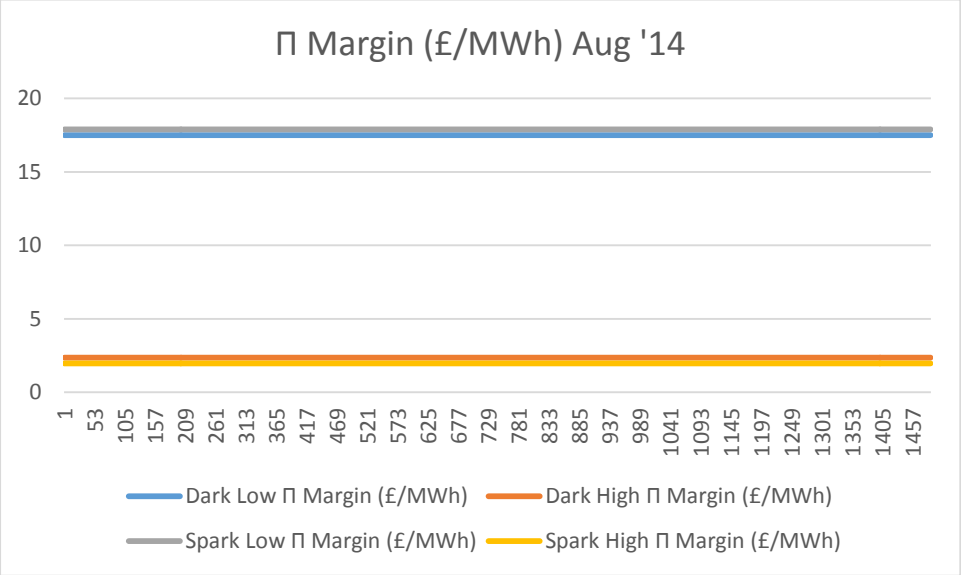
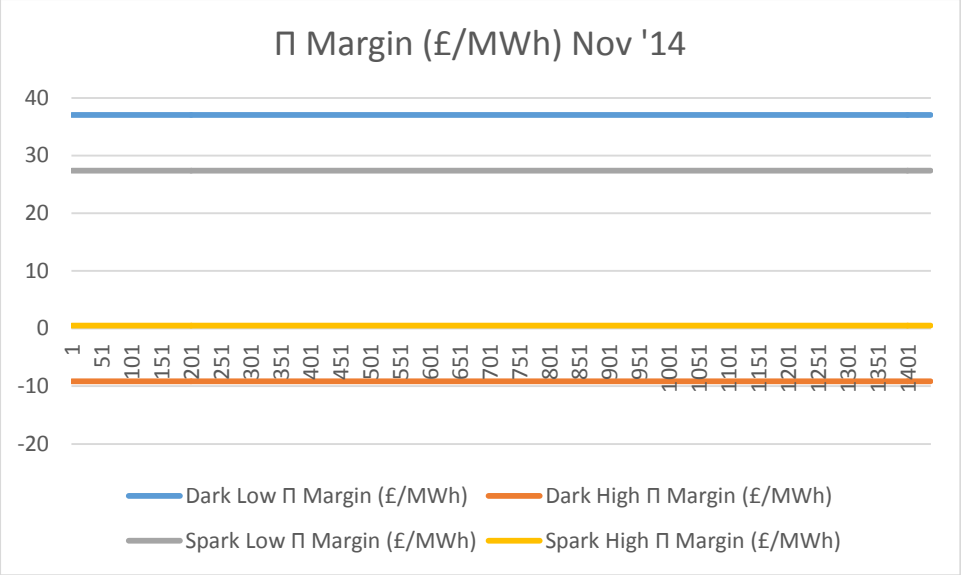
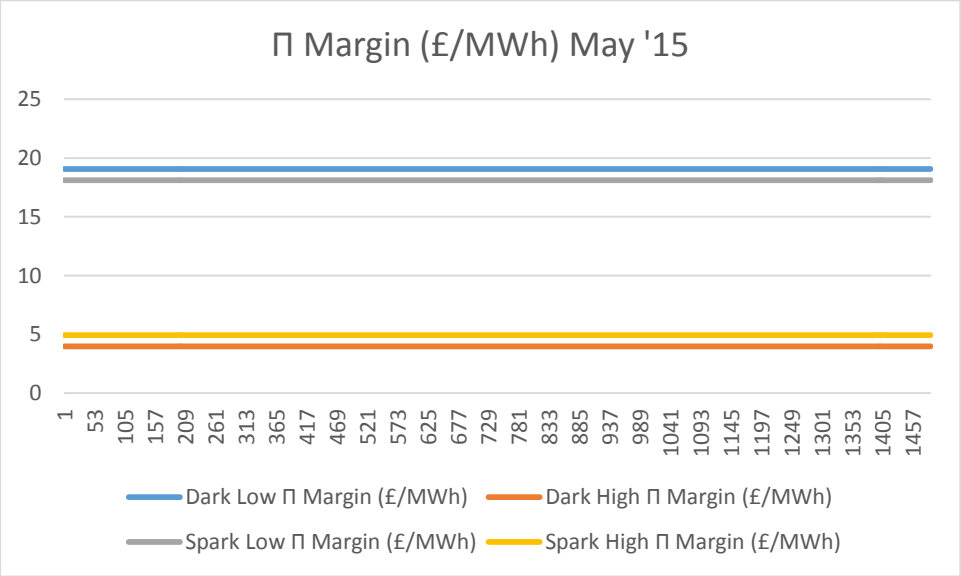


Appendix 2

Each graph in Appendix 2 shows the difference between the proxy marginal cost and the peak energy price in Aug ’14, Nov ’14, and May ‘15.

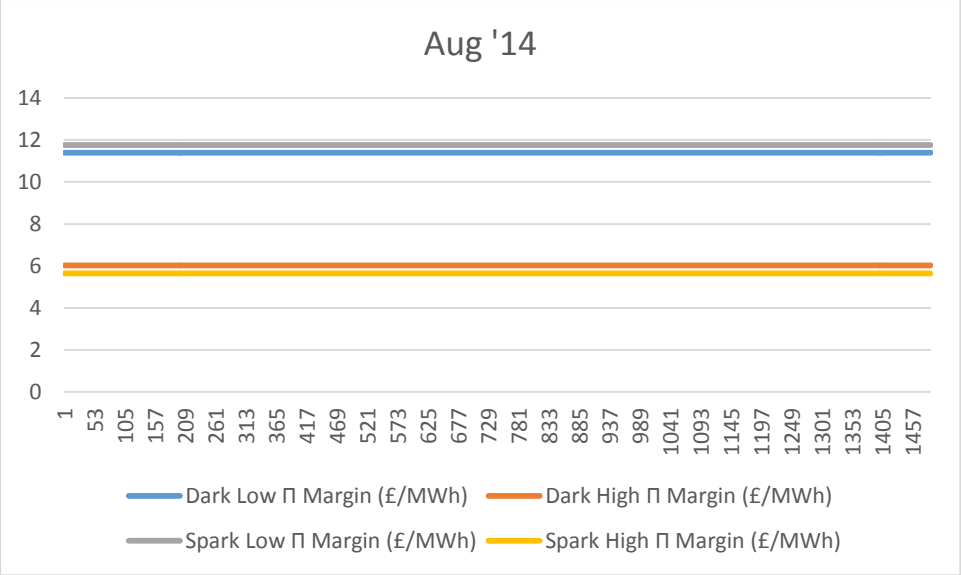






Appendix 3

Each graph in Appendix 3 shows the difference between the proxy marginal cost and the baseload energy price in Aug ’14, Nov ’14, and May ‘15.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Dark Low Π Margin (£/MWh)
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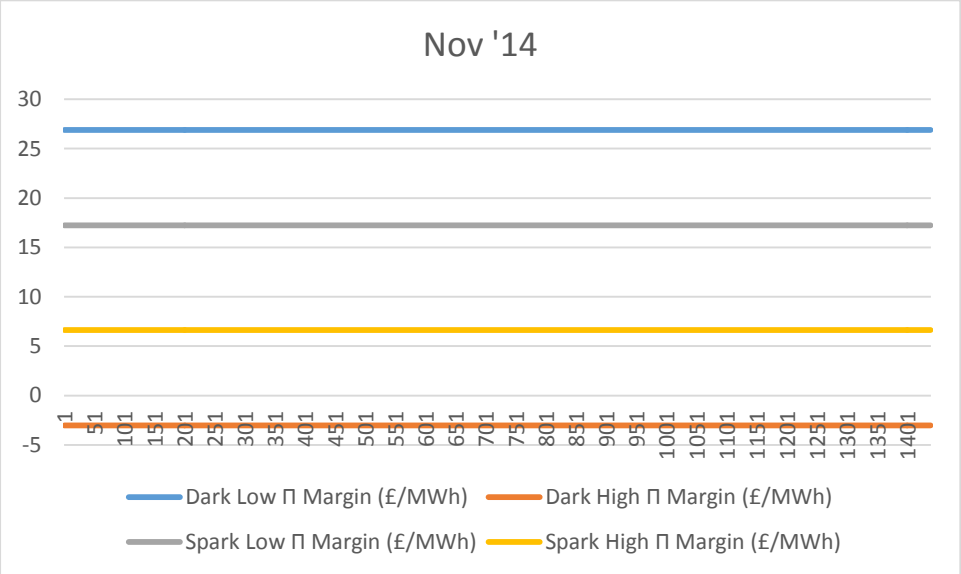
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Dark Low Π Margin (£/MWh)
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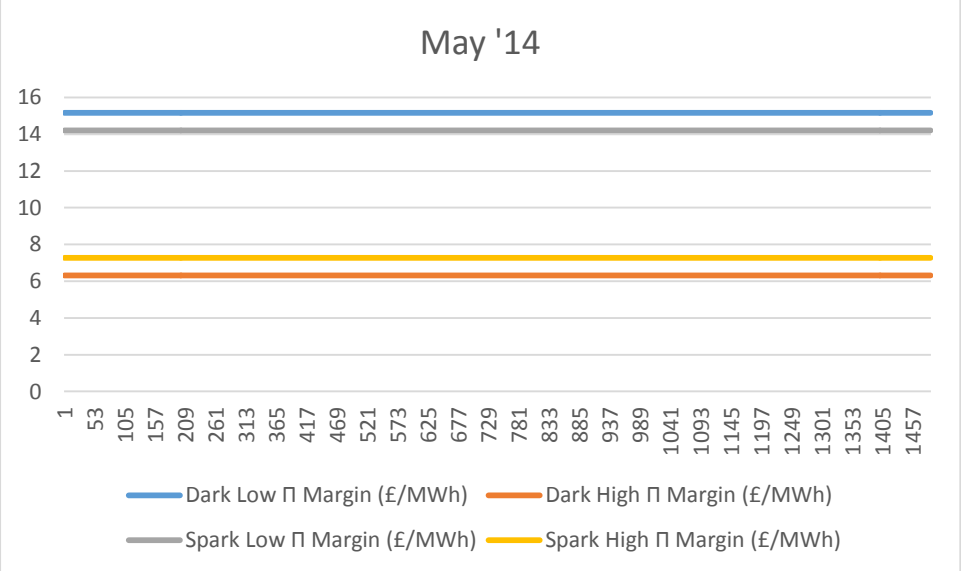
May '14
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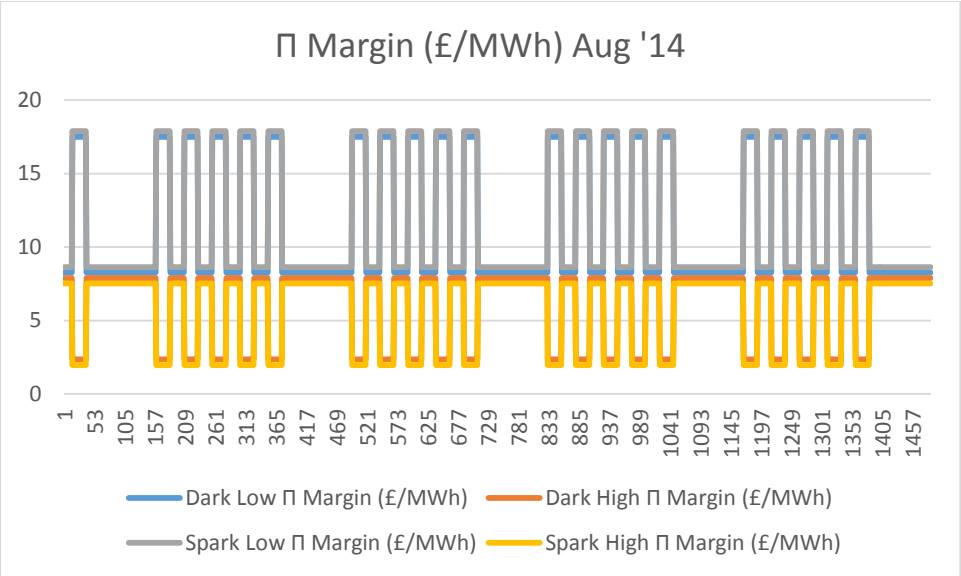
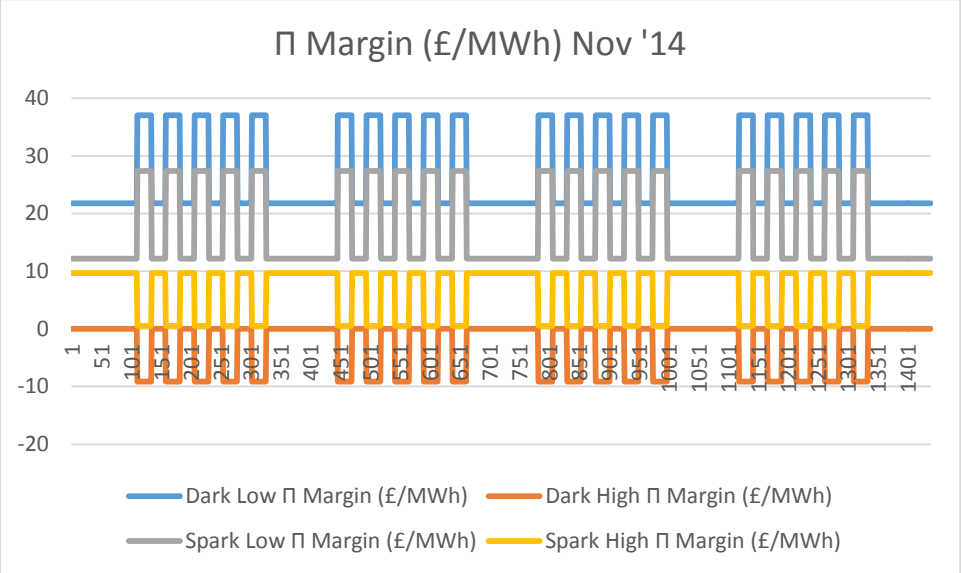
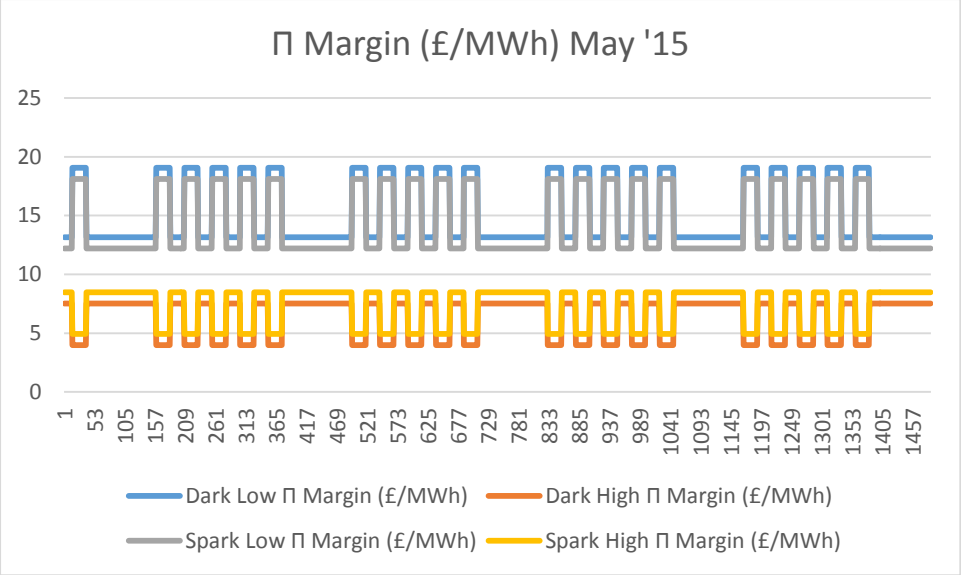
833
885
937
989
1041
1093
1145
1197
1249
1301
1353
1405
1457
Dark Low Π Margin (£/MWh)
Dark High Π Margin (£/MWh)
Spark Low Π Margin (£/MWh)
Spark High Π Margin (£/MWh)

Appendix 4

Each graph in Appendix 4 shows the difference between the proxy marginal cost and the peak/off-peak energy price in Aug ’14, Nov ’14, and May ‘15.

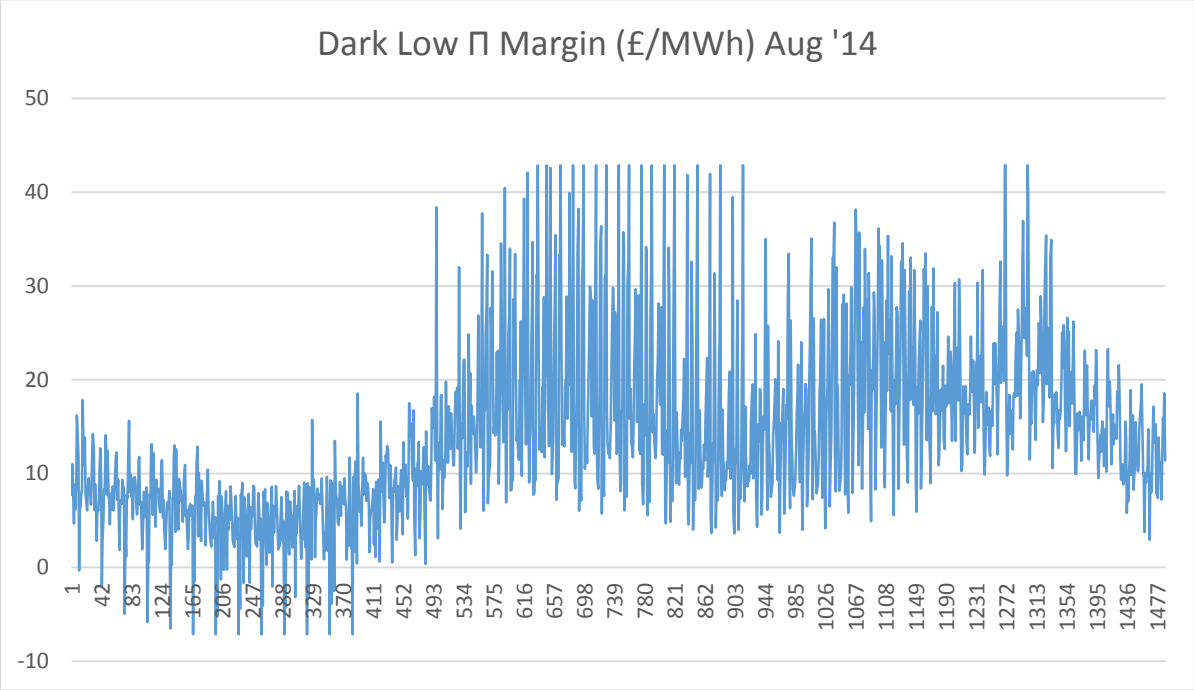


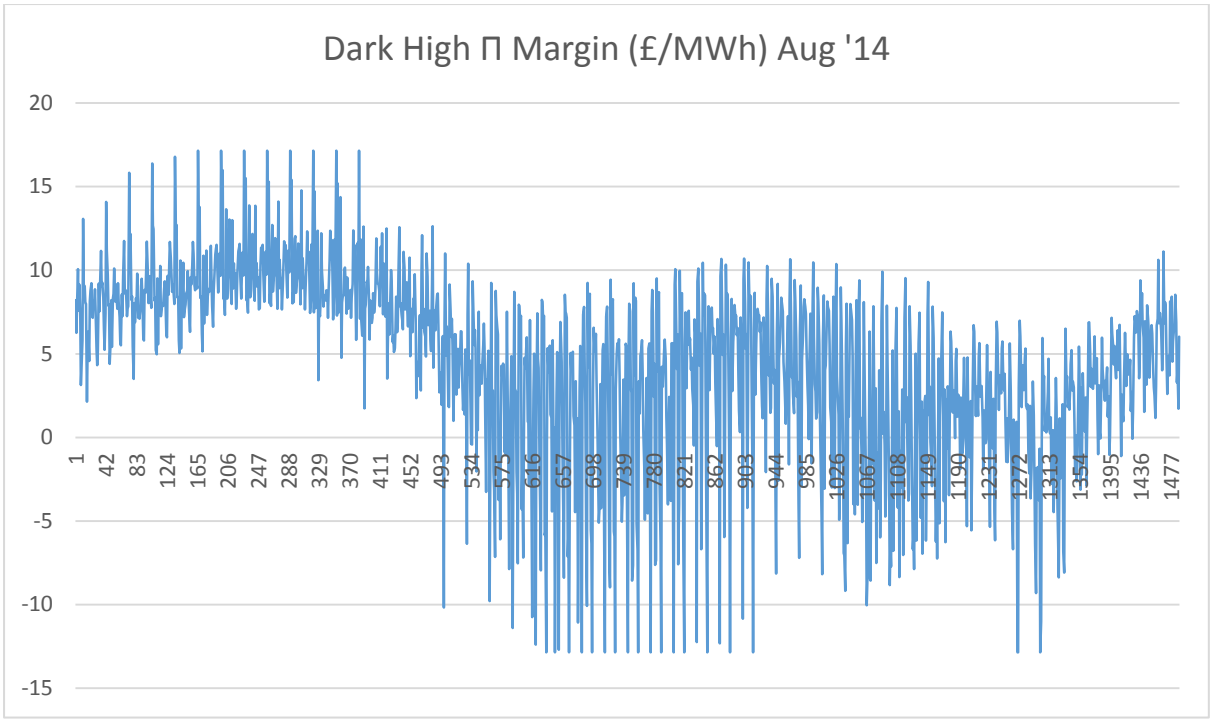




Appendix 5

Each graph in Appendix 5 shows the difference between the proxy marginal cost and the REP (MIP multiplied by the high or low FR multiplier) over the averaged day in Aug ’14, Nov ’14, and May ’15 with a cap of £60/MWh and collar of £20/MWh on the MIP.




Dark High Π Margin (£/MWh) Aug '14
20
15
10
5
0
-5
-10
-15
1
42
83
124
165
206
247
288
329
370
411
452
493
534
575
616
657
698
739
780
821
862
903
944
985
1026
1067
1108
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1190
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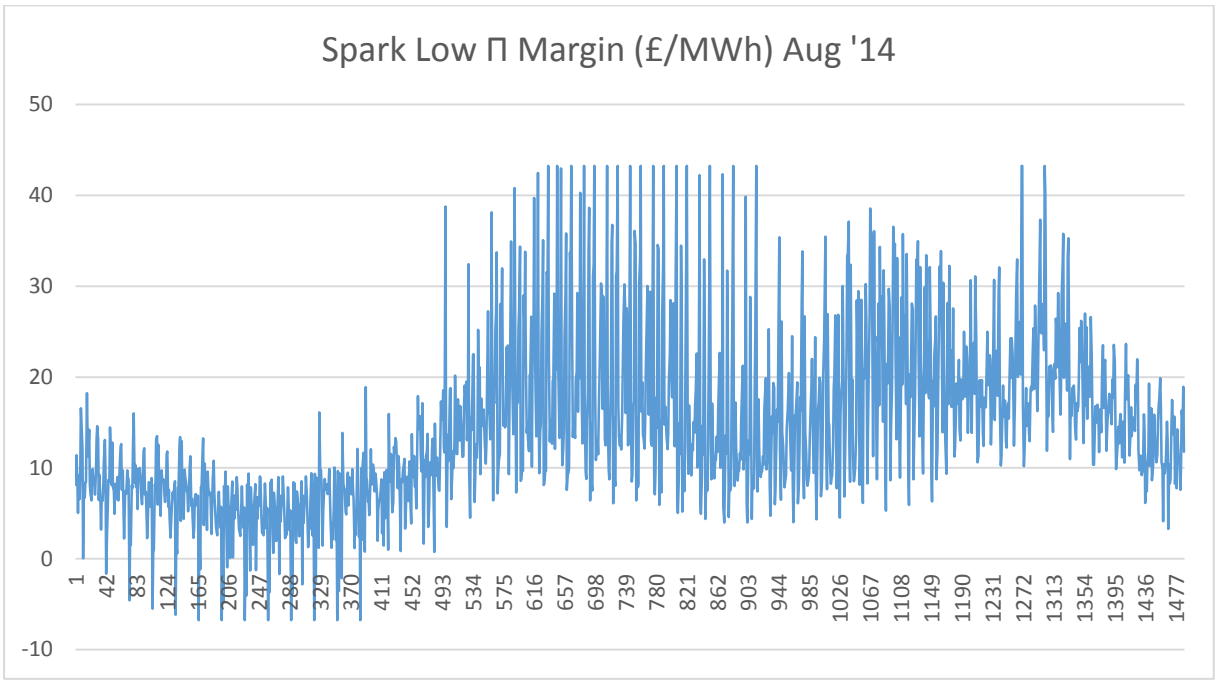
1354
1395
1436
1477


Spark Low Π Margin (£/MWh) Aug '14
50
40
30
20
10
0
-10
1
42
83
124
165
206
247
288
329
370
411
452
493
534
575
616
657
698
739
780
821
862
903
944
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1108
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1190
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1272
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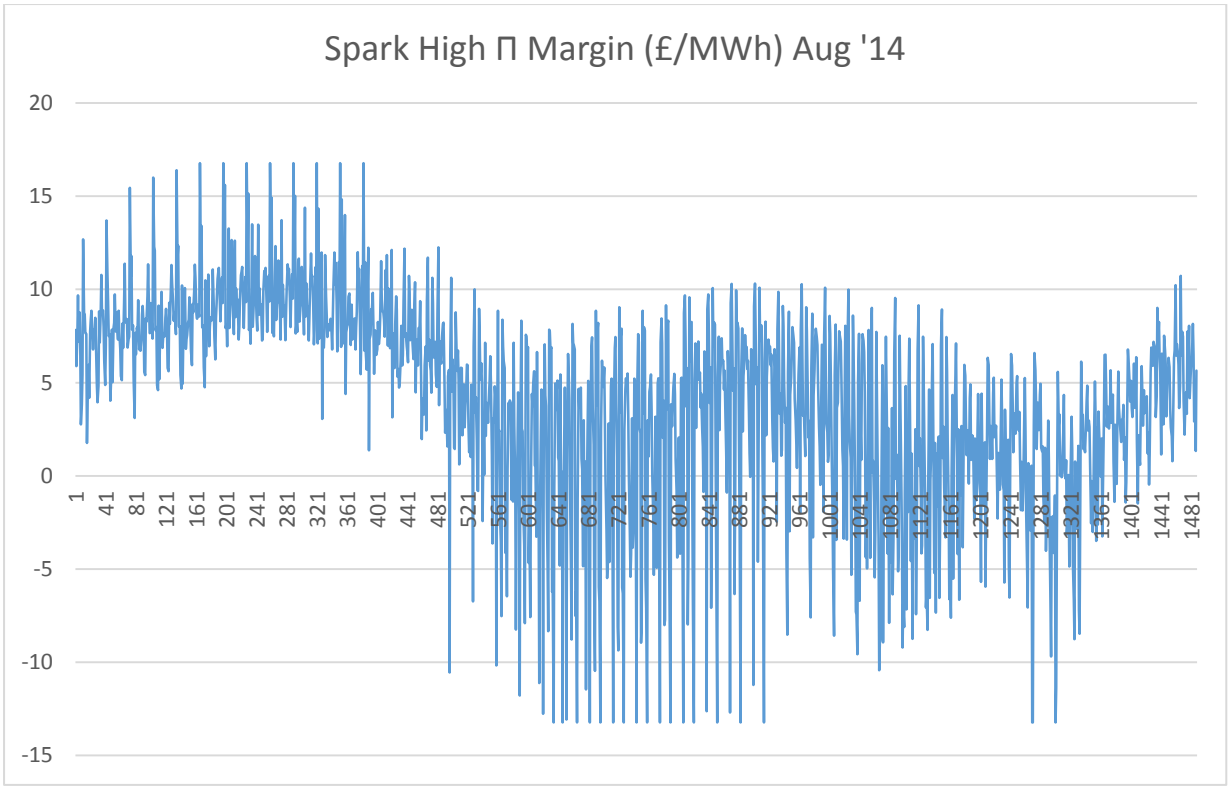
1395
1436
1477


Spark High Π Margin (£/MWh) Aug '14
20
15
10
5
0
-5
-10
-15
1
41
81
121
161
201
241
281
321
361
401
441
481
521
561
601
641
681
721
761
801
841
881
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1081
1121
1161
1201
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1281
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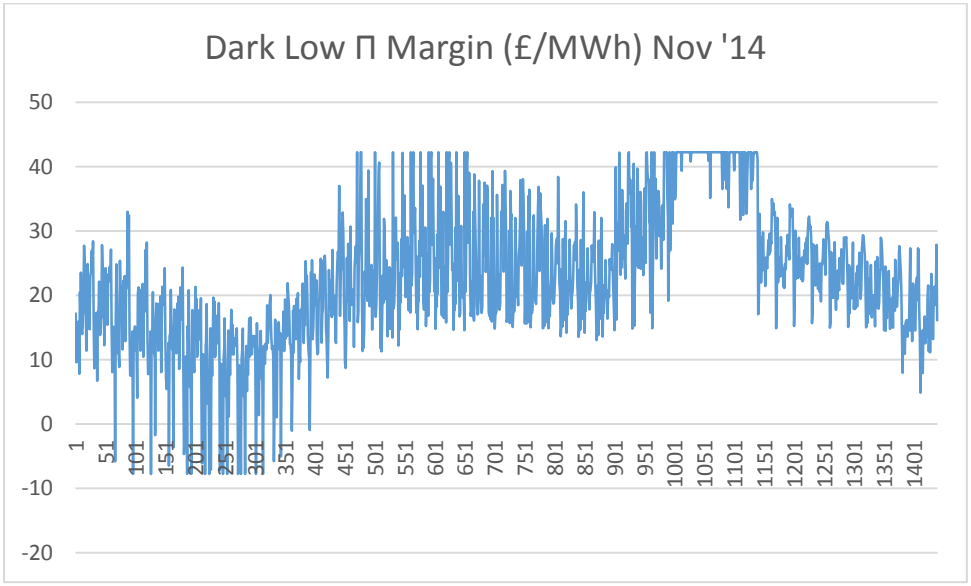
1401
1441
1481


Dark Low Π Margin (£/MWh) Nov '14
50
40
30
20
10
0
-10
-20
1
51
101
151
201
251
301
351
401
451
501
551
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701
751
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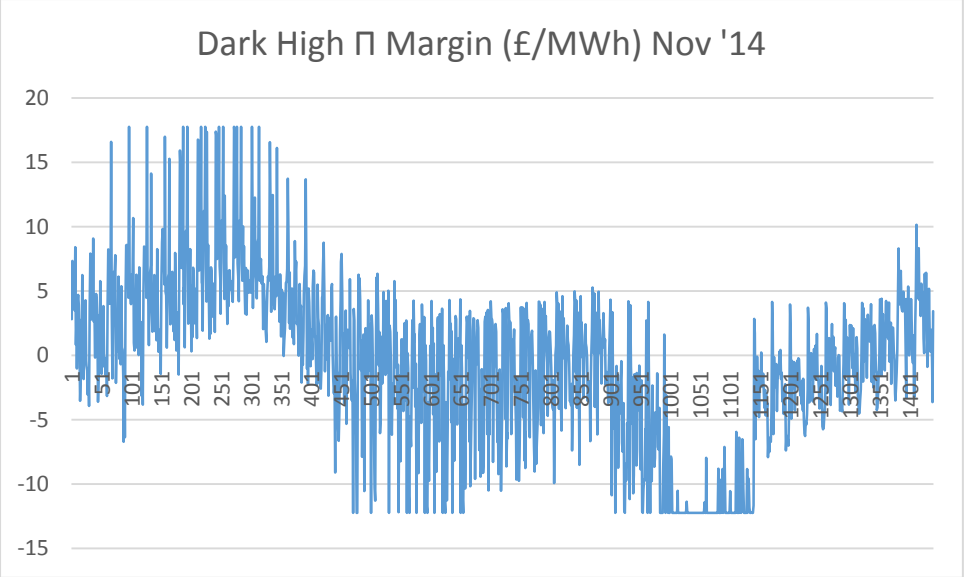
851
901
951
1001
1051
1101
1151
1201
1251
1301
1351
1401


Dark High Π Margin (£/MWh) Nov '14
20
15
10
5
0
-5
-10
-15
1
51
101
151
201
251
301
351
401
451
501
551
601
651
701
751
801
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1001
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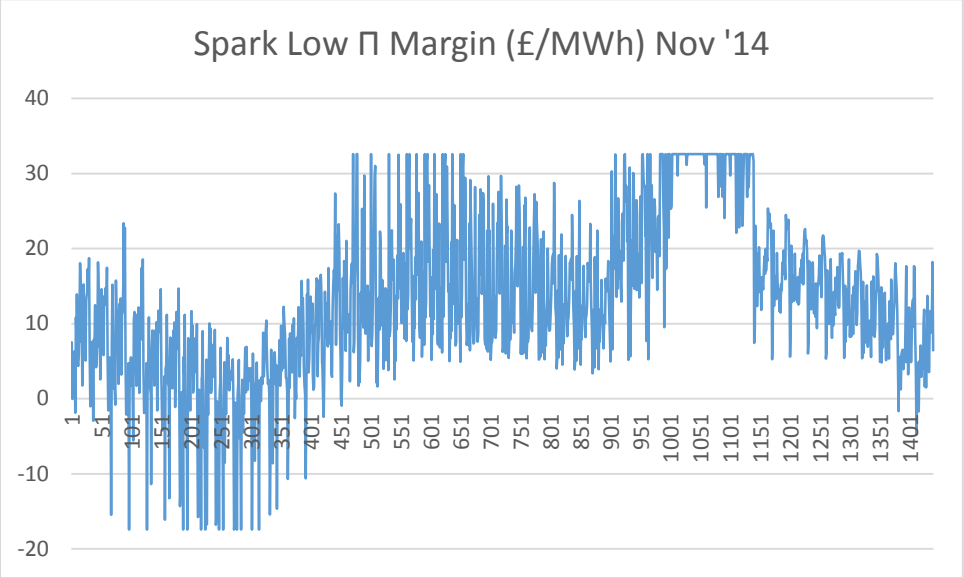
1301
1351
1401


Spark Low Π Margin (£/MWh) Nov '14
40
30
20
10
0
-10
-20
1
51
101
151
201
251
301
351
401
451
501
551
601
651
701
751
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1301
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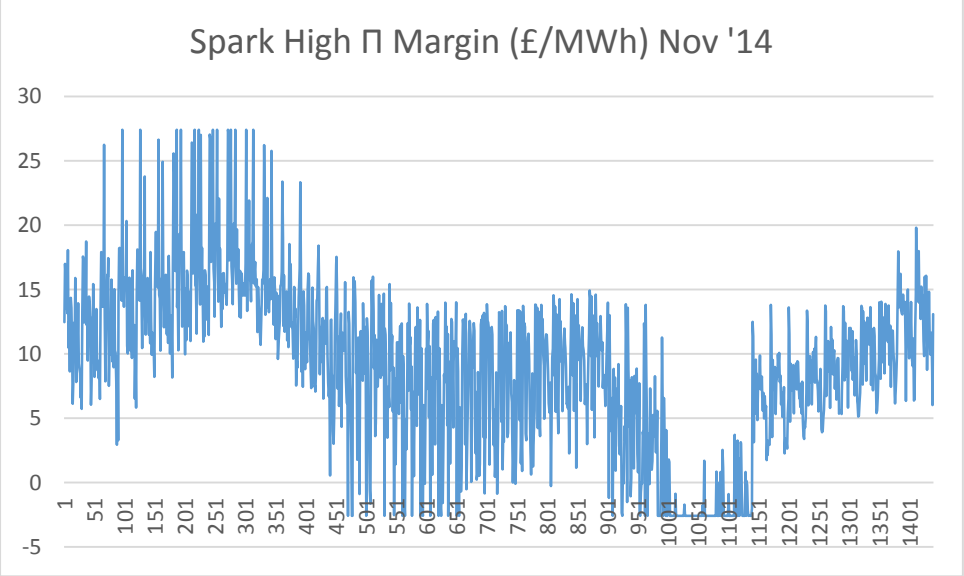
1401


Spark High Π Margin (£/MWh) Nov '14
30
25
20
15
10
5
0
-5
1
51
101
151
201
251
301
351
401
451
501
551
601
651
701
751
801
851
901
951
1001
1051
1101
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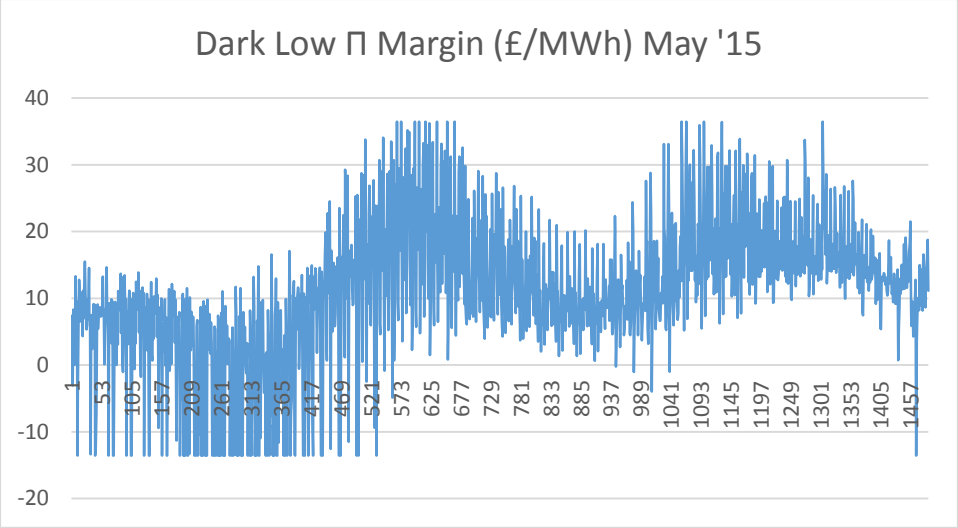
1351
1401


Dark Low Π Margin (£/MWh) May '15
40
30
20
10
0
-10
-20
1
53
105
157
209
261
313
365
417
469
521
573
625
677
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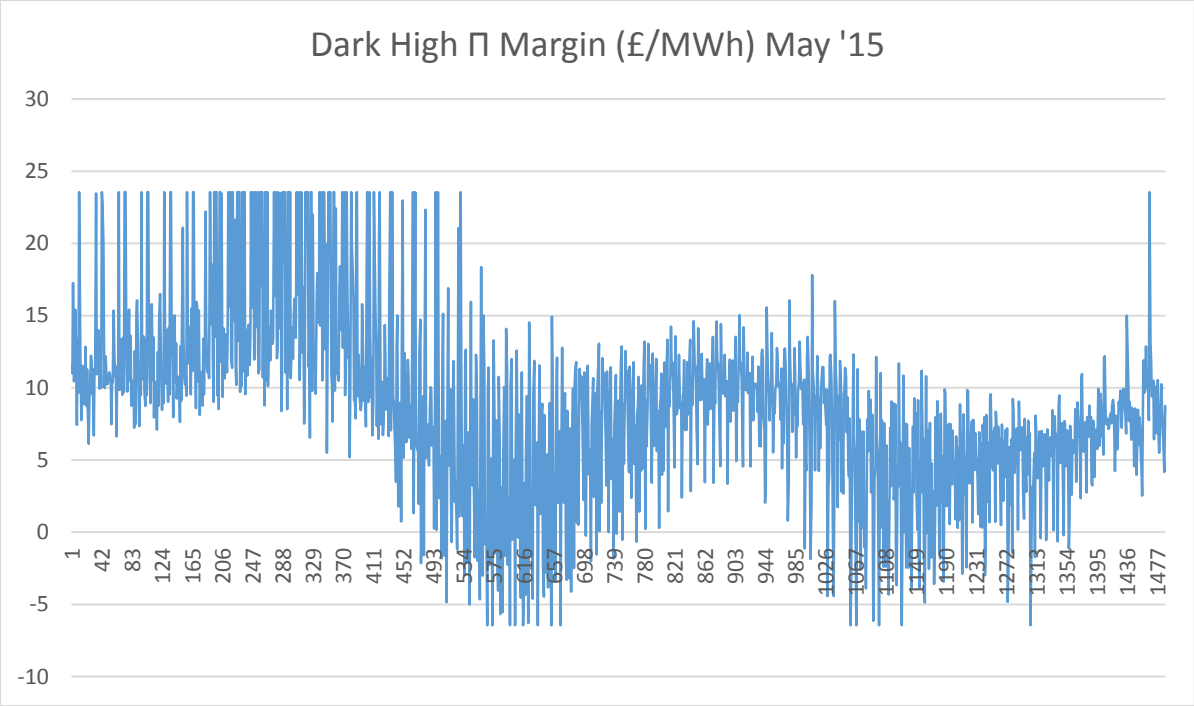
833
885
937
989
1041
1093
1145
1197
1249
1301
1353
1405
1457


Dark High Π Margin (£/MWh) May '15
30
25
20
15
10
5
0
-5
-10
1
42
83
124
165
206
247
288
329
370
411
452
493
534
575
616
657
698
739
780
821
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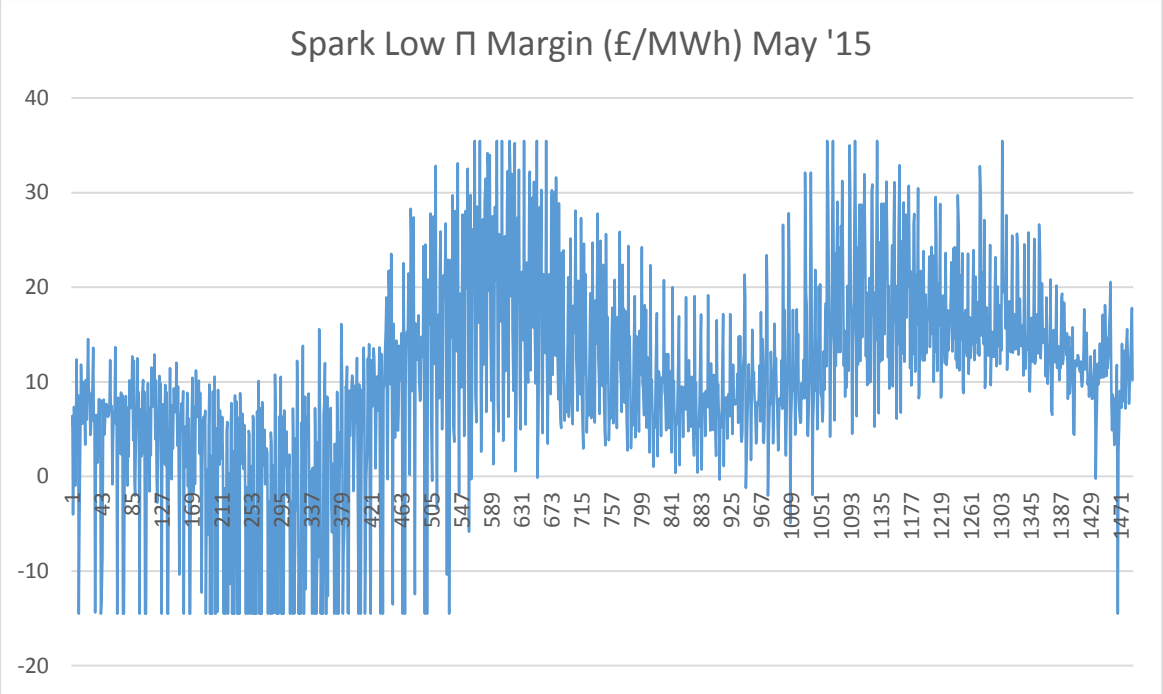
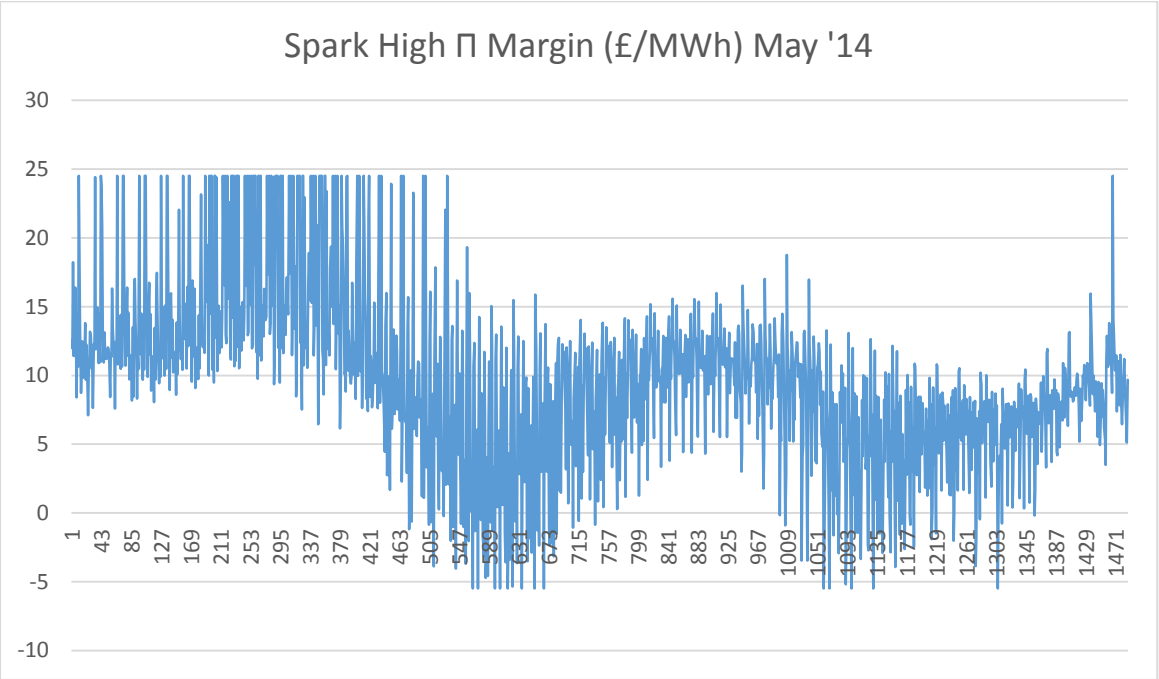
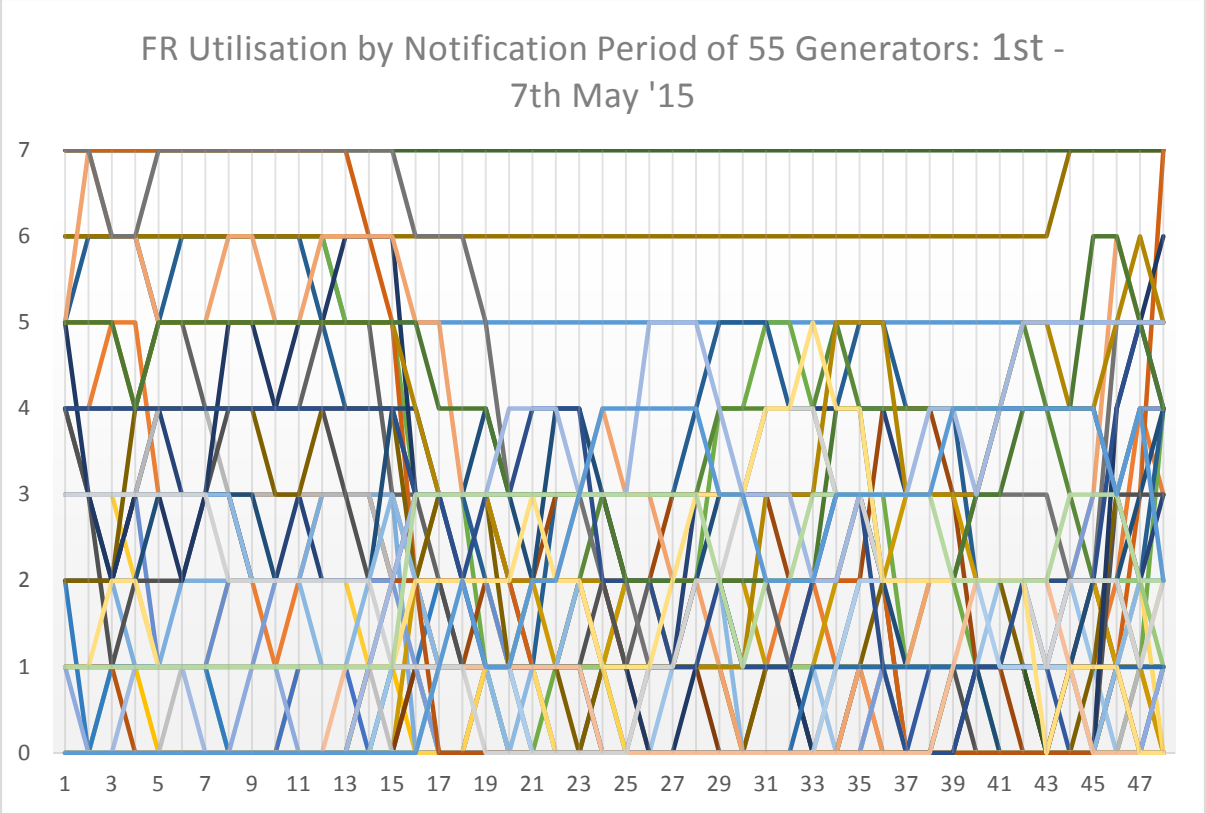
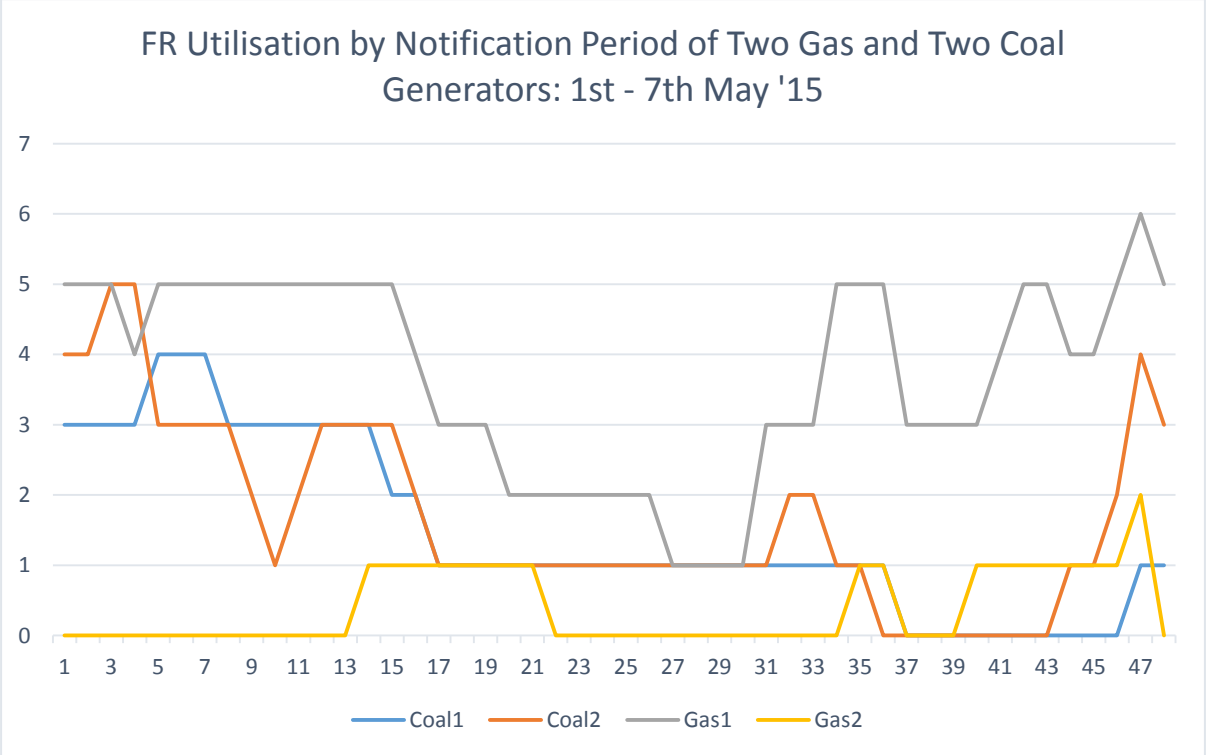




Appendix 6

The graphs below show how often a generator (each line represents a generator) is used in a particular settlement period over a week (i.e. a maximum of 7 times during a week).


FR Utilisation by Notification Period of 55 Generators: 1st - 7th May '15
0
1
2
3
4
5
6
7
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47


FR Utilisation by Notification Period of Two Gas and Two Coal Generators: 1st - 7th May '15
0
1
2
3
4
5
6
7
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Coal1
Coal2
Gas1
Gas2

Annex 5 – Drax Analysis on calculating required reductions in FR Holding Prices

CMP243 Analysis – Calculating required reductions in FR Holding Prices

Historic analysis undertaken on the potential options for change developed by the CMP243 workgroup generally show a modest increase in the total amount paid out by the System Operator (SO) through the Response Energy Payment (REP). Drax has undertaken analysis showing how much the related total Holding Price (HP) cost for the months analysed (Nov '14, May '15 and Aug '15) would have to decrease to net off the observed increase in total REP. The analysis described below only applies to Mandatory Frequency Response (FR).

Method

The increase in the total REP associated with the baseload, peak/off-peak, and peak options (Original, WACM1 and WACM2) for the given months are compared to the related total HP (taken from the MBSS reports). Using this information we calculate how much the total HP would need to reduce to net off the increase in the total REP. This is expressed as a percentage of the total HP. The results can be seen in the table below.

Results

Option	Months	Total REP Increase (£)	Reduction to HP required to net off total REP increase (%)
Baseload	Nov '14	159,386	3.99
	May '15	444,982	3.71
	Aug '15	322,688	3.91
Peak/Off-Peak	Nov '14	120,949	3.04
	May '15	455,523	4.06
	Aug '15	315,195	3.63
Peak	Nov '14	186,699	4.66
	May '15	478,418	4.80
	Aug '15	354,933	5.18

Conclusions

As can be seen from the above table, only a small percentage decrease in the total HP is needed to net off the increase in the amount paid out by the SO through the total REP. The Baseload and Peak/Off-Peak options tend to require a smaller HP cost reduction, but overall there is not a great deal to choose between the three options. Initial analysis of Commercial FR indicate that even smaller HP cost reductions are required to net off observed total REP increases.

We expect that reductions of this magnitude to the total HP are realistic, reflecting the reduction in price risk associated with the potential CMP243 options. Moreover, as the options will better facilitate competition, we expect this will place further downward pressure on FR HPs.

Annex 6 – Workgroup Consultation responses

CUSC Workgroup Consultation Response Proforma

CMP243 – A fixed Response Energy Payment option for all generating technologies

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm on 24th November 2015** to cusc.team@nationalgrid.com Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Jade Clarke at cusc.team@nationalgrid.com

These responses will be considered by the Workgroup at their next meeting at which members will also consider any Workgroup Consultation Alternative Requests. Where appropriate, the Workgroup will record your response and its consideration of it within the final Workgroup Report which is submitted to the CUSC Modifications Panel.

Respondent:	**Simon Lord** 01352 705289 07980 793692 simon.lord@gdfsuez.com
Company Name:	*ENGIE*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	
Do you believe that the proposed original or any of the alternatives better facilitate the Applicable CUSC Objectives? Please include your reasoning.	We believe that options 2,3 and 4 all have merit in that they are potentially better than the original in that prices are predictable or capped/collared and users are unlikely to be exposed to costs that would discourage provision FR. Option 1 we believe is worse than the existing CUSC in that whilst it gives stability it potential under rewards a large group of peaking generators and over supports base load generates as more frequency response is delivered during the lower demand periods. CUSC objective b **Applicable CUSC Objectives** (a) the efficient discharge by The Company of the obligations imposed upon it by the Act and the

	Transmission Licence. (b) facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the sale, distribution and purchase of electricity. (c) compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency.

Standard Workgroup consultation questions

Q	Question	Response
1	**Do you believe that CMP243 Original Proposal or either of the potential options for change better facilitates the Applicable CUSC Objectives?**	We believe that options 2,3 and 4 all have merit in that they are potentially better than the original in that prices are predictable or capped/collared and users are unlikely to be exposed to costs that would discourage provision FR. Option 1 we believe is worse than the existing CUSC in that whilst it gives stability it potential under rewards a large group of peaking generators and over supports base load generates as more frequency response is delivered during the lower demand periods
2	**Do you support the proposed implementation approach?**	Yes
3	**Do you have any other comments?**	We support the move to remove the short term volatility of response energy price implemented by either a cap/collar arrangement or utilising month ahead index prices. The solution should aim to be cost neutral from the customer's perspective and it is unfortunate that the month ahead options seems to add cost. The peak + off peak proposal (Option 2) seems to give the lowest additional cost and this is our preferred option for predictability. It is also likely to lead to improved cost reflectivity compared to other options in that peaking and based load generates are rewarded based on their cost structure. We believe that option 4 whist not addressing the predictability criteria does deal with the extreme price issue with the cap and collar set as suggested.

Q	Question	Response
4	**Do you wish to raise a WG Consultation Alternative Request for the Workgroup to consider?**	*If yes, please complete a WG Consultation Alternative Request form, available on National Grid's website[1], and return to* cusc.team@nationalgrid.com No

Specific questions for CMP243

Q	Question	Response
5	**Out of the four options suggested by the Workgroup in paragraph 2.35, which is your preferred option and why?**	See q3 our preferred is 4 or 2
6	**Do you consider there to be any further analysis required for the development of CMP243?**	Expand the existing analysis out to 12 months
7	**Do you think there are any other potential options for change which the Workgroup have not considered?**	No
8	**What price indices do you consider the Workgroup should use for their analysis?**	No specific but Argus is readily available
9	**Does the proposed timeframe of setting the REP ten days ahead of providing holding prices gives the right balance between accuracy of price and providing sufficient time for parties to respond to this price? If not, please provide your view on a more appropriate timeframe.**	Yes

[1] http://www.nationalgrid.com/uk/Electricity/Codes/systemcode/amendments/forms_guidance/

Q	Question	Response
10	**Do you believe FR providers should have the option of remaining/switching to the current MIP based REP?**	No all thermal generations should be subject to the same arrangements
11	**Do you believe that the current REP multipliers (1.25 for low FR and 0.75 for High FR) should be retained as part of a new REP methodology?**	Yes these copy with the obvious errors involved in that calculations of droop energy volumes based on spot minute frequency

CUSC Workgroup Consultation Response Proforma

CMP243 – A fixed Response Energy Payment option for all generating technologies

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm on 24th November 2015** to cusc.team@nationalgrid.com Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Jade Clarke at cusc.team@nationalgrid.com

These responses will be considered by the Workgroup at their next meeting at which members will also consider any Workgroup Consultation Alternative Requests. Where appropriate, the Workgroup will record your response and its consideration of it within the final Workgroup Report which is submitted to the CUSC Modifications Panel.

Respondent:	Andrew Raffan (andrew.raffan@scottishpower.com)
Company Name:	Scottish Power
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	We believe that the workgroup consultation has been thorough in examining the original proposal and the alternatives that were outlined. The analysis undertaken was in-depth and has provided enough information to judge the relative merits of each in relation to the CUSC Objectives.
Do you believe that the proposed original or any of the alternatives better facilitate the Applicable CUSC Objectives? Please include your reasoning.	As outlined elsewhere in our response we believe that the alternative proposal Option 2 (Peak and Off Peak Wholesale Month Ahead Price) meets the applicable CUSC objective (b) We do not believe that objectives (a) and (c) will be applicable to this proposal. In our view the increased certainty of Response Energy pricing and reduction in potential volatility will encourage greater competition. Participants will be able to reduce risk contingencies within submitted prices, and new entrants will have greater incentive to participate as their risk exposure will be reduced.

Standard Workgroup consultation questions

Q	Question	Response

Q	Question	Response
1	**Do you believe that CMP243 Original Proposal or either of the potential options for change better facilitates the Applicable CUSC Objectives?**	Our view is that Option 2 (Peak and Off Peak Wholesale Month Ahead Price) facilitates the Applicable CUSC objectives.
2	**Do you support the proposed implementation approach?**	Yes
3	**Do you have any other comments?**	No
4	**Do you wish to raise a WG Consultation Alternative Request for the Workgroup to consider?**	No

Specific questions for CMP243

Q	Question	Response
5	**Out of the four options suggested by the Workgroup in paragraph 2.35, which is your preferred option and why?**	Our preferred option would be Option 2 (Peak and Off Peak Wholesale Month Ahead Price). In our view this option meets the objective of increasing effective competition in the provision of Response Energy services by removing the uncertainty associated with a Market Index Price methodology.
6	**Do you consider there to be any further analysis required for the development of CMP243?**	No, the analysis carried out as part of the Workgroup was sufficient.
7	**Do you think there are any other potential options for change which the Workgroup have not considered?**	No.
8	**What price indices do you consider the Workgroup should use for their analysis?**	We have no preference on which indices are used, however these should be widely available to market participants and recognised by the industry as a proven source of forward price forecasts.

Q	Question	Response
9	**Does the proposed timeframe of setting the REP ten days ahead of providing holding prices gives the right balance between accuracy of price and providing sufficient time for parties to respond to this price? If not, please provide your view on a more appropriate timeframe.**	Yes.
10	**Do you believe FR providers should have the option of remaining/switching to the current MIP based REP?**	Yes. We believe this option should be offered on an annual basis and providers should be able to choose per BM unit.
11	**Do you believe that the current REP multipliers (1.25 for low FR and 0.75 for High FR) should be retained as part of a new REP methodology?**	Yes.

CUSC Workgroup Consultation Response Proforma

CMP243 – A fixed Response Energy Payment option for all generating technologies

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm on 24th November 2015** to cusc.team@nationalgrid.com Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Jade Clarke at cusc.team@nationalgrid.com

These responses will be considered by the Workgroup at their next meeting at which members will also consider any Workgroup Consultation Alternative Requests. Where appropriate, the Workgroup will record your response and its consideration of it within the final Workgroup Report which is submitted to the CUSC Modifications Panel.

Respondent:	*Garth Graham (garth.graham@sse.com)*
Company Name:	*SSE*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	
Do you believe that the proposed original or any of the alternatives better facilitate the Applicable CUSC Objectives? Please include your reasoning.	For reference, the Applicable CUSC objectives are: **Applicable CUSC Objectives** (a) the efficient discharge by The Company of the obligations imposed upon it by the Act and the Transmission Licence. (b) facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the sale, distribution and purchase of electricity. (c) compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency.

Standard Workgroup consultation questions

Q	Question	Response
1	**Do you believe that CMP243 Original Proposal or either of the potential options for change better facilitates the Applicable CUSC Objectives?**	At this stage in the process we believe that the Original and the potential options do better facilitate Applicable Objectives (a) and (b) for the reasons set out in the Proposal itself. They are neutral with respect to (c).
2	**Do you support the proposed implementation approach?**	We note the proposed implementation approach set out in section 5 of the consultation document. We support this proposed approach.
3	**Do you have any other comments?**	Not at this time.
4	**Do you wish to raise a WG Consultation Alternative Request for the Workgroup to consider?**	*No.*

Specific questions for CMP243

Q	Question	Response
5	**Out of the four options suggested by the Workgroup in paragraph 2.35, which is your preferred option and why?**	We have considered all four options set out in paragraph 2.35 and conclude that all four have merit. Of the four Option 2; which reflects both a Peak and a Baseline situation; most fairly, in our view, reflects the market situation as plant of both these types are active in the market.
6	**Do you consider there to be any further analysis required for the development of CMP243?**	We believe the Workgroup has undertaken sufficient analysis.
7	**Do you think there are any other potential options for change which the Workgroup have not considered?**	We think that the Workgroup has (via section 2 of the consultation document) considered a wide variety of potential options for change.

Q	Question	Response
8	**What price indices do you consider the Workgroup should use for their analysis?**	The price indices should be one that is widely used and easily available to market participants.
9	**Does the proposed timeframe of setting the REP ten days ahead of providing holding prices gives the right balance between accuracy of price and providing sufficient time for parties to respond to this price? If not, please provide your view on a more appropriate timeframe.**	The ten days ahead of the holding payment submission gives all parties sufficient time to complete their tasks whilst balancing that with the accuracy of prices.
10	**Do you believe FR providers should have the option of remaining/switching to the current MIP based REP?**	We think that an annual option (as noted in paragraph 2.34) offers market participants the ability to freely choose the option most suited to their needs.
11	**Do you believe that the current REP multipliers (1.25 for low FR and 0.75 for High FR) should be retained as part of a new REP methodology?**	Yes. The multipliers are based on rational factors to reflect the fuel sources 'used' or 'avoided' when providing the energy utilised (or not utilised) to provide frequency and therefore should be retained.

Annex 7 – Draft Legal text (Baseline CUSC text)

CMP243 (Original)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \begin{bmatrix} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{bmatrix} \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = in the case of a non-fuel cost **BM Unit,** max ($\sum_s$ {**PXP**$_{sj}$ x **QXP**$_{sj}$} / $\sum_s$ {**QXP**$_{sj}$} x 1.25, 0

) and in the case of a fuel cost **BM Unit**, the fuel cost market price x1.25

where $\sum_s$ represents the sum over all **Market Index Data Providers**.

Where RE_{ij} is negative then:

Reference Price = in the case of a non-fuel cost **BM Unit**, max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0) and in the case of a fuel cost **BM Unit**, the fuel cost market price x 0.75

where $\sum_s$ represents the sum over all **Market Index Data Providers**

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a fuel cost **Power Station**.

the fuel cost market price means the baseload wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**.

a non-fuel cost **Power Station** means a **Power Station** of the following type (which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

CMP243 (WACM1)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \begin{bmatrix} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{bmatrix} \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = in the case of a non-fuel cost **BM Unit,** max ($\sum_s$ {**PXP**$_{sj}$ x **QXP**$_{sj}$} / $\sum_s$ {**QXP**$_{sj}$} x 1.25, 0

) and in the case of a fuel cost **BM Unit**, the fuel cost market price x 1.25

where $\sum_s$ represents the sum over all **Market Index Data Providers**.

Where RE_{ij} is negative then:

Reference Price = in the case of a non-fuel cost **BM Unit**, max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0) and in the case of a fuel cost **BM Unit**, the fuel cost market price x 0.75

where $\sum_s$ represents the sum over all **Market Index Data Providers**

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a fuel cost **Power Station**.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**.

a non-fuel cost **Power Station** means a **Power Station** of the following type (which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

the fuel cost market price means for a **Settlement Period** (a) from 0700 hours to 1859 hours on a **Business Day**, the peak wholesale price and (b) within a day other than a **Business Day** or from 1900 hours to 0659 hours on a **Business Day**, the off-peak wholesale price.

the peak wholesale price means the peak wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business**

Day of the month preceding the month in which the price is used.

the off-peak wholesale price is calculated by the following formula:

Off-Peak wholesale price = (baseload wholesale price x 24 x days in the month – peak wholesale price x 12 x **Business Days** in the month) / ((days in the month – **Business Days** in the month) x 24) + **Business Days** in the month x 12

Where the baseload wholesale price means the baseload wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

CMP243 (WACM2)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \begin{bmatrix} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{bmatrix} \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = in the case of a non-fuel cost **BM Unit,** max ($\sum_s$ {**PXP**$_{sj}$ x **QXP**$_{sj}$} / $\sum_s$ {**QXP**$_{sj}$} x 1.25, 0

) and in the case of a fuel cost **BM Unit**, the fuel cost market price x 1.25

where $\sum_s$ represents the sum over all **Market Index Data Providers**.

Where RE_{ij} is negative then:

Reference Price = in the case of a non-fuel cost **BM Unit**, max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0) and in the case of a fuel cost **BM Unit**, the fuel cost market price x 0.75

where $\sum_s$ represents the sum over all **Market Index Data Providers**

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a fuel cost **Power Station**.

the fuel cost market price means the peak wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**

a non-fuel cost **Power Station** means a **Power Station** of the following type (which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

Annex 8 – Draft Legal text (assuming CMP237 is approved)

8.1 Whilst the Workgroup have assessed CMP243 against the CUSC Baseline, they understand that a related (albeit not linked) modification is currently with the Authority for decision (CMP237 'Response Energy Payment for Low Fuel Generation')

8.2 As these two modifications propose changes to the same section of CUSC Legal text, the following text has been produced to illustrate potential legal text if both modifications are approved by the Authority.

CMP243 (Original)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

[text shown highlighted yellow is TEXT as per CMP 237 Original and new text shown red and underlined/strike out]

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \begin{bmatrix} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{bmatrix} \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = ~~$\max (\sum_s \{\mathbf{PXP_{sj}} \times \mathbf{QXP_{sj}}\} / \sum_s \{\mathbf{QXP_{sj}}\} \times 1.25, 0)$~~ in the case of a fuel cost **BM Unit**

the fuel cost market price x 1.25 and ~~except~~ in the case of a non-fuel cost **BM Unit**, ~~where it = 0~~

~~where $\sum_s$ represents the sum over all **Market Index Data Providers**.~~

Where RE_{ij} is negative then:

Reference Price = ~~max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0)~~ in the case of a fuel cost **BM Unit** the fuel cost market price x 0.75 and ~~except~~ in the case of a non-fuel cost **BM Unit**, ~~where it =~~ 0

~~where $\sum_s$ represents the sum over all **Market Index Data Providers**~~

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of].a fuel cost **Power Station**.

the fuel cost market price means the baseload wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**

a non-fuel cost **Power Station** means a **Power Station** of the following type (which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in

advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

CMP243 (Original)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

[text shown highlighted yellow is TEXT as per CMP 237 WACM1 with new text shown in red and underlined/strike out]

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \begin{bmatrix} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{bmatrix} \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = ~~$\max (\sum_s \{\mathbf{PXP_{sj}} \times \mathbf{QXP_{sj}}\} / \sum_s \{\mathbf{QXP_{sj}}\} \times 1.25, 0)$~~ in the case of a fuel cost **BM Unit**

the fuel cost market price x 1.25 and ~~except~~ in the case of a non-fuel cost **BM Unit**, ~~where it = 0~~

~~where $\sum_s$ represents the sum over all **Market Index Data Providers**.~~

Where RE_{ij} is negative then:

Reference Price = ~~max ($\sum_s$ {**PXP$_{sj}$** x **QXP$_{sj}$**} / $\sum_s$ {**QXP$_{sj}$**} x 0.75, 0)~~ in the case of a fuel cost **BM Unit** the fuel cost market price x 0.75 and ~~except~~ in the case of a non-fuel cost **BM Unit**, ~~where it =~~ 0

~~where $\sum_s$ represents the sum over all **Market Index Data Providers**~~

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of].a fuel cost **Power Station**.

the fuel cost market price means the baseload wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**

a non-fuel cost **Power Station** means a **Power Station** of the following type (which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

and in respect of which a **User** has not opted for that **Financial Year** for such **Power Station** to not be classed as a non- fuel cost **Power Station** for the purposes of this Paragraph.

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

CMP243 (WACM1)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

[text shown highlighted yellow is TEXT as per CMP 237 Original and new text shown red and underlined/strike out]

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \left[\begin{array}{l} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{array} \right] \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = in the case of a non-fuel cost **BM Unit,** max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 1.25, 0

) ~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, ~~where it = 0~~ the fuel cost market price x 1.25

where $\sum_s$ represents the sum over all **Market Index Data Providers**.

Where RE_{ij} is negative then:

Reference Price = in the case of a non-fuel cost **BM Unit**, max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0) ~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, the fuel cost market price x 0.75 ~~where it = 0~~

where $\sum_s$ represents the sum over all **Market Index Data Providers**

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a fuel cost **Power Station**.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**

a non-fuel cost **Power Station** means:

a **Power Station** of the following type which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

the fuel cost market price means for a **Settlement Period** (a) from 0700 hours to 1859 hours on a **Business Day**, the peak wholesale price and (b) within a day other than a **Business Day** or from 1900 hours to 0659 hours on a **Business Day**, the off-peak wholesale price.

the peak wholesale price means the peak wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business**

Day of the month preceding the month in which the price is used.

the off-peak wholesale price is calculated by the following formula:

Off-Peak wholesale price = (baseload wholesale price x 24 x days in the month – peak wholesale price x 12 x **Business Days** in the month) / ((days in the month – **Business Days** in the month) x 24) + **Business Days** in the month x 12

Where the baseload wholesale price means the baseload wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

CMP243 (WACM1)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

[text shown highlighted yellow is TEXT as per CMP 237 WACM1 with new text shown in red and underlined/strike out]

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \left[\begin{array}{l} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{array} \right] \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = in the case of a non-fuel cost **BM Unit,** $(\sum_s \{\mathbf{PXP_{sj}} \times \mathbf{QXP_{sj}}\} / \sum_s \{\mathbf{QXP_{sj}}\} \times 1.25, 0)$

~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, market price x 1.25 ~~where it = 0~~

where $\sum_s$ represents the sum over all **Market Index Data Providers**.

Where RE_{ij} is negative then:

Reference Price = in the case of a non-fuel cost **BM Unit**, max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0) ~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, ~~where it = 0~~the fuel cost market price x 0.75

where $\sum_s$ represents the sum over all **Market Index Data Providers**

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a fuel cost **Power Station**.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**

a non-fuel cost **Power Station** means:

a **Power Station** of the following type which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

and in respect of which a **User** has not opted for that **Financial Year** for such **Power Station** to not be classed as a non- fuel cost **Power Station** for the purposes of this Paragraph.

the fuel cost market price means for a **Settlement Period** (a) from 0700 hours to 1859 hours on a **Business Day**, the peak wholesale price and (b) within a day other than a **Business Day** or from

1900 hours to 0659 hours on a **Business Day**, the off-peak wholesale price.

the peak wholesale price means the peak wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

the off-peak wholesale price is calculated by the following formula:

Off-Peak wholesale price = (baseload wholesale price x 24 x days in the month – peak wholesale price x 12 x **Business Days** in the month) / ((days in the month – **Business Days** in the month) x 24) + **Business Days** in the month x 12

Where the baseload wholesale price means the baseload wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

CMP243 (WACM2)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

[text shown highlighted yellow is TEXT as per CMP 237 Original and new text shown red and underlined/strike out]

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \begin{bmatrix} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{bmatrix} \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = in the case of a non-fuel cost **BM Unit,** max ($\sum_s$ {**PXP$_{sj}$** x **QXP$_{sj}$**} / $\sum_s$ {**QXP$_{sj}$**} x 1.25, 0

) ~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, ~~where it = 0~~ the fuel cost market price x 1.25

where $\sum_s$ represents the sum over all **Market Index Data Providers**.

Where RE_{ij} is negative then:

Reference Price = in the case of a non-fuel cost **BM Unit**, max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0) ~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, the fuel cost market price x 0.75 ~~where it = 0~~

where $\sum_s$ represents the sum over all **Market Index Data Providers**

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a fuel cost **Power Station**.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**

a non-fuel cost **Power Station** means:

a **Power Station** of the following type (which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

the fuel cost market price means the peak wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in

advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
"SPD"
"Market Index Data Provider"

CMP243 (WACM2)

Edits to CUSC Section 4 Paragraph 4.1.3.9A as follows:

[text shown highlighted yellow is TEXT as per CMP 237 WACM1 with new text shown in red and underlined/strike out]

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **Response Energy Payments** for **BM Unit** i in **Settlement Period** j to be made by **The Company** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formulae:-

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

But so that where REP_{ij} is negative such amount shall be paid by the **User** to **The Company**.

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

RE_{ij} is the expected response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

$$RE_{ij} = \int_0^{SPD} \left[\begin{array}{l} \max(FR_{ij}(t),0) \times (1 - SF_{LF}) \\ + \min(FR_{ij}(t),0) \times (1 - SF_H) \end{array} \right] \times K_T \times K_{GRC}\, dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t, over the **Settlement Period** duration.

SF_{LF} is equal to SF_P in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of SF_P and SF_S in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

SF_P, SF_S, SF_H, K_T and K_{GRC} have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant **Frequency Response Power Delivery Data** table in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the table entitled **"High Frequency Response Power Delivery – Mode A"** set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit** i shall be derived from:

A) the table entitled "Primary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the table entitled "Primary and Secondary Response Power Delivery – Mode A" in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case set out in the **Mandatory Services Agreement** and shall be signed positive.

Where: RE_{ij} is positive then:

Reference Price = in the case of a non-fuel cost **BM Unit,** max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 1.25, 0

) ~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, ~~where it = 0~~ the fuel cost market price x 1.25

where $\sum_s$ represents the sum over all **Market Index Data Providers**.

Where RE_{ij} is negative then:

Reference Price = in the case of a non-fuel cost **BM Unit**, max ($\sum_s$ {$\mathbf{PXP_{sj}}$ x $\mathbf{QXP_{sj}}$} / $\sum_s$ {$\mathbf{QXP_{sj}}$} x 0.75, 0) ~~except~~ and in the case of a ~~non-~~fuel cost **BM Unit**, the fuel cost market price x 0.75 ~~where it = 0~~

where $\sum_s$ represents the sum over all **Market Index Data Providers**

Where for the purposes of this Paragraph:

a fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a fuel cost **Power Station**.

a fuel cost **Power Station** means a **Power Station** other than a non-fuel cost **Power Station**.

a non-fuel cost **BM Unit** means a **BM Unit** [associated with] [registered in respect of] a non-fuel cost **Power Station**

a non-fuel cost **Power Station** means:

a **Power Station** of the following type which does not have the facility to store the energy produced)

- Onshore wind
- Offshore wind
- Solar
- Tidal
- Wave

and in respect of which a **User** has not opted for that **Financial Year** for such **Power Station** to not be classed as a non- fuel cost **Power Station** for the purposes of this Paragraph.

the fuel cost market price means the peak wholesale electricity month ahead price as published by the specified market index provider at the fifth **Business Day** of the month preceding the month in which the price is used.

the specified market index provider means the provider identified as such by **The Company** by reference to each **Financial Year** and published in advance of such **Financial Year** on **The Company's** website.

(b) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

"PXP_{sj}"
"QXP_{sj}"
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