

# Firm Frequency Response Market Information

Monthly Report

Dec-2013

## Key points

This report is intended for tenders to be submitted in the next month for services starting on or after the month named in the report

The prices in submitted tenders are usually compared with the cost of alternative actions in the BM. Therefore, participants should note the historic volumes and prices provided for bid and offers, and mandatory frequency response holding.

Daytime period is from 07:00- 23:00 and overnight is from 23:00 -07:00

## Introduction

Firm Frequency Response (FFR) is a service through which balancing mechanism (BM) and non-BM participants commit to providing a given measure of response for a fee. The service is procured through a tender process ahead of BM timescales and competes with the mandatory response service offered by BM participants.

This report is intended to provide useful information to current and potential providers about the volume of response required, the likely periods over which it is required and the recent costs of obtaining frequency response through the mandatory market.

In Dec-2013, National Grid will procure frequency response in line with the principles laid out in the Assessment Principles. In principle, tendered prices are compared to the alternative costs buying mandatory response through the BM. Mandatory costs include the response holding costs, the bid and offer acceptance costs and the margin costs. More details on how these costs are considered during tender assessments are contained in our assessment principles.

The next three pages of the report show the volumes of frequency response holding required. While the subsequent pages show the recent volumes and costs of response holding and bid and offer acceptances in the mandatory market.

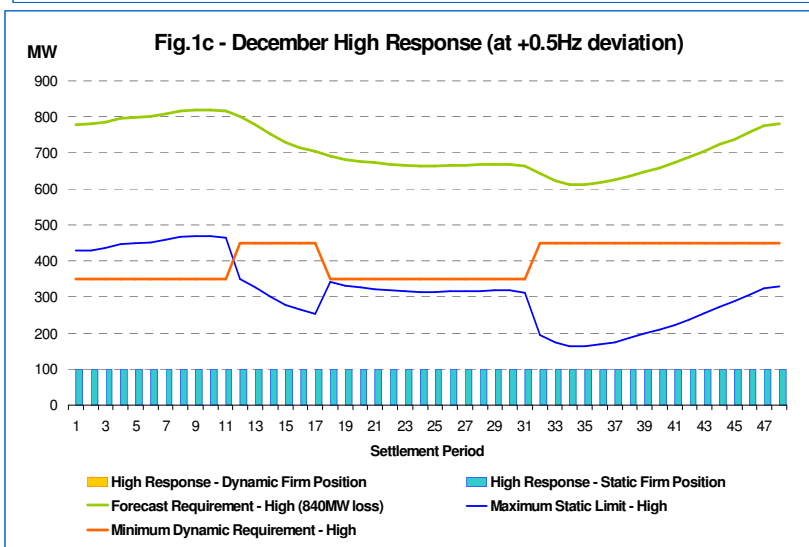
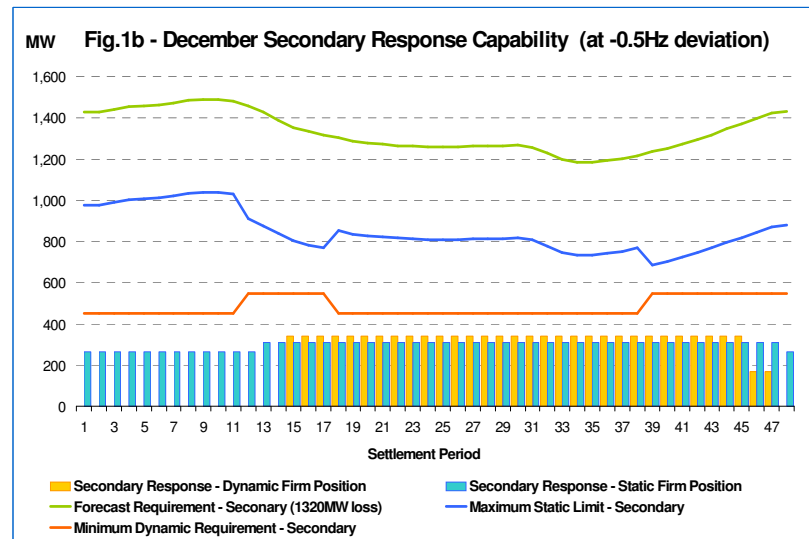
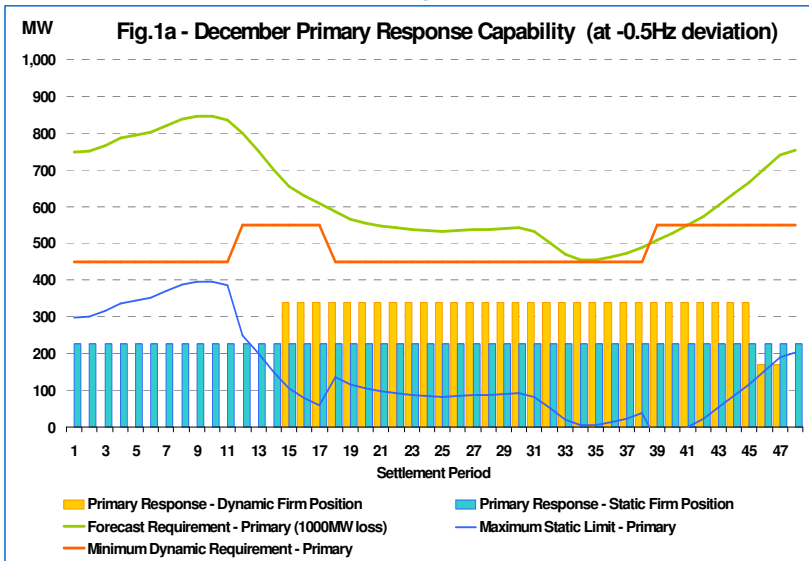
## Highlights

In October 2013, nineteen tenders were received offering frequency response from five BM units and one demand side unit. One tender from a demand-side unit was accepted. More details on the tenders accepted/rejected are available from the post-assessment tender report.

The FFR assessment principles and post-assessment tender report are available at:

<http://www.nationalgrid.com/uk/Electricity/Balancing/services/frequencyresponse/ffr/>

### Settlement Period Requirement



Figures 1a to 1c show the forecast frequency response capability requirements at 0.5Hz deviation for each settlement period in Dec-2013.

The expected response requirements shown in the following graphs are averaged for each day of the month, assuming low wind generation. The requirements are estimated based on forecast demand for individual settlement periods. It should be noted that the volume of frequency response required at weekends is slightly higher than during the week, and when there is higher wind generation. This is because lower demands experienced at weekends, and higher wind generation, both will cause the system inertia to be lower.

The green lines show the total forecast response capability required at 0.5Hz deviation to contain frequency fluctuation within security standard. The primary response requirements are set for a 1000MW loss, secondary response for a 1320MW loss and high response for an 840MW demand loss.

The orange lines show the indicative minimum dynamic response required at 0.5Hz deviation.

The blue line gives the indicative maximum static response that can be accommodated and is calculated as the difference between the total response requirement and minimum dynamic requirement.

The bars in the graphs show the expected contracted responses to be available during the periods shown on the graph. The orange bars indicate the firm dynamic response and blue bars represent firm static response. Both dynamic and those static responses below the static maximum limit will contribute to meet the total requirements.

## Daytime 12-Month Requirement

Figures 2a to 2c show the indicative daytime (07:00hrs - 23:00hrs) frequency response requirement for twelve months beginning Dec-2013.

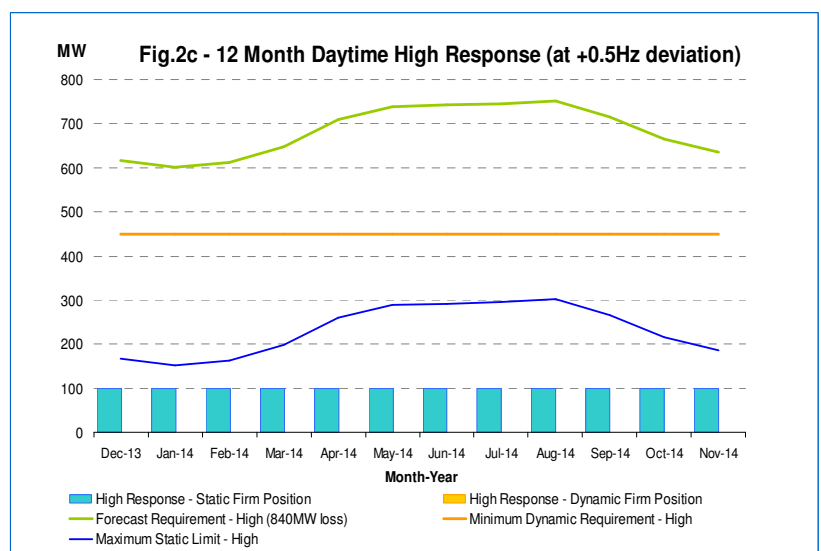
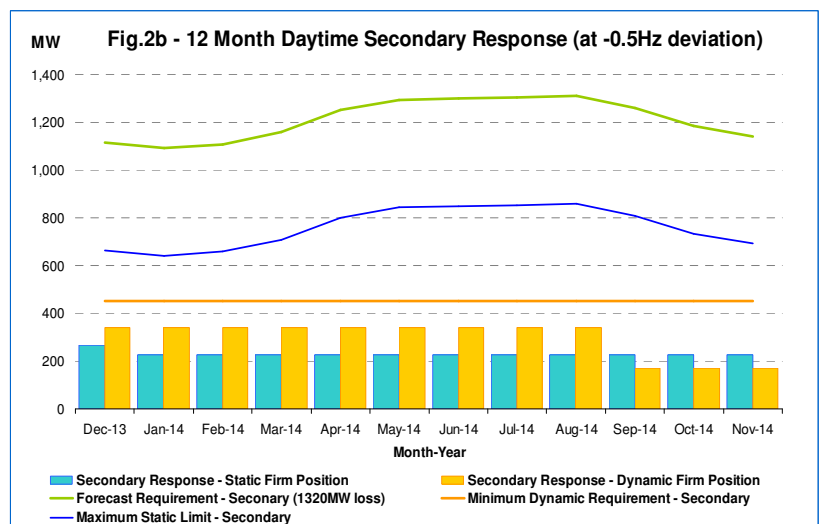
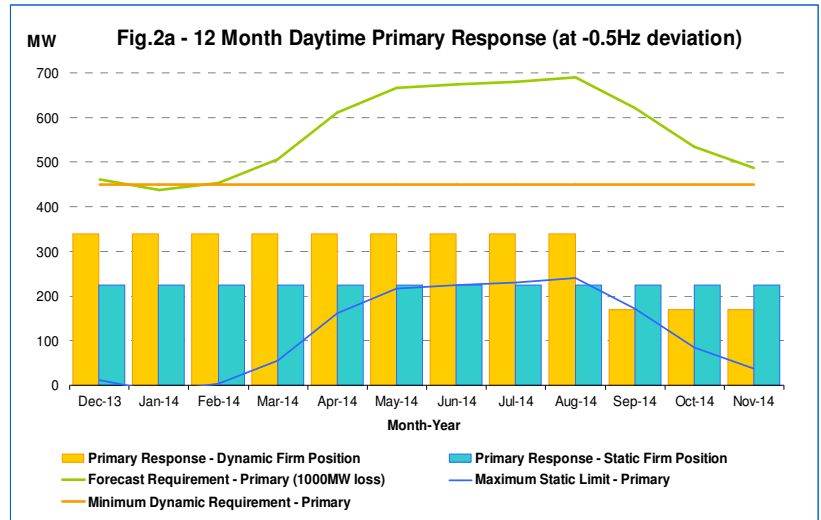
The forecast response requirements shown in the following graphs are averaged for each day of the month and are calculated based on the forecast demand during settlement period 36. The volume of response required will vary over individual daytime settlement periods. The figures show the base/minimum values expected during the day and assuming low wind generation.

The green lines show the total response capability required at 0.5Hz deviation to contain frequency fluctuation within security standard. The primary response requirements are set for a 1000MW loss, secondary response for a 1320MW loss and high response for an 840MW demand loss.

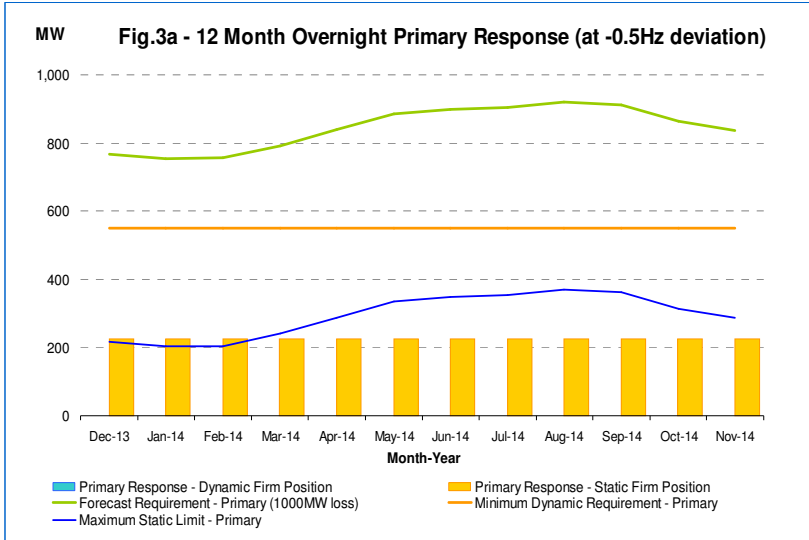
The orange lines show the indicative minimum dynamic response required at 0.5Hz deviation for settlement period 36.

The blue line is the indicative maximum static response that can be accommodated and is calculated as the difference between the total response requirement and minimum dynamic requirement.

The bars in the graphs show the expected contracted responses to be available during the periods shown on the graph. The orange bars indicate the firm dynamic response and blue bars represent firm static response. Both dynamic and those static responses below the static maximum limit will contribute to meet the total requirements.

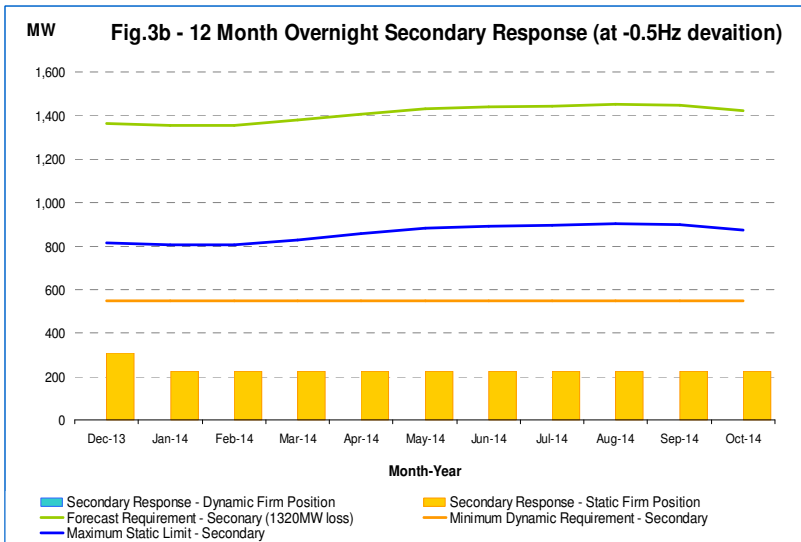


## Overnight 12-Month Requirement



Figures 3a to 3c show the indicative night time (23:00hrs - 07:00hrs) frequency response requirement for twelve months beginning Dec-2013.

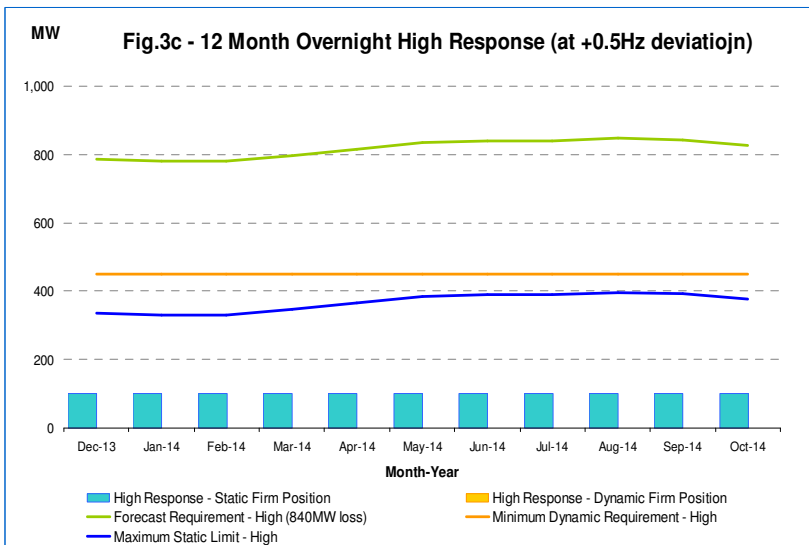
The expected response requirements shown in the following graphs are averaged for each day of the month and are calculated based on the forecast demand for settlement period 48. The volume of response required will vary over individual overnight settlement periods. The figures show the base/minimum values expected overnight and assuming low wind generation.



The green lines show the total response capability required at 0.5Hz deviation to contain frequency fluctuation within security standard. The primary response requirements are set for a 1000MW loss, secondary response for a 1320MW loss and high response for an 840MW demand loss.

The orange lines show the indicative minimum dynamic response required at 0.5Hz deviation for settlement period 48.

The blue line gives the indicative maximum static response that can be accommodated and is calculated as the difference between the total response requirement and minimum dynamic requirement.



The bars in the graphs show the expected contracted responses to be available during the periods shown on the graph. The orange bars indicate the firm dynamic response and blue bars represent firm static response. Both dynamic and those static responses below the static maximum limit will contribute to meet the total requirements.

### Historic Bids and Offers

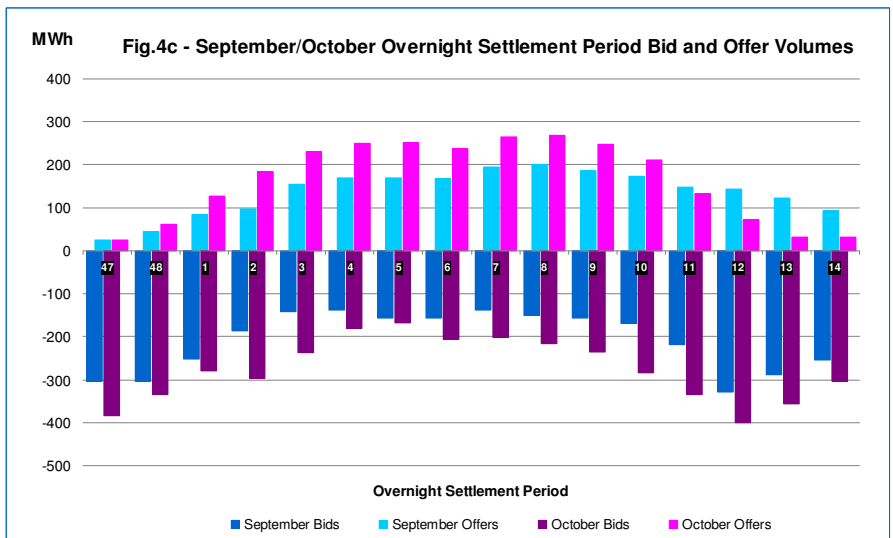
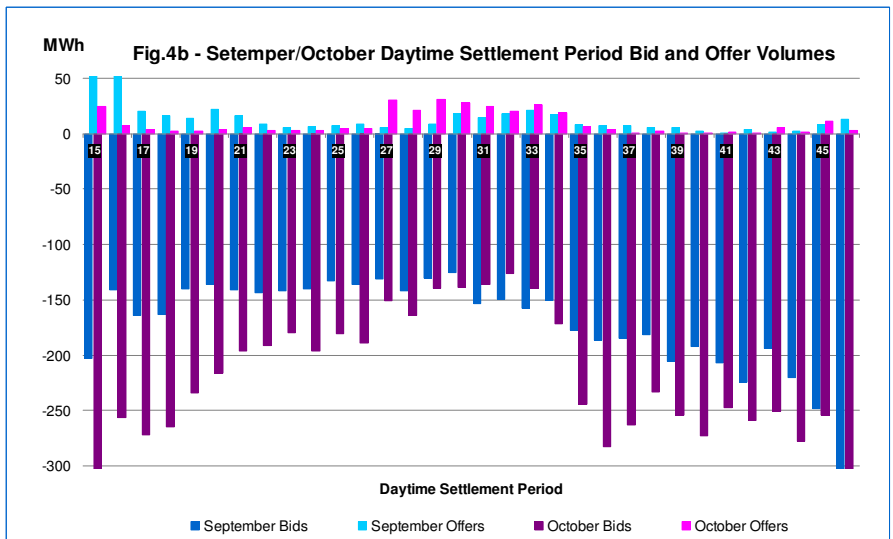
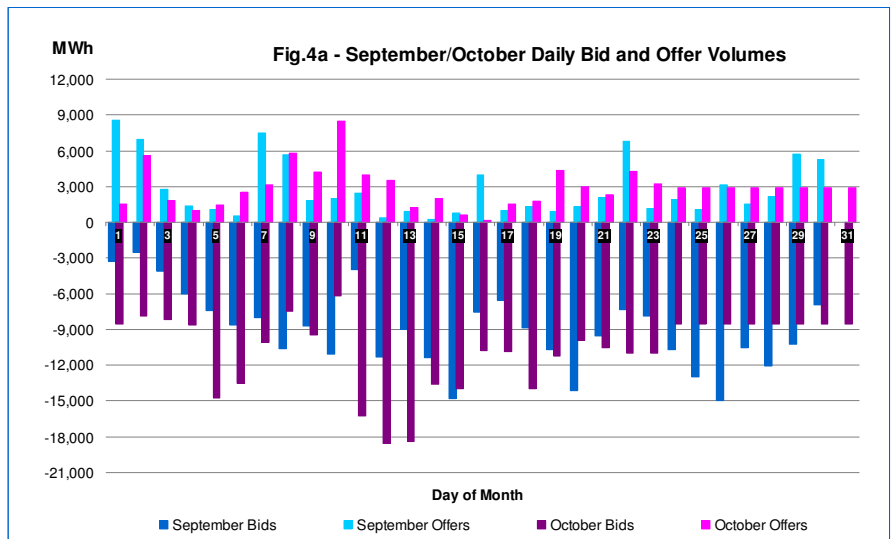
Figures 4a to 4c show the volume of Bid and Offer (BOA) instructions accepted by BM units that were, in conjunction with the delivery of the BOA energy, also providing frequency response.

Figure 4a shows the volumes on a daily basis while figures 4b and 4c show the average daily volume for each settlement period. These figures are presented for September 2013 and October 2013.

In order to publish this report by the 18<sup>th</sup> business day of October, figures for the last few days of October have been estimated. The actual figures for October will be published in the next market information report.

The settlement period figures show a profile of bid and offer acceptances over the day. It indicated that more bids were taken in the daytime periods compared to the overnight periods.

The Bid and Offer volumes presented in Figures 4a to 4c are indicative only. Actions may have been required for other reasons apart from, or as well as, frequency response optimisation. For example, bid and offer instructions may have also been required to resolve energy imbalance or system constraints.



Key dates in November 2013

In November 2013, National Grid will procure frequency response following the principles laid out in the Assessment Principles.

Tenders from eligible service providers for firm frequency response should be submitted by **Friday 1<sup>st</sup> November 2013** (1<sup>st</sup> business day) for all tenders.

National Grid will notify service providers of the outcome of the tender assessment by **Monday 18<sup>th</sup> November 2013** (12<sup>th</sup> business day).

For successful tenders, National Grid will notify nominated windows, following assessment by **Wednesday 20<sup>th</sup> November 2013** (14<sup>th</sup> business day).

Mandatory Response Costs

Response Bid and Offer Volume and Cost		
	September 2013 (Actual)	October 2013 (Estimate)
Total Response Bid Cost	£3.96 m	£4.79 m
Total Response Bid Volume	271,581 MWh	332,969 MWh
Total Response Offer Cost	£1,672,781	£1,690,406
Total Response Offer Volume	82,474 MWh	90,981 MWh

Response Holding Volume and Cost			
September 2013	Primary	Secondary	High
Price band (£/MW/h range)	Volume (MWh)	Volume (MWh)	Volume (MWh)
0 to 2	56,618	177,118	101,968
2 to 4	143,805	38,469	0
4 to 6	82,794	1,232	252,622
6 to 8	45,842	0	46,185
Greater than 8	5,427	3,954	105,734
<b>Total Volume</b>	<b>334.5 GWh</b>	<b>220.8 GWh</b>	<b>506.5 GWh</b>
<b>Cost</b>	<b>£1.43 m</b>	<b>£0.36 m</b>	<b>£3.55 m</b>
<b>Total Frequency Response Holding Volume</b>			<b>1,062 GWh</b>
<b>Total Frequency Response Holding Cost</b>			<b>5.34 £m</b>
October 2013	Primary	Secondary	High
Price band (£/MW/h range)	Volume (MWh)	Volume (MWh)	Volume (MWh)
0 to 2	53,264	223,365	109,970
2 to 4	192,197	47,717	665
4 to 6	136,387	1,486	295,794
6 to 8	43,169	0	64,742
Greater than 8	1,652	780	135,298
<b>Total volume</b>	<b>426.7 GWh</b>	<b>273.3 GWh</b>	<b>606.5 GWh</b>
<b>Cost</b>	<b>£1.84 m</b>	<b>£0.48 m</b>	<b>£4.43 m</b>
<b>Total Frequency Response Holding Volume</b>			<b>1,306 GWh</b>
<b>Total Frequency Response Holding Cost</b>			<b>6.75 £m</b>

\*This table is also provided in excel format on the website.

Calculation of Bid and Offer acceptance costs

Response offer cost = Volume Offers x (Offer Price – ERP)

Response bid cost = Volume Bid x (Bid Price – ERP)

ERP (Energy Reference Price) is the volume weighted average of the submitted bids or offers used to resolve net imbalance volume (NIV) ignoring plant dynamics. It does not include non-BM standing reserve prices, trades, PGBTS or SO-SO trades. The Energy reference Price is calculated for each settlement period.

For a short market, the price is calculated using all submitted offers up to the value of NIV, capped by MEL. For a long market, the price is calculated using all submitted bids on synchronised plant down to zero, including demand side bidders and unsynchronised units (e.g. DINO pumps). All prices do not factor in plant dynamics.