

# Firm Frequency Response Market Information

Monthly Report

Apr-2015

## 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. 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 Mar-2015, National Grid will procure frequency response in line with the principles laid out in the Assessment Principles (please see below link). 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. It also includes alternative costs from other tenders and other commercial services.

The next three pages of the report show the volumes of frequency response holding required. The minimum dynamic requirement indicates the response required for small load changes. The forecast response capability represents the response required to contain a system frequency deviation, due to an instantaneous loss of generation or demand, within the security standards. Subsequent pages show the recent volumes and costs of response holding and bid and offer acceptances in the mandatory market.

## Highlights

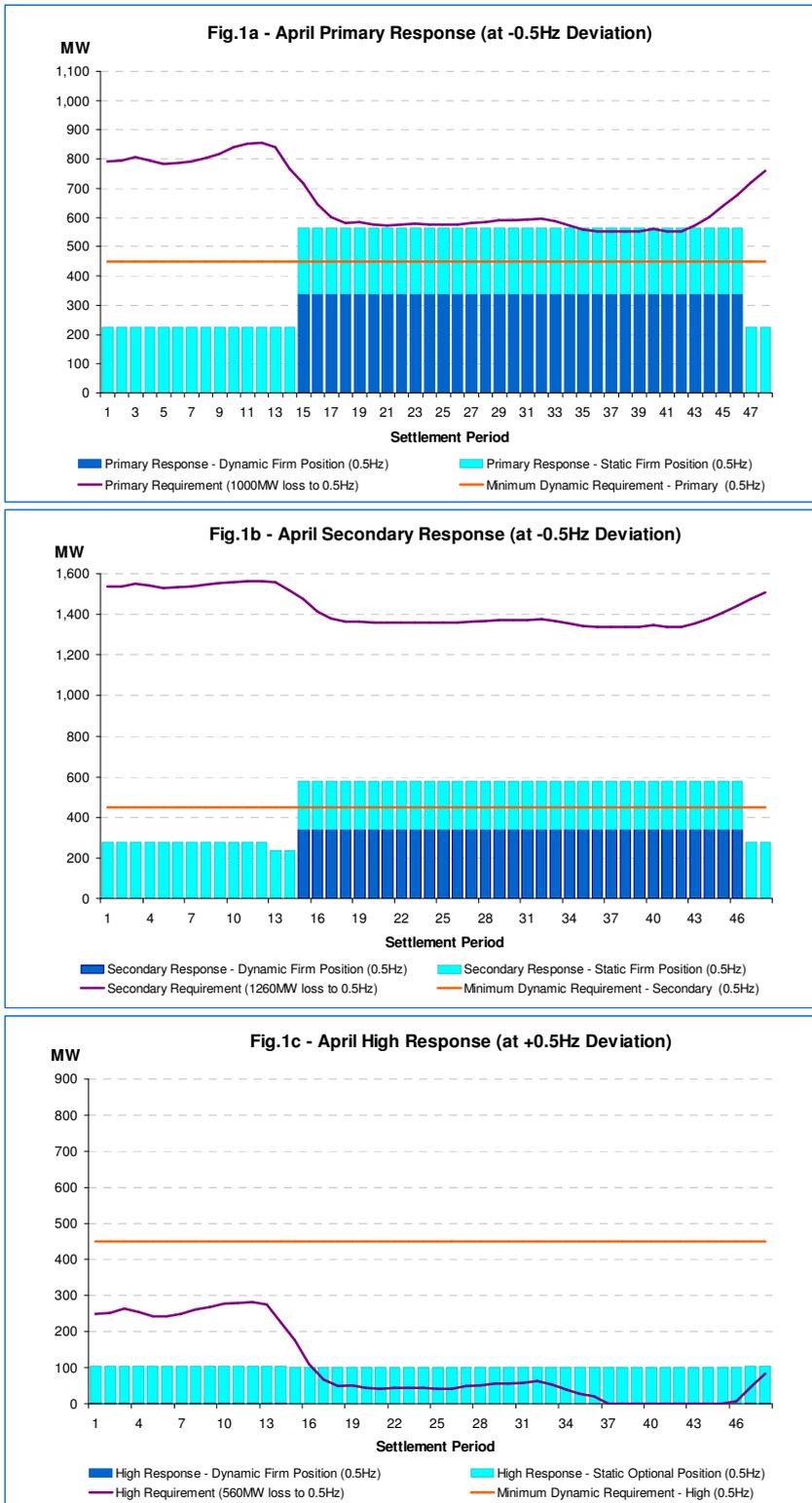
In February 2015, ten tenders were received offering frequency response from eight BM units. More details on the tenders accepted/rejected are available from the post-assessment tender report.

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

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

**Please note** we have revised our forecast of largest generation and demand losses and hence our forecast requirements have changed.

## Settlement Period Requirement



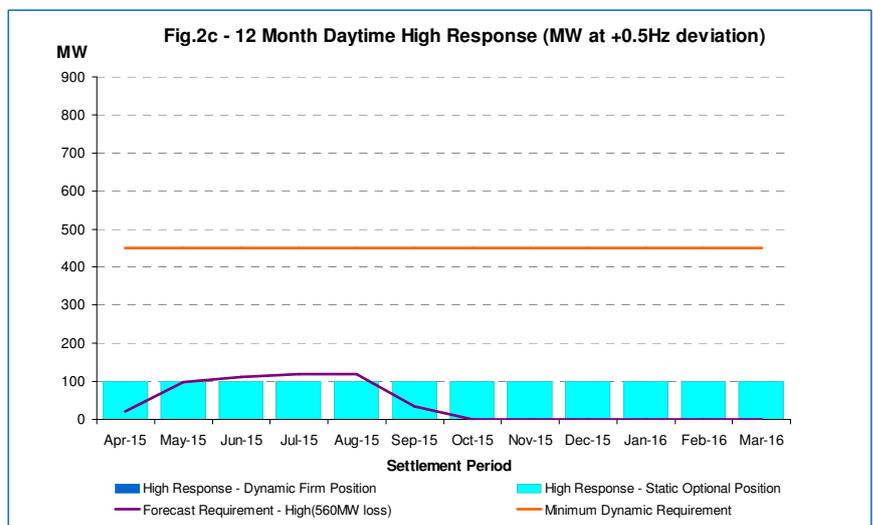
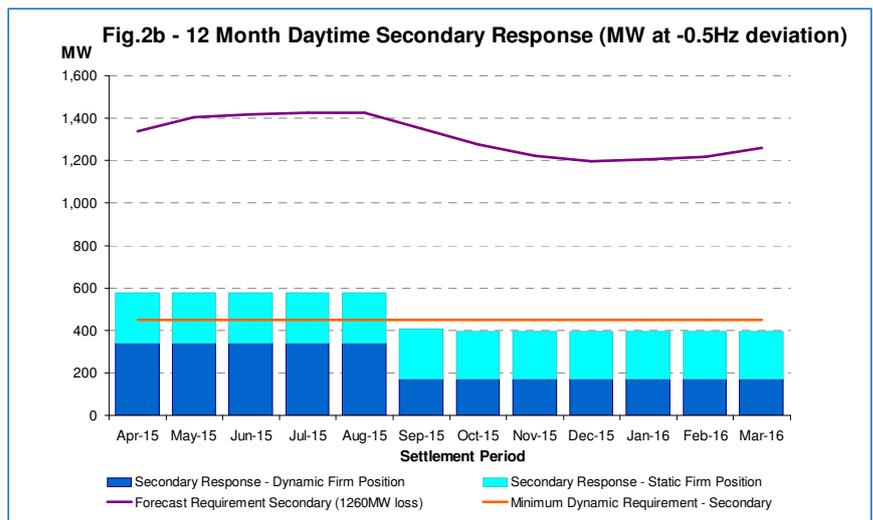
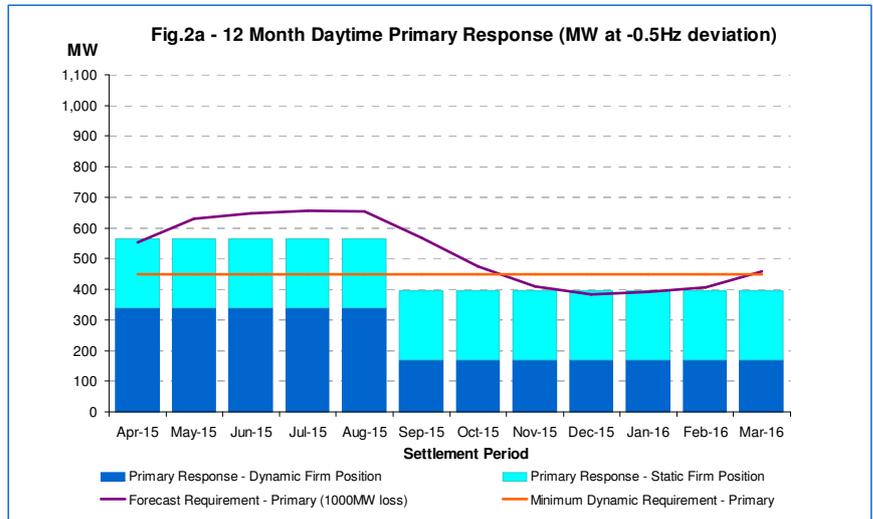
Figures 1a, 1b and 1c show the minimum response requirement for each settlement period. We've calculated these requirements assuming a peak level of inertia from the previous year's inertia levels to give an indicative minimum response requirement. For the same reason maximum forecast demand for each settlement period is used. We've assumed no rapid frequency response in the high frequency response requirement and 225MW of rapid frequency response for the low frequency response requirement. All response levels are calculated for a 0.5Hz deviation. Primary response is based on a generation loss of 1000MW, secondary response is based on a generation loss of 1260MW and high response is based on a demand loss of 560MW. The requirements would be higher than those indicated if the losses were increased.

The purple lines show the total minimum forecast response capability required to contain the frequency within security standards. The orange lines show the indicative minimum dynamic response capability. The bars in the graphs show the contracted response expected to be available during the periods. The dark blue bars represent Firm Dynamic response and the light blue represent Firm Static response.

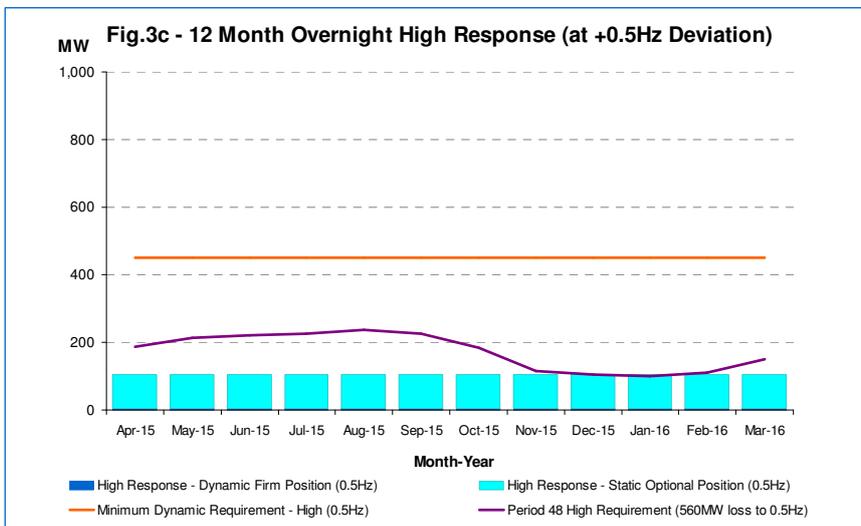
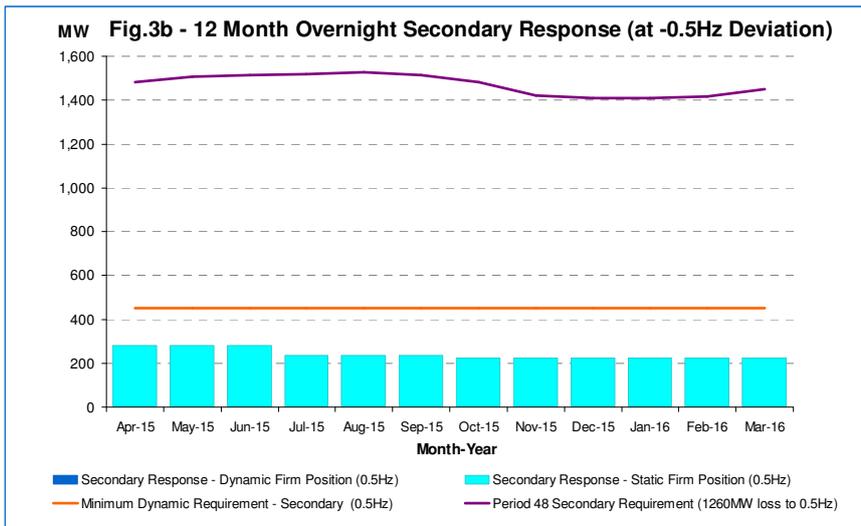
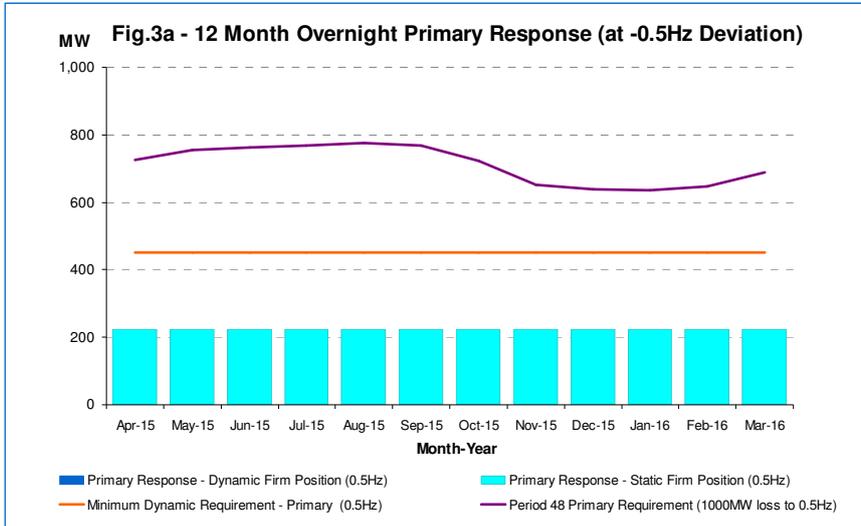
## Daytime 12-Month Requirement

**Figures 2a – 3c** show the daytime response requirements between 7am and 11pm and the overnight response requirements between 11pm and 7am starting from April 2015. Peak levels of inertia are assumed at maximum demand points, in both periods, giving an indicative minimum response requirement. The maximum demand of the month is used for the respective period (i.e. the maximum demand in the daytime and a separate maximum demand overnight, for all the days of the month). The volume of response will vary over individual settlement periods. The figures show the base/minimum values expected assuming optimum system inertia. All response levels are calculated for a 0.5Hz deviation. Primary response is based on a generation loss of 1000MW, secondary response is based on a generation loss of 1260MW and high response is based on a demand loss of 560MW. The requirements would be higher than those indicated if the losses were increased.. There is no rapid frequency response assumed for high frequency. 225MW of rapid frequency response has been assumed for low frequency. The minimum dynamic response is indicated for period 36.

The purple lines show the total response capability required at 0.5Hz deviation to contain frequency within our security standard, e.g. for a sudden loss. The orange lines show the indicative minimum dynamic response at a 0.5Hz deviation for settlement period 36.



## Overnight 12-Month Requirement



### Historic Bids and Offers

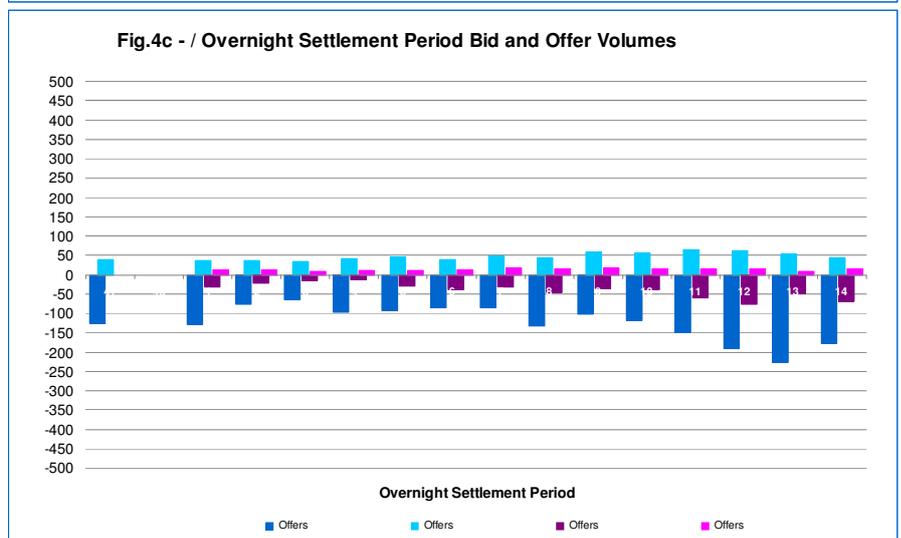
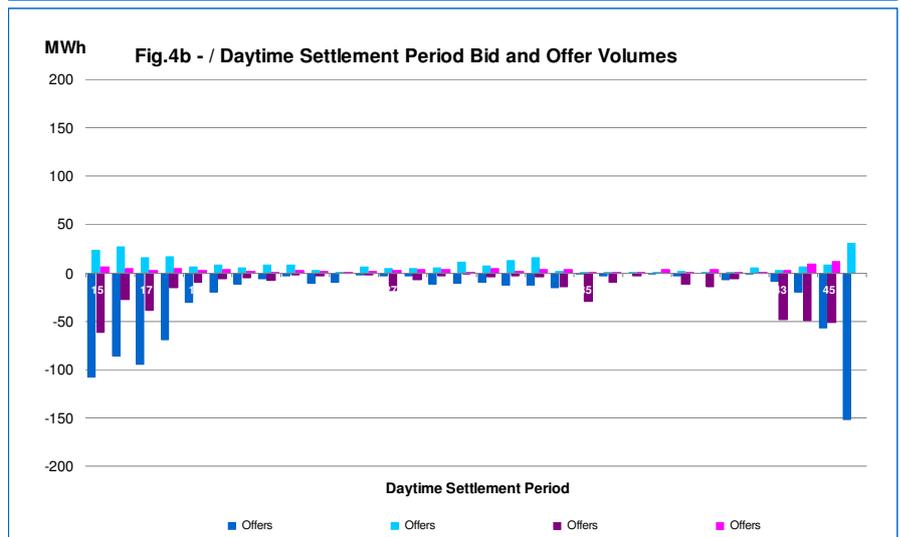
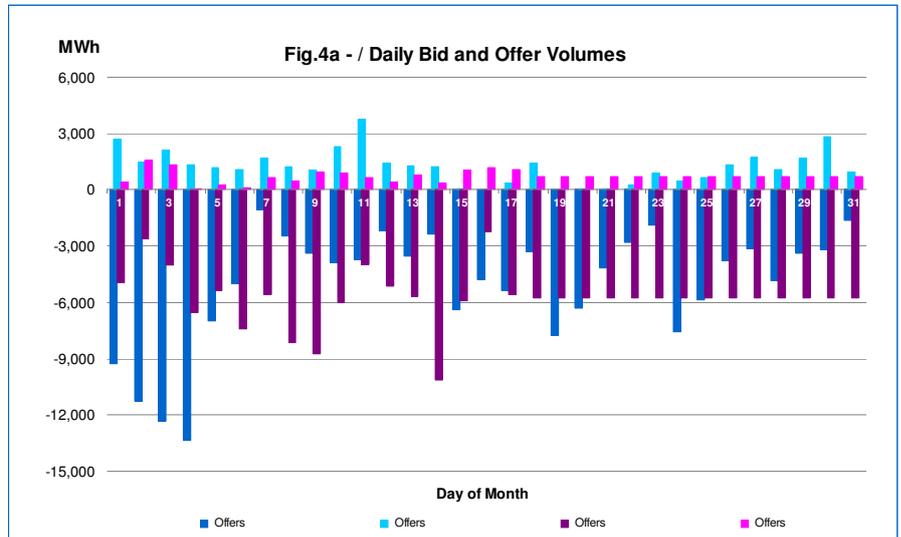
Figures 4a to 4c show the volume of Bid and Offer (BOA) instructions accepted by BM units that were, in conjunction with the delivery of the BOA energy, also providing frequency response.

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 January 2015 and February 2015.

In order to publish this report by the 18<sup>th</sup> business day of February, figures for the last few days of February have been estimated. The actual figures for February 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 Mar-2015**

In Mar-2015, 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 **Monday 02/03/2015**(1<sup>st</sup> business day) for all tenders.

National Grid will notify service providers of the outcome of the tender assessment by **Tuesday 17/03/2015** (12<sup>th</sup> business day).

For successful tenders, National Grid will notify nominated windows, following assessment by **Tuesday 17/03/2015** (12<sup>th</sup> business day).

**Mandatory Response Costs**

<b>Response Bid and Offer Volume and Cost</b>		
	January 2015 (Actual)	February 2015 (Estimate)
Total Response Bid Cost	<b>2.78 £m</b>	<b>1.53 £m</b>
Total Response Bid Volume	156,855 MWh	161,437 MWh
Total Response Offer Cost	<b>0.85 £m</b>	<b>0.26 £m</b>
Total Response Offer Volume	37,824 MWh	20,272 MWh

<b>Response Holding Volume and Cost</b>			
01/01/2015	Primary	Secondary	High
Price band (£/MW/h range)	Volume (MWh)	Volume (MWh)	Volume (MWh)
0 to 2	62,187	115,434	120,737
2 to 4	193,934	66,430	17,688
4 to 6	20,641	163	290,538
6 to 8	1,556	0	15,787
Greater than 8	350	139	34,795
<b>Total Volume</b>	<b>278.7 GWh</b>	<b>182.2 GWh</b>	<b>479.5 GWh</b>
<b>Cost</b>	<b>0.70 £m</b>	<b>0.28 £m</b>	<b>2.16 £m</b>
<b>Total Frequency Response Holding Volume</b>			<b>940.4 GWh</b>
<b>Total Frequency Response Holding Cost</b>			<b>3.15 £m</b>

01/02/2015	Primary	Secondary	High
Price band (£/MW/h range)	Volume (MWh)	Volume (MWh)	Volume (MWh)
0 to 2	44,523	112,061	118,764
2 to 4	172,973	58,619	41,231
4 to 6	21,760	1,110	243,066
6 to 8	6,461	5	25,901
Greater than 8	185	0	22,619
<b>Total volume</b>	<b>245.9 GWh</b>	<b>171.8 GWh</b>	<b>451.6 GWh</b>
<b>Cost</b>	<b>0.66 £m</b>	<b>0.25 £m</b>	<b>1.90 £m</b>
<b>Total Frequency Response Holding Volume</b>			<b>869.3 GWh</b>
<b>Total Frequency Response Holding Cost</b>			<b>2.81 £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.