

**April 2018**

**Procurement Guidelines Report  
FY 2017/18**

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**nationalgrid**



**As required by Standard Condition  
C16 of the National Grid's Electricity  
Transmission Licence.**

# Procurement Guidelines Report

1 April 2017 to 31 March 2018

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## 1. INTRODUCTION

National Grid procures Balancing Services subject to the framework laid down in Condition C16 of the Transmission Licence. This framework obliges National Grid to “operate the transmission system in an efficient, economic and co-ordinated manner” and also requires a number of statements and reports on the procurement and use of Balancing Services to be established. The **Procurement Guidelines** is one of these statements, and sets out the principles used in our procurement of Balancing Services, the kinds of Balancing Services that we may be interested in purchasing and the mechanisms by which we do so. The Procurement Guidelines is published on National Grid’s website and is subject to annual review and industry consultation. When a new Procurement Guidelines statement is published annually (covering the forthcoming relevant period), National Grid is required to produce a **Procurement Guidelines Report** (“Report”) covering the preceding relevant period, having previously agreed the ‘form’ of the Report with The Authority.

### 1.1 Purpose of Procurement Guidelines Report

The purpose of the Report is to provide information in respect of the relevant<sup>1</sup> Balancing Services that National Grid has procured in the defined reporting period.

### 1.2 Reporting Period

In accordance with Condition C16 of the Transmission Licence, the Report will be produced within one month after the date on which each revised Procurement Guidelines Statement is to be published.

The information utilised in this report is the best available at the time of publication and may be subject to minor changes as a result of final reconciliation.

<sup>1</sup> Scope of the balancing services covered in this document can be found in section 1.3 and 1.5

## 1.3 Balancing Services

The Balancing Services National Grid has procured, either via market arrangements or bilateral contracts, throughout the period covered by the Report, are:

- Frequency Response
- Reactive Power
- Fast Start
- Black Start
- Reserve Services - Fast Reserve, STOR and BM Start-Up
- System to System Services
- Inter-trips
- Ancillary Contracts to manage System issues
- Maximum Generation Service
- All Other Services
- Energy Related Products (including PGBTs)
- BM Constraints

It is important to note that Balancing Services are procured from both Balancing Mechanism and Non-Balancing Mechanism Parties.

## 1.4 Structure of Report

This report presents the Balancing Services under four main titles:-

- Services Procured via Market Arrangements
- Services Procured via Non-Tendered Bilateral Contracts
- Other Energy Related Products
- Constraints

It is then followed by a summary section providing the high level information for all services for the financial year 2016-17.

## 1.5 Services not included in the report

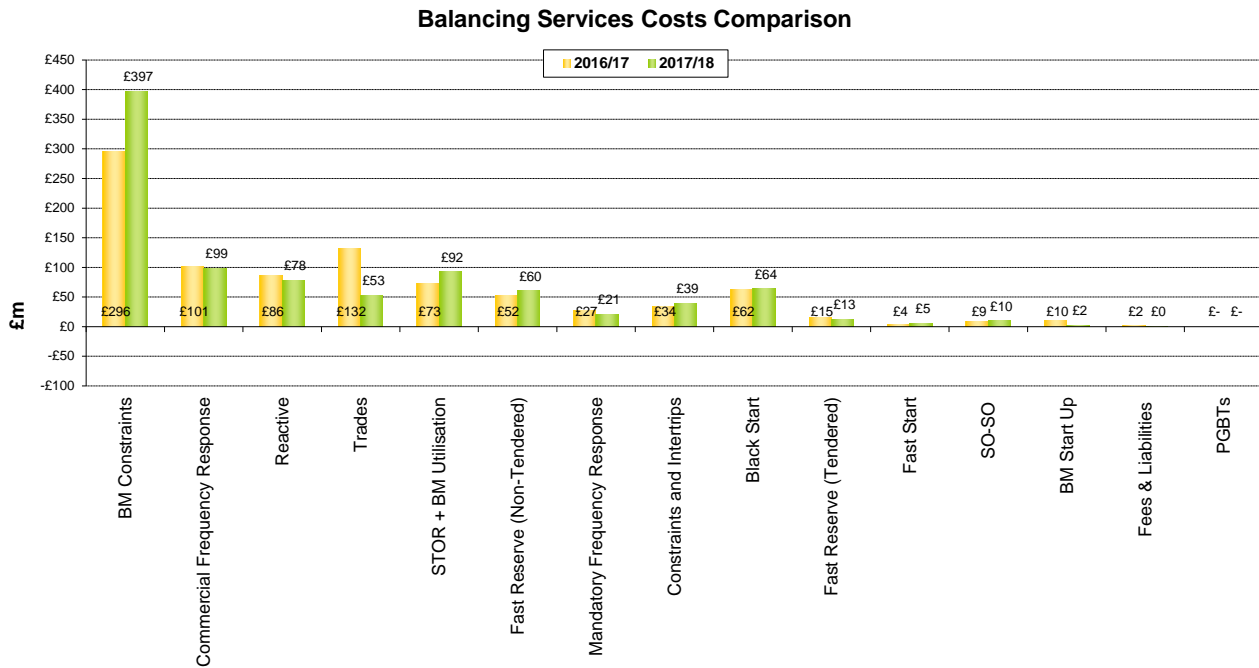
The scope of the Procurement Guidelines does not include the acceptance of Bids and Offers in the Balancing Mechanism. However, Bids and Offers for Constraint management (see section 5) and BM STOR Utilisation (see section 2.7) have been included to provide an appreciation of the overall costs. Further information on Bid and Offer acceptances can be found in the Balancing Principles Statement Report.

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## 1.6 Comparison with previous year

The total cost of Balancing Services over this financial year has increased by circa £31m, from circa £902m in 2016/17 to circa £933m in 2017/18. Trades was the category cost that saw the biggest reduction, showing a decrease of £79m. STOR costs (including BM utilization) increased by £20m. BM Constraints showed the highest increase from the past financial year with a value of around £397m, which is £101m higher than in 2016/17.



# Procurement Guidelines Report

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## 2. Services Procured Via Market Arrangements

### 2.1 Reactive Power

National Grid manages voltage on the transmission system within statutory limits to ensure quality of supply in line with the National Electricity Transmission System Security and Quality of Supply Standards (NETS SQSS). In doing this we ensure that reactive power resources are provided on a localised basis to meet the constantly varying needs of the system, and that there is sufficient reactive power reserve available to meet contingencies.

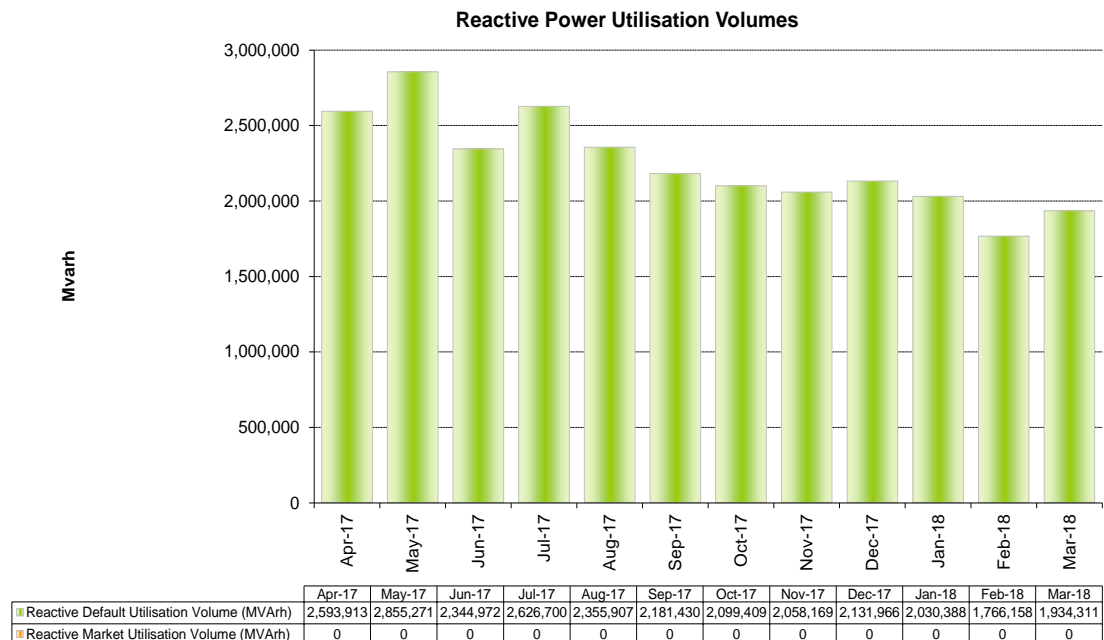
### 2.2 Market Arrangements for Reactive Power

There were two tender rounds (TR39, TR40) covering April 2017 to March 2018 period. No tenders were received for this period. Further information regarding each of these tender rounds can be found at the following website address:

<https://www.nationalgrid.com/uk/electricity/balancing-services/reactive-power-services>

Utilisation volume of Reactive Power under Market and Default arrangements over the relevant period are detailed in the chart below.

There was no reactive power utilisation volumes under market arrangements as a result of no tenders being received for the period.



## 2.3 Default Arrangements for Reactive Power

Further information regarding the default payment arrangements can be found at the following National Grid Website.

<http://www2.nationalgrid.com/uk/services/balancing-services/reactive-power-services/>

## 2.4 Reactive Power Comparison with previous year

Total Reactive Power costs have decreased from £86.1m in 2016/17 to £78.48m in 2017/18. The Utilisation Volume decreased as well, from around 29TVARh in 2016/17 to around 27TVARh in 2017/18

The average monthly Reactive Default Price in 2017/18 increased to £2.92/MVARh from £2.75/MVARh in 2016/17.

Utilisation volume and costs of Reactive Power under Market and Default arrangements for the last 10 years are detailed in the charts below.

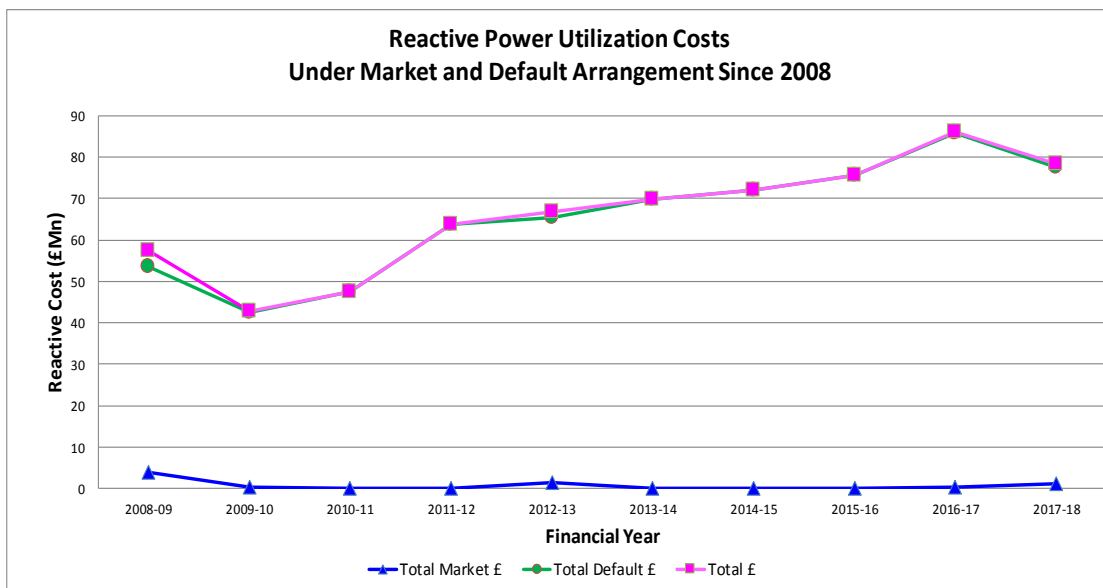
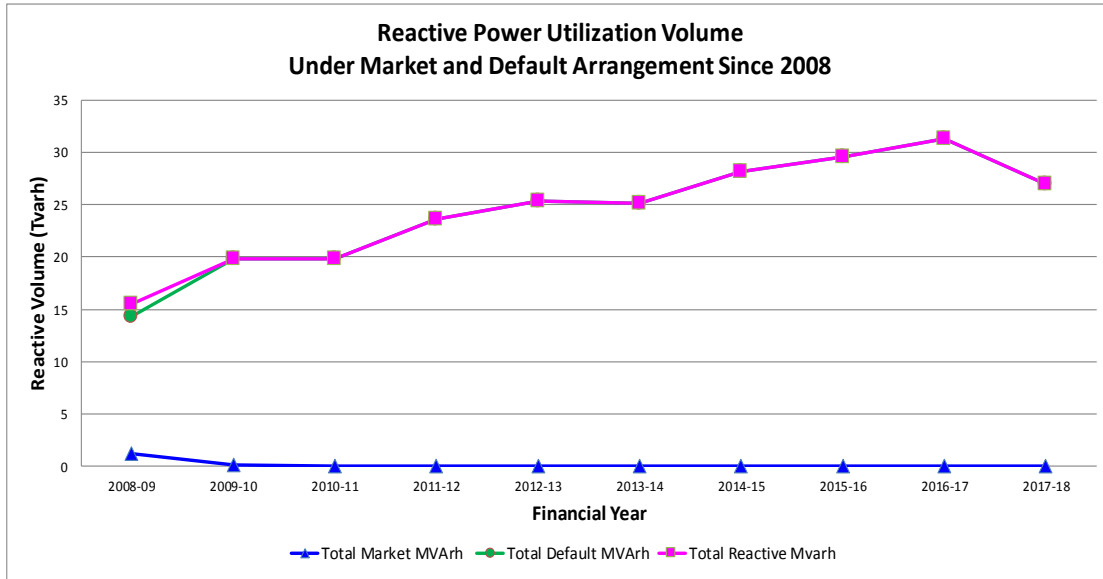
The proportion of utilisation under “market arrangement” has been shrinking, and in the previous 8 years, reactive power was purchased solely via the default arrangement.

In some instances, additional Balancing Service contracts were taken to ensure generators were running and thus able to provide reactive power via the default mechanism. The costs of these addition contracts are reported in section 3.14.



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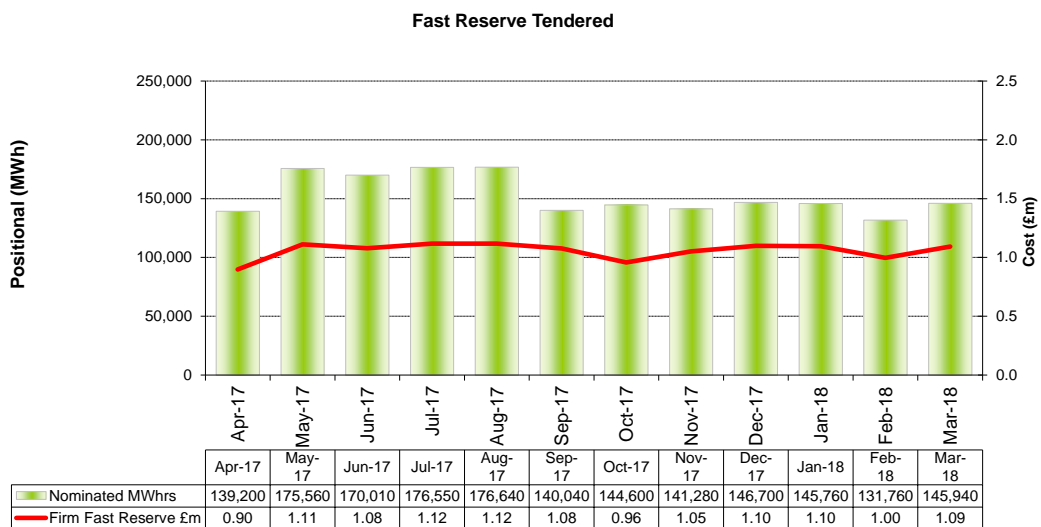
## 2.5 Fast Reserve

Further information explaining Fast Reserve and the assessment criteria of tenders can be found on the National Grid Website.

<https://www.nationalgrid.com/uk/electricity/balancing-services/reserve-services/fast-reserve>

## 2.6 Fast Reserve (Tendered) Comparison with previous year

The following graph shows the monthly variation in nomination hours from the contracted Fast Reserve Capacity.



The nominated volume of Fast Reserve of 1,834GWh in 2017/18 has not significantly changed from 1,827GWh in 2016/17. The requirement for Firm Fast Reserve has remained at 300MW.

The cost of the contracting Firm Fast Reserve in 2017/18 was £12.69m, this has decreased compared to £14.54m in 2016/17. This is due to increased competition in the Fast Reserve Market from NBM participants which has led to lower prices.

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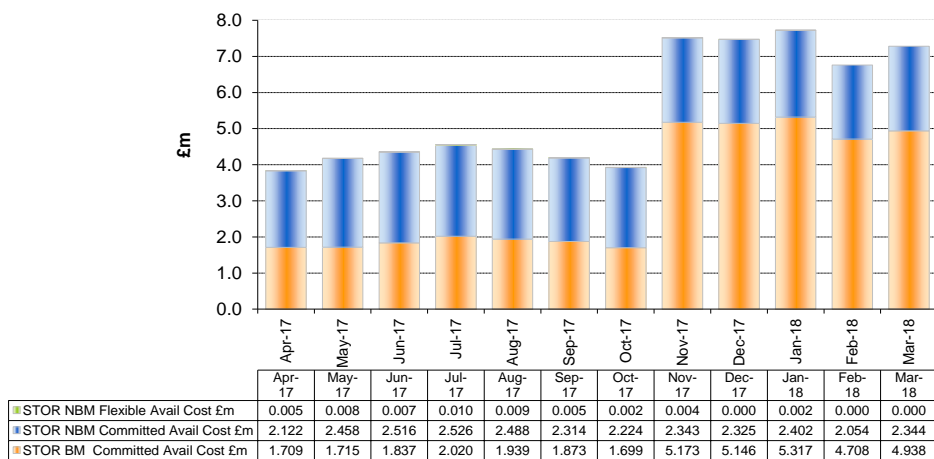
## 2.7 Short Term Operating Reserve (STOR) including Balancing Mechanism (BM) and Non-Balancing Mechanism (NBM)

National Grid procures Short Term Operating Reserve (STOR) through a competitive tender process which is conducted three times per year.

Further information on STOR can be found on the National Grid website:

<https://www.nationalgrid.com/uk/electricity/balancing-services/reserve-services/short-term-operating-reserve-stor>

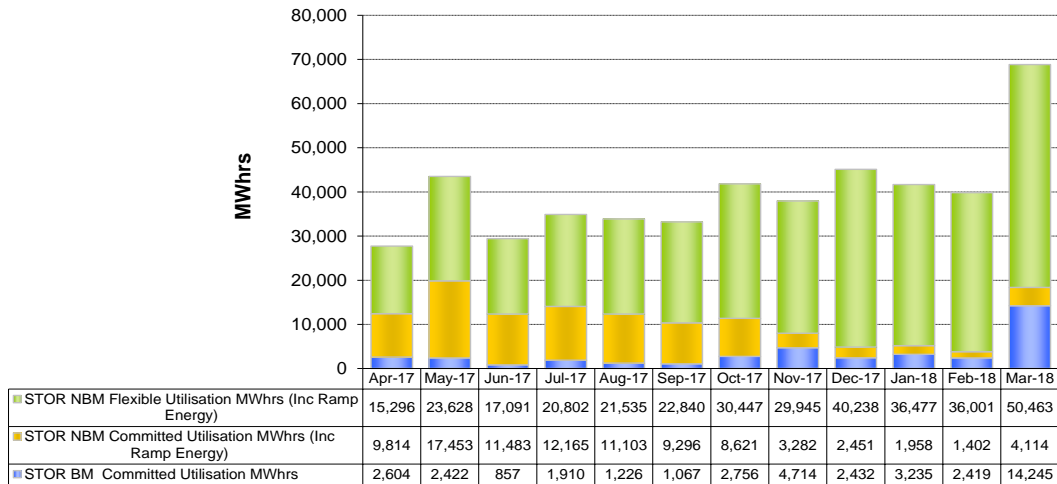
**STOR BM and NBM Availability Costs- Flexible and Committed**



# Procurement Guidelines Report

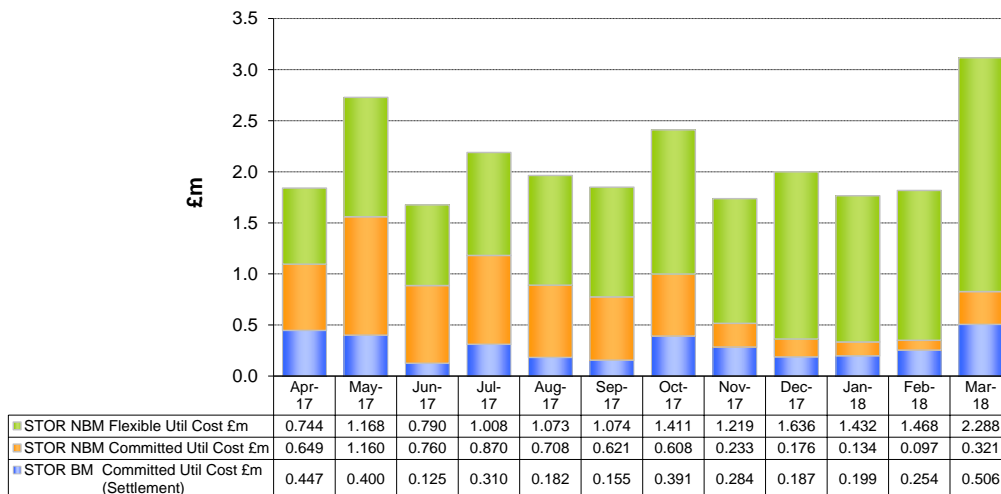
1 April 2017 to 31 March 2018

## STOR BM and NBM Utilisation MWhrs - Flexible and Committed



The greatest proportion of utilization was from NBM-Flexible STOR. However, in the summer the proportional difference is less. This is due to a greater proportion of the NBM market's provision providing committed STOR services in the summer. More information on contracted MW's and accepted/rejected prices can be found in the STOR market information reports.

## STOR BM and NBM Utilisation Cost - Flexible and Committed



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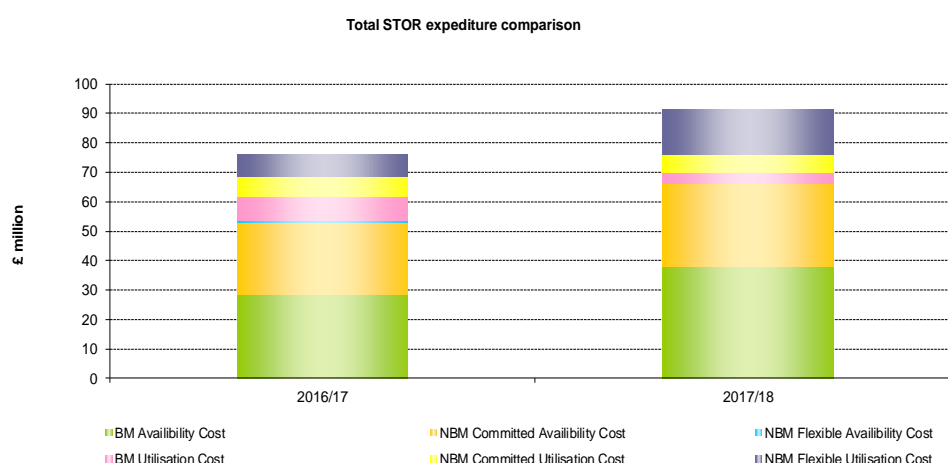
## STOR BM and NBM Utilisation Volume and Costs (Data)

Month	STOR BM Committed Util Cost £m (Settlement)	STOR NBM Committed Util Cost £m	STOR NBM Flexible Util Cost £m	STOR BM Committed Utilisation MWhrs	STOR NBM Committed Utilisation MWhrs (Inc Ramp Energy)	STOR NBM Flexible Utilisation MWhrs (Inc Ramp Energy)
Apr-17	0.447	0.649	0.744	2,604	9,814	15,296
May-17	0.400	1.160	1.168	2,422	17,453	23,628
Jun-17	0.125	0.760	0.790	857	11,483	17,091
Jul-17	0.310	0.870	1.008	1,910	12,165	20,802
Aug-17	0.182	0.708	1.073	1,226	11,103	21,535
Sep-17	0.155	0.621	1.074	1,067	9,296	22,840
Oct-17	0.391	0.608	1.411	2,756	8,621	30,447
Nov-17	0.284	0.233	1.219	4,714	3,282	29,945
Dec-17	0.187	0.176	1.636	2,432	2,451	40,238
Jan-18	0.199	0.134	1.432	3,235	1,958	36,477
Feb-18	0.254	0.097	1.468	2,419	1,402	36,001
Mar-18	0.506	0.321	2.288	14,245	4,114	50,463

[Please note graphs and the table above do not reflect any seasonal reconciliation due to non-availability]

Non-Balancing Mechanism (Non-BM) STOR Availability payments, Non-BM STOR Utilisation payments and BM STOR Availability payments are paid as Ancillary Services. BM STOR Utilisation payments are paid via the BM Bids and Offers, not as an Ancillary Service; they are included in this report to clarify the total STOR expenditure. STOR BM Utilisation costs in this report are based on actual spend (i.e. MWh Utilised x Utilisation Price for that BM STOR unit).

## 2.8 STOR Comparison with previous year



Total STOR costs for 2017/18 were £91m, which is £15m higher than in 2016/17. The cost increases are associated with increased availability spend and increased utilisation of NBM Flexible STOR.

Further information on STOR contracted volumes and accepted/rejected prices can be found in the STOR market information reports.

<https://www.nationalgrid.com/uk/electricity/balancing-services/reserve-services/short-term-operating-reserve-stor?market-information>

## **2.9 Tendered Frequency Response**

Please see Section 3.2 Services Procured via Non-Tendered Bilateral Contracts.

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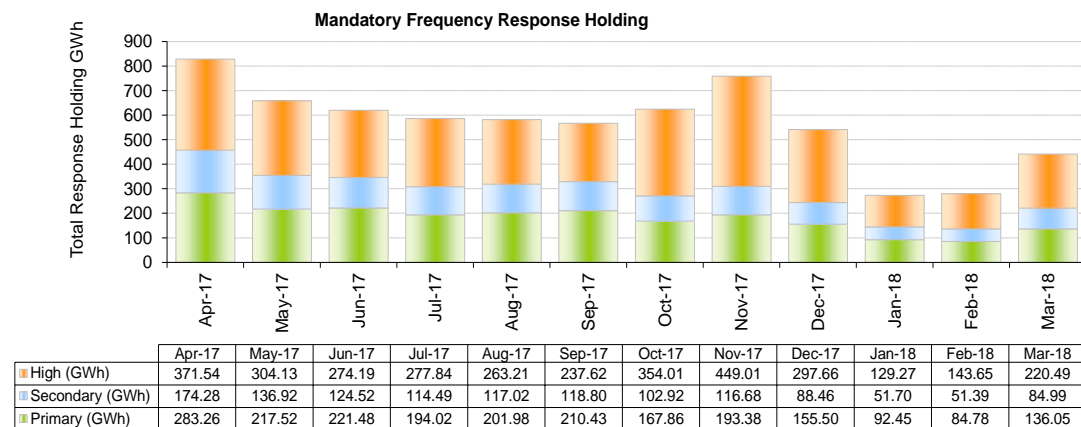
## 3. Services Procured Via Non-Tendered Bilateral Contracts

### 3.1 Mandatory Frequency Response

Mandatory Frequency Response is a compulsory service provided by large generators (>100MW) to automatically change their active power output in response to a change in system frequency. The Grid Code Connection Condition 6.3.7 and 8.1 describe the technical requirements for this service.

Payments for Mandatory Frequency Response comprise a Holding Payment (£/MW/h) and a Response Energy Payment (£/MWh). Details on frequency response holding volumes are given below. More information on this can be found on the National Grid Website.

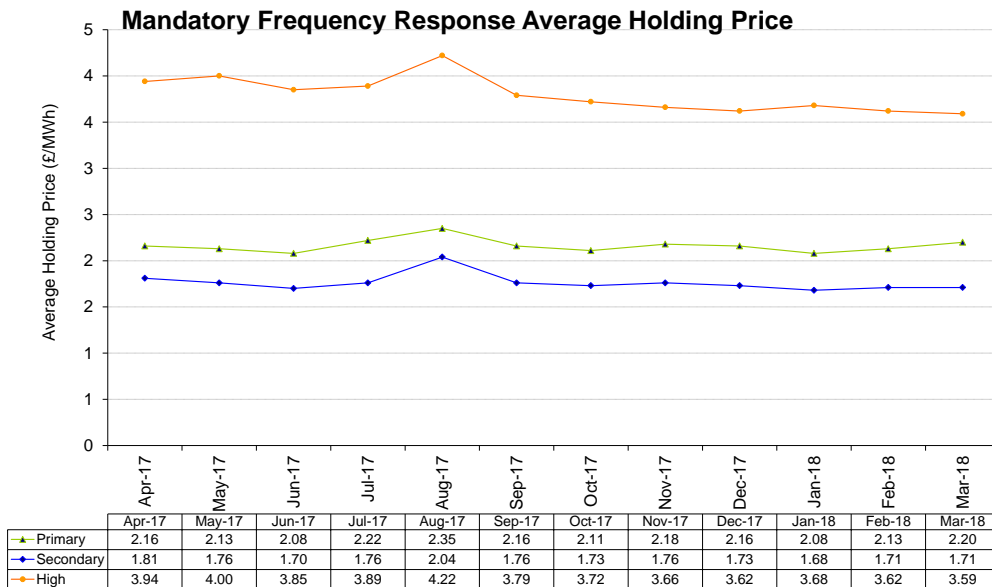
<http://www2.nationalgrid.com/uk/services/balancing-services/frequency-response/mandatory-frequency-response/>



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The next chart shows the Average Holding price paid for Mandatory Frequency Response.



The methodology for calculating Mandatory Frequency Response energy payments is given in CUSC section 4.1.3.9 & 4.1.3.9A.

<http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/>

## 3.2 Commercial Frequency Response

Commercial Frequency Response is a collection of services that can be provided by demand side participants and generation plant. The technical characteristics of these services are different to those required under mandatory service arrangements, and range from enhanced mandatory dynamic services through to non-dynamic services effected via Low Frequency relays. Part of the contract portfolio includes services provided by demand side participants via the Frequency Control by Demand Management (FCDM) service and through Firm Frequency Response (FFR) tender rounds.

Further information on Commercial Frequency Response is available on the National Grid Website, or specifically on firm frequency response through the tenders and reports section of National Grid's Balancing Services website.

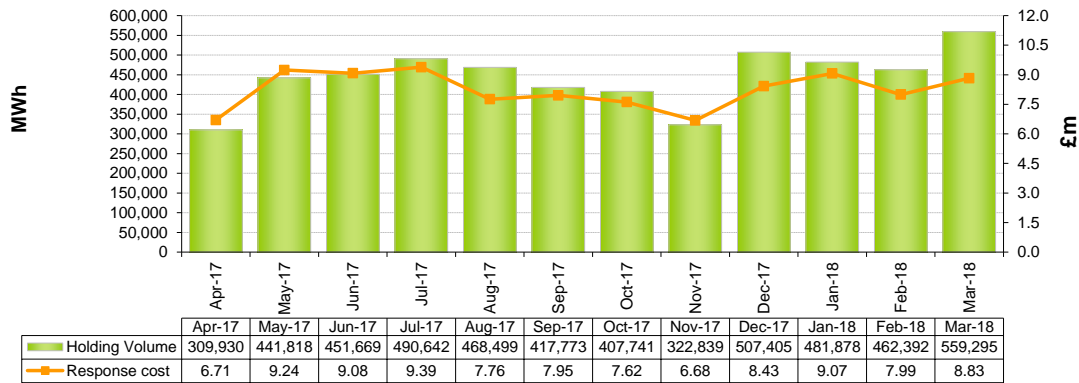
<http://www2.nationalgrid.com/uk/services/balancing-services/frequency-response/>



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## Commercial Frequency Response Holding



The response holding volume shown in the chart above is the Primary response capability or Secondary response capability if no Primary is offered. The costs are the total cost for all capabilities (Primary, Secondary and High).

### 3.3 Frequency Response Comparison with previous year

There was a £2m decrease in commercial frequency response costs in 2017/18, to £99m. Mandatory frequency response costs followed a similar pattern decreasing from £27m in 2016/17 to £21m in 2017/18.

In spite of a higher volume of commercial frequency response procured in 2017/18, increased competition in the market resulted in a downwards pressure on prices and overall cost. The increase in commercial frequency holdings had the effect of displacing a large volume of Mandatory holding volume and potential costs.

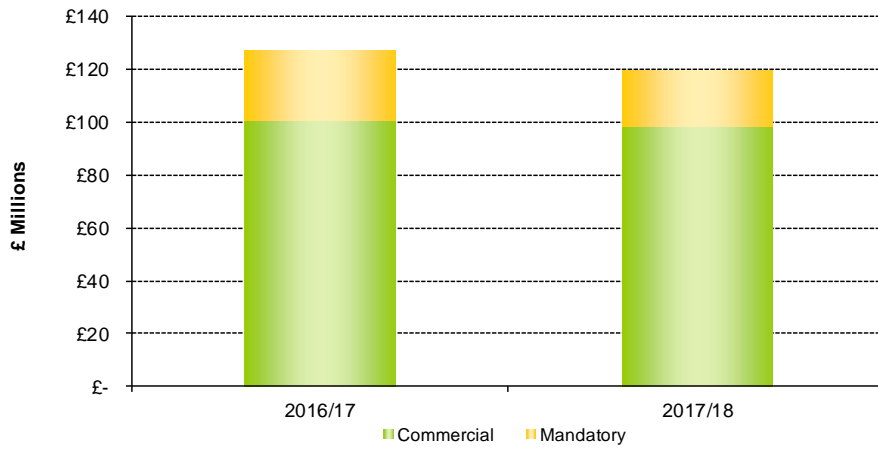
Whilst there are a number of factors which drive the volume of response holding; demand levels and error, wind volatility and level of contracted response volume amongst others, we believe that there are two key factors which have reduced the volume of response holding in January and February 2018; one is the ability to closer meet our response requirement through contracted units since moving to month ahead only tenders, the other is through the introduction of Enhanced Frequency Response (EFR).

EFR does not have holding volumes associated with it and is therefore not reported within response holding. This means lower levels of response holding are reported, without being 'replaced' by EFR volumes.

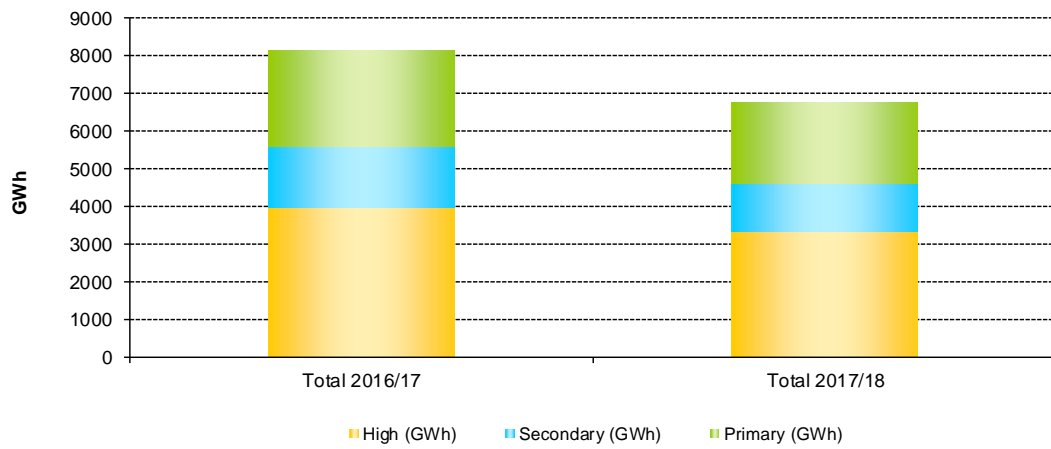
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### Total Response Holding Costs (Commercial/Mandatory)



### Total Mandatory Response Holding Volumes



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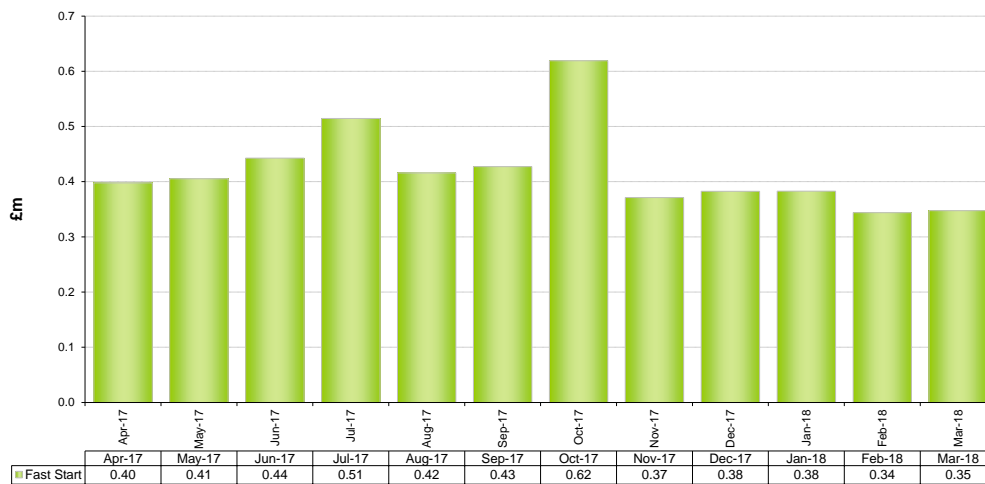
1 April 2017 to 31 March 2018

## 3.4 Fast Start

Fast Start is the ability of generation to start rapidly from a standstill condition, either via a Low Frequency triggered relay or through manual instruction; and to deliver its rated power output automatically within a defined time period. The Fast Start service is a legacy service and as such volumes and costs are not expected to change significantly.

Utilisation of the Fast start service in 2017/18 increased from 2016/17. Fast Start Capability and Utilisation Costs have come in at £5.0m in 2017/18, compared to £4.1m in 2016/17. Fast Start costs per month from April 2017 to March 2018 can be found below:

Fast Start Utilisation



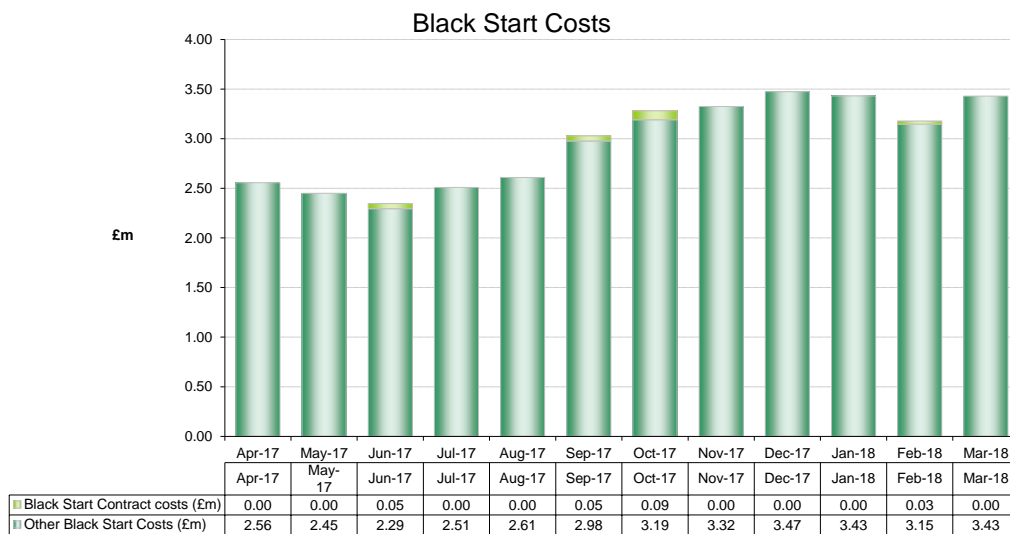
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## 3.5 Black Start

In 2017/18 there was a total of 19 Black Start providers with agreement in place. Two more providers than the past year.

Total Black Start costs in 2017/18 were £63.81m, which is an increase from the past financial year when the total spend for this category was around £62m.



[Please note that the above chart and table do not include the costs incurred in warming and running Blackstart units to maintain service availability]

Further information on Black Start can be found on the National Grid Website.

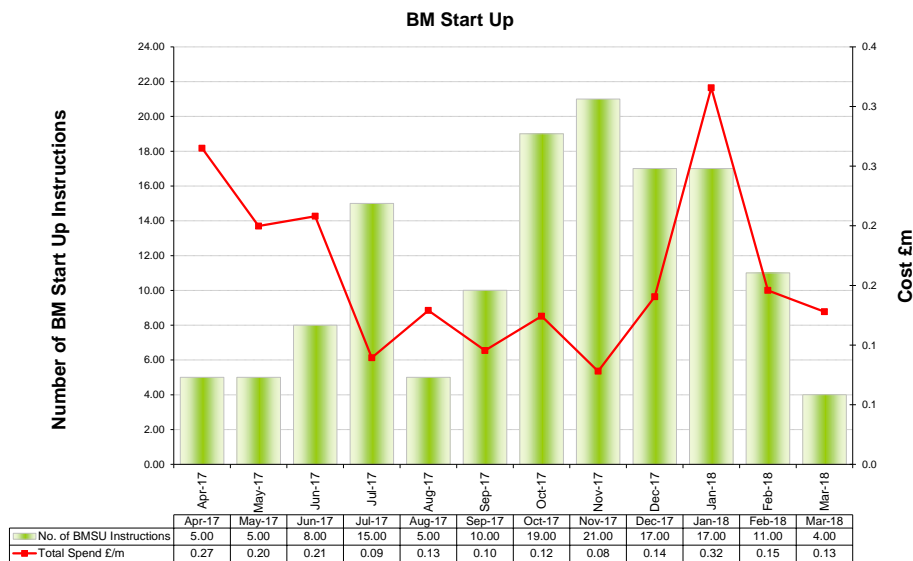
<https://www.nationalgrid.com/uk/electricity/balancing-services/system-security-services/black-start>

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## 3.6 BM Start up

The chart below contains information relating to the procurement of BM Start up Balancing Services:



## 3.7 BM Start up Comparison with previous year

The number of BM Start up instructions issued during 2017/18 was 137 compared to 326 instructions during the previous year. This decrease of over 60% of BM Start Up instructions, is reflected in the costs as well, which recorded a substantial decrease from the previous financial year. Around £1.92m was spent on this service in 2017/18 compared to £9.8m in 2016/17.

Further details are available via the National Grid Website.

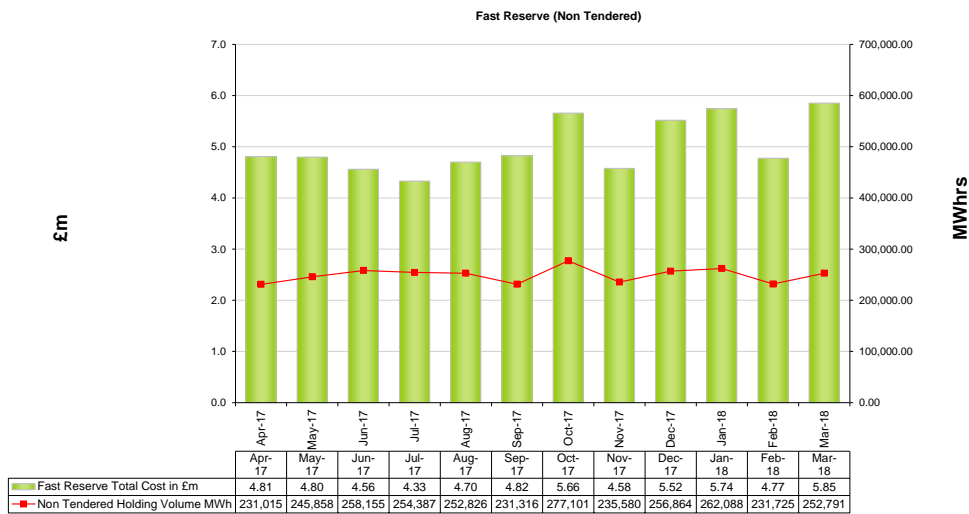
<https://www.nationalgrid.com/uk/electricity/balancing-services/reserve-services/bm-start>

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## 3.8 Fast Reserve (Procured on a Non-Tendered basis)

Non-Tendered Fast Reserve is a service that is contracted on a bilateral basis with service providers. The nature of the service is similar to the Firm Fast Reserve service although the payment and utilisation mechanisms differ for each service.



## 3.9 Non-tendered Fast Reserve Comparison with previous year

Non-tendered Fast Reserve costs have increased to £60.13m in 2017/18 from £51.86m in 2016/17.

The non-tendered holding volume in 2017/18 has increased to 2,990GWh, from 2,976GWh in 2016/17.

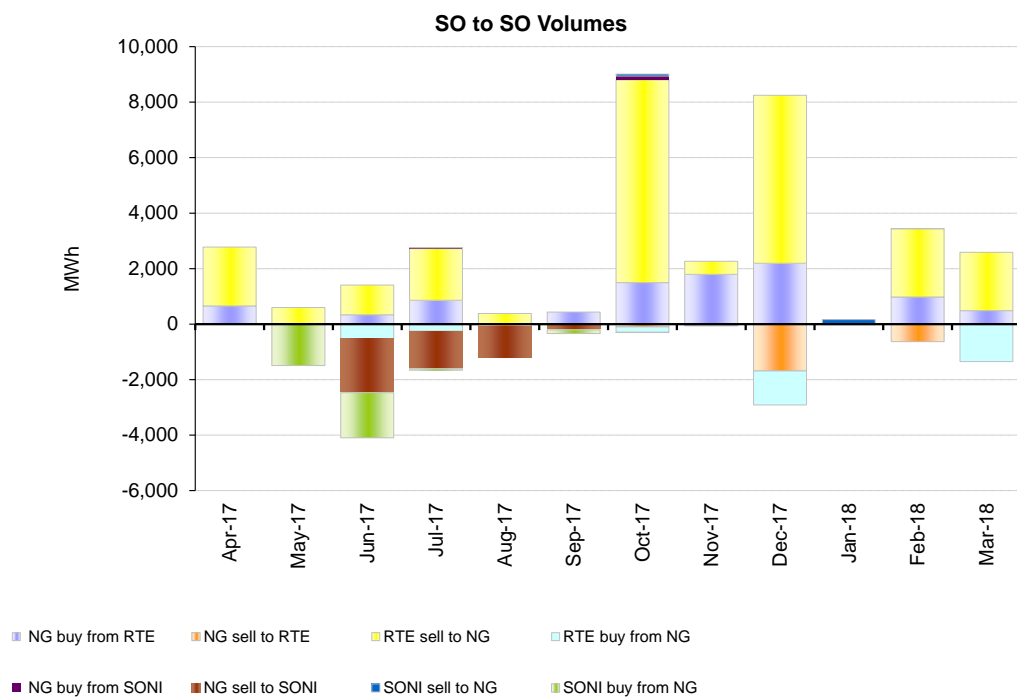
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## 3.10 System to System Services

System to System services are provided mutually with other Transmission System Operators connected to the GB system via interconnectors. Such services are typically used to manage interconnector transfer profiles and to increase or reduce power flows across an interconnector to resolve transmission constraints on either side, or provide Emergency Assistance if required.

The graph below shows the total net volume imported and exported between Great Britain, France and Ireland. Please see **Appendix 1** for further clarification on System Operator to System Operator (SO-SO) services.

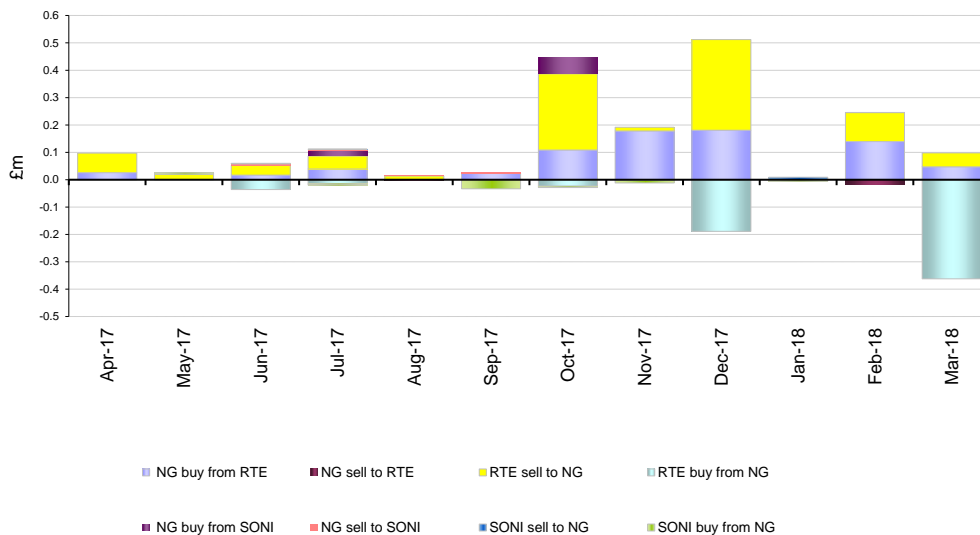


For definition see Appendix 1

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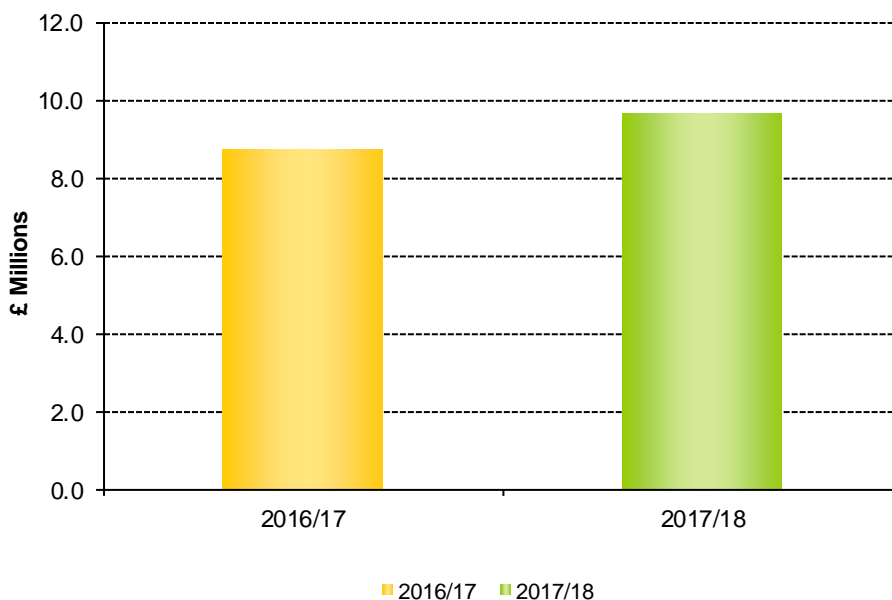
**SO to SO Costs**



### 3.11 SO-SO Comparison with previous year

Total System Operator to System Operator Costs have increased from £8.7m in 2016/17 to £9.62m in 2017/18 as shown in the graph below.

**SO-SO Net Costs**





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The volume of SO-SO trades undertaken decreased this year from 102GWh net in 2016/17 to 19GWh net in 2017/18. This reduction in SO-SO trades is largely due to an increase in forward trading across the interconnectors via counter parties.

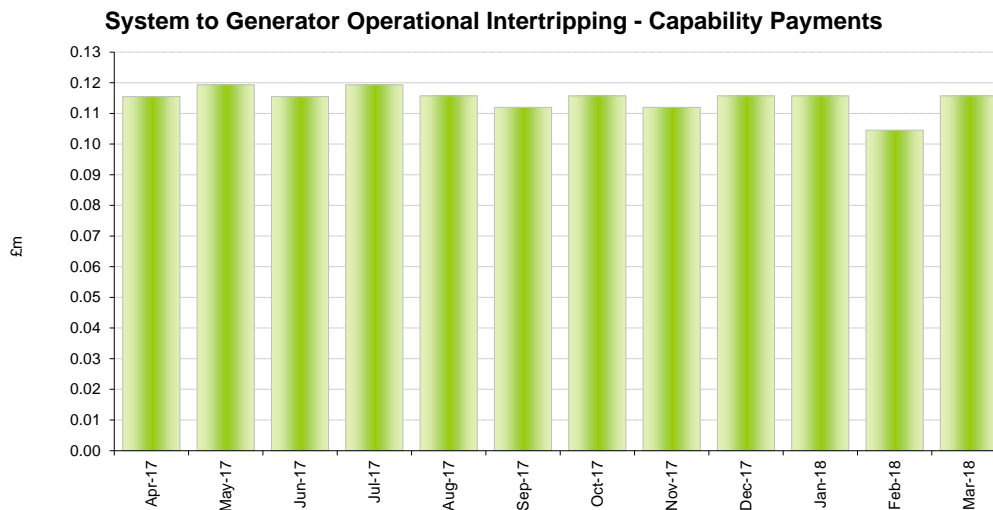
This represents a move on the part of National Grid away from using SO-SO actions towards other, more economic tools for managing the wider system. Export volumes remained roughly similar at 20GWh per year.

## 3.12 System to Generator Operational Inter-tripping Schemes

As a consequence of their connection conditions, certain generators are obligated to have in place operational intertrip schemes.

These schemes fall under a number of different category types as defined under section 4.2.A of the CUSC which describes the respective compensation arrangements. A proportion of these categories entitle the counterparty to payments for maintaining the capability to provide the intertrip and also following utilisation of the service.

Total costs for System to Generator Operational Inter-tripping Schemes has increased slightly from £1.34m in 2016/17 to £1.38m in 2017/18.

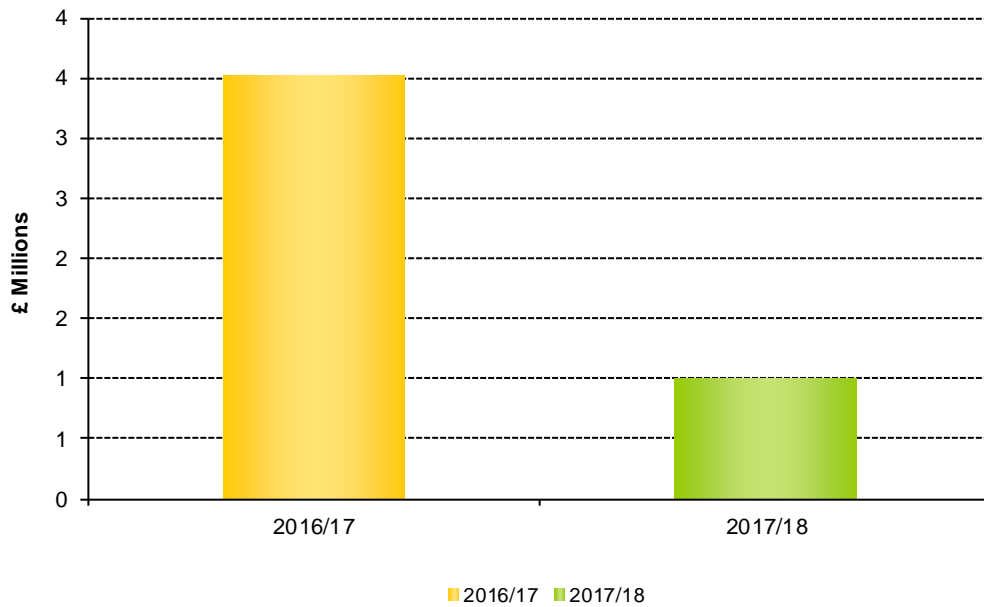


### 3.13 Commercial Intertrip Service

In addition to System to Generator Operational Inter-tripping Schemes, National Grid will seek to, where it proves economic and efficient to do so, enter into Commercial Intertrip schemes to assist with managing system issues.

The total expenditure on Commercial Intertrips has decreased from £3.5m in 2016/17 to £1m in 2017/18.

**Commercial Intertrip Cost Comparison**

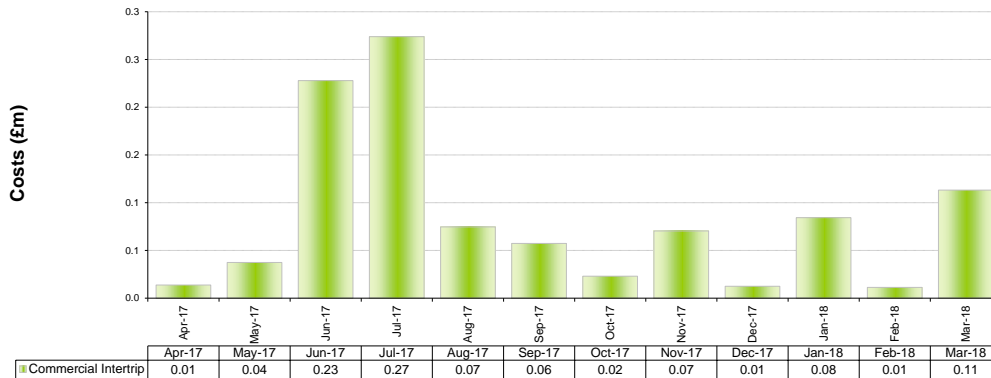


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## Commercial Intertrip Monthly Summary

Commercial Intertrips



Month	Capability Payment £'s	Arming Payment £'s	Number of Hours of Intertrip Arming, Outside of Pre-Paid Arming Contract(s)	Contracted Pre-paid Arming £'s	Number of Hours Armed under Pre-Paid Arming Contract(s)	Number of Trips	Tripping Payment £'s
Apr-17	12,092	1,725	6	0	0	0	0
May-17	12,495	24,970	40	0	0	0	0
Jun-17	12,092	215,769	209	0	0	0	0
Jul-17	12,495	261,466	243	0	0	0	0
Aug-17	12,495	61,955	94	0	0	0	0
Sep-17	12,092	45,284	73	0	0	0	0
Oct-17	12,495	10,484	17	0	0	0	0
Nov-17	12,092	58,263	99	0	0	0	0
Dec-17	12,495	0	0	0	0	0	0
Jan-18	12,495	71,885	54	0	0	0	0
Feb-18	11,286	0	0	0	0	0	0
Mar-18	12,495	100,914	159	0	0	0	0

Under commercial intertrip agreements arming is payable either as;

1. A fixed pre-agreed sum, this may be for a fixed number of hours or unlimited hours (shown above as Contracted arming) or;
2. Payable on utilisation with the generator typically having the right to alter their payments with a short notice period (shown above as Arming Payments).
3. The "Contracted Pre-Paid Arming" column indicates the maximum firm payment that could be made assuming the intertrip is available for use for all the Contracted Arming hours during the contracted period.

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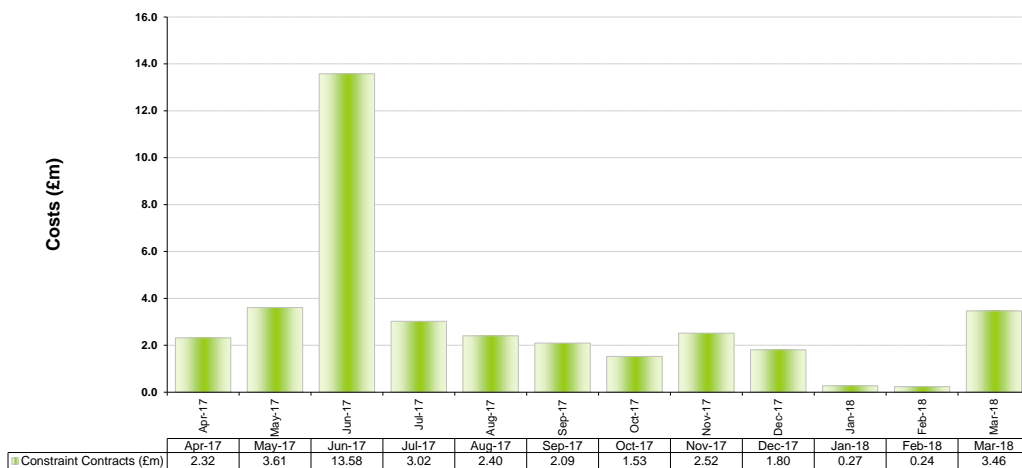
## 3.14 Balancing Services Contracts to manage System Issues

On occasion, National Grid enters into bespoke Balancing Services contracts to manage certain transmission system issues for example voltage issues. The contracts agreed via tender runs are available on the National Grid website, some of them however, by the nature of these contracts, remain confidential. The costs reported here include any costs of 'Transmission Related Agreements', which are entered as a consequence of certain customer choices of connection conditions.

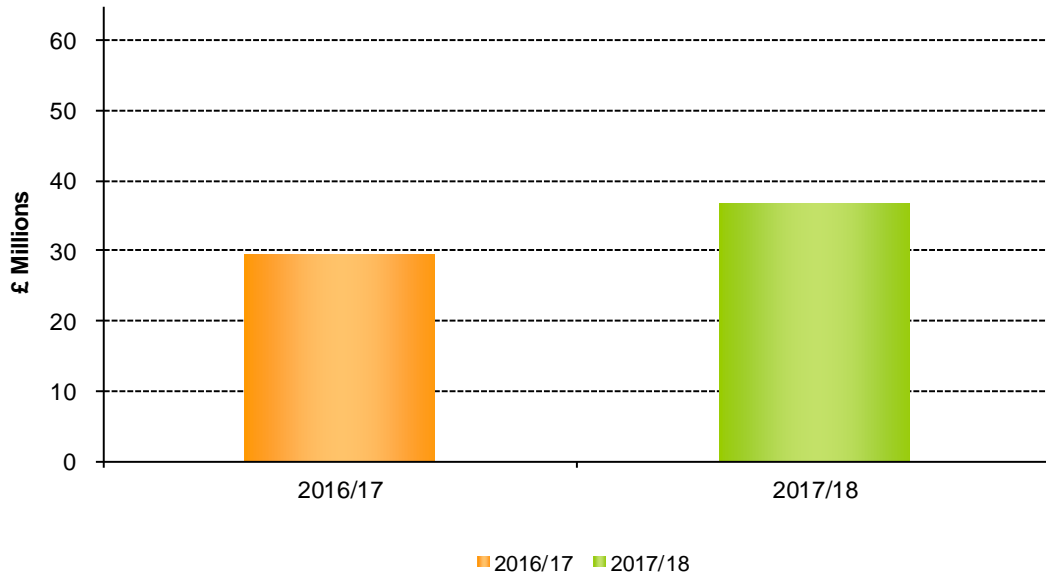
More information related to contracts designed to economically and effectively manage forecast constraint cost and volumes, arising from declining MVAR demand and low levels of expected generation overnight, can be found on the National Grid Website:

<http://www2.nationalgrid.com/UK/Services/Balancing-services/System-security/Transmission-Constraint-Management/Transmission-Constraint-Management-Information/>

Balancing Services Contracts



## Balancing Service Contracts for System Issues Costs



### 3.15 System Issues Comparison with previous year

The costs of managing Transmission System constraints via contracts increased from £29.3m in 2016/17 to £36.8m in 2017/18.

The constraint contract costs are the amount spent on contracts with generators to manage constraint groups as economically as possible and avoid cost that would have otherwise been accrued in the Balancing Mechanism.

Costs have largely increased due to a significant fault outage in June 2017. In order to mitigate significant cost in the BM, a contract was struck with a BM party.

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## 3.16 Maximum Generation Service

The Maximum Generation Service (MGS) is required to provide additional short term generation output during periods of system stress for energy balancing. This service allows access to unused capacity outside of the Generator's normal operating range. MGS will be initiated by the issuing of an Emergency Instruction in accordance with the Grid Code BC2.9.2. Details of the service are contained in the CUSC section 4.2

Further details on the utilisation and availability of the service are available on the National Grid Website.

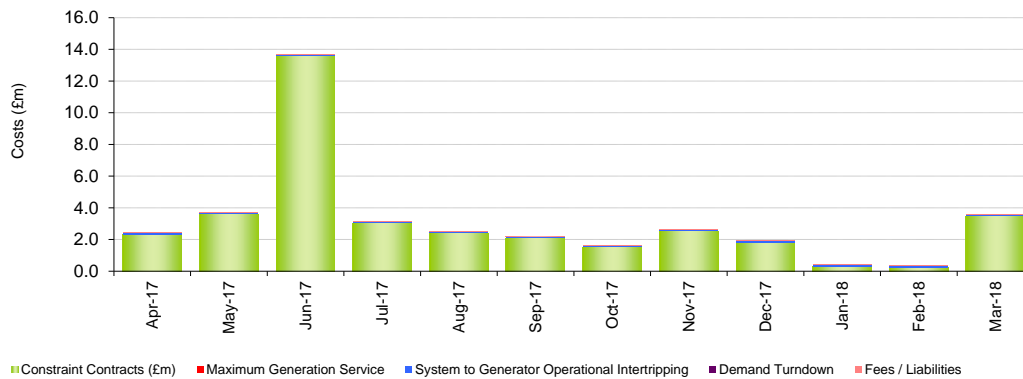
<http://www2.nationalgrid.com/uk/services/balancing-services/system-security/maximum-generation/>

The service was not utilised in 2017/18.

## 3.17 All Other Services

These include costs relating to trading fees and liabilities which are expected to be paid as a result of contracts awaiting signature or unresolved disputes. In 2017/18 costs have increased to circa £49m from £45.2m in reporting year 2016/17.

All other services



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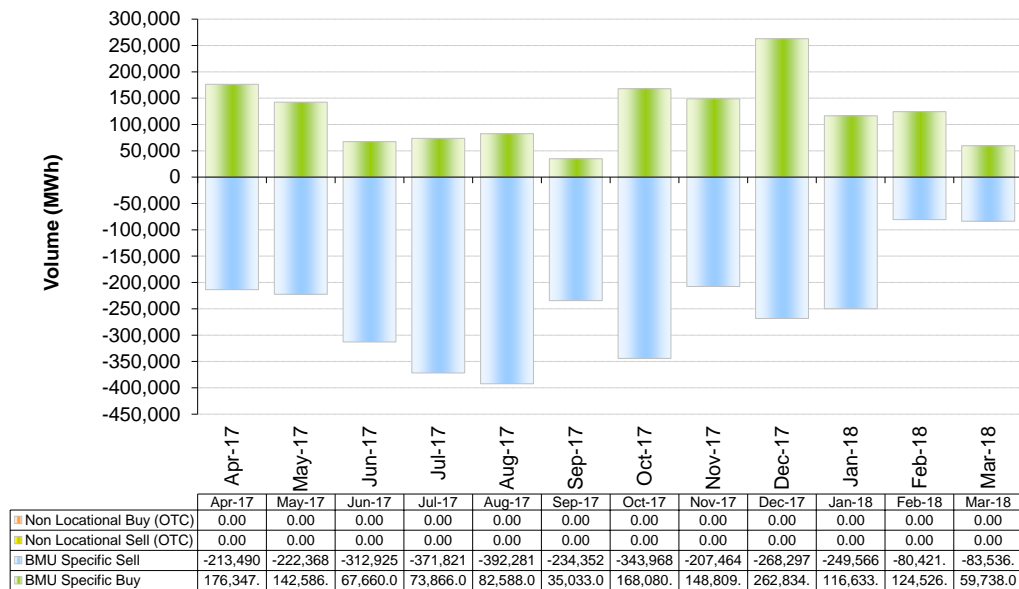
## 4. Energy Related Products

### 4.1 Forward Trading

National Grid's forward trading is undertaken to reduce the overall costs of balancing the system, and to resolve system issues as appropriate. There are a number of products and procurement mechanisms available.

<b>Non Locational</b>	Volume (MWh)	Cost (£)
Buy Volume	950.00	£102,555
Sell Volume	-1453	£43,379
<b>BMU Specific</b>		
Buy Volume (MWh)	1,218,279.5	£91,732,246
Sell Volume (MWh)	-2,644,687.5	-£60,561,474
<b>Net Total</b>		£31,229,947.58

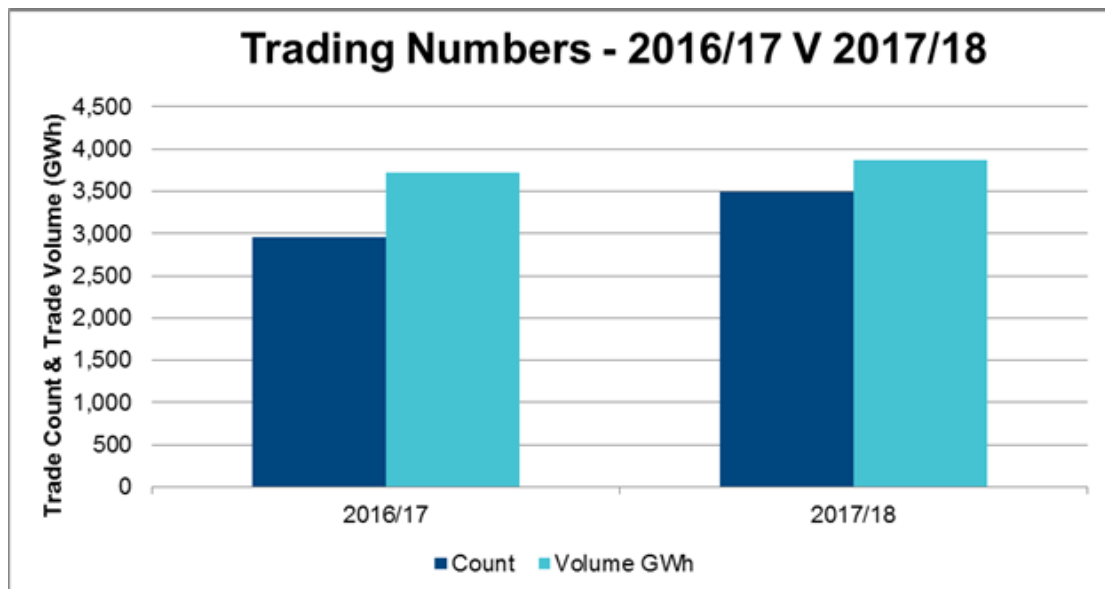
Forward Trade Buys and Sells



## 4.2 Trades Comparison with previous year

Following the large increase in trades from 2015 to 2016 the trading figures have continued to rise but at a much steadier rate. In 2017/18 we conducted over 500 more trades than in 2016/17 an 18% increase and traded an extra 150GWh of electricity. Non-locational trades have continued to decline to almost 0 whilst BMU specific trades have gone up by 5% from 2016/17.

The main driver in the increase in BMU Specific trades is trades done on the interconnectors which have gone up from 59% of our trades to almost 69% of our trades which has reduced the requirement for non-locational energy trades. Trades for SCOTEX have decreased over the year with the introduction of the HVDC link and a focus on taking units in the Balancing Mechanism for greater transparency.



Further details are available on the National Grid Website

<https://www.nationalgrid.com/uk/electricity/balancing-services/trading>

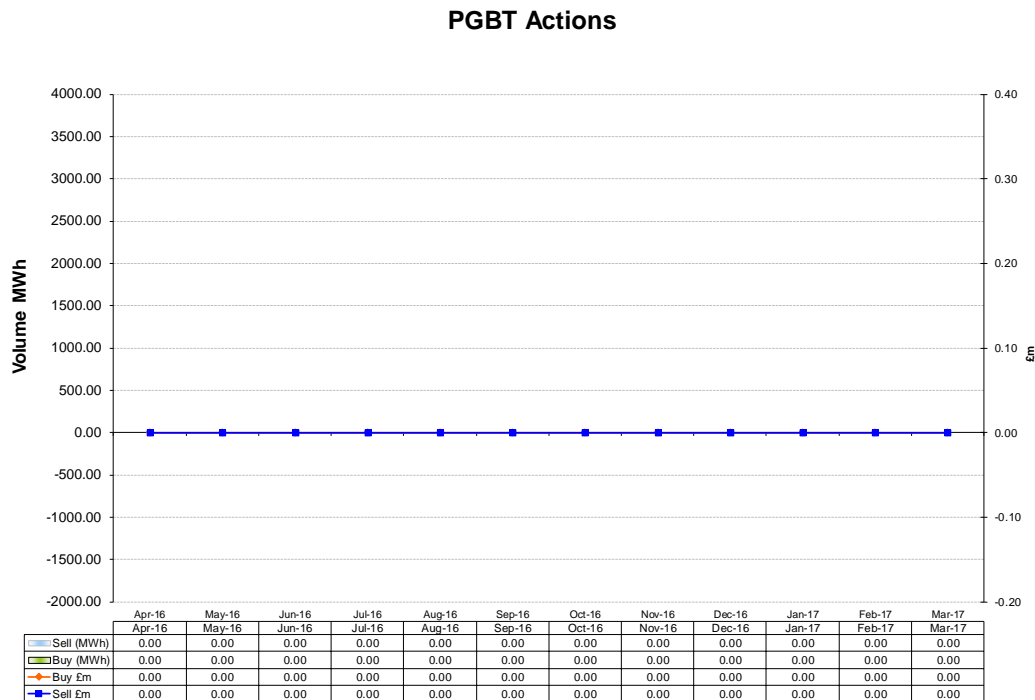


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## 4.3 Pre-Gate BMU Transactions (PGBT)

Information on PGBT activity transactions is given in the chart below:



## 4.4 PGBTs Comparison with previous year

There were no Pre-Gate BMU Transactions undertaken in 2017/18.

Details on real time PGBT transactions can be found on the BMRS (system warning page) and post event, on the National Grid Website.

<https://www.nationalgrid.com/uk/electricity/market-operations-and-data/data-explorer>

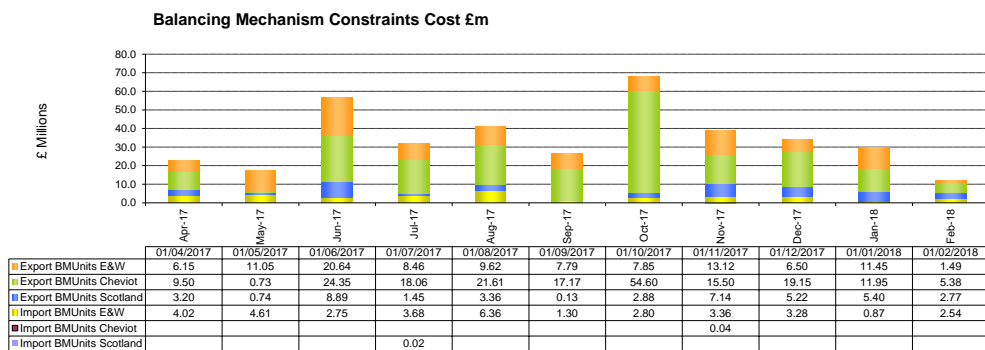
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## 5. Constraints

National Grid resolves constraints in the GB Transmission System through different mechanisms, including Bids and Offers in the Balancing Mechanism, PGBTs, Trades and System to System Services (SO-SO). The costs of resolving constraints via intertrip contracts (see section 3.13) and bilateral contracts (see section 3.14) have already been explored.

Information on BM constraints activity for the financial year 2017/18 is given in the chart below



### 5.1 BM Constraints Comparison with previous year

BM Constraints Costs for reporting year 2017/18 out turned at £396.88m compared to £295.55m in 2016/17. Higher constraint costs were incurred over the months of June, July and August due to a cable fault in Scotland that caused an additional system constraint between Scotland and England. Costs were exacerbated in October by some significant storms and high wind days, increasing the costs of managing Scottish constraints.

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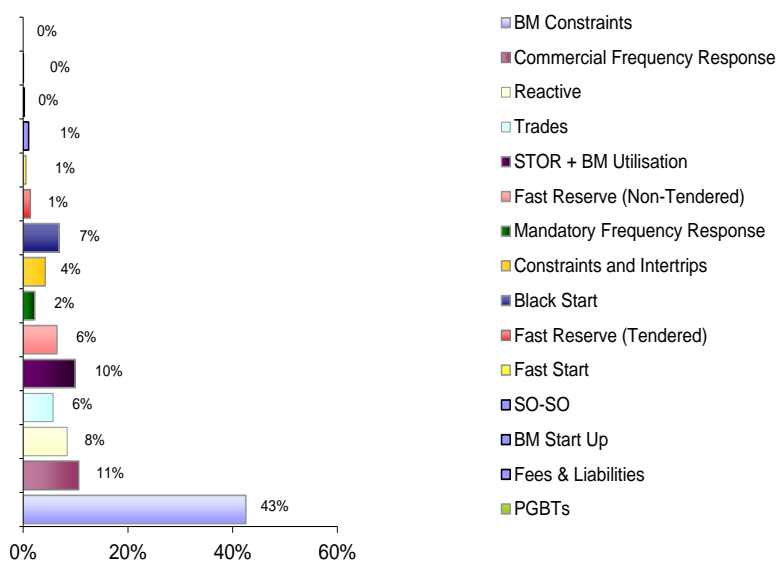
## 6. Summary

As a summary of financial activity, the following breakdown of balancing services costs is provided by category, for the financial year 2017/18.

### 6.1 Summary Chart

The information presented in the chart below is analysed in more detail in the relevant sections of this report.

Summary of Balancing Services Costs



### 6.2 Further information

For further information on the types of Balancing Services that National Grid intends to procure, please refer to the prevailing **Procurement Guidelines**. Information on bid and offer acceptances in the Balancing Mechanism is contained within the **Balancing Principles Statement Report** and published via the <http://bmreports.com> website. These documents, along with the **Procurement Guidelines Report**, are published in accordance with Standard Condition C16 of the Transmission Licence and are available on National Grid's website.

## **6.3 Contact and Feedback**

National Grid welcomes feedback on any aspect of this report including suggestions for future reports. For any comments please email Electricity Codes at [soincentives@nationalgrid.com](mailto:soincentives@nationalgrid.com)

## 7. Appendix

### 7.1 Appendix 1: System to System Services Definitions

Initiator	Definition
NG buy from RTE	National Grid request to RTE for additional energy to GB
NG sell to RTE	National Grid request to RTE for reduced energy to GB
RTE sell to NG	RTE request to National Grid for additional energy to GB
RTE buy from NG	RTE request to National Grid for reduced energy to GB
NG buy from SONI	National Grid request to SONI for additional energy to GB
NG sell to SONI	National Grid request to SONI for reduced energy to GB
SONI sell to NG	SONI request to National Grid for Additional energy to GB
SONI buy from NG	SONI request to National Grid for reduced energy to GB.

RTE = Reseau de Transport de l'Electricite (*French electricity grid operator*)

NG = National Grid

SONI = System Operator Northern Ireland

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## 7.2 Appendix 2: Table of Raw Data

Balancing Service	Info Provision	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Total costs Em	Total Value	
Reactive Power Market	Utilisation Volume (Market)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0GV/Wh
	Utilisation Volume (Default)	2594	2855	2345	2627	2356	2181	2099	2058	2132	2030	1766	1934	1934	26979	GV/Wh
	Total Spend (Market)	0.08	0.08	0.09	0.09	0.08	0.09	0.09	0.09	0.09	0.10	0.09	0.09	0.09	1.05	77.43
	Total Spend (Default)	7.68	7.63	6.24	6.79	6.31	6.08	6.19	6.08	6.61	6.48	5.57	5.77	5.77	77.43	
Short Term Operating Reserve (STOR) Including BM and NBM Availability & Util	Annual Average Availability Payments:	6.79	6.27	6.29	6.44	6.35	6.54	6.41	8.80	8.78	8.84	8.72	0.00	0.00	6.69	
	Average Contracted Utilisation Payments	74.41	72.92	68.68	72.73	65.44	62.85	64.22	66.41	54.91	56.52	54.16	0.00	0.00	59.39	
	Total Spend in Em	5.68	6.91	6.03	6.74	6.40	6.94	6.34	9.05	9.47	9.49	8.58	8.37	8.37	89.10	178.20
	Total Volume	27714	43503	29432	34877	33865	33203	41824	37940	45121	41670	39822	68823	68823	477793.393MWh	
Mandatory Frequency Response	Holding Volumes & Prices:	P S H	P S H	P S H	P S H	P S H	P S H	P S H	P S H	P S H	P S H	P S H	P S H	Primary / Sec / H	Primary / Sec / H	
	Average Volume held MW	394 243 517	293 185 409	308 173 381	261 154 374	272 158 354	293 165 331	226 139 476	269 163 624	210 119 401	125 70 174	127 77 214	183 115 297	247 147 379	247 147 379	247 147 379
	Average price €/MWh	2.16 1.81 3.94	2.13 1.76 4	2.08 1.7 3.85	2.22 1.76 3.89	2.35 2.04 4.22	2.16 1.76 3.79	2.11 1.73 3.72	2.18 1.76 3.66	2.16 1.73 3.62	2.08 1.68 3.68	2.13 1.71 3.62	2.2 1.71 3.59	2.17 1.77 3.8	2.17 1.77 3.799	2.17 1.77 3.799
	Total Holding Spend	2.39	1.92	1.80	1.86	1.99	1.82	1.98	2.30	1.60	0.79	0.81	1.32	20.38	20.38	
	Total Response Energy Payment Spend	0.15	0.12	0.14	0.07	0.09	0.19	-0.17	-0.20	-0.02	0.07	0.00	0.05	0.49	0.49	
Commercial Frequency Response	Total Spend	6.71	9.24	9.08	9.39	7.76	7.95	7.62	6.68	8.43	9.07	7.99	8.83	98.73	98.73	
Fast Start	Total Spend	0.40	0.41	0.44	0.51	0.42	0.43	0.62	0.37	0.38	0.38	0.34	0.35	5.05	5.05	
Black Start	Total Spend	2.88	8.49	7.65	7.64	7.14	6.48	3.63	3.36	4.46	3.68	3.36	3.75	63.81	63.81	
BM Start Up	Total Cost of BM Start Up	0.27	0.20	0.21	0.09	0.13	0.10	0.12	0.08	0.14	0.32	0.15	0.13	1.92	1.92	
	Number of Instructions	5	5	8	15	5	10	19	21	17	17	11	4	137	137	
Fast Reserve-Tendered	Total Spend on Availability & Utilisation	0.90	1.11	1.08	1.12	1.12	1.08	0.96	1.05	1.10	1.10	1.00	1.09	12.69	12.69	
Fast Reserve Non-Tendered	Total Spend on Availability	4.81	4.80	4.56	4.33	4.70	4.82	5.85	4.58	5.52	5.74	4.77	5.85	60.13	60.13	
SO to SO	Volume Imported	-3	-1	-1	-3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	34GVWh
	Volume Exported	0	-1	-4	-2	-1	0	0	0	-3	0	-1	-1	-1	-1	-14GVWh
	Total Spend	0.78	0.43	0.66	0.71	0.71	0.57	1.30	1.20	1.16	0.78	0.97	0.35	9.62	9.62	
System to Generator operational inter-trips	Capability Payments	0.12	0.12	0.12	0.12	0.12	0.11	0.12	0.11	0.12	0.12	0.10	0.12	1.40	1.40	
	Utilisation Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Commercial Intertrip Service	Total Spend	0.01	0.04	0.23	0.27	0.07	0.06	0.02	0.07	0.01	0.08	0.01	0.11	1.00	1.00	
Ancillary Constraint Contracts	Total Spend	2.32	3.61	13.58	3.02	2.40	2.09	1.53	2.52	1.80	0.27	0.24	3.46	36.84	36.84	
Maximum Generation Service	Total Spend	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
All Other Services	Total Spend	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.15	0.15	
BM Constraints	Total Spend	22.87	17.13	56.63	31.66	40.95	26.39	68.13	39.16	34.16	29.67	12.17	17.94	396.88	396.88	
Forward Trading	Traded gross volume	389838	364954	380585	445687	474870	269395	512048	356274	531131	366199	204947	0	4,295,917	4,295,917MWh	
	Net cost of forward trading	10.60	7.32	1.43	-1.35	-0.59	-1.88	5.49	7.65	12.07	4.36	6.70	0.00	0.00	0.00	
	OTC - Power Exchange & Energy															
	Buy Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0MWh	
	Sell Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0MWh	
	OTC - BMU Specific															
	Buy Volume	176347	142586	67660	73866	82588	35033	168080	148809	262834	116633	124526	0	1,398,962	1,398,962MWh	
	Sell Volume	-213490.5	-222368	-312925	-371821	-392281.5	-234352	-343988	-207464.5	-268297	-249566	-80421	0	-2,896,955	-2,896,955MWh	
PGBT	No. of PGBT entered into:															
	Sourced	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Agreed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Average PGBT Prices €/MWh:															
	Buy	0	0	0	0	0	0.00	0	0	0.00	0.00	0	0	0	0	
	Sell	0	0	0.00	0	0	0	0	0	0.00	0	0	0	0.00	0(Monthly Avg)	
	Volume MWh:															
	Buy	0	0	0	0	0	0.00	0	0	0.00	0.00	0	0	0	0MWh	
	Sell	0	0	0.00	0	0	0	0	0	0.00	0	0	0	0.00	0MWh	
	Total Cost of PGBT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total		68.65	70.56	110.28	73.08	80.98	62.24	109.63	84.16	87.12	72.49	52.86	57.59	1876.67m	1876.67m	

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