Firm Frequency Response Market Information for Dec-17

Monthly Report

Published Oct-17

Please note that we are constantly making changes to this report and as a result the content and requirements may change on a monthly basis.

Key points

This Market Information Report is relevant for tenders submitted in **Nov-17** for delivery **between Dec-17 and May-20.**

Tenders from eligible service providers for Firm Frequency Response should be submitted by **Wed 01-Nov-2017** (1st business day) for all tenders.

National Grid will notify service providers of the outcome of the tender assessment, and preliminary nominations, by **Thu 16-Nov-2017** (12th business day).

Notes:

We will be limiting contracts to 6 months ahead of tender month only and a maximum of two years in duration. Therefore tenders should not start later than May 2018.

A number of changes have been made to the report including data used within all graphs and the removal of the 12 month volume table as the graphs have been changed to show requirement by settlement period.

Introduction

Firm Frequency Response (FFR) is the firm provision of Dynamic or non-Dynamic Response to changes in frequency. Unlike Mandatory Frequency Response, FFR is open to BMU and non-BMU providers, existing Mandatory Frequency Response providers and new providers alike. National Grid procures the services through a competitive tender process where tenders can be for low frequency services, high frequency services or both.

This report provides information to current and potential providers about the volume, and time periods over which we are seeking to contract for frequency response services.

Highlights

In Oct-17 (Tender Round 94 (TR 94)), we received 126 FFR tenders from 34 units. More details on the tenders accepted/rejected are available from the post-assessment tender report. Links to the relevant section of the website can be found on page 8.

Each tender is assessed on the same basis. This involves comparing the cost of the tender against the cost of obtaining the same service in the mandatory market. This comparison provides a benefit for each tender. Tenders are then ranked based on the benefit that they provide compared to the mandatory market.

These tenders are then compared to the overall service requirement level. During periods of over holding, the value of the tender is set to zero. In these periods of over holding the benefit for those months is therefore negative (to the value of the contract costs of the tender). At this point, all the tenders are ranked again in order of the percentage benefit. Where tenders are still shown to provide a benefit for the remaining periods where a requirement exists, they may be considered for acceptance.

When determining which tenders to accept, National Grid will take account of its procurement requirement; how much of its overall service requirement it wants to buy at what point in time. In general, for example, we would not normally intend to buy 100% of our service requirement 12 months ahead. How much we buy will be influenced by the current market conditions, our assessment of counterparties' tendering strategy etc.

The accepted dynamic tenders in TR 94 continued to provide a significant benefit despite some periods of over holding. Those that were indicated as still beneficial but were not accepted, were rejected because they would have resulted in us procuring a larger proportion of our requirement further in advance than our current strategy intends.

We recognise that a number of providers use FFR to invest in new assets and we are looking at ways to facilitate this. We are currently focusing the FFR market on a maximum 6 month delivery date from tender month. Tenders must also be a maximum of 2 year duration from this date.

Response requirements are defined in terms of services that provide a full frequency range (referred to as a **Dynamic** service) and services providing a frequency set-point triggered response service (referred to as a **Static** service). The key principal of the Dynamic service is continuous delivery at frequencies near 50Hz to help maintain stable steady state frequency (pre-fault). Static services typically have a frequency trip point that is far enough away from 50Hz to be considered post event response. In order to control steady state frequency a certain volume of Dynamic response is required. This is referred to as the **Minimum Dynamic** requirement**.** Dynamic units, as described above, can be used to meet the full response requirement but Static units cannot meet the Minimum Dynamic requirement.

FFR Process Updates

Tendering

We have had feedback from a number of providers that the current monthly tender process does not provide enough time to understand and analyse results before needing to tender in to the next round. We are therefore implementing a change to how we tender for our FFR requirements, in order to provide more time to analyse results to inform long term tender strategies and also provide sufficient time for feedback to be taken on board and improvements made. We will continue to tender on a monthly tender basis as per the STCs, however, we will alternate on a monthly basis between procuring for our short term requirement and long term requirement. In practice this means that in one month we will tender for our long term requirement (from month ahead to 30 months out) and the following month we will tender for our short term requirement (month ahead only). To give market participants opportunity to prepare for this change we are giving notice that the first short term tender will take place in December for January's month of deliver. This means there will be one full tender round in November for contracts starting as early as December and progressing out to May 2020.

As we realise that this is different to the way that we currently tender for our requirement, we will offer a grace period which will allow providers to resubmit tenders where the tendered duration does not meet that months requirements. This will only apply when all other tender criteria have been met.

The tender periods that the grace period applies to are TR96-99 inclusive.

Minimum Dynamic Requirement

We are making a change to the minimum dynamic volume that we will procure against in future months.

Based on recent experience in the ENCC, and given current system conditions, we have confidence in being able to operate the system using a lower minimum dynamic response level. This will be reflected in the charts published in this month's information report and will be used going forward when assessing tenders for FFR.

The amount of minimum dynamic response we will procure has been reduced in all cases by 50 MW. Dynamic primary will be reduced from 500 MW during the day and 700 MW overnight to 450 MW during the day and 650 MW overnight. Dynamic secondary will be reduced from 500 MW during the day and 600 MW overnight to 450 MW during the day and 550 MW overnight. Dynamic high will remain unchanged at 400MW. These changes are effective from 1st April 2018.

We will continue to monitor these response levels and inform the market if there are likely to be further changes. It is however importatnt to note that our long term forecast for response requirements as set out in our System Needs and Product Strategy document remains unchanged in that we expect our response needs to increase over time.

Enhanced Frequency Response (EFR)

Now the first EFR battery has become operational, the volume of response that will be provided from units with an EFR contract will be included in the amount of already procured dynamic response. EFR will be considered on a 1 for 1 basis where 1 MW of EFR is equal to 1MW of dynamic FFR. These contracts start to deliver between October 2017 and March 2018. The MW provided from EFR contracts will be phased in in the information provided in the MIR charts. We assume that EFR contracts will provide 50% of their contracted volume between now and July 2018. From July 2018 we assume that all contracts will deliver 100% of their contracted volume. Over the coming months as more providers become operational and we gain experience of EFR we will review and monitor the interaction between the two response products and the contribution made by EFR to response provision.

Frequency Set-Point Triggered Services

The review of the Semi-Dynamic service referred to in the previous market information report has not yet been completed. Whilst this is ongoing National Grid is allowing Semi-Dynamic providers with an existing Framework Agreement the opportunity to tender into the FFR market on the conditions below. Given the duration of this arrangement, National Grid will not enter into any new semi-dynamic framework agreements until further notice.

- Semi-Dynamic tenders shall be assessed in the static market.
- Any Semi-Dynamic volume procured will be included in the static requirements holding.

A review of the suite of response services will be conducted with an update will be provided on the Semi-Dynamic service.

FFR Assessment Updates

Tenders received are assessed on the basis of the value they create and against the forecast of unit availability in the mandatory market. There are three main elements in the assessment that contribute towards this:

1. Value from offsetting Operating Margin actions within the Balancing Mechanism (BM). This is due to the reduction in the volume of actions needed to meet the requirements to create Reserve for Response.

    - For tenders submitted with a continuous availability i.e. throughout the day, the value proposition is clear and straightforward to assess. Difficulty arises however when providers submit tenders with periods of unavailability, particularly when the period of unavailability is at the time of day which has the most onerous requirement to create Operating Margin.

    - Operationally, the volume of actions required to create Operating Margin is determined at a half hourly level. The most onerous volume of actions will be at either the demand peak or demand trough. To ensure we meet the requirements in the most difficult half hour, it is not always possible to take actions for a single half-hour alone. The generation dynamics will sometimes result in actions having to be taken for a longer period of time.

    - For assessment purposes, the value of a tender with a period of unavailability will take account of generation dynamics and will be discounted to reflect the full action required to create the omitted Operating Margin provision. As mentioned above, this could be of a greater duration than the period of unavailability in the tender.

2. Value from offsetting Repositioning Costs. This is associated with the cost of instructing generation to be at optimal positional points to provide response.

3. Value from offsetting Holding Costs from Mandatory Frequency Response (MFR).

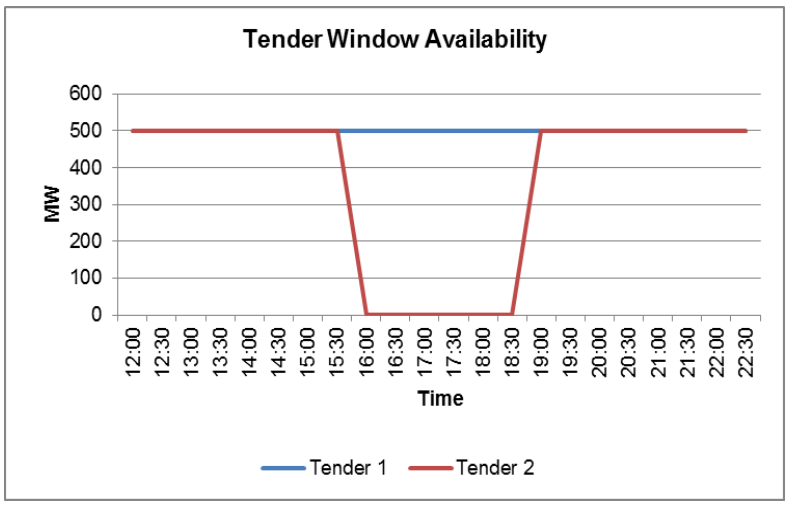
    - For both Repositioning and Holding Costs, there are additional costs – reduced value – associated with tenders with periods of unavailability. Similar to the cost of Operating Margin, a drop in response provision may require actions to be taken in advance to ensure that at the point of service unavailability, there is a smooth transition. These additional costs will be reflected in the value outturn of the tender.

Assessment of the value of these three main elements will also consider the impact of social, economic and political changes which will affect the pricing behaviour of the market. These include, but are not limited to:

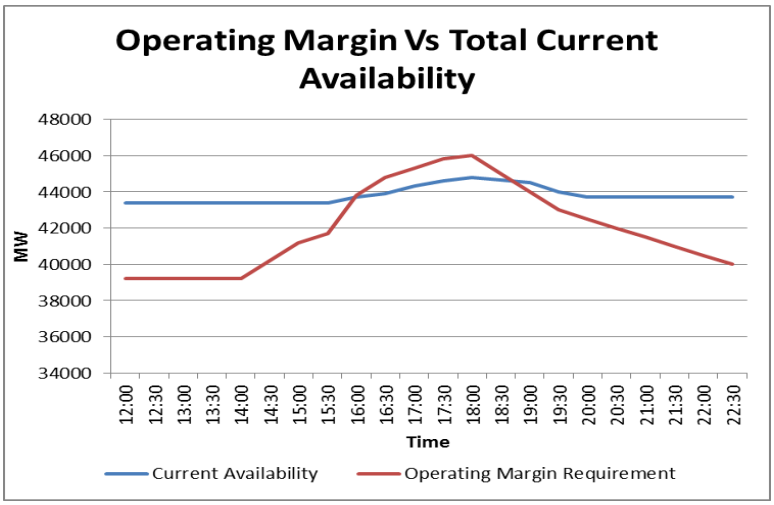
1. Regulatory Framework changes
2. Impacts of new technology
3. Closure of existing generation plants

A simplified example is provided below for illustrative purposes.

Two tenders are submitted for assessment with availability throughout the day. Tender 1 provides a continuous service whilst Tender 2 is unavailable between 16:00 and 19:00. This is displayed in the chart below.

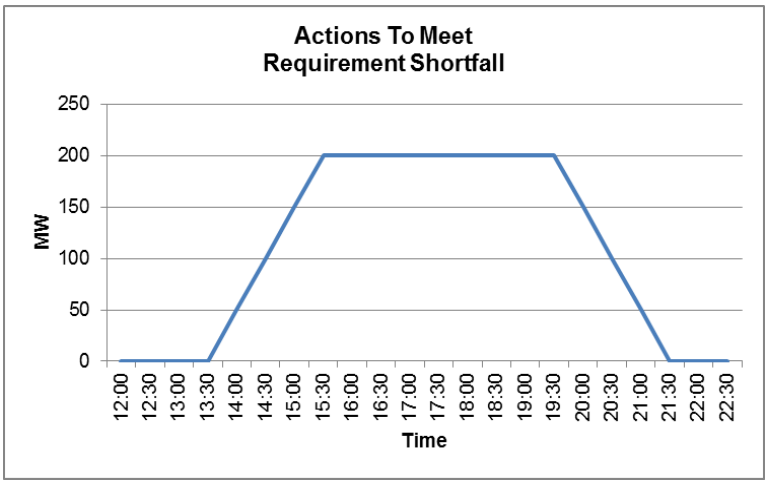


The Operating Margin requirement (as shown by the red line) versus the total availability before any National Grid actions are required (as shown by the blue line) are displayed in the chart below. These assume that the submitted tenders are yet to be accepted. From the chart, a shortfall in meeting the Operating Margin requirements between 16:00 and 18:30 is observed.



To resolve this, National Grid must begin to take actions to ensure that the Operating Margin requirement is completely satisfied. Due to the technical parameters of available energy, and assuming only Tender 2 is accepted, additional Operating Margin will be created between 13:00-21:30 as per the below. If only Tender 1 is

accepted under the same circumstances, the additional Operating Margin will not need to be created between 13:00-21:30.



Reason Codes

The table below provides guidance as to the reasons that a tender has been rejected. They can be matched against the numbers in the 'Reason Code' section of the Post Tender Report.

Where appropriate, new reasons will be added following each tender round.

No.	FFR Reason Codes	Definition
1	Beneficial but requirement already satisfied	While the price submitted was considered beneficial, on this occasion there were tenders that provided a higher benefit and were accepted first. This resulted in the requirement being satisfied.
2	Price not beneficial across tendered period	The price submitted was too high and did not provide any contract benefit against alternative actions including the mandatory and optional market.
3	Does not meet tender prerequisites	Please refer to the 'Technical Parameters' section using the following link to determine the criteria necessary to participate in the FFR market http://www2.nationalgrid.com/uk/services/balancing-services/frequency-response/firm-frequency-response/
4	Multiple tenders received for the same unit	Only the most valuable tender(s) of the total group of submitted tenders was considered.

Dec-17 Dynamic Requirement

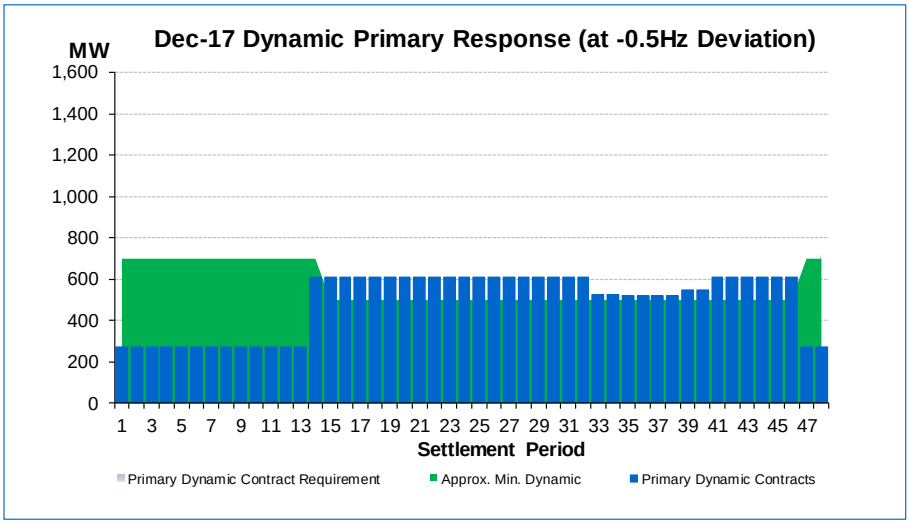
The three charts on this page display the volume of frequency response left to contract for the month ahead for **Dynamic** response. The blue bars represent existing contracted service provision including any optional non-FFR services routinely used that NG forecast to be cost effective for the month ahead.

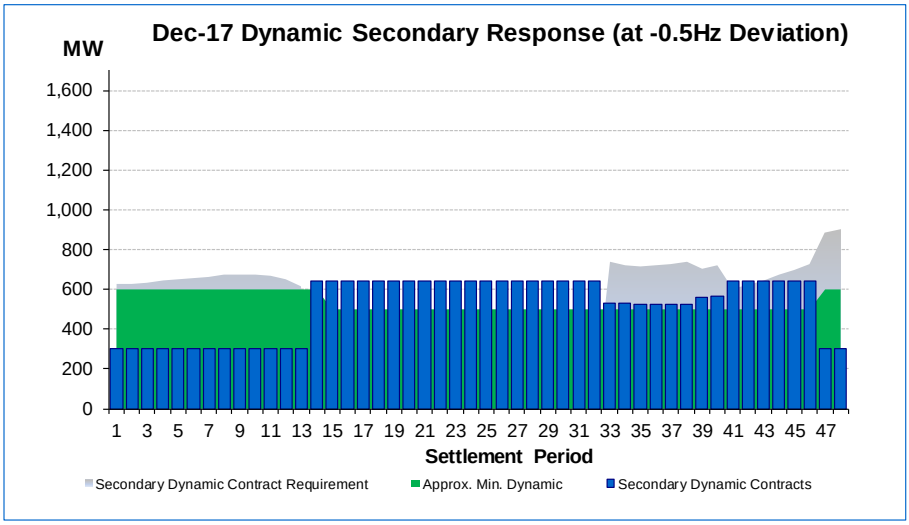
The green shaded area represents the Minimum Dynamic Requirement.

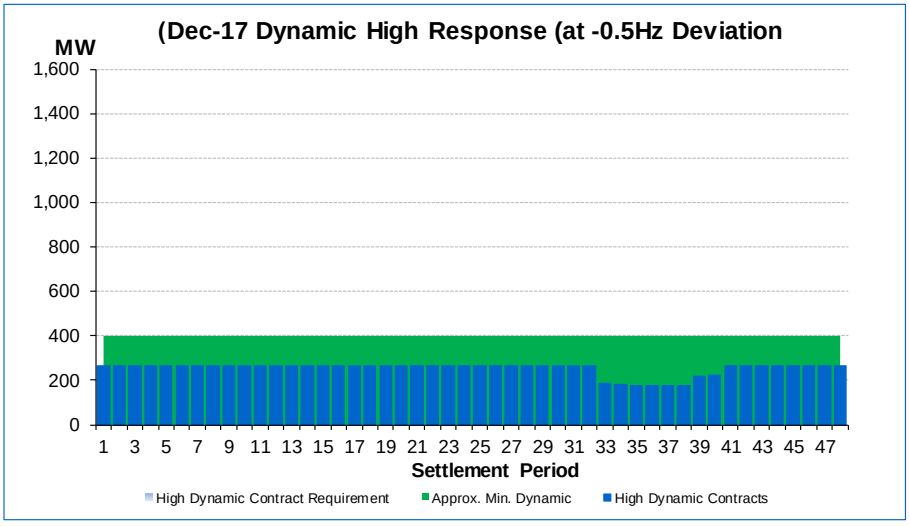
The blue/grey shaded area is the remaining volume to contract. This volume can be met from Dynamic or Static providers. As such, this volume also appears on the frequency set point charts on the next page.

Please note that the top line is not necessarily the total response requirement because volumes of Static services have been removed.

These charts represent a forecast average baseline requirement that NG would look to fill by contracting at month ahead. The actual requirement in real time will vary. Optional services and Mandatory Frequency Response will be used to make up any shortfall between contracted and real time requirement.







Dec-17 Static Requirement

The three charts on this page display the volume of frequency response left to contract for the month ahead for **Static** response.

Static, or post-fault, response can be used to displace the remaining response requirements once the Minimum Dynamic proportion has been satisfied.

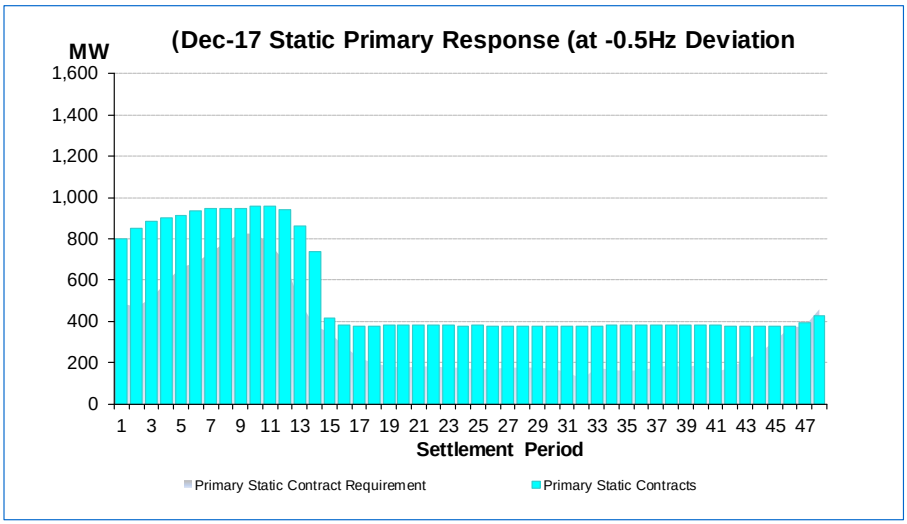
The light blue bars represent the existing contracted volume including any routinely used optional services that NG expects to be in merit in the stack for the month ahead.

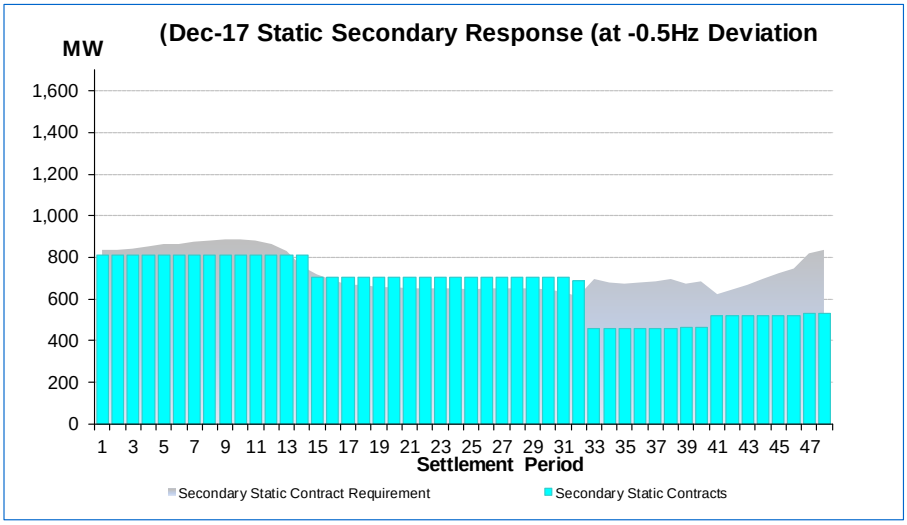
The volume to contract represented by the blue/grey shaded area is the same volume that is displayed on the Dynamic service charts above as either service can provide this volume.

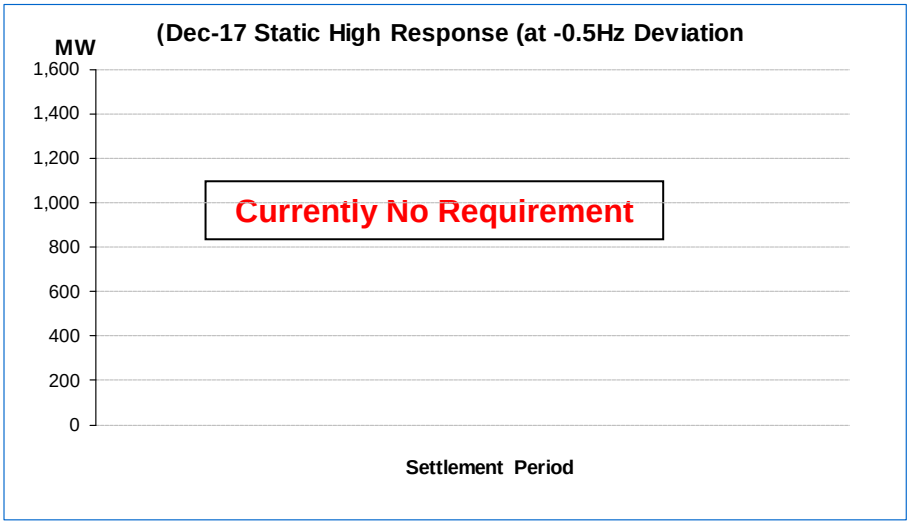
The frequency response requirements are calculated to ensure sufficient response capability to contain frequency to within certain limits following a specified size of generation or demand loss. One of the assumptions used is that the starting frequency when the loss occurs is 0.1Hz away from 50Hz. The requirement is calculated assuming a generic response profile from a Dynamic service as typically provided by the Mandatory response service. At 0.1Hz deviation a dynamic provider will have already delivered part of their response capability whilst a Static provider with a frequency trigger at >0.1Hz will not have delivered anything. This means that a Static provider can offset slightly more of the non-Minimum Dynamic requirement than a Dynamic provider of the same size. The requirement shown on the chart has therefore been adjusted to display the MW of static capability that could offset the response requirement.

Key points

There is currently no requirement for high static response due to the minimum dynamic requirement also being sufficient to secure for the normal demand loss.







What we are looking to Procure in the Short-Medium Term

This section aims to detail what we are looking to procure over the next few months:

- **Dynamic Response:**
    1. There is a requirement for overnight Dynamic Primary and Secondary response.
    2. The daytime Dynamic Primary and Secondary requirement has been satisfied.
    3. Whilst a daytime Dynamic High requirement exists, there is more value in this service overnight owing to footroom savings. Due to this, overnight only tender would be considered.
- **Static Response:**
    1. There is currently no requirement for Primary and High static response.
    2. There is a requirement for static Secondary overnight response. A longer duration, covering whole daytime periods would be more beneficial as we are trying to avoid a spikey response contracted profile. In order to cover the 1 – 3 hour period of response provision the ENCC has to procure additional energy to cover the before and after periods which sterilises the benefit of these tenders.

- All day response is 24 hours; Daytime is approximately between 07:00 and 23:00 and overnight is between 23:00 to 07:00.
- We are not looking to procure any services that start more than 6 months ahead of the tender month at this moment in time, via the FFR monthly tender round. Due to uncertainties in the future markets and the risks that this holds for us, we are aiming to clarify our long term procurement plan over the coming months.
- In all our assessments we look to procure contracts that have the most economic benefit against alternative costs and so what was accepted one month may not be the next depending on our forecasts of the alternative costs.
- We also look for tenders to have a window availability of a minimum of 5 hours to ensure a smooth overall response profile.

If you have any queries, suggestions or feedback on the content or format of the new report please contact your account manager or Andrew.Rice@nationalgrid.com

Links

Assessment Principles and Post-Assessment Tender Reports
http://www.nationalgrid.com/uk/Electricity/Balancing/services/frequencyresponse/ffr/

The Monthly Balancing Services Summary (MBSS) gives a monthly summary of the cost of services procured by service
http://www2.nationalgrid.com/UK/Industry-information/Electricity-transmission-operational-data/Report-explorer/Services-Reports/

12-Month Total Requirement

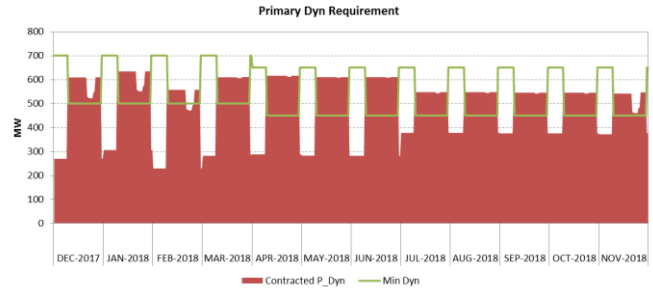
Please note that these graphs are reviewed regularly and may change month on month.

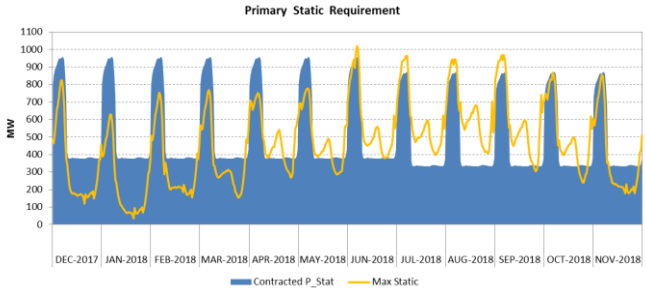
The following charts provide a breakdown of the Dynamic and Static requirements over the next 12 months. These are displayed by settlement periods within each month. The Minimum Dynamic requirement is represented by the green line and maximum Static is represented by the orange line. As mentioned above, any Static requirement can be met by either a Dynamic or Static service depending on which is more economical.

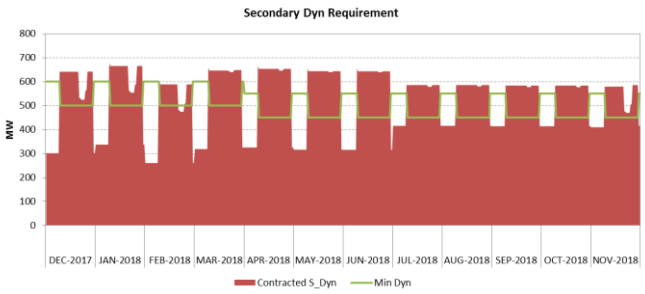
The area under each graph displays the total volume of contracts currently in place. This incorporates both firm and optional services procured through bilateral contracts. Historically they have been the lowest cost option compared to most tenders therefore they are instructed and also included in this report.

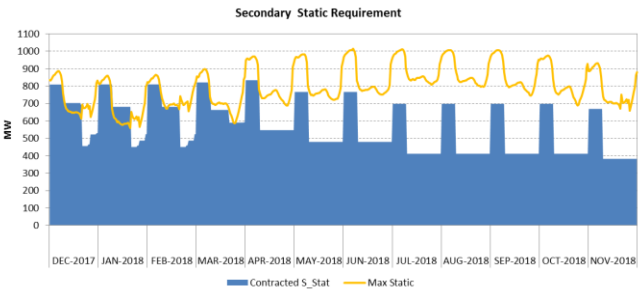
There is no daytime primary or secondary Dynamic requirement against our Minimum Dynamic requirement. There still remains an overnight requirement to satisfy in both markets. A Dynamic High requirement still remains across the whole day however overnight tenders would be considered where more value is observed.

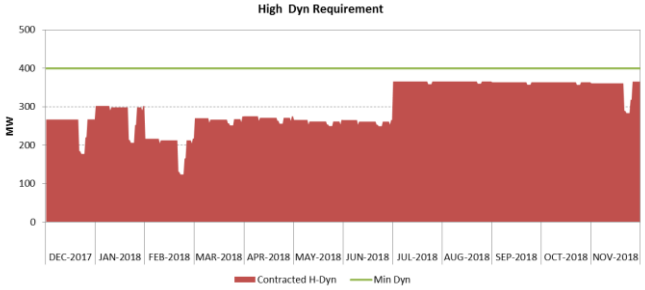
Static response can be contracted up to the orange line. There is a requirement for overnight secondary Static. A daytime requirement is not observed until January 2018.











Key points

The total response requirement is greater during the summer than winter.

The minimum dynamic requirement is typically greater overnight than during the daytime.

For High frequency response, the minimum dynamic response is greater than the requirement throughout the year. A static response service would therefore not be beneficial in meeting the requirement.

Contract Requirement Volume Tables

Dec-17 requirement - Volumes left to procure as shown in the charts on page 2 and 3

SETT_PERIOD	Dynamic Amount required (MW)		
	Primary	Secondary	High
1	430	298	133
2	430	298	133
3	430	298	133
4	430	298	133
5	430	298	133
6	430	298	133
7	430	298	133
8	430	298	133
9	430	298	133
10	430	298	133
11	430	298	133
12	430	298	133
13	430	298	133
14	90	0	133
15	0	0	133
16	0	0	133
17	0	0	133
18	0	0	133
19	0	0	133
20	0	0	133
21	0	0	133
22	0	0	133
23	0	0	133
24	0	0	133
25	0	0	133
26	0	0	133
27	0	0	133
28	0	0	133
29	0	0	133
30	0	0	133
31	0	0	133
32	0	0	133
33	0	0	214
34	0	0	216
35	0	0	222
36	0	0	222
37	0	0	222
38	0	0	222
39	0	0	180
40	0	0	178
41	0	0	133
42	0	0	133
43	0	0	133
44	0	0	133
45	0	0	133
46	0	0	133
47	430	298	133
48	430	298	133

SETT_PERIOD	Static Amount required (MW)		
	Primary	Secondary	High
1	0	27	0
2	0	24	0
3	0	31	0
4	0	43	0
5	0	52	0
6	0	56	0
7	0	64	0
8	0	72	0
9	0	76	0
10	0	76	0
11	0	68	0
12	0	53	0
13	0	18	0
14	0	0	0
15	0	15	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
32	0	0	0
33	0	238	0
34	0	219	0
35	0	217	0
36	0	221	0
37	0	229	0
38	0	240	0
39	0	205	0
40	0	219	0
41	0	100	0
42	0	122	0
43	0	146	0
44	0	173	0
45	0	199	0
46	0	223	0
47	0	286	0
48	28	302	0