nationalgrid

ESO Forward Plan FY18/19

July Reporting 2018

Executive Summary

In July, we continued to reflect on the monthly feedback from Ofgem about what is baseline and exceeding and how we communicate this in our reporting. We've had feedback that it is difficult to link the metrics to performance in each of the Principles. Plus, several stakeholders have reiterated their view that we don't have good measures of exceeding baseline performance. This month, the metric report sits alongside the Principle updates. This restructure helped us to see that whilst the metrics are a good indicator of strong performance to meet baseline, they don't connect well to exceeding baseline activity. We're going to keep working on this.

As mentioned in our previous reports we are working hard on the relaunches for all the Principles that need amendments, in order to reflect feedback on strategic direction, ambition and measures of success. Getting the story for our baseline activities right is an important part of that - as well as clearly articulating new or improved transformational activities and explaining how they are generating additional value for consumers, and demonstrating this through clear metrics.

Last month we published our Thought Piece on what methodologies we plan to use for evidencing in our reporting and to the Panel a) delivered benefits within this year and b) future benefits/ progress against longer term initiative. We are currently writing up the detail for these methodologies and will be consulting on this alongside our half-year report in October. We will use Principle 3 as a test case to demonstrate how these methodologies will be applied by us and this will give you an opportunity to challenge or ask questions. In the upcoming half year report we will also share with you our estimates for the additional value we think we have unlocked for consumers through the course of the first six months.

We met our baseline expectations in July through doing our core job well across the seven Principles. We also met some big milestones this month. We held our first IS Change Forum which was well received by stakeholders. We also successfully tested the new web-based Ancillary Services Dispatch Platform (ASDP) by dispatching for Fast Reserve for the first time using battery storage. The latter should by allowing more direct access to a range of previously inaccessible distributed energy resources to meet system dispatch needs increase market diversity and drive competition from distributed providers.

Your Feedback is Essential

We hope that you've started to see some changes. If you have or if you haven't, please do tell us what you think of our progress so far, and also, specifically on this report: Does it provide useful information? The right level of detail? Is it clear and accessible? Please provide feedback on this report or any element of the ESO Forward Plan and incentives to this email address box.soincentives.electricity@nationalgrid.com or fill in our survey here.

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As glossary for the terms in this document can be found here https://www.nationalgrid.com/sites/default/files/documents/Glossary%20of%20key%20terms.pdf

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Principle 1
Support market participants to make informed decisions by providing user-friendly, comprehensive and accurate information

Long Term Vision and Consumer Value

For this Principle, our vision is to be a transparent ESO who provides accurate information to help market participants make investment decisions and facilitate the transition towards balancing across shorter timescales. We are committed to improving the "user experience" in everything we do.

By improving confidence in our forecasts, increasing transparency of our balancing actions and providing more comprehensive information accessible to all, we expect to potentially unlock medium consumer value in the range of £15-£30 million in the short term.[1]

Our Key Baseline Activities

We support market participants by providing information which helps them forecast system needs and likely market outcomes. This is done by:

- The publication of our requirements for balancing services together with the outcomes of the tenders for these services
- The publication of a forecast of BSUoS outturn per month
- The publication of wind generation and demand forecasts
- Reporting of trades to the market
- Running events and maintaining multiple communication channels to share this information and intelligence with market participants and stakeholders
- Using our technical expertise, modelling and analytical capability to stimulate debate and support long-term decisions through publications such as Future Energy Scenarios, Market Outlooks, insight publications and the Electricity Capacity Report.

Our Deliverables for Q2 2018

Outcome	2018/19 Deliverables
Improve confidence in our forecasts	• Commence new BSUoS monthly reporting, including forecast upper and lower range. Portal version by Q4.
	• Publish our Future Energy Scenarios (FES) publication
	• Deliver a schedule of webinars and events relating to the Ancillary and Balancing Services (AS/BS) Tenders
	• Successful hosting of our Electricity Operational Forum event and expansion of our channels of information dissemination to support wider engagement of market participants and service providers
Increase transparency of our balancing decisions	• Publication of daily and monthly summaries of balancing costs, volumes and a high level summary of system conditions via new, more accessible channels

Performance this Month

Our performance this month meets baseline expectations. We are continuing to develop the ways we provide information to market participants and will share this in the relaunch of this principle.

Meets Baseline Performance

During July, we have met baseline expectations with the publication of the Future Energy Scenarios (FES). FES is widely acknowledged as the industry-leading publication on future energy trends; it is intended to identify a range of credible scenarios across gas and electricity on a GB-wide basis. These scenarios stimulate debate and help inform the decisions that shape the future energy system. To include the best possible data for its scenarios, the SO consults widely; this year's report includes feedback from 430 different organisations, each adding its input in to the in-depth analysis produced by our experts. Many of those organisations were represented among the 400 delegates who attended the FES launch on 12 July; the event was also followed by 200 people via a live web-stream. #FES2018 trended 4th on Twitter in the UK on the launch day and since, our FES website has had over 11,000 hits

We held our second Electricity Operational Forum event of the year on the 4 July; the agenda for the day covered a BSUoS update, Vector Shift, Constraints and Voltage, Product Roadmap for Reactive Power and general industry updates. ROCOF and Vector Shift were topics which received particularly good feedback.

In July, alongside the Quarterly Report we published our framework for engaging stakeholders to gain input and feedback on each of the seven principles. In accordance with this framework at the July Electricity Operational Forum, we sought stakeholder feedback on the Forum itself and usefulness of the BSUoS Forecasting information that we provide. We are in the process of setting baselines of

[1] See Pages 38 – 40 here for details https://www.nationalgrid.com/sites/default/files/documents/Performance%20Metrics%20Definition.pdf

stakeholder sentiment on key topics and will continue to use this framework to monitor progress through the year.

Overall, stakeholders rated the usefulness of the Operational Forum at 3.5 out of 5, noting that the presentations were interesting, providing good information on technical subjects. We also received useful guidance on how we can improve for the future. Attendees told us that we could improve by providing more examples of real operational days, more details on where the challenges are on the network and a look ahead to where challenges may occur in the future. We also received requests for additional notes to be provided alongside the presentations when we publish them after the event. This would reduce the need for attendees to try to make such detailed notes during the event.

Regarding the usefulness of the BSUoS Forecasting information provided, stakeholders gave us an average score of 3.4 out of 5. We will use this number as a baseline upon which we will target improvement throughout the year.

During July, we ran three webinars on the results on the tenders for ancillary and balancing services. The first STOR webinar was run with 44 attendees out of 55 unique providers and 65% responded to the polls and on the whole the respondees were positive. The FR webinar had five attendees and FFR had 12 attendees from 10 unique providers. Full details of our webinars are provided in Metric 1.

Exceed Baseline Performance

As we work towards a self-service portal for this information, due to be rolled out in Q4, this month we published the new BSUoS report on our website. To support the development of the self-service portal, during July, we ran a webinar to gather feedback on the trial of the BSUoS portal looking at the phase 2 requirements. Stakeholder feedback was very positive with stakeholders telling us that it is great to be included and it looks like this work will drive real benefit going forwards.

Principle 1: Performance Metrics

ESO role	Principle
Managing system balancing and operability	1. Support market participants to make informed decisions by providing user-friendly, comprehensive and accurate information

Metric 1. Commercial Assessment Transparency

Metric Description

This metric measures the publication of Ancillary Services/Balancing Services (AS/BS) tender assessment decisions to a published schedule. This is for Firm Frequency Response[2] (FFR), Short Term Operating Reserve[3] (STOR), and Fast Reserve[4]. The tender assessment runs monthly for FFR and Fast Reserve, and three times a year for STOR. Fast Reserve and FFR tenders are run monthly and STOR tenders are run three times a year. Other tenders are run when required.

Performance

Month	FFR		Fast Reserve		STOR	
	On time	Right first time	On time	Right first time	On time	Right first time
April	●	●	●	●	n/a	n/a
May	●	●	●	●	n/a	n/a
June	●	●	●	●	●	●
July	●	●	●	●	n/a	n/a
YTD	●	●	●	●	●	●

Table 1 - Metric 1 Commercial Assessment Transparency Performance

● Published on-time ● Published right first time

● Not published on-time ● Not published right first time

Supporting Information

The Fast Reserve webinar was held on 23 July; data shows that five individuals dialled in. A poll was used during the webinar to capture feedback with responses submitted by three participants. The feedback received was positive. Some suggestions on how to improve transparency were suggested that we will look in to.

The FFR feedback webinar was held on 23 July; data shows that there were 12 attendees from 10 providers dialled in. In addition to the usual feedback on the assessment results, an overview of the tender submission sheet was provided, with an explanation of the information and format that should be entered in order to ensure a compliant tender is submitted.

The first STOR results webinar was run on 25 July to provide feedback to providers on the outcome of TR35. There were 44 attendees which compares to the 55 unique

[2] https://www.nationalgrid.com/uk/electricity/market-operations-and-data/system-balancing-reports

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

[4] https://www.nationalgrid.com/uk/electricity/balancing-services/reserve-services/fast-reserve?market-information

companies that tendered in to TR35. The webinar took providers through the outstanding STOR requirement ahead of TR35, provided an overview of the tendered MWs and explained the number of MWs accepted. The outstanding requirement ahead of TR36 was presented along with information showing the length of supply in the market.

As well as reporting on the previous tender round, participants were updated on the key dates for TR36, progress on the outline change proposal (OCP), plans for a review of the service in light of TERRE, MARI and BM Access and an update on the Ancillary Services Dispatch Platform.

A WebEx poll was used to gather feedback from participants on the usefulness of the webinar. 37 of the attendees were via WebEx of which 24 participated in the feedback poll, a response rate of 65%. On the whole, the responses were positive, with attendees finding the webinar useful. The poll also asked when participants would like the next webinar to take place. We will use this information to help plan the next feedback session. A Q&A session followed.

All presentations and the Q&A sessions have since been uploaded onto the National Grid website. The schedule of webinars, dial in details and access codes are published on National Grid's website.

Fast Reserve

We received 18 tenders for Fast Reserve in the July tender round. The assessment took place according to the agreed timetable and the results were made available on time and right first time.

FFR

This month's FFR tender was for month ahead delivery only. 47 tenders were received, made up of 19 non-dynamic and 28 dynamic tenders. The FFR results were published on time and right first time.

STOR

There were no results due for publication for STOR during the month of July.

Metric 2. BSUoS Forecast Provision

Metric Description

We will develop a new methodology for a half-hourly total BSUoS cost forecast. The forecast will be published on the National Grid website. The measure will count the number of forecasts published during the agreed reporting period. In addition, we will publish a document describing at high level the main methodology that the forecasting process uses. The measure is the daily delivery, Monday to Friday, of a day ahead half-hourly BSUoS cost forecast by 08:00, and on Friday by 17:00 a half-hourly forecast for the coming Sunday and Monday. Performance will be measured from Q3 2018/19, following deployment and testing of the new BSUoS forecasting system in Q1/Q2 2018/19.

Performance

We will start measuring the delivery of the daily BSUoS forecast in Q3. The Modelling and Insight team are developing a more granular day ahead forecast, planned to be completed by the end of Q2.

Metric 3. Trades Data Transparency

Metric Description

We have invested in a new platform which will allow trades information to be published within one hour of it being available. The aim is to carry out seven-days-a-week publication of trades information within the targeted frequency of one hour. The target is to publish 80-90% of all trades data within one hour of capture in the first year of deploying this new system.

Performance

In July, small changes were requested to the web provider to improve the reporting process to ensure accuracy which were implemented by the 15 July. From 16 July to 31 July, we successfully published 95.9% of its trades within 10 minutes of capture.

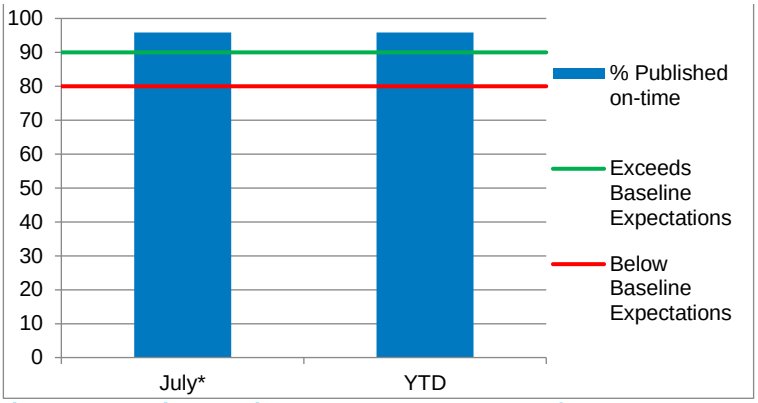


Figure 1 - Metric 3 Trades Data Transparency Performance

*indicates that July performance only shows performance from the 16-31 July

Supporting information

- The trades web portal is active and can be accessed here: https://trades.nationalgrid.co.uk/ this allows increased frequency of publication to trades to within an hour of a trade being enacted.

- We are now developing a solution which will add a time stamp to the trade so allowing us to measure the elapsed time following the trade to its publication.

Metric 4. Forecasting Accuracy

Metric Description

The day ahead (DA) Demand forecast accuracy will be calculated daily for the following forecasting points to align to market electricity trading blocks: overnight minimum, daytime peak, daytime minimum and evening peak. The performance of each forecasting point will be measured by comparing the forecast error (MW) to pre-defined targets (MW) for the four forecasting points.

The day ahead BMU wind forecast accuracy will be calculated for each settlement period (half hour) and will be based on: first run settlement metering data (in MW) and half hour BMU wind forecasts (in MW) excluding Bid Offer Acceptance (BOA). The incentive performance will be measured half-hourly by comparing percentage mean absolute error to pre-defined seasonal targets percentage.

Performance

This metric will cover the accuracy of our published DA Demand and Balancing Mechanism Unit (BMU) wind generation forecasts. To access the data that sits behind these metrics please click here.

Demand Forecast

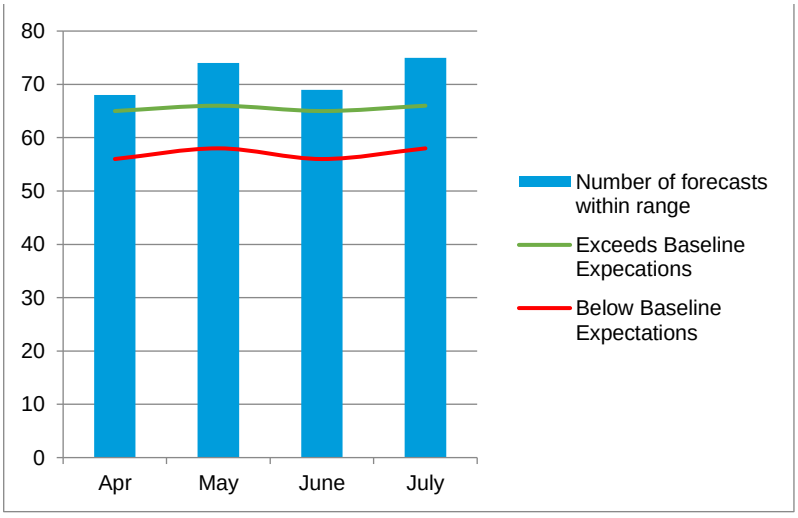


Figure 2 - Metric 4 Demand Forecasting Performance

In July 2018, the Energy Forecasting Team (EFT) achieved a day-ahead (DA) demand forecast performance above our baseline expectation. To achieve this, the EFT met demand monthly accuracy targets 60.5% of the time. Targets have been set to deliver a 5% reduction in error, on a monthly basis, against the average of the monthly performance from the last three years.

In July, we observed unusually prolonged warm weather conditions, making it provisionally one of the warmest and brightest Julys[5] of the last hundred years with 2.2 °C above the long-term average and 138% of additional average sunshine[6]. As a consequence, extra cooling load from the air conditioning were observed throughout the day and at night. At the end of the month, there was a marked and sudden change in prevailing weather, which further increased the complexity of demand, PV and wind forecasting. PV generation was high and wind output remained low for most of the month, increasing only for the last weekend of the month. Despite all the above, our Demand, PV and Wind forecasting models coped well with these unusual prolonged weather conditions, producing a good performance for the month.

Wind Forecast

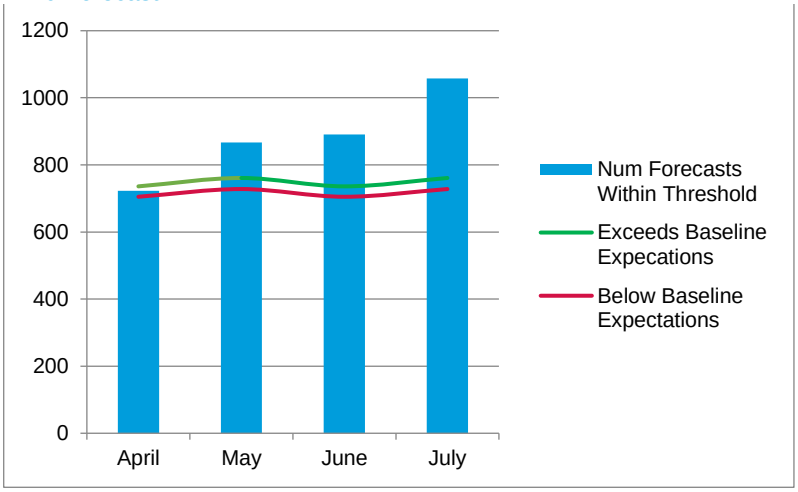


Figure 3 - Metric 4 Wind Forecasting Performance

In July, the Energy Forecasting Team (EFT) achieved a DA Wind BMU performance on this metric in line with exceeds baseline expectation. To reach this outcome, the EFT delivered wind BMU monthly accuracy targets 71.1% of the time. Targets have been set to deliver a 5% reduction in error, on a monthly basis, against the average of the monthly performance from the last three years.

In July, the prevalence of high pressure over the UK resulted in consistent low wind speeds compared to the monthly average.

Contributions to performance against this wind forecast metric was provided by delivering a major wind model update. This update included the following improvements:

- Review and update of physical wind forecasting power curves;
- Review and update of generic power curves of selected wind farms with site specific power curves;
- Test cubic spline wind power curves for selected BMU wind farms to improve wind forecasting accuracy.

[5] The provisional UK mean temperature was 17.3 °C, which is 2.2 °C above the 1981-2010 long-term average, making it provisionally the joint second warmest July (alongside 1983, after 2006) in a series from 1910. Mean maximum temperatures were over 4 °C above average in many central and southern parts of England (Source Met office UK).

[6] Sunshine was 138% of average and it was provisionally the sixth sunniest July in a series since 1929, and sunniest relative to normal in England where it was provisionally the second sunniest July after 2006 (Source Met office UK).

Principle 2
Drive overall efficiency and transparency in balancing, taking into account impacts of ESO actions across time horizons

Our Key Baseline Activities
We operate the system in real time and run all the systems and processes to ensure that the Electricity National Control Centre (ENCC) has the tools it needs to deliver secure, economical and efficient dispatch of the system. This includes assessing the notified market information for generation and continuously optimising the generation schedules to achieve overall system and demand balance, running integrated operational, commercial and network planning teams to ensure that we optimise the use of the system today; whilst developing an integrated view and approach to identify the challenges that the Control Centre will face, and the solutions we will use in the near-future.

Long Term Vision and Consumer Value

For this principle, our vision is that we drive overall efficiency and transparency in balancing, taking into account impacts of its actions across time horizons.

We expect to potentially unlock very large consumer value of greater than £50 million in the short term.[7] In the long term, this area will become a major contributor to consumer value.

Our Deliverables for Q2 2018

Outcome	2018/19 Deliverables
Develop our information portals and events	• Successful hosting of our Electricity Operational Forum event and expansion of our channels of information dissemination to support wider engagement of market participants and service providers
	• Kick off and delivery of the SO IS Change Forum

Performance this Month

Our performance this month meets baseline expectations. We are continuing to work with industry both in real-time and longer timescales to manage balancing costs down as changes in the networks are implemented to meet customer needs.

Meets Baseline Performance

We have been working with distribution network representatives to develop an approach to manage increasing RoCoF constraint costs. The cost of managing RoCoF has risen from £31.7m in 2016/17 to £59.2m in 2017/18, and are predicted to be higher in 2018/19 with £38m spent so far this year. As a result, a Distribution Code Consultation[8] was published on 13 July which uses the learning from our collaboration on vector shift to change existing RoCoF relay settings and remove remaining vector shift protection.

In July, alongside the Quarterly report we published our framework for engaging stakeholders to gain input and feedback on each of the seven principles. In accordance with this framework at the July Electricity Operational Forum (and IS Change Forum held alongside it) we sought stakeholder feedback on how we perform our balancing role. We are in the process of setting baselines of stakeholder sentiment on key topics and will continue to use this framework to monitor progress through the year.

At the Electricity Operational Forum in July we introduced a new question to start to gauge stakeholder views on our overall performance against this principle. When asked to rate the level of agreement on a scale of 1-5 (5 equals strongly agree) to the statement “The ESO provides value for money with its balancing role” the weighted average score was 3.9 out of 5. This feedback sets a baseline against which we can assess our performance throughout the year. We would expect it to be influenced by the range of activities that we perform under this principle.

We also took the opportunity at the Electricity Operational Forum to ask for feedback on the information we provide on the drivers of balancing costs. Overall, the information provided was rated at 3.2 out of 5.

The range of feedback received serves to illustrate the challenge of communicating a highly complex topic to a wide range of stakeholders with diverse needs. Comments received include “excellent explanation of difficult technical subject”, “incredibly interesting” and “very relevant”. However, there are other stakeholders

[7] See Pages 38 – 40 here for details https://www.nationalgrid.com/sites/default/files/documents/Performance%20Metrics%20Definition.pdf

[8] http://www.dcode.org.uk/consultations/open-consultations/

stating that we could do more to reduce the jargon in the presentations and that overall transparency in this area needs improvement. We will continue to work to improve our materials and channels to meet the needs of our increasingly diverse stakeholder base and to monitor our progress.

Exceeds Baseline Performance

In July, alongside the Operational Forum we held our first IS Change Forum. A trade fair approach was adopted to promote two-way conversation. We provided stands that focussed on the amount of change within the industry, the Balancing Programme, our approach to EU compliance (including TERRE and Wider Access) and PAS. ELEXON also attended as a key industry partner to share details of their Foundation Programme. There were around 70 industry participants who attended on the day giving both feedback on the event and suggestions on how we can improve it going forward. In summary

- 77% of respondees told us that the content provided was either useful or very useful”
- 71% were happy with the format of the IS Change Forum describing the event as “very informative” and “very interactive”
- 75% approved of the approach aligning the IS Change Forum to the Electricity Operational Forum

In addition, attendees told us that Webinars and more information and materials available online would be useful and that they would like specific sessions at a later date to give more detail on projects such as TERRE and EBS. Stakeholders would also welcome presentations and Q and A on key topics as well as an overview of forthcoming changes.

Principle 2: Performance Metrics

ESO role	Principle
Managing system balancing and operability	2. Drive overall efficiency and transparency in balancing, taking into account impacts of the actions across time horizons

Metric 5. Balancing Cost Management

Metric Description
This metric measures the total incentivised balancing costs excluding Black Start spend compared with the benchmark. For full details of how this was calculated please see the performance metrics definition document here.

Performance
For the details of our performance please see the principle 2 summary. For monthly breakdown of costs please refer to the hotspots and the accompanying data tables found here.

	April	May	June	July	YTD	Full year
Benchmark cost (£m) [9]	56.9	68.3	90.7	65.2	281.0	843.52
Outturn cost (£m)	56.4	58.8	85.5	77.0	277.7	

Table 2 - Metric 5 Balancing Cost Management Performance

Metric Performance Detail
High costs were incurred over the weekend of 28/29 July, and 31, due to record low demands and high wind conditions in Scotland, leading to constraint issues in the North of England which could not be alleviated as current outages could not be recalled and the Western HVDC was out of service. Low demands also meant less conventional generation was available to provide reserve increasing costs further, in addition to the ROCOF actions required for such low demand. Work undertaken by the control room with BM parties avoided further reserve costs. These conditions were significantly different to the rest of the month where stable weather patterns and low wind made daily costs in-line with an average July.

[9] Benchmark cost refers to the central benchmark number which has a +-£10million range

Principle 3
Ensure the rules and processes for procuring balancing services maximise competition where possible and are simple, fair and transparent

Our Key Baseline Activities:
To devise and run the processes to procure system balancing and ancillary services, we settle and report on the outturn of ancillary services contracts. We also support new and existing providers to help them participate in the ancillary and balancing services markets and tenders. We employ a schedule of open tenders to purchase a variety of products and services.

Long Term Vision and Consumer Value

Our vision for this Principle is to have simple, fair transparent rules for procuring balancing services to maximise competition where possible. In our Forward Plan, we described how we will use this to facilitate new business models and technologies into the market to deliver a distributed, smart, flexible electricity system.

We expect that by promoting competition and developing new markets, together with increasing participation in balancing services markets, we can potentially unlock consumer value in the short term[10]. In the long term, flexible markets are one of the keys to releasing maximised value.

Our Deliverables for Q2 2018

Outcome	2018/19 Deliverables	Status
Grow participation and promote fair access in provision of balancing services	• Understand the journey that potential counterparties go through from first showing interest in the Balancing Services market, through to signing a framework agreement	Immersion interviews completed
	• Explore restoration service provision from interconnectors	Workshop held on 2nd July
	• Publish Thermal Constraints Management information note	Published 26th July
	• Publish Wider Access to the Balancing Mechanism (BM) Roadmap	Due in August
Promote competition and develop new markets in balancing services	• Detailed auction trial publication	Delayed to Q2
	• Deliver a new, highly scalable and flexible dispatch solution for reserve - Phase 1 roll out for Fast Reserve providers	Phase 1 complete
	• Deliver new standardised products for reserve together with simplified contracts	STOR OCP published, FR being progressed
	• Publish and consult industry on exclusivity clauses to improve the ability to stack products	Due in Q2
	• Publish new testing and compliance/performance monitoring policy for response and reserve providers	Due in Q2

Performance this Month

This month we have delivered against our baseline expectation by supporting the entry of two new providers into the FR and FFR markets, engaging with industry through the STOR outline change proposal and publishing the information note on Thermal Constraint Management. These actions support our drive of increasing participation and competition in these services through increased transparency and reduced barriers to entry.

[10] See Pages 38 – 40 here for details https://www.nationalgrid.com/sites/default/files/documents/Performance%20Metrics%20Definition.pdf

We have exceeded baseline performance with a successful test of the new web-based Ancillary Services Dispatch Platform (ASDP) by dispatching for Fast Reserve for the first time using battery storage. As part of our provider journey transformation we have carried out interviews across a range of our providers to better understand their needs and help us to become a better buyer. We have also engaged with stakeholders on developing black start services provision from interconnectors to diversify and future proof our restoration strategy.

Last month the auction trial was delayed by six months from the aspired date in the Response & Reserve Roadmap to June 2019. To deliver the full benefits that satisfy our stakeholders, more complexity is required in the design and therefore the time needed to implement it. Work to incorporate this additional functionality into the auction trial is progressing.

Meets Baseline Performance

This month we have delivered against our baseline expectation by supporting the entry of two new providers into the FR and FFR markets, engaging with industry through the STOR outline change proposal and publishing the information note on Thermal Constraint Management. These actions support our drive of increasing participation and competition in these services through increased transparency and reduced barriers to entry.

We published an information note on Thermal Constraint Management to increase the transparency of how we manage constraints and encourage more participation by clearly signposting the services that potential providers can offer.

Alongside the Quarterly report, we published our framework for engaging stakeholders to gain input and feedback on each of the seven principles. In accordance with this framework at the July Electricity Operational Forum we sought stakeholder feedback on the Reactive Power Roadmap and our overall performance in improving balancing services and markets. We are in the process of setting baselines of stakeholder sentiment on key topics and will continue to use this framework to monitor progress through the year.

Stakeholders rated their satisfaction that the changes outlined in the Reactive Power Roadmap published in May will address current barriers to entry and facilitate access to these services as 3.7 out of 5. Satisfaction with the engagement on the roadmap was rated as 3.6 out of 5. This feedback is consistent with that received for engagement on the roadmap for Response and Reserve received in April which received a score of 3.6 out of 5.

We also asked the question “How satisfied are you with the scale and speed of the SO’s work to improve all our balancing services and markets?”. In April stakeholders gave a score of 3.3 out of 5, in July a similar score of 3.2 out of 5 was recorded. We do not think this minor change is statistically significant given the relatively small sample sizes (12 in April, eight in July) but does provide a relatively clear baseline upon which we will seek to improve.

The small sample sizes illustrate the ongoing challenge of collecting stakeholder feedback in an industry which is potentially suffering from engagement and survey fatigue. We will continue to challenge ourselves to use better and more intuitive ways to collect and report feedback such as in-webinar polls and enhanced documentation and reporting of feedback received in meetings.

Exceed Baseline Performance

As part of our transformational work we have exceeded baseline performance with a successful test of the new web-based Ancillary Services Dispatch Platform (ASDP) by dispatching for Fast Reserve for the first time using battery storage. The development of this new, flexible ASDP system allows a service provider to be available to be dispatched by the control room in less than a week following contract signing and technical integration with the platform. For STOR, this can currently take up to six months due to the need for a dedicated phone line. In addition, the cost of connection has reduced to around one tenth of the current value. In the next six months, a service provider who integrates with ASDP can choose to participate in FR, STOR and/or EFR without a requirement to interface to multiple IS systems. This new system delivers value to consumers by accelerating the rate at which new service providers are available on the system and reducing the cost of connecting each provider.

Restoration services from interconnectors was one of the ‘deep dive’ topics at the quarterly update meeting for GB Interconnector owners on Future GB Markets. The Restoration Roadmap was examined in detail and the interconnectors (new and existing) were able to participe in a Q and A session. We received good feedback from interconnector owners and developers, and detailed discussions are now

underway for establishing black start capability with a number of the current and future interconnectors.

The number and range of potential service providers has increased significantly in the last two years. This increases the potential for increasing liquid markets and reduced costs for end consumers. However, for this to be successful it is important that there are no unnecessary blockers in the market entry and service purchasing processes. In order to understand our processes from a provider perspective and improve them we have commenced a provider journey transformation. At the end of June and into July we have been carrying out interviews across a range of our providers to better understand their needs in becoming a provider of Ancillary Services and ways for us to improve once providers are delivering services and help us to become a better buyer.

The key insights are:
1. There's often a tension between the dynamism of the market and the innovation providers must carry out, with the appetite and ability of ESO to move at pace.
2. Providers feel that things are changing very quickly, they seek a better view of what's ahead, to help them plan – both on what the ESO needs in the future and when, for example, new IT goes live.
3. Newer providers struggle with workload and capacity as they often work extremely hard to secure funds, a contract etc. leaving them little time to actually build and set up.
4. Effort on all sides can be high to get things up and running. Information doesn't always flow between teams and manual data entry is common.
5. Account management is generally seen to be really good. Providers rely heavily on account managers and notice the effects of high staff turnover.

These key insights are being used to link into work already being undertaken by the ESO, as well as identifying any additional opportunities to make us a better buyer of Ancillary Services. The next step of the process is to reflect on the insights we have gleaned from the Provider interviews to help shape the thinking on what actions need to be implemented to improve the Provider experience. Our objective for the next phase is to prioritise areas of the design for implementation and identify follow up actions, which will include quick wins and longer term transformational projects. We will be going back to providers in the Autumn to seek input into the prioritisation of activities to meet their requirements and to test and refine the design ideas to better understand how far the actions go in addressing the pain points raised in the immersion sessions. We continue to invite views from all stakeholders via their Account Managers, through the Commercial Operations and future of balancing services inboxes, or through our stakeholder feedback survey.

Our focus on provider engagement throughout the Provider journey work has been very well received by stakeholders. Feedback from one Provider: "Thanks for taking the time to let me give my views on our provider journey experience. It's great to have the opportunity to raise these points with you"

Principle 4
Promote competition in the wholesale and capacity markets

Our Key Baseline Activities:
We are the code administrator for a number of codes and processes that govern the electricity markets:
• We ensure that the rules of participation and the commercial arrangements for using the system are clear, fair and promote competition
• We are the administrator for the BSUoS and Transmission Services Use of System Charges (TNUoS).
• We collect TNUoS charges on behalf of the Transmission Owner and offshore transmission owner companies, and distribute these funds.
• We are the EMR delivery body and we administer the running of the capacity mechanism auctions.
• We are a part of the European body for Transmission System Operators, ENTSO-E.

Long Term Vision and Consumer Value

We aim to be a trusted industry party providing our unique insight and delivering reform in key market issues, whilst ensuring the consumer remains at the heart of the debate. We will be transparent, timely and accurate in the information we provide to our customers, this will support their business and can lead to lower costs for the consumer. We will be agile and efficient in the code change process whilst supporting market participants to shape new code proposals with further targeted provision for new market entrants.

Stakeholders will have confidence in our ability to drive and shape change across the market. The Charging Futures Forum will have been a successful pilot for how we can provide stakeholder led change across the industry. We will be a visible market facilitator in both GB and Europe.

Facilitating the development of the codes, framework and charging processes to support the new electricity landscape and making this accessible to all industry participants, we expect to potentially unlock large value between £30 million and £50 million in the short term for example through project TERRE.

Our Deliverables for Q2 2018

Outcome	2018/19 Deliverables
Facilitate the development of the code and charging framework	• Deliver Charging Futures (CF) Forums that are open to all network users
	• Deliver webinars, podcasts and publications under the CF Brand
	• The ESO will have a stronger voice in the next stages of Charging Futures, helping to ensure that changes are designed, delivered and implemented successfully.
	• Publish an agreed Code Administrator improvement action plan for 18/19
We shape the outcomes of the regulatory frameworks to provide value and mitigate risk for consumers	• Deliver a stakeholder communication strategy to provide industry readiness for the implementation of EU Network Codes

Performance this Month

This month we met baseline expectations by continuing our work on the Code customer journey, engaging with stakeholders to ensure the future design meets requirements and drives consumer value. The communication tools we provided to stakeholders this month received positive feedback and we will carry on developing new ways to share useful information.

In our Charging Futures activities, we have delivered above expectations, co-hosting interactive Charging futures consultation webinars with Ofgem. Going forward, we endeavour to have a stronger voice in shaping charging policy and take a leading role in the reform of access and forward looking charges to promote consumer and competitive market interests.

Meets Baseline Performance

During June, we published a stakeholder communication strategy to demonstrate to stakeholders how they can learn about, shape and manage European Network Code implementation in GB. Under the strategy, we have now provided a series of different communication tools to stakeholders, examples being Connection Codes Videos, Electricity Balancing Guidelines Podcasts and webinars. As an example of feedback provided at an Electricity Balancing Guideline webinar, 75% of attendees rated us good or very good in terms of the ease of understanding of the material provided.

During July, we continued our progress on the Code customer journey. As part of this project we are engaging with stakeholders of the process to understand their needs better and make sure the future design experience is fit for purpose. As part of this engagement in July we conducted a session with Citizens Advice to understand the needs of their organisation, and to understand how the process can be geared around driving value which creates and protects consumer interests. As part of our ongoing programme of work we will be continually asking for feedback to shape our proposals.

In response to stakeholders wanting clarity of the prioritisation of CUSC modifications the monthly CUSC Panel Headline report now includes clear information on this as discussed and agreed by the Panel. This provides transparency and evidences the agility which is needed to efficiently manage code change across the industry.

We facilitated the transmission charging methodology forum (TCMF) and a customer brought topic which has resulted in a code proposal for panel this month. Four final modifications reports have been submitted to the authority this month for a decision.

Exceed Baseline Performance

During July, we supported Ofgem in the launch of their Access consultation. As lead secretariat of Charging Futures, we have helped to make the consultation accessible to all network users by communicating with industry. This has included hosting a webinar jointly with Ofgem and recording a podcast on the day of the consultation launch talking in more easy to understand ways. 127 people joined the webinar live and a further 82 views have been made via the Charging Futures website. The consultation launch podcast has had 165 listens and a series of podcasts is in production for release across the summer and planning is underway for the next Forum. We had active participation in the webinar including polls throughout to understand what individuals were seeking from the session. We saw an increase of participants considering themselves as having a good or strong understanding of the changes from 43% at the beginning of the webinar to 80% at the end. Through this Charging is made more accessible to a greater number of customers and stakeholders with all having an opportunity to learn, ask and contribute to the need for, design and delivery of reform.

During the next stages of Charging Futures, we will have a stronger voice helping to ensure that changes are designed, delivered and implemented successfully. By taking a more leading role in the reform of access and forward looking charges we will actively look to design and deliver reform in the interests of competitive markets and consumer value. Ofgem has now published its consultation into reforming access and forward looking charges. A role for ESO is envisaged both through a licence condition to work with DNOs on access and charging reforms and to lead work on the future of BSUoS charging.

Through bilateral engagement one customer has told us that stability and predictability of charging remains key for them - for the ESO to step up and drive change will give them more confidence their preferred outcomes will be considered. Another indicates that for them a stronger voice in charging policy is expected from a more independent system operator.

Principle 4: Performance Metrics

ESO role	Principle
Facilitating competitive markets	4. Promote competition in wholesale and capacity markets

Metric 9. BSUoS Billing

Metric Description

These metrics measure the quality of the billing process in response and resolution time of BSUoS billing queries alongside the timeliness of those bills.

Performance

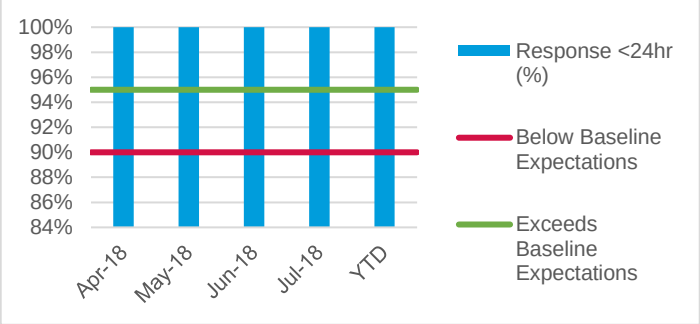


Figure 4 - Metric 9 BSUoS query response time

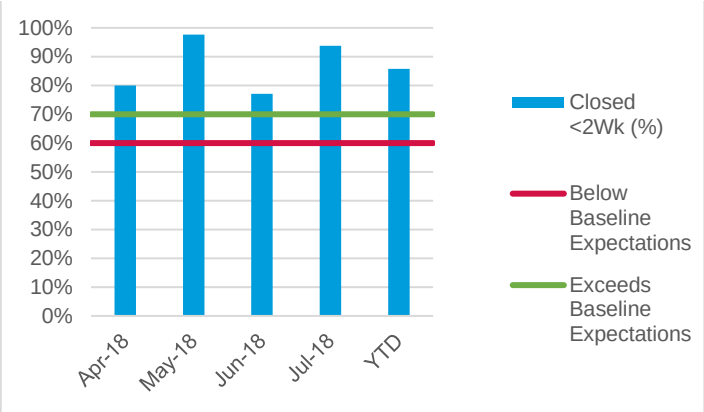


Figure 5 - Metric 9 BSUoS query resolution time

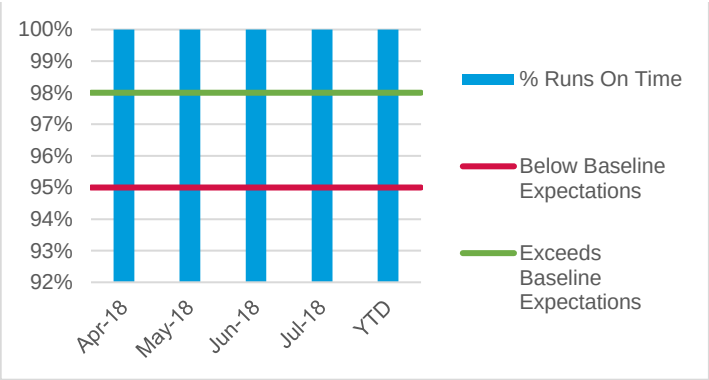


Figure 6 - Metric 9 BSUoS bills timeliness

Supporting information

- We issued a news roundup circular to BSUoS customers to keep them updated of the latest BSUoS news and information. This was sent to our distribution list of 670 email addresses that have registered to receive BSUoS related news and information. The circular was also published on our website

here https://www.nationalgrid.com/sites/default/files/documents/July%202018%20BSUoS%20News%20Roundup.pdf

- We advised customers of the date of our Customer Charging and Settlement seminar being held on the 15/16 October 2018. As a result of previous customer feedback, we will be running this as a joint event between the BSUoS and TNUoS teams with each day's presentations being tailored towards demand or generation.

- At the start of July, we transitioned the BSUoS query logging system from a custom access database onto Salesforce CRM. This new system, when rolled out to the whole ESO, will allow for a more collaborative and Joined up approach when dealing with queries and complaints. This system should result in better quality responses to customers delivered in a timelier manner.

- We cleared a backlog of older queries in June and July and the impact of this can be seen prominently within the June figures. This should create a good base for us being able to achieve our targets for the remainder of the year.

- After each BSUoS query/complaint is closed we issue a survey asking *"How would you rate the service that you have received*?" In July, we received 9 responses all with a rating of excellent. (Ratings available are: - Very Poor / Poor / Good / Excellent)

- It has been six months since we last suspended a single settlement run from daily BSUoS billing and over 18 months since we suspended daily BSUoS billing fully.

Principle 5
Coordinate across system boundaries to deliver efficient network planning and development

Long Term Vision and Consumer Value

Our long-term vision for network planning and development is that, to design the network we need by 2030, we will be working seamlessly with the DNOs, through new markets and using new processes, to explore all possible solutions for meeting transmission system needs, with these being optimised alongside distribution system needs to deliver best value for consumers – regardless of asset ownership boundaries.

Through cross-industry collaboration on efficient network planning and development, and continual improvements to our transmission network development publications, we expect to potentially unlock large consumer value between £30 million and £50 million in the short term[11]. In the long term, whole system sits at the heart of releasing consumer benefits.

Our Key Baseline Activities:
We facilitate efficient transmission network investment planning and development by:
• Working with the DNOs to facilitate connection of new users to the distribution networks.
• Collating, managing and modelling transmission system data.
• Identifying and publishing future transmission system needs.
• Supporting efficient development and investment in the transmission network through the Electricity Ten Year Statement (ETYS) and the NOA.

Our Deliverables for Q2 2018

Outcome	2018/19 Deliverables
Develop a whole system approach to meeting regional transmission needs	• Publish the results of the two NOA pathfinding projects and a plan to update the NOA methodology
Improve our cross-industry collaboration for whole system network planning and development	• Begin two new RDPs by publishing a bespoke work plan for each region
	• Implementation of new commercial contracts to allow DER to participate in provision of transmission services in our in-flight RDP areas

Performance this Month

We continue to develop our modelling approach to understand the technical and commercial implications of distribution-based solutions to high-volts issues. We anticipate that assessing these solutions against more traditional investments will deliver value to consumers, and we continue to work closely with DNOs to ensure the scope of the cost-benefit analysis of those options is robust.

Lessons Learnt
Economic analysis of the pathfinding projects had been scheduled during downtime of the main NOA process, however a number of delays beyond the team's control have caused a resource pinch-point. We have plans to work around this, however we need to continue to plan for appropriate contingencies to ensure the work is delivered on time.

Meets Baseline Performance

During July, we continued to progress our baseline ETYS and NOA work; undertaking boundary capability analysis in conjunction with National Grid Electricity Transmission for England and Wales, with the Scottish TOs performing equivalent analysis, to support submission of options to enhance transmission boundary capabilities for inclusion in our annual cost/benefit analysis processes. We also started to draft those chapters of the NOA document that do not rely on the availability of the modelling results.

Exceed Baseline Performance

The pathfinding projects are continuing to progress, with an enhanced regional modelling approach established to better understand the high-volts issues covering Northern Powergrid's Northeast area and Electricity North West's (ENW) Pennine area. Distribution options have been discussed and developed, for analysis alongside transmission options; and learning has been put into practice through a clearer restating of transmission network requirements for reactive power capability; and via broader consideration of the types of costs that need to feature in the new whole-system cost benefit analysis process. There is ongoing work to ensure fullest treatment of costs in the cost benefit analysis process. Discussions continue with SP Manweb (Mersey Ring) and Western Power Distribution (WPD) (South Wales) on the development of similar work. Currently work is being undertaken following

[11] See Pages 38 – 40 here for details https://www.nationalgrid.com/sites/default/files/documents/Performance%20Metrics%20Definition.pdf

identification of regions through post fault analysis and assessment of current high spend. These also align with recently-published Reactive Power Roadmap.

What is a Pathfinding Project?

A targeted collaboration between the ESO and DNOs. They build upon work previously undertaken, for example through Regional Development Programmes or The Open Networks Project, to develop the necessary processes to support delivery of new whole system ways of working consistently across GB.

The new Regional Development Plan (RDP) with SP Energy Networks in Dumfries & Galloway is getting underway, with the detail of the project and its associated plan currently being scoped. ENW are keen to explore the potential to establish an RDP and have proposed several whole-system issues that could potentially be investigated. Also, a possible further RDP with WPD is being considered - they are keen to explore commercial solutions to battery storage capacity issues at demand peak and a meeting has been arranged to discuss.

Work to draft distributed embedded resources (DER) constraint management contract terms continues. A key element of this work involves defining the structure of the contracts across the ESO, DNO and DER, with different approaches aligning with different potential future approaches to developing and managing Distribution System Operator (DSO) arrangements. Given the sensitivity of future roles and capabilities in this area, it is important that we meet the needs of all parties in a way that doesn't undermine any future transition – discussions continue to ensure we agree on an appropriate structure.

Principle 6
Coordinate effectively to ensure efficient whole system operation and optimal use of resources

Our Key Baseline Activities:
We ensure efficient transmission system operation and optimal use of resources by:
• Planning and optimising outages of the transmission network to allow connections and asset maintenance.
• Six-monthly engagement with all DNOs to share the future seasonal challenges faced by the transmission system and discuss approaches to coordination and collaboration across networks to resolve these challenges.
• Developing and maintaining the TOGA model.
• Modelling and analysing the transmission system to identify future operability challenges.
• Informing market participants and our stakeholders about future operability challenges for the transmission system by developing and publishing the System Operability Framework.
• Innovating to find cost-effective technical and commercial solutions to operability issues.
• Facilitating the connection of new users to the transmission system and managing connection contracts.

Long Term Vision and Consumer Value

The evolution of whole system operation and optimal use of resources begins now with finding new approaches to optimising whole system operation.

We want to be an ESO who coordinates effectively to ensure efficient whole system operation and optimal use of resources; improves our cross-industry collaboration on whole system; implement learning from our major innovation projects and improves the service and information for new connection applications.

Under this Principle we expect to potentially unlock medium consumer value in the range of £15-£30 million in the short term[12]. This area is one where the main consumer value will be achieved in the long term. Actions that we take with the industry now are central to the ability to unlock vast financial future savings.

Our Deliverables for Q2 2018

Outcome	2018/19 Deliverables
Improve our cross-industry collaboration on whole system	• Leading the consultation process with stakeholders on future DSO commercial and technical arrangements (Open Networks consultation on Future Worlds). • Playing a pivotal role in the delivery of ENA Open Networks project.
Improve the service and information for new connection applications	• Scoping of the new TOGA system and issuing a procurement ITT for the new system.

Performance this Month

Meets Baseline Performance

We have previously had feedback from DNOs that our engagement and communication around work on tertiary connections to super grid transformers was not open and transparent enough. We have been working to address this both through written communication to each of the DNOS as well as attending the Energy Networks Futures Group to listen to the concerns of the DNOs and discuss them directly. Going forward, our objectives are to build a more open and transparent relationship based on communication and mutual understanding, especially of each other's ongoing initiatives and activities, the related operational decisions being made and the desired outcomes.

Exceed Baseline Performance

Stakeholders have told us that whilst our existing Transmission Outage Generator Access (TOGA) system performs the basic function it is required to do, it does not provide a good user experience and meet all stakeholder requirements. This is particularly true in the rapidly changing stakeholder landscape in which we need to provide access to the network to an increasingly wide range of customers. For this reason we are scoping a potential replacement for the TOGA system and taking a new approach to systems development through involving a wide range of stakeholders to understand their needs in this area and to include them in the procurement process. We are taking a tailored approach to designing this tool, delivering understanding of the current environment as well as the upcoming changes. This will help stakeholders define their requirements for a tool that is not only fit for purpose now but will continue to be so as the market evolves.

In July and August, we held stakeholder workshops in London, Birmingham and Glasgow. Across the three workshops, a total of 40 people attended representing 30

[12] See Pages 38 – 40 here for details https://www.nationalgrid.com/sites/default/files/documents/Performance%20Metrics%20Definition.pdf

companies. The levels of engagement were consistently high with very positive feedback received. From our post event questionnaires:

- For the 'content' element *(how useful was the information discussed),* the NPS® score is at +29% with positive comments about hearing other people thoughts and improvements, and thinking about future direction
- For the 'process' element *(how useful was the workshop style),* the NPS score is at +43% with positive comments about organisation, expectation setting and use of post-its!

Output from the three workshops is being collated with a view to feeding back common themes and requirements for TOGA's replacement, via webinars, in September. Many customers and stakeholders expressed an interest in supporting the TOGA replacement project and will be invited to user group workshops at the appropriate times.

The ESO is a proactive member of the ENA Open Networks Project and is leading on several key deliverables including the Future Worlds consultation that was produced in July and published on 1 August. The ENA Open Networks Project is a major energy industry initiative that will transform the way our energy networks work, underpinning the delivery of the smart grid. Through the Future Worlds consultation, the ESO is working very closely with the ENA and other networks companies to engage a wide stakeholder base on potential future energy system arrangements from a whole electricity system perspective. This work is a key enabler for unlocking the consumer value of the smart, flexible electricity system of the future. We are also promoting the consultation through all of our stakeholder engagement channels to ensure the views of the widest possible national stakeholder base is considered in this work which will inform future industry arrangements.

Principle 6: Performance Metrics

ESO role	Principle
Facilitating whole system outcomes	6. Coordinate effectively to ensure efficient whole system operation and optimal use of resources

Metric 14. Connections Agreement Management

Metric Description

The GB transmission system is constantly under change as TOs build new assets. We need to ensure that the relevant contracts for the affected generators are then updated to reflect this change. Some agreements permit us to curtail generation under certain circumstances at no cost but if an agreement is not up to date and the generation requires curtailment we may need to instruct this through a Bid Offer Acceptance (BOA).

Ensuring that connections agreements are up to date to reflect changes to the transmission network gives us more options to ensure the system can be run safely and securely and potentially saves BSUoS cost when we would need to pay to curtail generation.

Performance

This metric is a nine-month process so we will only report the final metric from January onwards. For the interim we will use this indicative metric to show our progression towards full delivery. This indicates the percentage of milestones completed on schedule in any given month in the process. This allows us to drive performance in this area and keep our stakeholders informed of an indication of our performance.

During July, all the milestones due were completed. There are currently seven connections agreements that require updating following notification since April 2018. Of these, four are making very good progress and are well ahead of schedule and four have been issued to the customer. During July, we have had no notifications of reconfigurations that have an impact on generators. Our year to date performance is 93% of milestones have been achieved.

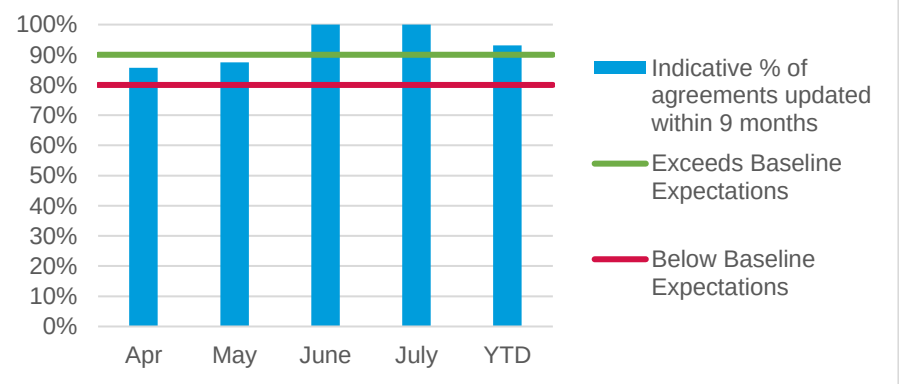


Figure 7 - Metric 14 Connections Agreement Management

Metric 15. System Access Management

Metric Description

We, as the ESO, direct the flow of electricity over the transmission system in real time whilst the TOs own the assets through which electricity is transferred. To ensure that these assets are maintained, the TOs ask us for access to their assets. When the system access requests are formally submitted, we undertake due diligence on these requests and, if secure and economic, they are accepted into the master outage plan in the Transmission Outage Generation Availability (TOGA) database before 15:30 at DA. These outages are then reassessed in the control phase (within day) before the asset is switched out to make sure it adheres to policy[13]. When a system access request has been accepted into the plan, TOs, DNOs and generators will act on the assumption that it will go ahead. Sometimes these requests are delayed or even cancelled within day for a variety of reasons from unforeseeable weather conditions to faults on the system to planning process failures. These cancellations can lead to higher network costs.

Performance

In July, we had two system access requests that were classified as fail to fly. That is those system access requests that have been cancelled or delayed by more than

[13] GBSQSS-GB Security and Quality of Supply Standard

one hour from where they were planned or one hour after requested by the TO within the control phase that can be attributed to us. Each of these instances is internally investigated using root-cause analysis tools and learnings from these are communicated to the relevant teams using operational learning notes. These are a tool used to investigate the cause of the process failure and communicate the findings to the relevant teams.

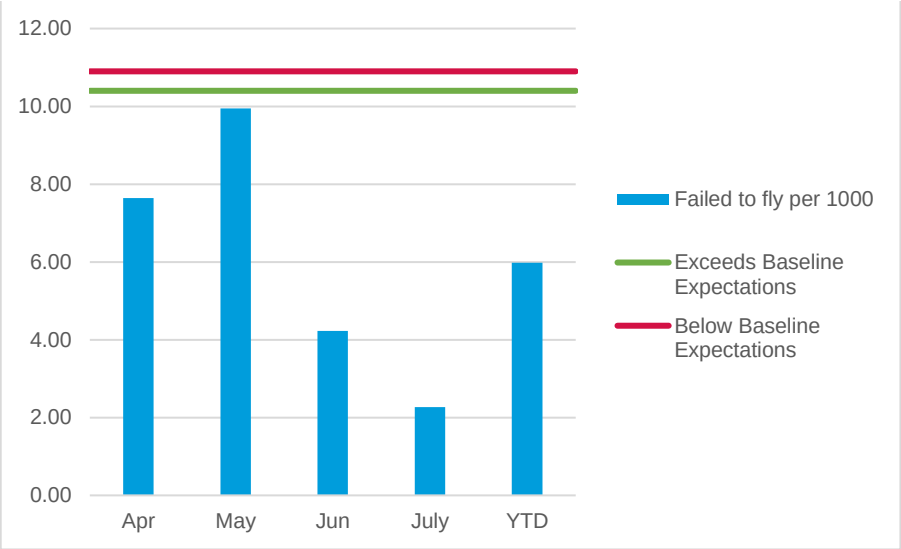


Figure 8 - Metric 15 System Access Management Performance

Principle 7
Facilitate timely, efficient and competitive network investments

Our Key Baseline Activities:
We facilitate efficient transmission network investment and planning, and help to identify investments suitable for competition by:
• Identifying future transmission system needs under the Future Energy Scenarios.
• Publishing the future transmission boundary requirements in the ETYS, informed by the Transmission Owners.
• Delivering SO-led analysis to identify extra solutions across TO boundaries and alternatives to network investment.
• Modelling and analysis to identify the most economical and efficient solutions to meeting future transmission system needs.
• Running the NOA committee review and publication of the NOA recommendations about efficient network investment to meet identified transmission system needs.
• Identifying projects from the NOA recommendations that meet the criteria for competition.

Lessons Learnt
Whilst 13 responses to the Network Development Roadmap was a positive increase compared to our usual network planning documents it would be have been even better if we had reached a wider group of stakeholders. We are considering how we can raise awareness and involve to a greater extent those organisations that would not normally get involved in network planning. For example, Ovo sent an open letter to the Minister for Energy and Growth, Claire Perry MP, pushing for network companies to make changes in RIIO-2 that are very much in line with our proposals. It would have been really good if that had recognised what we're doing.

We also learnt lessons on engaging with the Scottish TOs. Whilst we had taken some steps to talk through the changes with them, their challenging responses demonstrated that we hadn't fully brought them with us. Since the consultation response have been received we have taken a number of steps to enhance the relationship in this area and ensure a better two-way dialogue.

Long Term Vision and Consumer Value
For this Principle, our vision is to work to maximise competition in delivery of network investment and build new tools allowing the market to explore alternative solutions to meet transmission system needs.

Work that supports the outputs under this Principle will provide long term benefits in improving competition in efficient network investment by providing better engagement and facilitating more participation. Through this we expect to potentially unlock large consumer value in the range of £30 million to £50 million in the short term[14].

Our Deliverables for Q2 2018

Outcome	2018/19 Deliverables
Maintain and improve the quality of our insight publications	• Deliver the finalised Network Development Roadmap
	• Submit NOA methodology to Ofgem for approval • Commence technical studies as part of ETYS and NOA
	• Progress delivery of the pathfinding projects to implement the Network Development Roadmap

Performance this Month
The *Network Development Roadmap – confirming the direction* was published on 12 July following analysis of the consultation responses. Work is progressing well to implement the changes set out in the roadmap through our learning by doing approach of pathfinding projects. We also submitted the NOA methodology to Ofgem for approval on 2 July, a month ahead of the required deadline, in response to stakeholder feedback to get an agreed approach before the studies start.

Meets Baseline Performance
During July, we started the technical studies which form part of ETYS and NOA. The studies have been looking at system boundaries for England and Wales and we have been collaborating with National Grid Electricity Transmission (NGET) on this. The study programme has been encountering challenges and was revised for England and Wales due to lost time and rework caused by modelling issues.

We submitted the NOA methodology to Ofgem for approval on the 2 July, ahead of the August deadline. The early submission of the NOA methodology to Ofgem allows the Transmission Owners and SO to have a mutually agreed approach to studies at the beginning of the study period, rather than part way through it as in previous years. This submission of the NOA methodology to Ofgem as early as possible was in response to stakeholder feedback.

Exceed Baseline Performance
We received 13 responses to the Network Development Roadmap consultation, which is twice the number we usually receive to the NOA methodology consultation and the NOA report and from a broader group. This included responses from all of the transmission and distribution network companies, large and small energy resources and academics. The responses were positive overall and allowed us to confirm our proposed direction of travel in the document *Network Development Roadmap – Confirming the direction*[15] on 12 July. A summary and analysis of the responses received to the consultation were published as an annexe to the roadmap document and we are publishing full responses on our website as we receive responders' permission to publish. The feedback on the consultation document was

[14] See Pages 38 – 40 here for details https://www.nationalgrid.com/sites/default/files/documents/Performance%20Metrics%20Definition.pdf

[15] https://www.nationalgrid.com/sites/default/files/documents/Network%20Development%20Roadmap%20-%20Confirming%20the%20direction%20July%202018.pdf

Clarifying Metric 17 – NOA consumer benefit
When considering the options for network reinforcement there are two main ones: asset build or an alternative option. Reduced build options, which is the term we have used in the ESO Forward plan, is a subset of alternative options (the term used in licence condition C27). To be more accurate we feel that metric 17 should consider all alternative options, which by their definition also include reduced build options, but also extends to cover commercial solutions that do not require the construction of any assets. This ensures that the SO is considering the widest possible range of solutions to maximise consumer value. Table 2.2 (page 20) of the current draft NOA Methodology provides greater detail on alternative options, with the level of build involved increasing as you move from operational options down to the final example of a reduced build option.

generally positive and the finalised document was promoted at the Future Energy Scenarios (FES) Conference with a good level of interest.

Beyond the FES conference we have also held conversations with a number of commercial providers who are supportive of the changes and see they provide new opportunities but would like to see them implemented sooner.

Many of the developments within the Network Development Roadmap require new ways of working; modelling, analysis and collaboration. To facilitate these developments, we have adopted a “learning by doing approach” to develop our capabilities so that these changes can be included into the NOA methodology. These have been called pathfinding projects. In a number of regions, we are looking at the issue of managing high voltage and in phase 1 we are focussing on working with DNOs on establishing the modelling, processes, interactions and data exchanges. Once these projects are complete there will be a standardised methodology for comparing solutions to high voltage challenges which will be incorporated into the NOA methodology. We previously reported how we had decided to revisit how we had stated the system requirements to the DNOs in our first region to refine the process for future use. This has now been completed, with a heat map approach preferred. As a result, in July we have had sight of the options being developed by DNOs to meet transmission network needs that they will soon submit those in a more formal format. Internally, work to develop the Cost Benefit Analysis tool to assess high voltage solutions in this region is progressing well.

Alongside this we are also working to build the process to include commercial options into the 2019 NOA. We are requesting information on commercial options for the first time to increase boundary capability for the northern boundaries, which will help us deliver against metric 17 – NOA consumer benefit.

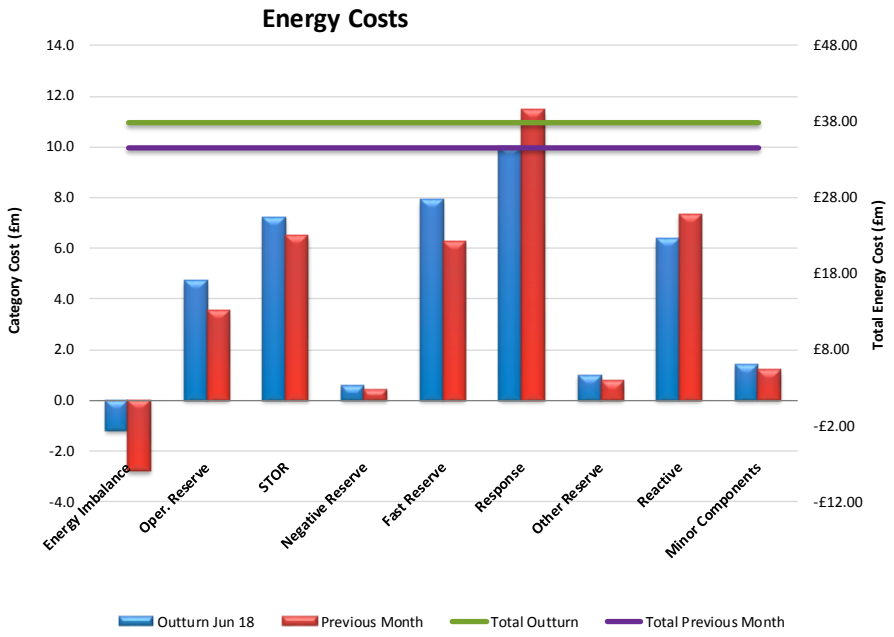
The development of our approach to test moving to a probabilistic approach for assessing boundary capabilities in the ETYS and NOA is progressing well. A new planning boundary has been identified which is better reflective of the current system needs and will be included in the probabilistic case study as well as in the current deterministic approach. This should help ensure the approach taken to meeting network needs delivers the greatest value for consumers. Whilst it is showing good initial results, the tool is a development tool and we will need to take a decision once we have completed the work on how to take the tool forward in the long term.

Hotspots

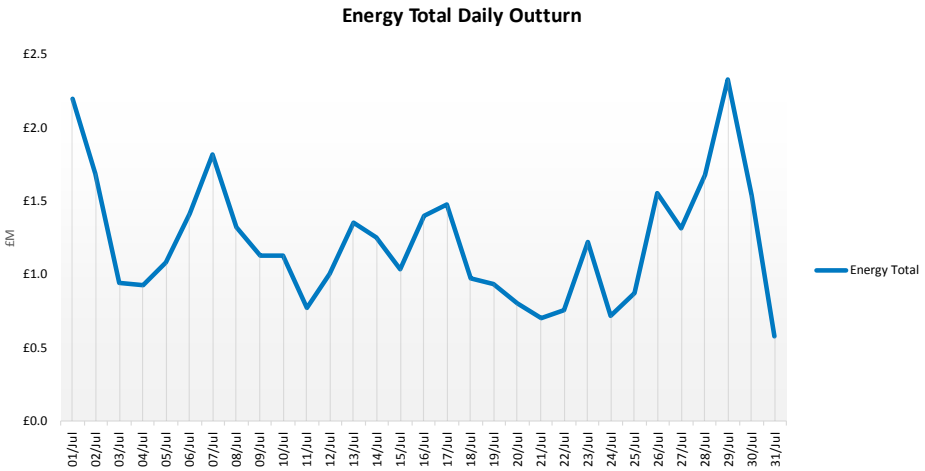
Energy Costs

Energy costs (including energy imbalance) for July 2018 out-turned at £37.91m, showing an increase from the previous month outturn of £3.3m. The average daily energy spend was £1.12m.

Compared to June 2018, all energy costs categories increased, except Response and Reactive that showed a decreased of around £1.5m and £1.0m respectively.



Energy Total Daily Outturn



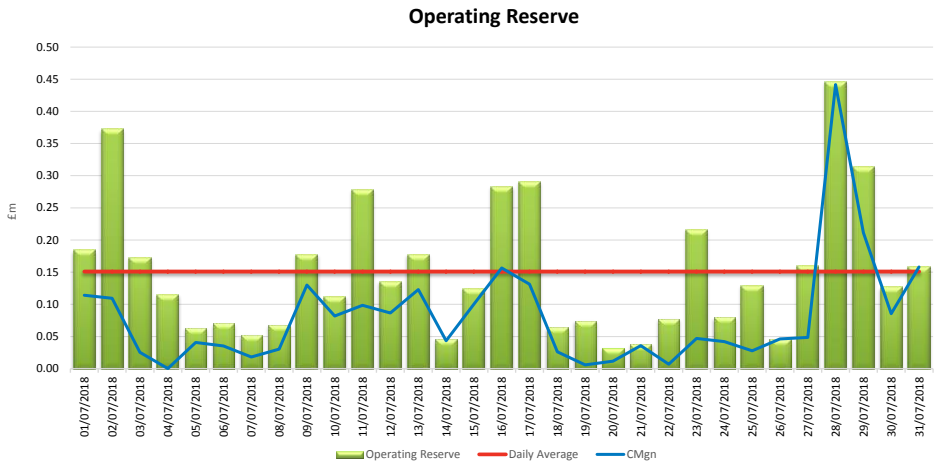
Daily Energy costs remained below or around £1.5m for most of the days in July 2018. Higher energy costs were recorded over the first two days and throughout the last weekend of the month. The most expensive day of the month was Sunday 29, when energy costs peaked at over £2.3m. The high cost was mainly due to a prevailing short market, that kept the energy imbalance and operating reserve costs high. Another high cost day in July 2018 was Sunday 1 with the energy cost at around £2.2m. The main drive behind this high cost day was the short market day that required numerous BM units to be synchronized for margin. On top of it, issues with weather data caused the wind forecast to be around 2.2GW overforecast, requiring additional units to be synchronised alongside 660MW of STOR to be utilised. Additional response was also required with the wind shortfall, to allow

ramping on the interconnectors. Trades were enacted on the interconnectors to provide additional negative reserve.

Operating Reserve

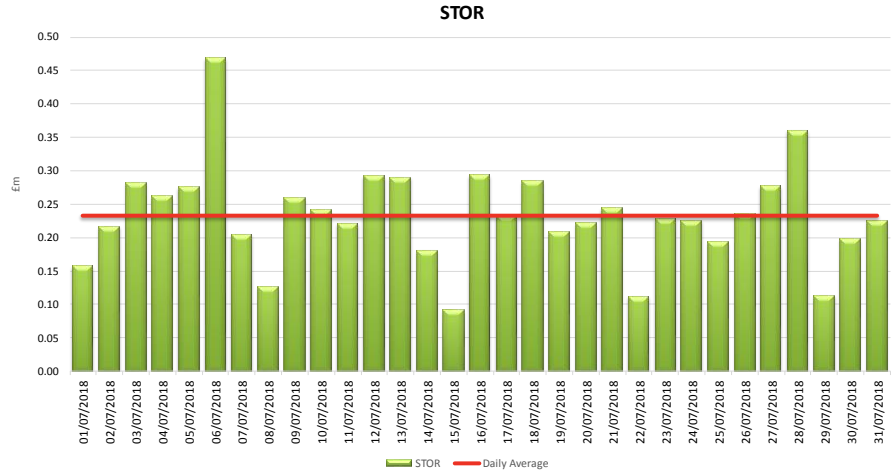
Operating Reserve out-turned at £4.7m showing an increase from June 2018 of £1.1m. The highest daily cost for this category was recorded on Saturday 28, with a spend of £0.45m. These costs were entirely incurred as a result of the active constraints on the system and are therefore considered as Constrained Margin costs. High costs incurred on the 2 July were due to high output of Solar PV and wind shortfall compared to forecast which required units to be kept on, rather than desynchronise, with prices in excess of £60/MWh.

Of the total spend, £2.5m is attributed to constrained margin costs which are notionally incurred as a result of active constraints on the system preventing access to generation which is in merit. The cost of constrained margin has largely driven volatility of the daily spend, as can be seen in the below graph.



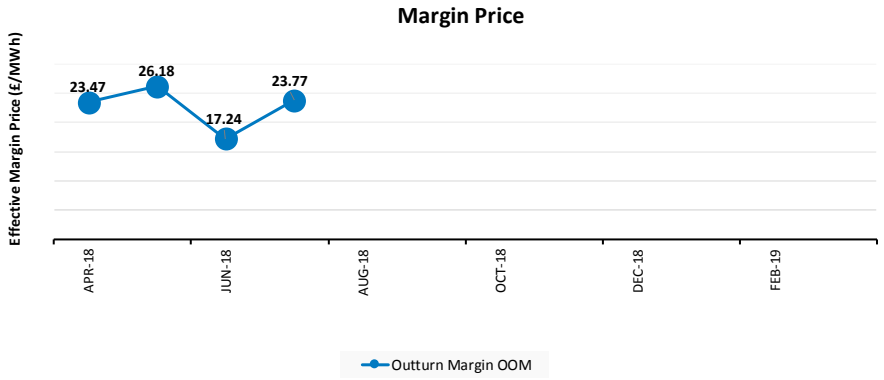
STOR

STOR cost for July 2018 was £7.2m compared to £6.5m in the past month. Daily costs for this category remained below £0.3m for most of the days, except for Monday 6 and Saturday 28 when costs peaked at £0.47m and £0.45m. In both cases, significant volume of STOR were deployed to account for demand forecast errors, wind generation volatility and generating plants not available.



Margin Price

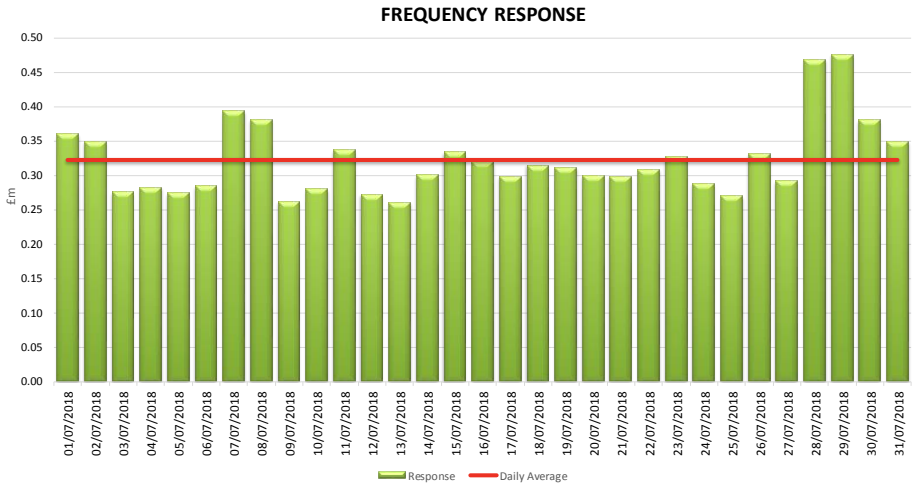
Average margin price in July 2018 out-turned at £23.77/MWh. This is an increase from the past month (£17.24/MWh).



Frequency Response

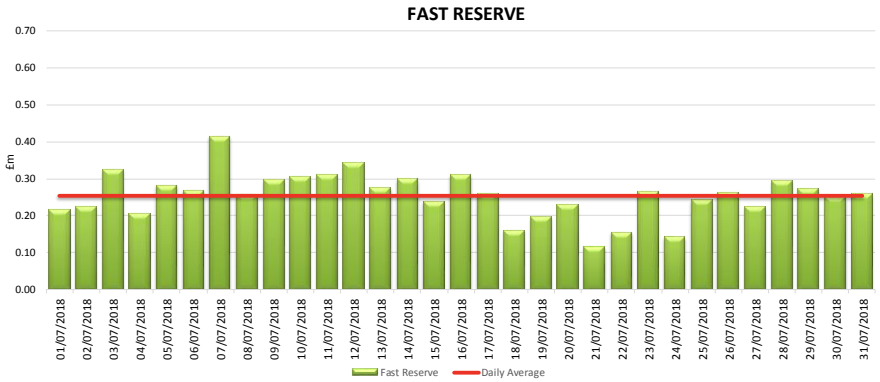
Frequency response in July 2018 out turned at £10m which is a £1.5m decrease from last month. Response costs are largely ancillary costs (~85%) with the rest being incurred in the BM, positioning units so they can provide a response service. The movement in day to day outturn reflects the level of response held in control room based on system conditions. Overall costs were lower for the month due to stable weather conditions meaning additional levels of response were not required to the levels seen in previous months.

The highest spend was recorded on Saturday 28 and Sunday 29, when the spend for this category was of £0.47m and £0.48m respectively. On Saturday, wind volatility in the early hours required additional primary, secondary and high to be held, with HF volumes up to three times the minimum volume. Throughout the morning and afternoon, demand forecast errors were in excess of 2GW and wind bids were taken to provide response.



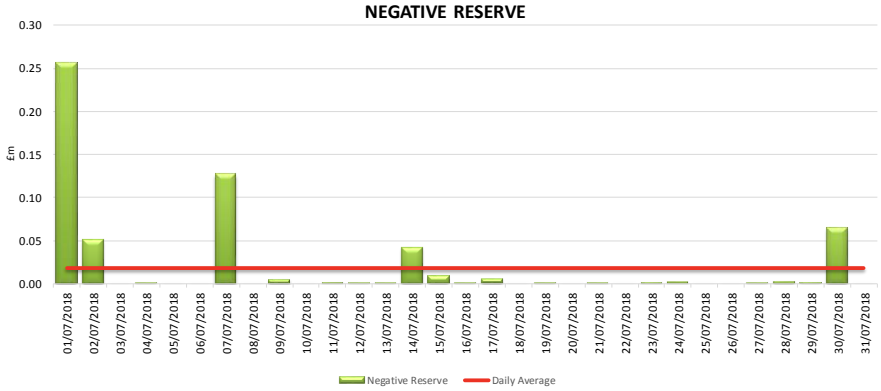
Fast Reserve

Fast reserve out turned at £7.9m, which is an increase of £1.6m from June 2018 costs. Throughout the month, the average daily cost was below £0.3m and the ancillary costs made up circa 86% of the total costs, most of which is incurred on the SpinGen service. Arming the service delivers consumer value over procuring reserve in the BM (Operating Reserve).



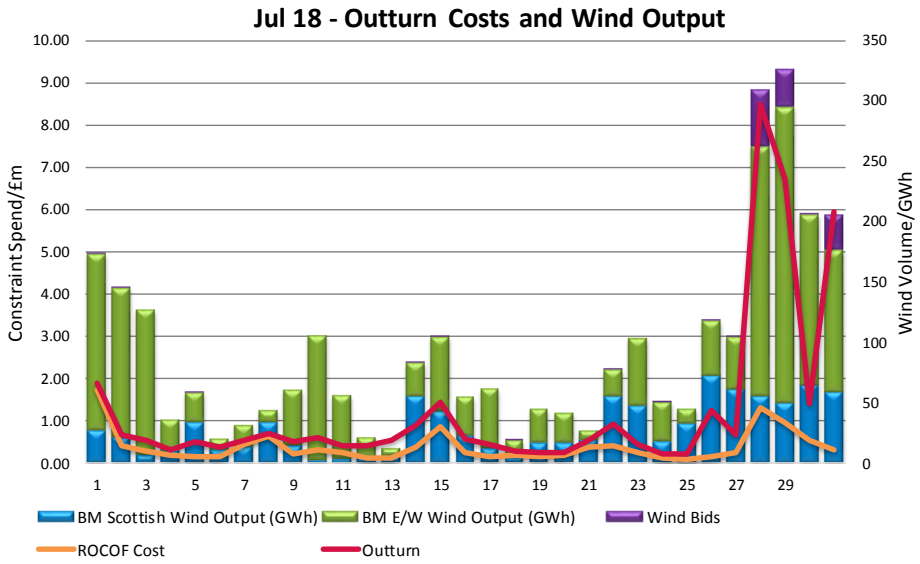
Negative Reserve

Negative Reserve out-turned at £0.6m, which is £0.2m higher than June 2018. Most of the days in July 2018, the costs for this category were nil. Relevant high spend days were Sunday 1 and Saturday 7, when costs were £0.26m and £0.13 respectively. In the first case, multiple trades on the interconnectors were enacted overnight to provide additional reserve, as the high wind levels were reducing the reserve provided by the market. In addition, the DTU (demand turn-up) service was instructed late afternoon. On Saturday 7, at times of low demand, interconnector trades were taken to provide additional reserve. In both cases, trades for RoCoF reason delivered consumer value against Negative Reserve.



Constraints Costs

The total constraints cost for July 2018 was £39.1m; £16.4m for England and Wales, £0.7m for Cheviot, £0.2m for Scotland, £9.5m for Sterilised Headroom, £12.1m on ROCOF, and £0.2m on Ancillary Services costs.



The graph above shows the daily outturn costs and the portion made up by RoCoF. It also shows output levels of BM wind and volume of wind bids (including trades) to indicate the extent to which wind output drives constraint costs.

During July 2018, the constraint daily costs was below £2.0m for most of the days, except for the last four days of the month, throughout which, the spend was nearly 58% of the total monthly constraint cost. Saturday 28 was the most expensive day, with costs peaking at around £8.5m. Over that weekend, constraints were in place in the North of England due to three planned key outages. This scenario was exacerbated by significant increases in wind output in that region and in Scotland from Saturday afternoon, that required large volume of trades and BM actions to solve the constraints. Since this situation remained unchanged until the late evening of the following day, on Sunday 29 the spend was around £6.3m. A similar scenario was repeated on Tuesday 31, as the wind levels increases significantly again, and the costs on that day peaked at nearly £6.0m.

Whilst costs were high over this weekend, a significant volume of work was undertaken in very short timescales to mitigate any further spend. The Sunday morning experienced the lowest ever demand of ~15.8GW which was not forecast in advance timescales. The key outages were not able to be recalled and so constraints in the North of England were very tight requiring large volumes of wind bids. Such low demand contributed to negative reserve issues in addition to constraint, voltage and RoCoF problems. We worked with BM parties to help ensure system security in a very challenging environment.

RoCoF

The RoCoF outturn was £12.1m, which is nearly £2m higher than costs recorded in June 2018. The highest daily cost for RoCoF incurred on Sunday 1 July, when cost peaked at over £1.7m. On that day, since high level of PV and wind generation and low demand, large volumes of trades were taken on the interconnectors and on generating units throughout the 24hours to limit the largest generation loss on the system. High costs were recorded also over the last weekend of the month peaking at £1.3m on Saturday 28. On that day, since RoCoF level trigger was low due to significant wind generation displacing conventional generation and low demand, we had to buy on conventional generation as well as large trading actions.

Voltage

These costs relate to the buying of energy, in order to access the voltage capability on the generating units. The costs for voltage are reported in the Reactive Power category.

Voltage costs in July 2018 out-turned at £2.1m to deliver 110.1GWh of energy with voltage supporting capabilities, of which over 91% of volumes were solved with forward trading.

As well as in June 2018, NW England incurred in the majority of spend (67%) to access voltage units. This was a similar situation as the previous month, to allow for an outage to be taken in the North of England.