nationalgrid

ESO Forward Plan FY18/19

May 2018

Executive Summary

'We're two months in to delivering against our 2018/19 Forward Plan. By providing our customers, stakeholders and the regulator with complete transparency on our actions and priorities, we're getting more feedback than ever before – we're listening – and we're responding.'

May was a month for feedback. Ofgem published its Formal Opinion[1] on the Forward Plan, we had our first feedback session with Ofgem on the April monthly report, and several deliverables were completed that made a splash with stakeholders, who felt compelled to let us know about it. This was our first taste of how the new ESO incentives regime will drive our performance and maximise value for consumers through your feedback and engagement.

Ofgem's Opinion on the 18/19 Forward Plan was a welcome boost, and a helpful reminder. It's great to hear that our efforts to embrace the new regime, and work with all our stakeholders to create the first Forward Plan have been recognised. It was also helpful to have a clear articulation of the areas where our plans and intent still aren't clear, and where we need to provide more evidence, or more effort to really demonstrate that we plan to exceed expectations, and deliver exceptional additional value to consumers. We're working on it.

This month's report has per Principle summaries on what we understood from the Opinion, and what we think needs to change. The Quarter 1 report will see a re-launch of the work programme and metrics for several of our Principles, to really respond to this feedback.

The April monthly feedback meeting with Ofgem galvanised these messages, and gave all of us a feel for what more transparent engagement is going to look like between the ESO and Ofgem. We've published the minutes of the meeting on our website[2], and over the next 12 months you will be able to see the new incentives regime take shape, through the story of delivery against the Forward Plan.

We met some big milestones this month, and with big milestones comes reactions and feedback. At the very beginning of the month, we launched our Network Development Roadmap consultation; we're bringing the topic of network planning to a wider audience! Shortly afterwards, we published our Roadmaps on Restoration and Reactive Power, which follow up the System Needs and Product Strategy with a clear plan to develop markets in these important areas. Later in the month our two-year collaboration with the DNO community and Ofgem on establishing new Vector Shift solutions came to a conclusion. Our control room had an innovative new tool to help manage the system just in time for the sunny Royal Wedding weekend, and the ESO and several DNOs have pioneered some new ways of working that will become the norm as we move to a Whole Electricity System way of thinking.

It was good to tick off the first of our commitments in the Forward Plan, and a good opportunity to gather feedback on what we have produced, and hear whether it meets expectations. This feedback, positive and negative, has given us the chance to understand more of the dependencies between the deliverables in the Plan, as well better appreciating the needs of our stakeholders and the impact of our outputs.

All feedback helps us improve, and we'll use the Quarter 1 report in July to give you all a better, consolidated view on how we will communicate with you, and how we will seek your feedback on our plans and performance.

Your Feedback is Essential

We hope that you've started to see some changes already. 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.

[1] https://www.ofgem.gov.uk/system/files/docs/2018/05/ofgem_formal_opinion_on_eso_forward_plan_2018-19.pdf

[2] https://www.nationalgrid.com/sites/default/files/documents/Agenda%20and%20Meeting%20minutes%2030th%20May%202018_0.pdf

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CORRECTION:
In our April report we incorrectly stated our performance for query resolution time within two weeks as 78%. We have since identified that this was a mistake and that the performance was 80%. This is reflected in the performance for May. We have already informed Ofgem of this and have carried out root cause analysis to learn from this.

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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.[3]

Our Deliverables for Q1 2018

Outcome	2018/19 Deliverables
Improve confidence in our forecasts	• Commence new BSUoS monthly report • Information provision innovation – publish carbon intensity • Publish Summer Outlook Report
Increase transparency of our balancing decisions	• Deliver a schedule of webinars and events relating to the Ancillary and Balancing Services (AS/BS) Tenders
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

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 communications 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 decision.

We do this through publications such as Future Energy Scenarios, Market Outlooks, insight publications and the Electricity Capacity Report.

Performance this Month

In May, Ofgem launched an investigation into the demand forecasting for the UK electricity market[4]. The opening of this investigation does not imply that any findings of non-compliance have been made. We continue to support and work with Ofgem as part of this ongoing investigation.

Meets Baseline Performance

To meet our aim of minimising the actions we take as System Operator, market participants are encouraged to balance their positions. We support them by providing information which helps them forecast system needs and likely market outcomes.

In May we met our baseline expectations, we continued to publish tender results to the market to the schedule and our Monthly Balancing Services Summary (MBSS). Our Firm Frequency Response (FFR) and Fast Reserve tenders were undertaken and results published on time and right first time on our website. The Short Term Operating Reserve (STOR) Tender remained open at the end of May. Wind and demand forecasts were continually published allowing market participants to self-balance their position as much as possible.

Exceed Baseline Performance

Our customers have asked for enhanced transparency and accessibility of balancing cost information to help them manage their businesses more efficiently. In response we are developing an information portal that will include BSUoS forecast material and daily balancing costs.

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

[4] https://www.ofgem.gov.uk/publications-and-updates/investigation-national-grid-electricity-transmission-nget-and-its-compliance-its-obligations-under-standard-licence-condition-16-transmission-licence

During May, we have exceeded baseline performance with the launch of the carbon intensity API, strong performance against the metrics and delivery of webinars for the results of tender assessments for both FR and FFR.

In May, we completed development of Phase 1 of the customer portal which will provide both BSUoS forecast and out-turn data. This is being implemented in response to stakeholder input and we have also prepared the stakeholder engagement activities to provide input into Phase 2 which will focus on providing more granular balancing cost information. In addition, we have made good progress in the development of a new BSUoS report; both PDF and data file which will be available next month.

In addition, the Carbon Intensity platform[5] was further expanded, adding a new regional forecast of Carbon Intensity. This was launched during May at the House of Lords. We are consistently seeing 500+ users per day accessing the site and 45,000+ hits per day on the platform. Users vary from individuals, apps, charge platforms like Pod Point, heat pump providers such as Sunamp. Our delivery has been discussed by stakeholders on the international stage and has laid the foundations for our recent strides to establish us as an innovative leader in Artificial Intelligence in the energy industry. The forecasting research developed whilst creating this nationally used platform is being built into the solar and wind predictions that make up our GB Demand Forecast.

Our metrics show strong performance during May for forecasting and delivery of webinars to explain the results of tenders for Ancillary and Balancing Services; detail of our performance against metric 1 can be found in the Appendix. These both show improvements in the quality of the information published to the markets to support their decision making. The half-hourly BSUoS forecasts will start from Q3, no progress made this month. Our Trades Data Transparency metric is not currently reported because the trades are not time- stamped within the portal. This is required to show that the trade publication is carried out within the 1 hour required in the metric. The implementation of this new functionality was tested and minor adjustments have been identified and implemented for further testing. The performance metrics which support Principle 1 are largely tracking in line with and above expectations. The detail of performance can be found here.

The demand and wind forecasting metrics (Metric 4) are based around the accuracy of our forecasts over the last 3years with a 5% reduction applied to the error. These are ambitious because of the increasing levels of intermittent distribution connected generation especially solar. During May, our performance was good with 58% of wind forecasts and 59.7% of demand forecasts reaching this ambitious accuracy target.

In May, to support our stakeholders understand why their tenders had been accepted or rejected we hosted webinars on Fast Reserve (FR) and Firm Frequency Response (FFR). This is to further support stakeholders in understanding the information that we provide. We gathered feedback from stakeholders in previous months at the end of call, but this month used the interactive polling SLI.DO. We have seen a steady increase in participants to 44 for FFR, but the number of responders to the survey was very low but we will respond to the feedback provided. The FR webinar was the first one this month and stakeholders told us that the information was useful and they did not require further information about the rejection codes. These are groups of reasons that help explain why tenders have been accepted or rejected.

Changes to Principle 1 in the Forward Plan

We see that we need to present clearer plans for the year of what we will do and when. Our stakeholders are looking for more detailed descriptions of deliverables. We will review our metrics and be clear about the narrative that binds the metrics to the long term vision, and where we are delivering against baseline expectations, or going over and above.

[5] http://carbonintensity.org.uk/

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

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.[6] In the long term, this area will become a major contributor to consumer value.

Our Deliverables for Q1 2018

Outcome	2018/19 Deliverables
Improve confidence in our forecasts	• Consultation on innovation priorities and publication of the 2019/20 ESO Innovation Strategy
Increase transparency of our balancing decisions	• Delivery of our schedule of webinars and events relating to the Ancillary and Balancing Services Tenders
Develop our information portals and events	• Successful hosting of our Electricity Operational Forum events and expansion of our channels to share information to support wider engagement of market participants and service providers

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 near-future.

What is a Vector Shift?

It is a type of Loss of Mains Protection used by some embedded generation and requires us to take additional actions to secure large distributed generation lossess triggered by transmission system faults. This is visibile to us as an increase in the local demand on the transmission network immediately after a fault on the system. Periods of low system demand and high levels of distribution generation output are the times when Vector Shift (VS) poses the greatest risk and is costliest to manage using traditional balancing actions.

Performance this Month

Meets Baseline Performance

In May we met baseline expectations by performing a large volume of trades (350,000MWh) to manage voltage, negative reserve and RoCoF. The voltage trading benefit when compared with the Balancing Mechanism (BM) was £1m. Overall, energy cost was 30% lower when compared with May 2017. For tendered Fast Reserve, we have reduced firm holding costs by around 20% compared with 2017, delivered through increased competition from new non-BMs providers. We have reviewed the frequency response requirements and contracted more FFR compared with 2017, optimising the amount of contracted response against the mandatory market (this applies to 2017/18, not just May). The demand turn-up service was used in May to help efficiently manage negative reserve requirements. During periods of low north to south transfer, voltage management has been very challenging, the Control Room avoided the requirement for additional spend on voltage machines by switching out voltage control circuits and utilising flows by tapping the quad boosters to also manage volts. We have continued to optimise the outage plan in all timescales by managing those outages that present a significant cost risk.

Exceed Baseline Performance

In May, we concluded a highly collaborative piece of work with Ofgem and DNOs that began back in 2016. In May 2016, we noticed the local demand on the transmission network had increased immediately following a fault on the transmission system. We set up a joint investigation with Western Power Distribution (WPD) over the summer and concluded that embedded generation disconnecting due to vector shift protection was the cause. This was fed into the GC0079 Working Group to support the review of protection settings at a national level, meanwhile work continued during 2016 between National Grid and WPD to resolve the local issue.

In early 2017 we started to engage directly with UK Power Networks (UKPN) on this topic. During 2017, a ban on vector shift protection for new connections was implemented in the WPD and UKPN areas, which was later implemented on a national level. In mid-2017 we engaged directly with Scottish and Southern

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

Electricity (SSE) to investigate the issue in their area. Using information collected via the DNOs we established that the volume of existing generation using vector shift protection across the three DNO areas was significant enough to put the system at risk following specific faults on the network. We identified that changing the protection may be the least cost to the consumer than other mitigation strategies. During 2018 we worked with Ofgem and the three DNOs to establish the appropriate approach and then, design and implement a new process to change the protection in the at-risk areas.

To achieve this, we collectively closely examined the industry codes and licence details with multiple legal teams and got clarity on the possible swift courses of action to mitigate the VS risk. The result was the development of a new efficient commercial approach. Our commercial and technical cross-site teams worked together to design a competitive tender process whereby generators bid to change their VS protection settings for a fee. Despite only having 5 days to respond to the open invitation to participate, over 1.3 GW of capacity across 180 sites participated in the tender process, thanks to DNO support in marketing the opportunity to their customers. Bespoke VS contracts were awarded to 71 successful sites which met the assessment criteria and fulfilled our requirement at least cost to the consumer.

800MW of VS protection was changed between the 15th May 2018 and the 1st June 2018 at a cost of approximately £200k. We spent around £1.3m managing VS over the weekend of the Royal Wedding, but enough VS protection changes were made by the late May Bank holiday to avoid any additional costs. Lessons learned from this project will feed into work that teams across the ESO are undertaking to design and implement innovative solutions for a range of system operability issues in collaboration with other DNOs.

As with other special events, we forecast demands for the royal wedding based of the schedule of the day, predicting when we thought people would be watching the wedding on TV (reduction in demand) or taking a break from the TV to get a drink (increase in demand). To manage the increased unpredictability of the demand brought by the wedding we held some additional response and reserve on the system to manage frequency.

Changes to Principle 2 in the Forward Plan

We will continue to improve this transparency and simplicity created by our new balancing cost metric by including more detail on benchmarking this performance. Our metric on system operability will help us to track success in delivering additional value for consumers in balancing.

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

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[7]. In the long term, flexible markets are one of the keys to releasing maximised value.

Our Deliverables for Q1 2018

Outcome	2018/19 Deliverables
Promote competition and develop new markets in balancing services	• Publication of information on real-time trading activity • Standardise the FFR product structure and simplify the contract • Publish roadmaps on the development of markets for voltage, constraints and black start

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 the balancing mechanism and ancillary services contracts, we support new and existing providers to help them participate in the ancillary and balancing services markets and tenders and we have employ a schedule of open tenders to purchase a variety of products and services.

Performance this Month

Meets Baseline Performance

In May, we performed well against our baseline activities. To prepare for the June tender for Firm Frequency Response, our Business Development team worked to tight deadlines in May to ensure 17 new Framework Agreements for Non-BM units were put in place allowing providers to tender in these units for the first of the new tender structure. The impact of our balancing services reforms is also filtering into the baseline work with one new non BM provider on-boarded to compete in the Fast Reserve market for the June tender, this is the first non-BM provider to enter in 18 months, and has taken the non BM fast reserve provider total up to 3. Guidance for how to participate in these markets and how to complete tender forms has been given to ensure providers are supported on their new venture. In addition to growing market participation we prepared for the launch our new YouTube channel which features introductory guides to Frequency Response services[8]. The next series, on reserve products and the future of Balancing Services will be following shortly.

Exceed Baseline Performance

On 30th May, we achieved a significant milestone of publishing the Product Roadmaps for Restoration[9] and Reactive Power[10] on the Future of balancing services website. The roadmaps follow on from last year's System Needs and Product Strategy (SNAPS) publication, and fulfil commitments made in our Forward Plan. They set out when and how we will develop the Reactive Power market and Restoration service in order to improve transparency and increase competition, whilst meeting our anticipated operational needs. The actions intend to create more liquid markets to drive value for the end consumer. Diversifying the technology mix of providers will provide the opportunity to develop alternative approaches to system operation and meet future operational needs.

Coordination with DNOs will be vital to understand and realise effective service delivery from distributed energy resources and to optimise the use of network assets. The Roadmaps set out our commitment and actions to achieve services that are

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

[8] 'The Power of Frequency Response' - https://www.youtube.com/watch?v=HbsD-kRhizc&list=PLxwEbKHSSM0VTCngOouUlWDCt0T2H2QG6&index=3

[9] https://www.nationalgrid.com/sites/default/files/documents/National%20Grid%20SO%20Product%20Roadmap%20for%20Restoration.pdf

[10] https://www.nationalgrid.com/sites/default/files/documents/National%20Grid%20SO%20Product%20Roadmap%20for%20Reactive%20Power.pdf

transparent and accessible for *all* parties – traditional or emerging – and we welcome feedback from all stakeholders. This important step allows all stakeholders a chance to question us, provide their input and ultimately help to shape our future vision. In addition to the feedback survey that is live, we will be engaging stakeholders on the Product Roadmaps at the Power Responsive Annual Event in June and the Electricity Operational Forum in July. We are also seeking input on the Product Roadmaps through industry associations to ensure we get a good coverage from all sectors and provide an opportunity for stakeholders to understand what these commitments means for them.

Changes to Principle 3 in the Forward Plan

Feedback from the Formal Opinion has been broadly positive but we see there remains some work to be done to make clear what meeting baseline delivery is, and what is going over and above. Some of the metrics require further work to explicitly set out the measures and the benchmark against which we aim to perform.

Principle 4
Promote competition in the wholesale and capacity markets

Long Term Vision and Consumer Value

We are committed to enabling the transformation towards a smarter, more flexible energy system. This will enable us to maximise the full potential that a greater diversity of technologies, market participants and business models can deliver for the consumer. We will continue to build on our ability to lead cross-industry engagement and will expand on initiatives such as Charging Futures and Power Responsive, bringing together a range of stakeholders helping industry to navigate the strategic challenges and reduce the barriers to participating.

We expect to potentially unlock large value between £30 million and £50 million in the short term[11]. In the long term driving towards an efficient framework which supports the widest potential industry where every consumer can participate is a large undertaking and is fundamental to realising those future £8 billion of savings[12].

Our Deliverables for Q1 2018

Outcome	2018/19 Deliverables
Continual improvement of network charging processes	• Improved transparency and publication of charging data – Phase 1: Customer Access to information • Provide additional information to support the Electricity Capacity report
Facilitate the development of the code and charging framework	• Deliver Charging Futures Forums that are open to all network users • Deliver webinars, podcasts and plain English publications under the Charging Futures (CF) Brand

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.

Performance this Month

Meets Baseline Performance

We have met baseline performance in May; in our role as Code Administrator for Grid Code and CUSC we continued to drive forward a prioritisation of code modifications through our engagement with Code panels. This enables more efficient and targeted use of industry time to progress those modifications that are considered by Code Panels to be more important and imperative to progress on a timely basis.

More specifically, as code experts for access and charging, we met with customers to discuss CUSC modifications against the backdrop of the Access and Forward Looking Charges Task Forces and current pipeline of change. We facilitated discussions with our customers and avoided seven potential CUSC modifications with customers agreeing that significant future analytical work and industry debate is required before these modifications can be raised. We continue to support the work of the Access and Forward Looking Charges Task Forces in their strategic review.

At the May Transmission Charging Methodology Forum, we presented to our customers an explanation of how charges are calculated for those that are seeking a transmission connection on Scottish islands. We clarified that the intention would be to ensure any such connections were treated in the same way as onshore connections would be treated. In this we are facilitating our customer needs and providing transparency to customers of the charging arrangements.

We wrote to customers on 30 May to set out our intention to ensure that the interpretation of the EU cap on generation charges is actively reviewed given the TCR and against the backdrop of the access and forward looking charges task forces and current pipeline of change. We understand this as an issue for customers and our committed to stepping up to resolve this.

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

[12] See the National Infrastructure Commission's 'Smart Power' Report for further detail on the future £8 billion savings. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/505218/IC_Energy_Report_web.pdf

What is Charging Futures Forum?

It is a programme coordinating significant reform of electricity access and charging arrangements in close collaboration with users of GB's electricity network. Acting as a bridge between policy, industry initiatives and the industry code governance process, Charging Futures has four key parts: a quarterly Forum, a Delivery Body, Task Forces and Ofgem as Chair.

The Charging Futures Forum is the primary place for users of the electricity network to learn, contribute and shape the future of charging arrangements. The quarterly Forum provides regular updates, high level reviews and consultations to progress the work of the charging Task Forces.

Exceed Baseline Performance

In May, we supported Ofgem with the delivery of the third Charging Futures Forum (CFF) where Ofgem presented an update on the Targeted Charging Review (TCR) as well as Access and Forward Looking Charges. In our role as Lead Secretariat, we are facilitating greater industry participation in network charging and access reform through an enhanced and targeted engagement approach. We have previously received feedback that we needed to help people to learn, ask and contribute in new ways. By bringing all of the complex issues of charging and access together in one forum and providing more accessible materials, such as podcasts and briefings, we are making progress in our objective to facilitate the participation of a wider audience in industry change processes. There is evidence that this approach is working. For example, in May our podcast on Access and Forward Looking charges has been listened to 136 times, bringing the total number to date to 469 times. In addition, the number of parties wishing to attend the seminar has increased by 71%, to 154, since the first CFF. The increasing engagement base, with broad sectoral representation, demonstrates that busy people think this forum is a good use of their time. Furthermore, stakeholders have told us that the supporting materials, such as briefings and podcasts, allow them to come better prepared and get more out of the event.

Changes to Principle 4 in the Forward Plan

Reflecting on the feedback received as part of the Formal Opinion, we will review our metrics and clearly articulate which are good indicators of meeting baseline performance, and which demonstrate how we are going beyond baseline expectations. In due course, we will publish our thinking on how we can provide more strategic leadership across the industry code landscape and we will talk about our role in the EMR 5-year review. In our Q1 Report, we will share an updated version of the Delivery Schedule section for this Principle to articulate our long term vision and deliverables for 2018/2019.

Corrections

In our April report we incorrectly stated our performance for query resolution time within 2 weeks as 78%. We have since identified that this was a mistake and that the performance was 80%. This is reflected in the performance for May. We have already informed Ofgem of this and have carried out root cause analysis to learn from this. In May our performance for responding to queries and timeliness was 100% and our query resolution within 2 weeks was 98%.

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

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.

Whole System and the NOA

The current NOA process focuses on the assessment of options to reinforce the capability of major national transmission system boundaries, as defined in the ETYS. Currently, boundary reinforcement options are submitted by onshore TOs. Additionally, the NOA process allows for alternative options to be considered, such as commercial arrangements with users to provide transmission services and balancing services; and for liaison with distribution licensees on possible distribution system solutions. The process is governed by the NOA Methodology, which is consulted upon, reviewed and updated annually by agreement with the Authority. The NOA Methodology has yet to be fleshed out with detail on how alternatives to TO reinforcements would be treated, however a means of doing so is proposed in the Network Development Roadmap. Issues that are not associated with the main ETYS boundaries are not currently part of the NOA process.

Long Term Vision and Consumer Value

The vision for this Principle is to develop ourselves as an ESO who facilitates the move to a low-carbon grid and joins up the way we design and run the network across transmission and distribution. This will ensure decisions are made efficiently across all networks, speeding up connections by optimising the use of existing network infrastructure; and ensuring the broadest possible assessment of solutions to future transmission system needs.

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[13]. In the long term, whole system sits at the heart of releasing consumer benefits.

Our Deliverables for Q1 2018

Outcome	2018/19 Deliverables
Maintain and improve the quality of our insights publications	• Publish the Network Development Roadmap consultation and final Roadmap
Improve our cross-industry collaboration for whole system network planning and development	• Publication of the Western Power Distribution (WPD) and UK Power Networks Regional Development Programme Learnings

Performance this Month

Meets Baseline Performance

During May, we began working on the feedback received from our NOA 2018/19 methodology consultation, which closed on the 21st. We also began the process of incorporating the latest scenario data from our Future Energy Scenarios (FES) team into our models, and issued transmission boundary requirements to TOs for them to prepare options that meet future needs.

Exceed Baseline Performance

In May, we continued to collaborate with DNOs to develop a whole-system approach to dealing with transmission system issues. This new way of working seeks to transform the way we manage transmission system issues by assessing how effective solutions are at distribution level, both from a technical and commercial perspective.

Our collaborative approach requires us to work closely with DNOs to (1) understand the capability of the network on a whole system basis, (2) work together to identify a range of credible distribution options to solve the transmission issue and (3) develop our cost/benefit assessment methodology to assess those distribution options against transmission options, so that the best option can be recommended. Our aim is to enable a broader range of transmission network issues to be included as part of the NOA process.

During May, we continued work on our Pathfinding Projects to tackle areas with persistent high volts on a whole electricity system basis, using a regional NOA concept. We have begun to analyse several submitted distribution solutions to high-volts issues in Northern Powergrid's (NPG) North East area and Electricity North West's (ENW) Pennine area, and through this process we realised that our articulation of system needs didn't quite hit the spot, so we have refined the way we articulate transmission system requirements so that they are clearer and enable the broadest possible range of options to be submitted for consideration. We have also developed our CBA approach to include a wider range of input costs.

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

What is a RDP?

A programme that provides detailed analysis of the 'whole-system' that includes the transmission network as well as areas of the network with large amounts of Distributed Energy Resources (DER) and, as a consequence, associated known transmission / distribution network issues.

The idea is to use this detailed 'whole-system' analysis to innovate and push the boundaries of current thinking, with a "design by doing" approach to resolving the issues - pushing towards more active distribution system operator-type solutions and informing thinking for the Distribution System Operator (DSO) debate.

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.

Our collaborative Regional Development Programmes[14] with UKPN and WPD have provided an environment in which we have delivered a step-change in the way we analyse Transmission and Distribution networks on a whole system basis. We have devised an enhanced approach to modelling distribution-connected demand and generation to better understand its impact on transmission in both a steady state (pre-fault) and dynamic (post-fault) sense. This has allowed us to better understand the whole-system network capability, and hence to identify actions needed to enable further DER connections in both the South-East Coast and South-West Peninsula areas of the country.

Our approach enables further DER connections by introducing provisions to manage consequential transmission issues. The approach mirrors the transmission 'connect and manage' principles in that it provides both the technical and commercial means to manage the type of transmission issue that can arise at times of peak solar or wind output, which include the risk of circuit overloads and of dynamic voltage performance issues.

During May, we have translated our initial 'Heads of Terms' into a first draft commercial contract for a DER transmission constraint management service. We have worked hard to ensure the contract is consistent with the principles we are following to simplify our service term, and in alignment with the technical solution to deliver appropriate visibility and controllability of DER output, and visibility of potential service conflicts due to distribution network constraints.

Changes to Principle 5 in the Forward Plan

We see the need to present clearer plans for the year about what we will do and when, and to provide more detailed descriptions of our deliverables. We need to explain which of our metrics are measuring baseline performance expected and which are stretch. In our Q1 Report, we will share an updated version of the Delivery Schedule section for this Principle to articulate our long-term vision and deliverables for 2018/2019.

[14] https://www.nationalgrid.com/sites/default/files/documents/NG_UKPN_RDP_InfoSheet%20-%20Final%20-%20Agreed.pdf

Principle 6
Coordinate across system boundaries to deliver efficient network planning and development

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

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[15]. 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 Q1 2018

Our activities in Q1 are laying the foundations for deliverables in Q2 and Q3.

Performance this Month

Meets Baseline Performance

Our current interactions with Distribution Network Operators (DNOs) are set out in the industry codes framework, which covers investment, planning and operational timescales. Interactions currently focus on exchange of information between transmission and distribution with the aim of ensuring the impact of one party on another is managed efficiently. In this context, May saw us continue to engage to deliver transmission and distribution outage plans.

In May our two metrics for this principle are showing good performance this month with the indicative metric for Connections Agreement Management indicating that performance is on track. One of the agreements has already been sent to the customer. System Access Management has seen 8 out of 804 requests being cancelled at day ahead. For each of these cancellations analysis is carried out to identify the root-cause and the learnings are communicated with the relevant teams.

Exceed Baseline Performance

We presented at the Scottish Renewables Hydro and Pumped Storage Conference in May and outlined potential challenges and opportunities for hydro technology on both Transmission and Distribution networks in Scotland. The impact of hydro on network congestion, and its potential role in constraint management and potential contribution to wider system operability solutions was debated as well as System Operator engagement in solving issues across transmission and distribution networks. This event brought together cross industry parties to both inform and discuss wider issues but allowed important engagement on access to the electricity network and to help parties better engage with current processes.

Changes to Principle 6 in the Forward Plan

We see the need to present clearer plans for the year about what we will do and when, and to provide more detailed descriptions of our deliverables. We need to explain which of our metrics are measuring baseline performance expected and which are stretching. In our Q1 Report, we will share an updated version of the Delivery Schedule section for this Principle to articulate our long term vision and deliverables for 2018/2019.

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

Principle 7
Facilitate timely, efficient and competitive network investments

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[16].

Our Deliverables for Q1 2018

Outcome	2018/19 Deliverables
Improve the Network Options Assessment (NOA) models and methodologies to support Extending Competition in Transmission	• Publication of the NOA Report and methodology • Publication of the Network Development Roadmap consultation and the final Roadmap • Incorporate Interconnector methodology within the NOA Report

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.

Performance this Month

Meets Baseline Performance

We are on track to deliver against all commitments for Q1. During May, our NOA methodology consultation, including the NOA interconnector methodology, closed following a six week period; during which we received 16 responses (8 specifically on the interconnector methodology). This compares to 10 responses last year of which 6 were specifically on the interconnector methodology. We have continued to provide opportunity for stakeholders to ask questions and engage on the methodology. This has been through our regular weekly teleconferences with the Transmission Owners and through a stakeholder workshop we hosted on the interconnector methodology during the consultation.

We have also met with third parties interested in submitting options into the NOA process to understand their requirements of us and willingness to work with us to help develop the necessary processes.

Exceed Baseline Performance

On the 1st May, we published our Network Development Roadmap Consultation[17], which sets out an ambitious plan for how we will develop our Electricity Ten Year Statement (ETYS) and Network Options Assessment (NOA) to create much more value from the way the network is planned. It proposed that we will set out our electricity network needs clearly, invite network owners and market providers across transmission and distribution to tell us how they can meet those needs, when and at what cost.

Based on those proposals, we will carry out a cost-benefit analysis to recommend which option, or combination of options, should be taken forward to meet our transmission network needs over the next ten years and beyond. In parallel, we are addressing some of the changes now by taking a trial-by-doing approach. For example, we are testing the analysis and processes needed to identify and implement solutions to manage high voltage in the long term, through working on focused areas of the network. Since publication the document has been downloaded 124 times.

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

[17] https://www.nationalgrid.com/sites/default/files/documents/Network%20Development%20Roadmap%20consultation.pdf

The changes we are making to the Network Development Process will open up opportunities for a far wider range of parties than previous approaches. However, we are aware that there is a very low level of awareness on this topic beyond traditional network solution providers. Through our stakeholder engagement we are actively raising awareness of our network planning and proposals to develop it. For example, at an Energy UK Flexibility working group before and after surveys showed that we had significantly increased the level of understanding of this topic with an audience that had previously very low levels of understanding. A simple straw poll that assessed the before and after level of understanding of this topic against four categories from Low (never heard of it) to High (Good level of understanding and information) demonstrated improved understanding. Most of the room assessed themselves in the bottom two categories before the presentation but in the top two at the end. We clearly still have a lot to do to engage an appropriately wide audience on this topic and will be developing our approach throughout the year as our work progresses.

After publishing the Roadmap we have been working hard internally and with DNOs to develop the capability we need to assess high voltage regions and assess DNO solutions. We have received options from Northern Power Grid and Electricity North West to meet the challenges in the region we are considering first. We will be revisiting how we set out the needs and inviting further options as we refine our approach to define the enduring process

Changes to Principle 7 in the Forward Plan

We will be clear about what meeting baseline delivery is, and what is going over and above. We will be proportionate in our presentation of what we want to achieve, and help stakeholders understand the complexity of what we are proposing to do.

Appendix

For full details of the performance metrics please read the Performance Metrics Definitions document:

https://www.nationalgrid.com/sites/default/files/documents/Performance%20Metrics%20Definition.pdf

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[18] (FFR), Short Term Operating Reserve[19] (STOR), and Fast Reserve[20]. 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

The FFR and Fast Reserve results were both published on time and right first time for the month of May. STOR TR35 submissions are currently being assessed but there are no results to report on at this moment.

Month	FFR		Fast Reserve		STOR	
	On time	Right first time	On time	Right first time	On time	Right first time
April	●	●	●	●	●	●
May	●	●	●	●	●	●
YTD	●	●	●	●	●	●

Table 1 - Metric 1 Commercial Assessment Transparency Performance

Key:

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

Supporting Information

- Two webinars were held on 23rd May to take interested parties through the FFR and Fast Reserve assessment results.
- The 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.
- A Sli.do survey was live during both webinars to capture feedback.

Fast Reserve Webinar

- This was the first time that a webinar was run for Fast Reserve. We had 4 participants dial into the webinar. For information, there are 8 live framework agreements for Fast Reserve; however there are currently four active participants that regularly tender into the market.

[18] https://www.nationalgrid.com/uk/electricity/market-operations-and-data/system-balancing-reports
[19] https://www.nationalgrid.com/uk/electricity/balancing-services/reserve-services/short-term-operating-reserve-stor?market-information
[20] https://www.nationalgrid.com/uk/electricity/balancing-services/reserve-services/fast-reserve?market-information

- Two participants took part in the survey.

- The presentation took participants through the outstanding requirement ahead of the tender, an overview of the tenders received and the assessment steps. We took the time to give additional information and explanation of the rejection reason codes used in the Market Information Report as we had received feedback that these were not easy to understand. The results for this month were then explained.

- At the end of the presentation, we asked providers to give feedback to 3 questions through Sli.do. We asked:

    - If “the rejection codes need further explanation?” 100% responded “No”.

    - If “the specific information on the periods we are looking to procure, that is now published in the Market Information Report, is useful?” 100% responded “Yes”.

    - Participants on a scale of 1 to 5 (1 being the lowest) how useful would you rate this webinar? 100% responded “3”.

- We then opened up the Q&A session.

FFR Webinar

- A webinar was held on 23rd May to take interested parties through the FFR assessment results.

- In addition to the usual slides covering that month’s assessment and results, participants were provided with new graphs and analysis on accepted and rejected tenders (service type, price) and number of live contracts. We received feedback saying this was useful and how improvements could be made to the presentation of the information. This will be addressed for the next webinar.

- The webinar was also used to once again signpost the simplification and standardisation changes that have been made to the tendered FFR service.

- There has been a steady increase in the number of industry participants dialling into the results webinar for FFR. In March 20 participants attended, increasing to 28 in April (the first time it was opened up to a wider audience) and 44 in May.

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 complete 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

We will be trialling the system in Q1 2018/19 and then will measure publication performance as detailed here from Q2 2018/19 onwards. We will trial the implementation of a weekly report detailing the time-stamping of the data through April and May 2018, which will then become the mechanism of reporting the performance. The process to receive time stamp data is now being trialled to verify

adequacy of sourced IT solution. Minor adjustments have been identified and implemented for further testing.

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.

- This solution will be trialled and tested during Q1 to then start reporting in Q2.

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

In May, the Energy Forecasting Team (EFT) achieved a DA Demand performance on this metric in line with exceeds baseline expectation. To reach this outcome, the EFT achieved demand monthly accuracy targets 59.7% 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. For example: May's error target was created from May's performance 2015, 2016 and 2017. These were averaged and then a reduction of 5% applied.

In May there were mostly good forecasting conditions. The weather was generally stable with periods with thundery showers. The average temperature was slightly above the seasonal norm and wind was lighter than normal. The Demand forecasting models coped well with these conditions producing a good result. During the month there were a few challenging days for Demand Forecasting related to thunder storms, bank holidays, FA cup final and the Royal Wedding.
Factors which helped drive performance:

- Demand Forecasting Process standardisation was implemented;

- Reviewed/updated solar power forecasting model in preparation for upcoming summer period.

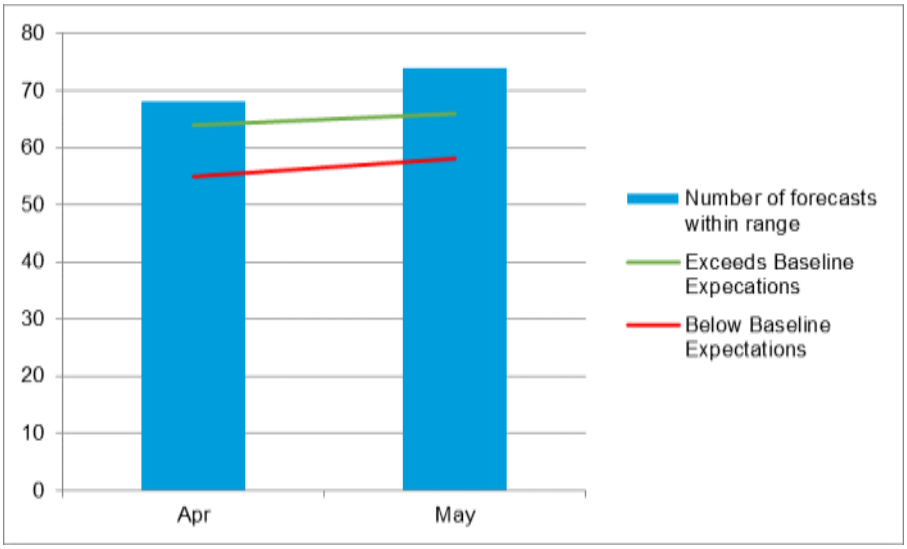


Figure 1 - Metric Demand Forecast Performance

Wind Forecast

In May, 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 58% 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. For example: May's error target was created from May's performance 2015, 2016 and 2017. These were averaged and then a reduction of 5% applied.

In May, a prevalence of high pressure over the UK resulted in lower wind speeds than the monthly average. Despite that our models coped well with lower than usual wind speeds.
Contributions to performance against this wind forecast metric was delivered by the following:
Testing of our wind models. We are in the process of testing the accuracy of the new Cubic SPLINE models for BMU Wind power forecasting.

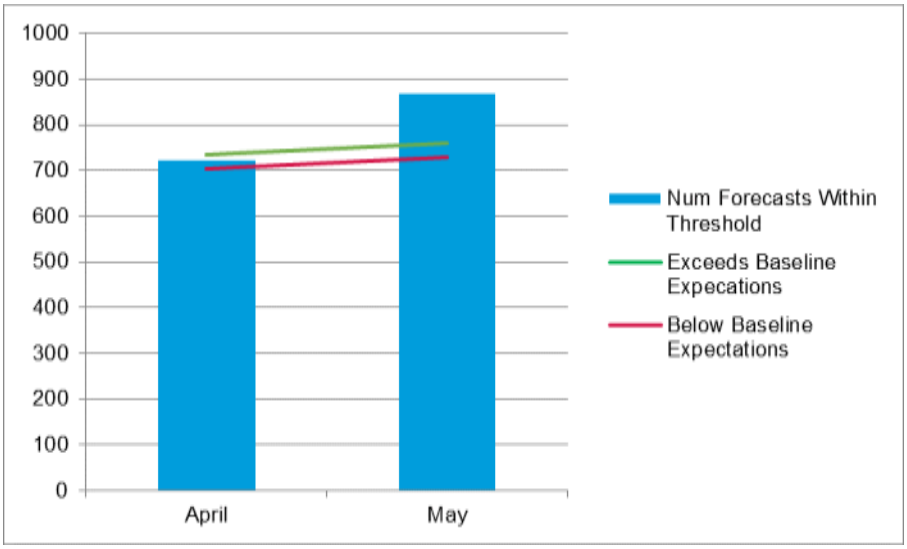


Figure 2 - Metric 4 Wind Forecast Performance

Supporting Information

Customers/Stakeholders.
In May EFT met with:

- Power Market. A start-up company whose mission is to find information about solar PV capacity and locations. This is in line with our effort to finding new innovative solutions to improve Solar PV forecasting accuracy.

Innovation
- Early Weather Warning NERC Project started (with Reading University). The objective of this project is to develop a model to provide early warnings of extreme weather events and as a result increase demand / wind accuracy.

- Weather Optimisation NIA Project started (with Smith Institute). The objective of this project is to define the optimal weather data solution to increase energy forecasting accuracy (demand, wind and solar PV).

Special Events
- Royal Wedding and FA cup final within the same day. Extensive preparation was dedicated to ensure accurate demand forecasts during these special events. System security was maintained and the forecasting error was successfully contained.

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.

	April	May	YTD	Full year
Benchmark cost (£m) [21]	56.9	68.3	125.1	843.52
Outturn cost (£m)	55.6[22]	57.9	113.6	

Table 2 - Metric 5 Balancing Cost Management Performance

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

[22] Previous month Balancing costs are subject to reconciliation and therefore these change costs change

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 is response and resolution time of BSUoS billing queries alongside the timeliness of those bills.

Performance

Figure 3 - Metric 9 BSUoS query response time

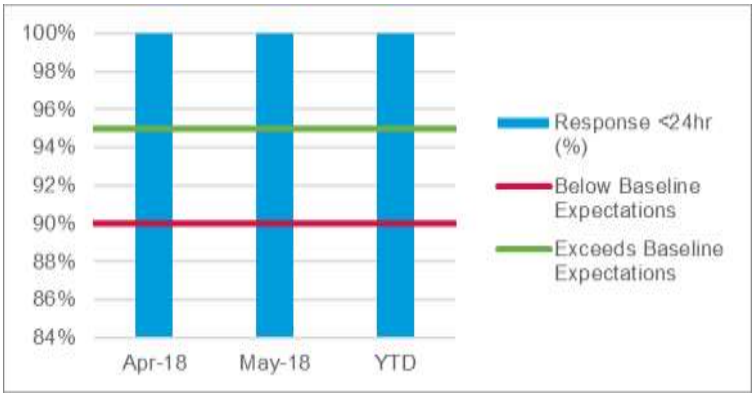


Figure 4 - Metric 9 BSUoS query resolution time

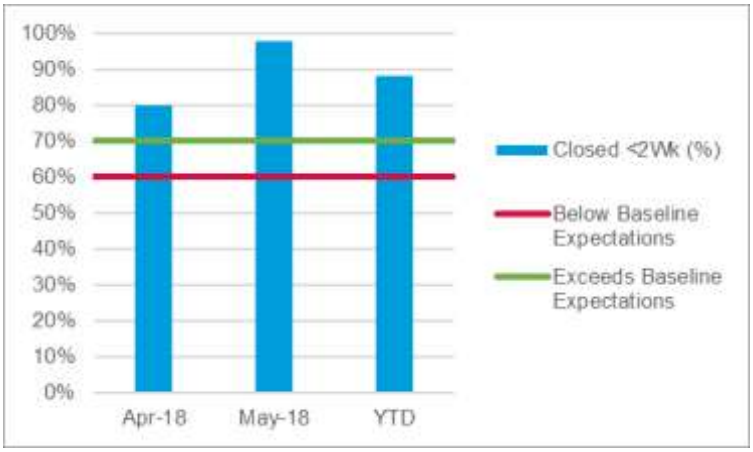
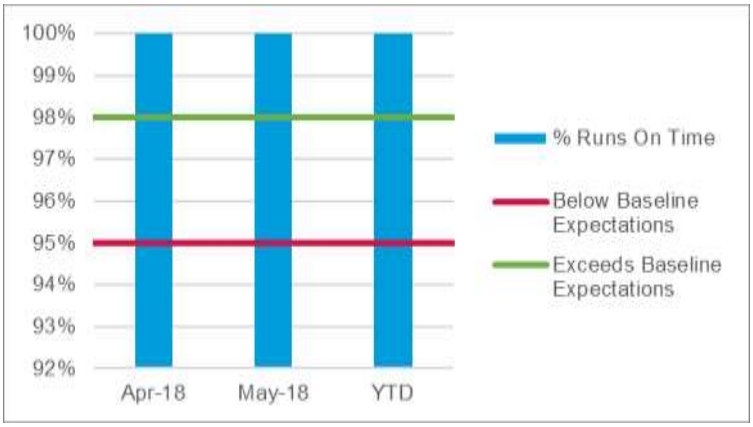


Figure 5 - Metric 9 BSUoS bills timelines



Metric Ambition

We recognise that there is a requirement in CUSC that requires us to prepare daily BSUoS bills in a timely manner; against a set of timing parameters outlined in CUSC. We publish a payment calendar on our website which is based on the CUSC requirements. However, on more than two thirds of settlement days in the year, we set a timescale that is earlier than the CUSC requires. Timings are based on preparing bills the next working day following receipt of the required input data by Elexon. It would not be possible to bill customers any sooner; the dates indicated by the CUSC would allow us to bill later in a number of cases.

We believe that our metric does drive outperformance against CUSC and is a stretching target as the baseline dates for the timeliness metric are the payment calendar that we publish not the minimum CUSC requirements and we set ourselves the target of 98% timeliness against this more challenging calendar.

Supporting information

April 2018 BSUoS query resolution time, figure adjusted from 78% to 80% due to the identification of an error in last month's data. Prior version of a spreadsheet that caused the error has been retired and the figures verified at the source data.
No suspended billing runs in May means four consecutive months of no suspended runs.

We issued a circular to advise customers that £15m for the ESO incentive would be recovered starting 1st May settlement day.
https://www.nationalgrid.com/sites/default/files/documents/BSUoS%20Charging%20Circular%20-%202018-19%20ESO%20Incentive%20Recovery.pdf
We issued a circular to advise customers of the forecast RF adjustment for 2017/18 (-£716,183.89)
https://www.nationalgrid.com/sites/default/files/documents/BSUoS%20Charging%20Circular%20-%202017-18%20RF%20Recovery.pdf
For the first time, we issued daily adjustment data for the RF adjustment for 2017/18 to help customers forecast the impact of final reconciliation on their daily charges.
https://www.nationalgrid.com/sites/default/files/documents/BSUoS%20SF%20and%20Forecast%20RF%20costs%20for%202017-18.xlsx

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 9-month process so we will only report the final metric from January 2019 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.

Of the seven agreements identified in April it is now clear that only four require updating. Three of these are well ahead of schedule and one of which has been sent to the customer. The other agreement has not met the milestone required for May and this is now a priority. There have been three additional agreements identified as requiring updating. All of these have met the milestone for month one.

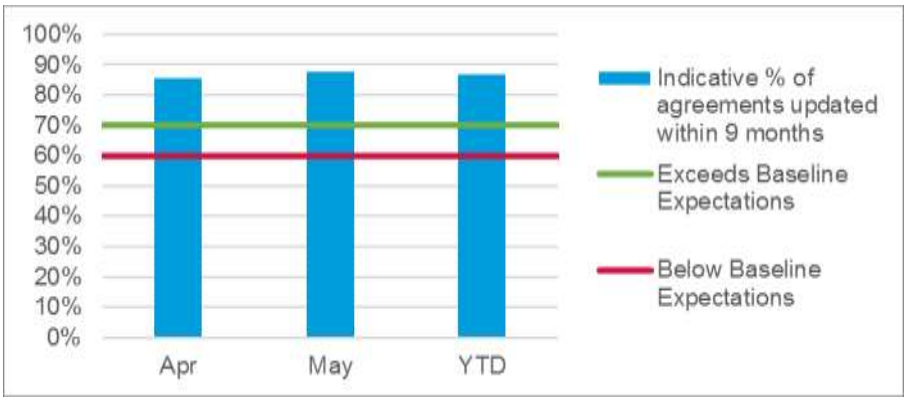


Figure 6 - Metric 14 Connections Agreement Management Performance

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[23]. When a system access request has been accepted into the plan, TOs,

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

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 May, we had eight 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 one hour from where they were planned or an 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.

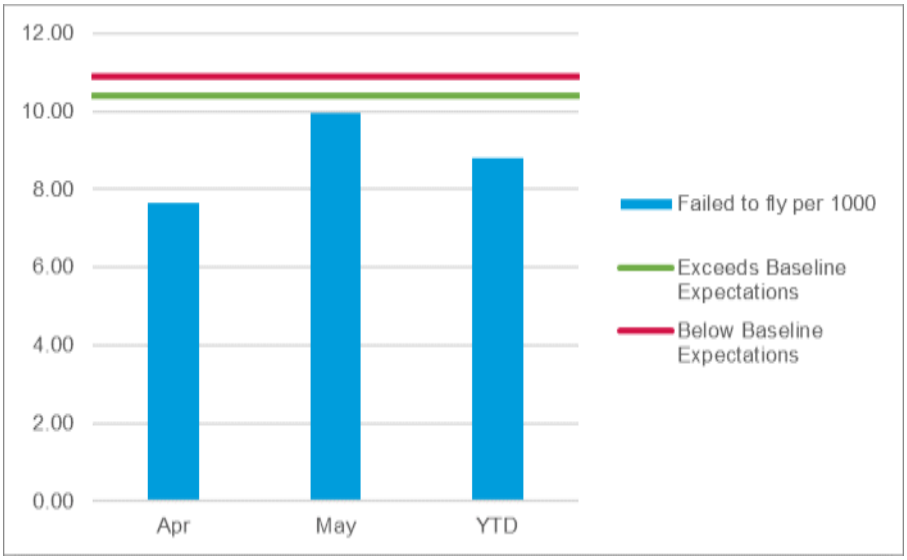


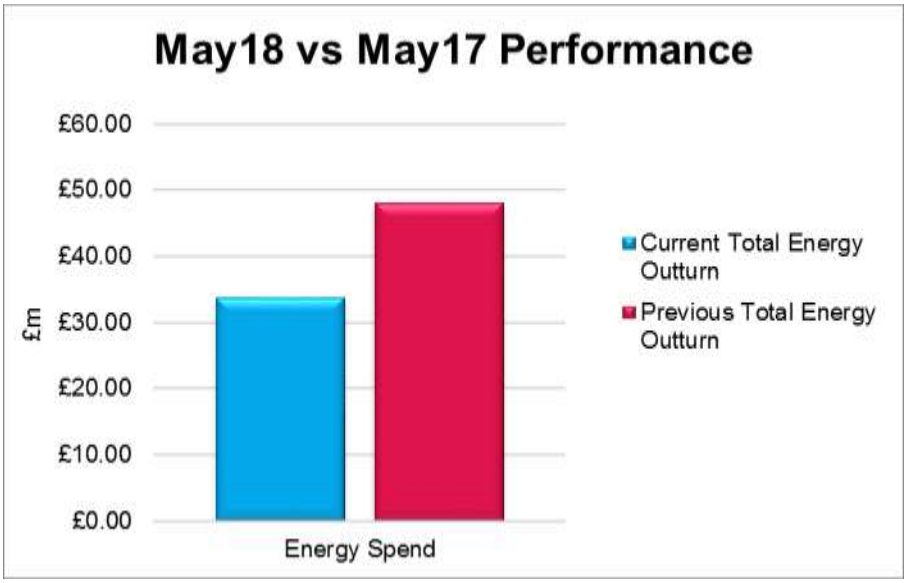
Figure 7 - Metric 15 System Access Management Performance

Hotspots

Energy Costs

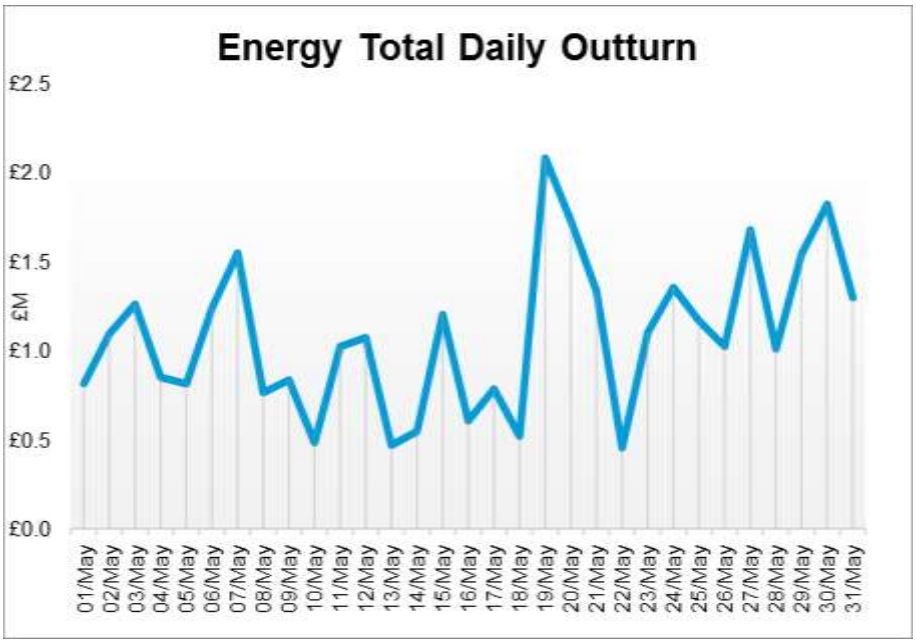
Energy cost (including energy imbalance) for May 2018 out-turned at £33.72m, showing a decrease from the May 2017 outturn of £14.3m. The average daily energy spend was £1.1m.

With respect to last year's May, all the categories costs decreased or showed little variance. Operating Reserve and Frequency Response showed the highest reduction, of £4.2m and £1.3m respectively.

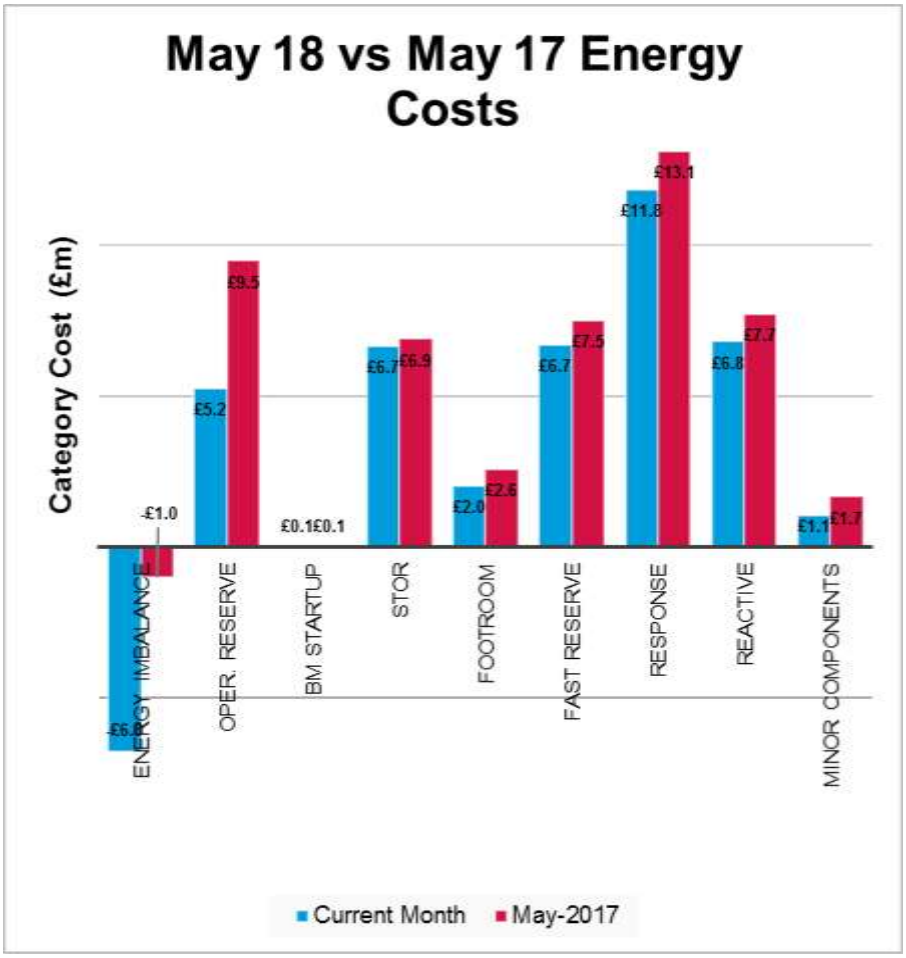


Energy Total Daily Outturn

Overall energy cost was 30% lower compared with May 2017. Daily Energy costs remained below or around £1.5m for most of the days in May 2018. The most expensive day of the month was Saturday 19th, the Royal Wedding day, with a cost of circa £2.1m. The predicted demand pick-ups and drop-offs, for that day, were not as high as forecast, possibly due to the good weather reducing the amount of people watching the event at home. However, due to the special event, high levels of frequency response services were held for the uncertainty around the demand forecast. In addition, high volumes of STOR were used in the evening to account for the loss of an interconnector. Sunday 20th the total energy cost was circa £1.7m. On that day, up to 700MW of STOR was run over the morning peak and the evening peak, to manage demand forecast errors and wind generation shortfall. Another high cost day was Wednesday 30th with a recoded cost of £1.8m. Unplanned generation unavailability, solar generation out-turning around 2.2GW lower than forecasted in the morning, and up to 400MW of STOR deployed in the evening to account for demand forecasting error, were the main drivers behind this high cost day.



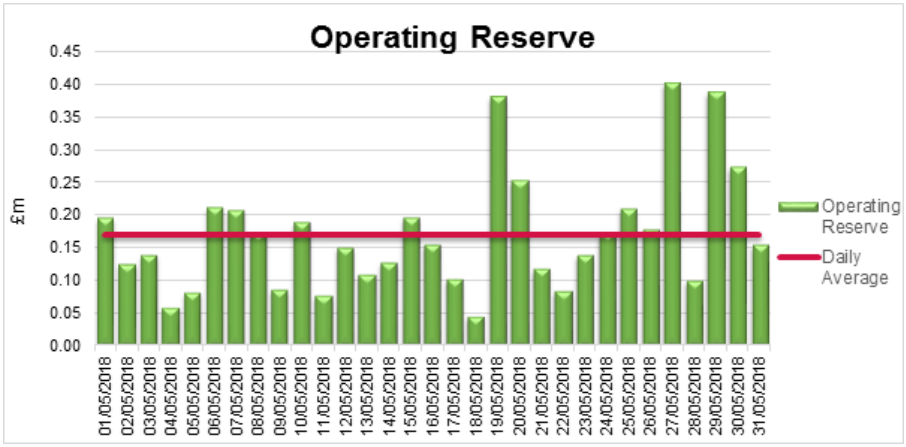
Energy Costs Breakdown



Operating Reserve

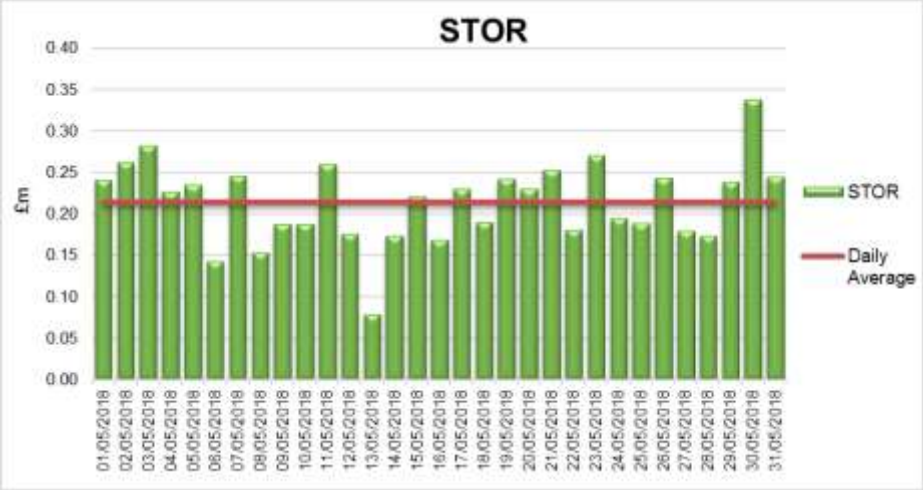
The Operating Reserve cost out-turned at £5.2m showing a decrease from May 2017 of £4.2m. This large difference from last year's cost was caused by a specific day in May 2017, when there was the loss of multiple generators over a period characterised by a short market. This caused the operating reserve costs to peak at over £3m on a single day.

The daily spend for this category cost remained below or around £0.2m, on most days in May 2018. On Saturday 19th, Sunday 27th and Tuesday 29th, the costs peaked at around £0.4m. It is noticeable, that the main drivers behind Saturday 19th high cost were the unusual demand pick-ups and drop-offs due to the Royal Wedding event.



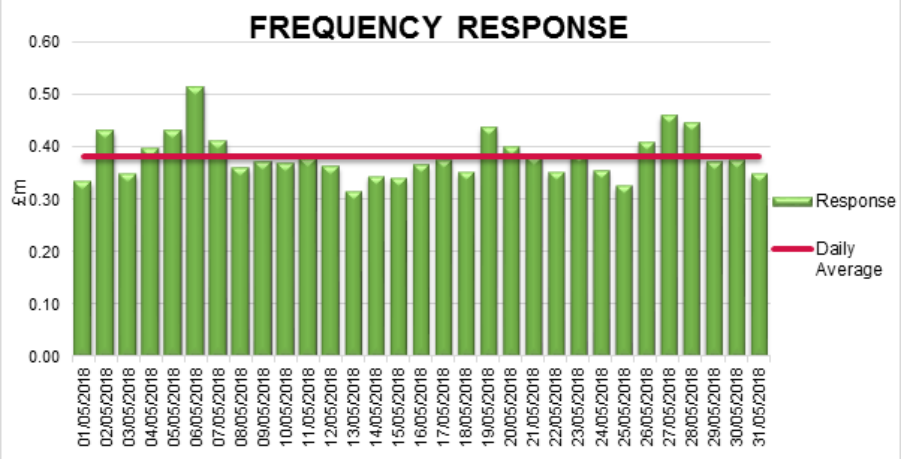
STOR

STOR cost for the month of May 2018 was £6.7m, which is £0.2m lower than the one recorded in May 2017. The average daily spend was of £0.2m. Wednesday 30th was the most expensive day for STOR this month with a cost of £0.3m. STOR units were dispatched in merit, to manage system shortfalls, demand forecast errors and interconnectors faults.



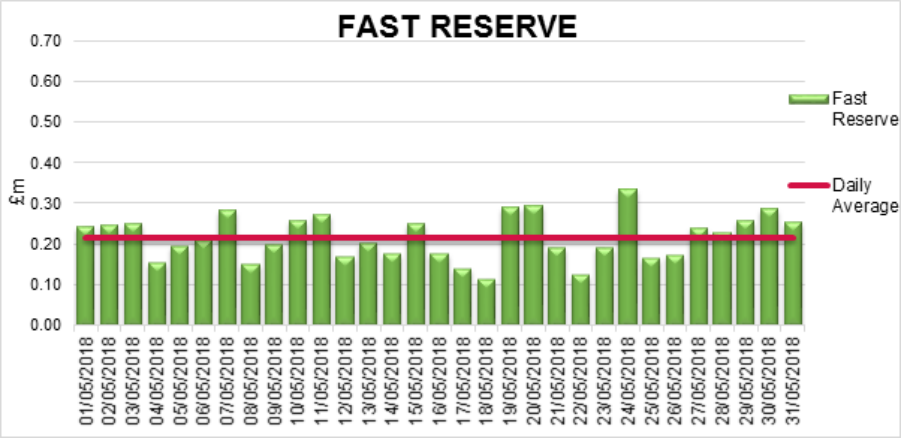
Frequency Response

Frequency response in May 2018 out turned at £11.8m which is a decrease from last year cost. The average daily spend was circa £0.4m. Sunday 6th recorded the highest daily cost for this category which was £0.5m.



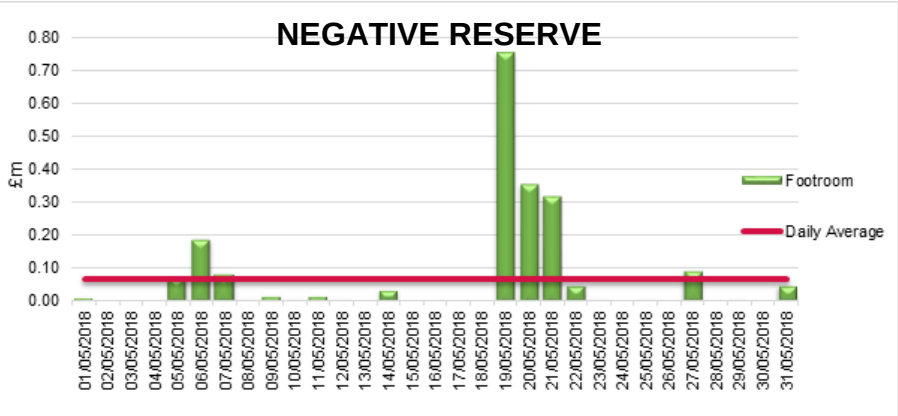
Fast Reserve

Fast reserve out turned at £6.7m, which is a decrease of £0.8m from May 2017 costs. Throughout the month the average daily costs was around £0.2m.



Negative Reserve

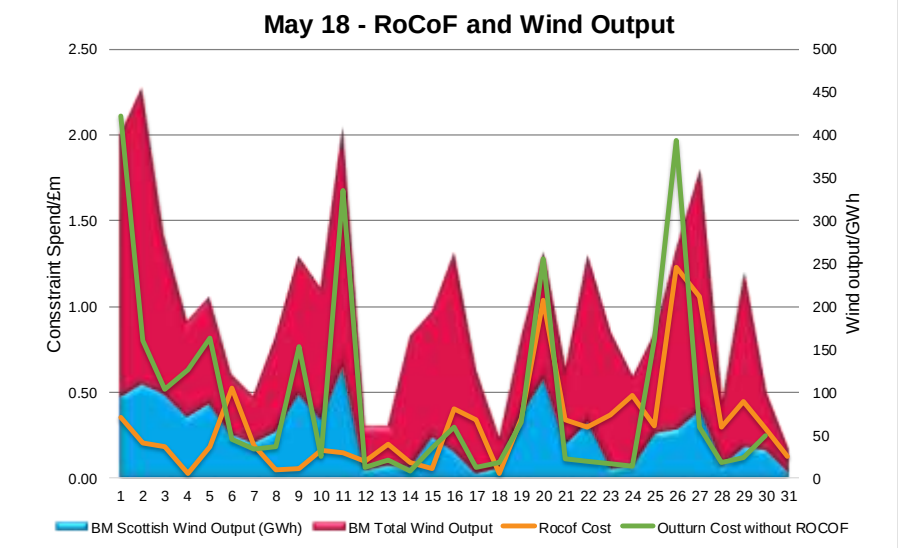
Despite the increasing challenges of managing negative reserve out-turned at £2.0m, which is £0.5m lower than May 2017 cost. The daily spend for this category was below £0.01m for most days. The highest costs were recorded during the third weekend of the month, peaking on the royal wedding day, Saturday 19th, at circa £0.8m. The main drive behind that high cost day was the high volume of interconnector trades undertaken in support of downward regulation issues.



Constraint Costs

The total constraint cost for May 2018 was circa £14.5m. This is an increase of around £2.3m with respect to last year's May constraint cost. The average cost per day was approximately £0.47m.

The breakdown of the constraints outturn cost in May 2018 was: £6.0m for England and Wales, £1.8m for Scotland, £1.1m for Cheviot, and £5.7m for Sterilised headroom.



The graph above shows the daily outturn costs and BM wind to indicate the extent to which wind output drives constraint costs.

Total wind volume in the BM out-turned at around 4424.8GWh. This is 594.8GWh higher than May 2017 and in line with the higher constraint outturn cost.

The most expensive day in May 2018 was Tuesday 1st with a daily spend of £2.1m. The wind level increased significantly throughout the 24 hours, triggering significant power flow restriction on the network boundary between Scotland and England. Because of it, a high volume of wind generation was bought off in the BM from mid-morning until late night. The BM actions were also supported by trading on wind generating units.

Another significant high cost day was Saturday 26th when the daily spend was around £2m. High wind generation level over the day characterised by low demand which was exacerbated by high PV generation, triggered power flow restrictions in the system, resulting in large volume of BM actions on wind generations units especially in Scotland, throughout the 24 hours.

RoCoF

The outturn for ROCOF cost was £9.9m, which is £6.2m higher than costs recorded in May 2017 for this category. The volume in May 2018 totalled 230.31GWh of which over 93% was solved through forward trading, and the remaining was solved with BM actions. RoCoF daily cost remained below or around £0.5m for most of the days except for Sunday 20th and Saturday 26th when it peaked at £1m and £1.2m respectively. In both cases, the main driver for the high spend, was the high level of renewable generation over periods of demand uncertainties on the system.

Voltage

Voltage costs in May 2018 out-turned at £1.8m to deliver 109.5 GWh of energy with voltage supporting capabilities, of which around 68% of volumes were solved with forward trading.

Last year May costs for this category were £3.6m for a related volume of 162.1GWh. Throughout May 2018, voltage daily spend remained below or around £0.1m, except for Sunday 27th when the daily spend peaked at £0.29m. Overnight during this bank holiday weekend when the demand was at its daily minimum, a unit that was scheduled to be deployed for voltage control in the BM tripped and had to be replaced by other generating units, resulting in higher costs.