nationalgridESO

Mid-year report

Part 3. Principle Evidence Chapters

October 2018

Contents

A

Principle 1 Evidence Chapter

Performance in the last six months

Meets baseline performance

We have delivered our baseline activities over the past six months.

- We have published the **Future Energy Scenarios** (FES) report in July 2018, and 2019 Call for Evidence.

  The pace of economic, social, political and technological change is relentless. Each year we therefore review our scenarios to ensure they remain credible and fit for the various purposes of ourselves and our stakeholders.

  We use our scenarios as a foundation for a range of modelling activities. FES is the starting point for our regulated long-term investment and operability planning as well as a reference point for further analysis projects. As each subsequent process has its own specific requirements, further analysis is undertaken, building on the detail in the scenarios.

  The creation of the FES is an annual process that starts and ends with the publication of FES, usually in July.

- The **Summer Outlook** was published.
- We successfully hosted our **Electricity Operational Forum** events in April and July
- We published our **requirements for balancing services** together with the outcomes of the tenders for these services.
- Published **daily and monthly summaries of balancing costs**, through the daily cost report and Monthly Balancing Services Statement.
- Reported trades to the market through the web portal, as reported in Metric 3 – *Trades data transparency*.
- Published **wind generation and demand forecasts**, as reported in Metric 4 – *Forecasting accuracy*.

Exceeds baseline performance

We exceeded baseline performance in some areas:

- Working closely with customers we have improved the **accuracy of our BSUoS forecasting** and developed a **new BSUoS report** (monthly), that provides a detailed monthly forecast and outturn, and upper and lower forecast range, accuracy statistics, and a narrative on balancing costs. Both the report and underlying data is available for download here: https://www.nationalgrideso.com/balancing-data/forecast-volumes-and-costs
- The **Carbon Intensity Forecast** provides user-friendly, comprehensive and accurate information that helps consumers make decisions about the power they use and when to use it. The data is available online or in a free to access API (application program interface) which makes it easy for customers to seamlessly download and use the data. This delivers additional consumer value through lowering bills for consumers, reducing environmental damage in the long- to medium-term and direct improved quality of service in the short term.

  http://carbonintensity.org.uk/

- We trialled a **data portal platform** with a small group of suppliers, using data from our existing monthly BSUoS report. We would like to make all balancing data provided outside of BM Reports more accessible to the market by sharing them on a data portal platform. We are currently in the process of rolling out a Customer Relationship Management system (CRM), and plan to extend this to provide a data portal function. We have delayed the introduction of a data portal to Q4 to allow completion of the CRM rollout.
- We have improved the granularity and scope of the **Monthly Balancing Services Report (MBSS)**. We have broken down the costs and volume of the Ancillary Services we procure to a greater level of detail, and have also added BM and trading data with a similar level of

granularity so that comparisons can be made between costs and volumes taken in the BM, trading and Ancillary Services.

- We implemented improvements to the wind and demand forecasts and new artificial intelligence (AI) models for forecasting solar photovoltaic (PV) (see call out box below for more detail).
    - Implementation of “Demand Forecasting process standardisation”. This delivered improved forecasting procedures and demand models in the process of demand forecasting.
    - Review and update of solar PV and demand power forecasting model in preparation for upcoming summer and winter periods.
    - Following the initial results of our “Weather optimisation” innovation project, we have increased the weather forecasting feeds for our forecasts by 50%, from four to six per day.
    - Delivery of a major wind model update. This update included improvements to physical wind forecasting power curves and the adoption of “Cubic Spline” wind power curves for selected balancing mechanism unit (BMU) wind farms. An important positive contribution to BMU wind performance was made also by the increased weather forecasting feeds.
- We launched a new Energy Forecasting Website with the objective to increase access, clarity and usability of some of the key demand and wind forecasts published daily to the market. This website offers a subscription option to users interested in receiving the daily wind and demand forecasts immediately after they are published to the market. The next phase of this initiative is to start publishing historic energy forecasting data to the market.
- We implemented a large amount of **innovation initiatives**.
    - The “Sheffield Solar Phase 3” Innovation project was successfully commenced in collaboration with Sheffield University. This is a three year project aimed at producing 5-minutely national and GSP (grid supply point) PV outturns to the industry and will improve error in installed PV capacity.
    - The “Early Weather Warning” National Environmental Research Council (NERC) project successfully kicked off in collaboration with Reading University. This project aims to provide modelling capabilities to forecast extreme weather events as they are big contributors of forecasting errors.
    - The “Weather Optimisation” innovation project successfully completed in collaboration with the Smith Institute. This has delivered key recommendations on frequency and granularity of weather data for optimised energy forecasts. This is currently informing our strategy on improved weather data.
    - The “Solar Radiation Optimisation” project successfully complete in collaboration with the Met Office. This has produced a “within 24-hour” improved solar radiation forecasts that will benefit solar and demand within day forecasts and the industry.

Solar power forecasting model

On 25th September, we successfully implemented for the first time an Advanced Machine Learning Technology to forecast National PV generation.

This remarkable milestone was a direct result of an innovation-funded Proof of Concept developed in partnership with the Alan Turing Institute, and further developed and implemented by our cross-functional team leading to tangible consumer benefits.

We expect this new AI solar model to help improve performance of National Demand Forecasts at all time scales. Over the last summer our analyses show that this state-of-the-art approach increases solar model accuracy (mean absolute error) by

more than 40% on previous models. This new PV forecast is now published to the market daily via **BM Reports**. This is the 3pm forecast sent to BM daily at 5pm for the day-ahead.

In our effort to deliver transformational innovation and tangible value to the market, we are committed to publishing - within the next 6 months - these new PV forecasts hourly to the market. This is a key milestone in our path to deliver relevant innovations to the market to improve forecasting accuracy that would ultimately benefit consumers by lowering the cost of balancing the electricity network. This is the first of many forecast innovations we are delivering to enable a more efficient operation of a decarbonising electricity grid.

- We have held webinars on Ancillary Services tender decisions to better inform participants and take questions and feedback.

  We began by offering firm frequency response (FFR) providers the opportunity to dial into a webinar where we would give feedback on the monthly tender results. In April, we then opened up the invitation to all interested parties. The FFR webinars are well attended, with up to 44 participants dialling in. Numbers vary depending on whether the feedback is for a month ahead only tender or a long term tender. The results webinars have been rolled out for the Fast Reserve market (first one in May) and the STOR market (first one in July). Fast Reserve results webinars take place monthly following each assessment. There has been one STOR webinar following Tender Round 35. In general, the webinars are well attended, with a similar number of participants dialled in to the number of organisations tendering in.

  As well as the results webinars, a **market information report** (MIR) is produced for each of these regularly tendered services. Improvements and additional information have been added to both the results webinar and the MIR in response to feedback from the market. For example, we have introduced reason codes to explain why tenders are rejected. Participants have asked for additional detail on these reason codes and we have used the webinar to give that additional feedback. In Fast Reserve, we have used the MIR to give providers a much clearer idea of our procurement intentions for the following tender rounds. In general, this has resulted in providers tailoring their tenders to better suit our requirements. Our intention is to provide similar messaging for FFR going forward in the hope that this will help the market understand the periods we want to procure in.

In order to improve our service, we engaged with stakeholders to collect feedback which we documented in the Stakeholder views section.

Following our refresh of Principle 1 we have added several **new deliverables** to our plan (in bold).

Summary table of Deliverables

Outcome	2018/2019 Deliverable	Status
Improve confidence in our forecasts	Deliver Future Energy Scenarios 2018	Delivered, July
	Deliver Future Energy Scenarios 2019	On track
	Develop and publish Regional Carbon Intensity Forecast	Delivered
	Improve monthly BSUoS forecast accuracy and publish new report	Delivered, June
	Publish our Summer Outlook Report	Delivered, April
	Implementing new energy forecasting tools, machine learning forecasting models, and cloud based systems	Delivered, September

Outcome	2018/2019 Deliverable	Status
	Increase frequency, granularity and provide underlying assumptions of our energy forecasts	**On track for Q4**
Increase transparency of ESO decisions	Publish a schedule of Ancillary and Balancing Services events and results for 19/20	Delivered Q1
	Review Monthly Balancing Services Statement (MBSS) improve granularity and scope of data provided	Delivered, April
	Publish trades data at near real time	Delivered, April
	Hosting of our 'Ops Forum' quarterly	Delivered, April, June, October
	Energy Forecasting Website	Delivered, July
	Increase granularity of constraint costs and volume data	**On track Q4**
Improve accessibility of information	**We would like to trial new ENCC "visit days" once a month, and customer roadshows twice a year. Which would provide an opportunity for market participants to feedback on our plans, to determine if and how they help facilitate changes in their behaviour to benefit consumers**	**On track for Q4**
	Publish an 'investor, customer and stakeholder roadmap' to help customers navigate the information we publish	**On track for Q4**
	Publish a list of information we don't publish, and what we are thinking of sharing	**On track for Q4**
	Commit to providing an FAQ document following each new information item	**On track for Q4**
	Rationalisation of our communication channels	**On track for Q4**
	Provide all energy forecasting data in one place	**On track for Q4**
	Develop a customer data portal for balancing cost data	Originally scheduled for Q3, aiming to deliver in Q4

Consumer Value

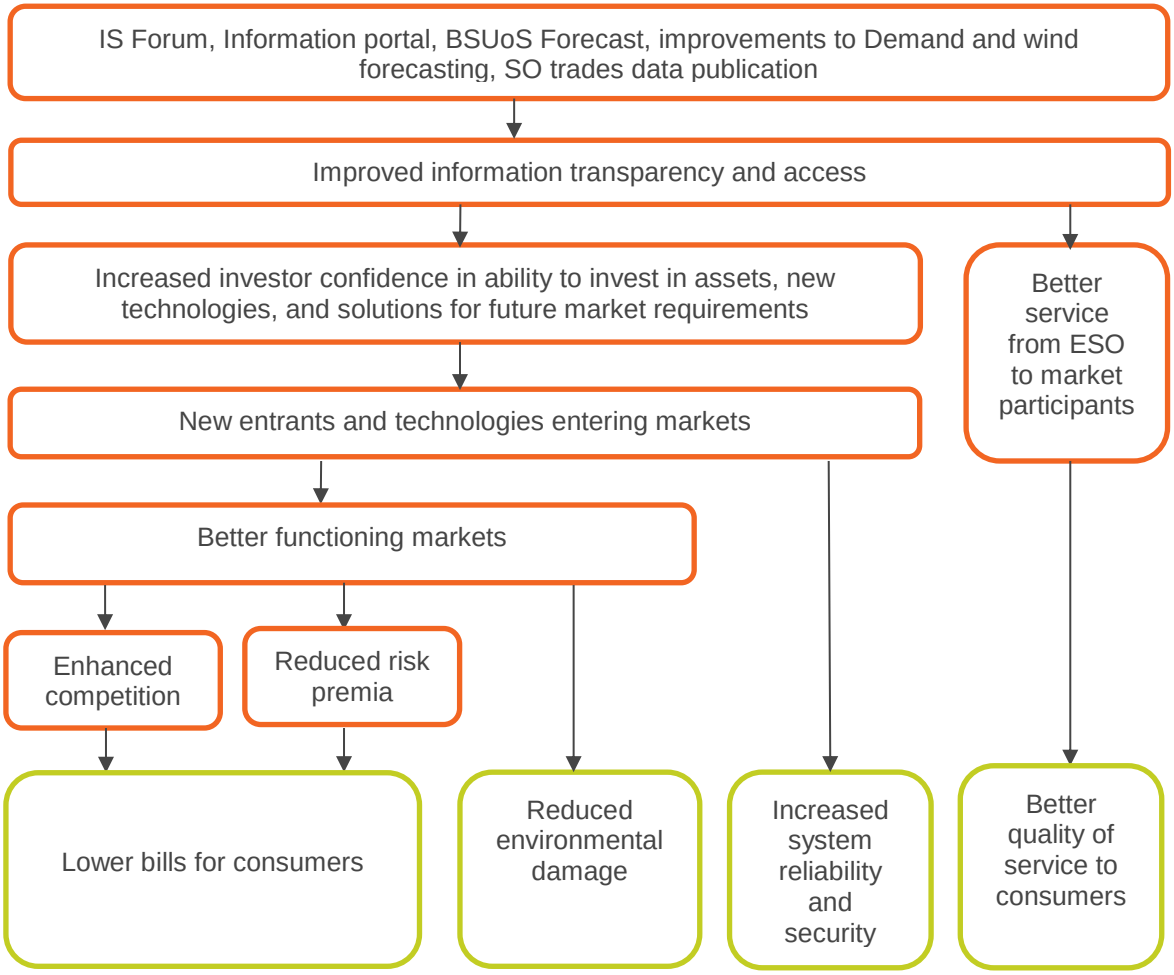
1. Improving information transparency and access

Mechanism for consumer value

We are increasing information transparency and ease of access to information for participants of both the ancillary and wholesale markets through channels shown in the Investor roadmap. These deliverables indirectly create consumer value through 2 levers:

- Increasing competition and enabling better functioning markets through easier market access
- Increasing investor confidence through reducing risk associated with information asymmetry

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



This activity benefits the consumer through:

- Reduced environmental damage both now and in the future as new entrants are likely to be smaller and newer providers with novel, low carbon and flexible sources of supply
- Better quality of service between us and our providers should lead to more efficient process within the suppliers' influence, and could indirectly benefit consumers through better efficiencies
- Lower bills than would otherwise have been the case. Better information availability to participants in terms of both quality and timeliness increases transparency and contributes to easier access to the market. This results in increased market participation and enhanced

competition. In principle, increased competition drives down prices and creates value for consumers (as explored in the Principle 3 case study).

In addition, reducing the information asymmetry between us and the market increases investor confidence and reduces associated risk premia. For example, better self-balancing may result in lower risk premia being held to cover cash-out risk, and lower payments being made via the Balancing Mechanism by us to balance the system. Assuming these savings are passed on to consumers, this results in lower bills for consumers. Increased competition will deliver lower prices for us as the purchaser of ancillary services, which in turn means lower BSUoS cost which is levied on system users and seen as a pass-through cost to end consumers.

- Improved reliability and safety, for example due to a diverse supplier base being more resistant to fuel scarcity problems, and contributing to system resilience through reliance on multiple technologies

Drawbacks and potential for unintended consequences of our actions

There is a risk that transparency in markets where there is currently limited competition may lead to short term increase in prices due to price discovery. However, this would provide an investment signal to new entrants, and the resulting development of the market and increased competition would then lead to lower prices in the medium to longer term.

Innovative and/or efficient new entrants may also displace lower merit costly technologies or participants, which could affect the profitability or commercial viability of these participants. However, we are continually scanning for these potential outcomes and will take action and provide guidance and information where appropriate.

Interactions and overlaps between principles

There may be some interaction with the work delivered under Principle 3. For example, the publishing of product and system roadmaps, and new provider on-boarding programs work hand-in-hand with information transparency and access to deliver the outcomes of increased market participation, facilitation of new-technology entry, and better functioning markets, all leading to lower prices for consumers.

Quantification

This work is a fundamental enabler to ensure the future electricity system is fit for use, from economic, technological, environmental and security perspectives. Research by the National Infrastructure Commission (NIC) [12] puts the upper bound of consumer benefit from industry working together to solve the challenges appearing on the system as a result of the transition to a low-carbon environment at £8bn/year in 2030. We are a key player in the drive to achieve that economic and sustainable future vision, delivering work in information transparency and provision to contribute to positive outcomes for consumers.

The work we are doing in this area is a long-term plan, and as such will deliver outcomes over a timescale outside of this financial year. We continue to deliver improvements this year, and as such we estimate the split of consumer benefits to be:

Current year	10%
Future years	90%

Realisation of consumer value is relatively indirect and lag exists in the realisation of value in each stage of the supply chain.

[1] https://www.gov.uk/government/publications/smart-power-a-national-infrastructure-commission-report
[2] https://www.nic.org.uk/wp-content/uploads/Delivering-future-proof-energy-infrastructure-Goran-Strbac-et-al.pdf

In the next six months, we will attempt to quantify the value delivered in this area through looking at:

- Any changes to costs/prices of ancillary services prior and post our deliverables and interventions
- How our actions in this area affect risk premia held by market participants
- How improvements to our demand wind and solar PV forecasting can affect levels of ancillary services procured

Additionality above baseline

Our work in this area is a combination of incremental improvements on the regular activity expected from us, and new, innovative activity delivering additional value. For example, we are enhancing our baseline activities through improvements to standard reporting, and delivering exceeding performance through activities such as the carbon intensity forecasting platform, incorporating AI in solar PV forecasting, and introduction of the new BSUoS reporting.

2. Development of Carbon Intensity Forecasting Platform

Mechanism for consumer value

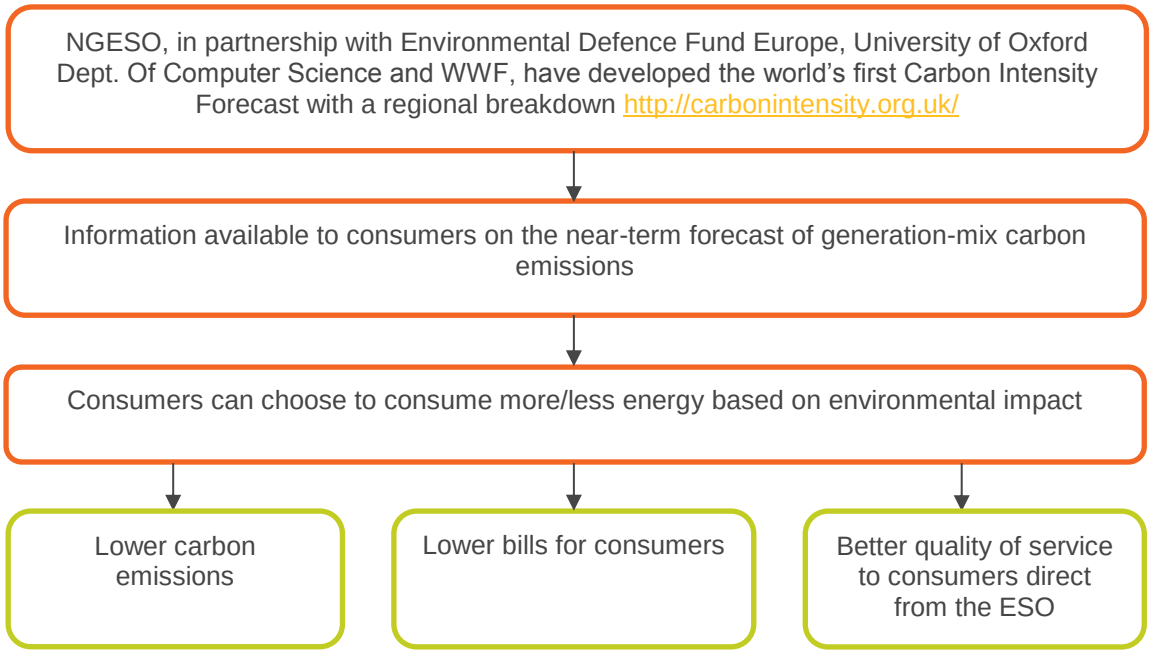
The Carbon Intensity Forecasting Platform allows consumers to choose when to consume electrical energy based on the CO2 emissions forecast from the generation mix, which can result in shifting consumer consumption patterns to optimise use of lower-CO2 emitting generation, thereby reducing carbon emissions. E.g. a consumer could choose to charge their electric vehicle when there is a large volume of wind and/or solar energy forecast to be operating.

Note that this is one of the few ways in which we, as the ESO, can currently interact directly with end-consumers.

This work results in direct benefits to the consumer in terms of:

- **Reduced environmental damage** both now and in the future due to consumers being able to consume more energy at times of low-carbon generation fleet output, and less energy during times of higher-carbon output.
- **Better quality of service**, via us interacting directly with end-consumers to provide benefit directly through modern technology platforms.
- **Lower bills** than would otherwise have been the case, through consumers being able to choose when to consume energy, and as we progress to subsidy free low-carbon generation this should lead to lower costs.

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



Consumers are already benefitting from this technology and information, for example in August there were 2.9m data requests delivered to our stakeholders through the website API (application program interface). We expect the majority of benefit to come in future years, as more consumers take up this technology and 'smarter' use of energy becomes more commonplace in a world of greater consumer participation and choice.

This work demonstrates we are using our skills, expertise and data, to interact directly with the end consumer in a new and novel way. We have identified where we can add real value for the users of the low-carbon network today and in the future. We have delivered tangible output within this

financial year which we will continue to evolve and build upon through further stakeholder engagement.

Drawbacks and potential for unintended consequences of our actions

In the longer term, there is a risk of impact to the market if significant numbers of consumers adopt this technology and change their demand patterns which would need to be addressed by new approaches to demand forecasting by us and market participants. However, this would be a result of greater individual consumer participation in the market, which of course should be facilitated to enable true participation open to all.

Demand forecasting could become more challenging if demand patterns change due to shifting consumption behaviour. An input to demand forecasting processes is historic behaviour, and as this become less relevant new approaches will need to be taken.

This will also lead to greater need for flexibility in the system, an area being addressed from many angles through other ESO workstreams.

Quantification

This deliverable is by its nature difficult to quantify or monetize in a 'bottom-up' manner.

Data required to do this exercise robustly would include:

- Impact of information on consumer behaviour.
- Volume of energy consumption changed due to consumer behaviour.
- Carbon costs of energy displaced.

It may be possible to gather some of this information from engagement with end consumers and then use extrapolation; however this is beyond the scope of the project at this point.

However, we can use data we do have available as a proxy for how successful this venture is, and how much usage it gets. The data is available in a free to access API (application program interface) which makes it easy for customers to seamlessly download and use the data. We have provided clear and concise documentation so that software developers can easily integrate the data into stakeholder systems. We believe this is the first API introduced by the ESO and sets the standard for data streams in future. The system was delivered quickly and a flexible way, delivering a minimum viable product working closely with stakeholders and responding to their feedback. We are currently in the process of productionising the system, to provide a robust service to the increased number of users. In August, there were 2.9m data requests delivered to our stakeholders through the website API.

We can also illustrate the potential of the impact of this type of work on consumers and the environment as follows:

The Annual emissions from power stations = 72MtCO2 (see 2017 UK Greenhouse Gas Emissions, provisional Figures[3]).

For example, if information provision can reduce emissions by just 0.5%, then potential reduction in emissions = $72MtCO_2*0.005 = 0.36MtCO_2$.

The UK Carbon Price Floor (to 2020) = £18/tCO_2.

Therefore, consumer benefit = 0.36*10^6*18 = £6.48m.

Additionality above baseline

This work demonstrates we are using our skills, expertise and data, to interact directly with the end consumer in a new and novel way. We have identified where we can add real value for the users

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695930/2017_Provisional_Emissions_statistics_2.pdf

of the low-carbon network today and in the future. We have delivered tangible output within this financial year which we will continue to evolve and build upon through further stakeholder engagement.

Stakeholder Views

Stakeholder views summary

We have received overwhelmingly positive feedback from our 2018 Future Energy Scenarios event and engagements. Broadly positive feedback was also received for market information shared including through the Electricity Operational Forum and Ancillary Services tenders webinars.

Stakeholder engagement overview and objectives

The main event through which we provide explanation and background as well as provide an opportunity to ask questions is the **Electricity Operational Forum**.

In addition, we hold **webinars** on topics such as Ancillary and Balancing Services tender results. Our **Customer and Stakeholder satisfaction surveys** also target the users of these services to capture feedback on our performance in this area. We seek to capture feedback through all of these channels to maximise the opportunity for stakeholders to provide input to our approach whilst minimising the administrative burden.

How we have engaged and what have stakeholders told us?

Future Energy Scenarios (FES)

Our stakeholders tell us that the Future Energy Scenarios (FES) are a leading contribution to the debate around the future of energy. The process includes several stages, including stakeholder engagement, data and intelligence gathering, followed by high level scenario creation and our own detailed modelling and analysis. At each stage in the development process we apply our expertise and judgement to ensure we deliver plausible and credible scenarios.

Our stakeholders play a vital role in the creation of FES and we engage with them and listen to their feedback and insight, both through specific engagement events and ongoing interaction throughout the year. As the energy sector evolves at a rapid pace, so does our stakeholder base. We continually review our stakeholder groups and how we engage to ensure we capture the breadth and needs of our stakeholders.

Every year we produce a Stakeholder Feedback Document[4] for FES, a licence requirement document submitted to Ofgem in January. That document sets out our approach and summarises our engagement activities and the feedback from stakeholders that we have gathered and how we have taken this forward for the coming year's scenarios.

Based on stakeholder feedback on our engagement, we have made improvements to our engagement process during 2018. These include:

- Providing as much notice as possible to stakeholders about our forthcoming events
- Continuing to review our stakeholder list and look for new stakeholders to engage with
- Providing a clearer explanation of our engagement cycle and when stakeholders can be involved
- Communicating changes to the future energy scenarios throughout the year
- Ensuring opportunities at our engagement event for stakeholders to meet the team

We use a range of events, channels and tools to engage stakeholders in the development of FES and to seek feedback on our work and how we engage. In addition to the methods of engagement detailed below, we have ongoing on-line communication with our stakeholder audience. We produce a regular newsletter to which more than 7,400 stakeholders have subscribed. This provides details of our forthcoming engagement events, updates on our scenarios and information about wider System Operator reports. Our previous newsletters can be found here.

The 2018 Stakeholder Feedback Document can be found here.

Event: **FES 2018 Launch Conference**

Topic: FES 2018

Date: 12th July 2018

Number of attendees: Around 400

Overview: The 2018 FES were launched on 12 July at the Queen Elizabeth II Conference Centre in London. It event was attended by nearly 400 stakeholders representing over 300 different organisations from the energy industry and beyond. The conference was also viewed by over 200 stakeholders via a live-stream.

During the day, we gave several presentations explaining our 2018 scenarios and ran question and answer sessions as well as a discussion panel. We also held exhibitions to provide stakeholders the opportunity to engage closer with the FES and wider System Operator teams, find out more about our work and ask questions.

To add different perspectives about the world of energy, we were delighted to have two distinguished guest speakers; Baroness Worthington, Executive Director of Environmental Defense Fund Europe, and Ged Davis, Executive Chair of the World Energy Scenarios to share their views.

All the material from the conference, including a recording of the livestream, was also made available online on the FES website.

We made several changes to this year's conference based on the feedback we received **previously. These changes included an extended exhibition area to provide a further level of detail and to provide the more opportunities for delegates to meet our team. We also held more question & answer sessions to allow for more debate and discussion. We also made sure that our FES team was more visible at the event as requested by stakeholders by wearing blue polo-shirts.**

On the day, we provided feedback cards and received more than 100 responses from our attendees. The results of this survey are summarised below.

	# Responses	Average Score
Using a scale of 0-10, where 0 is not at all likely and 10 is very likely, how would you recommend today's conference to a friend or colleague?	112	NPS +53 Av. 8.7
Did the format of the conference meet your expectations	112	98% yes
Did the content of the conference meet your expectations?	112	96% YES

Summary of comments from all questions above:

Stakeholders found the conference to be very well organised, friendly, open, approachable, and improved from the previous year. Stakeholders commented that the ability to interact and discuss FES with the team both in the question & answer sessions and in the exhibition areas was a positive. Positive comments were also made about the increase in networking opportunities with other delegates. Stakeholders informed us that they liked the venue for its accessibility. Many comments were also received about the guest speakers and the morning and afternoon presentations being informative and a highlight of the day.

Stakeholders also provided comments on areas that could be improved. These include detailing the change year on year on the scenarios and providing more detailed information on the assumptions and scenario modelling. Stakeholders said that they would like even more time for networking, interaction with the team, question and answer sessions and deep dives into more specific areas.

Stakeholders also commented that they would like to receive the full FES documents in advance of the conference and to receive earlier pre-read material.

We will take all this feedback on board during the planning and development stages of the 2019 FES publication and conference.

Event: FES 2018 Launch Questions & Answers captured on Sli.do

Overview: During the conference, we used Sli-do to capture questions from the delegates regarding the scenarios and the detail and assumptions that sit behind these.

Sli-do is an audience interactive tool for smart devices such as mobile phones that we used for polling and questions & answers during our engagement.

Using this tool at the conference ensured all questions from stakeholders were captured during day. To ensure that we remain open and transparent we gave a commitment to publish a detailed Frequently Asked Question (FAQ) document.

We captured all the questions and then following the launch conference we published a FAQ document.

The latest version of FAQ document was published on the 3rd September.

The link can be found here – FAQ v3.0

Event: FES 2018 post launch webinars

Topic: FES 2018

Date: w/c 16th July 2018

Number of attendees: 150

Overview: The week after the launch of the 2018 FES we held webinars on five different topics to provide insight for those stakeholders that were unable to join us for the conference or that wished to receive the information again and in greater detail. We also made a recording of the webinars and the presentation slides available on our website.

In total, we had nearly 150 attendees. Following the webinars, we published a survey asking for feedback on how we can improve for the future.

	# Responses	Average Score
Using a scale of 0-10, where 0 is not at all likely and 10 is very likely, how likely would you be to recommend the recent FES 2018 webinar to a friend or colleague?	9	NPS +44 Av 8.5
Did the format of the webinar meet your expectations?	9	YES – 100%
Did the content of the webinar meet your expectations?	9	YES – 100%

Overall comments from all questions above:

- Mixed comments received on the log-in process, the technical and audio aspects of the webinars.
- Areas for improvements for the future include considering how many presenters are used during the webinar, as too many can make the flow difficult to follow. Thought should be given on the content of the presentations to ensure that it can be understood by the wide ranging audience.

We will be testing the webinar technology to ensure a smooth and robust process for our stakeholders and take on board comments regarding presenters and presentations for our future webinars.

Event: FES 2018 Launch Conference Formal Satisfaction Survey

Date: Surveys were conducted w/c 23rd July over 6 weeks

Overview: In addition to the short satisfaction cards that we used on the day at the conference, we also gathered feedback through the formal satisfaction survey process which is conducted by an expert provider on our behalf.

The satisfaction survey is sent to gas and electricity customers and stakeholders. For this report, we have only included those responses from those contacts who specified that they deal with electricity ('Elec') or gas & electricity ('Dual').

	# Responses	Average Score
Overall on a scale of 1 to 10, where 1 is very dissatisfied and 10 is very satisfied, taking all aspects of the service you have received into account, how satisfied are you with National Grid <Electricity/ Electricity and Gas> Transmission?	Elec 36 Dual 36	8.08 8.03
Using a scale of 1 – 10, where 1 is very dissatisfied and 10 is very satisfied, how would you rate your overall satisfaction with the FES team?	Elec 21 Dual 22	8.62 8.59
Using the same scale how would you rate your overall satisfaction with FES conference?	Elec 37 Dual 40	8.62 8.30

Overall comments from all questions above:

Feedback was received from most delegates who were asked to respond to the formal satisfaction survey. Comments covered many areas of the conference, engagement and the scenarios.

The most common positive feedback was about the excellent content and information on the scenarios that was presented during the day and in the material provided. The other area that was commented on was the availability, accessibility and interaction with the FES team. Stakeholders also commented how the team listen and take on board feedback. General comments stated that the conference was a good event with lots of quality engagement and networking taking place.

Areas for consideration include providing costings for the scenarios with many stakeholders requesting further detail and descriptions into the modelling and scenario assumptions. Stakeholders would also like more time for discussion at the conference and frequent and regular presentations rather than just once year.

Summary of feedback and actions taken in response to feedback

We are currently considering all the feedback we received from stakeholders across all sources to create themes and an action plan for how we continue to engage with them for 2019 FES and beyond.

The feedback received from stakeholders will also feed into developing the detail of our 2019 Future Energy Scenarios. We will summarise the feedback from all sources in the FES 2019 Stakeholder Feedback Document which we will submit to Ofgem at the end of January. Last year's document can be found here for information.

BSUoS Forecasting provision

We publish annual and monthly BSUoS forecasts and we are aware that stakeholders have not been happy with the accuracy of these. We know that these forecasts are key for stakeholders to manage their costs so the quality of these forecast are important to us.

Event: **Electricity Operational Forum**

Topic: BSUoS forecasting provision

Date: 4th July 2018

Number of attendees: 91

Overview: Our Electricity Operational Forum in April and July is our main opportunity to share information and to give stakeholders opportunity to ask questions.

	# Responses	Average Score
How would you rate the usefulness of the BSUoS forecasting provided	10	6.8/10

Ancillary and balancing (AS/BS) services tender webinars

We have started to engage with stakeholders on AS/BS tender results to be transparent with providers and share the reasons that tenders have been rejected and support with tender submission forms as these have recently changed. During these webinars we have tried to collect data using different tools, which haven't been as successful as we would have liked and as such have not got all the feedback that was given. During each webinar there is an opportunity to ask questions, these are answered during the webinar and the transcript for this is included in the slides which are published on the website.

Event: **Tender Results Webinar**

Topic: Firm Frequency Response tender results

Date: 22nd June 2018

Number of attendees: 44

Overview: A webinar to share the results of FFR tender results and for providers to ask questions.

	# Responses	Average Score
On a scale of 1 to 4 how useful was the June-18 Market Information Report?	2	3.5/4
Please suggest any additional data or material that would be useful for us to provide in the Market Information Report? Comments: NGET's procurement strategy	1	n/a
On a scale of 1 to 4, how useful did you find this Webinar?	2	2/4

Event: **Tender Results Webinar**

Topic: Firm Frequency Response tender results

Date: 24th September 2018

Number of attendees: 21

Overview: 10 responders, 7 existing providers and 3 potential providers

	# Responses	Average Score
I have the information I need to understand FFR tender results. On a scale of 1-5, with 1 for disagree and 5 for agree.	11	2.82/5
On a scale of 1-5, with 5 being the most useful how would you rate the usefulness of the FFR results webinar?	11	2.45/5
What can we do to improve transparency of the FFR tender results?	Provide hedging strategy Give more info around rejection codes e.g. pick out and work through anonymised examples. Publish the code used to optimise tender acceptance. Publish the procurement strategy. Have more feedback sessions. Present pricing comparison with Mandatory procurement	

Event: **Tender Results Webinar**

Topic: Fast Reserve tender results

Date: 23rd May 2018

Number of attendees: 4

Overview: A webinar to share the results of FR tender results and for providers to ask questions

	# Responses	Average Score
Do the rejection codes need further clarification?	1 (no)	No 100%
Is the specific information on the periods we are planning to procure, that is now published in the MIR, useful?	2 (yes)	Yes 100%
On a scale of 1-5 how useful would you rate this webinar, with 1 being the lowest	2	3

Event: **Tender Results Webinar**

Topic: Fast Reserve tender results

Date: 21st June 2018

Number of attendees: 3

Overview: During this webinar we had responses from 2 individuals, these were both potential providers

	# Responses	Average Score
On a scale of 1 to 4 how useful was the June-18 Market Information Report?	2	3/4
Please suggest any additional data or material that would be useful for us to provide in the Market Information Report?	A bit more time on rejected codes. Good to be able to ask questions	
On a scale of 1 to 4, how useful did you find this Webinar?	2	3.5/4

Event: **Tender Results Webinar**

Topic: Fast Reserve tender results

Date: 23rd July 2018

Number of attendees: 5

Overview: This webinar poll was completed by 3 stakeholders, 2 existing and 1 potential

	# Responses	Average Score
I have the information I need to understand FFR tender results. On a scale of 1-5, with 1 for disagree and 5 for agree.	3	4/5
On a scale of 1-5, with 5 being the most useful how would you rate the usefulness of the FFR results webinar?	3	4/5
What can we do to improve transparency of the FR tender results?	Market report a bit faster especially this time of year with holidays etc. More forward planning info	

Event: **Tender Results Webinar**

Topic: Fast Reserve tender results

Date: 21st August 2018

Number of attendees: 12

Overview: This webinar poll was completed by 3 stakeholders, 2 existing and 1 potential

	# Responses	Average Score
I have the information I need to understand FFR tender results. On a scale of 1-5, with 1 for disagree and 5 for agree.	3	4/5
On a scale of 1-5, with 5 being the most useful how would you rate the usefulness of the FFR results webinar?	3	3.33/5
What can we do to improve transparency of the FR tender results?	• Now not sure how the min no zero time affects results • Maybe give each tender a %	

	value so we know how Grid are valuing each different value - i.e. two equally priced tenders but where one was accepted because of a MNZT value?

Event: **Tender Results Webinar**

Topic: Short Term Operating Reserve tender results

Date: 25th July 2018

Number of attendees: 44

Overview: The was the first STOR tender and the pool of providers is much larger. For this webinar poll we had 24 responses, 21 existing providers and 3 potential providers

	# Responses	Average Score
How would you rate the usefulness of this STOR results webinar? On a scale of 1-5, with 1 for not very and 5 for very.	25	3.56
What other material would have been useful as part of his webinar?	• Price (6) • Happy with content • Market Results • All or nothing • Explain acronyms • Assessment process	
Generally, I have the information I need to understand STOR tender results. On a scale of 1-5, with 1 for disagree and 5 for agree.	24	3.88
What can we do to improve transparency of the STOR tender results?	Satisfied – no improvements required (2) Pricing (2) Unit/provider details (2) Merit order Explanation of assessment	

Summary of feedback and actions taken in response to feedback

You said	We did
Providers of ancillary and balancing services have requested the hedging strategy	Our aim is to be as transparent as possible in order to promote competition in markets and drive down costs for consumers. However we believe that publishing the exact volumes we plan to purchase in each tender would restrict our ability to react to changing market conditions and could also result in less efficient outcomes due to tendering behaviour. Instead

	our focus is on publishing total requirement volumes for each time period together with the volumes purchased in each tender round and running a webinar after each tender round to discuss the outcome. We are reviewing internally to see how we can provide more clarity to the industry on the periods we wish to procure for. We will give an update to the market on this ahead of the next long term tender round due to take place in December 18.
An AS/BS provider was looking for a bit more time on rejected codes. Good to be able to ask questions	In order to better explain the tender assessment outcome we have taken time in webinars to explain the reasons in detail and how the codes are applied. There is a question and answer session at the end of every call. The questions and answers are then published on the website alongside the presentation from the webinar.
Request for earlier publication of the Market Information Report	We understand the market's requirement for information as early as possible. However, we already have a tight assessment timetable and are unable to send the Market Information Report (MIR) out earlier; we use the webinar to give the market feedback on results before the MIR goes out.
Request for forward planning information in the Market Information Report.	We have been providing more detail in the MIR about our intentions to procure for future periods since the report published in February. This information is under constant review.
Stakeholders are not aware of what information is already provided.	We will support providers in accessing the information that they need.
Can you explain what your acronyms stand for and what these mean.	We will ensure that these are covered all future webinars.

Electricity Operational Forum

The Operational Forum is our main channel for sharing information with our stakeholders, providing a forum for questions and answers and for gathering stakeholder feedback.

Event: **Electricity Operational Forum**

Topic: Event Poll

Date: 24th April 2018

Number of attendees: 97

Overview: Our Electricity Operational Forum in April and July is our main opportunity to share information and to give stakeholders opportunity to ask questions.

	#responses	Average Score

How easy is it to find the information you are looking for on the National Grid website? Scale of 1-10.	14	6.0/10
How would you rate the usefulness of the Electricity Operational Forum	*8*	7.0/10

Event: **Electricity Operational Forum**

Topic: Post Event Poll

Date: 4th July 2018

Number of attendees: 91

Overview: Our Electricity Operational Forum in April and July is our main opportunity to share information and to give stakeholders opportunity to ask questions.

	Average Score
How helpful was the content presented at the July Operational Forum	7.25/10
Overall, how would you rate the July Operational Forum	7.63/10

What do you think went well at the July Operational Forum	• No. Interesting presentations. Useful to understand more about handling of RoCoF. Good opportunity for questions • The presentations were interesting and having it before the IS forum was particularly useful. The questions were also well moderated • Presentations were clear and event was well attended • General organisation, audibility and visibility of presentations, were both good • Interesting Presentations - particularly the ROCOF / Vector Shift • It was good to get some more information on the Western Link • Vector shift - amazing!
Next time, what would you like to see more of?	• **Generally I found the forum very useful; it was the first I've been to, so was just interested to see the kinds of things covered. Maybe over time I will be more able to suggest things I'd like to see more of.** • **Examples of real operational days, and what happened on them and why.** • **No ideas** • **Presentations by control room team member.** • **More detail on where on the system 'problems' are and how they're being managed, e.g. Voltage constraints in S Wales and SE, B6 boundary constraints. A 6-12month 'lookahead' to problems or issues that are forthcoming would be useful. More details on key infrastructure projects e.g. Western Link** • **More information on BSUoS, and reasons for costs not at such high level.** • **Difficult days are a useful update on the way NG is working. A day between a lot of non-BM STOR and a day with less would be good.** • **I like example days - showing the trade-offs and challenges.**
Next time, what would like to see	• Can't think of anything in particular.

less of?	• The deep dive into BSUoS could have been shorter? • None. • Nothing • Nothing - it was all useful - in fact I would have gone on after lunch. Things like - in the control room why does everything not appear to be based on price - some of the things humans take into account as EBS never arrived! • For me the technical explanations are not necessary, but for others they are very good.
Is there anything else you'd like to share about the July Operational Forum	• My only suggestion would be to perhaps have future forums in a venue with some natural light. I had an early start that day to get down to London for the forum and after that, a day in a windowless room made it sometimes hard to stay alert enough to get full benefit from the day. The lunch was very nice though! • No thanks, I enjoyed it as always. • No • Could it be run in Scotland? • I understand that in the presentation you need them to be clear and easy to read, however when the presentations are published it would be helpful to have some notes to give the slides context. Otherwise I have to try and write considerable notes at the forum and I cannot keep up. • Tell (name)- she did a fab job, explaining something difficult and we got it, but slow down when speaking. Enjoy the glory of knowing more about this than at least 70% of the room, feel free to talk down to those us writing notes like we are at school, take your time to show how clearly smart you. (it was yours, your were great - own it!)

Energy Forecasting

The Energy Forecasting team has attended a number industry fora and bilateral meetings with customers and have received productive feedback on how to improve.

Summary of feedback and actions taken in response to feedback

You said	We did
Provide a terminology list to include definitions and glossary, best view of capacity and expected growth of embedded generation by technology and transmission connected wind. Also, a half-hourly time series extract containing identifiable components of national demand from which the numerous definitions of demand can be constructed to ensure transparency.	We have created a website for incentivised forecasts to increase transparency, accessibility. We have planned by the end of the year to provide a description of definitions we use in energy forecasting. We have met and we will continue to meet with market participants to get their feedback and explain what we do and how we do it.

Performance Metrics

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[5] (FFR), Short Term Operating Reserve[6] (STOR), and Fast Reserve[7]. 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
August	●	●	●	●	n/a	n/a
September	●	●	●	●	●	●
YTD	●	●	●	●	●	●

● Published on-time ● Published right first time

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

Figure 1 Metric 1 Commercial Assessment Transparency Performance

Supporting Information

The assessment of tenders for Firm Frequency Response (FFR) and Fast Reserve services takes place each month. The results of the tenders are published on the ESO website on the 12th business day of the month. The information has been published on time every month and has been published right first time every month. The assessment of tenders for Short Term Operating Reserve (STOR) takes place three times per year. The timetable containing the dates for the tenders and the associated results days is published on our website. Two STOR tenders have taken place during this review period. On both occasions the information was published on time and right first time.

The FFR, Fast Reserve and STOR assessment results were published on time and right first time in September.

This month's FFR tender was a full term tender. 436 tenders were received, made up of 61 non-dynamic and 375 dynamic tenders.

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

The FR tender received 43 tenders in the September tender round.

The STOR assessment took place according to the agreed timetable and the results were made available on the ESO website on time and right first time.

We are delivering a series of tenders and assessments for markets that are becoming increasingly liquid and competitive. The number of participants in all services is increasing as is the number of tenders that require assessment in each tender round. We are running the assessments to the same strict timetable, while managing to assess an ever increasing number of tenders. The results have been delivered to the market on time and right first time following every tender round. At the same time, we are delivering additional information to the market through better market information reports (MIRs) and webinars to improve the transparency of the services, while simplifying and standardising processes and contracts.

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 our 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.

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

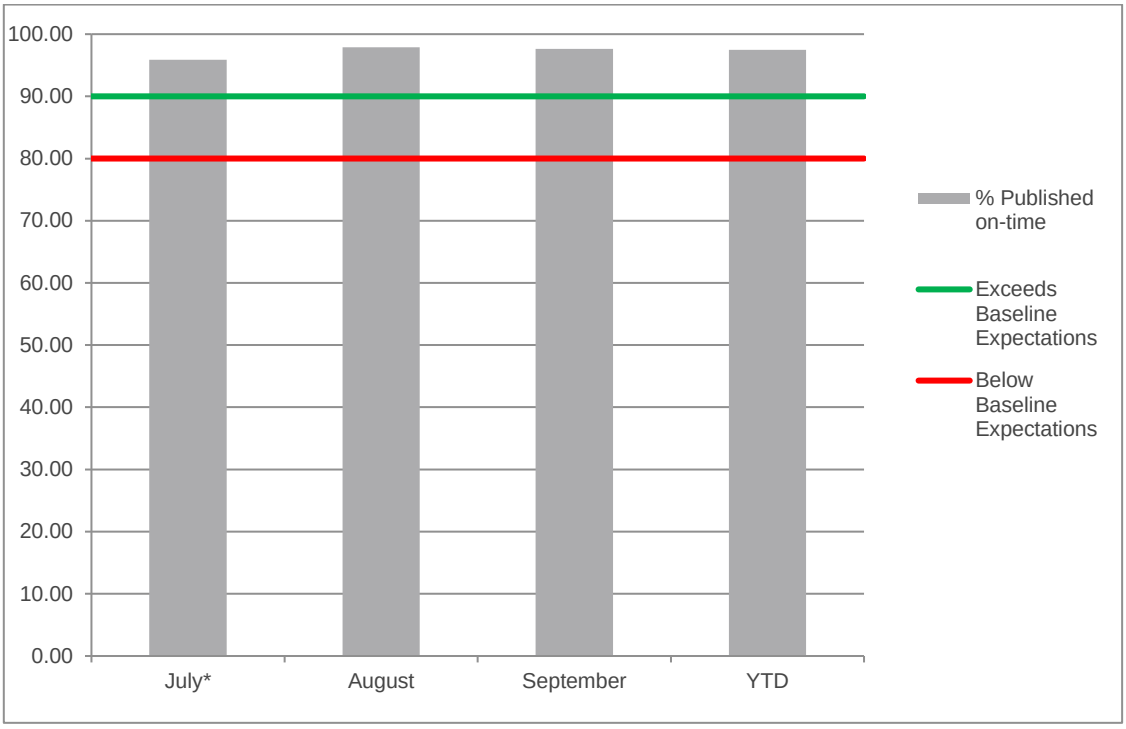


Figure 2 - Metric 3 Trades Data Transparency Performance

*indicates that July performance only shows performance from 16th-31st July

Supporting information

We have been publishing information about our trades on our new web portal (https://trades.nationalgrid.co.uk/) since April. Since July we have been able to time stamp the trade allowing us to measure the elapsed time following the trade to its publication. In this time 1614 trades have been published and of these 1573 within 10mins of capture which is 97.5%.

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 September 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 54.2% 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.

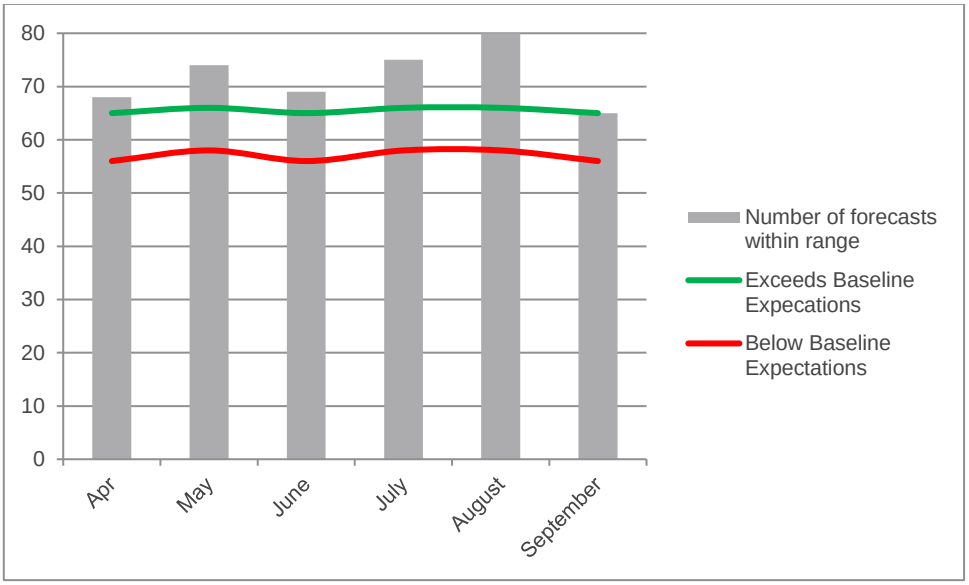


Figure 3 - Metric 4 Demand Forecasting Performance

Wind Forecast

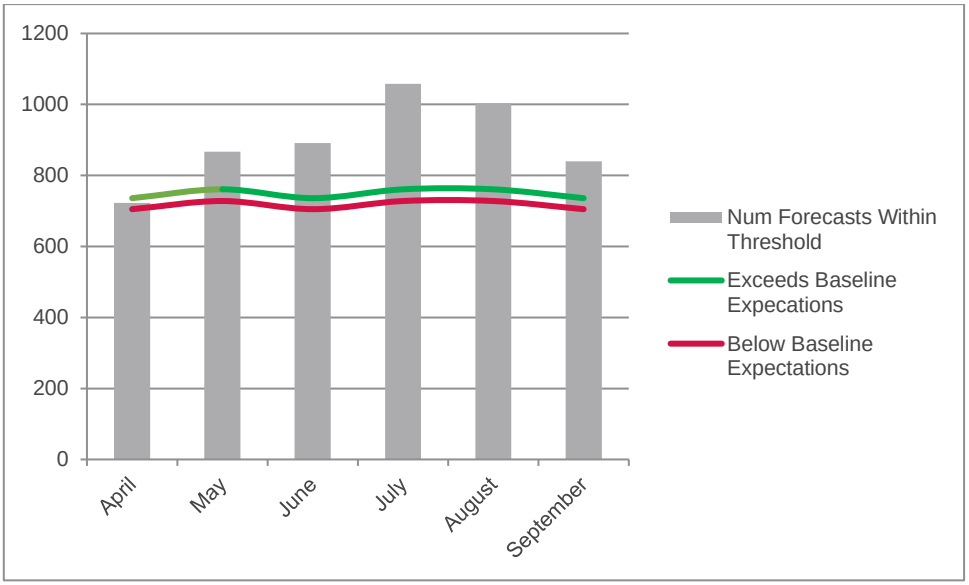


Figure 4 - Metric 4 Wind Forecasting Performance

During the first half of the year, Energy Forecasting has been working closely with its key partners and industry players to improve the accuracy and accessibility of Demand and Wind forecasts. We have delivered several transformational improvements on Energy Forecasting that resulted in an increased forecasting accuracy compared to the same period last year.

The performance of energy forecasting is measured by two key metrics: Day Ahead demand forecasting accuracy and Day Ahead Wind BMU forecasting accuracy. The forecasting

performance of this financial year shows that DA Demand accuracy has improved by 7% compared to the first half of 2017/18. Wind BMU accuracy has also increased by 8% compared to the same period last year. This was achieved within a changing energy landscape and increasing complexity and volatility of the electricity system. These improvements will allow market participants to make better decisions to balance the network while approaching real time. As a result of this substantial drop in forecasting error, in the first half of this financial year, ESO have delivered overall “above expectations” on the two forecasting metrics.

The 2DA Demand forecast have also seen a substantial improvement in accuracy with a 7% increase compared to the same period last year. 7DA demand accuracy has remained unchanged. This shows ESO Energy Forecasting commitment to continuing to improve performance at all timescales. The performance achieved during the first half of this financial year is a direct result of some major transformational changes and innovations delivered by ESO Energy Forecasting on processes, data and forecasting capabilities.

B

Principle 2 Evidence Chapter

Performance in the last six months

Meets baseline performance

Efficient balancing spend

Balancing costs tracked below benchmark up to August, as we managed ongoing access to the system and continued change to the supply mix and associated technical challenges. However, constraint spend increased dramatically in September with the Western HVDC link out of service, while we were also taking proactive action to ensure system security could be managed across the winter with significant plant not being available in Scotland. We worked closely with the TOs to keep costs down in September, while looking ahead to manage coming months and potential system risks.

	Apr	May	Jun	Jul	Aug	Sep	YTD
Benchmark Cost (£m)	56.9	68.3	90.7	65.2	72.4	57.5	**410.9**
Benchmark Adjusted for WHVDC (£m)	62.6	72.9	102.9	74.3	86.5	71.4	**470.6**
Actual Cost (£m)	56.5	59.3	85.8	77.8	72.3	139.9	**491.5**

Figure 5 - Balancing cost (benchmark vs outturn)

The balancing costs benchmark was originally discounted by £136.4m to take account of the benefit of the Western HVDC Link on balancing costs. Commissioning problems have meant that this asset has not been available for all this period and so we would expect to adjust the benchmark upwards by £59.7m to take account of this unplanned unavailability.

Prior to September, we had been holding costs below the original agreed benchmark, even without the benefit of the Western HVDC link. This is thanks to the contracting decisions that have been made ahead of real time and the proactive and fast decision-making in the control room:

- Reducing active power demand, increasing reactive power demands and increasing renewable generation makes managing the voltage more complex, and has the potential to push balancing costs up. Predicting system voltage is challenging as the impact of some actions are not observed until hours after they were taken, when other system changes could have a positive or negative impact voltage as well.

  We focused on establishing and living with an appropriate level of risk to drive down the use of additional machines and keep reactive power dispatch to a minimum. To enable this, we introduced additional monitoring, comparing outturn on the day with offline analysis of the expected system conditions. This provides greater visibility of the approach and impact of our actions, and focus on the costs within the right risk envelope. Through this approach, we reduced overall spend on reactive power utilisation by 3% compared to last year through connection of additional reactors in key areas and increased focus on actions. The introduced monitoring and process improvement will allow us to continue to identify opportunities for further optimisation.

- Balancing our requirements for voltage management and upward/downward frequency response in real-time is becoming harder as the minimum demand drops and distributed energy increases. As more reactive power is generated over the minimum period, we need providers to absorb the excess to avoid high voltage on the system; however increasing the number of generators on the system can introduce difficulty in having access to the right amount of upward and downward frequency response. As well as contracting with distributed providers for response, we introduced super-SEL (Stable Export Limit) contracts with larger synchronous units, and currently eight contracts are in place. These contracts provide access

to generator capabilities that are not available to us in the Balancing Mechanism and were crucial in managing low demand periods this summer.

Delivering secure energy supplies with continuously evolving demand patterns and energy providers

This summer, we saw high levels of solar generation (up to 10GW on some days), the lowest transmission demand so far (15.8GW) and reduced levels of synchronous generation (76 hours without coal generation). This all leads to a reduction of the inertia on the system. During these periods, the frequency is more sensitive to changes in demand or output of generation. Against this backdrop, we managed the TV pick-ups of the World Cup and a Royal Wedding. We need to make sure we have enough frequency control armed to respond quickly to any changes in demand during these situations, without over-securing and thus adding cost to the system.

Contracts for Enhanced Frequency Response (EFR) providers are now live and delivering sub-second frequency response. This new response tool provides additional capability in managing frequency control on a low inertia system. We have more work to do to fully understand the impact of introducing this new service while reducing our usage of other response services. Our experiences from integrating EFR into our suite of balancing tools is feeding into the development of new frequency response services designed to facilitate the secure and economic operation of the modern power system. We continued to engage with industry on these changes through a webinar and three workshops which presented an opportunity to tell us how our designs could be adapted to minimise the cost of delivering the services from the provider's point of view.

Over the past six months, we continued our voltage reduction testing program which began in 2017 and was highlighted as an opportunity to improve confidence in our industry's coordinated response to a potential low margin situation. With changes to both our and the DNOs structures, there was the opportunity to practice and improve upon our procedures. These tests have evolved from a paper-based exercise through a communication-only exercise to live tests. All test results were presented at the regular SO/DNO conferences sponsored by us, the ESO, and we are pleased to report all to date were successful (covering half of DNO areas). No consumers were adversely affected during these live tests. The tests are set to continue into 2019, until all eligible DNO partners have participated. They will deliver increased confidence in the ESO and DNOs capabilities to deliver security of supplies.

Our ENCC has implemented a number of manual processes to accelerate onboarding of an aggregated unit and provide access to the Balancing Mechanism ahead of the Wider Access program.

Transparency in our balancing actions

The balancing actions that we take are visible on BM Reports and we provide further information on our reasoning for these actions through the Monthly Balancing Services Summary (MBSS) reports and reporting at the Electricity Operational Forum. We continued to develop the MBSS report through principle 1 to ensure it provides the level of information needed. The Electricity Operational Forum provides a good opportunity for us to have a conversation with industry stakeholders about where we see increasing balancing costs and the actions we are taking to address any issues. We continue to ask for feedback on these sessions and are seeing increased engagement through an upturn in the number of questions that are being asked of the ESO panel and experts in the room.

We are aware that we need to do more to provide better information on the issues that the ENCC are managing on a day-to-day basis, which would deliver a clearer picture of why we take the actions we do. To drive meaningful cultural change in this area, we are exploring barriers to sharing information within control timescales and identified concerns including inadvertently providing commercial advantage rather than transparency to the market.

Delivering appropriate IT change

We implemented the Electricity Balancing System (EBS) where we have a mixed scheduling solution that makes use of both EBS and elements of the existing balancing systems. We continue

to update EBS to improve performance and ensure it can meet the TERRE (Trans-European Replacement Reserves Exchange) and Wider Access regulation changes by December 2019. We also established the Design Authority, taking a process driven approach to ensure we deliver for consumers in partnership with customers and stakeholders. However, implementation of EBS has been a much more complex IT programme than expected and the energy landscape has changed faster than anticipated, resulting in significant delays and functional delivery complications. We recognise that we have not done enough to communicate these challenges and we will need to make significant changes in our approach to keep you informed.

From industry feedback, it is clear that there is interest in more information on our IT delivery; in response we started to hold an IS Change Forum. Following the success of the first IS Change Forum on the 4th July, we are preparing for the next event which is scheduled for the 15th October. Based on positive and supportive feedback from the first event, this will again be run alongside the Electricity Operational Forum and will follow a trade stand approach. Also in response to feedback, we will have an increased number of stands covering a wider range of systems, and more representatives from each project to facilitate greater levels of detailed discussions.

We continued to represent GB interests in Europe and are working with our European transmission system operator (TSO) colleagues to implement the platforms needed to enable scheduling and dispatch of the European reserve products RR (Replacement Reserve) and mFRR (manual Frequency Restoration Reserve). The regular code modification workgroups (P344 and GC0097) through which we worked with the industry on the TERRE solution drew to a close earlier this year, and the final proposals were presented to the respective panels in May 2018. The final solutions were supported by both the balancing and settlement code (BSC) and Grid Code panels and were approved by Ofgem on 24th August 2018.

With Elexon we are jointly planning the next TERRE industry day (the first one was held in January this year) for interested market participants. It will take place on 11th December and will focus in on providing clarity on some of the questions that we are being asked, an update on timelines for implementation, and what GB market participants will need to do in order to participate in the market.

One of our fundamental obligations is to manage the system frequency as close to 50Hz as possible in a cost-effective manner. It is necessary to measure the system frequency accurately and reliably and this is done using a system of distributed measurement units which provide readings to ENCC, called FATE. The main use for this is in the second-by-second balancing of generation and demand but it is also necessary to enable the power system to be recovered following a shutdown. The second phase of the project was completed in April and installed measurement units at new sites to ensure that frequency measurements were available to the control room from the best locations to support normal operation and black start.

Exceeds baseline performance

Balancing costs

Vector shift (VS) 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 losses triggered by transmission system faults. This is visible 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 poses the greatest risk and is costliest to manage using traditional balancing actions.

VS was first noticed after a local demand on the transmission network had increased immediately following a fault on the transmission system. We worked to investigate the cause with Western Power Distribution (WPD) and concluded that embedded generation disconnected due to VS protection settings. We established that changing the protection may be the least cost to the consumer than other mitigation strategies. We worked with Ofgem and the three DNOs in the high-risk areas (Western Power Distribution, UK Power Networks and Southern Electric) to get the right approach and then, design and implement a new process to change the protection in the at-risk

areas. In May 2018, the delivery of a unique collaborative commercial solution to mitigate VS risk was a great result. The cost of these changes was ~£200k and saved between £16m to £30m, so far this year.

We used our experience from this project to develop the next steps for Distribution code review group DC 0079. This group has been working on RoCoF and Vector Shift protection settings for several years. The last consultation was completed in August and the modification proposal is to retrospectively reset all remaining RoCoF relays and remove Vector Shift for all existing non-type-tested generation, which is expected to save up to £300m by 2024.

Work is ongoing to establish the funding and implementation plan with the following expected timeline:

- September – November 2018: Detailed implementation planning
- December 2018: Report to Ofgem
- January – March 2019: Mobilisation, including establishment of industry steering committee
- April 2019 – October 2021: Implementation of changes

Transparency

We are reviewing the Procurement Guidelines to ensure that they provide transparency of the balancing services that we expect to be buying in 2019/20 and the procurement approach we will be taking. We will host a webinar to seek industry views on the Procurement Guidelines at the end of October, to play back what we have heard and listen to stakeholders on where changes need to be made. Our proposed changes to address these comments will then be shared at the beginning of December, where further changes can be suggested, ahead of public consultation in January.

Following feedback that we need to be more visible, our SO Innovation team attended a number of industry events to showcase current innovation projects, outline our innovation priorities, and explore opportunities for collaboration. Such events included Utility Week Live and the Energy Storage World Forum, as well as ESO hosted events such as Power Responsive, the Future Energy Scenarios (FES) conference, and the Electricity Operational Forum. We will continue to increase our visibility externally over the second half of the year. In September, we launched a consultation to refresh our innovation priorities for 2019/20 starting with collecting industry feedback on our current priorities. We are hosting a webinar in October which will be a chance to discuss this with stakeholders in more detail.

We held the first SO Open Innovation Day in March 2018 which was a huge success – over 130 different organisations applied to innovate with us. Since then we worked on developing ideas that were taken forward on the day into projects. We received a lot of positive feedback from participants of the Open Innovation Day, as well as extensive constructive feedback from those not chosen for immediate development. We are taking all of this feedback on board to plan an even more successful event in early 2019.

Delivering secure energy supplies

Inertia is becoming an increasingly important factor for secure system operation and knowing how much inertia is on the whole electricity system is critical to understanding how quickly scheduled frequency control needs to respond. We are working with potential providers of inertia measurement to develop an inertia measurement and monitoring service which can be used to deliver an accurate view of the level of inertia on the whole system into the ENCC and allow us to schedule the right levels of response needed to catch sudden and fast changes in frequency.

Appropriate IT

The **Platform for Ancillary Services** (PAS) is an **agile programme** aiming to deliver integrated solutions to automate the business processes for the operation of ancillary service. This includes:

- A Customer Relationship Management (CRM) solution for automating the process from registration through to contract award

- Ancillary Services Dispatch Platform (ASDP) that enables the dispatching of ancillary services bilateral contracts that the ESO enters into with service providers
- A settlement solution that evaluates the performance of ancillary services contracts based on agreed contract.

In addition, PAS is also delivering the solution for P354 and Power Potential and will ensure that the relevant parts of the solution are adherent to Electricity Balancing Guideline (EBGL). We communicate our plans and progress to both internal and external stakeholders through a roadmap that is published every quarter along with relevant technical documentation.

Once completed, the project is expected to deliver the following outcomes

- Reduce the time to connect to National Grid from six months to less than a week from being awarded a contract
- Have one access point to all Non-BM ancillary services with one set of web services allowing providers to move within services quickly
- Reducing the amount of manual work i.e. Faxes to the ENCC
- Enable changes to ancillary services quickly to reflect market conditions

For the last six months of the year, PAS aims to deliver the changes that will enable the control room to operate Non-BM STOR from ASDP.

Summary table of deliverables

Outcome	2018/2019 Deliverable	Status
Develop our information portals and events	Initiation and delivery of the SO IT Forum with terms of reference based on feedback from customers and stakeholders. Topics identified for the forum include the change roadmap, communication of project delivery and technical aspects of projects which will impact user groups	Completed in July
Solve operability challenges and prepare for the future	Significant upgrading of IT systems to prepare for implementation of European network codes	Ongoing
	Publish Operability Report on challenges, planned activity and stakeholder engagement	On track for Q3
	Publication of the Future of ENCC Study, recommendations and scope of future work	Sought initial views of stakeholders on Future of the ENCC ahead of Thought Piece to be published by end of October
	Embedding of enhanced inertia modelling tools and new inertia measurement capability	On track for delivery in 2019
	Deliver new systems capability within the ENCC, specifically PAS (Platform for Ancillary Services), and progress an update of the dispatch module for our energy balancing processes	On track
Efficient management of the costs of balancing the system	Publication of a new monthly BSUoS report Publication of daily and monthly summaries of balancing costs, volumes	Complete

	and a high-level summary of system conditions via new, more accessible channels	
	Publication of daily and monthly summaries of balancing costs, volumes and a high-level summary of system conditions via new, more accessible channels	Complete

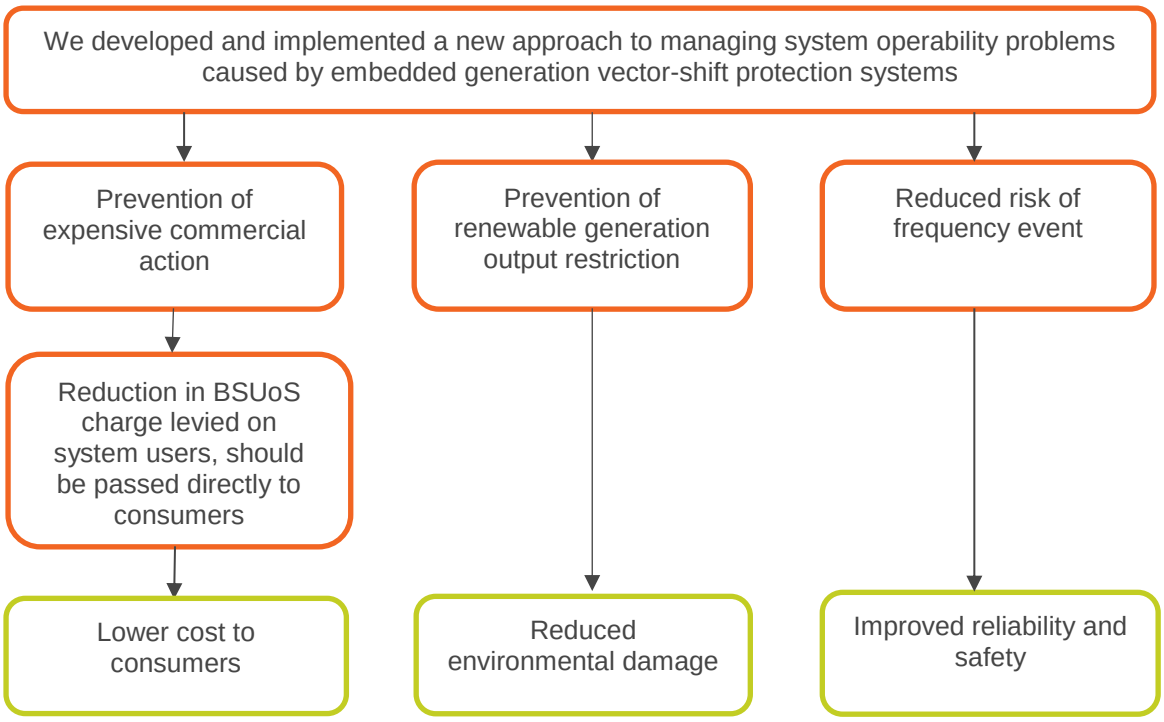
Consumer Value

3. Resolution of system operation problems due to embedded generation

Mechanism for consumer **value**

Earlier this year, a threat of certain embedded generators being at risk of trip was identified. Commercial actions to mitigate against the risk were costing up to £1.5m per sunny weekend (solar photovoltaic generation being a contributing factor). The threat was specific to southern areas of the electricity network, and related to the type of protection used by the generators: Vector Shift (VS) protection systems. We worked with relevant DNOs to modify the protection systems of the at-risk generators, to deliver direct benefit to consumers through reduced system operation spend via BSUoS. An alternative solution would be to restrict the access of solar photovoltaic (PV) generation to the system at times of risk, and by not pursing this potential option, we also contributed to increased environmental benefit due to solar PV contributing to the generation mix and displacing higher-carbon output generation.

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



This work led to positive outcomes for consumers, in terms of:

- Lower bills due to avoiding system management spend levied via the BSUoS charge
- Improved reliability and safety due to removing the risk of trip from the applicable generators, which aids system stability and resilience
- Reduced environmental damage due to us not pursuing the option of restricting solar PV generation output

The monetary benefit for the consumer is direct, as the work resulted in a lower BSUoS charge than would have otherwise been the case as BSUoS is levied on system users and passed through to end consumers (the assumption being that a reduction in BSUoS will be passed through to the end consumer). The value to the end consumer lies in the range of circa £16m - £30m for the 2018/2019 incentives framework period.

Drawbacks and potential for unintended consequences of our actions

There is a risk this action may have set a precedent in terms of price, as the commercial approach was not tendered, if there is a need to reset protection system settings. We will be reviewing the procurement approach as part of the program to retrospectively change RoCoF relay settings and vector shift protection.

Quantification

The calculated benefit to 30th September 2018 is:

Sensitivity	Benefit (£)
Low	13.9m
Mid	19.3m
High	27.9m

Figure 6 - calculated benefit of resetting RoCoF relays

We also estimate a further £2m of benefit through to the end of the 2018-19 financial year, based on historic data, predominantly in March 2019 (as we head back in to spring / summer, with higher solar output and lower demand and inertia).

To calculate the benefit, we looked at the reduction in balancing costs due to avoided actions to manage the Vector Shift risk from transmission faults. Data used includes:

- what the expected Vector Shift loss would have been, had no relays had been changed
- the outturn RoCoF trigger level
- a calculation of the cost of actions required to manage each event where the Vector Shift loss would have exceeded the RoCoF trigger level

We performed analysis from 26 May 2018 to 30 Sep 2018, the start date being once the majority of relays had been changed and the end date been the latest available data.

There are Low, Mid and High sensitivities for the price of synchronising additional units (offers) and the replacement price to balance those actions (bids).

The benefit to the consumer from this work was immediate, in terms of the reduction to the BSUoS charge which should flow through to bills in the short term. Environmental and system benefits were also immediate and delivered this financial year.

Note that the benefit of this action is enduring and will result in avoidance of spend on this issue ad infinitum.

Additionality above baseline

The problems caused to the main interconnected system operation was due to the configuration of protection installed on certain embedded generators and had never been seen, envisaged, or expected previously, hence this work was entirely above the baseline normally performed by us. The issue was identified promptly by us and plans to design a permanent fix rapidly put in place and executed to avoid the spend on commercial actions to mitigate against the problem.

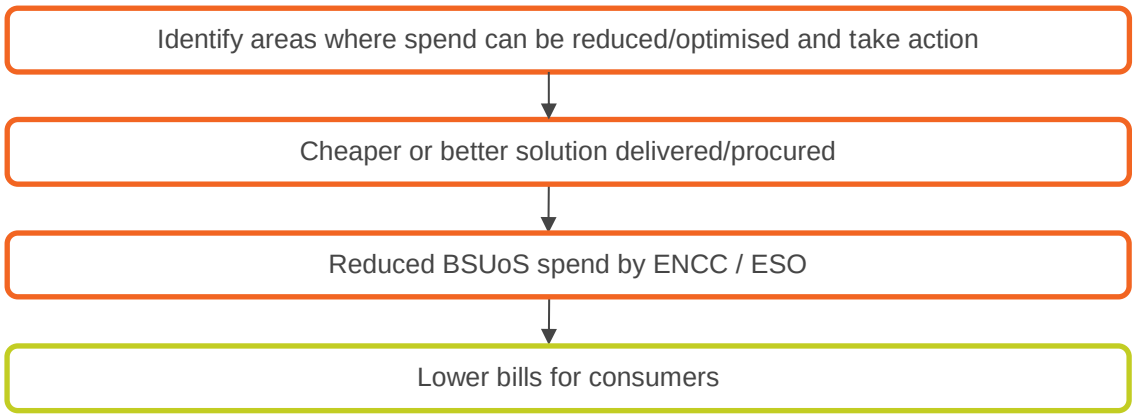
4. Actions to reduce BSUoS spend

Mechanism for consumer value

The Electricity National Control Centre (ENCC) and associated support teams are responsible for managing and balancing the main GB electricity system, which costs approximately £850m/year in actions taken in the Balancing Mechanism and other commercial arrangements.

There is scope for staff to identify cost savings during real-time and close to real-time operational timescales, which of course must be balanced with the requirement to operate the system to the relevant security standards. For example, control engineers use the optimum combination of levers to manage system issues, e.g. generators, demand-side response, interconnectors, asset configuration and so on.

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



Cost savings realised through these routes directly benefit the consumer, as the costs are levied through the BSUoS onto system users, who should then pass it onto end consumers, resulting in lower bills than would otherwise have been the case.

Drawbacks and potential for unintended consequences of our actions

Because decisions are taken in real-time and close to real-time, there could be risks of trading off system security against cost savings. Therefore, all relevant decision makers need to be aware that cost savings should not be pursued in isolation, and the standards against which the system is operated must never be violated. We mitigate against this by ensuring rigorous training, advanced planning and authorisation processes are in place for relevant staff.

Quantification

In order to make our decision making more transparent, we started to record information directly within the control room at the point of decision, which will help analyse impact on cost. As a result, the quantification of this activity will be developed further as more information is recorded.

In the short-term, we are able to provide examples of actions the control room has taken which directly benefit consumers:

- Use of trades enacted on interconnectors to provide negative reserve. This was more economic than the alternative actions of wind bids and two shifting BM plant.
- Trades enacted on interconnector for margin, giving benefit against delaying desynchronisation of units.
- Enacting super-SEL contracts, benefitting in reduced negative reserve costs.
- Using situational learning to reduce the number of machines being run for voltage support.

- Optimising spend to manage ROCOF by units traded on to increase inertia level, against the alternative option of reducing the largest loss through further BM actions.

The actions and outcomes described here are taken in real-time and close to real-time, and benefits delivered through the BSUoS charge, which should be passed through to the end consumer in the short-term, are realised within this financial year.

Additionality above baseline

The consumer benefit delivered via this work is largely encompassed in the incremental improvements in ways of working by the ENCC and its supporting teams, realised through the control room and associated staff performing their expected duties to a high standard, continually looking for savings to be made in the running of the system. Within those processes, there is potential for new and innovative solutions to be deployed to real-time and near-real-time operations which can have a significant impact on the BSUoS charge.

Stakeholder Views

Stakeholder views summary

Whilst acknowledging there is a lot more we can do, we saw a marked improvement in feedback on our engagement and information shared on the costs of balancing the system between the April and July Electricity Operational Forums.

We received very positive feedback on our first IS Change Forum as well as useful guidance on how to improve it which we are using to plan the next forum in October.

Stakeholder engagement overview and objectives

We believe that our engagement on the below topics will be of most value to **electricity suppliers**, **balancing services providers and networks companies** regardless of business model or technology type.

The main event through which we provide explanation of the drivers of balancing costs and as well as opportunity to ask questions is the **Electricity Operational Forum**. Run alongside the Electricity Operational Forum, the newly formed **IS Change Forum** will also be a key face-to-face opportunity for stakeholders to learn about changes to our IT systems and the implications for their businesses.

How we have engaged and what have stakeholders told us?

Electricity Operational Forum

The Operational Forum has been our main channel for sharing information with our stakeholders, providing a forum for questions and answers and for gathering stakeholder feedback. The Operational Forum was held on the 24th April and the 4th July, we continue to use this event to talk about the cost of balancing the system.

Event: **Operational Forum**

Topic: Balancing Costs Information

Date: 24th April 2018

Number of attendees: 97

Overview: Our Electricity Operational Forum in April and July is our main opportunity to share information and to give stakeholders opportunity to ask questions.

	# Responses	Average Score
Question: How would you rate the information we provide on drivers of balancing costs?	3	4.0/5

Comments

- Add an explanation of new balancing cost categories
- More detail and commentary than provided before
- Does the HVDC create new constraints where is lands and is this factored into the constraints forecasts

Event: **Operational Forum**

Topic: Balancing Costs Information

Date: 4th July 2018

Number of attendees: 91		
Overview: Our Electricity Operational Forum in April and July is our main opportunity to share information and to give stakeholders opportunity to ask questions.		
	# Responses	Average Score
Question: On a scale of 1-10 how would you rate the information we provide on drivers of balancing cost	10	6.3/10
Comments • Very jargon heavy • Why is EFR not helping RoCoF- this needs further transparency		
Question: The ESO provides value for money with its balancing role (higher number is higher agreement)	16	7.8/10
Comments • Clear explanation • Very relevant • A tricky one to answer depending on whether you're a provider of BS or a consumer • Is NGET thinking of running another tender for dealing with vector shift if GC0079 is not quickly progressed • Congratulations on covering this topic • Incredibly interesting and engaging		

IS Change Forum

Our first IS Change Forum took place on Wednesday 4 July 2018. This was an important initial step in re-setting our approach to industry stakeholder engagement associated with changes that are being made to our core systems. The focus of the day was to communicate the change landscape within the electricity industry, inform market participants about how we are setting ourselves up to deliver change, share with market participants our progress and plans on specific projects that will impact them as well as to seek feedback to ensure two way conversations on IS changes. A trade fair was adopted to promote two-way conversations. 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 attended as a key industry partner to share details of their Foundation Programme. We carried out a survey at the event to gather feedback on our approach how to best set up the next IS Change Forum. We are using the data collected to prepare for the next event in October.

Surveys were carried out using Survmetrics after the event and the questions asked are listed below. In summary:

- 77% of responders 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&A on key topics as well as an overview of forthcoming changes. In addition, we also received emails from stakeholders saying that the event was interesting and informative.

In preparation for the next event, we are using the feedback received; we are continuing to run as a trade stand approach and including ELEXON. In addition, we are now going to be offering more stands, as well as offering break-out sessions and more details shared about the balancing programme on their webpage https://www.nationalgrideso.com/codes/balancing-framework-and-balancing-and-settlement-code-bsc/balancing-programme-update.

Event: IS Change Forum

Topic: IS Change

Date: 4th July 2018

Number of attendees: 91

Overview: A trade fair event to allow two way conversations with stakeholders

Question	# Responses	Options	Average Score/Responses
How well did the IS Change Forum meet your expectations?	27		3.81/5
Did you find the content provided useful?	27		3.89/5
What stands did you find useful and why?	76	Elexon's Foundation Programme ENC compliance Change Landscape PAS Balancing Programme	11 16 12 19 15
Was there any other information you would have liked to see or hear about from the stands?	28	Elexon's Foundation Programme ENC compliance Change Landscape PAS Balancing Programme	41% 44% 56% 60% 70%
Did you like the format of the event?	25	(1-5)	3.88/5
Do you believe that aligning the IS Change Forum with the Operational Forum is appropriate?	25	Yes No Not sure	75% 4% 21%
How would you like to be informed about IS Change matters going forward?	42	Regular events Newsletters Other	55% 43% 2%

Comments
• Specific sessions focused on projects e.g TERRE, EBS • Materials to be shared after the event • Overview of forthcoming changes • Q&A sessions • Presentation at beginning of event to summarise content
What do you think would be the best format for future IS Change Forums? 21
Comments
• More detailed sessions • Format was good more stands if more people and somewhere for people to chat • Use this and specific project meetings • Interactive • Format good if you know the content, stands showing unfamiliar content it's hard to know what to take from it • Would be good to have an overview of the changes first before going to the trade stand • Worked well but also happy with conference approach • Like presentations and Q&A • Mix of presentations and focus areas • More stands with more detail • Good to have informed presenters but would be better at stand-alone event

After the event, we also received emails which contained positive comments on the IS Change Forum event where stakeholders told us that it was interesting and informative.

In addition we held a webinar for Short Term Operating Reserve (STOR) providers about the new the Ancillary Services Dispatch Platform. We took a number of questions which were answered and published on our website here. The questions asked relate to technical details about metering, timelines and how providers will be supported as part of this transition.

Summary of feedback on IS Chang Forum and actions taken in response to feedback

You said	We did
Stakeholders have asked for a greater range of subjects at future IS Change Forum events.	We will add in additional subjects including Commercial Systems and TOGA at the next event.
Stakeholders have requested further technical details.	The Balancing Programme will be sharing a metering proof of concept and technical design details of approaches to system integration and Wider Access connectivity.
Asked to share more details about what each stand will cover.	We will provide high level detail for each stand with the invitations and reminders seeking people to register to the event
Stakeholders have asked to consider how to integrate presentations and question and answer time.	The majority of the feedback supported the trade stand approach so will continue with this style. In addition we will include a break out

	session for PAS which has been popular based on registrations.
Consider standalone events instead of joined with the Operational Forum.	The majority of feedback preferred that the IS Change Forum ran alongside the Operational Forum. All the projects that attend the event are also adopting their own engagement strategies and utilised this event to ensure attendees are aware of project specific communication channels.
Asked to publish the presentation materials.	We are looking to develop a discrete website to share this content.

Performance Metrics

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 performance summary and the *Plan delivery* section. For monthly breakdown of costs, please refer to the hotspots and the accompanying data tables found here.

	Apr	May	Jun	Jul	Aug	Sept	YTD	Full year
Benchmark cost (£m)	56.9	68.3	90.7	65.2	72.4	57.5	410.9	843.52
Outturn cost (£m)	56.5	59.3	85.8	77.8	72.3	139.9	491.5	

Figure 7 - Metric 5 Balancing Cost Management Performance

Metric performance detail

Constraint spend increased dramatically in September with the Western HVDC link out of service, while we were also taking proactive action to ensure system security could be managed across the winter with significant plant not being available in Scotland. We worked closely with the TOs to keep costs down in September, while looking ahead to manage coming months and potential system risks. Throughout September – assessment of voltage requirements meant one unit could contribute to two regions, saving of one machine per night

- 1st / 2nd - Significant assessment and trade action required to facilitate a high transfer across the Scotland - England boundary. The additional challenge involved multiple transmission studies associated with the wind forecast profile to deliver the MW volume required to complete the test programme
- 3rd – reassessed voltage requirements as a result of generation distribution – reduced requirement by one machine saving approx. £93k
- 4th – trade on interconnector to reduce high voltage; saves running an additional unit in the South East.
- 9th – constraint in Northern England required bid volumes to solve. An additional unit was run on the opposite side of the constraint which reduced power flow across part of the constraint; this raised the constraint limit, reducing the bid volume required on more expensive units.
- 10th – unit used to solve two voltage regions, reducing requirement in one area saving £150k
- 11th – unit chosen to solve a constraint, voltage in south east and north London saving £320k
- Unit run again to increase constraint limit on northern England constraint, whilst solving margin requirement – saving £260k
- Use of transmission system to change the active constraint; this reduced the volume of bids required to solve saving £30k/hr.
- 13th/14th – circuit fault in Scotland put a planned circuit outage at risk of being cancelled or delayed – National Grid ESO proved, in short timescales, the circuit could still be taken
- 17th – two units run to provide additional system inertia – at same time negative reserve was made available avoiding expensive wind actions for negative reserve

C

Principle 3 Evidence Chapter

Performance in the last six months

Baseline Performance

Standardise Product Structure and Simplify Contracts

The drive towards, distributed, decentralised and decarbonised electricity generation is seeing our requirement for flexibility increasing and the traditional sources of flexible capability declining. For example, distribution connected solar photovoltaic (PV) generation continues to reduce the demand seen on the transmission system. The daytime summer minimum demand was 20.1 GW in 2017, it had reduced to 15.8GW in 2018 and we forecast embedded solar and wind generation capacity to continue to grow. Therefore, our requirements for balancing services are generally increasing with greater extremes and volatility. Traditional Balancing Mechanism sources of flexibility are less available and the product design and market structures are not effective for these new non-traditional generation assets and providers.

In our subsequent Response and Reserve Roadmap we committed to rationalise our existing product suite through the removal of obsolete products, increase the transparency of remaining services through standardisation of terms and conditions, procurement windows and assessment methods and begin to develop improved services in conjunction with industry.

Standardisation of Firm Frequency Response (FFR) Market

Our System Needs and Product Strategy (SNaPS report) was published in June 2017. The report set the scene for our future system requirements, and consulted on the future of our balancing services markets. When the consultation closed in July 2017, it received 128 responses with the clear message that the vast majority, 98%, agreed with our proposed approach on the future of our balancing markets of increased standardisation of our products, move procurement closer to real time but also provide periodic longer term contracting opportunities. In our Forward Plan we committed to delivering the actions set out in the Response and Reserve Roadmap. In May, we rolled out the use of 4 hourly blocks and seasonal windows in our FFR tender. Reducing the allowable variability in how market participants could submit their bids, increasing transparency of our volume requirement, allowing participants to have a better understanding of the value of individual tenders to us, which aids competition and helps deliver a lower cost to the end consumer. The introduction of seasonal windows provides greater transparency of pricing while also allowing parties investing in new assets to access longer term contracts and build a development period into their tendering strategy. As detailed in our Metric 8 performance these changes, particularly the longer term seasonal windows have seen a large increase in competition and tenders received.

In June, we released details of our proposals to simplify the FFR contract by inviting industry views via our Detailed Change Proposal document. We believe that by reviewing our contracts and clauses we can remove unnecessary barriers to entry and facilitate greater competition in the interest of the end consumer. In an update to industry in August we advised that whilst we were minded to implement the change proposals, due to the volume and quality of stakeholder feedback we required additional time to fully consider all comments received. The review exercise has now been completed, and we can confirm our intention to proceed to the implementation phase. We expect to publish full details of our conclusions in early October 2018.

This work has unlocked up to £30m of potential consumer value, as detailed in the Consumer value section. The actions delivered in this area have seen the cost of FFR reduce from ~£18/MWh in January 2017 to ~£2.50/MWh in October 2018. Since April this year the price has reduced from ~£4/MWh to ~£2.50/MWh delivering in year consumer value.

Deliver new, standardised products for reserve together with simplified contracts

Work has also begun to realise the benefits of standardisation and simplification to our reserve products as well. The STOR (Short Term Operating Reserve) Outline Change Proposal closed in August; proposals included a new set of simplified contract terms. Stakeholder feedback on these proposals has been reviewed. In our response and reserve roadmap we also set out our aim to future proof our balancing services products to, as much as reasonably possible limit additional market change. This will help providers and their investors to make efficient decisions, particularly through considering the European guidelines when designing our products. When considering

STOR through this lens we decided not to further standardise the STOR product beyond simplifying the contract terms, due to the timescales over which it is bought (i.e. 2 years out), and the significant systems changes that would be required to the despatch systems, we are not proposing to simplify STOR. The infrequent tender opportunities and the typical length of the contract terms (seasons up to 2 years out) means that any changes would be unlikely to take effect before we are starting to introduce the new reserve product suite, and therefore would not deliver any value to providers or consumers. Instead we will focus our efforts on reform of reserve services and what the future reserve product suite may look like. This more fundamental reform of reserve services will better align them with our operability needs, the opening of the Balancing Mechanism, and the introduction of European standard products TERRE and MARI. We are aiming to begin engagement with stakeholders on these reforms by the end of 2018.

We issued the Outline Change Proposal for our Fast Reserve product in September, this included a new set of simplified terms as well as proposals to standardise the product in line with the changes to FFR, to deliver similar benefits to those seen in the FFR market. There is also a proposal to reduce the minimum clip size for the service which currently stands at 50MW to 25MW, stakeholder feedback tells us that this is a significant barrier to market entry for new participants and a reduction could facilitate enhanced competition. We will be issuing a further update to the market on the 5th November, with the process concluding at the beginning of December. Changes to the fast reserve market may take longer than anticipated due to the volume of balancing market reform work currently underway but our aim is to implement these changes between January and March 2019. Broadly, we received positive feedback from stakeholders over the last 6 months on the Response and Reserve Roadmaps, please see the Stakeholder views section for more information. We also developed a number of lessons learned; we appreciate that responding to so much industry change and trying to proactively address the future needs of the energy system, requires a proportional scale of change in our balancing markets. It can be difficult for providers and investors to deal with this uncertainty, so we need to better signpost when change is coming and where we can accelerate the delivery of this change to improve our markets in the best interests of the end consumer.

New Provider Onboarding - Additional Guidance

In our response and reserve roadmap we committed to creating YouTube videos explaining the aspects of the operation and procurement of our products. Interactive guidance for how to participate in STOR markets and how to complete tender forms has been given to ensure providers are supported.

Power Responsive

Power Responsive is our programme of work to promote participation in demand side flexibility, which is industrial and commercial load response, small-scale generation and storage. The launch of the programme in 2015 was driven by the changing energy mix and the need to encourage flexibility from demand, as well as generation, to ensure we continued to balance the electricity system in an economic and efficient way in the future. At the same time, we were receiving increasing interest from demand side players who wanted to offer Balancing Services to us but found the existing design posed barriers to entry. Through a variety of engagement channels, Power Responsive provides a platform for non-traditional stakeholders to stay informed and provide their views on industry change.

In our Forward Plan we set out our intention to grow the Power Responsive programme. We hosted our fourth annual Power Responsive conference in June. From 80 delegates at the first annual Power Responsive event in 2015, 350 delegates registered to attend this year, for the second year in a row. The discussion and outputs from the event are informing the activities for the current year of Power Responsive. During the event, we celebrated demand side flexibility success stories; six projects that have demonstrated benefits for demand side flexibility and showcased collaboration within the industry. Thanks, in no small part to the engagement and success of establishing Power Responsive, we saw a 97% increase in the number of unique non-traditional units tendering into our balancing services markets. We now deal with over 350 market participants, up from just 20 two years ago, and receive in excess of 300 tender responses per

month. These increased levels of competition are helping to reduce costs to the end consumer and Power Responsive plays an important role in promoting the opportunities and helping non-traditional providers engage.

It's important to us that our stakeholders are kept up to date on relevant industry changes and emerging opportunities, utilising our mailing list, we share the latest information, for example, on our reform of balancing services, DNO and supplier flexibility services, consultations and reports. Many non-traditional market participants use Power Responsive as the vehicle by which they engage with our balancing markets. Feedback to the SNaPS consultation told us that our markets were not always easy to navigate, the Power Responsive programme has helped address this concern as detailed in the stakeholder views section of this document.

This year Power Responsive has utilised new targeted approaches to industry engagement. The Local Authority workshop was a great example of how the programme is growing its reach to find new sources of flexibility and encourage participation in the balancing services markets. Please see the Stakeholder views section for more information on the excellent feedback received.

Exceeding Baseline Performance

Publish a new FFR testing and compliance policy for market participants, to streamline the process and make it more accessible

As part of the Product Roadmap for Frequency Response and Reserve, we committed to reviewing our policy for testing and performance monitoring of balancing services. We published the testing guidance document for consultation on 7th August, and included some changes to address providers' concerns. The draft policy for performance monitoring requirements was published at the end of September and we are currently receiving feedback from stakeholders.

This document is the first step to rationalising and standardising our performance monitoring processes, which is a necessary precursor to streamlining our upfront testing requirements. The policy sets out the data requirements for all services, such that providers are not having to install different metering or communications assets to different specifications. The specific calculations for performance monitoring of each balancing service will continue to be contained in the Standard Contract Terms (SCTs) for the service in question, but they will all be compliant with this new policy.

Performance monitoring for balancing services is undertaken differently depending on the service in question. Whilst all services have performance monitoring requirements defined in their SCTs, how they are implemented and what data is required is not consistent. Some services require specific data to be submitted by the provider, whilst others use pre-existing data flows such as metering for the Balancing Mechanism or dedicated IT infrastructure such as STOR Despatch System. As we move to reform our balancing services, we need to ensure that our requirements are consistent and appropriate.

The policy for performance monitoring will sit alongside the work being done as part of Grid Code (GC) Modification 0114 to define the policy for pre-qualification and testing of assets providing balancing services. Actions to streamline these processes will lower barriers to entry and increase competition, while ensuring value to end consumers by increasing the scale of and efficiency of our ongoing performance monitoring systems and processes to ensure service delivery.

Our ambition is to lower barriers to entry for new assets and aggregated portfolio growth inherent in the current testing requirement. However, this necessitates increasing the scale and efficiency of our ongoing performance monitoring systems and processes first. This policy, along with the work on the testing guidance document, GC0114, and the new product suite, is a step towards that goal.

Develop an integrated approach to buying standard and faster-acting frequency response

There are some technical issues, such as baselining and state of charge management, which are difficult to address within the current performance monitoring processes without risking the creation of technology-specific arrangements due to the design of the current balancing products. As part of the programme of works to reform our balancing services, outlined in the Product

Roadmap and Forward Plan, we are designing a suite of new frequency response and reserve products that will have consideration of these elements built in. This work has been discussed with the industry at webinars and technical workshops, please see the stakeholder views section for the feedback we received. In May, we held several small but well attended technical workshops to engage with interested parties at a working level to get detailed feedback on our proposals for Fast Acting Frequency Response, which we will use to support the design work. The detailed discussions between the parties on service design elements and reasoning were well received; we will be publishing a plan for the rollout of the new frequency response product suite in December.

As the generation mix continues to change from large synchronous plant to smaller, decentralised renewables, the amount of inertia on the system is continuing to decrease. This results in system frequency becoming more volatile closer to real time. The development of these new products will ensure the SO has a more efficient use of fast-acting assets could be in addressing the problem of frequency containment, which will better manage the system needs and the enhanced efficiency will help lower costs to the consumers.

We continue to be technology neutral, ensuring the design of products is based on the operational requirement and aiming to capture as many technical capabilities as possible within those products; and the design of products will aim to minimise barriers to market entry for existing technologies, but also for new and emerging technologies as far as reasonably possible.

The Platform for Ancillary Services (PAS)

PAS is a key enabler for our market reforms. The project provides an end-to-end solution for the ancillary services lifecycle enabling commercial and operational flexibility. It replaces legacy systems which is a key requirement to unlocking the value of the market reforms detailed in SNaPS and associated roadmaps. It will drive significant cost and process efficiencies for providers, reducing connection time from 6 months to less than 1 week from contract award, providing one set of web services allowing providers to move quickly within services, reducing manual work and enabling agile changes to our ancillary services that reflect market conditions. Phase 1 of the project provided an online system for distribution-connected providers of Fast Reserve to communicate with our Electricity National Control Centre (ENCC), increasing competition and reducing barriers with one new non-traditional unit winning a Fast Reserve contract. Significantly this is the first battery unit to be accepted, and takes the number of non-traditional parties in the Fast Reserve market from two to three.

Exclusivity Clauses

The success of market reforms in increasing participation and reducing prices in markets such as FFR has also necessitated the need for market participants to seek value in other markets. We have responded to this feedback by consulting on the exclusivity clauses in our contracts. The consultation reviews the exclusivity clauses within our balancing services contracts, which currently prevent providers from providing other commercial services to third parties, such as Distribution Network Operators (DNOs). Changes to the existing exclusivity provisions should facilitate revenue stacking and increase clarity as to how services can be provided to DNOs at the same time as being under contract to the ESO and vice versa. DNO products for real power have now been commonly agreed by all UK DNOs and have been designed to align with existing STOR contracts, should the provision for exclusivity be removed. As well as being a deliverable under the Product Roadmap, this review is also an important element of the Energy Networks Association (ENA) Open Networks Project, which is facilitating the emergence of Distribution System Operator (DSO) models. The consultation letter published at the end of September represents the first stage in the process to better facilitate revenue stacking opportunities to the industry and further creating value for the end consumer. The consultation period closes at the end of October after which we will provide a summary of responses and agree on next steps.

Auction Trial for Frequency Response

68% of respondents to SNaPS were positive about us trialling alternative procurement approaches. We responded feedback in the Product Roadmap for Frequency Response and Reserve by detailing our plan to trial the procurement for a small volume of frequency response via weekly auctions. The beauty of trialling closer to real time procurement is the ability to understand how this new approach changes market participant behaviour and how it increases market and procurement process efficiency and competition. For example by enabling intermittent forms of generation to compete more optimally and improve transparency and economic efficiency by using a clearing algorithm to optimise procurement across different products. We see these changes delivering significant efficiencies resulting in a more efficient and competitive market that will deliver lower costs to the end consumer, the trial will enable us to prove this hypothesis. Significant work has been completed on our Auction Trial; we have identified a preferred supplier to deliver the trial, completed the initial design work based on industry views, and are now finalising contractual discussions to deliver and operate the platform. The trial will test closer to real time procurement and facilitate lower barriers to entry, increased competition and transparency to deliver lower costs to the end consumer. The development work identified the need for a more sophisticated platform and complex algorithm to deliver maximum benefit. Following consultation with our technology partner we decided to delay the start of the trial to include additional functionality. However, we will still commence our trials in this financial year 2018/19, but have learned lessons we will take forward.

In September we shared a summary of the auction design to over 175 interested industry participants, please see the stakeholder views section for details on the feedback. We consider a more complex functionality to be essential to delivering an auction that is beneficial to all parties. It is vital that we trial new procurement routes thoroughly and in detail to maximise the learning available and ensure that the issues stakeholders have raised with our existing procurement methods are fully addressed. Ultimately our aspiration is to move procurement of all balancing products closer to real time, but this will not be possible without a firm foundation and understanding of potential benefits and pitfalls.

We will be looking at how we can engage with providers throughout the development process, potentially introducing a scaled down version of the platform prior to a full rollout. This is a project of genuine ambition which we believe will deliver value for the market and end consumer.

Reactive Power

In May 2018, we also published our Product Roadmap for Reactive Power, it sets out our approach to broadening competition and participation in our voltage markets. It provides greater clarity on our service requirements and our plans to work more closely with our industry partners to improve the shorter-term market for reactive power. The Roadmap details our long-term vision and approach to improving the market for reactive power services and in the process created an additional set of deliverables within the scope of principle 3.

In this Roadmap, we explained our current options for procuring reactive power – Obligatory Reactive Power Service (ORPS) and Enhanced Reactive Power Service (ERPS) – and indicated that, due to the changing dynamic of the energy market, are less fit for purpose. We also explained that in the medium-term we will work with DNOs to optimise the use of transmission and distribution network assets across the system, with the longer-term approach being addressed in the separate Network Development Roadmap Consultation.

A significant deliverable within the roadmap was the publishing of an Expression of Interest for the competitive provision of reactive power services in South Wales. This was identified as a region where voltage issues are forecast and prioritised. Following this, we decided to expand on the road map commitment and have issued Expressions of Interest for services in both South Wales and the Mersey Ring area.

Broadly the Roadmap was well received, please see the stakeholder views section for detailed feedback. However, a learning point was the need to have earlier engagement with impacted Distribution Network Operators (DNO) to ensure alignment and a forward view of any impacts to their networks. We committed to work with the ENA via the Open Networks project to enhance this pre-engagement with the DNOs.

These actions will remove barriers to entry, increase participation, and drive competition in the pursuit of a more transparent and efficient market for reactive power services that delivers value for the end consumer.

Restoration

We procure Restoration or 'Black Start' services to ensure we can always restore the system efficiently and economically in the unlikely event that the electricity system fails.

In May 2018, we published our Product Roadmap for Restoration, setting out our aspiration to improve transparency around Black Start services and to remove barriers to entry to allow improved market access to a broader range of potential participants. The roadmap received positive feedback from stakeholders please see the evidence for details of survey feedback and comments.

A greater number of service providers increases the potential for 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.

Through our Monthly Balancing Services Statement (MBSS) reporting, we have made changes to improve the transparency around cost information for Black Start. The changes provided a more granular breakdown of our Black Start costs to provide more transparency to the market on the actual costs and cost components of the service.

In addition, restoration services from interconnectors was one of the 'deep dive' topics at the quarterly update meeting for GB Interconnector owners on Future GB Markets. 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.

To further improve transparency around this service, we'll be publishing information on the value of Black Start based on technical capability of providers. These updates are on track for delivery by the end of Q3 2018/19 and will increase market understanding of the service requirements and coupled with increased transparency of Black Start costs in the MBSS will begin to encourage competition and potential entry of new participants.

Wider Access to the Balancing Mechanism

The success of market reforms in increasing participation and reducing prices in markets such as FFR has also necessitated the need for market participants to seek value in our markets. We have responded to this feedback by consulting on the exclusivity clauses in our contracts and seeking to accelerate wider access to our Balancing Mechanism.

The Balancing Mechanism (BM) is a core tool for us, used in both energy balancing and resolving a broad range of system operability challenges. Having listened to stakeholder feedback we took the strategic decision to produce an additional road map and set of deliverables not promised in our original Forward Plan on Wider Access to the BM. We want to ensure that the BM remains fit for purpose and is an accessible market for new types of balancing service providers. Changing market dynamics, increased competition in STOR and FFR, with our reforms helping to reduce prices in these markets necessitated the deliberate strategy to enable access to the BM for new non-traditional participants. We are working to remove barriers to entry to the BM for distribution connected participants (including aggregators) as part of the most significant reform of central BM arrangements since NETA (New Electricity Trading Arrangements) in 2001.

This work has involved improving an existing route to the BM for Suppliers wishing to create aggregated BM Units (BMUs). The first example of this was with a demand side aggregator, who entered the Balancing Mechanism in August as the first Virtual Power Plant. Our control room and the new aggregated Balancing Mechanism units are still on a learning curve in terms of operations. We also have business process and systems challenges to address, work is on-going to address these and to consider the next steps in the road map such as how these aggregated BMUs can also provide ancillary services. Progress in this area has not been as fast as we or

industry would like but we continue to explore how we can unlock this situation in advance of full wider access.

We published our Wider Access to the BM Roadmap on 9th August setting out our commitments to enable wider BM access for all by 2020.

We are developing new routes to access the BM for non-traditional providers through a set of industry framework modifications and operational systems and process changes by December 2019. These developments will also deliver the required changes to facilitate GB's participation in Project TERRE (Trans-European Replacement Reserves Exchange). This aligns with commitments outlined in the Roadmap for Frequency Response and Reserve.

Power Responsive Innovation Projects

Our Power Responsive Programme continues to grow promoting flexibility and providing vital engagement with industry to identify barriers. We have also expanded the scope beyond the original remit to support and drive forward several innovation projects that look to further reduce barriers to entry identified by stakeholders, increasing access to markets for new sources of flexibility and increasing competition to reduce costs to the end consumer.

We have been working on NIA (National Innovation Allowance) projects that are being established following the SO Open Innovation Day in March. This was an open call for project ideas and since then we have been working with the project partners who submitted innovation ideas where we identified value that could be delivered to the market, wider industry and end consumers.

NIA Residential Response

The project will utilise the expertise of four industry partners to establish innovative ways to meet the fundamental principles for the provision of frequency response, the learning from which will be used to remove barriers to entry for residential providers. The project scope covers onsite metering and testing, and ways to enable dynamic management of an aggregated portfolio. The benefit is creating a more accessible route to market for smaller scale flexibility, and in turn creating more competitive markets that drive value for end consumers.

NIA Water DSR

The project is improving understanding of how additional demand side flexibility can be realised by taking a systems perspective on assets within water catchment areas. The learning from the demonstrator will be rolled out across GB to provide a new resource to the ESO from existing water assets. There are commercial and technological barriers to deploying this approach, which an NIA funded innovation project could help to overcome.

NIA Asset Register

We hypothesise that we can unlock more flexibility capacity and better utilise assets by building a shared asset register. Using blockchain technology to underpin the single system will avoid having to create a monopoly to run the system, will be readily extensible, and cheaper than the current systems. In the future these assets could have smart contracts linked to them which will help to balance the system more efficiently.

Benefits include better visibility over generation assets would improve our forecasting ability, which lowers the cost of balancing for consumers. The system would allow for more efficient mechanisms to add/ move generation assets around markets, hence creating operational efficiencies and removing opportunities for human error. In the future, it would facilitate a traded market for flexibility linked to assets on the register thereby reducing costs to consumers and reducing carbon

In addition to these NIA projects the team are also part of two Innovate UK funded consortium projects, building understanding of vehicle-to-grid (V2G) opportunities, i.e. enabling electric cars to deliver electricity back to the grid. Across both projects, we will provide inputs on system needs and evolving markets to ensure results and recommendations remain relevant. Innovate UK V2G is a feasibility project identifying and evaluating business models for deploying V2G, providing recommendations on feasibility and efficient business models, overcoming roadblocks and

identifying industry enablers. Innovate UK E4Future is a project to identify key barriers in the policy and regulatory framework that may prevent V2G providers from being adequately remunerated for the value they can provide to the system and will propose high-level solutions for overcoming these challenges. Our 2018 Future Energy Scenarios forecasts electricity demand to grow in all of its 4 scenarios, particularly from the 2030s onwards. This is due to the electrification of transport in all scenarios with the potential for 36 million electric vehicles on the road by 2040. While Electric Vehicles will increase demand they also create new sources of flexibility in our system, these projects will address the barriers to entry and enabling activities required to ensure they can compete in our balancing services markets.

Cornwall Local Energy Market

The drive towards, distributed, decentralised and decarbonised electricity generation is seeing our requirement for flexibility increasing and the emergence of new sources of flexibility and Distribution System Operator (DSO) models. We are working with project partners to shape arrangements to ensure coordination between existing flexibility arrangements and the Local Energy Market, which will trial a platform that matches transmission and distribution system needs with the flexibility that domestic and commercial providers are able to offer. This work will help increase access to our balancing markets and ensure efficient coordination between distribution and transmission actions to reduce costs to the end consumer.

Summary table of deliverables

Outcome	2018/19 deliverables	Status
Promote competition and develop new markets in balancing markets	Standardise the FFR market	Standardised seasons and four-hourly EFA blocks were introduced for the May tender
	New simplified contract	The simplified contract was published as part of the FFR OCP consultation in June
	Publish Restoration Roadmap	The Restoration and Reactive Roadmaps were published in June
	Publish Reactive Roadmap	The Restoration and Reactive Roadmaps were published in June
	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
Grow participation and promote fair access in provision of balancing services	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	Published 9th August
	Detailed auction trial publication	Summary published 31st Aug, webinar held on 27th September and published online with Q&A

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	Simplified contract terms have been published in the STOR and Fast Reserve OCPs in July and September; details of standardisation of Fast Reserve is included in the September OCP. Standardisation of STOR will be superseded by wider reform of reserve services which is coming early 2019
Publish and consult industry on exclusivity clauses to improve the ability to stack products	Published consultation on the 28th September
Publish new testing and compliance/performance monitoring policy for response and reserve providers	Published on the 30th September
Build and implement a measurement framework that will track the success of ESO in helping potential and existing providers progress through the journey	Metric proposal published as part of 6 month report
Raise a CUSC modification for removal of ERPS	Modification Raised
Raise ORPS concerns with CUSC issues standing group	On track for delivery in Q3
Develop an integrated approach to buying standard and faster-acting frequency response	On track for delivery in Q3
Publish an invitation for Expressions of Interest for provision of reactive power services in South Wales	Expressions of interest published in October
Launch a weekly auction trial for response	Off track for delivery in Q3, trial launch scheduled for late Q4

Consumer Value

Purpose of this case study

Evidence of delivered and future consumer benefits are two of the criteria for assessment of ESO performance under the 18-21 incentives framework. Ofgem have provided guidance on what they are looking for and the level of detail expected to be provided as evidence against these criteria, through the ESO Regulatory Incentives (ESORI) Guidance document.

In collaboration with CEPA (Cambridge Economic Policy Associates), an economic consultancy, we developed a methodology to articulate the potential consumer benefit our work will deliver, and to report on the benefit that we have unlocked and realised in the reporting period.

This methodology builds upon the thought-piece we published in July on 'Measuring and Demonstrating Consumer Value'. An overview of the methodology is included on the next page.

We applied this methodology in full to principle 3 for the mid-year report, where the analysis showed potential consumer value in the range of **£54.6m to £74.4m** to be realised in the short and medium term. We considered two activities from principle 3: 'Reform of balancing services market' (Case 1) and 'New provider on-boarding' (Case 2). We hope the case study, provides a clear explanation of how we approached quantification of monetisable benefit from these activities and how they also deliver non-monetisable benefit, namely better quality of service, improved reliability and safety, and reduced environmental damage.

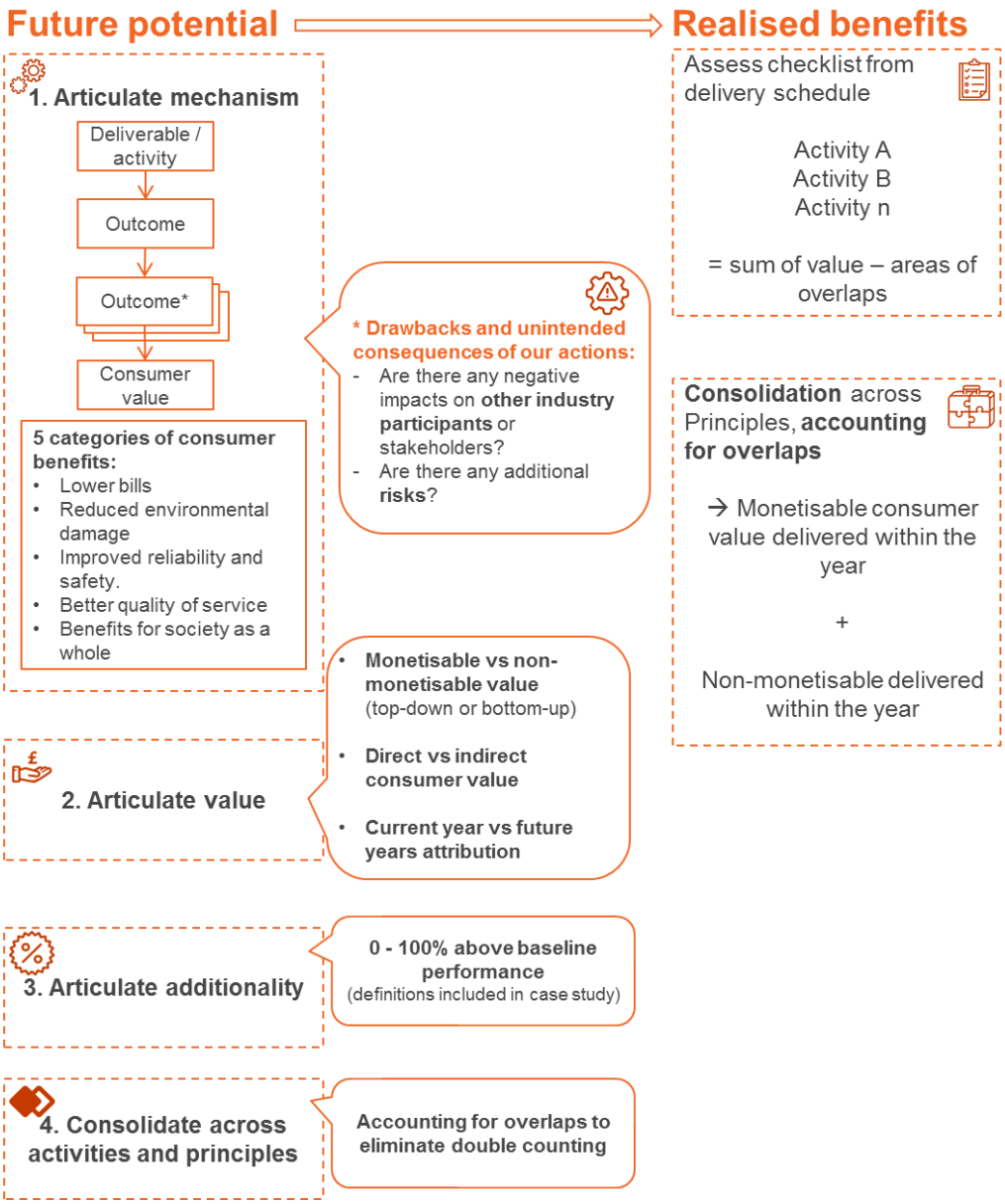
We chose principle 3 as a test case because Ofgem have fed back that they believe our ambition in this area is appropriate and because we have not substantially altered our principle 3 delivery plans. For other principles, we used one or two relevant activities as examples for the articulation of how we believe consumer value is delivered and how we would approach quantifying it.

Another purpose of the principle 3 consumer value case study is to collect feedback from Ofgem and other stakeholders on whether our proposed approach is satisfying both their information needs and the incentive scheme regulatory reporting requirements. We will incorporate that feedback and learning into the end-of-year report, where we will report in detail on consumer value across all principles. Please share your feedback via email by the 9h of November.

Overview of methodology

We developed a structured methodology to help us evidence consumer value created through our actions. An overview of the methodology and its key steps can be found below.

We start with estimating the future potential value that can be delivered through the activity and, where feasible, quantifying the monetisable value, identifying any drawbacks or unintended consequences and the level of additionality on top of our baseline performance requirements. Through this process, a value can be assigned to each activity within the delivery schedule, accounting for possible overlaps between deliverables and principles. At the end of the reporting period, the delivery schedule can be used as a 'checklist' and values against deliverables summed, deducting areas of overlap. In addition, explanations of how we deliver non-monetisable value will be included.

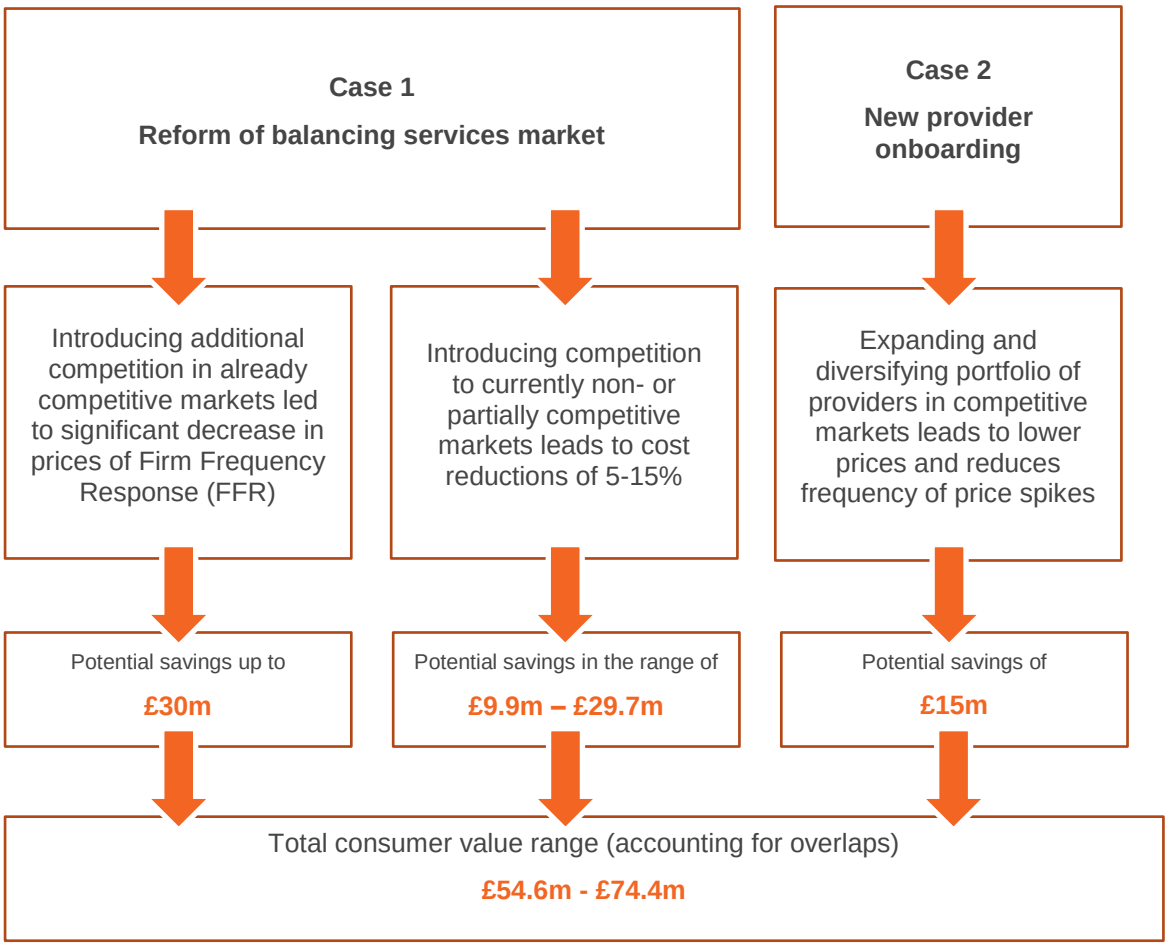


Principle 3 case study

In this case study, we present **indicative analysis of the potential consumer value** which is envisaged under principle 3. We applied the methodology outlined on the previous page to provide an example of how the methodology can be used. For more information on the methodology, please get in touch with us via email. Based on feedback from Ofgem and stakeholders, we will update the methodology and apply it to all principles for the end of year report.

The approaches chosen for quantitative analysis of principle 3 draw on case studies to identify proxies and apply them to the analysed examples. These case studies are drawn from historical analysis of balancing services procurement by National Grid or from other areas of the energy industry.

Summary of P3 consumer value analysis



In our Forward Plan, we identified potential consumer savings of over £50 million for the activities within principle 3. A proportion of this value can be delivered in the current financial year and we include examples of actions we are taking to deliver them.

Case 1: Reform of balancing services market

Mechanism for consumer value

- Our 'Reform of balancing service market activity is designed to increase access to the markets for both existing and new participants.
- Our analysis estimates **lower bills** than would otherwise have been the case, as a result of our initiatives stimulating more market entrance and competition through moving from bilateral procurement to open market-based procurement. Increased competition will deliver lower prices for the ESO as the purchaser, which in turn means lower BSUoS cost which is levied on system users and seen as a pass-through cost to end consumers.

There are **two** key **methods for increasing access**:

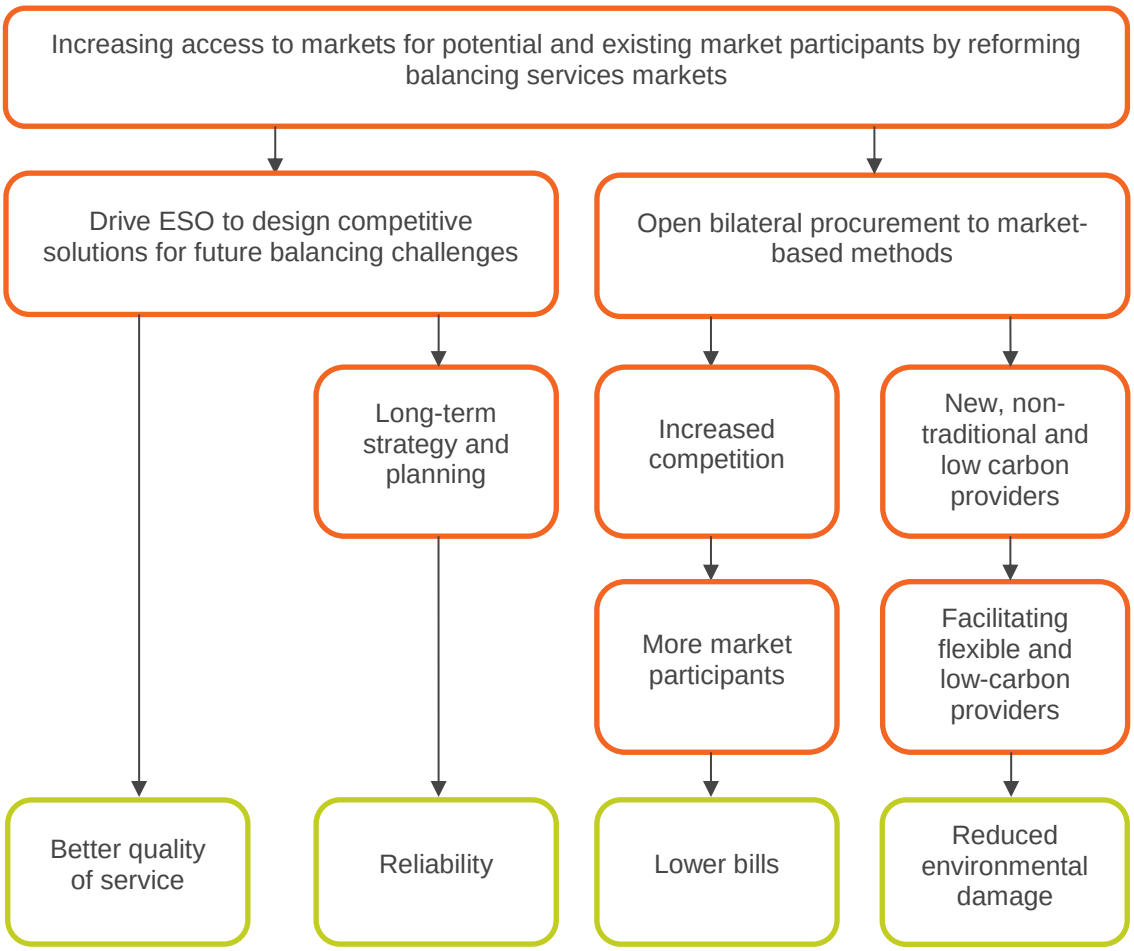
1. We anticipate future balancing challenges as described in the Forward Plan and proactively design solutions to deal with them in a competitive way, creating potential direct consumer value **due to introducing competition in the range £9.9m - £29.7m.**
2. We reform processes to increase competition and broaden the range of participants by adopting market-based methods. These reforms include **simplifying and standardising the tendering process** to create a level playing field for potential new entrants. Initial analysis shows that Firm Frequency Response (FFR) prices decreased significantly this year following standardisation of the product; **potential savings could be up to £30m.**

This activity also delivers **non-monetisable benefits**:

- **Reduced environmental damage** both now and in the future as many new entrants are will be smaller and newer providers with novel, low carbon and flexible sources of supply. In this area, we are a facilitator rather than a driver of positive consumer outcomes, as we are required to procure services on a technology neutral basis. The extent of benefit is largely driven by the technologies which engage in the market.
- **Better quality of service** between us and our providers should lead to more efficient process within the providers' influence, and could indirectly benefit consumers through better efficiencies. While improvements to quality of service may be measurable in some ways – for example through our customer satisfaction score – it is not possible to turn this into a monetary value to consumers.
- **Improved reliability and safety**, for example due to a diverse supplier base being more resistant to fuel scarcity problems, and contributing to system resilience through reliance on multiple technologies. Within the broader context of reliability and safety on the electricity system, these benefits are considered relatively intangible.

As we have already made progress towards simplification and standardisation of balancing services in several markets – e.g. response and reserve services, we are continuing to learn from our progress and from stakeholders to enhance competition within these markets further. As a result, we estimate that around 50% of the consumer value within this area will be realised within the present reporting year.

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



Drawbacks and potential for unintended consequences of our actions

Increasing competition from non-traditional providers may result in provision of services from less well understood technologies which may require the incorporation of additional risk mitigation whilst we incorporate them in our processes.

Interactions and overlaps between principles

There are overlaps with activities within principle 2 which relate to management of balancing costs and, to a lesser extent, with principle 1 which relates to the provision of information to the market. These will be taken into account when consolidating value across principles.

Quantification

- **Lower bills**: These benefits are easier to quantify, as the value of competition to the consumer can be considered, drawing on proxies from historic case studies or other markets.

The main driver of potential consumer benefit is the increase in competition which could be realised by the introduction of new markets where bilateral arrangements currently exist.

There are two main ways consumer value may be realised:

1. **Enhancing competition in already market based services** by standardising, simplifying and communicating service opportunities more effectively. We analysed FFR prices pre- and post- standardisation, which showed a 30% decrease in price.

2. **Introducing new competitive markets** for services which have been historically procured through bilateral or other non-competitive means. We developed a proxy case study based on other markets where competition was introduced and applied necessary corrections resulting in an estimate for total cost reduction in relevant markets of 5-15%.

We explore these mechanisms for consumer value in detail in the Supporting Information section of the report.

Additionality above baseline

Our work in this area is has the potential to unlock significant value for the end consumer. We are delivering a combination of incremental improvements on the regular activity expected from us, and new, innovative activity delivering additional value. For example, we are enhancing our baseline activities through improvements to our standard contract terms, and standardising product structures. While delivering exceeding performance through activities such as the development of new products such as our new suite of frequency response products, exploring new methods of procurement, such as the weekly FFR auction trial and introducing more competition into our other markets through developments such as PAS and the Expressions of Interest for Reactive Power Services.

Case 2: New provider on-boarding

Mechanism for consumer value

Our 'New provider on-boarding' activity is designed reduce barriers to entry to the markets.

Our analysis estimates **lower bills** than would otherwise have been the case due to our initiatives stimulating more market entrance and competition by moving from bilateral procurement to open market-based procurement. Increased competition will deliver lower prices, which in turn means lower BSUoS cost being levied on system users and seen as a pass-through cost to end consumers.

There are **two key methods** for delivering this value:

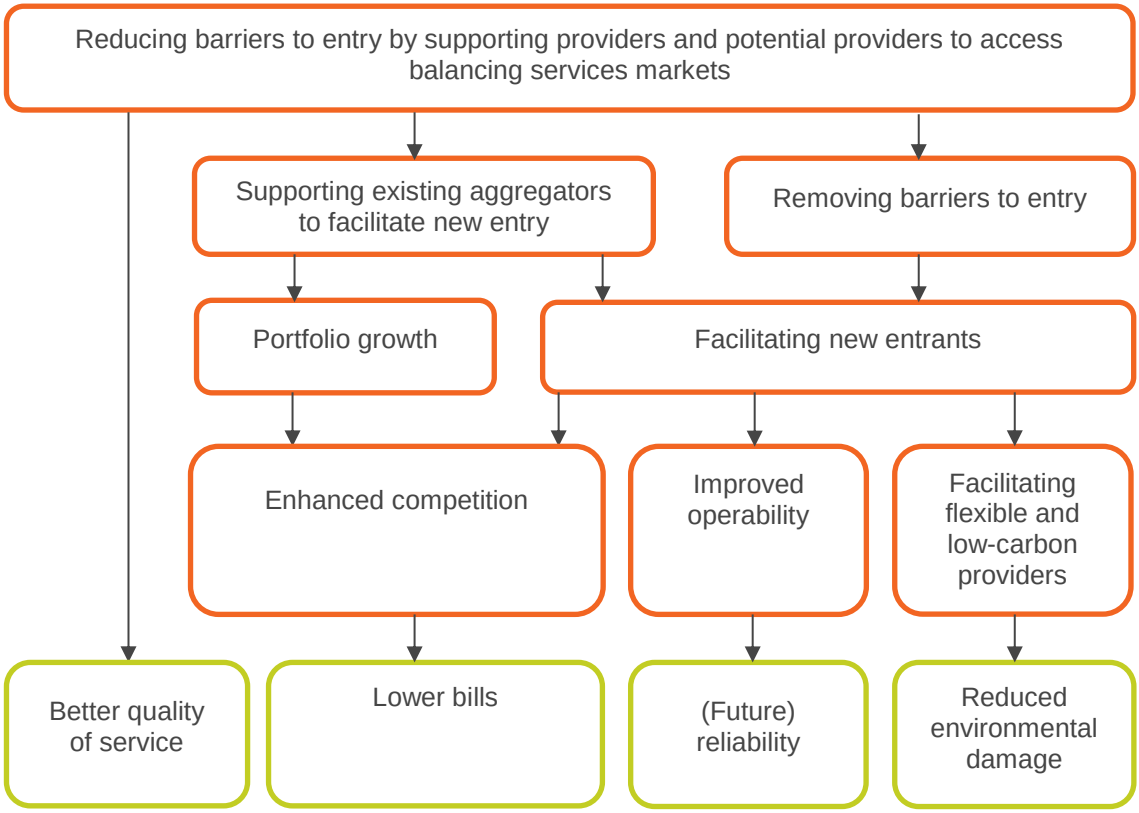
1. We will on-board new and existing providers in order to increase access to the various balancing markets including removing administrative and technical constraints that currently act as barriers.
   This creates potential direct consumer value **due to increasing competition of circa £15m.**
2. By supporting existing suppliers, there is the potential to grow the overall size of the portfolio of providers. This should, over time, improve reliability as there will be less reliance on individual suppliers and particular sources of energy.
   This creates potential direct consumer value at times of system stress when **diversity could help protect us against price shocks and spikes.**

This activity also delivers **non-monetisable benefits**:

- **Reduced environmental damage** both now and in the future as many new entrants are likely to be smaller and newer providers with novel, low carbon and flexible sources of supply. In this area, we are a facilitator rather than a driver of positive consumer outcomes, as we are required to procure services on a technology neutral basis. The extent of this benefit is largely driven by the technologies which engage in the market.
- **Better quality of service** between us and our providers should lead to more efficient processes within the providers' influence, and could indirectly benefit consumers through better efficiencies. While improvements to quality of service may be measurable in some ways – for example through our customer satisfaction score – it is not possible to turn this into a monetary value to consumers.
- **Improved reliability and safety**, for example due to a diversity in the supplier base to the ESO being more resistant to fuel scarcity problems, and contributing to system resilience through reliance on multiple technologies. These benefits are relatively intangible within the broader context of reliability and safety on the electricity system.

The objective of new provider onboarding is to support potential providers who have historically been less engaged in balancing services markets. There is a significant amount of up-front time and resource investment needed from us, with relatively long lead-times before value is ultimately realised. For that reason, we expect most consumer benefit from this work to be realised in future years. However, the ongoing removal of barriers is real and tangible, and we expect this to be impacting existing and potential market participants within this financial year.

We illustrate the mechanisms which may result in consumer value in the flow-diagram below:



Drawbacks and potential for unintended consequences **of our actions**

- Increasing competition from non-traditional providers may result in the provision of services from less well understood technologies which may require the additional risk mitigation whilst we incorporate them in our processes.
- Some stakeholders may suggest that supporting new providers is not reflective of the technology neutral approach that we are required to take to balancing service procurement. However as long as the appropriate balance is achieved, on-boarding of new providers will result in levelling of the playing field. The need for on-boarding support may reflect the lower levels of resources that such providers may have available to engage in procurement processes.

Interactions and overlaps between principles

Increasing competition for balancing services is an objective that relates to multiple metrics and activities included within our forward plan. New provider onboarding will contribute towards this consumer value by investing time in supporting new providers which should help to ensure that competition for services thrives in the future.

As new-provider onboarding increasingly helps to drive lower balancing costs in future years, the interactions between this activity and others which are related to balancing cost management may increase.

Quantification

- **Lower bills**: These benefits are considered more quantifiable, given that the value of competition to the consumer can be considered, drawing on proxies from historic case studies or other markets.

We use two case studies to look at the benefit we deliver in this area. Analysis of historic STOR prices to estimate potential savings resulting from increased competition and analysis of system operability issues and price spikes.

We explore these mechanisms for consumer value in detail in the Supporting Information section of the report.

Additionality above baseline

Our work in this area has the potential to unlock significant value for the end consumer. We are delivering a combination of incremental improvements on the regular activity expected from us, and new, innovative activity delivering additional value. For example, we are enhancing our baseline activities through improvements to our end-to-end provider journey, and provision of online, interactive guidance and YouTube channel while delivering exceeding performance through activities such as the development of our Wider Access Roadmap and accelerated entry into the Balancing Mechanism for non-traditional providers (like we did earlier this year with a virtual power plant).

Stakeholder Views

Stakeholder views summary

Stakeholders have told us that we are doing very good work in transforming markets for balancing services and how we are engaging with them on this topic. Whilst acknowledging that this is very complex and that we need to engage broadly and deeply some stakeholders have told us that we need to move faster.

There is strong evidence that we are helping a wide range of parties to understand and engage with the balancing services markets. We have also heard that we need to provide more detail in some areas, such as wider access to the Balancing Mechanism.

Engagement overview and objectives

We have engaged extensively with existing and future balancing services providers on a wide range of topics and through multiple channels. Topics of engagement include Product Roadmaps that outline the strategy and delivery for how we are transforming balancing services and make it easier for all parties to participate in markets to offer flexibility services to the ESO.

We have utilised a range of channels including plenary forums, workshops, webinars, consultations and newsletters, the Electricity Operational and Power Responsive Forums and webinars have been rich sources of stakeholder input and feedback on our work.

The objectives of our engagement have been to communicate proposed activity as part of the reform of our balancing services, to report progress on these activities and to seek feedback to shape future work and understand the effectiveness of our communication.

How we have engaged so far this year and what stakeholders have told us

There is a diverse group of stakeholders for principle 3. Our balancing services have historically been designed around large traditional providers, but as the energy landscape changes and we strive for more accessible, competitive markets, it is vital that we involve our traditional and newer stakeholders equally in these developments.

Even within our less traditional stakeholder base there is diversity in the knowledge, experience and resource, for example between demand side aggregators and large energy users. For this reason, we have utilised a variety of engagement channels to reach our stakeholders and ensure their views are represented.

This includes conferences, webinars, written consultations, surveys and one to one meetings with stakeholders.

Frequency Response and Reserve Roadmaps

Engagement Forums

Over the last six months we have engaged with a broad range of stakeholders to seek views on our roadmap commitments and progress to delivering these through the Power Responsive programme and the Electricity Operational Forum. These events enable us to target both non-traditional and traditional services providers and tailor the information we provide so it maximises value to the audience.

Event: **Electricity Operational Forum**
Topic: Frequency Response and Reserve Roadmap
Date: April 2018
Number of attendees: 97
Overview: This is an open forum with electricity customers and stakeholders to discuss topics

related to the operation and performance of system balancing and capacity.

	# responses	Average score
How satisfied are you with the pace of delivery of the developments outlined in the Product Roadmap for Response and Reserve?	12	3.3/5
How satisfied are you with the level of engagement on the developments outlined in the Product Roadmap for Response and Reserve?	12	3.6/5
How satisfied are you with the scale and speed of the SO's work to improve all our balancing services and markets?	12	3.3/5
Please provide any additional feedback	• We started the discussion re product review and consolidation back in Q4, 2015. While accepting the complexity of the issues the whole process has been painfully slow which creates uncertainty for service providers and investors/developers	
How satisfied are you with the level of engagement on the developments outlined in the Product Roadmap for Response and Reserve?	7	3.4/5

Event: Power Response Summer Reception

Topic: Frequency Response and Reserve Roadmap

Date: 26th June 2018

Number of attendees: 221

Overview: Provide latest updates relevant to demand side flexibility stakeholders, promote debate and provide delegates with access to subject matter experts from across the industry.

	# responses	Average Score
How satisfied are you with the scale and speed of National Grid SO's work to improve all balancing services and markets?	15	6.7/10
How satisfied are you with the level of engagement on the developments outlined in the Product Roadmap for Response and Reserve?	15	6.8/10

Comments:

- Good engagement with industry players but reaching out more to non-industry participants may be useful.
- Good engagement given regulations and monopoly position - there is only so much consulting you can do before taking decisions.
- NG is moving too slow. Appreciate it's a complicated piece of work to redesign the whole suite

of products however it's been going on for over 4 years now. The problem is there is no engagement at ground level - Grid is working behind the scenes and then publishing to the market ideas that then need further thinking which could have been done from the start had they consulted with stakeholders from day 1. Work groups for each service is needed and on a monthly basis to derive sensible design and testing.

- Could be quicker
- Nat Grids staff do excellent work in liaising with the industry, and showing their excellent knowledge.
- Partly lack of regular engagement on my part, but also lack of understanding because much of the material published is too opaque and difficult for non-experts to easily understand.
- There are many more stakeholders that weren't there.
- Its progress, but no certainty of DSR revenue. Very hard to make a business plan as no factual guarantees. The volatility of the solar tariff cost our company £millions in lost investment. We dare not spend the required investment without guarantee of a known revenue / return on the investment.
- Good communication with the documents. The simplification document only made us ask more questions! Getting the balance right to communicate with a wide range of stakeholders can be difficult. But as an end user of DSF we want to feel engaged and valued to provide this service.

Faster acting frequency response webinar

In April, we hosted a webinar to share our initial design for a faster acting frequency response product suite with a broad audience. We surveyed the 350 participants who dialled in to understand their views. Of the 65 who responded to the survey, 60%-70% agreed or strongly agreed with our approach to using staggered and static wide deadband dynamic products (25%-16% were neutral, respectively).

Faster acting frequency response technical workshops

We then held three small but well attended (30 attendees in total) technical workshops to engage with interested parties at a working level. These workshops provided a detailed challenge and review on our proposals for fast acting frequency response, the feedback from which we are using to support the design work. The detailed discussions between the parties on service design elements and reasoning were well received.

Event: **Faster acting frequency response workshop**

Topic: Faster acting frequency response

Date: May 2018

Number of attendees: 30 across three workshops

Overview: technical workshops to discuss our proposals in more detail, explore the reasons behind some of the design decisions we have made and understand providers' views first hand

	# responses	Average Score
How did you find information presented and discussed at the workshop?	11	8/10

Comments

- Availability of key National Grid personnel and willingness to engage in discussion around reasons for new services (Scored 9/10)
- Further details on SoC [state of charge] management would be great (Scored 8/10)
- Really useful to see and hear the description of how balancing and frequency response are applied. And good to have the most recent view on the description of the new services. (Scored 8/10)
- Provided some insight into the potential new ancillary services being considered (Scored 8/10)
- Transparent approach to NG thinking set out (presenter provided very good background to decision making) (Scored 8/10)
- Very useful to find out the reasons for some decisions and also get a chance to view the SOC mgmt doc before it was published (Scored 7/10)
- There was a lot of well presented information but in certain areas it assumed a level of understanding that I didn't possess. (Scored 7/10)
- New item at the workshop was the presentation of feedback from the stakeholder review. I was told our comments were dismissed as not relevant without sufficient explanation. (Scored 5/10)
- It really helped to understand the reasoning behind the suggested product design as a result of knowing more about real life system requirements. (Scored 10/10)

How did you find information presented and discussed at the workshop?	11	8/10

Comments

- Good to have a relatively small group that encouraged participation from all (Scored 9/10)
- Good, got lots of different people talking with different perspectives (Scored 7/10)
- Good to have a mediator to facilitate discussion (Scored 9/10)
- A good balance between background information followed by discussion. The facilitator did a reasonable job but probably wasn't required given the level of engagement and organisation of other NG representatives. (Scored 8/10)
- Larger groups tend to be 'hogged' by a few more outspoken individuals (Scored 10/10)

From the feedback received, it is clear stakeholders feel that smaller, more focused technical workshops are a valuable engagement approach through which to share their views with us and shape our work. As a result, we will hold similar technical workshops to seek views on our approach to reforming our reserve services.

Outline Change Proposal (OCP) consultation to simplify contracts

Through our OCP process we have consulted on simplified contract terms for Firm Frequency Response (FFR), Short Term Operating Reserve (STOR) and Fast Reserve to make these more accessible for all providers.

The modified STOR OCP closed on the 30th August, to which there was only 1 response from industry. There were 8 responses to the original STOR OCP which were all largely supportive of the proposed changes. We will continue to engage as we develop the proposals for the Detail Change Proposal (DCP) which is next stage of the change process.

Auction trial webinar

On 27th September, we shared a summary of the auction design with our stakeholders and sought views on progress through a webinar with 179 participants (some of whom dialled in as a group of colleagues).

Event: Frequency Response Auction Trial Webinar

Topic: Frequency Response Auction Trial

Date: 27th September 2018

Number of attendees: 179

Overview: Webinar to share latest proposals for the action design and seek stakeholders' input

	# responses	Average Score
How useful was the content of this webinar?	11	4.2/5

Comments:

- Clear description on why this is being pursued and how it will be implemented. (Scored 5/5)
- Understanding is key to evaluate (Scored 5/5)
- Lots of useful content but went through too quickly at times. The diagrams are helpful - potentially more of them? (Scored 4/5)
- Gave a very clear introduction into how the auction will work (Scored 4/5)
- information clearly presented, managed our expectations. (Scored 4/5)
- No questions/answer session (Scored 3/5)

How satisfied are you that these changes will address current barriers to entry and facilitate access to this service?	11	3.4/5

Comments:

- Coming from a DSR perspective these changes will help what currently is the biggest barrier to entry which is availability forecasting a long way out combined with the need for flat firm availability delivery. Going further with tendering to the half hour level a day out will be the ultimate enabler and will mirror products like FCDM which facilitate DSR and other newer technologies very well. (Scored 4/5)
- Unclear yet, will depend on how trial works (Scored 3/5)
- More information required for longer term procurement contracts. week ahead / day ahead is interesting but not possible for project finance. (Scored 3/5)
- For wind and solar to actively participate day-ahead auctions are needed - 2years + seems a long time to wait for this (Scored 2/5)
- Unclear yet how renewables will perform in the auction (Scored 2/5)

How satisfied are you with the **scale** of the ESO's work to improve all our balancing services and markets?	11	3.7/5

Comments:

- There are lots of improvements happening, though with so many roadmaps it hard to link them together. Could you create a better directory or roadmap of roadmaps?! (Scored 4/5)
- A lot of services, from the implementation to the testing and procurement and contacting fit very well for conventional generation but make integration for newer technologies very time consuming and cost prohibitive. The ESO has taken positive steps to solve these issues and the hope this work will continue at as fast a pace as is possible. While doing so, it is important

to fully communicate the changes and to ensure there are clear paths to providing new services, ideally running services in parallel while transitions are made. (Scored 3/5) • Greater certainty required over the future participation of onshore wind t assist the business model for fully merchant, subsidy free operation (Scored 2/5) • Important delays, uncertain volume (Scored 2/5)		
How satisfied are you with the **speed** of the ESO's work to improve all our balancing services and markets?	11	2.5/5

Comments:

- Things can always be done faster but we recognise that it is important time is taken to ensure a new product/service is implemented correctly. Engagement and communication are very important so providers consumers can also be kept up to date with accurate information. (Scored 3/5)
- Would like to see more work on day-ahead before end of two year trial. Auction go-live has moved from Dec to "end of next year". Is there a more specific date or timeline? (Scored 2/5)
- Important delays, causing lost in trust and increase uncertainty for project developers /asset owners (Scored 1/5)
- Progress across all areas always seems to be delayed well beyond initial timescales. Please either deal with the reason for the delay (if it is an issue under the ESO's control) or be more realistic with the initial timelines! (Scored 1/5)
- Onshore wind requires certainty now to assist the subsidy free business model (Scored 1/5)

Testing guidance consultation

We are reviewing our policy for testing and performance monitoring of balancing services. As part of this, we published the testing guidance document for consultation on 7th August, and included some changes to address providers' concerns.

We received 12 responses to the consultation consisting of the following themes:

- Proposals for testing of aggregated assets
- Requests for further clarity on how test results are assessed
- Making testing more consistent with Grid Code/BM units

We are working through this feedback and will share outcomes and next steps in November.

Wind Advisory Group

On 20th September, we hosted the first Wind Advisory Group meeting to understand more about the issues with intermittent generation providing balancing services. We set the group up with RenewableUK in response to several requests from the wind industry. The group plans to meet every three months with meeting material and summaries published by RenewableUK.

Channel	Unstructured feedback on Wind Advisory Group
Date	20th August 2018

Comments:

- Excellent meeting run by National Grid ESO and Renewable UK
- National Grid is producing so many reports. They are useful but it difficult to find the information you need. This may be helped with a directory or Roadmap of the Roadmaps!
- The new website is really good and has gone a long way in helping make information easier to find
- The 6month Operability Report sounds positive and will make the SOF more meaningful

Media coverage

The frequency response weekly auction trial has been covered in industry media through a number of factual articles, which highlight a positive response to the closer to real-time procurement from demand side aggregator Open Energi.

> **National Grid to trial same day frequency response auction**
>
> The Energyst, 07/09/2018
>
> National Grid is to trial same day frequency response procurement from June 2019. The two year trial is "for a small volume of frequency response" but will enable less predictable technologies, such as wind, to participate, and give those with demand-side response a clearer picture of what may be required of them and when – as the first delivery window will be 23:00 hours the same day. National Grid said the auction will be held every Friday morning with results published by early afternoon. It will procure high frequency dynamic response, low frequency dynamic response, high frequency static response, and low frequency static response.
> https://theenergyst.com/national-grid-trial-day-ffr-auction/

Commenting on this article, Open Energi state:

> *Real-time procurement of frequency response will help to increase participation of clean, low-cost flexibility from distributed energy resources and is a vital step towards creating a level playing field for these services to compete with large generation – who currently hold sole access to real-time balancing markets. We look forward to working with National Grid to help bring these measures into successful commercial operation as early as possible.*

> **National Grid readies for same day frequency response auctions from June 2019**
> *Current News (Web), 10/09/2018*
> National Grid is to trial same day procurement of frequency response in order to ensure 'less forecastable' technologies such as demand side response (DSR) can take part. In a briefing note sent to industry late last month, acting head of business development Colm Murphy explained that the transmission system operator would hold the auctions every Friday morning from June 2019, with results published by early afternoon.
> https://www.current-news.co.uk/news/national-grid-readies-for-same-day-frequency-response-auctions-from-june-2019

> **National Grid to trial weekly frequency response auctions**
>
> Utility Week, 11/09/2018
>
> https://utilityweek.co.uk/national-grid-to-trial-weekly-frequency-response-auctions/

Restoration and Reactive Power product roadmaps

Engagement forums

Details of the Restoration and Reactive Power product roadmaps were presented to attendees at the Power Responsive Summer Reception on 26th June and at the Electricity Operational Forum on 4th July.

Event: Electricity Operational Forum

Topic: Product Roadmaps and reform of balancing

Date: 4th July 2018

Number of attendees: 91

Overview: This is an open forum with electricity customers and stakeholders to discuss topics related to the operation and performance of system balancing and capacity.

	# responses	Average Score
How satisfied are you that the changes outlined in the Product Roadmaps will address current barriers to entry and facilitate access to services?	8	7.4/10
How satisfied are you with the level of engagement on the developments outlined in the Product Roadmaps?	8	7.1/10
How satisfied are you with the pace and scope of the SO's work to improve all of our balancing services markets?	8	6.3/10

Please provide any additional feedback

- We see opportunities to deploy but the system services market does not fully allow these opportunities to be realised. Though heading in the right direction.
- It would be good to prepare a case study on the solutions that the Irish system operator to the reactive power challenge
- Clear and very informative

Interconnectors and remote end Transmission System Operator (TSO) workshop

Through our workshop on 2nd July, 11 representatives from current interconnectors, future interconnectors and remote end TSOs received updates on restoration roadmap to signpost the future of the service and encourage them to think about how they could contribute to this market-based solution. One of the parties involved has progressed an application to provide black start and is on track to do so.

Wider access to the Balancing Mechanism roadmap

On 9th August, we published our Wider Access to the BM roadmap. The purpose of this was to provide clarity on the current routes to entering the BM and our plans to facilitate wider access to all parties by 2020 through GB's participation in Project TERRE (Trans-European Replacement Reserves Exchange).

Wider Access to the BM roadmap webinar

Following the launch of the roadmap we held an introductory webinar to over 125 attendees. During this webinar, we sought feedback via a poll.

Event: Webinar on Wider Access to the BM Roadmap		
Topic: Wider Access to the BM Roadmap		
Date: 23rd August 2018		
Number of attendees: 125		
Overview: Webinar to provide clarify on the current routes to entering the BM and our plans to facilitate wider access to all parties by 2020 through GB's participation in Project TERRE (Trans-European Replacement Reserves Exchange).		
	# responses	Average Score
How satisfied are you with the pace of delivery of the developments outlined in the Wider BM Access Roadmap?	41-44	3.5/5
Comments: • seems a lot of work to do in the time available • yes very clear		
How satisfied are you that the changes outlined in the Wider BM Access Roadmap will address current barriers to entry and facilitate access to these services?	41-44	3.5/5
Comments: • Confusion about VLPs and balancing position • Needs to be a level playing field with existing players so can't be too easy • Not sure - quite a few things are subject to finding solutions		
The content of the Roadmap is clear and understandable?	41-44	3.6/5
Comments: • More details and practical steps to enable/enter BM would be appreciated • Give more acknowledgement to the support you are getting from ELEXON in future • Content clear but how it will be delivered much less clear		
How satisfied are you with the level of engagement on the developments outlined in the Wider BM Access Roadmap?	41-44	3.5/5
Comments: • Pleased to have these webinars		

IS Change Forum

We also attended the IS (Information Systems) Change Forum on 4th July to seek views on the changes to IT required to enable wider access to the BM. Following the launch of the roadmap our stakeholders told us they'd like us to build on this by providing further information on the Supplier route, IT changes and Virtual Lead Parties. We are developing material on these topics as a result.

Additional engagement for early access to the BM

In addition to publishing the Wider Access to the BM roadmap, we have worked closely with members of the industry to facilitate early access ahead of TERRE through, improving existing routes to market by bringing forward some of these operational changes. This has involved improving an existing route to the BM for Suppliers wishing to create aggregated BM Units (BMUs)

in the interim period. The first example of this was demand side aggregator Limejump, who entered the Balancing Mechanism in August as the first Virtual Power Plant.

Limejump have responded very positively to the facilitation of their early access to the BM.

Channel	Email received from Limejump
Date	15th August 2018
Comment	Just a quick email to say thank you for the hard work over the last year working through all the ups and downs in getting us live into the BM - along with all the other areas around FFR etc. We have really been impressed with the pace that you have been able to work to help support us through this. This is truly a great example of innovative collaboration in a dynamic and changing energy landscape! This is great for competition within the BM and is another step towards a sustainable energy future.

Media coverage

The roadmap publication and Limejump's early entry to the BM have generated media interest, with factual articles published by several industry press organisations:

National Grid outlines roadmap to bring all flex providers into Balancing Mechanism
The Energyst (Web), 10/08/2018
National Grid has published a roadmap to enable all those with flexibility to sell it into the Balancing Mechanism, a key tool in balancing supply and demand close to real time. Participants in the Balancing Mechanism (BM) offer flexibility by altering generation and/or consumption of their assets, or those that they manage on behalf of other parties. The bid in flexibility to half hour settlement periods and National Grid pays for what it needs to keep the system balanced.
https://theenergyst.com/national-grid-outlines-timetable-bring-flex-providers-balancing-mechanism/

"Important milestone": Limejump"s takes first aggregated unit into Balancing Mechanism using Virtual Power Plant
Current News (Web), 13/08/2018
On Friday National Grid outlined its vision for the future of the BM, which held a particular focus on widening access to the BM for smaller flexibility providers. While this included allowing BMUs as small as 1MW to enter, developing new routes to market for aggregators without a supplier licence were also proposed for as early as April 2019.
https://www.current-news.co.uk/news/important-milestone-limejump-takes-first-aggregated-unit-into-balancing-mechanism

Limejump enters virtual power plant into balancing market
New Power (Web), 13/08/2018
Previously, the BM has largely been the domain of large power plants and specific distributed single large sites that have a generation licence. National Grid's drive for wider access to the Balancing Mechanism has allowed Limejump to enable smaller generators, such as wind, solar, batteries and industrial electricity users, to directly compete in this £1 billion a year market.
Article | Link

Limejump makes UK grid leap
ReNews (Web), 13/08/2018
Live aggregated balancing mechanism unit to offer access for renewables and storage.

Energy storage developer Limejump has entered the first aggregated unit to go live on to National Grid's balancing mechanism (BM) in the UK. National Grid published earlier this month a roadmap to widen access to the BM to all technologies and providers ahead of a new pan-European reserve market, the Trans European Replacement Reserves Exchange, due to go live in December 2019.
http://renews.biz/112116/limejump-makes-uk-grid-leap/

Limejump now trading flex in Balancing Mechanism
The Energyst (Web), 13/08/2018
The BM is a key tool used by National Grid in balancing supply and demand in real time. It is a deeper market to contracted ancillary services, that are usually awarded weeks ahead of time for set services and durations. Currently it is largely the preserve of licenced energy suppliers and transmission connected generation.
https://theenergyst.com/limejump-now-trading-flex-balancing-market/

Limejump''s entry into the UK balancing market increases competition with major power plants
Renewable Energy Magazine (Web), 13/08/2018
For the first time,renewable and distributed energy generators in the UK can compete with the Big 6 and other large power plants in the National Grid Balancing Mechanism thanks to energy technology innovator Limejump. The company's Virtual Power Plant (VPP) has now gone live on the Balancing Mechanism Market, the first aggregated unit to do so, having received dispensation from OFGEM.
https://www.renewableenergymagazine.com/panorama/limejump-s-entry-into-the-uk-balancing-20180813

New provider onboarding

Providers interviews

Throughout June and July, we carried out 10 interviews across a range of our providers to better understand their needs in becoming a provider of Ancillary Services, way to improve once providers are delivering services and help National Grid to become a better buyer.

Through the provider experience design process, we have brought to life the voice of our providers, engaging with both new and existing providers to get their feedback and identify where we can improve. The insights from these conversations have been used to characterise the different provider's needs and are highlighted below:

Channel	New providers onboarding interviews with 10 providers
Date	June-July 2018
Themes	
Pace and dynamism	There's often a tension between the dynamism of the market and the innovation providers must carry out, with the appetite and ability of National Grid to move at pace.
Power imbalance	Smaller providers feel extremely vulnerable. This is due to market volatility risks and what they see as last minute changes in what National Grid wants, as well as a distinct power imbalance.
Horizon scanning	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 grid needs in the future and when, for example, new IT goes live.
Time	Newer providers struggle with workload and capacity as they often work

constraints	extremely hard to secure funds, a contract etc. leaving them little time to build and set up.
High effort	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.
Reactive, not proactive	Too much time is spent reacting to issues and dealing with system faults rather than proactively creating future opportunities.
Individual relationships	Account management is generally seen to be really good. Providers rely heavily on account managers and notice the effects of high staff turnover.
In transparency, we trust	There is a thirst for transparency. Providers want to understand the decision-making processes behind the scenes, for example, across payments and dispatch.

Power Responsive programme

Power Responsive is our programme of work to promote participation in demand side flexibility, that is industrial and commercial load response, small-scale generation and storage. Through a variety of engagement channels – across our own and others' events – Power Responsive provides a platform for non-traditional stakeholders to stay informed and provide their views on industry change. The programme extends beyond a channel to communicate other principle 3 deliverables.

In our Forward Plan we set out our intention to grow the Power Responsive programme. Over the timeframe of the Forward Plan we are growing the programme in two ways:

1. Broadening our engagement to target 'harder to reach' stakeholder groups

This is in response to feedback from our Power Responsive Steering Group members that, whilst Power Responsive has become a well-known name and the programme has an engaged core stakeholder base, there are still groups of large energy users who remain unaware of or less engaged in demand side opportunities.

2. Evolving the scope to incorporate emerging forms of demand side flexibility

This is in recognition of and to better understand the potential flexibility that could be delivered from domestic electricity users and electric vehicle charging.

Power Responsive Summer Reception 2018

We hosted our fourth annual Power Responsive conference – the Power Responsive Summer Reception – on 26 June 2018. From 80 delegates at the first annual Power Responsive event in 2015, 350 delegates registered to attend this year, for the second year in a row. The discussion and outputs from the event are informing the activities for the current year of Power Responsive. During the event, we also celebrated Demand Side Flexibility Success Stories; six projects that have demonstrated benefits for demand side flexibility and showcased collaboration within the industry.

Through the Power Responsive Summer Reception our stakeholders told us that there is a need to make 'whole electricity system' opportunities accessible for those parties who don't see the distinction between transmission and distribution networks and services. During the Power Responsive Summer Reception, facilitating whole system outcomes was recognised as a priority area under the next regulatory framework and the audience were encouraged to engage on work in this area to help shape future approaches.

It was also acknowledged that, while different markets and services are at different stages of maturity, network operators can improve confidence for parties looking to deliver flexibility services by providing an early view of what these services may look like.

To address this challenge, we're working more closely with DNOs to present a coherent picture of market opportunities to our stakeholders through our regular mailing list updates and events. For example, at the Power Responsive Summer Reception UKPN and WPD exhibited on their flexibility procurement, and at our Local Authorities workshop, WPD presented and exhibited on their Flexible Power brand and DSR requirements.

In response to the Power Responsive Summer Reception, we received feedback from two DNO representatives to say they took great value from attending the event, and had some great conversations, including with those they aren't always able to reach.

Event: Power Responsive Summer Reception 2018

Topic: Demand Side Flexibility

Date: 26th June 2018

Number of attendees: 221

Overview: Provide latest updates relevant to demand side flexibility stakeholders, promote debate and provide delegates with access to subject matter experts from across the industry

How would you rate your knowledge on the following topics PRIOR to and AFTER the event?	# responses	Average score – before	Average score – after
BEIS and Ofgem actions	15	6.3	7
ESO Forward Plan	15	5.6	7.3
ESO Product Roadmaps	15	6.2	7.3
Whole Electricity System Approaches to flexibility	15	6.6	7.3
Network Charging	15	5.3	6.3
Wider Access to the Balancing Mechanism	15	5.6	6.9
Please provide us with any comments and feedback from the day and/or the suitability of the Power Responsive Flexibility Forum.	9		

Comments

- Another excellent and informative power responsive seminar at a great location where people were able to get up to speed with the pace of change and network with many different stakeholders.
- There is a need for this event to engage with DERs and aggregators.
- This is an important forum in promoting flexibility and DSR. In addition to BEIS, Ofgem and ESO, it will be good to have other speakers from the aggregators, start-ups, as well as technology providers sharing the main platform too. I'm afraid the BEIS and particularly the Ofgem speaker and presentation sounds the same every year at this event.
- I'm relatively new to power responsive topics and feel unable to comment.
- Excellent discussions; excellent venue; excellent opportunity to network. Thank you very much
- Thought having the later start and evening drinks worked really well. Having time to chat and network was very useful and was the most beneficial part of the day. Sometimes helps knowing who else is attending (not necessarily names of individuals) but the companies. Good venue and communication before the event. Good to hear the Power Responsive

campaign is continuing too!

- I felt that the information was too high level to be of any value -there was insufficient detail to justify debate and any new knowledge just muddied the waters. Sorry!
- was a very well organised and informative conference.
- It's useful

Power Responsive stakeholder mailing list

It's important to us that our stakeholders are kept up to date on relevant industry changes and emerging opportunities, so we utilise our mailing list, of over 2200 members from over 1200 organisations, to share the latest information, for example, on our reform of balancing services, DNO and supplier flexibility services, consultations and report. Between 1st April and 30th September, we sent 14 email communications to our members – equating to 22354 emails in total – with a 37% open rate. The benchmark open rate for 'non-labelled accounts' on the marketing platform used is 21.1% (source: https://mailchimp.com/resources/email-marketing-benchmarks/).

Power Responsive Local Authorities workshop

To broaden our reach to audiences who may have limited experience with demand side flexibility and who would benefit from more targeted engagement, we hosted a Power Responsive workshop for Local Authorities on 26th September, which delivered an overview of routes to market for demand side flexibility and real-life case studies. The workshop concluded with a discussion to identify current barriers facing Local Authorities trying to unlock demand side flexibility, which ranged from operational challenges to strategic and institutional barriers.

The event was attended by over 40 delegates from 11 councils, and we were joined by external speakers and exhibitors to from demand side aggregators, suppliers, a DNO and other parties.

We asked attendees to tell us how satisfied they were with the event and to rate their knowledge before and after the workshop. There was a very high level of satisfaction (8.7/10) with the event, and knowledge has increased significantly. The scores, detailed below, demonstrate the value of targeted engagement – when we strive to engage new stakeholder groups, it is vital to tailor the material and speakers to the needs and experiences of the audience.

Event: Power Responsive Local Authorities workshop

Topic: Demand Side Flexibility

Date: 26th September 2018

Number of attendees: 47

Overview: Targeted workshop to raise awareness of flexibility opportunity and identify barriers to entry

	# responses	Average score – before	Average score – after
How satisfied are you with today's workshop?	18	NA	8.7/10
How would you rate your knowledge on the following topics PRIOR to and AFTER the event?			
Demand side flexibility and the benefits	17-18	5/10	7/10
Markets available to you as a demand side flexibility provider	17	4.4/10	7/10

The different routes to market available e.g. through an aggregator or supplier	17	4.8/10	6.9/10
The practicalities of offering demand side flexibility	17-18	4.5/10	6.6/10
Local authority assets that may be suitable for offering flexibility	17-18	4.6/10	6.2/10

Through the round table discussions at the Local Authorities workshop we identified the following themes as barriers to entry:

- Energy must compete with priorities/pressures to gain senior level buy-in and thus it can be difficult to gain traction
- Assessing assets and understanding what could deliver flexible electricity consumption – it is either challenging to find an answer or it is perceived incorrectly that assets can't deliver flexibility
- It is difficult to visualise the benefits and there is no guarantee of revenue

Summary of feedback and actions taken in response to feedback

Engaging with stakeholders on the range of principle 3 deliverables and through a variety of channels has provided some valuable insights into how well our stakeholders believe we're delivering our commitments, how our stakeholders want us to communicate change and effective communication methods. Stakeholder feedback has also been vital to strengthening our understanding of barriers to entry for different markets and stakeholder groups.

The following themes have emerged:

Summary of feedback and actions taken in response to feedback

You said	Our response
Speed of delivery: Whilst providers are generally satisfied with the scale of the changes we are proposing and delivering, we have received feedback from some stakeholders around the pace of change and that they would like to see us implement changes more quickly.	We recognise the need to work at pace to ensure periods of uncertainty are minimised for our stakeholders, yet we need to be careful to strike the right balance with feedback that non-experts can find some topics difficult to understand and they want to feel engaged in the process. Regardless of stakeholders' stance on either end of the spectrum, regular and clear communication is key.
The need to signpost changes: Stakeholders told us that we need to provide a better forward view of all the changes that are coming into the balancing markets.	In response to this and the feedback from the Electricity Operational Forum, since May we have been publishing a monthly newsletter to provide updates via the Future of Balancing Services webpages to increase transparency and provide timely progress updates.
Effective engagement methods: From the feedback we have received following a number of engagement activities, it is clear that stakeholders value a range of engagement methods. We have learnt that webinars (to communicate changes on wider access to the BM, faster frequency response and the frequency response auction trial) are an	We will continue to utilise these routes of engaging for principle 3, as well as exploring additional methods of communicating with our stakeholders, and we welcome views on this.

effective and accessible way to share new material with a large audience. We have also learnt that small, targeted workshops (such as those with Local Authorities and the technical workshop on faster acting frequency response) enable us to tailor the content to the audience so they receive maximum value from attending and we are able to seek insightful inputs to shape particular deliverables.	
New provider onboarding (Metric 7): Through the provider interviews we conducted we learnt that we can become a better buyer of services through addressing not only the new provider onboarding process, but designing solutions to overcome pain-points across the end to end provider experience.	This has driven our desire to broaden the focus of Metric 7 to cover the key points across the whole provider journey, as explained further within the Metric 7 section of this document.
Challenges facing our stakeholders: Through our Power Responsive events – Summer Reception, July Steering Group and Local Authorities workshop – our stakeholders have helped us to identify the remaining challenges they face when pursuing routes to markets for our balancing services and other flexibility opportunities. These range from a lack of understanding of the opportunities available to overcoming complex policy and service-related issues. We have also learnt that, with a number of revenue streams under review, uncertainty is a wide-reaching barrier and that, when it comes to the need for a whole electricity system approach, we need to be mindful that our stakeholders don't always see the distinction between transmission and distribution.	These insights will inform how we continue to work with our stakeholders to address barriers to entry, to ultimately create accessible and competitive markets.

Performance Metrics

6 Reform of Balancing Services Markets

Metric Description

We will publish quarterly our progress on reforming balancing service markets. Progress against the plan will be reported, supported by an explanation of the current state of the programme, and, where changes have been made, the rationale for the changes. Where deadlines have been missed or key milestones delivered early we will report the reasons for this.

Our stakeholder engagement approach for the Reform of balancing services markets is outlined in the stakeholder views section of the document above.

Performance

2018/19 deliverables	Detail	Status
Standardise the FFR market	Standardised seasons and four-hourly EFA blocks were introduced for the May tender	●
New simplified contract	The simplified contract was published as part of the FFR OCP consultation in June	●
Publish Restoration Roadmap	The Restoration and Reactive Roadmaps were published in June	●
Publish Reactive Roadmap	The Restoration and Reactive Roadmaps were published in June	●
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	Published 9th August	●
Detailed auction trial publication	Summary published 31st Aug, webinar held on 27th September and published online with Q&A	●
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	Simplified contract terms have been published in the STOR and Fast Reserve OCPs in July and September; details of standardisation of Fast Reserve is included in the September OCP. Standardisation of STOR will be superseded by wider reform of reserve	●

	services which is coming early 2019	
Publish and consult industry on exclusivity clauses to improve the ability to stack products	Published consultation on the 28th September	●
Publish new testing and compliance/performance monitoring policy for response and reserve providers	Published on the 30th September	●

Figure 8 - metric 6 Reform of Balancing Services Markets Performance

Supporting information

One of the commitments in the Product Roadmap for Frequency Response and Reserve and was to simplify and standardise our existing tendered markets (FFR, STOR and Fast Reserve), prior to a more fundamental review. The FFR market standardisation was implemented in May, with the introduction of EFA blocks, seasons, and splitting long- and short-term procurement. The market standardisation of Fast Reserve was consulted on in September, and we are in the process of reviewing the feedback and drafting the final proposals for implementation early next year. We have carefully considered how the STOR market may be standardised, taking account of provider feedback, and have concluded that it is not in the best interests of the industry or consumers to attempt to standardise this market. Any changes to the STOR market to increase standardisation (such as moving to EFA block procurement, or setting specific speed and ramping requirements) would not be seen until 2020 at the earliest, as existing contracted volumes cover the majority of the requirement until then (remaining requirement is approximately 250MW across 2019). By this time, we expect to be in an advanced stage of reforming our reserve markets to ensure that they are fit for purpose for the future, and integrate holistically with new pan-European standard products being delivered through Project TERRE and Project MARI. Therefore any benefit to the market from standardisation of STOR is likely to be minimal, and may even cause additional costs to providers through unnecessary and short-lived systems and process changes.

7 New Provider On-boarding

Metric Description

Tracking our progress in facilitating new providers offering Balancing Services

Performance

Through the Provider experience design process, we have brought to life the voice of our Providers, engaging with both new and existing Providers to get their feedback and identify where we can improve. The insights from these conversations have been used to characterise the different Provider's needs. It is not until we put ourselves in the Providers' shoes and walked through their experience did we truly understand what matters most and how to improve their experience.

Before focusing in and designing solutions we looked at the end to end Provider experience and identified opportunities to better service Providers across the entire journey. This has driven our desire to broaden the focus of Metric 7 from not only the on-boarding stage of the experience but across the key points that cover the whole of the journey.

All new Providers go through the on-boarding process but at any point in time the proportion at this stage can be low compared to the rest of the journey. We have increased our ambition beyond on-boarding to enable us to make improvements of real value to both our new and existing Providers, the ESO and ultimately end consumers.

To realise the end to end value we are developing an approach to capture feedback across the journey around the four key moments that matter to new and existing Providers, including:

research phase, tendering, contract and query management. The increased ambition means that there is further work to do to enable data capture and measures at these four points.

Image 1: The Provider Experience and points of measurement.

We have developed the questions and mocked up a visual output for the feedback we will obtain on the Research phase, for implementation next month, an example can be found below. We will collect feedback between September and November and will use this data to set our baseline and appropriate targets for the rest of the year.

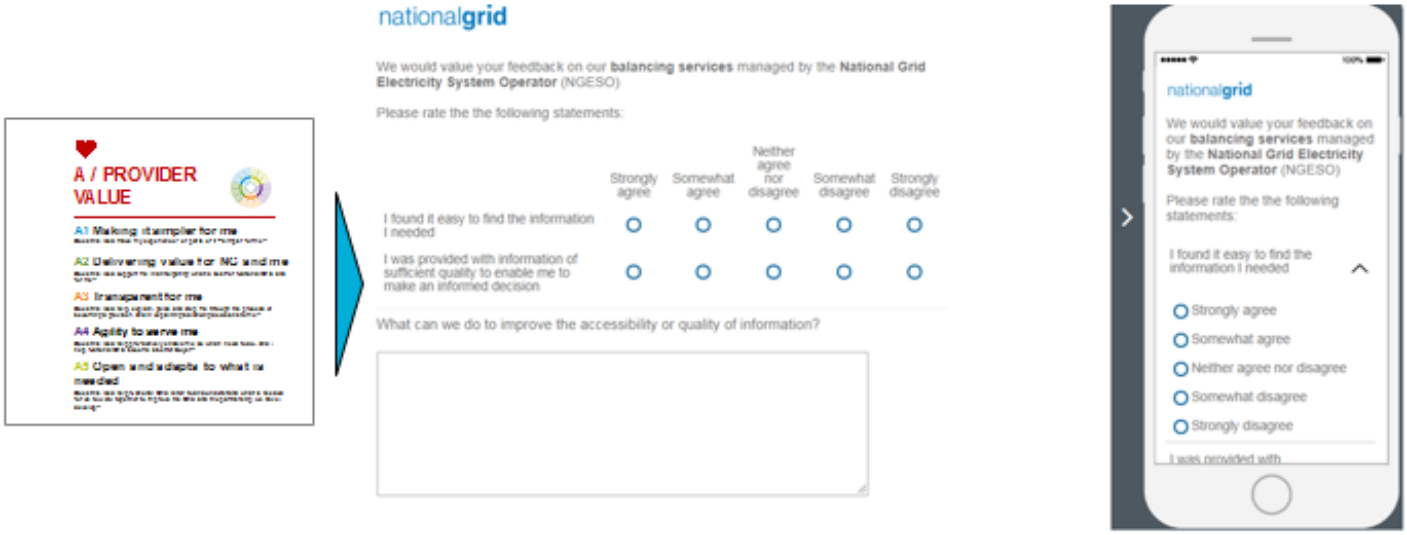


Image 2: Example of the questions and formatting Providers will receive at the Research phase.

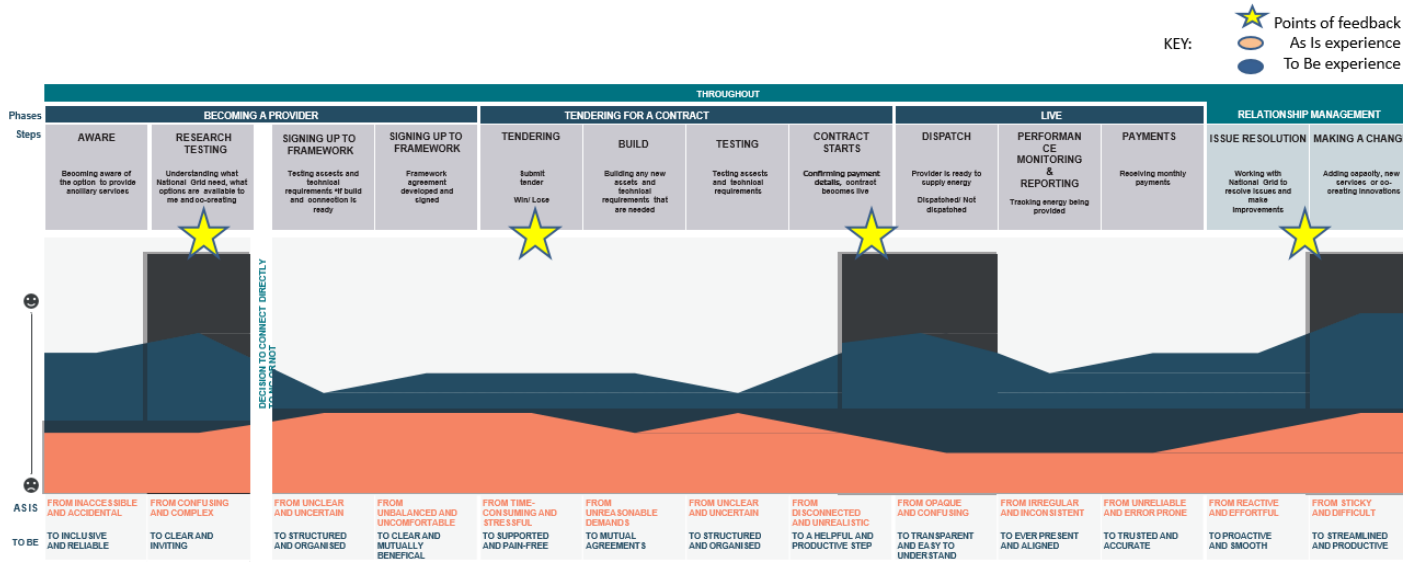
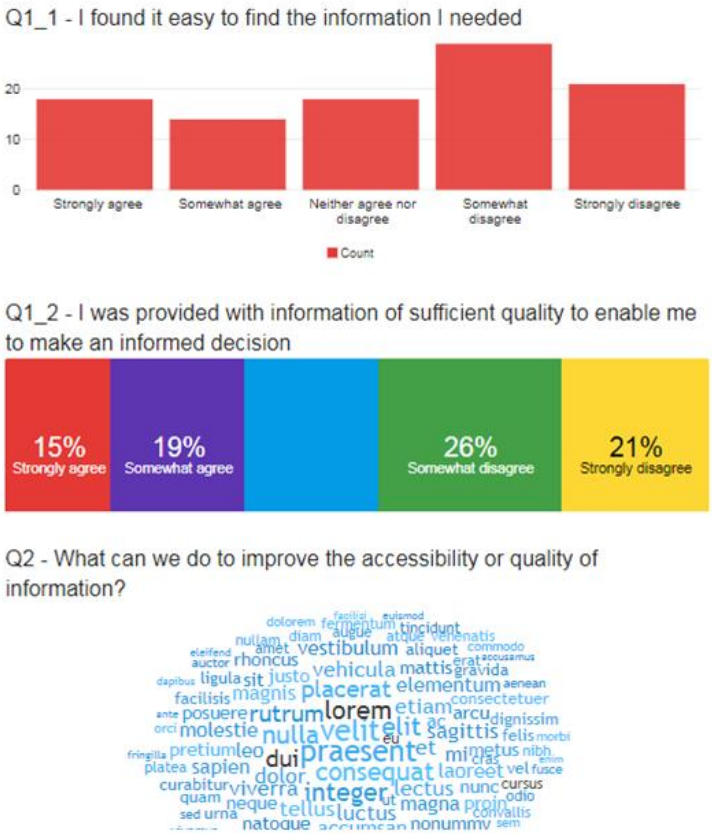


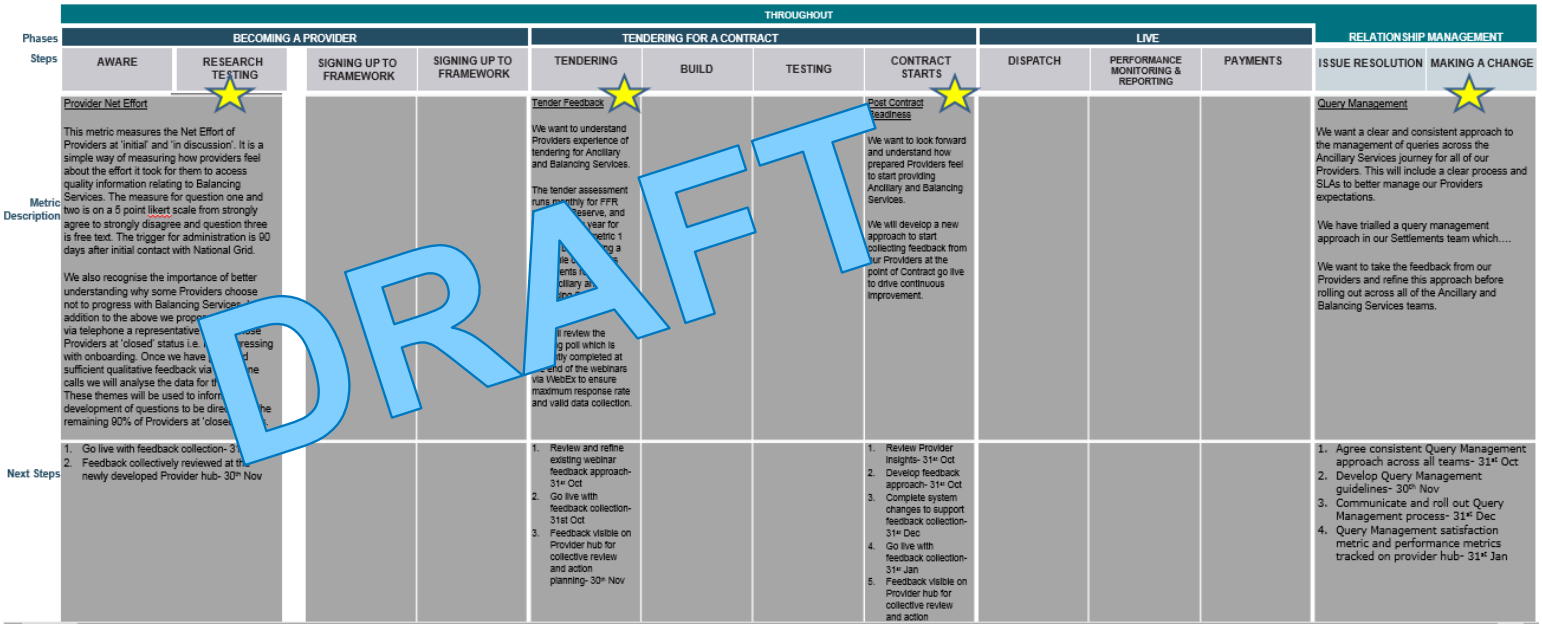
Image 3: Example of the Research phase metric (for illustrative purposes only and includes dummy data).



We recognise the importance of better understanding why some new Providers choose not to progress with Balancing Services. In addition to the above we propose to contact via telephone a representative 10% of those Providers at 'closed' status i.e. not progressing with on-boarding. Once we have gathered sufficient qualitative feedback via telephone calls we will analyse the data for themes. These themes will be used to inform the development of questions to be directed to the remaining 90% of Providers at 'closed' status.

To support the construction and delivery of the remaining three measures; Tendering, Contract and Query Management we have developed an action plan.

Image 4: Action plan to deliver Tendering, Contract and Query Management measures.



The outputs of the Provider journey work, feedback and Metric 7 are being further developed into a visual management Provider hub for internal use which will capture, measure and track all work in this area.

The feedback we receive will give us another check-point to understand if the activities identified in the forward plan are having their desired effect, including previous Provider feedback received around simplifying services and removing barriers to entry and if the work in this area is addressing it.

The experiences our Providers have with us and how they feel about us is the sum of many aspects of what we do working together and can't be considered in isolation. Delivering for our Providers requires collaboration and coordination across the business. By measuring the identified key moments, we can understand areas of opportunity across the end to end Provider journey which will enable us to continue to grow the competitive market for Balancing Services, help make the ESO a better buyer and ultimately drive value for the end consumer.

8 Market Diversity

Metric Description

A measure of success of our activities demonstrated through increased liquidity in relevant markets.

Performance

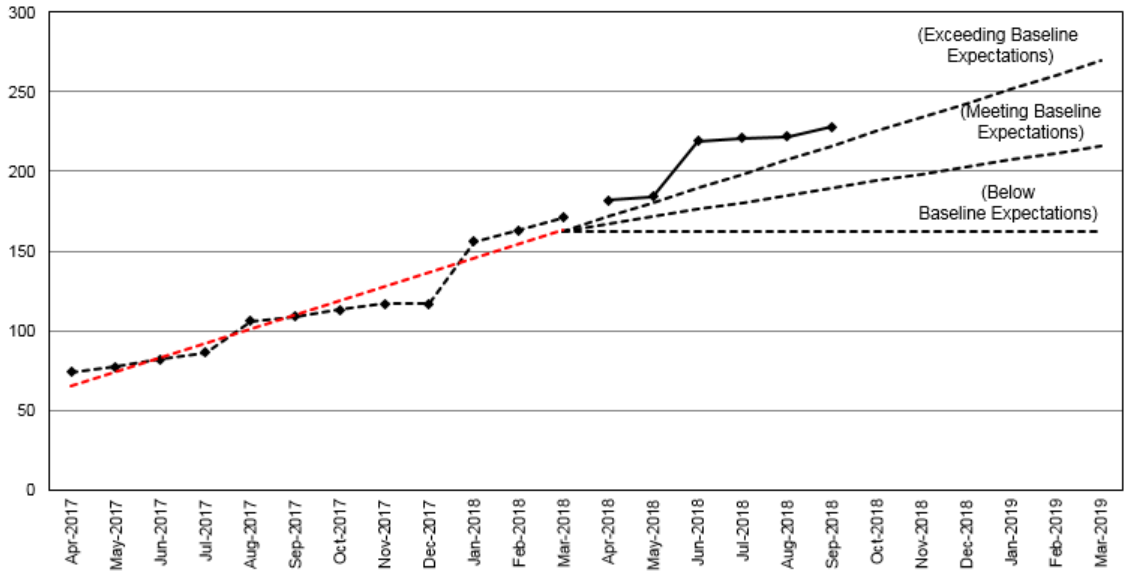


Figure 9 - metric 9 Market Diversity Performance

During the first half of this year there have been a number of new entrants into the markets. This has continued the trend set by new aggregators entering the market during 2017 which caused the historical increases in entrants.

Firm Frequency Response (FFR)

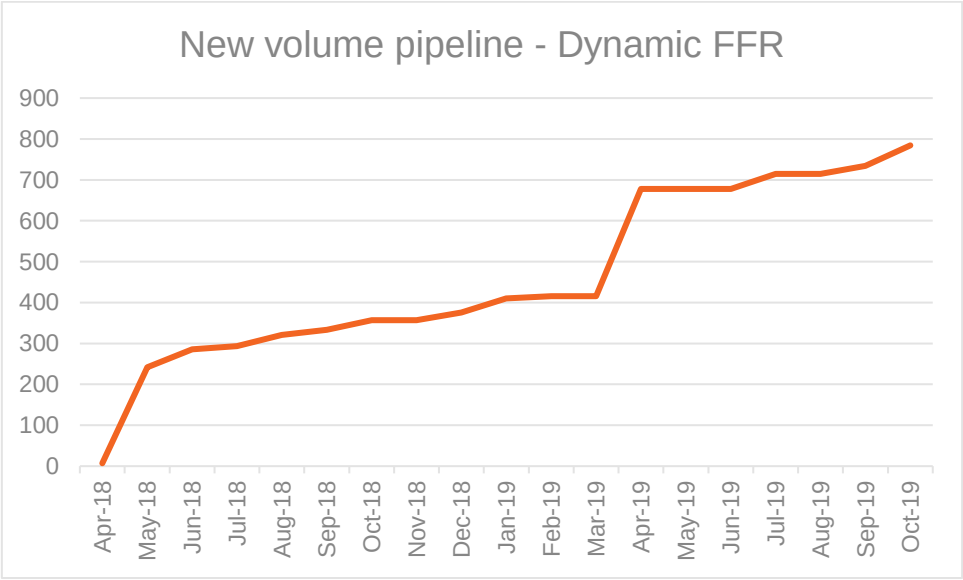


Figure 10 - new volume of dynamic FFR

Since April, Account Managers have facilitated entry of 42 new units into the monthly FFR market and we have implemented the response market simplification and standardisation work streams of the Product Roadmap. In addition to the new units shown in the metric performance chart above, Aggregators and other providers with aggregated FFR portfolios have added significant volume to their existing units over the last 6 months. This provides us with a pipeline of new volume which we expect to enter the market as and when each new unit is ready for delivery, which is defined as the Effective Date in dynamic FFR. Since April 2018, 61 new sites with a combined capacity of

785MW have been added to Framework Agreements. 50 of these are battery storage units. The Effective Dates for these sites provide us with the below trajectory for dynamic FFR market growth to Q3 2019:

In the static FFR market, approx. 215MW from 126 sites has been added to Framework Agreements, with this new volume expected to come into the market following the trajectory shown in the chart below.

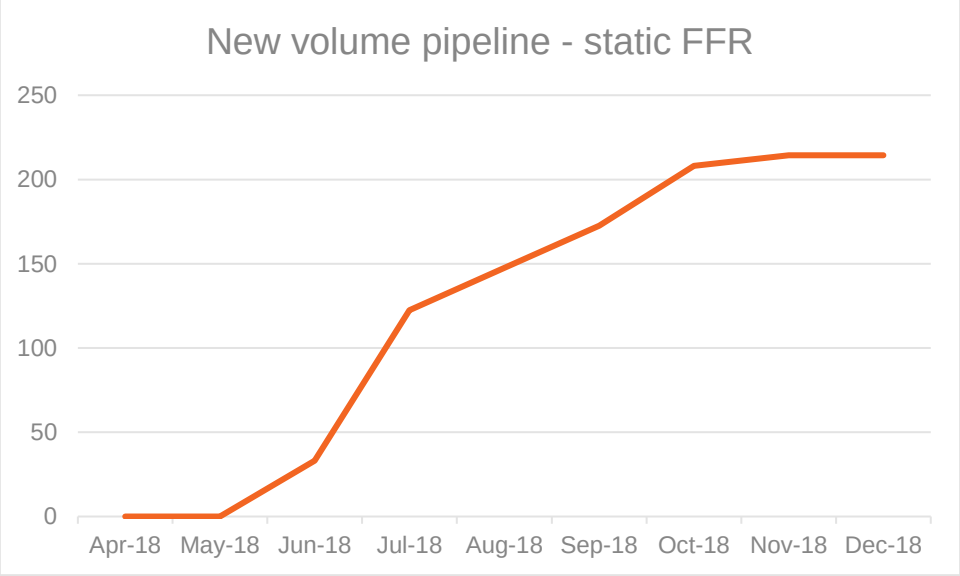


Figure 11 - new volume static FFR

Across the Dynamic and Static FFR markets, almost 1GW of new volume has been added to contracts in the last 6 months, providing us with a healthy pipeline of new FFR volume.

The new FFR market structure aims to simplify the tender rules and make the market easier to interpret. An example of success in this area is that a domestic DSR provider with frequency measurement and metering at an asset level has recently been awarded an FFR contract, and we believe it is the first company of its kind to enter the market. The company was awarded a contract and the testing process has successfully been completed for a small sample of assets with full testing to follow. We are excited about this contract award, as it demonstrates that this market is continuing to open up and diversify in terms of technology and provider type.

FR

Since April, 3 new Non-BM units have entered into the FR market. Of these one is a battery unit that was tested during the period and has now been awarded a contract. This is the first FR contract award for a battery asset which is really exciting as it demonstrates that our efforts to diversify the balancing markets are leading to the introduction of new entrants and technology types. This is great news for market participants, particularly as the Fast Reserve market has historically been perceived as having high barriers to entry given the 50MW minimum entry size.

We have now published the Outline Change Proposal (OCP) for Fast Reserve. This is an opportunity for the industry to feedback on the proposed changes to the service. Part of this OCP is the simplification of the Standard Contract Terms (SCT) as stated in the product road map for frequency response and reserve. This OCP has been created to ensure that the Fast Reserve service continues to attract new entrants and facilitate competition. In doing so, we have taken on board observations from the current Fast Reserve tender process and on industry feedback throughout the year. During the review, we are revising the volumes, methods, and methodologies for the procurement of Fast Reserve along with taking into consideration the new Ancillary Services Dispatch Platform (ASDP) that has recently been deployed opening up the service to providers not in the Balancing Mechanism. It is envisaged that over the coming months, the

industry will see increased transparency in these aspects. In addition, the European Demand Connection Code has introduced several requirements. As these changes arise from a change in law, we have set out the proposed changes in a separate OCP-2B which, for convenience, has been included with the OCP-2A in a single document. The OCP consults on standardising contract lengths which will help potential Providers analysis of the markets and increase transparency. As part of the product simplification roll out the FR tendered service will be moving to EFA blocks, to bring the Fast Reserve market time scales in line with those for FFR. Perhaps the most important element of the OCP is the proposal to reduce the threshold MW size. One of the biggest challenges for new entrants into the FR market is the current entry threshold of 50MW, to continue to meet the objectives of reducing barriers to entry on tendered services the proposal is to reduce this threshold to 25MW for new entrants. Currently the ramp up and ramp down rate requirement for Fast Reserve is 25 MW/ min, will remain the same.

STOR

We continue to work towards standardising products for reserve together with simplifying contracts. During this half year, we have published a STOR OCP which received 8 responses which were all largely supportive of the proposed changes. Latterly we published the modified STOR OCP which closed on the 30th August, to which there was only 1 response from industry. Experience from previous deliverables has taught us the need to signpost change as early as possible to the market to reduce uncertainty and enable ability to invest to meet the future needs of the system in the most efficient and economic way for the end consumer. We will continue to engage as we develop the proposals for the Detail Change Proposal (DCP) which is next stage of the change process

Overall

In terms of attracting new types of providers and diversifying the market, we have had several enquiries and initial meetings with various companies and consortiums that are interested in providing frequency response and reserve capability from Electric Vehicle and Domestic DSR aggregation. The companies have all been assigned Account Managers, who are supporting them through the on-boarding process with a view to setting up Framework Agreements that will allow them to tender in to provide balancing services.

D

Principle 4 Evidence Chapter

Performance in the last six months

Baseline Performance

Managing customer profitability

Since April 2018, we have been working on delivering an Action Plan delivering changes to improve the customer experience, and putting customer at the centre of our network charging processes. We are making improvements to our processes to ensure that we are providing bills on time with expectations, we made our website clearer for stakeholders so they know who pays which charges and why, we refined our TNUoS tariff reports, consulted on our five-year view of TNUoS and are utilising more of our communication routes to make sure the information is more accessible.

We have seen positive feedback on our work to improve the experience for the customer. An example of this is last year a customer wrote to us expressing disappointment at our handing and communication of key charging issues. As a result of our customer journey we have implemented more timely communications and explanation of how and when we will recover revenue for our incentive scheme and improved the transparency of market information. In addition, this customer had a particular concern about modifications to the charging methodology, we met with them bilaterally providing our expertise of the topic to help discussion how their concerns could be addressed. This customer focus to our work resulted in a further letter from this customer in June of this year providing us with positive feedback and direct thanks for our improvements.

Delivering code changes

Since April, in our role as Lead Secretariat we held two Charging Futures Forums, facilitated several webinars providing accessible information covering a number of topics including the targeted charging review, access and forward looking task forces and settlement reform project. As the secretariat of the Charging Delivery Body we continue to hold regular meetings that help members maintain a holistic view of all changes to electricity network charging arrangements. Over the last six months, we saw an increase in how likely an attendee would recommend the webinars to a colleague as well as a significant viewing numbers. By bringing complex issues of charging and access arrangements together within Charging Futures, we are enabling all network users to better engage with industry change processes.

Facilitating code change

Official survey results published by Ofgem about how we compare against other Code Administrators within the industry show positive feedback compared to the previous year. Our latest CACOP (Code Administration code of Practice) survey results have shown a significant increase from last year (2016/17) in overall satisfaction from our customers and stakeholders across CUSC (Connection and Use of System Code), Grid Code & STC (System Operator Transmission Owner Code). We heard feedback that it was difficult for smaller organisations and businesses to understand and engage, so we acted to increase our team size so ensure provide the best support to stakeholders.

As part of our approach to facilitating the quantity of modifications we also for the first time developed a prioritisation process with the respective panels. This process has been taken forward based on stakeholder feedback on the capacity issues that stakeholders have in managing the level of change across the industry. With record level of modifications across our codes we are conscious of the burden that this provides on many of our stakeholders so we have proposed a transparent prioritisation process to provide visibility to industry of what modifications we will be facilitating across different timescales. Whilst some stakeholders argue that we should be driving all modifications forward no matter how many there are, the bulk of our stakeholders valued transparency on our approach and this has helped provide confidence on how they organise their own resources to coordinate their input across multiple modifications.

Capacity Market Modelling

Our baseline obligations were met to deliver to BEIS and the Panel of Technical Experts (PTE) our Electricity Capacity Report by 31 May 2018. This report is crucial to the Secretary of State's decision on how much capacity to secure in CM (Capacity Market) auctions. We made adjustments and improvements to our analysis to address the 2017 feedback from the PTE and delivered a number of workshops with BEIS, Ofgem and the PTE for scrutiny of the modelling approach and assumptions. We worked bilaterally with Electralink (ensuring legal obligations are met) to secure access to data on distributed generation as a critical enabling factor to improving our modelling of distributed generation. This will facilitate the development of derating factors for future CM auctions. Finally, we are developing a method for calculating derating factors for renewable technology utilising an Equivalent Firm Capacity approach. This new process of developing incremental derating factors for wind as opposed to average derating factors as currently used ensures the value of the next MW of wind to connect is correctly valued regarding both its contribution to security of supply and what value it delivers to the consumer

Exceeds baseline performance

Building on our Lead Secretariat role of Charging Futures (CF), we heard the feedback that we needed to help people to learn, ask and contribute in new ways. We are responding to this by delivering targeted engagement activities. There is evidence that this approach is achieving greater industry participation in charging reform. Overall the CF podcast has been listened to over 1500 times in Q2 showing how network users value our innovative approach of engaging on network charging; we have seen the scores of how likely attendees would recommend the event to a colleague increase to 7.9 (from 6.5) on a scale of 1-10. The creation of Charging Futures as a platform for stakeholder-led reform is a new approach to market change and facilitation. We are engaging with a broader range of stakeholders than ever before and have lifted the prominence of network charging and access to a level that allows innovators and investors to understand its relevance and impact better.

Following discussions at the Transmission Charging Methodology Forum (TCMF) we initiated a more comprehensive review of BSUoS. Through these sessions, we will listen and work with customers to determine what we feel are the appropriate next steps to facilitate competition and drive value for consumers.

During the summer, we initiated some whiteboarding sessions on the long-term future of regulatory frameworks in collaboration with Institute of Engineering and Technology (IET). These sessions invited a group of industry influencers and experts including BEIS and Ofgem to have broad holistic debate. We discussed how regulation, licensing and codes could evolve or be revolutionised to deliver and support future markets. This new way of engaging on strategy and policy issues will be taken forward as part of our regulatory horizon project under our role as a Code Administrator. As the project develops we will communicate more about how this work will contribute to our role as a Code Manager.

Summary table of deliverables

Outcome	2018/2019 Deliverable	Status
Managing Customer Profitability – helping our customers be successful ultimately driving down costs to end consumers	Joint Charging and Settlement Forum	On track for completion 16 Oct and 17 Oct 2018
	Publish Improvement Action Plan	On track for delivery in October
	Delivery of improvements	On track for completion in line with plan commitments

Facilitating Code Change – our work aims to ensure that all our changes contribute to delivering consumer value	Publish Improvement Action Plan	On track for delivery in October
	Delivery of improvements	On track for completion in line with plan commitments
	Deliver Charging Futures Forums that are open to all network users. Deliver webinars, podcasts and plain English publications under the Charging Futures (CF) Brand. Adapt the content and format in response to the ongoing requirements and preferences of all CF members. Publish a report on Charging Futures. Identify the lessons learned from cross-industry and code engagement.	On track with next Forum scheduled for 2019 and additional communications to be developed supporting planned Ofgem publications.
Capacity Market Modelling – facilitating broader participation in the CM to provide security of supply at best value for consumers	Consult on our renewables derating method and results	On track, dependent on BEIS timescales
	Consult on our distributed generation derating method and results	On track, dependent on BEIS timescales

Consumer Value

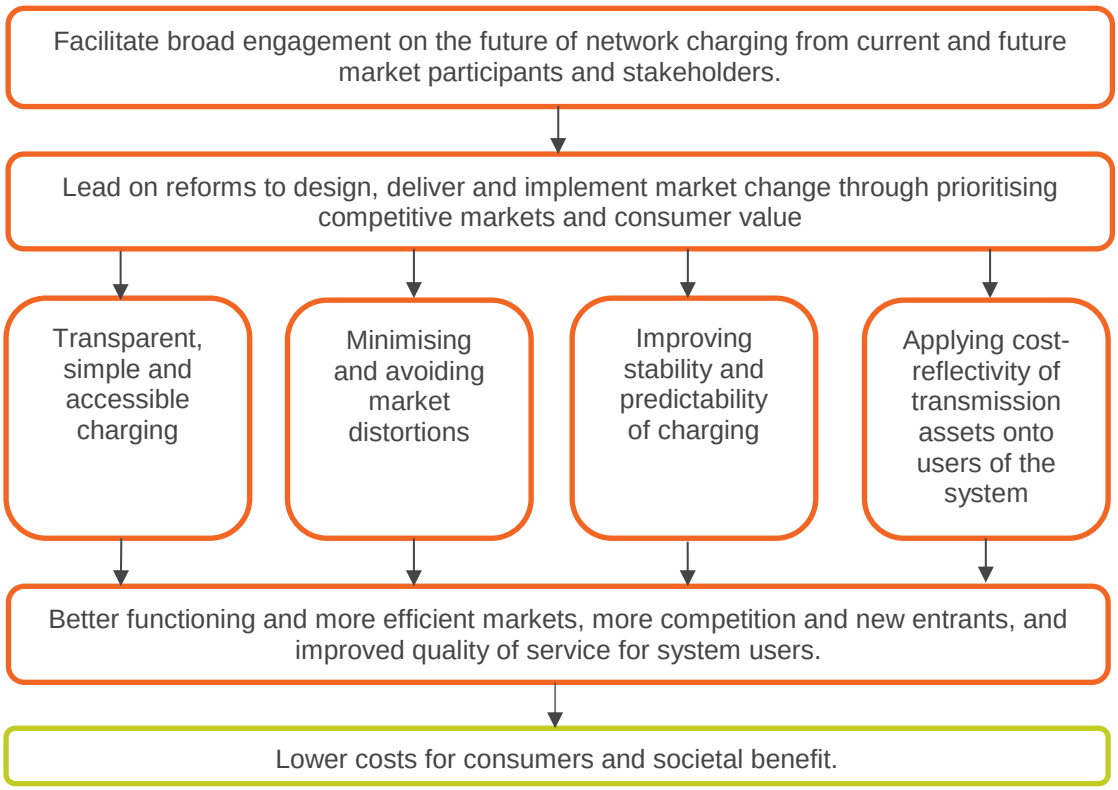
Facilitate the evolution of the markets, providing thought leadership and insight

Mechanism for consumer value

We facilitate the evolution of the markets, providing thought leadership and insight to unlock the full potential that a greater diversity of technologies, market participants and business models can deliver for the consumer.

A key focus for us in facilitating competitive markets is working with the industry and wider stakeholders to deliver the necessary electricity market change. In addition to our role as code administrator we have another role - participating in the change processes as subject matter experts. This means we provide our own unique perspective on changes. Consumer benefits beyond the baseline can be delivered by enhancing the way we perform this role through stepping up further to facilitate and contribute to the debate.

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



The work we undertake in this area leads to consumer benefit through:

- Facilitating better functioning markets, competition, and new entrants which results in lower bills for consumers
- Better quality of service through focus on our stakeholders, suppliers, providers and customers, which should in turn benefit the customer of those organisations, who in the case of suppliers is the end consumer.
- Benefits for society as a whole, through ensuring that we avoid inadvertently disadvantaging vulnerable customers or other classes of user when designing network reforms, for example considering if the costs of infrastructure development to support EV take-up should be borne by all consumers, or apportioned to the users or developers of EV technology.

We will continue to improve the way in which we share learning, explain issues and bring about greater contribution from market participants in industry change processes. Charging Futures

provides an example of where we have started to facilitate stakeholder-led change. It enabled us to work with Ofgem to deliver a new approach to early engagement with all interested parties on network charging and access issues. By using more tailored approaches to presenting on complex topics such as downloadable webcasts and podcasts (our podcasts have been listened to over 700 times) we see great participation in the discussion. We provided numerous easy to read guidance documents and regular email newsletters. The quarterly forums enable attendees to learn, ask and contribute to Ofgem led reforms. Tools such as sli.do and menti have opened up these sessions to allow records views and comments to be shared both with Ofgem and across all stakeholders. This brings greater efficiency to the industry change processes which in turn allow for timely changes to market arrangements. As a result, value to consumers is delivered at the earliest opportunity via continuous improvement of effective competitive markets.

As we move to being a legally separate entity in April 2019, we will step up and play a central role in debating key policy and industry change areas and through the process gain increased trust in our independent view point and our focus on consumers. To achieve this, we will be transparent, sharing our thought processes and governance of our decision making of our position on charging reform topics including how they should be prioritised and implemented.

We will take forward substantial topics for change in agreement with Ofgem and stakeholders, providing our unique perspective on broader energy policy matters.

Drawbacks and potential for unintended consequences of our actions

Our baseline objectives include consideration of applying cost-reflectivity to network charging arrangements. However, cost reflectivity for network charging can manifest itself at a very detailed level resulting in complex modelling and mathematics required to establish charges. We therefore need to also balance simplicity and transparency into charging arrangements to ensure that cost reflective charges provide price signals to which market participants can react otherwise the economic benefits to consumers cannot be realised. Making changes to charging may lead to some dissatisfaction from some users, charging arrangements ultimately result in the total recovery of network costs due to network operators and therefore any changes can often benefit some parties and be detrimental to others. Any short-term downside from this perspective should be outweighed by the longer-term transition to minimising and avoiding market distortion across the whole-system.

There is a risk in that if changes made to charging frameworks do not fully consider all outcomes then there could be further market distortion. We mitigate against this by engaging fully and robustly with all stakeholders throughout the journey, demonstrating how we listen to and act upon their input.

Quantification

- We are a key contributor to setting the foundation of the economic and secure system of the future as discussed in industry reports such as The National Infrastructure Commission's (NIC) 'Smart Power', which indicate if all players act together in the consumer interest there are savings of up to £8bn to be unlocked.
- Having the right charging arrangements in place facilitates and underpins future market functioning, which needs to be efficient and effective to deliver benefits such as increased participation, increased competition, and facilitation of new technologies.

A recent example of where charging arrangement reform delivered huge benefit for the consumer was the implementation of code modifications CMP264 and CMP265. Ofgem highlighted this positive consumer outcome in their latest Consumer Impact Report *(the following text draws on this report): The framework changes involved the charging arrangements for small embedded generators. Arrangements relating to the TNUoS (Transmission Network Use of System) Demand Residual (TDR) charge meant that the ability of a supplier to use and pay smaller embedded generation (EG) (TDR payments) to reduce their (the supplier's) TDR charge gave rise to significant distortions. Code modifications to address this issue were proposed by industry together with Connection and Use of System Code (CUSC) and Workgroup Alternative CUSC*

modifications (WACMs). The proposals included a range of values that replaced TDR payments to smaller EG, and included various implementation options. In place of TDR payments, a new cost-reflective payment is now available to smaller EG and is being introduced through a three-year phased implementation, which commenced on 1 April 2018.

Work commissioned by Ofgem suggested an expected net benefit to consumers of over £7bn over a 14-year period from 2021 to 2034 (2016 year prices), accounting for consumer costs and savings resulting from the decision.

It is anticipated that our work to lead on the reform of charging frameworks may lead to further benefits to the end consumer.

Recent work under CUSC modifications CMP286/7 has indicated (from a formal request for information issued by NGESO) that the risk premia added by suppliers to domestic bills for the uncertainty in TNUoS could be as much as £26m per annum across the market. An alternative charging arrangement where charges are fixed ex ante could significantly reduce this cost.

The benefits of this work are indirect between us and the consumer, relying on the interactions of multiple third parties in the value chains to deliver the savings and improvements felt by the consumer. The benefits will materialise over future years outside of this financial year, as we build upon the foundations of this work to deliver an economic and secure system to 2030 and beyond.

Additionality above baseline

Our work to deliver value in this area is a combination of being better at what we already do through improving efficiency and effectiveness of existing processes, and stepping up to engage in areas where we have not been active previously, such as our leading role in Charging Futures and significant stakeholder engagement, for example through our ‘Customer Journey’ programmes.

Stakeholder Views

Stakeholder views summary

We received overwhelmingly positive feedback on our engagement on network charging training sessions and webinars. We adjusted our approach to engagement on charging throughout 2017 and in this Forward Plan in response to the extensive engagement we made through our Managing Profitability Customer Journey. This identified significant areas in which we can improve our performance in the service we provide to industry for network charging.

Our Code Administrator Code of Practice (CACOP) stakeholder survey results show that we made great progress in our role of code administrator although we know there is still a lot of improvement required.

We also received highly positive feedback in our role as lead secretariat for Charging Futures and for our work engaging stakeholders on European Network Codes.

Engagement and communications overview and objectives

There are three main areas in which we have engaged stakeholders regarding Promoting Competition in the capacity and wholesale markets:

- **Managing Profitability Customer Journey:** Administration of BSUoS and TNUoS charges, including collection of TNUoS charges on behalf of the TOs
- **Facilitating code change:** Our role as code administrator for the System Operator Transmission Owner Code (STC), the Connections and Use of System Code (CUSC) and the Grid Code
- **Delivering code change:** This is principally through the Charging Futures Forum and engagement on European Network Codes

Managing Profitability Customer Journey

How we engaged stakeholders so far, this year

In June 2018, we published an open letter on our proposed approach to the Five-Year View of TNUoS tariffs (for 2018/19 – 2023/24). We received 9 responses to our letter which have helped us design the report and shape our future thinking.

There was broad support for our approach to the sensitives we were proposing, however, there were several areas where customers said further guidance could be provided. There was some further feedback provided, asking that we undertook further modelling around the potential methodology changes arising from current work streams that are in progress. Where this couldn't be taken forward we explained the reasons why in the Five-Year View of TNUoS Tariffs Report. Further, in the case of some proposals we explained when we do not have data to allow us to forecast in the manner proposed. A further opportunity for stakeholders to feed in their thoughts and ideas on the proposals was given at the Transmission Charging Methodology Forum in August.

Additional feedback was also captured in the minutes of the Transmission Charging Methodology Forum.

We regularly ask stakeholders for feedback after webinars, training sessions and forum events using Survey Monkey and Sli.do. In August we sent out an online Net Promoter Score (NPS) survey to our customers, which we plan to send out every six months. In addition to this, we send out an annual Customer Satisfaction Survey which is conducted by our external providers.

Net Promoter Scoring:

Scores of 0-6 are classed as detractors, 7 is neutral and 8-10 are promoters. The percentage of promoters minus detractors gives an NPS score. Scores range from -100 to 100.

Since 1 April 2018 we have collected the following feedback from our events:

- Four Transport and Tariff model in-house training sessions. Before May 2018 we conducted a written survey - we now capture this feedback using sli.do. We received 16 responses in total.
- Three Tariff forecast webinars, for which there were 7 responses
- One Online NPS Survey, for which we had 5 responses
- Also included below is the feedback we received from the Charging and Settlements Forum which we ran in November 2017. We received 18 responses for the 2017 Forum. We have been working on this feedback for our 2018 Forum in October.
- A summary of the questions asked and responses are below.

Written Survey

Event: Transport and Tariff model training

Topic: Transport and Tariff model for calculating TNUoS charges

Date: 5 April 2018

Number of attendees: 7

Overview: Interactive sessions with the experts to get a detailed understanding of how the transport and tariffs model works.

	Number of responses	Options	Responses
Overall, how satisfied were you with today's event?	7	Very satisfied	3
		Fairly satisfied	2
		Neither Satisfied or dissatisfied	
		Fairly dissatisfied	1
		Very dissatisfied	
		Didn't respond	1
Which part did you find the most useful and why? (select multiple)	7	Q&A Discussion	5
		Overview	3
		Spreadsheet layout	3
		Troubleshooting	2
		Exercise/ Run your own model	5
How could we improve this training session?	3	• It was good to get real life user practice. The overview was useful and presenters were helpful • Some confusion around models being given out for the forecast • Further support after session would be appreciated	
Please let us know any other feedback.	3	• Could do a longer session or offer follow up to cover more details • Would be good to get guidance on how to play around with models based on potential changes. I.e. Significant Code Review • Share an electronic copy of slides	

Sli.do Surveys

Event: Transport and Tariff model training

Topic: Transport and Tariff model for calculating TNUoS charges

Date: 16 May 2018, 11 July 2018, 19 September 2018

Number of attendees: 20

Overview: Interactive sessions with the experts to get a detailed understanding of how the transport and tariffs model works.

	Average Score	NPS Score Responses
Using a 0-10 scale: How likely is it that you would recommend this training to a friend or colleague?	8.33	44
Which part did you find the most useful and why?	• Understanding the TNUoS charging scheme and wider aspects of the grid. • Explaining what each component of the model includes. • Meeting the team and being able to ask questions. • Going through the model itself and getting information about the structure etc. This has made me more comfortable with making changes and saved me time in highlighting the bits that I do not need to worry about. • Getting hands on experience troubleshooting and testing model. • Seeing the model working in action. • The high-level overview of what drives the changes in TNUoS charges • Explanation of the differences between generation and demand tariffs. Important for business that have interest in both sectors of the market. • Having an in-depth explanation of how the tariffs are calculated, coupled with hands on use of the model, has helped to better understand what affects the locational signals of the network and therefore how it flows through into the final tariffs. • Getting an understanding of what elements go into each price component, and how changes in one affect the others.	
How could we improve this training session?	• Would be good to understand what's specific to each stakeholder and give time for them to offer feedback as the session goes along • A pre-study package would have been useful with a glossary of acronyms • A longer session would have been preferred to include more simulations and time to understand the model • Consider running separate sessions for different customer types • Consider including forecasting data and an overview of the National Grid TNUoS website page • More information regarding where the input information comes from to allow for independent forecasting	

	• Contents page for the model so it's clear what is included in each tab rather than the user guide appendix • Have a slide showing the changes year on year previously and what caused the changes at a high level • Allow more time for practical troubleshooting scenario exercise • More testing on the model • More detail into how offshore tariffs and revenue are calculated, particularly looking towards assets which have not yet transferred • Change the troubleshooting for running through a couple of scenarios E.g. increased embedded generation. • The session could have been longer
Please let us know any other feedback.	• Knowledgeable and friendly presenters • Good representation from the team at National Grid - able to provide a wider understanding of the industry • Overview of TNUoS could be more basic and the relationship between transport and tariffs could be better explained • It was good to get a glimpse of the wider charging structure • Useful and informative session • Right level of detail • Felt slightly rushed

Webinar Surveys (Survey Monkey)

Event: TNUoS Tariffs Webinar on the latest quarterly forecast / TNUoS Tariffs Webinar on the latest 5-Year Forecast

Topic: TNUoS Tariffs Forecasts

Date: 11 May 2018, 6 July 2018, 20 September 2018

Number of attendees: 57

Overview: These webinars provided stakeholders with an overview of the latest TNUoS forecasts and provided an opportunity to ask questions.

	Options	Responses
Overall, did you find the report and webinar useful?	Extremely useful Very useful Somewhat useful Not so useful Not at all useful	1 5 1
Does the report appear easy to read?	Very easy Relatively easy Neither easy nor difficult Relatively difficult Very difficult	3 4

The presentation contains the right level of detail.	Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree	3 4
Overall, would you rate the delivery of presentation as…	Very good Good Neither good nor bad Bad Very bad	3 4
Do you have any other comments about how we can improve our communication?	• More specific commentary regarding revenue movements between forecasts would be helpful (where it isn't commercially sensitive). • The webinar was particularly helpful for someone who is relatively new to TNUoS forecasting. • More detail on the actual slides would be helpful so that the slides serve as a reminder of the webinar commentary. (E.g. a summary slide for each section). • Keep doing what you're doing.	

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Summary of webinar feedback and actions taken in response to feedback

You said	We did
Facilitation/presentation	
Keep doing what you're doing.	We will continue to run webinars for our Tariffs reports. Due to popularity, we are looking at using webinars for other guidance materials.
Quality	
More detail on the actual slides would be helpful so that the slides serve as a reminder of the webinar commentary. (E.g. a summary slide for each section).	We have added greater notes and explanation in our webinars on movements in particular zones. We have also recorded the webinars and made them available to watch afterwards which means that the slides and commentary are saved together.
Content	
More specific commentary regarding revenue movements between forecasts would be helpful (where it isn't commercially sensitive).	Without going into specifics, we have talked generally around what our assumptions are and tried to be clearer on why things have changed, if we can't say exactly what they are.

NPS Survey

This August was the first-time customers have received this survey. Response levels were low and so we are reviewing whether the survey should continue in this format and timeframe. In addition to the NPS question below, we asked respondents questions regarding recent documents

released from our team. These were either an Initial Demand Reconciliation Statement, or Tariffs Report. We asked responders to rate their usefulness, quality and level of detail. However, no respondents chose to answer this section of the survey.

Event: TNUoS and BSUoS NPS Survey

Topic: Feedback on the quality of service from the TNUoS and BSUoS teams

Date: 10 August 2018

Number of responses: 5

Overview: This August was the first time customers have received this survey. Response levels were low and so we are reviewing whether the survey should continue in this format and timeframe. In addition to the NPS question below, we asked respondents questions regarding recent documents released from our team. These were either an Initial Demand Reconciliation Statement, or Tariffs Report. We asked responders to rate their usefulness, quality and level of detail. However, no respondents chose to answer this section of the survey.

	Average Score	NPS Score
On a scale from 0-10, how likely are you to recommend the overall experience you have received from the following area(s) [TNUoS Charging and Billing / TNUoS Tariff Setting and Forecasting] to a colleague or business associate?	7.4	0

Additional feedback

Throughout the year, we receive written and verbal feedback from our stakeholders in emails, on the phone and in person.

Charging can be very complicated, which is why the team spend a lot of time explaining things to customers. We aim to give customers the information they need, at the level they need it, within the time they need it in and in a friendly way.

We had a significant amount of feedback via email (communications from over 20 parties) acknowledging the clarity and detail of our responses to queries; or timeliness in dealing with requests and the overall customer experience we have delivered. This evidence is being held in a database that is available for audit by Ofgem.

What stakeholders have told us and what we are doing about it

Customers told us through the feedback process that there are three key areas in which we can improve to drive value for consumers by supporting our customers to manage their profitability. The Action Plan that we have developed based on feedback will address each of these three areas specifically.

The table below summarises all of the feedback we have received across our engagement on the customer experience of charging. It also outlines how we responded to feedback or how we plan to respond to address the feedback.

You said	What we're already doing	What's coming next
I need to understand relevant information and data: • Content to give information on what	• We utilise technology and now record our webinars and publish these to the website afterwards. This gives all types of customers greater access to information in their own time.	• We're hosting two Charging & Settlement Forums (TNUoS/ BSUoS/ Ancillary Services) in October

charges we will face, with relevant updates • Content to explain how charges are calculated • Forecasting data that is transparent and clearer on accuracy • Experts who can support with finding relevant information	Customers who listen get the benefit of the analyst talking them through the updates to the tariffs. • We continued to refine our TNUoS tariff reports, including better structures and clearer data. We also aim to be clearer about how tariffs might change, what is fixed and what external changes may impact. This helps customers to better understand how and when tariffs may evolve. • We consulted on our five-year view of TNUoS to understand what customers value from the report and is wanted in future. Our next report is due in September and will reflect any feedback.	2018, with each day focussed on either Generators or Suppliers. This means customers will need only attend on one day to understand everything for their business. Attendees will get an overview of the different charges, as well as the opportunity to ask questions directly to subject matter experts.
I need better access to relevant information and data: • Improvements to digital access to information • Improvements to how we can interact with data • Access to relevant experts and knowledge of how to reach the right people	• We made improvements to our processes to ensure that we are providing bills on time with expectations; the improvements made have ensured we are now consistently delivering timely bills. We will continue to maintain this standard of delivery, whilst committing to improve in the areas in which we have been given direct feedback. • We made the first set of changes to our website to make it clearer who pays which charges and why. We know there is more we can do in this space. • We introduced new email newsletters with upcoming key dates and topics. We will continue to see how we can refine these to make them really useful for customers.	• Continuing to improve our website, documents, letter and emails. Making them easier to understand, and at the right level for our customer's businesses. • Publishing data in a timely and useful way. Making sure customers have the best available data on which to make informed decisions to enable them to be fully informed.
The onboarding process is not clear: • Knowledge of who to contact and what to know for new entrants		• Designing a new holistic onboarding process. A complete suite of support for new suppliers wanting to join the market to help them understand their interactions with us, the charges they will face and their obligations. This will include dedicated web content, checklists, beginner's guides, webinars and one-to-one support. This means that parties understand their

	obligations and can get active in the market as quickly as possible.

Facilitating code change - Code Administration

How we have engaged stakeholders so far this year

In April 2018, we began work on ‘’Manage a Code change’’ customer journey. The journey concept means we look at creating the right customer experience for our customers & stakeholders in the future, removing inefficiencies and areas of frustration they have with the process today.

The customer journey outputs will be designed to make our process work for our customer’s future business needs, we can only achieve success by designing this future experience in collaboration with our customers and stakeholders.

As part of this commitment we conducted over 10 bilateral discussions with consumer bodies, trade associations and customers with different wants and needs, to understand their views on the current process and what needs to change. The main channels used were a selection of Immersion events, 1-2-1 interviews and workshops.

Traditionally we surveyed annually on our performance. We feel very strongly that frequent engagement with our customers is important in what and how we deliver against our commitments. So, this year we will be asking for regular feedback on progress as part of the journey to help inform progress on the improvements we make and their effectiveness.

We found the most effective methods used has been predominately 1-2-1 interviews, and group discussions via Panel meetings.

What stakeholders have told us and what we are doing about it

Code Administrator Code of Practice survey

Our latest CACOP Survey results have shown a significant increase from last year (2016/17) in overall satisfaction from our customers and stakeholders across CUSC (Connection and Use of System Code), Grid Code & STC (System Operator Transmission Owner Code).

CACoP Survey Results: Overall Satisfaction

Code	2017 (%)	2018 (%)	% change
CUSC	47	65	+18
Grid Code	59	66	+7
STC	57	58	+1

Our provision of support has increased significantly from smaller organisations, and smaller businesses have reported greater confidence in their ability to deal with codes compared to last year.

CACoP Survey Results: Provision Support

Code	2017 (%)	2018 (%)	% change
STC	45	75	+30

CUSC	54	71	+15
Grid Code	67	73	+6

Overall Feedback

The below table captures the main themes of feedback on code administration we have received and how we have addressed or plan to address it.

You said	We did/ We are doing
Provision of Support	
Our customers told us that for the immediate term they would like us to provide more clarity and guidance on the front end of the process when looking to raise a code change and what it means to them.	We will update our website to ensure that the latest contacts as a route in when raising modifications, we will also revamp our guides, templates to help our customers navigate through the governance process easier.
Stakeholders told us that there is a sense of real frustration with the current code process, primarily driven by timescales and resource commitment to inform the debate.	We committed to increase the team by five FTE's as a response to the feedback from stakeholders. We delivered our recruitment processes quickly and this has enabled the right resource numbers, coupled with the correct capability to provide timely support to stakeholders, particularly in a time where we are seeing record level of modifications across our codes.
The scope of business activities for many industry parties also means that there is resource required to cover many modifications across multiple codes. Many stakeholders feel the process is not inclusive unless their organisation has dedicated resource.	As a Code Administrator, we recognised the need to prioritise code changes and the need to be confident that the process can be run in a robust and inclusive manner, where decisions for prioritisation are clearly understood across the industry.
Whilst we are endeavouring to provide forums for discussion before modifications have been raised this is not always effective and as such new modifications coming forward without discussion can be a surprise for parts of industry.	As part of our approach to facilitating the quantity of modifications we have for the first time developed a prioritisation process with the respective panels. This process has been taken forward based on stakeholder feedback on the capacity issues that stakeholders have in managing the level of change across the industry. With record level of modifications across our codes we are conscious of the burden that this provides on many of our stakeholders so we proposed a transparent prioritisation process to provide visibility to industry of what modifications we will be facilitating across different timescales. Whilst some stakeholders argue that we should be driving all modifications forward, the bulk of our stakeholders valued transparency on our approach and this has helped provide confidence on how they organise their own

	resources to coordinate their input across multiple modifications. To provide greater visibility to smaller participants within the energy market, we will facilitate seminars & attend industry events, to provide visibility to a wider pool of stakeholders on the key code modifications in place.
Facilitation	
We heard that we need to improve our website, it's difficult to find things.	We will continue to improve our website, how and where we provide information, making it easier to access with fewer clicks (code reports, calendar/ events, contact info, reporting).
Our customers told us that remote access is difficult, and that code development is not their fulltime job, so attending workgroups needs to be worth their while, and especially find our teleconference facilities frustrating.	We have committed to improve the ability to join and gain access to meetings via WebEx, teleconference facilities. We will also trial varying the location, and coordinate topic related modifications.
Ease of Interpreting Information	
Complexity of interpretation of changes. Our customers have told us that it takes huge resource to work out what changes will mean for all parties, and to sift through the volume of updates. Streamline the traffic of information & updates.	We are changing the way we communicate to help streamline the relevant information to our customers. We will provide more high level information, removing the jargon so it is easily digestible, targeting our industry updates on key stages as and when they happen in the code modification process, who is impacted, why and when. We will signpost you to the full report. We will target our industry updates on key stages as and when they happen in the code modification process, who it impacts, why and when. We will provide easy access to our code modification reports, with an executive summary with the option to read the full report should our customers choose to.
Whilst the nature of open governance means that any code party can submit a proposal at any time, the visibility of some changes has not been transparent to industry prior to being raised.	We will provide an overarching snapshot report each month, a dash board of all modifications in flight, stage gates & progress in one place on our website. We are also producing a horizon scan, which captures potential modifications that could be raised in the next six to twelve months including who is impacted which will help our customers know where to place their resource for the future.

Facilitating code change - European Network Codes

The Third Energy Package of European legislation created a requirement for European network codes (ENC), covering grid connections, markets, and system operation. The codes are designed to provide a sustainable, secure and competitive electricity market across Europe.

All ENCs have now entered into force, and are EU Regulations in their own right. Implementation activities in Britain will continue for a number of years. Grouped into three areas, there are eight European network codes required by the Third Energy Package.

See our website for more detail.

How we have engaged stakeholders

A number of the European network codes are at methodology stage or entering into GB code. Our goal is to ensure customers and stakeholders have the chance to see these and input. It is important there are no surprises for them.

Topics progressed this year to date:

- SOGL (System Operation Guidelines) – European methodologies and codes
- EBGL (Electricity Balancing Guidelines) – European methodologies and codes
- Project TERRE (Trans European Replacement Reserve Exchange) - An early adoption project of the EU Electricity Balancing Framework, TERRE is expected to go-live in Q4 2018. It sets a common platform for Replacement Reserves across EU regions and helps to implement EBGL
- Project MARI (Manually Activated Reserves Initiative) - European Project MARI, which is creating a European platform for the exchange of manually activated Frequency Restoration Reserve (mFRR) issued its first public consultation on various aspects of the project. This consultation can be found on the European Network of Transmission System Operators for Electricity (ENTSO-E) website. As Project MARI is very similar to Project TERRE, it is likely to have significant impacts on at least the BSC and Grid Code

In all the above topics, we wanted to ensure we reached an industry wide audience:

- To help any parties affected by these topics to have a clearer understanding of what was required from them and why
- To allow affected parties to actively engage with the us so we could provide more detailed information on individual basis as needed or signpost them to other support channels
- We tried to simplify content to help stakeholders understand what their obligations were around these topics. A variety of channels were used to help support these objectives
    - Webinars/Podcasts – these were widely used as they were effective in allowing stakeholders who could not attend to see recorded versions at a later date and still feedback.
    - Sharing meeting documents
    - Fact sheets
    - NG Website with full European engagement plan details
    - LinkedIn
- Feedback was mostly collected in the Q and A sessions during/after the webinars, but also as below:
    - Polls in webinars
    - Email feedback post event

Forums

Event: EBGL webinar
Topic: Article 18 proposal

Date: 19th April 2018

Number of attendees: 8 attendees

Overview: Looking at our proposal for delivering against article 18 for EBGL in GB. This relates to the ESO obligations for providing the terms and conditions for balancing service providers and balancing responsible parties

Comments

Q: Will the webinar be made publicly available? Yes, recorded and on website

Feedback: “Useful overview of our approach to this proposal”

Event: EBGL podcast

Topic: Introduction to EBGL episode 1

Date: 24th August 2018

Number of attendees: pre-recorded, so unknown

Overview: This introductory Podcast briefly explains what the EBGL is, who they affect and what the series of videos will cover

Comments

Feedback by email: “Very good overview”

Event: Project TERRE webinar

Topic: TERRE War Games review

Date: 21st May 2018

Number of attendees: 6

Overview: A review of 2017 “TERRE War Games” which simulated the conditions under which TERRE will operate.

Event: Project MARI webinar

Topic: Introduction to MARI

Date: 19th April 2018

Number of attendees: 8

Overview: An introduction to Project MARI (mFRR), why it’s being done and what it is expected to deliver.

Comments

- Q:Why are GB implementing MARI and not PICASSO (answered in call)
- Q:Will system architecture be similar to TERRE? (answered in call)

- Q:How will this process interact with project TERRE? (answered in call)
- Q:What governance process will be used to update codes for MARI? (answered in call)
- Q:Pay as clear makes sense for scheduled activation but how would it work for direct activation? (answered in call)
- Q:Questions based on delivery profile (answered in call)
- Q:Questions on the 15 min ISP (imbalance settlement period) in EB GL (answered in call)

Feedback: “Excellent overview of the project, very helpful overview”

Event/Webinar	**Project TERRE webinar**
Topic/overview	A review of 2017 “TERRE War Games” which simulated the conditions under which TERRE will operate.
Date	21st May 2018 6 attendees (stakeholders/customers)

Event/Webinar	**Project MARI webinar**
Topic/overview	An introduction to Project MARi (mFRR), why it’s being done and what it is expected to deliver.
Date	19th April 2018 8 attendees (stakeholders/customers)
Comments	• Q:Why are GB implementing MARI and not PICASSO (answered in call) • Q:Will system architecture be similar to TERRE? (answered in call) • Q:How will this process interact with project TERRE? (answered in call) • Q:What governance process will be used to update codes for MARI? (answered in call) • Q:Pay as clear makes sense for scheduled activation but how would it work for direct activation? (answered in call) • Q:Questions based on delivery profile (answered in call) • Q:Questions on the 15 min ISP in EB GL (answered in call) • Feedback: “Excellent overview of the project, very helpful overview”

Event: SOGL Webinar

Topic: SOGL Operational planning part 1

Date: 31st May 2018

Number of attendees: 28

Overview: In Part 1 of operational planning, we provided an insight into the way we that we send data for operational security and we also touched on the key Pan-European requirements for coordinated security analysis and outage coordination

Comments

- Q: What will happen after Brexit?
  We aim to remain in the internal market as we think it is beneficial especially with more interconnection planned to the rest of Europe in the future but it is difficult to say at this point.
- Q: I am interested in CGM (common grid model) and whether any TOs have to do anything?
  We as NGESO currently interface with OPDE (Operational Planning and Data Environment) and have the responsibility of sending IGM (individual grid model) across to OPDE from a GB perspective

Event: SOGL Webinar

Topic: SOGL Operational planning part 2

Date: 28th June 2018

Number of attendees: 17

Overview: In Part 2 of Operational Planning we provided an insight into our compliance approach to Adequacy Assessment, Ancillary Services and Operational Planning and Data Environment (OPDE) requirements of the system operations guideline

	# responses	Average score
How did you find the SOGL webinars	12	42% Very Good 42% Good 8% no answer
How would you rate the ease of understanding of these webinars?	12	8% excellent 33% Very Good 42% Good 8% fair 8% no answer
Were you happy about the way you were contacted for the event	12	75% yes 17% no 8% no answer
Would you like more detail on anything covered in webinars?	No response	No response
How would you best like us to engage with you in the future on the topic of SOGL?	12	67% webinar 33% JESG newsletter 8% physical event 8% one to one 25% no answer

Event: SOGL Operational Security Webinar

Topic: SOGL Operational Security Webinar

Date: 14th June 2018

Number of attendees: 16

Overview: Through this webinar we provided details on the EU regulation on system security and our journey to ensure compliance of the security requirements, testing and data exchange between the Transmission System Operators, Distribution Network Operators and other Significant Grid Users

	Number of responses	Weighted average score
Please provide feedback on this webinar	2	100% most useful
Comments	• Q: What is the impact on interconnectors? Answered in webinar • Q: Will there be additional changes to Grid Code in future? Answered in webinar Feedback: "Useful webinar on steps required to ensure compliance."	

Event: SOGL Webinar

Topic: SOGL Frequency control

Date: 17th May 2018

Number of attendees: 14

Overview: This webinar explains the Load, Frequency Control and Reserve elements of the System Operation Guideline which covers frequency quality standards; frequency control process design; reserve service design; operational agreements - including cross-border services; regulatory reporting and transparency obligations

	Number of responses	Weighted average score
How did you find the SOGL webinars	10	42% Very Good 42% Good 8% no answer

Delivering code change – Charging Futures

How we have engaged stakeholders so far this year

Charging Futures is designed to give all network users the opportunity to learn more about the reform of electricity network charging, ask questions of the options being considered and contribute their views on how reform should be taken forwards. We worked to these objectives through a number of engagement activities.

The central activity to delivering these opportunities is the Charging Futures Forum which has been held twice this year and all network users are invited to attend and take part in discussion.

The Forum is supported by a range of additional channels that give updates as and when developments happen. This is through email updates, webinars, podcasts and a website.

What stakeholders have told us and what we are doing about it

Charging Futures Forums

During the first half year, the Charging Futures Forum was held in May and September. This brought together network users to share views and collaborate. The focus was on Ofgem's consultation on Access and Forward Looking Charges; updates were also given on the Targeted Charging Review and the approach for setting RIIO2 price controls. Finally, there was also an opportunity for network users to contribute their views on other high priority areas of reform for electricity network charging.

Surveys at Charging Futures Forums

Improvements made to the Charging Futures Forum in response to stakeholder feedback are reflected in improved scores from 6.5 in May to 7.9 in September.

Event: Charging Futures Forum

Topic: Targeted Charging Review, Network Access and Forward Looking Charges and Settlement Reform

Date: May and September 2018

Number of attendees: 72

Number of attendees: 31

Overview: May's Forum gave a greater focus to the Targeted Charging review where Ofgem shared their latest modelling as well as giving network users an opportunity to understand the Final Reports published by the Access and Forward Looking Charges Task Forces and the opportunities created by settlement reform.

	Average score	Net promotor score
On a scale of 1-10 (10 being highly-recommend) how much would you recommend this event to a friend or colleague?	6.5	-36

Event: Charging Futures Forum

Topic: Network Access and Forward Looking Charges, Targeted Charging Review, RIIO2 and Wider Reform

Date: 05 September 2018

Number of attendees: 70

Number of Responses: 30

Overview: The focus of the day was on Ofgem's consultation on Access and Forward Looking Charges. Updates were also given on the Targeted Charging Review and the approach for setting RIIO2 price controls. Finally, there was also an opportunity for network users to contribute their views on other high priority areas of reform for electricity network charging.

	Average score	Net Promotor score
On a scale of 1-10 (10 being highly-recommend) how much would you recommend this event to a friend or colleague?	7.9	20

Charging Futures Webinars

Alongside the Forum we have facilitated two webinars which have enabled network users to hear directly from Ofgem on the content of their consultation of Access and Forward Looking Charges and their progress on the Targeted Charging Review. These webinars received an average score of 7.3 out of 10 when attendees were asked how much they would recommend the webinars to a friend or colleague. Across the two webinars, 235 people watched live which has so far risen to 589 in total when on-demand views are included; this shows the level of interest in engagement activities facilitated by Charging Futures.

Webinar	Score from participants (1-10)	Number of participants	Number of views on demand
Access and Forward Looking Charging Consultation	7.7	102	172
Targeted Charging Review: Significant Code Review	6.9	133	182

Surveys at Charging Futures webinars

Survey results from our webinars show that attendees' understanding of the Access and Forward Looking Charging Consultation significantly improved as a result of the webinars.

Event: **Charging Futures Webinar**

Topic: Access and Forward Looking Charging Consultation

Date: 24 July 2018

Number of attendees: 102

Overview: An overview of Ofgem's consultation on Access and Forward Looking Charges and an insight to how changes could affect different types of network user. There was also an opportunity for questions and answers.

	# Responders	Average score
At start of webinar: How well do you feel you understand the content of the Access and Forward Looking Charges consultation? *Percentage shows proportion of positive responses*	61	43%
At end of webinar: How well do you feel you understand the content of the Access and Forward Looking Charges consultation? *Percentage shows proportion of positive responses*	81	80%
Would you recommend this webinar to a friend or colleague? On a scale of 1-10 (10 being definitely recommended)	81	7.7

Event: **Charging Futures Webinar**	
Topic: Targeted Charging Review: A Significant Code Review	
Date: 29 August 2018	
Number of attendees: 133	
Overview: The webinar gave network users an update on the Targeted Charging Review's progress and an overview of the initial analysis undertaken to understand how changes in network charges will impact users.	

	# Responders	Average score
At start of webinar: How well do you feel you understand the content of the Access and Forward Looking Charges consultation? *Percentage shows proportion of positive responses*	104	67%
At end of webinar: How well do you feel you understand the content of the Access and Forward Looking Charges consultation? *Percentage shows proportion of positive responses*	97	96%
Would you recommend this webinar to a friend or colleague? On a scale of 1-10 (10 being definitely recommended)	93	6.9

Charging Futures Podcasts

There have been 12 podcasts added to the Charging Futures library since April which have enabled network users to develop their understanding of reforms being discussed in industry. These are used by network users that attend the Forum but are also publicly available so that all stakeholders interested in network charging and access arrangements can engage with the reform. As part of this we have introduced a series of podcasts over the Access and Forward Looking Charges consultation period that considered the consultation from the perspective of different types on network users. This series allowed listeners to gain an insight in how other users are affected by the changes and see opportunities in how the future arrangements could work. There were six parts to the series that have received over 750 listens.

Number or listens to the various podcasts on Charging Futures website

Quarter	Number of new podcasts published	Total podcast listens (to all available)
Q1	3	688
Q2	9	1,586

You said	We did
Give a stronger focus to creating opportunities for contributing views at the Forum: • Issue information in advance of forums so that attendees aren't overloaded and the Forum can focus on users contributing their views	We have worked to make contribution the primary objective of the Forum. We have done this by: • Minimising the amount of information shared for the first time at the Forum • Sharing information through other platforms that give network users more flexible

• Don't issue documents with little notice before the forum so there is time for all parties to digest them	access. For example, to support the Access and Forward Looking Charges consultation we communicated information by email, podcast, webinar and a summary note ahead of the Forum. • All information is now shared well in advance of the Forum and recommended 'pre-reading' is communicated with attendees. • We continue to listen to feedback on how well we structure Forums and will use ongoing feedback to continuously improve in the future
Make it easier to understand the progress of charging reform: • Create summaries of work areas to help all users understand how they will be affected • High level 'cheat sheets' to bring everyone up to speed • Simplify the key messages to give better clarity on progress	To support network users to understand the Access and Forward Looking Charges consultation we: • Informed our distribution list on the day of the consultation launch and provided a podcast that helped explain the eighty-eight-page consultation document's key themes in 35 minutes • Facilitated a webinar the day after the consultation launch for network users to hear directly from Ofgem and have the opportunity to ask questions • Shared an eight-page summary note as an alternative for network users to read the consultation's key points and get up to speed with work so far • Recorded a six-part podcast series that gave an insight to the views on the consultation of different network user types

Performance Metrics

9 BSUoS Billing

Metric Description

This metric measures the quality of the billing process in response and resolution time of Balancing Services Use of System (BSUoS) billing queries alongside the timeliness of those bills.

Performance

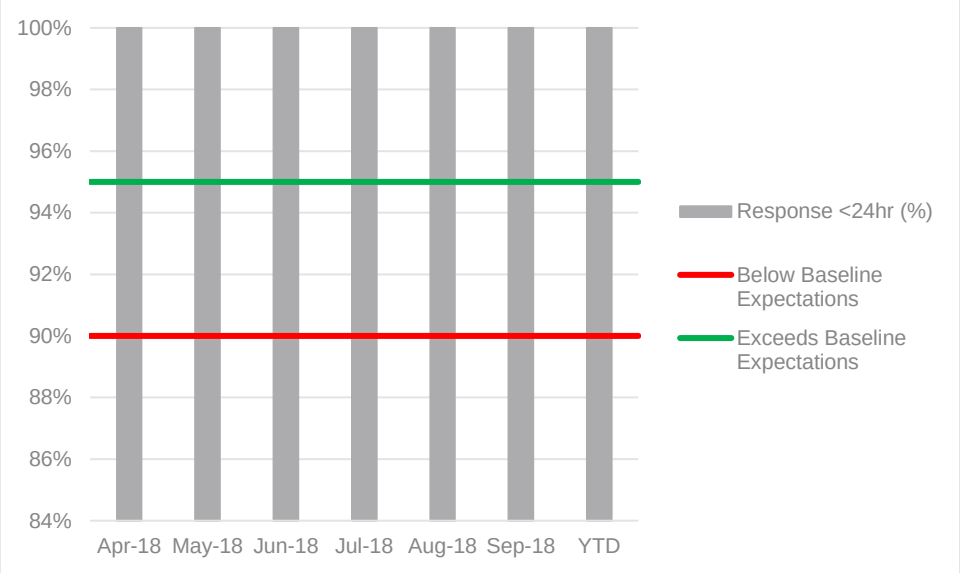


Figure 12 - Metric 9 BSUoS query response time

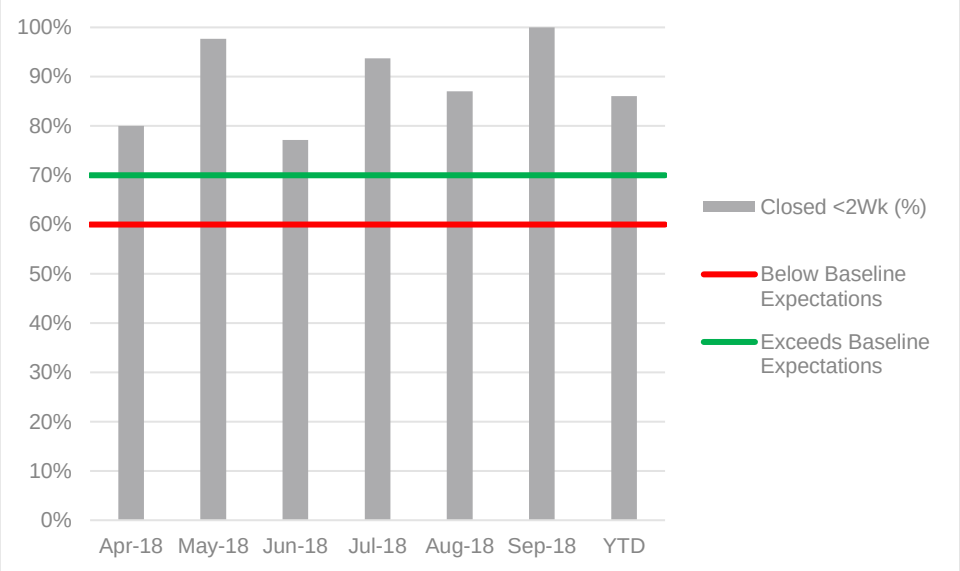


Figure 13 - Metric 9 BSUoS query resolution time

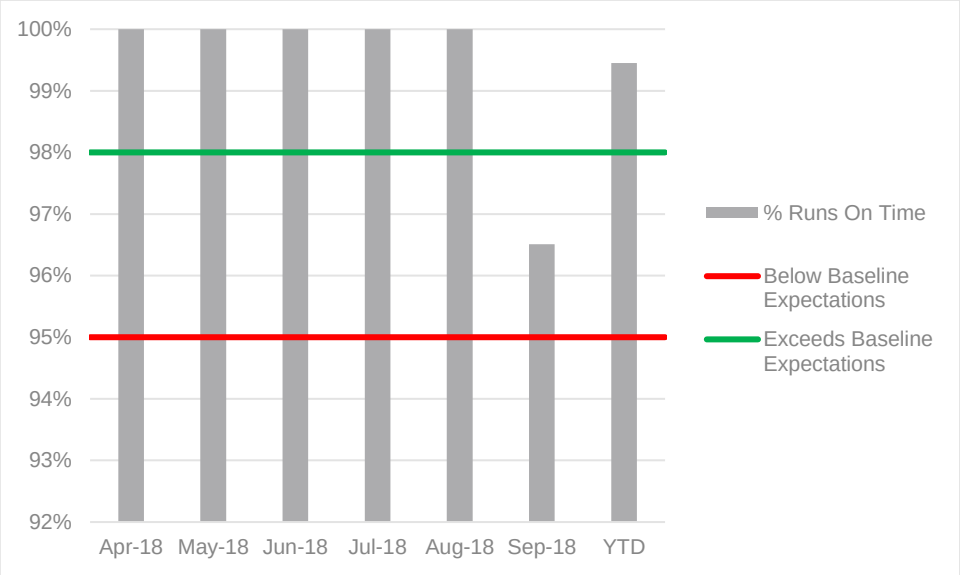


Figure 14 - Metric 9 BSUoS bills timeliness

During the first half of this year we responded to 100% of BSUoS queries within 24 hours and resolved 86% of queries within 2 weeks. BSUoS bills were sent out to customers 99% of the time which relates to one day of suspended billing. This occurred on the 21st September due to a planned outage on our SAP system that produces the BSUoS invoices. We informed customers of this outage a week beforehand via a circular that was sent out to our distribution list and published on our website in the BSUoS news section. This was a planned outage but due to it being a deviation from the originally published calendar it shows as suspended runs for September. All other runs were completed on time.

Supporting information

- Queries September – We have established new benchmarks in terms of dealing with customer queries/complaints. We reached 0 open queries/complaints for the first time ever and dealt with all new queries received in both August and September within the 14-day target.
- We received 35 new queries in September and closed 35 queries in that same period. We received five customer survey results following query closure all with a rating of excellent. (Ratings available are: - Very Poor / Poor / Good / Excellent)
- Following on from the scheduled billing suspension above, we experienced an issue that resulted in BSUoS direct debits for one settlement day being collected a day early. We issued an email communication to customers to make them aware of this issue and published this same information on our website.
- Prior to the changes to the website on the 17th September we sent a circular out to customers explaining the changes that were taking place and directing them to where they would be able to find BSUoS information on the new website.
- We have been engaging with customers regarding the Settlement and Charging event we are holding on the 16th and 17th October 2018. We currently have 115 BSUoS and TNUoS customers registered to attend this event.

10 Code Admin Stakeholder Survey

Metric Description

We now understand that the measure of Code administrator stakeholder satisfaction we expected to use (the Ofgem-run Code Administration Code of Practice (CACoP) survey) will not provide us with data on our 2018/19 performance in a timely manner. We expect to build a portfolio of evidence of our continued improvements measured against explicit stakeholder feedback. This will be reflected in the development and delivery of our improvement plan.

Performance

Official survey results were published by Ofgem on the 8th October 2018. Overall, it has been positive feedback compared to the previous year. The survey is confidential in terms of the visibility of what individual stakeholders have said.

Our latest CACOP Survey results have shown a significant increase from last year (2016/17) in overall satisfaction from our customers and stakeholders across CUSC (Connection and Use of System Code), Grid Code & STC (System Operator Transmission Owner Code).

Code	2017 (%)	2018 (%)	% change
CUSC	47	65	+18
Grid Code	59	66	+7
STC	57	58	+1

Figure 15 - CACoP Survey Results: Overall Satisfaction

Our provision of support has increased significantly from smaller organisations, and smaller businesses have reported greater confidence in their ability to deal with codes compared to last year.

Code	2017 (%)	2018 (%)	% change
STC	45	75	+30
CUSC	54	71	+15
Grid Code	67	73	+6

Figure 16 - CACoP Survey Results: Provision Support

Supporting information

From our latest survey results we understand that we are moving in the right direction as there has been an increase in overall satisfaction of our service compared to last year. Stakeholders have told us that the support we provide has increased significantly for smaller organisations, and smaller businesses have reported greater confidence in dealing with codes. Part of the rationale for this feedback has been driven by the decision we took at the start of the year to increase our team numbers by five staff as a response to the feedback from stakeholders in our 2016/17 survey, primarily based on our customer's frustrations driven by timescales and resource commitment to inform the debate. We delivered our recruitment processes quickly and this has enabled the right resource numbers, coupled with the correct capability to provide timely support to stakeholders, particularly in a time where we are seeing record level of modifications across our codes.

11 Charging Futures

Metric Description

Survey the full Charging Futures membership with 3 outcome-focused metrics based around the three engagement objectives for Charging Futures of:

- Learn – about electricity network charging across the whole system today, and how it could change in the future.
- Ask – regularly ask charging and regulatory experts questions related to reforms, and wider charging code change.
- Contribute – be able to contribute to reform at all stages and through a number of ways.

Charging Futures Forums

During the first half year, the Charging Futures Forum was held in May and September. This brought together network users to share views and collaborate. The focus of the day was on Ofgem's consultation on Access and Forward Looking Charges but updates were also given on the Targeted Charging Review and the approach for setting RIIO2 price controls. Finally, there was also an opportunity for network users to contribute their views on other high priority areas of reform for electricity network charging.

May's Forum gave a greater focus to the Targeted Charging review where Ofgem shared their latest modelling as well as giving network users an opportunity to understand the Final Reports published by the Access and Forward Looking Charges Task Forces and the opportunities created by settlement reform.

At the event, we use the following question to assess our performance:

On a scale of 1-10 (10 being highly recommended) how much would you recommend this event to a friend or colleague?

Quarter	Average Score	Net Promotor Score
Q1	6.5	-36
Q2	7.9	20
Q3		
Q4		

Figure 17 - Metric 11 Charging Futures Performance

Webinars

Webinar	Score from participants (1-10)	Number of participants	Number of views on demand	Net Promotor Score
Access and Forward Looking Charging Consultation	7.7	102	172	2
Targeted Charging Review: Significant Code Review	6.9	133	182	-16

Figure 18 - scores from webinars

Alongside the Forum we facilitated two webinars which enabled network users to hear directly from Ofgem on the content of their consultation of Access and Forward Looking Charges and their progress on the Targeted Charging Review. Across the two webinars, 235 people watched live which has so far risen to 589 in total when on-demand views are included; this shows the level of interest in engagement activities facilitated by Charging Futures.

As the secretariat of the Charging Delivery Body (CDB) we continue to hold regular meetings that help members maintain a holistic view of all changes to electricity network charging arrangements.

Podcasts

There were 12 podcasts added to the Charging Futures library since April which enabled network users to develop their understanding of reforms being discussed in industry. These are used by network users that attend the Forum but are also publicly available so that all stakeholders interested in network charging and access arrangements can engage with the reform. As part of this we introduced a series of podcasts over the Access and Forward Looking Charges consultation period that considered the consultation from the perspective of different types on network users. This series allowed listeners to gain an insight in how other users are affected by the changes and see opportunities in how the future arrangements could work. There were 6 parts to the series that have received over 750 listens.

Quarter	Number of podcasts added	Podcast listens (to all podcasts available)
Q1	3	688
Q2	9	1,586
Q3		
Q4		

Figure 19 - number or listens to the various podcast on Charging Futures website

Website

The Charging Futures website offers full transparency to all network users of the GB electricity system. It offers a single place to go to for users to understand and learn about reform to network charging by hosting summary notes and recordings of webinars. All meeting materials are also published on the website which includes the Charging Delivery Body, Task Forces and the Forum. A significant proportion of the traffic we see on the website is driven around the dates of the Forum when users are accessing pre-reading, presentation materials, and summaries of discussions at the Forum. In addition, there is also a consistent level of traffic accessing the website outside of the Forums.

We measure a user's visit to the Charging Futures Website as a session. The number of sessions we have recorded during 2018/19 has stayed consistent which suggest that users continue to find the website a useful resource during a time of significant reform to network charges.

Total number of sessions on the Charging Futures Website

Quarter	Total Sessions
Q1	549
Q2	548
Q3	
Q4	

Figure 20 - number of sessions on the Charging Future website

E

Principle 5 Evidence Chapter

Performance in the last six months

Meets baseline performance

General baseline activities to ensure coordination across system boundaries to deliver efficient network planning are set out in the Grid Code Planning Code, and revolve around the exchange of data between network companies to assess the security and safety of the transmission system at the interface with Network Operators for both operational and investment planning purposes.

The purpose of these processes is to establish whether the system is compliant with the National Electricity Transmission System Security and Quality of Supply Standard (commonly referred to as the NETS SQSS or SQSS) and trigger remedial works if not. TO/SO/DNO (transmission owner/system operator/distribution network operator) investment planning consists of a loop of exchanging data between the parties. Key dates of the process are:

- Week 17: National Grid makes an official request to DNOs for data including single-line diagrams for networks, agreed access periods and times of minimum/maximum GB demand.
- Week 24: DNOs submit requested data to National Grid (DNOs may delay this by week 28)
- Week 42: National Grid submits transmission network data to other network operators
- Week 6: National Grid confirms compliance with SQSS

We provide the week 42 model provided to DNOs to support the development of the week 24 data submission for next year.

For the first half of 2018/19, we have undertaken the early stages of the process, such that we are now in the process of checking submissions and querying where necessary. Currently, data submissions arrive in a variety of different formats. To improve the process this year, we have, in collaboration with DNOs, started rolling out standardised templates for the submission of data – this is proving to have a number of benefits over what happened previously, such as improving the consistency of submissions and allowing for future year-on-year comparisons in a more straightforward way.

General baseline activities to ensure coordination across system boundaries to deliver efficient network development are set out in the NOA methodology. The 2018/19 methodology, submitted to Ofgem for approval on the 2nd July, references activities we are undertaking to develop a more 'whole electricity system' approach, which are covered in more detail in our Network Development Roadmap. As part of our relaunch of principle 5, information on our baseline activities to ensure efficient network development is now captured within principle 7.

Exceeds baseline performance

Improve our cross-industry collaboration for whole system network planning and development

Our Regional Development Programmes (RDPs) are ground-breaking collaborations with DNOs that take a **whole-system approach to planning and operating** electricity networks. They represent a step-change in the way we work together, compared with our baseline obligations, and enable us to tackle existing and future operational challenges in new ways.

In the first half of 2018/19, we concluded the design phase of our first two RDPs with Western Power Distribution (WPD) and UK Power Networks (UKPN), which created an enhanced approach to modelling distribution-connected demand and generation to better whole-system network capability. This has allowed us to identify actions needed to 'unlock' capacity for further Distributed Energy Resource (DER) connections in both the South-East Coast and South-West Peninsula areas of the country.

We then commenced the delivery phase of our work to enable further DER connections in the WPD and UKPN regions. This 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. These include the risk of circuit overloads and of dynamic voltage performance issues.

Latterly we have been working to agree tri-party terms for a DER transmission constraint management service that accounts for the impact that more actively-managed distribution networks have on the ability of DER to provide the service in a predictable manner. We have worked hard to ensure the contract is consistent with the principles we are following to simplify our service terms, and in alignment with the technical solution to deliver appropriate visibility and controllability of DER output.

Alongside this commercial work, we continue to progress IS (information systems) and operational activities to implement the service in our control environment. These will allow us to understand and mitigate the risk of conflict between the requirements of the transmission network and the capabilities of the distribution networks. This work is taking place within Open Networks (simulation results from which are expected later in the year).

Finally, we are in the early stages of plan formation with SP Energy Networks (SPEN) for our third RDP covering the Dumfries and Galloway area of Scotland. Our meetings with Western Power Distribution to discuss a possible fourth RDP have been positive, containing wide ranging discussion on issues regarding connecting storage technologies at distribution voltages and possible routes to tackling them. The next steps involve distilling the discussion into realistic deliverables that can form the basis of a plan.

Develop a whole system approach to meeting regional transmission needs

Our pathfinding projects are also ground-breaking collaborations with DNOs that take a **whole-system approach to developing** electricity networks. They represent a step-change in the way we work together, compared with our baseline obligations, and enable us to investigate new ways of delivering transmission network capability by looking beyond the traditional approach of installing transmission assets. As part of our relaunch of Principle 5, information on our baseline activities to ensure efficient network development is now captured within Principle 7.

Summary table of deliverables

Outcome	2018/2019 Deliverable	Status
Improve our cross-industry collaboration for whole system network planning and development	Publication of the Western Power Distribution and UK Power Networks Regional Development Programme Learnings	WPD: Published in June UKPN: Originally scheduled to be published in June; on track for Q3 (awaiting final review by UKPN)
	Begin two new RDPs by publishing a bespoke work plan for each region	On track for Q3
	Facilitate unlocking of further DER connections through: • Implementation of innovative connections contracts that support the roll-out of revised Statement of Works processes on a national basis and the ability for DER to provide transmission constraint management services in our in-flight RDP areas	UKPN: Delivered in June 2017 WPD: on track for Q3
	• Implementation of new commercial contracts to allow DER to participate in the provision of transmission constraint management services in our in-flight RDP	Originally scheduled for Q3. Now aiming for Q4. Delays have been

	areas (Q3) • Implementation of enhanced systems and ways of working between transmission and distribution to support provision of transmission services by DER (Q3)	experienced in both the technical and commercial workstreams.

Consumer Value

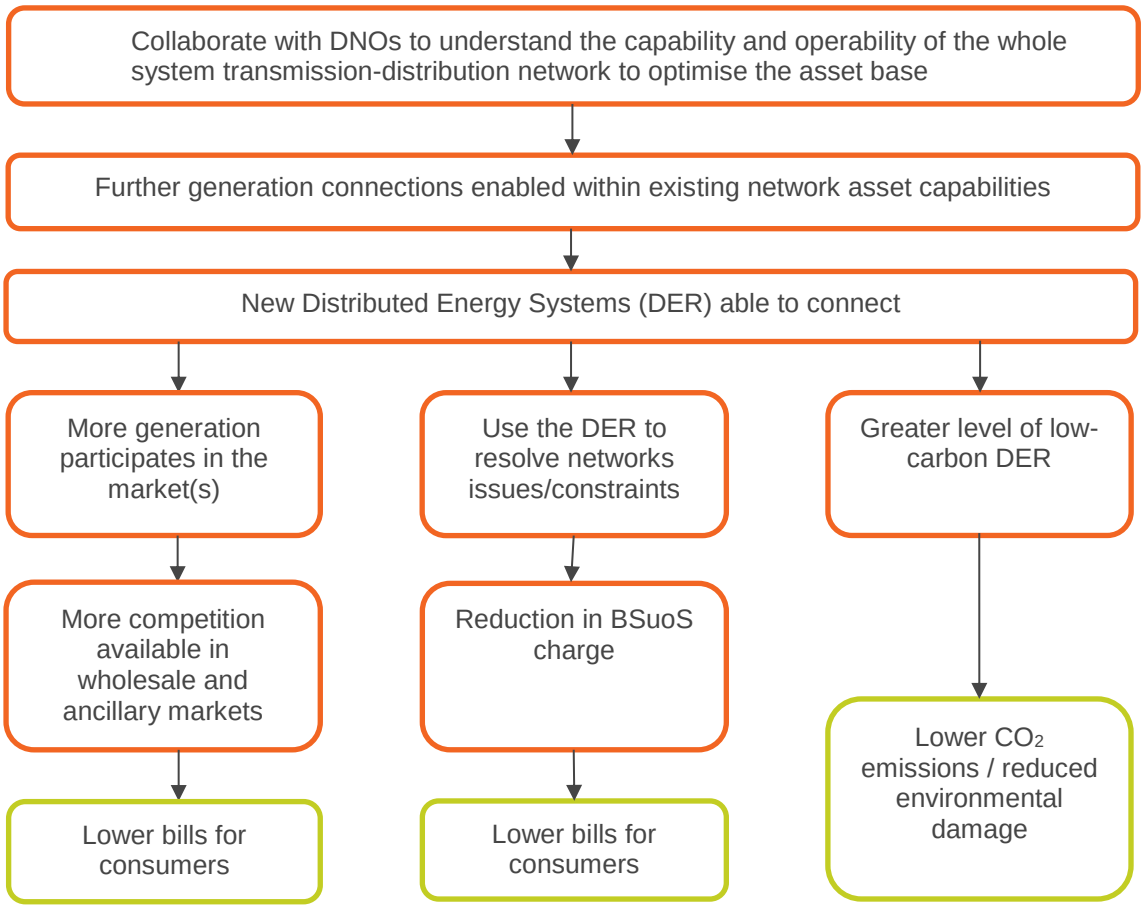
Facilitate distributed energy resource (DER) connections within the DNO network

Mechanism for consumer value

Through our collaborations with DNOs to better understand the capability and operability of the whole system transmission-distribution network, we are seeking to identify new, more efficient ways of working that drive more value for consumers.

We are conducting power system studies to analyse and understand the interaction of the transmission and distribution networks. Prior to this approach, new embedded generation may have been prevented from connecting, or delayed until appropriate re-enforcements were in place. However, now, with deeper understanding of whole electricity system capability, we can better model the impact of the proposed new connections. With the ability to see and manage the megawatts generated, we can create frameworks through which to manage and utilise the DER to assist system operation by the Electricity National Control Centre (ENCC). Instead of being something that causes a problem for the system operator, the generation can be viewed as another resource, or tool, available to provide options to the ENCC when facing system operation challenges. This can promote competition in the provision of services and help reduce costs.

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



Benefits to the end consumer resulting from this work will include:

- Direct benefit through lower BSUoS (balancing services use of system) charges (levied on system users and passed through to consumer bills), due to the ENCC having more options to manage the system which should feed through into lower energy bills

- Indirect financial benefit due to increased generation participating in markets, leading to greater competition, with greater competition leading to lower wholesale and balancing service prices
- Direct environmental benefit where the newly connecting generation is low-carbon, as tends to be the case with new DER.

The work we are doing in this area has not been done before and is outside of what has historically been expected of us. It is innovative and should deliver value to generators wishing to enter the market, DNOs, and end consumers.

Quantification

Environmental benefit: to determine this we would need to consider the amount of newly-connected generation by fuel type and an estimate of how many MWh it will generate per year, and then estimate the carbon offset of this (if the new generation is low-carbon). This approach is difficult in the case of network connected batteries, as we also need to consider the carbon intensity at the time the batteries are charging. We will look at how to quantify this aspect of the new DER connections for our end of year report.

System operability: over the course of the next year we will develop our understanding of how the newly connected generation can be used to manage system issues and the cost/benefit of this.

Benefit due to increased market participation: We do not intend to quantify this at this point in time. The amount of additional generation being connected now would not be large enough in proportion to the entire GB generation fleet to make a significant, measurable impact on prices. However, we firmly believe that we should keep focused on this work to ensure that in future years we continue to optimise assets across the whole-system; the facilitation of generation connections is absolutely in the consumer interest.

The benefit of this activity is projected to appear outside of the current 2018/19 financial year, when the new generation is connected, operating, and available for utilisation by the ENCC.

Additionality above baseline

The collaborative work we are doing in this area has not been done before and is outside of what has historically been expected of us, based on the requirements of the current GB regulatory framework. It is innovative and a step-change above the level of incremental improvement to our ways of working that we normally try to achieve. We are transforming the way we understand the behaviour of the networks on a whole electricity system basis, which is allowing us to collaborate to meet system operation challenges like never before. This should deliver value to generators wishing to enter the market, the DNOs who need to manage the networks to which they connect, and end consumers by ensuring we get the most out of existing network infrastructure.

Stakeholder Views

Stakeholder views summary

We heard that we need to more clearly articulate our vision and strategy for whole electricity system issues and begun to respond to this.

We engaged DNOs differently to solve shared problems through Regional Development Programmes and are communicating earlier with other networks companies on topics of interest in response to feedback.

How we engaged and what have stakeholders told us?

In this period, we continued to evolve how we communicate and engage with stakeholders on whole electricity system issues. We have:

- Provided clarity on our views on whole electricity approach (also applies to Principle 6)
- Changed how we engage with network companies to coordinate across system boundaries to deliver efficient network planning and development

Providing clarity on our views on whole electricity system (also applies to Principle 6)

The table below outlines how we responded to feedback on our position on whole electricity system issues.

You said	We did
During this period, we received feedback both from Ofgem and industry stakeholders that our position on whole electricity system issues was not clear. This is clearly articulated in Ofgem's formal opinion on our 2018-19 Forward Plan	In response to this feedback, in July we published a thought piece on Facilitating Whole Electricity System Outcomes. This document clarifies why we believe a whole electricity system approach can deliver consumer value. It also describes a number of principles we believe necessary to ensure maximum consumer value is delivered in the transition.

Changing how we engage with network companies to coordinate across system boundaries to deliver efficient network planning and development

The table below outlines the feedback we have received from DNOs and how we have addressed it:

You said	We did
We encountered several challenges in the first half of this year in how we engage and communicate with networks companies on whole electricity system issues. We received *clear feedback* from DNOs and TOs that they wanted us to communicate earlier and more clearly on topics that are relevant to them such as regional approaches to managing reactive power and future plans for evolving the NOA process.	In response to this feedback we now produce and share a monthly table providing a forward view of our relevant pieces of work and when we were planning to engage externally on these topics. We also encouraged other network companies to reciprocate, ultimately driving enhanced transparency of activities across networks. We also sought DNO input into a letter on exclusivity of ancillary services contracts in advance of engaging with industry more broadly.

How we engaged with DNOs on the Regional Development Programmes

UKPN RDP - As part of the work referenced above with UKPN to address the lack of capacity for new connections on distribution network on the Southeast coast the ESO engaged extensively with the DNO to develop a solution. The initial approach of the DNO was to use Active Network Management system (ANM) to manage the specific transmission network restrictions on their DER customers in a similar way that they are developing for distribution constraints.

Under this approach, it would not have been possible to ensure fair and consistent treatment between transmission and distribution customers. We therefore held several collaborative meetings and workshops between us and the DNO, in which we shared our knowledge of transmission operation, the developing NOA processes and the application of connect and manage rules.

This collaborative approach was able to work out how best to piece together the wide system ANM technology that UKPN are developing with NOA processes we are developing. The output has allowed for the development of the UKPN ANM with enhanced visibility and control to facilitate new connections to the network.

WPD RDP - Using future analysis work WPD realised that the rapid expansion of solar PV generation seen in the mid 2010's had potential for significant acceleration in the coming years and were concerned about the ability of their and NG ET's networks to enable this expansion.

The Regional Development Plan team set up a series of collaborative study sessions where WPD brought their detailed scenarios for DER expansion to the table and we shared our experience of actively operating diverse networks. Many collaborative working sessions were held to analyse the study results showing that the worst-case scenario for limitations on the network only presented itself for very limited peak periods. Further collaborative study work also showed how WPD and ESO could work together in developing a control philosophy using the distribution system to support the transmission system for short periods and further increase the capacity traditionally available.

By using a new way of managing new connections, using a similar method as developed for the UKPN RDP by using the DNO control schemes to provide visibility and commercial control, we demonstrated that it will be possible to connect the range of likely DER in the area for the foreseeable future.

Whilst the technical approach to the analysis in the two examples above was very different (solving a specific and immediate problem compared to longer term scenario planning), the principle of collaborative design by doing followed in both cases has resulted in a similar outcome for developers in both cases. Plans are now in place with both DNO's to provide the infrastructure to deliver connections and benefits to the consumer on that basis.

Further evidence of our enhanced engagement with network companies to deliver whole electricity system outcomes can be found in the WPD Southwest Regional Development Strategy document which references how we and WPD have successfully worked together to develop "increased understanding of the interaction between transmission and distribution networks".

Performance Metrics

13 Whole System- Unlocking Cross Boundary Solutions

Metric Description

This metric is an assessment of the effectiveness of our whole system actions, measured in terms of their consequences. The measure is the contracted MW capacity of distributed energy resources (DER) connections as a result of the 2017 UKPN/ESO collaboration on the South-East Coast.

Performance

Grid Supply Point (GSP)	MW	Commentary on DER technology types
Bolney	130	126MW of battery storage schemes 4MW of gas scheme
Canterbury	0	n/a
Ninfield	51.2	All battery storage scheme
Sellindge	0	n/a
Total	181.2	

Figure 21 - Metric 13 Whole System Unlocking Cross Boundary Solutions Performance

Supporting information

During April to June we had new connections of 133.2MW of battery storage schemes. This has slowed down during the July – September 2018 period with just a single new acceptance processed through the regional development plan (RDP) Appendix G trial at Bolney GSP for 48MW. This brings the total of Embedded Generation (almost all battery storage) up to 181.2MW in this half year.

Work is ongoing with Western Power Distribution to implement an RDP Appendix G trial process across their South West area, and potentially into the Midlands which would only include battery storage. Work is also ongoing with Scottish Power Energy Networks for RDP Appendix G trials across 11 GSPs in South West Scotland.

F

Principle 6 Evidence Chapter

Performance in the last six months

Meets baseline performance

The energy market is changing at pace and the scale of these changes is having a significant impact on the way we engage with customers and network owners and this has had significant effect on how we operate the network and deliver our baseline activities.

The principles behind the baseline activities that we deliver as the ESO in operating the transmission network remain fundamental to the standards of security and quality of energy supply delivered, however the environment in which we deliver them has changed significantly in parallel with the large changes we have seen in the energy market since the beginning of the RIIO period.

The commitment for the UK to meet climate change targets by 2030 and 2050, the increasing volume of renewable energy sources connecting to the network at both transmission and distribution levels, the changing generation background driven by the end of asset life for traditional generation sources as well as UK energy policy changes have all led to an energy system that has different technical characteristics and requires operating differently than the industry could have perceived at the beginning of the decade.

This volume and pace of changes has required us to continually develop the way we do things; many of our baseline activities such as the connection offer process or the outage planning processes are approached completely differently to ensure they work in the new environment and meet the needs of system users. We have continued to adapt these activities to ensure we continue to economically operate a safe and secure transmission network.

The volume of embedded generation projects connecting to DNO (distribution network owner) networks has increased rapidly; this began in the south of England as solar PV investments took off but this trend also extended to other types of embedded generation connections from battery storage projects to gas reciprocating peaking generation plant. We have also seen a considerable increase in the volume of applications to connect to the transmission network, in the first five months of the 2018/19 financial year we had processed over 80 connection applications, more than double the application rate for previous years. The increase in connection applications from more diverse technologies requires us to engage with customers in a different way; many of the applications come from new providers who have little or no electricity market experience. With these applicants in particular, we have taken the opportunity to demonstrate our commitment to delivering outstanding customer satisfaction by providing detailed support throughout the application and contracting process. We ensure they understand the connection processes and the codes that govern them, provide consistent account management support so they feel supported throughout and ensuring that we achieve a high contract signature rate that will ultimately lead to increased liquidity in the energy market.

Customer satisfaction has been a key priority since the beginning of the current RIIO period. This year the increased volume of new applications for connection to the transmission network has provided a great opportunity to excel at the service we offer. In 2017 we introduced a new fast-track approach to the customer connection offer process. This has continued through 2018 with some customers specifically requesting offers in ‘Sprint’ timescales. At the same time, other customers have expressed a preference to the standard 3-month process and this has given us the flexibility to offer additional services that better meet customers’ needs. The focus on customer service delivered increased satisfaction in both the application process and the connection compliance process our customer satisfaction surveys are regularly receiving 8/10 and 9/10.

We have developed improvements to our Customer Connection Seminars that we hold twice a year as an industry engagement event for all new and existing customers. These events provide insight into the development of the transmission networks and changes and developments in the commercial frameworks that affect our customers. We hold the events in Glasgow and London to ensure maximum opportunity for attendance and typically receive 80 – 100 participants at each location. We receive excellent feedback from participants, a recent example being: -

‘The user seminar was also a great event – we find it is consistently the most useful networks related industry event each year.’

We are also improving our baseline performance with much more liaison around the future system access plan with affected customers and the relevant TO (transmission owner). We are well underway with our development of TOGA (transmission outage and generator availability) replacement – this is the tool that customers and TOs use to request system access. The approach we have taken is that the new functionality should be customer led and we have held two very successful customer events at which we asked the questions around what they would want to see from TOGA.

Exceeds baseline performance

Beyond baseline activities, we are working in new ways and developing products and services that are needed to ensure the network can be operated economically and efficiently in a completely new operational environment.

Collaboration with other parties is critical to facilitating whole system outcomes that deliver consumer value. The ENA (Energy Networks Association) Open Networks project brings together all the main GB networks organisations to develop new approaches and ways of working that the changing energy landscape requires. We are a committed and valued member of the ENA Open Networks project providing significant resource to the development of the project's initiatives. Our subject matter experts have joined other networks organisations, with our unique perspective as the ESO ensuring a rounded debate and bringing extensive system operator experience to discussions.

Earlier this summer, we led the publication of the 'Future Worlds' consultation as part of the Open Networks project. Through a stakeholder-led development process, the consultation provided an accessible means for a broad range of parties to understand and discuss potential future industry arrangements and how they could be affected. We were highly involved in stakeholder events during the consultation period, presenting at both the Future Worlds seminars and also hosting the two Future Worlds webinars. Around 50 responses were received to this consultation, a record for the Open Networks project, and we are now leading the project's review of responses to inform the project's next steps.

We have been supporting a new type of innovative connection solution brought forward by a storage provider (Pivot Power) and the England and Wales TO (NG ET) which utilises the tertiary connections in supergrid transformers. This new type of connection offers the connecting customer a lower cost and quicker connection than would have otherwise been available but is limited to connections up to 50MW in capacity. In many cases supergrid transformers provide the connection point for DNOs and other customers connected to the transmission system; the use of the tertiary connection for additional customers will change the commercial arrangements for connection charges. In particular, DNOs currently pay for sole use of connection assets on the network and as such we will need to develop alternative commercial arrangements at sites where these connections take place. This is a new concept and we are currently in discussion with all affected DNOs about this new type of connection. There is more commercial and regulatory development work required to be finalised before the connections are completed, but this is a great example of the ESO, the TO and the DNOs working together on a whole system basis to find new and innovative ways to facilitate new customer connections.

The "Appendix G" process started as a pilot project between ourselves and two DNOs (UKPN and WPD) the trial was developed to find a better way of providing connection offers to DNO embedded generation projects. The existing Statement of Works Process has been in place for a long time and was not designed to accommodate the volume of applications that DNOs have seen in recent years. This new approach gives DNOs visibility of the volume of capacity available at individual Grid Supply Points up to a set limit. This gives greater transparency to the DNO and enables them to contract with embedded customers more quickly without individual applications to the ESO. This new approach informs the 'Statement of Works' that define Transmission network reinforcements required. We have trialled changes to this process to better process the large volumes of embedded generation that is wishing to connect and now extended this process to all DNOs. This process has saved many hundreds of individual Statement of Works delivering value

through reduced application fees and processing time, and providing more agile and cheaper connections to the DNOs' customers.

In our Network Access Planning team, we worked to develop automated study set up to allow more efficient ways of creating the studies required to carry out system security analysis. This project is using existing resources and expertise to reduce the human processes involved and employ robot functionality to create efficiencies in our day to day operations. These studies are critical tools that enable operational planning to be conducted from three weeks ahead and facilitate delivery of an operational plan to the control room to be used in real time operation. Currently the creation of system studies takes four days and the automation we have been developing over the past three months will reduce the study time by 50%.

Through the Network Outputs Assessment (NOA) process we identified a potential alternative approach to enable increased boundary flows without the significant transmission infrastructure investment. This approach will use intertrip arrangements that are typically used for reducing output from generation during fault conditions. We are currently developing this potential alternative and identifying specific areas on the network where it may be a suitable option. Initial assessment forecasts potential savings of £400m in the 2020s.

Summary table of deliverables

Outcome	2018/2019 Deliverable	Status
Baseline		
Working with stakeholders to design new systems	TOGA replacement	Extensive stakeholder engagement, ensuring new functionality is customer-led through hosting three customer workshops during July and August 2018 to collect input
Improve our services for connected customers	Delivering increased volume and complexity	The changing use of the network by an increasingly diverse range of connections has increased the level of complexity in daily operation of the network additionally the developing energy market is resulting in much greater volumes of connection enquiries and applications to connect to both the Transmission and Distribution networks these challenges have required us to develop changes in the usual activities we do and find ways to carry out our day to day operations better and more quickly to maintain the security of the network and meet customers requirements.
	Increased connection application volumes and 'Sprint' process	The continued use of the 'Sprint' approach to the customer offer process has enabled us to deliver double the volume of connection applications compared with the same period last year
	Connection and Compliance customer engagement	In the connection offer and connection compliance areas we saw continued improvement in reported customer satisfaction, regularly receiving 8/10 and 9/10 survey responses.
	Customer Connection seminars	Delivered successful Customer seminars in Glasgow and London, attracted over 80 participants at each event receiving excellent feedback.

Improve our cross-industry collaboration on whole system	Network user planning workshops to reduce outage 'churn'	We developed and delivered stakeholder events with TOs focusing on outage planning optimisation, addressing the levels of change and creating a more accurate plan to deliver system access for maintenance and connection works
	DNO Operational Liaison	Quarterly operational engagement workshops with DNOs resulting in improved information sharing, seasonal operating challenges addressed and improved cross network collaboration
Exceeding		
Improve our cross-industry collaboration on whole system	'Whole Electricity System Outcomes' paper	Allows us and the industry to understand the areas that need to be considered as we move to a whole system approach
	ENA Open Networks Future Worlds consultation	Received positive stakeholder feedback on the delivery of the consultation
	Extend Appendix G trial processes	The Appendix G trial was initially started with UKPN and WPD to improve the application process for connection of embedded generation projects. It has now been rolled out with all remaining DNOs. Previously DNOs applied to NGESO each time they received a customer application to connect to their network, they did this through the Statement of Works (SoW) process which identified any required transmission works. In some areas, the SoW process caused delay to the DNO being able to make connection offers, the Appendix G trial provides more transparency of the connection capacity available at particular Grid Supply Points. This enables quicker connection times and reduced costs for connection. Saved many hundreds of individual Statement of Works and has saved many £000s in application fees and processing time, and provides quicker and cheaper connections to the DNOs customers
	Supporting a new Tertiary connection product that the NGET TO has offered to the market	These offer the connecting customer a lower cost and quicker connection, but require significant engagement with all DNOs to develop the appropriate technical and commercial solution.
Designing new products for connections	Non-Firm and Restricted access connections	In certain congested areas of the network we continued to receive applications for connecting additional generation products, to provide these connections quickly and without triggering the requirement for significant transmission reinforcements we developed new commercial products that provide access to the market but during restricted time windows, these products meet customers' needs but reduce the cost to the consumer of operating a constrained network.

Consumer Value

Playing a pivotal role in the ENA Open Networks project to deliver Whole System outcomes

Mechanism for consumer value

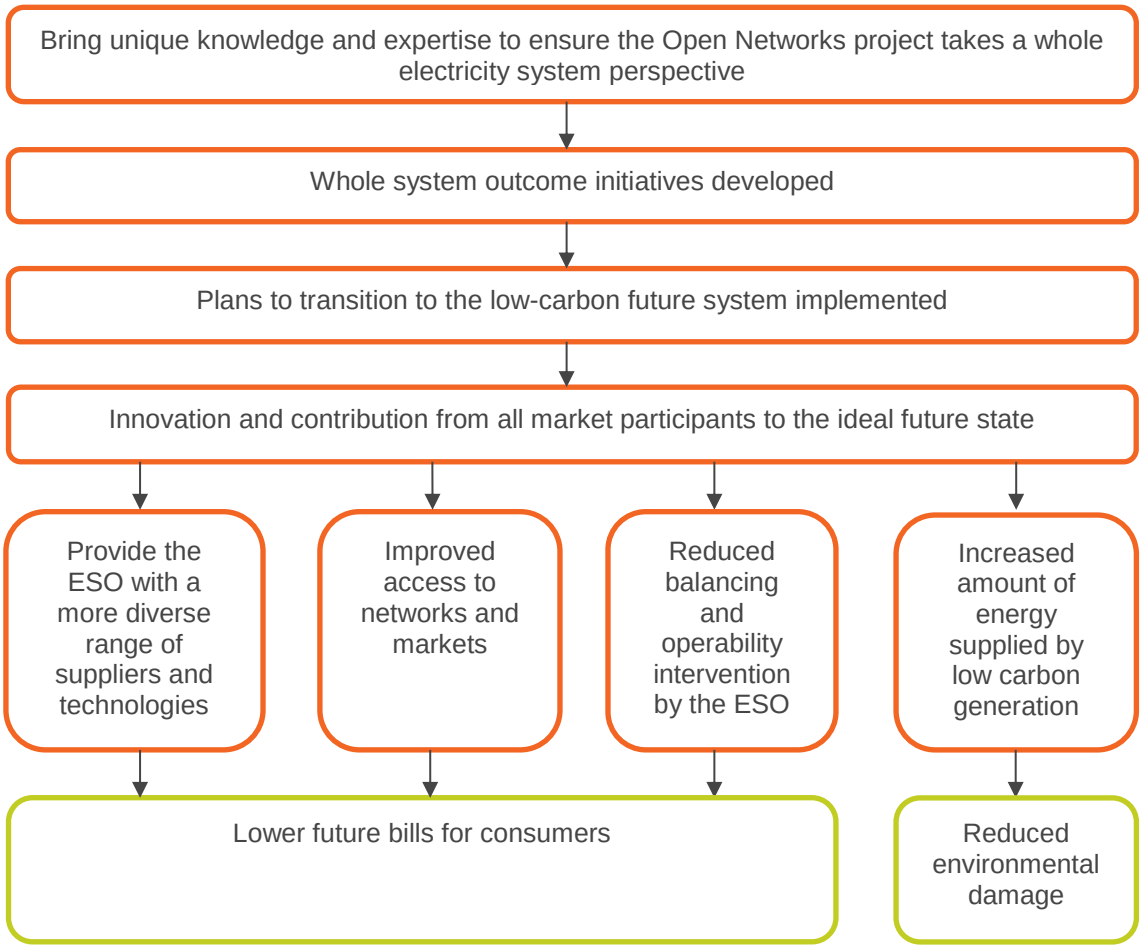
We will provide a pivotal role in enabling the unlocking of consumer value from the smart, flexible electricity system of the future through being a valued member of the ENA Open Networks Project. We will draw on our extensive knowledge and experience to provide thought leadership on all the project's workstreams and relevant deliverables (referred to as 'products'). On major deliverables, the we will take a lead role, using our extensive knowledge and experience, to deliver products that are valued by other ENA members and the wider stakeholder base. This is evidenced through our lead role in the delivery of the 'Future Worlds' consultation. In this consultation, we are leading 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

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.

The project will benefit the end consumer in terms of:

- **Lower bills** than would otherwise have been the case, through all parties ensuring that the future system is planned to be able to be operated economically
- **Reduced environmental damage**, due to all stakeholders working to facilitate and develop the low-carbon generation system of the future

We illustrate the mechanisms which result in consumer value in the flow-diagram below:



The ENA intend to reference consumer value for each Open Networks deliverable in their upcoming end of year report (due December 2018), and we will elaborate on the value we add through this work in our end of year report (due May 2019).

Benefits to the consumer will be both direct and indirect. Direct benefit will be through attention being paid to ensuring network and system operator costs are optimised (both of which are levied on system users who then pass that through to consumers), and through exploring options for economic network development. For example, looking to avoid asset build-out if other technological solutions are emerging. Indirect benefit will arise from all system participants seeing a 'level playing field', enabling competition and participation in the generation, supply, and usage of energy to all, down to the individual consumer.

The benefit to the consumer will be realised in the coming years, however it is imperative that there is focus and incentive on key parties to act now, due to the unprecedented and rapid change taking place in the industry.

By playing a valued role within the sphere of the ENA to shape the future system, we are demonstrating how we can leverage our expertise and knowledge to advance the development of the system in timescales not envisaged at the beginning of the current regulatory period. Vastly increased amounts of renewable generation and the rapid decline of coal-based plant have accelerated what was expected of us in this period, however we have stepped forward to meet the challenges head-on and will continue to do so.

Specifically, our active involvement in the Open Networks project ensures that a broad consideration of the whole electricity system is undertaken and that best practice techniques and experience from system operation of transmission networks and markets is used to develop whole system solutions. Such solutions will ensure best value outcomes for the end consumer in line with our position on facilitating whole electricity system outcomes.

Drawbacks and potential for unintended consequences of our actions

The ENA has no decision-making powers to implement its recommendations in frameworks and regulation, nor to manage the implementation of a plan even if it is agreed across industry. BEIS, Ofgem and Government will make decisions on what solutions are chosen following consultation, and what tools or mechanisms enacted to ensure delivery of those solutions.

Quantification

Work in this area is fundamental to the achievement of an economic and securely operable electricity system in the future.

Current research (from Energy UK, ADE, Ovo Energy) demonstrates that if industry works together to solve the challenges appearing on the system as a result of the transition to a low-carbon environment, there are immense benefits to be realised for the end consumer. For example, the often-cited papers for the National Infrastructure Commission puts the upper bound of consumer benefit in the region of £8bn/year in 2030. We are a key player in the transition of the electricity system to its low-carbon decentralised future state, and as such will contribute significantly to deliver future consumer benefits in this area.

We demonstrate how we are working with industry to achieve the economic, secure and operable system of the future. The following chart illustrates the contribution we make to the ENA workstreams and products, through providing significant levels of resource to the projects. The chart shows the number of ENA roles we perform, against the average number of roles across the other comparable organisations (major onshore GB DNOs and TOs) participating in the ENA workstreams and products.

The Open Networks project is focused on the transition to DSO and is naturally a significant project for all electricity DNOs. It can clearly be seen that our involvement is significantly higher than the average. This is to be expected and is appropriate, as with six DNO and three TO organisations, views of these entities can be given by a number of parties whilst our perspective as the ESO is unique and required across the majority of products.

(Note that to calculate the average we totalled the Lead, Member, and Support roles performed by comparable organisations other than the ESO, and divided by that number of organisations. We have also treated organisations who perform both a transmission and distribution function as two entities for purposes of calculating the averages.)

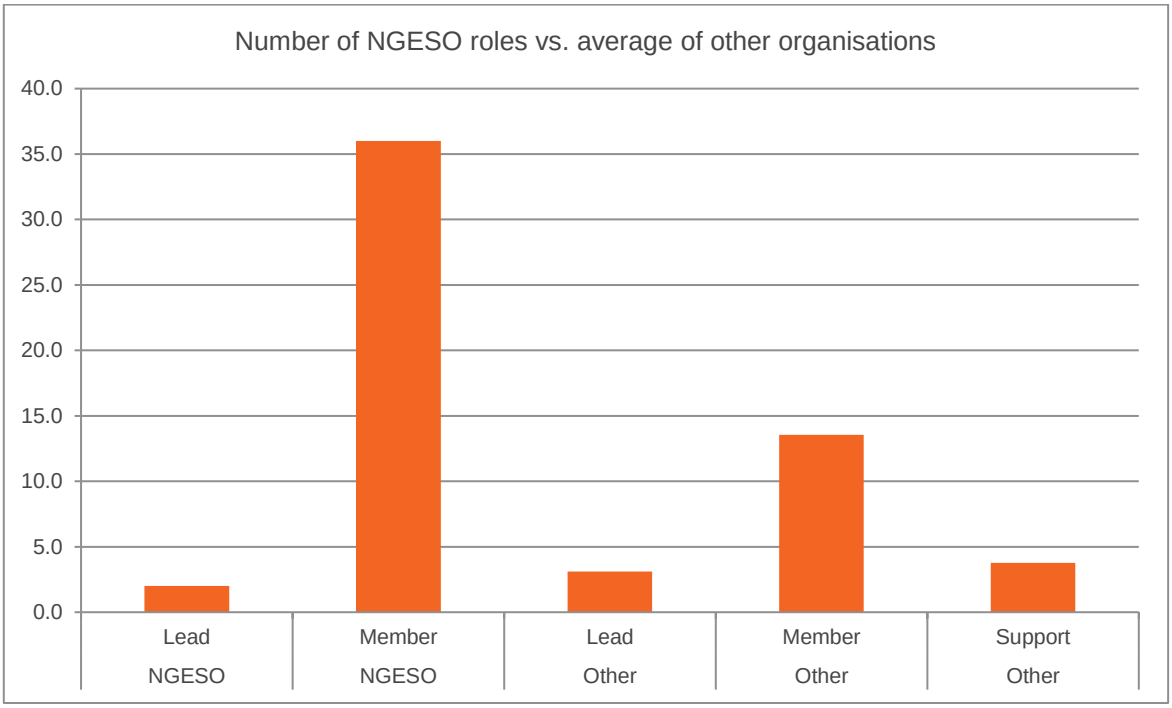


Figure 22 - Chart showing the number of ENA roles NGESO performs, against the average number of roles across the other comparable organisations.

Stakeholder Views

Stakeholder views summary

We received a lot of useful feedback from our customers on how we need to improve our outage management system.

We received very positive feedback through our customer satisfaction surveys for Customer Connections and Generator Compliance. We also had some positive views from stakeholders regarding our work leading the engagement on the ENA Open Networks Future Worlds consultation.

How we have engaged and what have stakeholders told us?

In this period, we have continued to evolve how we communicate and engage with stakeholders on whole electricity system issues. We have:

- Provided clarity on our views on whole electricity approach (also applies to Principle 5)
- Provided significant input in to the ENA Open Networks Project and promoted network engagement with wider industry to facilitate whole electricity system outcomes
- Engaged our customers on a replacement for the Transmission Outage and Generator Availability (TOGA) system

Providing clarity on our views on whole electricity system (also applies to principle 5)

The table below outlines how we have responded to feedback on our position on whole electricity system issues.

You said	We did
During this period, we have received feedback both from Ofgem and from industry stakeholders that our position on whole electricity system issues was not clear. This is clearly articulated in Ofgem's formal opinion on our 2018-19 Forward Plan.	In response to this feedback in July we published a thought piece on Facilitating Whole Electricity System Outcomes. This document clarifies why we believe a whole electricity system approach can deliver consumer value. It also describes a number of principles we believe necessary to ensure maximum consumer value is delivered in the transition.

ENA Open Networks Project Engagement

Future Worlds Consultation

We led the ENA Open Networks activity on the Future Worlds Consultation as well as the associated stakeholder engagement. In developing the consultation we adopted a stakeholder-centric approach to act on the learnings of the previous ENA Open Networks Consultation; the Commercial Principles for Contracted Flexibility.

This included engaging early and seeking stakeholder feedback and input into the consultation document in advance of publication. For example, we asked relevant stakeholders to comment on the level of content and the clarity for the stakeholder roles section including: Citizens' Advice on the consumer section; The Association for Decentralised Energy on the aggregator section; Centrica on the supplier section; Energy UK on the Transmission connected generation section and the Scottish Government on the Government section.

We facilitated two stakeholder workshops on the Future Worlds consultation with over 150 participants in total from across industry. We also led 2 industry webinars joined by over 100 industry stakeholders.

We received overwhelmingly positive feedback on the Future Worlds consultation:

"Clear and well-thought-out stakeholder-facing consultation, particularly given the scale and complex interactions that exist within the Open Networks Project" "

"The consultation puts forward a coherent view of the key considerations (or enablers) that will facilitate the change needed to deliver Government policy."

"The consultation is a very helpful articulation of a range of options available to the GB energy market and an excellent starting point for engagement."

"The event recently facilitated by the ENA in Edinburgh really helped to set out the background to the consultation, the key considerations and highlighted the importance of stakeholder engagement."

"We commend the teams who have created the document on their hard and thoughtful work and for bringing this forward in a timely manner in support of a fast-changing energy system."

We also heard that we could offer a platform for more diverse speakers on this topic.

You said	We did
We received anecdotal feedback from a small number of stakeholders that the Open Networks Project was too networks-centric.	In response, we have promoted a more substantial role for non-networks stakeholders in the work of the Project. To demonstrate delivery of this approach we have organised workshops with stakeholders for the "products" which we are leading to get their input during the development phase of the work. A good example of this is the stakeholder focus group we organised and ran for Workstream 1 Product 2 (DER Services Procurement), bringing together energy suppliers, industry associations and academics to discuss the design and procurement of DSO services, including the interactions required between transmission and distribution markets.

Transmission Outage and Generator Availability (TOGA) system

TOGA is a system that enables us as the ESO and all Users to meet their Grid Code and System Operator and Transmission Owner Code (STC) obligations in the areas of Transmission Outage Planning and Generator Availability.

We engaged customers early to understand their needs from the system to inform the scope of a new system. We held three industry workshops in July and August 2018 with 40 customers from 20 companies including TOs, DNOs, Generators, Directly Connected Customers and Interconnectors. This was an opportunity for customers to share their experiences and interactions with TOGA and to provide their capability needs of the new system.

Customers unable to attend were invited to provide feedback via a briefing pack and customers raised the following issues with the existing system:

- Manual and inconsistent processes
- Outage status and impact hard to understand

- Poor change management processes
- Poor communication
- Poor reporting and visibility of data
- Only contains assets of relevance to National Grid
- Poor user experience
- Need to align data requirements of different systems so that data only needs to be uploaded once

Our next steps will be to:

- Publish a consultation on duplication of submission of data to different systems.
- Hold working groups with stakeholders who have volunteered to provide a playback of what we have heard discuss the system design changes that we could take forward
- Communicate a project update in December 2018.

Customer Connections

Customer Satisfaction surveys

Customer satisfaction surveys are conducted by an independent third party service provider.

Date: FY2018 Q1 and Q2

	# responses	Average Score
Overall on a scale of 1 to 10, where 1 is very dissatisfied and 10 is very satisfied, taking all aspects of the service you have received into account, how satisfied are you with National Grid Electricity Transmission?	22	7.64/10
What could National Grid <survey area> have done to score a 9 or above? / What did National Grid Customer Connections do particularly well?	22	n/a – comments below

- I guess the project management wasn't really or always seemed to be technically lacking in experience. Perhaps they didn't have a technical grasp of what was happening and there were a few issues setting up meetings and conference calls
- They are so much better than the distribution operators and the other people such as the transmission operators. I have been flabbergasted at how helpful they have been. There have been lots of different people in our meetings but I am not sure if they are part of a bigger part of the team or they have come separately. The people I have dealt with have been first class. They responded very quickly to my correspondence and they have promised to get back to me and informed me if when they have needed time to find something out. They have always given me a date and they have done it within that date. I would say National Grid have difficult processes but they always explain them to me and get me through them even when they're a challenge. We have changed things many times so I can imagine that gets quite annoying
- They respond well to queries and answer things in a quick and timely manner. They arrange meeting as and when is required
- They gave us feedback and they facilitate issues that we have with their contractor
- I just think they are pretty thorough and respond quickly. I have genuinely been impressed with them
- They could be more responsive

- They could probably co-ordinate their meeting system more efficiently and specific contact telephone numbers for conference calls
- I suppose they could have had some additional people at some of the meetings to represent other parts of National Grid
- For me to give a 9 or above they would have to be basically perfect. Most of the issues we have is begin timely with responses
- Challenge the TOs more not purely act as a postbox. Consider the Customer's view first. Make fewer mistakes in offers.
- Improve speed of sorting call requests out and having flexibility with payments
- The score I have just given is solely in response to the Electricity Transmissions Connections Team. The other teams I deal with on the other side I am less than satisfied with. I guess its part of our education and it's a very complex system they're running which I appreciate. They do expand on things which is very good and we had a meeting also which was very good. It was helpful talking about that team in isolation. Without changing the fundamental system I don't think there is a lot more they can do. Their communication I very good and I Graham Neil is very responsive. By me giving a seven I feel that score is more reflective of me trying to learn more about the system than any of the failings of National Grid's personnel. They're very open and I have never had chase Graham Neil for a response to me; they have been very good
- They could turn round the quotes quicker
- Sometimes there is a bit of a delay in replying to emails but that is just a minor detail
- Maybe the speed of response could have been quicker and when various assigned contacts are on leave cover isn't always obvious and available. There could be a better contact handover when someone is on leave
- I think greater understanding of customers' needs and perhaps more focused engagement with the customer. Offer more understanding of the customer and not just seeing it from their perspective
- I think there is opportunity for quality improvement around the issuing of documents and or contracts. Again I think maybe ensuring very high quality checks in contract issuing and negotiations
- I guess to score a nine or above sometimes it can take a little while to contact the actual individual we actually need to speak to. I know they're very busy but when we do get to our account manager we get a very good service
- They could have more staff they seem to be very under staffed and I can normally get the answers quicker than they can particularly about their own policies
- I guess it's always easy to speak to face to face but I think a personal visit would help; it would be pretty good to get a performance review

Generator compliance

Customer Satisfaction surveys

Customer satisfaction surveys are conducted by an independent third party service provider.

Date: FY2018 Q2

	# responses	Average Score
Overall on a scale of 1 to 10, where 1 is very dissatisfied and 10 is very satisfied, taking all aspects of the service you have received into account, how satisfied are you with National Grid Electricity Transmission?	22	8.86/10

What could National Grid <survey area> have done to score a 9 or above? / What did National Grid Customer Connections do particularly well?	7	n/a – comments below

- I'm not sure. I never score a nine or a ten there's always room for improvement. There are a few guys who are busy and I have to get in contact with these guys or have good means of communication. It's down to a lack of people and lots of work
- I think the relationship we have the Compliance Team could be more positive. It would be better if they had a better understanding of their target connections earlier and an easier compliance requirements regarding this type of connection
- Very pragmatic and understanding and gave very good feedback to questions and it was quite simple query we had anyway but yeah just all a very professional experience
- Just I guess good communications and they respond to emails. They are good at keeping minutes during meetings; it is quite a professional service
- They handled, the meetings were well scheduled, they provided back up where the grid compliance coordinator didn't know what the answer was he was able to get the answers from someone else within National Grid which is important the engineers are extremely helpful
- They just took us through the compliance process quickly and pragmatically
- They are just very good at responding and also chasing up within National Grid for various things and actions that need to be done. They chase up those different people in National Grid

Performance Metrics

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.

We are making good progress with updating connection agreements. There are currently nine connection agreements that require updating. Eight of these are making very good progress and five have been issued to the customer. One of the connections agreements that we started working on in April has not yet been issued to the customer and we have escalated this to ensure that the agreement is issued without any further delays. We also intend to engage with the customer to explain the changes within the BCA in detail so as to facilitate a prompt response from the customer.

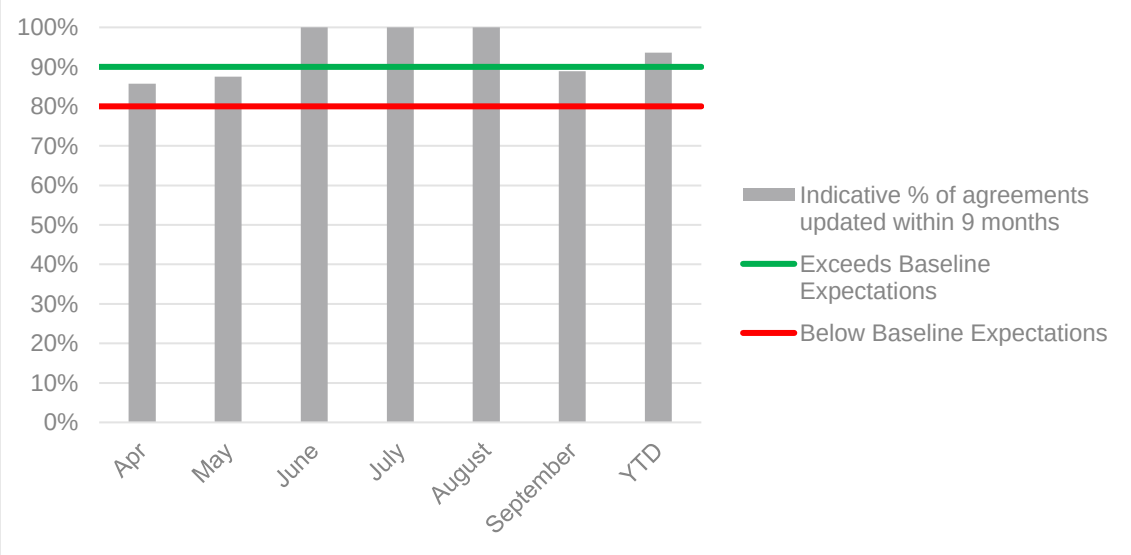


Figure 23 - Metric 14 Connections Agreement Management

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 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[8]. 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 September, 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 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. During the first six months we have 27 outages which we classified as failed to fly out of 4634 outages. 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.

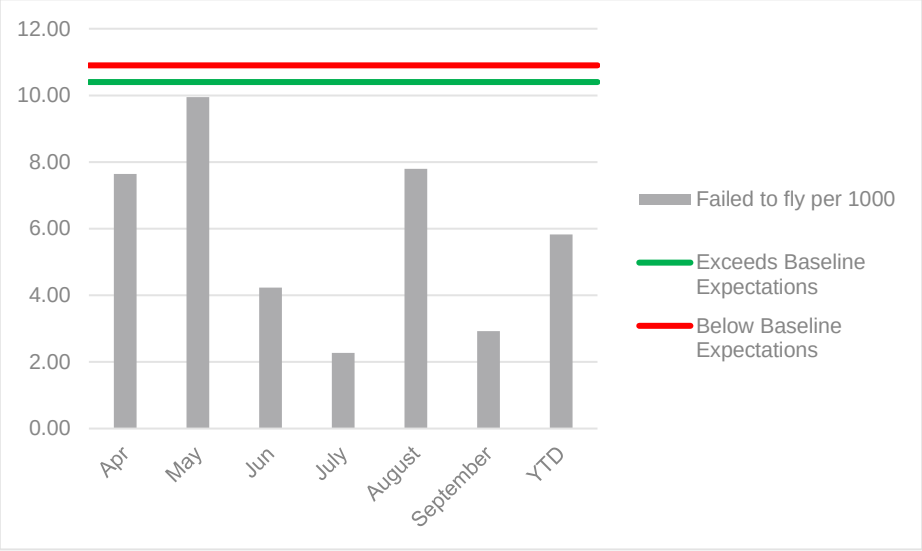


Figure 24 - Metric 15 System Access Management Performance

16 Future GB Electricity System Security Planning

Metric Description

We will measure our delivery of the Six-Monthly Operability Reports, stakeholders' engagement with them, and our delivery against plan.

Through the operability reports, the operability delivery plan will be supported by a narrative explaining the current state of the programme, and where changes have been made, the rationale for the changes. Where deadlines have been missed or key milestones delivered early we will report our reasoning for this.

Performance

Our first Operability Report is due in Q3 which will provide an update on actions we have taken, and our future plans, to deliver an operable system. Further information on the Operability Report

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

can be found in the Forward Plan Performance Metrics Definition 2018/19 document. Using feedback we received from industry on our System Needs and Products Strategy (SNaPS) publication we have developed a consistent structure to be applied to each of the five key focus areas of the report to ensure it is simple to read and clear for our stakeholders. This first report is on track for publication by 14 December 2018.

G

Principle 7 Evidence Chapter

Performance in the last six months

Meets baseline performance

Our baseline activities cover the existing Network Options Assessment (NOA) and Electricity Ten Year Statement (ETYS) processes and associated activities. We have delivered our commitments in both processes and continue to improve the processes and our engagement year on year.

In April, we commenced our external engagement on the NOA with publication of the methodology for consultation. The methodology this year contains incremental changes, mainly focussed on improvements in response to stakeholder feedback and ahead of upcoming changes to Standard Licence Condition C27. There were two more significant changes as well; to incorporate the interconnector methodology into the main NOA methodology for the first time and to include the high-level process for assessing generator and demand connection applications to the transmission network against the competition criteria.

In response to stakeholder feedback the methodology consultation was run earlier than in previous years to allow us to submit the methodology earlier to Ofgem for approval. The technical studies for the NOA process begin in early June and as such having a methodology agreed between stakeholders ahead of this is beneficial to all of those involved in the process (ESO & TOs) so we all are in agreement on the process being followed.

We submitted the methodology to Ofgem for approval in early July. This was later than intended, although still well in advance of the date required by our licence. The delay resulted from us listening and responding to stakeholder feedback to facilitate a simpler way of providing feedback on the methodology rather than through formal written responses.

During September, we tested the new methodology for assessing generator and demand connection applications with a range of qualifying and non-qualifying projects. We talked through the approach to this and outcomes with the relevant team in Ofgem. We also discussed our proposal on how the expected new licence obligation on the ESO carrying out early works for certain options to go into the NOA could work. We received positive feedback from that meeting on our solutions-focused approach.

We were still awaiting confirmation from Ofgem that the methodology been approved at the end of September deadline. However, we have since received confirmation of their approval of the methodology for this year. Having approval of the methodology is important as it provides confidence for all stakeholders in the process we are applying in the assessment of system needs and the options to meet them.

Further stakeholder engagement was conducted on the form of the ETYS report and following this, the form of the report was submitted to Ofgem in May and has subsequently been approved.

In addition to our licence driven stakeholder engagement we have also continued to work closely with the TOs, building on feedback received at the end of the previous NOA cycle. To address some of their concerns and provide greater insight into the processes we held a workshop in May to go into detail on the cost benefit analysis process and provide an overview of the other process improvements we made in response to both their and our internal feedback. This workshop was well received, scoring highly in terms of stakeholder satisfaction. We also continue to run a weekly teleconference with the TOs to specifically discuss the ETYS and NOA processes.

In September, the focus has very much been on delivering the 2018 ETYS and 2019 NOA. This month we have finalised the technical analysis of options to meet system boundary transfer requirements with all three Transmission Owners (TOs) for the ETYS and NOA. This process has been run jointly between us and NG ET for England and Wales ahead of the TO taking responsibility for this following legal separation of the ESO from England and Wales TO in April 2019. For Scotland, the TOs have conducted the analysis with us undertaking validation studies to confirm results.

This has required close working with the TOs to ensure that the studies undertaken can be used to the fullest extent in the NOA cost benefit analysis. To ensure this we have introduced a number of challenge and review sessions with the TOs to review their studies and understand their thinking. These challenge and review sessions have been viewed positively by all parties and have resulted

in the opportunity to identify nine SO-initiated options. These options cover a variety of solutions, including operational measures, commercial solutions, reduced build schemes and changing the order of reinforcements to deliver optimal system benefit. These options will feed into the cost benefit analysis, with those that appear in the optimal path counting towards the NOA Consumer Benefit metric.

Exceeds baseline performance

We have also made good progress and learned some helpful lessons on our activities that exceed baseline performance. These are related to the Network Development Roadmap. The roadmap sets out our intentions regarding expanding the NOA process to consider a wider range of options and facilitate participation by a wider set of stakeholders. We are implementing the recommendations of the roadmap through several pathfinding projects, which are being conducted on a “trial by doing” approach.

In May, we published the Network Development Roadmap consultation to the industry to obtain views on our proposals. We received 13 responses to the six week consultation, from a more diverse set of stakeholders than we have historically heard from, including onshore TOs, DNOs and market participants. This wider stakeholder response was achieved through broadening the channels used to publicise our network planning approach and developments. We launched the finalised Network Development Roadmap on 12th July, confirming the direction set out in the initial consultation and providing further clarity where our intentions were not clear or well understood. Our engagement on the roadmap has continued with a wide range of stakeholders beyond its publication, with network companies and market participants.

Alongside launching the Network Development Roadmap we commenced a number of pathfinding projects which will be used to deliver the enhancements outlined in the roadmap. Three pathfinding projects are looking at developing a whole system NOA-style process to address regional high voltage issues. The three areas identified for consideration stem from current high spend on voltage management and future projected risk of SQSS non-compliance.

The first pathfinder project covering the Pennine region looks to develop processes to economically assess options to manage high voltage issues and considers both TO and DNO solutions. This project is progressing well with five possible solutions received from the two relevant DNOs. Further network options, such as the use of tap stagger, circuit switching and voltage set points were also considered in addition to those submitted but were discounted due to the low benefit they provided or additional operational risk they introduced.

Typically, we have found that DNO options are effective if the source of the problem (i.e. reactive injection) comes from the DNO network. However, TO solutions are equally effective and tend to provide a wider spread of voltage control than distribution solutions. Where the two solutions are equally as effective, the decision on whether to choose a DNO or a TO option depends on cost, which is very site specific. We are in the final stages of assessment with conclusions on the recommended option due in mid-October.

The project covering the Pennine region is being delivered through the ENA Open Networks Project and in September we have continued to engage with the TOs and DNOs through this group. We have also progressed conversations on how DNOs will be funded for options recommended in the NOA through the ENA Electricity Regulatory Group, with the aim of having short term solutions in place by the end of the year.

Whilst the identification of the initial high voltage pathfinding projects stemmed from future network analysis and current high spend, we are also developing our tools such that we have the capability to apply a systematic approach to identifying future network issues. The tool under development looks to use historical data to identify patterns that lead to voltage issues, which can then be applied to the Future Energy Scenarios (FES). This will identify network conditions, locations and timescales which can then be further investigated through power system analysis to identify any future system voltage needs. The tool has been developed over the past six months to the point that it is now in the testing phase and with the intention that it will be finalised Q1 to be used in the 2019/20 NOA cycle.

We are also driving innovation in our network planning tools and enhancing our analysis of year-round network conditions through the use of thermal probabilistic analysis. The use of thermal probabilistic techniques has resulted in the identification of a new planning boundary which has been studied as part of the NOA process (see page 20/21 of our Q1 report for more information). This new boundary better reflects the needs of the system going forward and will result in more appropriate investment recommendations. The network needs for this boundary have been assessed using the current deterministic approach and probabilistic approach and will be published as a case study within the ETYS document in November. During September, we have focused on how we can explain the process and case study in the forthcoming ETYS.

We also ran an engagement workshop with the onshore TOs to provide an update on the pathfinding projects and get their input to the development of the tools and processes. This was well received with the TOs scoring us an average of 7.8 for the engagement on the Network Development Roadmap and 7.9 for the quality of the workshop overall. In general, they appreciated the continued engagement and being kept informed of the developments. Where we can improve is to be clearer on how we are utilising the feedback to shape what we are doing. We have also continued to engage with a broad audience and talk to them through their established groups about this new subject. This has included attending a meeting at the Association of Decentralised Energy (ADE) to speak with demand service providers about the developments to network planning and get their feedback on how they may be able to participate in the processes. We have also promoted the work in our regular Development of Ancillary Services newsletter, which goes to a wide audience of existing and potential balancing service providers. The ESO 2030 Ambition Workshop held in September provided a good opportunity to promote the developments to a wider audience and seek their views on what we're doing too.

Summary table of deliverables

Outcome	2018/2019 Deliverable	Status
Improve the Network Options Assessment models and methodologies to support Extending Competition in Transmission (ECIT)	Publication of the NOA Report and methodology.	NOA methodology published for consultation in April, final document published in July
	Publication of the 2019 NOA recommendations.	NOA report on track for Q4
	Publication of the Network Development Roadmap consultation and the final Roadmap.	On track for Q4
	Publication of the Electricity Ten Year Statement, which includes some of the methodology improvements mentioned.	Roadmap consultation published in May, final version in July
	Publication of the ENA Open Networks approach to whole system investment and operability options across transmission and distribution networks.	On track for Q3
	Increase the scope of the NOA methodology to include non-network solutions.	Consultation on track for Q4

	Improve and develop our modelling capability, further embedding the interconnector modelling and our analysis of offshore networks.	NOA interconnector methodology incorporated in overall NOA methodology April (consultation)/ July (final) includes a number of modelling improvements,
	Progressing probabilistic year-round assessment to understand how often the network boundaries are exceeded.	On track for first part of case study in Q3 and second part in Q4
	Integrate changes in our models and methodology to include analysis of generator connections to the transmission network that are suitable for competition. This is in addition to the current identification of wider works projects (in expectation of the ECIT policy development to embed the potential for competition in delivery of generation connections).	Delivered in April/July as part of the NOA methodology
	Design developments to the NOA to support the introduction of competition in delivery of the onshore transmission network.	Ongoing

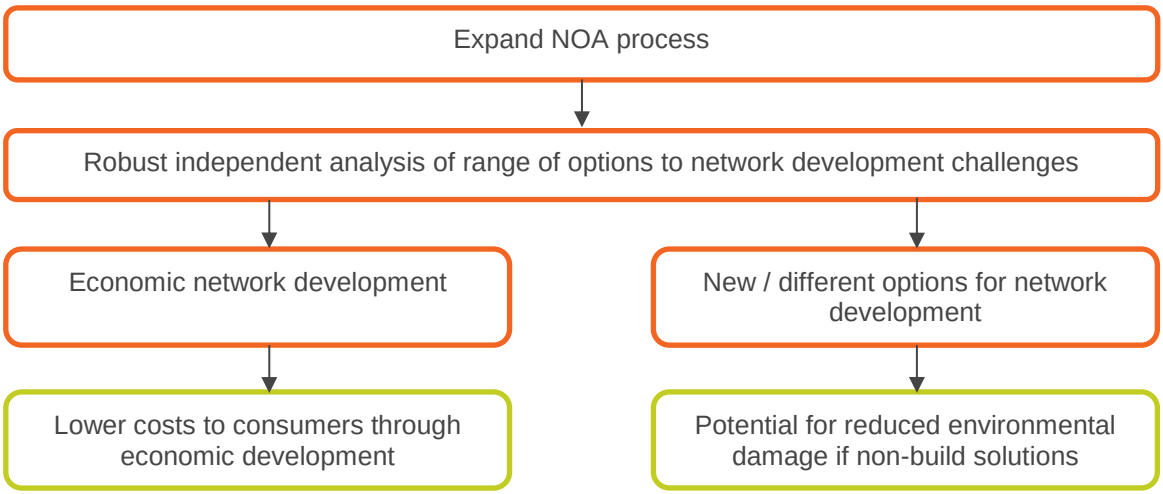
5. Expand the Network Options Assessment (NOA) process to evaluate a wider range of options

Mechanism for consumer value

We will expand the Network Options Assessment (NOA) process to solutions to network development challenges from network and non-network providers across transmission and distribution, and to expand the range of system needs that a NOA-type approach is applied to.

In the future, solutions to network development problems will be evaluated, over and above (but also including) traditional transmission network build options.

The following flowchart describes the generic process and outcomes from this work. We supplement this generic process with a specific example where we have applied this methodology to a transmission high voltage problem.



End consumers benefit directly from this approach via:

- Lower bills than would otherwise have been the case due to pursuing the most economic solutions for network development, which will optimise costs across network and system operation charges which are levied on system users and seen as a pass-through to consumers
- Reduced environmental damage both now and in the future where solutions deployed may result in lower carbon emissions and/or reduced physical infrastructure, dependent on the solutions chosen
- Potential reliability and safety benefits, dependent on the solutions chosen
- Potential societal benefit dependent on the solutions chosen, for example if end consumers were to be facilitated to provide services to the network through participating in markets.

This approach builds upon the existing NOA process, but through the new application of analysing all options and solutions over and above traditional transmission network build, we are demonstrating the additional value that we can and will deliver to the end consumer.

Drawbacks and potential for unintended consequences of our actions

There are several risks which we must consider whilst delivering this process. Risks to security and reliability could arise, for example because the NOA recommendation is not a mandate to ensure the recommended path is followed for all of the solutions. Although we can put contracts in place with some solution providers, with others there is not a mechanism to mandate their delivery. There may be risks of non-delivery, and the risk associated with deploying a new/innovative solution untested in a production environment. These risks will need to be identified and managed on a case-by-case basis.

Quantification

For each case, we will develop a cost benefit analysis to show the financial benefit of the new/innovative/non-traditional solutions.

Consumer benefit from this work will be delivered in future years outside of this financial year.

Additionality above baseline

We are expanding the NOA approach to be able to evaluate a wider range of options to meet a given system need, which will introduce new and innovative approaches to do this, delivering significant additionality over our baseline role. We are also expanding the needs that this option assessment approach applies to such that we can ensure that the right network investment is made to continue to operate an efficient, economic and reliable network. This approach builds upon the existing NOA process, but through the new application of analysing all options and solutions over and above traditional network build-out (network and non-network across transmission and distribution) and for a wider range of system needs, we are demonstrating the additional value that we can and will deliver to the end consumer.

6. Resolve high-voltage transmission system issues through collaboration with DNOs

Mechanism for consumer value

This is a specific example of the generic approach described previously. The fundamental driver of the work undertaken in this area is to assess a range of solutions to a new transmission system problem (where we have not previously applied this type of approach) in order to determine the most economic approach.

We are collaborating with DNOs to develop a whole-system approach to transmission and distribution issues. As a second step, we will be expanding the approach further to invite longer term market solutions to help manage high voltage challenges.

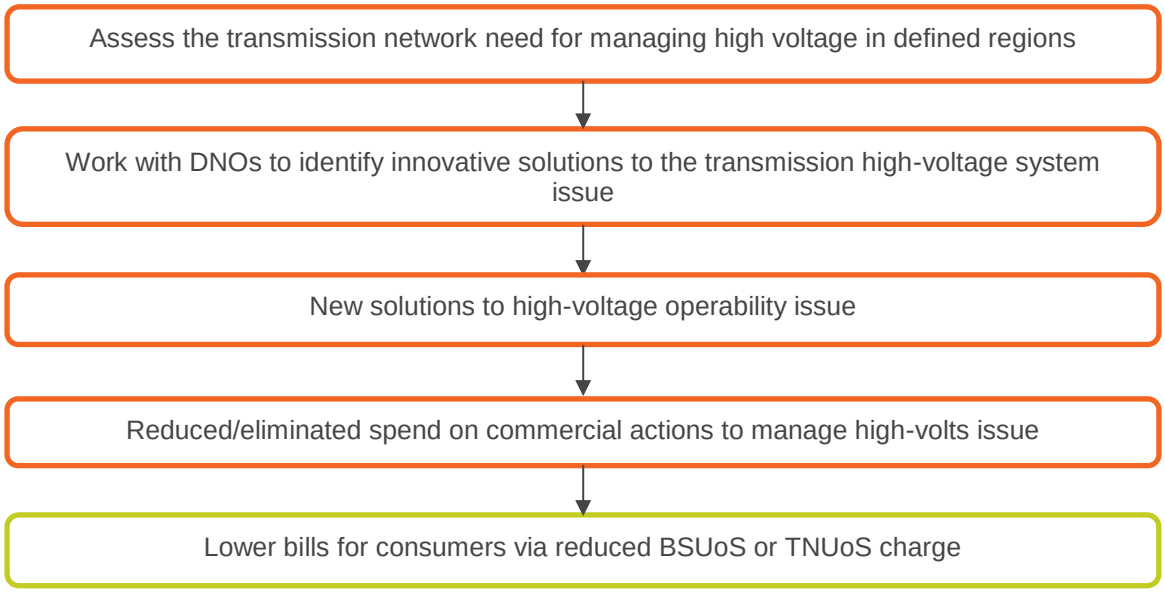
We are tackling areas of persistent high-voltages on the transmission system through analysis of both transmission and distribution system solutions, with the potential to deliver lower costs to consumers by ensuring we find the most economic solutions to managing voltage issues in the networks. We are also ensuring safety across the networks by managing voltage within safe limits.

We currently use a range of operational and commercial tools to manage voltage problems. For example, instructing suitable thermal generation plant to run which can be used to control geographic voltage issues as well as instructing TOs to switch certain parts of the network out or switch on reactive compensation equipment. This work will study the electricity power system in a holistic manner, to discover if other solutions could be developed, for example by installing voltage control assets within the DNO network or further parts of the TO network.

This will result in direct savings to the consumer as a result of reducing spend on managing voltage with commercial tools. Spend is charged to system users via the BSUoS charge, which is turn is passed on to the end consumer.

The consumer benefit of this activity will be realised in the future outside of the 2018/19 financial year.

The following flowchart illustrates how this activity delivers consumer value.



Drawbacks and potential for unintended consequences of our actions

Additional elements to ensure the success of this workstream will be required to provide frameworks to enable the delivery of the new solutions. For example, if we recommend that an asset be deployed within a DNO network, then suitable regulatory and commercial mechanisms need to be in place to facilitate that new way of whole-system funding and development.

Quantification

We will provide detail on the quantification of the consumer benefit resulting from this work later in the year when we have the data and analysis available.

Data we will use:

- Spend on commercial actions to manage high voltage in the relevant area pre-solution.
- Anticipated future spend on commercial actions to manage high voltage in the relevant area post-solution.
- Cost benefit analysis of the DNO asset-based solution versus a TO asset-based solution.

Additionality above baseline

This activity demonstrates significant additionality by applying an options assessment approach to additional transmission system needs for the first time and evaluating solutions from both TO and DNOs. This new whole-system approach has the potential to deliver consumer savings through ensuring that the most economic approach is taken to solve transmission system problems. We will continue to advance this approach by exploring the requirements to fully facilitate innovative approaches to network development.

Stakeholder Views

Stakeholder views summary

We understand that we are in the early stages of reaching out to a wider stakeholder audience than has been engaged on this topic than before. We have made good progress but know that there is a lot more we need to do as our work progresses in this area.

Our efforts to engage more broadly and more effectively on network development have been appreciated by our stakeholders with mostly positive feedback in this area. The level of engagement and input on the Network Development Roadmap and NOA methodology have enabled us to build our plans upon robust stakeholder input and feedback, demonstrating that our engagement approach has been effective.

We have learnt important lessons on how we engage with other network companies on strategic issues and will take this learning into our future activities.

Engagement objectives for principle 7

Many stakeholders are not aware of the existing network planning and options assessment documents as they don't currently have a lot of relevance to them. They are also not necessarily presented in a way that an audience beyond the current one can easily understand. The priorities are therefore to:

- Involve a broader stakeholder group than currently (e.g. beyond the TOs)
- Raise awareness of the current processes and documents analysing system needs and how they can be met
- Raise awareness of the changes we have committed to in the Network Development Roadmap and how we are implementing them through the pathfinding projects
- Get stakeholders' input to the developments at the appropriate point, to help shape them to work as effectively as possible
- Set expectations on what can be achieved and when
- Invite participation in pathfinding projects and promote their existence
- Get stakeholders' views on potential further developments in RIIO-2

How we have engaged and what have stakeholders told us?

Historically, the main focus has been on engaging with the Transmission Owners as they are currently the only companies able to submit options to the Network Options Assessment, which is the main process being changed by the Network Development Roadmap.

In the first phase of delivering the changes set out in the Network Development Roadmap we have focused our engagement on the TOs and DNOs as they will be impacted by the changes to the greatest extent in the nearer term. We are working with them through the ENA Open Networks project and directly on the pathfinding projects, which are our approach to developing the tools and processes we need to implement the changes. Whilst we have tried to raise the awareness of the Roadmap with a broader audience of potential commercial providers, we will have a greater focus on their engagement in the second half of the year as we look to extend our pathfinding projects to market participants. In order to achieve our objective of reaching a wider audience we utilised additional channels for the first time in this period such as the Operational Forum and Balancing Services Development newsletter.

We are making good progress addressing some stakeholder concerns, with many seeking more clarity, which we are beginning to emerge through the pathfinding projects. Strategy workshops with the Scottish TOs and also a workshop with all of the TOs on the NOA developments have all helped improve our engagement with the transmission companies. We are also utilising the ENA Open Networks meetings more effectively, and complementing those with more specific and detailed engagement with the DNOs involved in the pathfinding projects outside the meetings. We

are ensuring we share relevant publications and announcements that may impact the other network companies with the ENA Open Networks before they are published more broadly.

In the first phase of pathfinding projects we have focused on bringing DNO solutions into the expanded NOA process. We have therefore focused on working closely with the involved DNOs to develop the processes and understand the information we need to provide them with. We have made use of a combination of teleconferences and face to face meetings, and also using discussions in the margins of ENA Open Networks meetings to ensure progress. We have learnt what has and hasn't worked well as the project has progressed, and built on the more successful elements of the engagement such as ensuring teleconferences are planned for key points in the project.

Network Development Roadmap

We have aimed to engage widely to raise awareness of the Network Development Roadmap consultation and gather views on the proposals. As highlighted above a lot of focus has been on engaging with the network companies in the early stages as we have initially focused on including DNO asset options in the NOA process through our first pathfinding project. Our second phase of pathfinding projects will expand the process to market participants. The pathfinding projects are our learning by doing approach to developing the tools and processes we need to deliver the changes set out in the roadmap and involve working closely with the relevant TO, DNOs and, in future, market participants.

Engagement forums

Feedback received from the forums at which we have engaged on the Network Development Roadmap can be found below.

Event: **Electricity Operational Forum**

Topic: Network Development Roadmap

Date: 24th April 2018

Number of attendees: 97

Overview: At the Electricity Operational Forum in April, we unveiled plans for our Network Development Roadmap consultation, proactively engaging a new audience on what we are doing to expand our processes to consider non-network and distribution solutions to meet Transmission network needs. The Electricity Operational Forum was identified as a good opportunity for reaching a wide range of balancing services providers, a key new audience for our work on transforming network development processes.

Our proposals were well received but perhaps unsurprisingly we learnt that very few people in this audience were aware of our proposals to develop our network planning processes. The number of people in the sample is low so it gives a very limited view on engagement. The score range was wide with one respondent giving one while another gave eight. We have devised a set of survey questions and will now implement them to provide our survey numbers through the year as well as for the final survey at the end of the year.

This low score is to be expected as this was the first time we had engaged with the audience on the subject. Although a small population this is a helpful baseline for the beginning of the year.

	# responses	Average score
What is your level of understanding of how we intend to develop our network planning processes?	3	6/10
How well engaged do you feel in the development of the network planning tools?	3	6/10

Event: Energy UK Flexibility Working Group

Topic: Network Development Roadmap

Date: 17th May 2018

Number of attendees: 15

Overview: In discussions with Energy UK, their Flexibility Working Group was identified as a good opportunity for reaching a wide range of balancing services providers, a key new audience for our work on transforming network development processes.

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

	# responses	Response
What is your level of understanding of how we intend to develop our network planning processes? Before	15	Never heard of it
What is your level of understanding of how we intend to develop our network planning processes? After	15	Good level of understanding

Event: TO workshop on NOA developments

Topic: Network Development Roadmap

Date: 10th September 2018

Number of attendees: 9

Overview: We held a NOA developments workshop with the TOs on Monday 10 September. This provided an update on the progress of the pathfinding projects set up to deliver the commitments in the Network Development Roadmap

	# responses	Response
How are we engaging on the Network Development Roadmap?	5	7.8/10
How useful was today's workshop?	7	7.9

- Very positive feedback on approach to engagement and transparency.
- More information requested on RIIO T2 impact and NOA processes and timescales.

In addition to the face to face engagement and consultation, we have included information on the roadmap in the Energy Insights and Power Responsive newsletters to raise awareness among a broader audience as well as the usual subscribers to the NOA. These communications have reached over 3000 people, including current and future balancing service providers, investors, BEIS, Ofgem, network companies, electricity suppliers and researchers. Since the launch of the roadmap we have also shared information on the pathfinding projects in our Ancillary Services Development Newsletter. This is targeted at current and future balancing services providers,

developers and investors and has an audience of 800 people. We had seven enquires on the back of this.

Additional engagements

- We held senior level strategic workshops with the Scottish TOs, which included conversations about the Network Development Roadmap and helped address some of the concerns the TOs had raised in their consultation responses. This has helped shape the developments in the roadmap as well as our thinking for RIIO-2.
- We have continued to work with the DNOs and TOs through regular meetings of the Energy Networks Association Open Networks Investment Processes Product as well as a conversation on the roadmap consultation with the Open Networks workstream 1. We have also engaged directly and more frequently with the TOs and DNOs involved in the pathfinding projects. This engagement has helped shaped the pathfinding projects to effectively work with the DNOs.
- We met with the Scottish Government on 12th September to share the changes set out in the Network Development Roadmap and seek their feedback. They found the meeting useful and were interested in the developments, particularly where they are likely to have an impact in Scotland.
- We attended a regular meeting of the Association of Decentralised Energy (ADE) to talk through the Network Development Roadmap and understand their members' views and how they may wish to get involved in the future. This was a useful session which highlighted a desire for us to "do something" even if it is not perfect and that DSR could be beneficial for managing residual constraints.
- We have also met with six potential service providers who are interested in the roadmap developments and potential opportunities for them. These are storage developers in the main.

Network Development Roadmap Consultation

In May, we published our **Network Development Roadmap Consultation**, which sets out an ambitious plan for how we will develop our Electricity Ten Year Statement (ETYS) and NOA to create much more value from the way the network is planned. It proposed that we will set out the transmission 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.

We published a draft version of the Network Development Roadmap as a consultation to gain stakeholder insight before publishing the final version. We utilised a number of existing industry events to publicise the consultation, such as our Operational Forum, Energy UK's Flexibility working group and the ENA Open Network project, through which some of the pathfinding projects are being delivered.

There were 187 unique downloads of the consultation document over May and June. We received 13 responses about the Network Development Roadmap during the consultation period from network companies, potential market participants and academics. Although this isn't a high number it is twice the number we generally receive to NOA consultations if the interconnector developers are not included. The majority were positive overall, with a couple challenging the changes as a whole. Those challenges were around whether the ESO should be expanding the NOA beyond its current regulatory remit and whether the proposals change the role of the ESO and TOs. We have worked with these stakeholders to further understand their concerns and answer their questions.

Many respondents sought clarification on elements of the proposals and had helpful suggestions for improvements, which we aimed to pick up through this finalised roadmap or will do through the pathfinding projects. There was a general push to work through ENA Open Networks but others also challenged whether the group would move at sufficient pace. More than one response also highlighted the need to ensure the focus on system security remains.

The responses covered a range of views, with the majority welcoming the proposals. We received some very helpful, constructive suggestions and questions for clarification on issues such as

transparency, how we will compare different types of options, how we will use probabilistic analysis and what is meant by stability.

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

Further information:

- The Network Development Roadmap Consultation can be found here: https://www.nationalgrideso.com/sites/eso/files/documents/Network%20Development%20Roadmap%20consultation.pdf
- The Network Development Roadmap including a summary of responses to the consultation, can be found here: https://www.nationalgrid.com/sites/default/files/documents/Network%20Development%20Roadmap%20-%20Confirming%20the%20direction%20July%202018.pdf
- Stakeholder responses to the Network Development Roadmap can be found here (scroll to the bottom of the page): https://www.nationalgrideso.com/insights/network-options-assessment-noa

Network Options Assessment (NOA) Methodology

Engagement Forums

- ENA Open Networks Project work stream 1 meetings and more detailed discussions on the developments in work stream 1 product 1 meetings
- NOA for Interconnectors workshop – Friday 18 May
- Direct engagement with a number of companies (three storage developers, one large generator) and academics (University of Strathclyde, Imperial College London).
- NOA workshop held with TOs on Tuesday 22 May
- Additional questionnaire for interconnector developers to respond to the NOA methodology was circulated on Friday 15 June in response to feedback from stakeholders that they would find this an easier way to respond to the consultation. Eight interconnector developers provided their views through this channel.

NOA Methodology Consultation

We launched our NOA methodology consultation in early April which consolidated the methodology for interconnectors into the main NOA methodology for the first time. During the consultation period, we engaged with the TOs and ran a workshop for interconnector developers. The consultation closed following a six-week period; during which we received 14 responses (eight specifically on the interconnector methodology). These can be broken down into Environment (one), Industry other than TO (two), Transmission Owners (three) and Interconnector developers and associated parties (eight). This compares to 10 responses last year of which six were specifically on the interconnector methodology. We have continued to provide the 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.

Interconnector parties attended our NOA interconnector workshop in May on preference to providing formal written responses and provided a range of potential revisions to the methodology. To ensure that all stakeholders were provided with an opportunity to comment on some of the proposed methodology revisions, we decided to extend the consultation period and run an online survey. This was well received by the community and provided useful quantitative and qualitative data. Since the NOA consultation closed, we have been digesting the feedback, amending the methodology where appropriate and contacting those who provided feedback. The input from stakeholders is reflected in the methodology submitted to Ofgem in early July. The submitted

methodology is published on our website and we sent an email to all parties who have registered an interest in the NOA.

As the NOA's scope is widening to beyond the transmission asset based solutions, we realise that the way that we reach stakeholders will have to change. As a result, we are considering how we engage with stakeholders and aiming to make the NOA more accessible, particularly for providing options by using different events such as a webinar.

What have we learnt and what we are doing about it?

The table below summarises what we have learnt from the above engagement and feedback and how we are responding.

You said	We did, we will or we will not and here is why
It is clear from the number of responses and the comments that we need to do more to reach a wider audience on the topic of network development planning.	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. We will need to recognise though that people may be less interested until the changes have a real world impact on them. 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 good if that had recognised what we're doing.
Certain stakeholders didn't agree with the general direction of the Network Development Roadmap consultation.	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 responses have been received we have taken several steps to enhance the relationship in this area and ensure a better two-way dialogue, particularly with the TOs and DNOs.
The ESO is running ahead of other industry initiatives rather than responding to them. The ESO should also not be extending what the NOA does beyond the legislative and regulatory requirements	We will continue to push forward with ambitious changes in this area. As the ESO, we have a role to transform and push forward change within the industry to drive additional consumer value. Sometimes this will see us trying to push industry initiatives faster to keep pace with the changing environment. We are not proposing changes that go against the current regulatory arrangements on for example ownership of assets, but rather optimising the situation within them and ensuring there are robust business cases for recommendations taken forward.
The ESO is expanding its responsibilities into areas currently covered by the TOs through the changes set out in the roadmap.	We clarified our intentions in the roadmap and that we did not intend to change the current accountabilities. We have had good, constructive conversations with the TOs since receiving this feedback and believe they are now more comfortable with our intention.

There isn't a need for the ESO to get involved in many of the issues raised by the roadmap – the TOs and DNOs can sort them out between themselves	We believe there is a role for a more independent ESO to drive greater value. The arrangements in Scotland and England and Wales mean that the TO-DNO direct interaction model may not work as well in England and Wales as in Scotland.
More detail is needed on how the developments will work, there were lots of questions on specific aspects of the changes. These questions were in relation to transparency, ensuring a level playing field, how different types of solution will be assessed against each other and the impact of distribution connected solutions on distribution networks.	When the roadmap was published we were at an early stage in the pathfinding projects, which are our way of taking forward the changes set out in the roadmap. As a result, we were not aware of the answers to many of the questions people were wanting to know. We answered the questions in the finalised roadmap where we could and are working to answer others through the pathfinding projects.
There is a need to ensure appropriate funding routes are in place for solutions not currently covered by the NOA or existing price controls, such as DNO solutions.	We are leading work through the ENA Open Networks project to recommend appropriate funding routes for solutions in RIIO-1 and RIIO-2, for discussion with Ofgem.
Long term contracts will be needed to bring forward new, innovative solutions from market participants.	The roadmap highlighted that the pathfinding projects will explore the value reflected by different length contracts, particularly when the provision of new, long term market solutions are being considered.
How will the proposed probabilistic assessment be used while continuing to ensure a secure system and compliance with the Security and Quality of Supply Standard (SQSS)?	In the roadmap we provided further clarification of how we intend to use the probabilistic approach and how that fits with the SQSS requirements. We will also explain this further in the case study on the approach that will appear in the ETYS in November and the final results in Q4.
The new approaches should be consulted on as the NOA methodology currently is.	We will consult on the newly developed methodologies as they are developed with the intention that all are incorporated in the NOA methodology that is consulted on annually in the long term.
The ESO needs to be clear on the network needs and provide sufficient information for potential solution providers to be able to respond to them.	We recognise that we are expanding the NOA to a new audience and need to reflect that in the way we communicate. We will use the pathfinding projects to test how best to communicate our needs and also aim to improve the ETYS over the coming years so it is easier for a broader audience to use.
What is meant by stability and how is this different to what the TOs currently assess as part of their connection applications?	We clarified what we meant by stability in the finalised roadmap and the difference to what the TOs assess in this area.
As part of the first Pathfinder project the DNOs we are working with told us that we need to improve our communication of system needs to	Our initial approach was to present the results of system needs studies identifying all of the challenging areas. Our DNO partners told us

enable them to identify potential solutions to feed in to the process.	that we provided too much information that covered too many potential opportunities and that we needed to narrow it down to specific areas. In response, we did some additional transmission network analysis to identify specific hotspots. This turned out to be too location specific with DNOs telling us that this limited their options for identifying solutions on other sites. Considering all of the above feedback the solution we identified was to create a heatmap providing more nuanced information on priority level for each area. We can see from the options that we have received from DNOs that our refreshed approach to communicating the system needs has been successful.

Performance Metrics

12 Whole System Optionality

Metric Description

This metric is a simple count of the number of non-TO (transmission owner) solutions to transmission system challenges submitted by non-TO parties as part of an extended Network Options Assessment NOA process, which we are developing though our pathfinding projects. The concept of Whole System Planning is to approach the technical issues as a single entity (ESO, TO and Distribution System Operator (DSO)/ Distribution Network Owner(DNOs)) and come up with the solution that is best for the consumer (economic and efficient). The aim of the incentive metric is to act as a measure of how effective we are in encouraging non-TO parties to suggest solutions to transmission system needs. These solutions will be assessed against what are considered as more traditional transmission network solutions through a detailed cost-benefit analysis.

Performance

2018/19	Non-TO Initiated Options	Target
Q1	0	3
Q2	5	3
Q3		3
Q4		3

Figure 25 - Metric 12 Whole System Optionality Performance

Current Status: Above Target

Currently, there are three ongoing pathfinding projects which could potentially trigger new whole system options being proposed from non-TO parties in addition to commercial solutions being considered as part of the main NOA process. The three pathfinding projects are high voltage projects focused on transmission high voltage issues across three separate locations and four DNO areas, which aim to include DNO solutions, and later market based solutions, as alternatives to TO solutions.

Supporting information

High Voltage Project

In the last quarter, we have made good progress in terms of setting out the needs and identifying the DNO solutions with Electricity North West (ENW) and Northern Power Grid (NPG) to address the high voltage challenge in the Pennine region. So far 800 MVAr of reactive compensation have been identified as required to maintaining voltage compliance in the region. This is equivalent to 4x200 MVAr reactors across four possible 400kV substations. We have found that DNO options are effective if the source of the problem (i.e. reactive injection) comes from the DNO network. However, transmission solutions are equally effective and tend to provide a wider spread of voltage control than distribution solutions. Where the TO and DNO options are equally as effective the decision on whether to choose a DNO or a TO option depends on cost, which is very site specific. Currently, there are five DNO options have been identified: three from ENW and two from NPG. The result form our analysis shows that the each of the options from ENW can effectively be used to replace 1x 200 MVAr reactor, and a separate study is also in the progress to check if each of the two options submitted by NPG can be used to replace 1x 200 MVAr reactor. National Grid Electricity Transmission (NG ET) have also proposed additional options which we are currently assessing before making a final recommendation between the TO and DNO solutions.

The analysis is nearing completion with assessment of some further TO options being undertaken, as previously identified potential locations are unviable due to space constraints. We continue to engage with the DNOs and TO, focusing on finalising all the costs for each option that goes into the cost benefit analysis (CBA), and plan to carry out the second stage of the CBA to compare the costs of the DNO to the TO options, making a final recommendation in early October.

For the Mersey Ring region, a requirement for 100 MVAr of reactive compensation has been identified and we have already started the engagement with SP Manweb who are currently looking at possible sites to install DNO reactors. For the South Wales region, a requirement for about 150 MVAr of reactive compensation has been identified. We will continue engaging with the relevant DNOs to develop solutions for these regions, and in addition, we are also intending to explore the use of commercial solutions as alternatives to asset based solutions from the TO and DNOs for these two areas. Our current plan is to consult the potential market participants for these commercial solutions via a Request for Information (RFI) in Q3. This will follow on from the RFIs signposted in our Product Roadmap for reactive power. In the long-term we plan to, based on the findings and lessons learnt from this pathfinding project, introduce a process to address transmission system high voltage needs into the NOA 2019/20 methodology.

17 NOA Consumer Benefit

Metric Description

This metric will count how many of the reduced build options that have been submitted to the NOA process appear in the optimal path and where this is the case what their consumer value is. This will drive the ESO to propose cheaper, reduced build solutions as alternatives to those provided by the TOs for the national Network Options Assessment (NOA), to create greater value for the GB consumer.

Performance

2018/19	ESO Initiated Options	Target	Total Consumer Value
Q1	0	0	£0
Q2	9*	1	£0
Q3	-	1	-
Q4	-	1	-

Figure 26 - Metric 17 NOA consumer benefit performance

**This is the number of options put forward by the ESO. Consumer value is only calculated if one or more of these options is required in the NOA optimal paths. It is therefore unlikely this number will remain at 9 and will be confirmed in later reports.*

Current Status: On Track

Currently our Network Development teams are still analysing the transmission network and identifying potential reinforcement options. For this report an indicative list of ESO initiated options are presented, with a view to publishing the final version in the Q3 report.

In the last quarter, the ESO has worked tirelessly with all Transmission Owners to assess the future needs of the transmission system for the Electricity Ten Year Statement and Network Options Assessment processes. So far, the ESO has developed a number of solutions that could be submitted into the 2018/19 NOA, these options can be broken down into 3 categories:

Category	Description	Number of options at the end of Q2
ESO Initiated Options	These are traditional options identified by the ESO and put forward subject to TO agreement (if required)	7
ESO Challenged Options	These are additional options that are submitted following efficiency challenges by the ESO	1

ESO Collaborative Options	These are options that are developed collaboratively between the ESO and the respective TO following the ESO's technical studies	1
	Total number of options	9

Figure 27 - catergories of options

Supporting information

ESO Initiated Options

Six ESO initiated options are thermal rating enhancements which avoid the capital cost of replacing the conductors, utilising an existing asset by running it closer to its physical limits, whilst ensuring that all safety procedures are adhered to. We are also still investigating the possibility of at least two commercial constraint management options. Lastly, we are still investigating the possibility of at least two commercial constraint management options. Whilst it is agreed that these do not provide boundary capability they can significantly reduce constraint costs, saving the GB consumer money.

ESO Challenged & Collaborative Options

Whilst working on the ETYS and NOA studies, we have also challenged National Grid Electricity Transmission's (NG ET) proposed reinforcement plan for the North Wales region. The strict order reinforcements were required in was challenged by the ESO and this led to an alternative submission that meant that some reinforcements could be built sooner. This has the potential to reduce constraint costs and would not have been available had we not initiated discussions for an alternative order of reinforcements.

Furthermore, we have proactively worked alongside NG ET this year on a new suite of low-cost reduced build options called static synchronous series compensation (SSSC). This innovative technology allows the impedance of a transmission line to be altered remotely by the control room, enhancing their management of power flows across the network and reducing the potential build-up of future constraint costs. We have analysed several SSSC options determining their optimal ratings to reduce costs. All SSSC options will be assessed as part of the NOA process later this year.

Commercial Solutions in the NOA

For the development of commercial solutions, we have put considerable effort in to analysing the 2016/17 NOA residual constraints in order to identify the most suitable methodology to be implemented for the 2018/19 NOA in the last quarter. Since then several methodologies have been proposed and, after careful consideration and assessment, the new methodology that allows for competition between commercial solutions and conventional asset reinforcements was agreed and will be implemented in NOA4.

The plan for the next step is to carry out the NOA CBA analysis based on the agreed methodology to determine which boundaries or regions will have commercial solutions to be considered. This approach will use some assumptions based on our experience of constraint management services to develop an initial commercial option. Following the CBA analysis and NOA recommendations, this will then be progressed post NOA via a marketing campaign to determine interest and develop options for market based solutions to be included in the 2019/20 NOA. The intention is that these options will be available to be included in the technical analysis which will commence in June 2019 to facilitate a full assessment against asset based solutions.

Potential Obstacles

Commercial constraint management options require a contract to be agreed across a range of customers. This is great for competition but there is a strong reliance on several participants which could pose a risk to the delivery of the project if terms cannot be agreed.

The transmission network continues to be assessed in greater detail every year. Several projects, such as the national thermal uprating scheme, also identify reinforcements that can be delivered outside of the NOA process. As the NOA process matures and the TOs are pushed to think more innovatively about what can be done with existing assets, the opportunities for us to identify other value opportunities may reduce. We are, however, considering commercial options to a greater extent in the long term.

Further Improvements

This year we created two new boundaries to increase our range of analysis ensuring we assess areas of the network that are currently causing issues in operational timescales. If reinforcements are available these boundaries could significantly reduce ESO balancing costs in the future.

We are also investigating much larger projects such as automatic quadrature booster (QB) optimisation and modifications to existing business processes that could significantly increase the capability of many transmission boundaries. These projects will require detailed analysis and engagement with all parties over the course of the next couple of years to determine their suitability, therefore these options will not be considered this year.

18 NOA Engagement

Metric Description

This updated description of the NOA engagement metric aims to meet Ofgem's concerns that they raised in their consultation response and the formal opinion.

The metric will continue to comprise a table of the number of responses and the score, and supporting narrative. This update describes how we will survey stakeholders' opinions and is in line with the Forward Plan. There are two questions, which vary slightly depending on whether our audience is more interested in the Network Development Roadmap or the NOA methodology and report:

- How satisfied are you overall with the service you have received from National Grid?
- I have been appropriately engaged by the ESO on Network Development Roadmap/NOA methodology and report

Scoring is on a scale of 1 to 10 with low scores reflecting negative sentiments.

We will use any suitable engagement channels to gather the data and so far have identified:

- CSAT/SSAT surveys
- Customer connections seminar
- Electricity Operational Forum
- Power Responsive Flexibility Forum
- Industry association meetings

As we gather this data throughout the year, we will build a continuous picture of the quality of our engagement with stakeholders and discern any trends. We will use this information to improve our engagement with stakeholders. We will publish the scores in the quarterly return table set out below and use the Q4 figures for the year-end return. We will also include an average figure for the 12 month period.

So that stakeholders can provide any further thoughts, our survey will include a free text field that we will also use to guide how we improve engagement.

Performance

The score that we quoted for Q2 is based on a survey of the TOs at a workshop that we held for them on Monday 10 September. The sample comprised five people from the three TOs so it is a small population and gives a limited view on engagement. However, the score range was very

narrow. We have devised a set of survey questions and will now implement them to provide our survey numbers through the year as well as for the final survey at the end of the year.

2018/19	Score	Parties	Target	Last financial year
Q1	5	3	N/A	N/A
Q2	7.8	3	6	N/A
Q3	-		8	-
Q4	-			-
Year to date				

Current Status: On Track

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Consumer value supporting information

Case 1: Reform of balancing services market

In this section, we set out detailed analysis and supporting information to illustrate our derivation of quantified consumer value for the Reform of balancing services market activity.

1. Enhancing competition in already competitive markets

In our System Needs and Product Strategy (SNaPS) document in 2017, we set out our intention to identify opportunities for product simplification, including standardisation of products such as FFR. We developed new approaches such as the standardised seasonal windows and delivery blocks. Our analysis shows that this strategy has delivered consumer value by lowering average FFR prices. To evaluate this, we analysed the average prices of submitted tenders for the FFR product in the contracting period just before and just after implementation of these new, standardised arrangements (i.e. May and September 2018). To compare prices, we use a combined measure of submitted prices per unit of volume of primary, secondary and high frequency response services[9]. We calculate the average submitted price for all providers as well as considering submissions for static and dynamic response separately.

Table 1: FFR standardisation impacts

Service type	Pre-standardisation (May 2018)	Post-standardisation (September 2018)	% decrease
All	3.81	2.66	**30.2**
Static	2.01	1.90	**5.6**
Dynamic	5.39	3.18	**40.9**

Source: CEPA analysis

We observe a clear **decrease in submitted prices**. Considering static and dynamic services together, the percentage decrease is **greater than 30%**. We see that this is particularly pronounced for the dynamic service which decreased by more than 40%.

FFR makes up a significant proportion of commercial frequency response holdings which have in the past two years cost an average of £100m per year. While some of the downwards pressure on prices may be relatively short-term as the market goes through a period of price discovery, benefits of the order of a 30% decrease in tendered prices suggest the potential for delivery of consumer value of the order of £30m in the area of commercial frequency response services alone.

Total expected consumer value = 30% X £100m = **£30m**

2. Introducing new competitive markets

To develop an estimate for the magnitude of the potential consumer benefit which could result from introducing new markets, we have adopted the following quantification approach:

1. Identify the total volume of balancing services costs which are currently procured bilaterally which could, in theory, be procured competitively *at some stage in the future*.
2. Develop a case study of the benefits of competition from another area of the energy industry which can serve as a proxy for the magnitude of cost saving which would result from the replacement of non-competitive procurement arrangements.
3. Apply corrections to account for the fact that savings may not be as easily achievable in these market areas as in the case study example which has been considered.

[9] We note that this is a necessary simplification. While it would be challenging to compare these services individually, it is possible that market participants value the services differently and so would submit a tender which implicitly captures a different value of each.

4. Apply this proxy saving to the identified volume of balancing services costs in question.

Table 2: Identify total volume of balancing services costs

We currently procure the following services through non-competitive processes[10]:

Service	Annual cost 2016-17 (£m)	Annual cost 2017-18 (£m)	Average annual cost 2016-2018 (£m)	In scope for development of market-based mechanisms
BM Constraints	296	397	346.5	Partial (assumed 25%)[11]
Mandatory frequency response	27	21	24	Yes
Black start	62	64	63	Partial (assumed 50%)[12]
Fast reserve (non-tendered)	52	60	56	Yes
BM start-up	10	2	6	No
Commercial intertrip	34	39	36.5	No
System-system services	9	10	9.5	No
Total value of markets in scope:				£198.1m

We identify that in the case of four of these seven services, a market-based mechanism could be introduced at some point in the future. The sum of the average costs of these services over the last two financial years gives a total market value of approximately £198.1 million per year.

[10] The following services are not included within analysis: System-generator operational intertrip, bespoke contracts to manage system issues and maximum generation (Maxgen) services.

[11] Due to their locational and time-specific nature, a sizeable proportion of constraint management services will always need to be procured through non-market based means such as bilateral contracts and use of the BM in real-time. However, we are exploring options to develop more competitive arrangements, for example through encouraging wider participation and by making use of the Network Options Assessment to encourage competition between system and non-system solutions to constraints identified ahead of time. We therefore consider it reasonable to identify the potential for more competitive service procurement and consumer savings in at least a proportion of our constraint management services.

[12] We are currently investigating the development of market-based solutions for the procurement of Black start services through a number of projects under our Restoration Roadmap. However, it may be unlikely that Black start is ever procured completely through market-based approaches given the locational requirements and security of supply implications. We therefore assume that approximately 50% of the service can be procured through market-based measures with a consequential benefit to consumers.

Case study of the benefits of competition: Restructuring of balancing services procurement in Ireland

Case study: I-SEM DS3 Design

Perhaps the most directly relevant case study comes from the Irish market where Eirgrid (the system operator) is in the process of re-structuring its balancing services procurement and processes as part of the move to the new I-SEM market. This re-structuring programme is known as DS3[13].

We can use the impact assessment which was used to evaluate the benefits of competitive tendering for DS3 services as a proxy to evaluate the potential scale of benefit of introducing competition into otherwise non-competitive balancing services.

Consideration of impact assessment

Following a decision by the I-SEM Committee[14], the DS3 programme involves moving away from non-competitive procurement of balancing services products to annual competitive auctions, wherever competition is considered viable. In its previous consultation document[15], the I-SEM Committee carried out an impact assessment of the options available.
This assessment did not include quantitative analysis of the savings expected. However, it did compare the different options qualitatively, including an assessment of 'Consumer Interest' which considered bill impacts.

The SEM Committee identified the level of consumer interest as 'medium-high' under their preferred competitive auction design in comparison to consumer interest ranging from 'low' for options which allowed for little to no price discovery for individual services to 'medium' for options which allowed for individual price discovery to a more limited extent.

This analysis supports the consideration of consumer benefit which can be achieved by introducing competition.

Apply necessary corrections

- It is difficult to estimate a level of consumer value that may be implied by a 'medium-high' qualitative impact. However, we assume that this may imply that savings of the order of 15-25% could be achievable[16].
- The extent of plausible savings will likely depend on the service in question. Some balancing services are relatively broad in scope, do not require particular technical characteristics and are well understood by ourselves and the market. The benefits of competition in these cases are likely to be high.
- In other cases, more specific requirements or inherent risk within the provision or procurement of the service may mean that fewer providers are able to enter the market or that price differentiation is less achievable. In these cases, the benefits of competition may be lower.

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[13] http://www.eirgridgroup.com/how-the-grid-works/ds3-programme/
[14] https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-14-108%20DS3%20System%20Services%20Decision%20Paper.pdf
[15] https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-14-059%20DS3%20System%20Services%20-%20Procurement%20Consultation%20-%20Final.pdf
[16] Though the context of the introduction of competition is quite different, this aligns with estimated savings resulting from the development of the offshore transmission tender regime which estimated savings of between 23-34% as a result of the competitive process introduced: https://www.ofgem.gov.uk/system/files/docs/2016/05/extending_competition_in_electricity_transmission_updated_impact_assessment_0.pdf

- It is likely that the potential savings from introducing competition into some markets is at or below the lower bound of possible benefits estimated in other contexts. It is therefore prudent to apply a correction to the proxy values we have estimated.
- Without conducting detailed, bespoke analysis, it is not possible to develop highly accurate estimates of the level of correction needed and therefore we apply a level of judgement. Assuming that we would only introduce a competitive approach where the benefits are sufficient to outweigh the transition costs and the inherent price and service risk, we may expect that the magnitude of benefit may be somewhere in the region of 5-15% in the remaining non-competitive markets.
- Apply proxy savings to relevant markets.
- Applying our proxy estimate of cost reductions to those services within scope for the introduction of competition allows us to calculate an estimate of the total potential consumer value:

Total expected consumer value = 5-15% X £198.1m: **£9.9-29.7m**

Case 2: New provider on-boarding

In this section, we set out detailed analysis and supporting information to illustrate our derivation of quantified consumer value for the New provider on-boarding activity.

We use two case studies to look at the benefit we deliver in this area: Analysis of historic STOR prices, and market diversity to improve operability.

Case study: Historic STOR prices

We identify a balancing service which has benefitted from competition historically and use this as a proxy for the scale of benefit which could be achieved across balancing services more widely.

For these purposes, we have chosen to analyse historic price trends of the short-term operating reserve (STOR) service. From 2012 to 2016, we witnessed a significant decrease in the unit costs of the STOR service. We consider availability fees paid to STOR providers. Availability fees constitute a significant proportion of STOR costs. In 2012/13 for example, we spent around £88m on STOR availability fees.

The figure below shows the average availability fees paid to STOR providers per MW contracted between 2012/13 and 2018/19. Based on our analysis, we suggest that these availability fees are driven, at least in part by an increase in competition for STOR contracts.

In the period from 2012/13 to 2015/16, the reduction in STOR availability fees led to a reduction in total availability fees of more than £50m. This suggests that encouraging competition for services can drive significant consumer value.

Since 2016, the unit costs have increased (though to levels below that seen in 2012). We believe that this is consistent with the drivers of unit cost, including competition, which we assess below.

Two of the key factors which we believe drive the STOR unit costs are the wholesale market price and competition for contracts. Analysis of STOR provision can be used as a proxy to estimate the overall benefit which could be achieved by increasing competition across additional services.

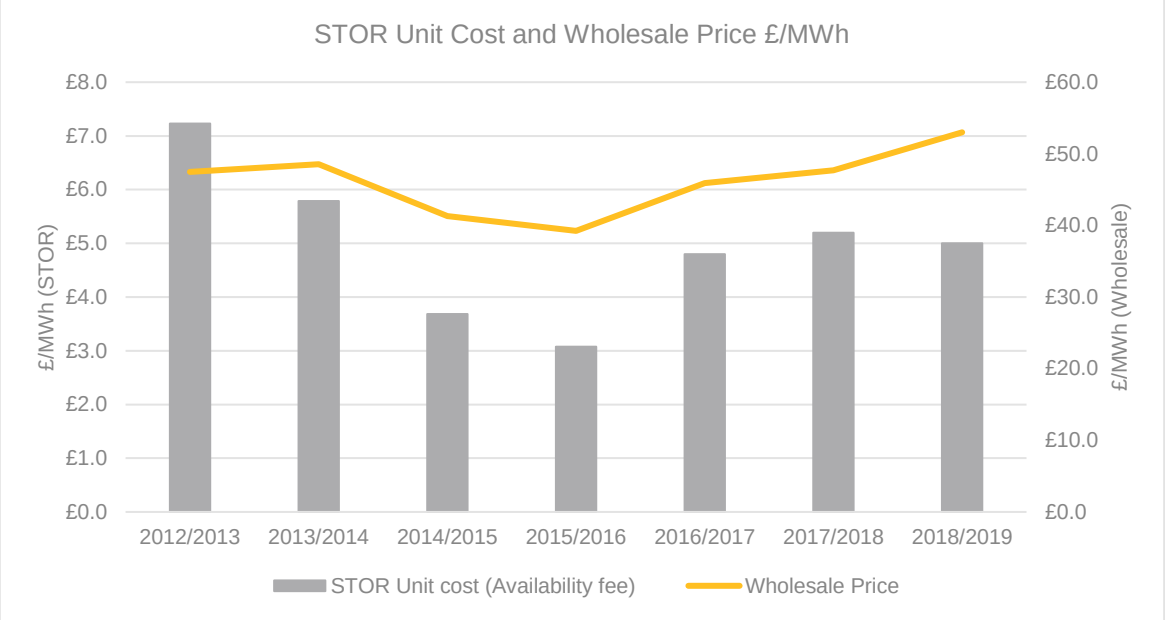
Driver 1: Wholesale market price

Considering the wholesale price, we see a broadly similar, but less pronounced trend from 2012 to 2016. This suggests that the decrease in the wholesale market price over this period was an important factor which led to a reduction in the unit costs of the STOR product.

However, it is clear that these interactions can only partly explain the STOR unit cost trends. While the wholesale price decreased from circa £47.50/MWh to £39.00/MWh (a decrease of approximately 20%), the STOR unit costs more than halved from £7.20/MW to £3.07/MW in the same period (a reduction of more nearly 60%). In addition, the STOR price fell between 2012/13 and 2013/14 while the wholesale price increased in this period. Finally, we also see that the wholesale price and STOR unit costs have followed inverse trajectories in some periods within recent years.

We therefore conclude that there are other important factors. We consider the interaction between the level of competition for STOR contracts in order to observe the extent to which this may also explain a proportion of the unit cost decrease.

Figure 1: Historic STOR availability prices and wholesale price (£/MWh)



Sources: ESO; Ofgem wholesale market indicators

Driver 2: Competition for STOR contracts

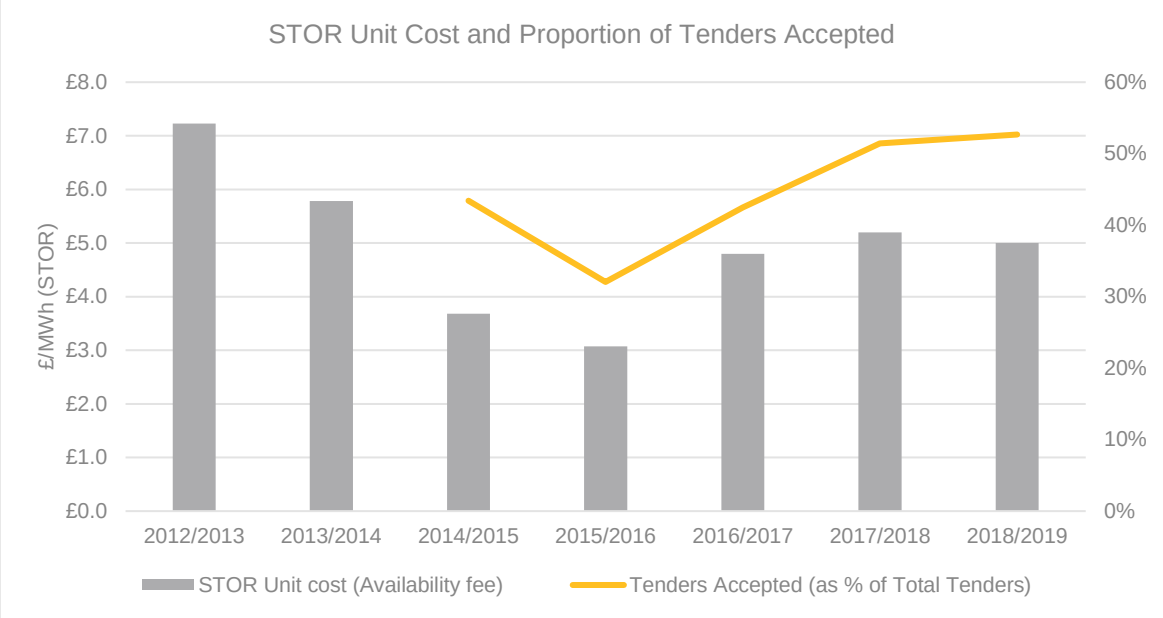
In order to analyse the extent of competition for STOR contracts, we use the ratio of submitted tenders to accepted tenders as a proxy for the level of competition for STOR contracts. Where this ratio is high, this may indicate that the market is over-subscribed and that levels of competition are high.

Due to data availability, analysis of submitted vs accepted tenders is conducted from 2014/15 onwards. For the years following this, we observe a similar trend as for the STOR unit costs and for the wholesale market price. Competition increases from 2014/15 to 2015/16 as the unit cost of the STOR service continues to fall. From 2015/16 onwards, it appears that competition weakens slightly, at least as measured by our proxy.

This could be explained a number of factors. A number of conventional plant, who had traditionally provided STOR services, left the market in this period. In addition, the cyclical nature of competition for a roughly constant volume of service needs to be considered. Over a short time period, intense competition can lead to significant cost reductions when the market is heavily over-subscribed while in the longer term, technologies which become uncompetitive may be forced to exit the market, relaxing this competition to some degree. As we see from figure 1, STOR availability prices have remained below the earlier peak of 2012/13 even after competition appears to have softened a little. Finally, a proportion of this relaxing of competition may be due to STOR providers moving to other products. For example, the lowering of the FFR entry capacity to 1 MW in early 2017 may have led to a proportion of competition shifting away from STOR and to FFR.

In any case, it appears that a certain amount of the relaxing of competition observed, in combination with the increase in the wholesale market price, could be considered as two of the key explanatory factors for the increasing STOR unit costs in recent years.

Figure 2: STOR Unit Cost and proportion of tenders accepted



Source: ESO

Estimate of contribution of competition to STOR unit cost trends

We now consider the relative importance of the wholesale market price and competition for the service as drivers of STOR unit costs.

Given the analysis which has been set out above, it would appear that the wholesale price and the level of competition for the service are indeed important drivers of STOR unit costs. This analysis would also suggest that both contribute towards unit costs in roughly equal measure.

Noting that there may be other factors which influence STOR unit costs, we consider it reasonable to assume that competition may have contributed towards up to 50% of the decrease in unit costs witnessed between 2012/13 and 2015/16.

Quantification of consumer value

Between 2012/13 and 2015/16, the reduction in STOR availability fee spending was around £53.6 million. Assuming that 50% of this was driven by an increase in competition, we can estimate that additional competition for the service led to around £26.8 million of consumer value.

In 2012/13, the total costs of the STOR service (including BM utilisation) were approximately £91m. If we therefore consider the savings attributed to competition as a proportion of this, we can estimate that competition reduced service costs by approximately 30%.

In the table below, we present the average annual costs of the services that we procure through competitive market-based processes.

Figure 2: Annual costs of market-based services

Service	Annual cost 2016-17 (£m)	Annual cost 2017-18 (£m)	Average annual cost 2016-2018 (£m)
Commercial frequency response	101	99	100
Reactive	86	78	82

STOR and BM utilisation	73	92	82.5
Fast reserve (tendered)	15	13	14
		Total value of markets in scope:	278.5
Total value of markets in scope (not including STOR and BM utilisation):			196

While acknowledging that STOR prices may have reached a floor in previous years, we can apply potential savings of a similar magnitude to other competitive services to provide us with an indication of the level of possible consumer value. Applying the potential 30% saving leads to overall potential for consumer value of approximately £58.8 million.

It is not reasonable to assume that we will be solely responsible for additional competition for services. Technological development and broader market and policy design will inevitably have a significant impact also. However, this provides an indication of the overall value which may be attributed to enhancing competition for competed services, of which we may make an important contribution.

Even assuming that our contribution to this level of savings is of the order of 25%, the consumer value which we can deliver under this activity is approximately £14.7 million.

Total expected consumer value = 30% X 25% X £196 million = £14.7 million

Case Study: Improved operability

In addition to driving down tender submissions through enhanced competition, diversity introduced through new provider on-boarding can help to improve system operability. We take an example of operability challenges from February 2018 to demonstrate the potential value of this.

In figure 3 we show the daily balancing costs for the UK over the first quarter of 2018. Generally, this cost fluctuates between £0.5 and 6.0 million during this period. However, at the end of February and beginning of March, there is a sharp spike in the daily price, up to £16.0 million. During those days there was a period of heavy snow falls and sub-zero temperatures across the country. This led to a number of simultaneous shortfalls and failures across the system, meaning that the market was short by several GW. To deal with this challenge, we brought on a number of units to secure the South East of the country and to manage North-South power flows.

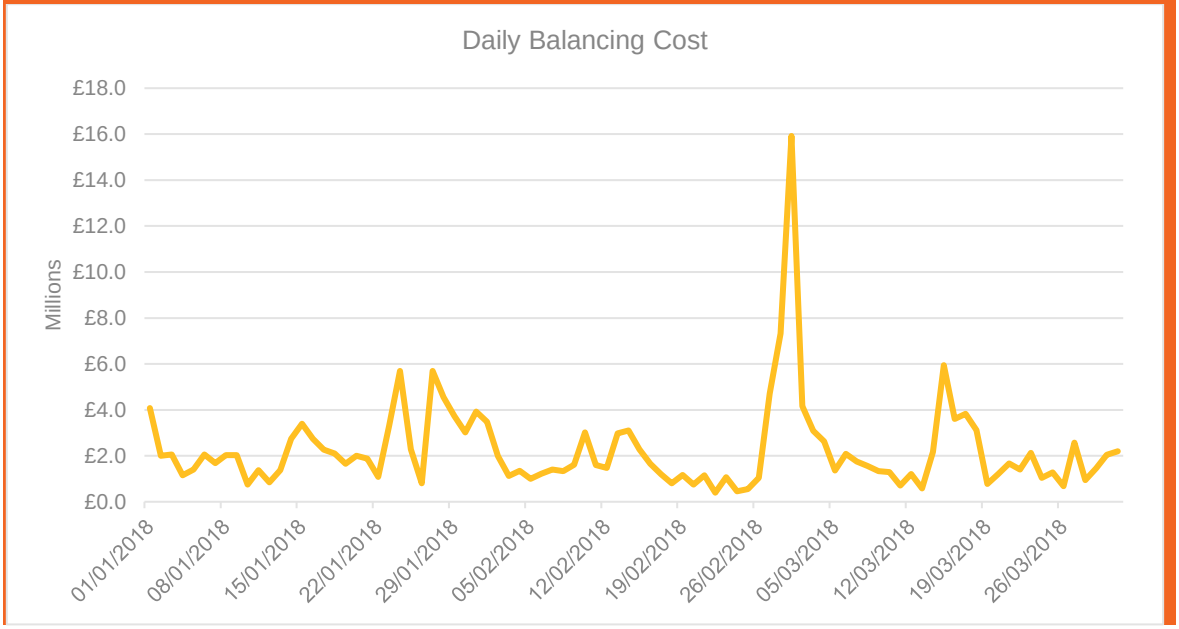
On 1 March, we had to take a number of special actions to cover the risk of gas plant supply issues in the presence of a Gas Deficit Warning issued by the gas system operator. A number of additional technical issues with certain unit types compounded these challenges.

In combination, the unexpected increase in demand, dependence on certain plant types and issuance of a Gas Deficit Warning led to a significant increase in the cash-out price which led to balancing costs to cover the shortfall of approximately £16 million.

While demand spikes are beyond the control of the ESO, we consider that an increasingly diverse portfolio of balancing service providers could help to mitigate unpredictable challenges like these across a number of our balancing services. This should both enhance reliability of the system and dampen the effects on price resulting from challenging events. For example, a diverse portfolio which dampened the short-term increase of balancing costs in this period by even 25% could save consumers around £2.5m – £4m over just a few days.

Our New Provider Onboarding and Diversity activities, along with activities in a number of our other principles will help to contribute to this identified potential consumer value.

Figure 3: Daily Balancing Cost Jan – Mar 2018



Case study limitations

In several areas, we were able to develop quantitative and monetised ranges of the potential consumer value. In other areas, analysis is limited to a qualitative explanation of the mechanisms for consumer benefit.

Quantification accuracy was constrained by data availability due to:

- Historical data being only available for recent years, not sufficient for drawing robust conclusions;
- Lack of baseline or counterfactual against which the potential for consumer value can be compared;
- Data being commercially sensitive and publication may result in negative outcomes for consumers – e.g. through revealing our procurement strategies.

Across the seven principles, it is important that the approach towards assessing consumer value is proportionate. For example, it would not be proportionate to develop or run detailed models (e.g. econometric or market models) for example and using such models may provide a level of sophistication which is not helpful for the task at hand.

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