Electricity Transmission Resilience Workshop

Summary feedback report

London, 23 October 2018

nationalgrid

Contents

Executive summary

Overview and key messages

- As the England and Wales Electricity Transmission network, we held a workshop on 23 October 2018 at CCT Venues, Canary Wharf as part of our wider programme of stakeholder engagement

- The aim of this workshop was to consult stakeholders on the topic of resilience (how our network should be protected against external threats), and to give them the opportunity to shape our future plans and processes as we prepare for the next regulatory period, RIIO-T2, which begins in 2021

- Through previous engagement, including our 2017 workshops, online consultations, research surveys and ongoing conversations, resilience has been identified by our stakeholders as one of their priority focus areas

- The topic includes physical security, cyber security, resilience to extreme weather events (including the potential impact of climate change), and 'black start' (where the whole or significant parts of the GB electricity network suffer a complete loss of power)

- Given the sensitive nature of the topic and how threats are dealt with by organisations nationwide, we were unable to share specific details of our plans or present as many options to stakeholders in comparison to other topics we have engaged on

- 39 stakeholders representing 26 organisations attended the workshop, covering nine of our key stakeholder segments/sub-segments

- Key headlines from the workshop were:

  - The need for a resilient electricity network will increase in future

  - Cyber attacks are seen by many stakeholders' as the biggest short-term threat and climate change could have the greatest longer-term impact

  - Our approach to physical security is supported

  - For cyber resilience and black start recovery, we need to be joined up with the right organisations to ensure a coordinated approach

  - Our approach to extreme weather resilience needs to be flexible, forward looking, and adapt to likely future changes

- We will incorporate what we heard at the workshop with feedback from other engagement activities, and with input from our Stakeholder Group and Ofgem's Consumer Challenge Group, use this to develop our RIIO-T2 business plans

- We will publish the first draft of these plans in 2019, so that stakeholders can review our proposals and let us know whether we've correctly interpreted their expectations

- We will continue to share updated plans with stakeholders before final submission to Ofgem in December 2019

1. Context

In 2017, we ran a programme of engagement activities as the England and Wales Electricity Transmission network[1] to understand our stakeholders' priorities and explore what they would like us to focus on in our future business plans. From this engagement, we established eight stakeholder priorities and three consumer priorities, as shown below (for more details, please click here). Ensuring our network is protected from external threats (resilience) is one of these priorities.

Consumer priorities		
I want an affordable energy bill	I want to use energy as and when I want	I want a sustainable energy system

Stakeholder priorities			
I want you to provide a safe and reliable network, so that electricity is there whenever I need it	I want you to make it easy for me to connect to and use the electricity network	I want you to provide value for money	I want you to enable the ongoing transition towards the energy system of the future
I want you to care for communities and the environment	I want your network to be protected from external threats	I want you to be transparent and easy to work with	I want you to be innovative

Using these priorities as the basis for our engagement topics, throughout 2018 we are talking to stakeholders about what they would specifically like to see in our plans for the next regulatory period, RIIO-2, which begins in 2021.

As part of this programme, we held a workshop at CCT Venues in Canary Wharf on 23 October 2018 to consult stakeholders on the topic of resilience. We are also consulting stakeholders on the same topic via other channels, to ensure we obtain views representative of all of our stakeholder segments.

This report summarises the comment and feedback we received from the workshop, and acts as a check that we have correctly captured and interpreted what stakeholders told us.

For more information about our network and how we are building our business plans, please visit http://yourenergyfuture.nationalgrid.com/electricity-transmission/.

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[1] Note that this excludes the Electricity System Operator, which will become a separate business within the National Grid group from April 2019, and which has its own programme of stakeholder engagement

2. Objectives and format

We talk to our stakeholders regularly using a variety of channels. For each of our engagement topics, we work with stakeholders to establish the desired outcomes of the engagement, who needs to be involved, and therefore how we should best engage.

For the topic of resilience, much of what we include in our plans is determined by requirements set by Government, Ofgem and other organisations charged with ensuring that the country's key national infrastructure is protected against a range of possible threats. Where this is the case, we work with those stakeholders to ensure the detail of our plans delivers what is expected of us.

However, not everything we do on the topic of resilience is predetermined, and we recognised that other stakeholders have an interest in, and are impacted by, this area.

Having identified these stakeholders, we asked them how they'd like to be engaged, and a face-to-face workshop was the most popular choice.

We needed to ensure that attendees were able to provide input in an informed way, so we began the workshop with a high level overview of what we do, our approach to engagement and how we currently manage the resilience of our network.

We then structured the day around topic-specific sessions, using a similar format to previous workshops, which had received positive feedback from attendees. For each session, this involved:

- a short presentation to provide enough context for all stakeholders to be able to discuss the subject area

- a facilitated table discussion, during which all stakeholder comments were captured to provide qualitative feedback

- where relevant, a short voting exercise, allowing us to capture quantitative feedback where there are options regarding our strategy, approach and/or what we include in our plans

Within the table discussions, stakeholders were able to suggest additional options for us to explore further.

As with previous workshops, we deliberately chose not to use a third party facilitator, but made sure that all National Grid employees were fully briefed so as not to introduce any potential bias to the conversations. This again appears to have been well-received by attendees, with a Net Promoter score of +40 and an average score of 8.4 out of 10 when asked how likely they would be to recommend the workshop to a friend or colleague.

3. Workshop attendees

39 attendees

representing

26 organisations

The following 26 organisations were represented at the workshops, with 39 attendees in total:

ABB Limited	Mitsubishi Electric Air Conditioning
Arup	National Grid US
Atkins	National Grid System Operator
British Geological Survey	Nissan
Department for BEIS	Northern Power Grid
Environment Agency	Ofgem
Electricity North West	Resilience First
GE Power	Siemens
Highview Power	SSE
Imperial College	Strathclyde University
KCOM	UK Power Networks
Manchester Fire and Rescue	University College London
Manchester University	Volta Partners

Segmenting our stakeholders

We asked attendees to classify themselves into stakeholder segments, as shown below.

Segment	Number
Customer (pays National Grid directly)	2
Consumer interest organisation	2
Regulator or government (central or local)	9
Energy network owner or operator	7
University, think tank or academic	7
Supply chain	7
Other energy industry	4
Other non-energy industry	1

We also mapped attendees to our own more detailed sub-segments:

Segment	Number
Academics	6
Distribution network operators	5
Transmission owners	2
Electricity System Operator	1
Generators/storage	3
Political and regulatory	8
Supply chain	9
Other energy industry	1
Other non-energy industry	4

When reviewing feedback from all workshop attendees, there were no significant differences in opinion across stakeholder segments.
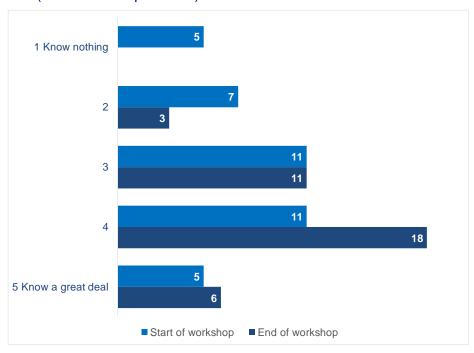
Not surprisingly, some stakeholders provided comments which focused on their particularly areas of interest and involvement (for example, representatives from distribution networks commented on the need for transmission and distribution to work together on resilience activities), but unlike other topics where opinions have been polarised, there was largely consensus across the group.

Level of knowledge and impact on attendees

At the start of the workshop, we asked attendees to tell us how much they knew about resilience in electricity transmission, and how much they were impacted by it. We asked the same questions at the end of the workshop to gauge how well we had explained what we do and why.

Q: *On a scale of 1 - 5 where 1 is know nothing and 5 is know a great deal, how much would you say you know about electricity transmission resilience?*
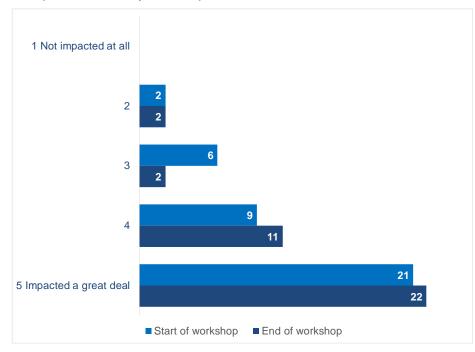
(Number of respondents)

Stakeholders told us their knowledge of resilience had increased by the end of the workshop

Start of workshop mean score = 3.1 (39 respondents)

End of workshop mean score = 3.7 (38 respondents)

Most stakeholders said they were impacted a lot by electricity transmission resilience

Q: *On a scale of 1 - 5 where 1 is not impacted at all and 5 is impacted a great deal, how impacted are you (or those you represent) by the topic of electricity transmission resilience?*

(Number of respondents)

Start of workshop mean score = 4.3 (38 respondents)
End of workshop mean score = 4.4 (37 respondents)

4. Stakeholder feedback

Within the workshop, we began with a general session on what resilience might need to look like in the future, then covered the specific topics of:

- Physical security

- Cyber security

- Resilience to extreme weather events (including the potential impact of climate change)

- 'Black start' (where the whole or significant parts of the GB electricity network suffer a complete loss of power)

We focused on these topics because they had been highlighted as priorities by our stakeholders through previous engagement, and/or the costs associated with these activities make up a material part of our business plans.

This section provides a summary of the feedback received, taking each workshop session in turn.

4.1 Session 1: Resilient future

We began the workshop with a short presentation about existing and potential future threats to infrastructure and what the country's reliance on, and expectations of, electricity might look like in the future.

We then used the following questions as prompts for facilitated discussions at each of the tables:

- How do you think the resilience of the electricity transmission system could impact the operations of your business and/or personal life?

- What are the threats that we should be resilient against in the future?

- Which of these are the most important? Where should we focus future investment?

- How do you see the influence of electricity changing in the next 20 years?
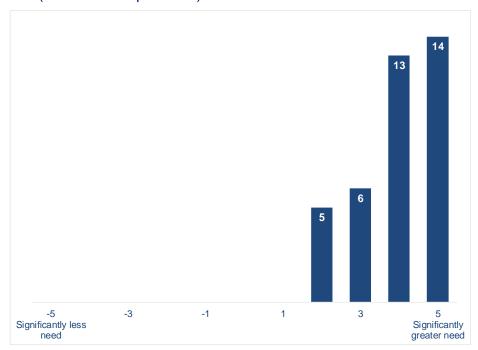
Summary of stakeholder comments and questions

- It was largely recognised that loss of supply incidents because of faults on the transmission system are very rare. However, if they do occur, their impact has the potential to be much more widespread than a more localised distribution network loss of supply.

- The potential impact on towns and cities is huge (for example, the Lancaster incident in 2015 and recent loss of power to Victoria Station in London), and current trends suggest a greater proportion of the population living in cities in the future

- The knock-on impact of a loss of supply is also important to consider. For example, the emergency services rely very heavily on electricity. Distribution networks also rely on transmission resilience.

- Generally, it was felt that consumers do not care how a fault happens (i.e. transmission or distribution), they're just concerned about the disruption it causes

- Some threats are more obvious than others. For example, a natural disaster which has a physical impact on the network is a more obvious risk than an 'invisible' cyber attack.

- Several attendees believed that the risk of these unseen threats, particularly cyber, would increase (at least in the short term)

- Longer-term, the biggest impact on our resilience could be climate change (rising sea levels, higher risk of flooding)

- There was a view that we should prioritise based on likelihood and impact, and should take a balanced approach across all threats

- Adapting to change and predicting future change is important (the impact of solar weather or wildfires, for example)

- Some stakeholders questioned whether end consumers recognise their own dependency on electricity because they haven't experienced a long-term blackout. People are unlikely to want to pay for resilience measures when they don't fully understand the consequences.

- There was a consensus that the overall dependency on electricity (business and domestic) is increasing and will continue to do so in the next 20 years, particularly with our reliance on mobile communications and the electrification of transport

- There were several comments about adopting a whole system approach, aligned with distribution networks and the system operator, and also considering the European system in an interconnected world

- Some stakeholders felt that non-transmission solutions, such as storage or backup generation, could help provide flexibility for electricity networks as a whole, but others didn't see these as a completely secure solution (e.g. in an emergency, some backup generation would fail)

Headline:

All attendees thought there would be a greater need for a resilient electricity network in the future

We finished this session with an exercise on each of the tables to understand whether attendees saw a changing importance for resilience in the future, with results as follows:

Q. *Relative to today, what do you think the future need for a resilient electricity network will be?*

(Number of respondents)

(38 respondents)

4.2 Session 2: Physical security

We began this session by explaining the process we currently follow for protecting our assets against physical (man-made) threats. We explained how we work with the Department of Business, Energy and Industrial Strategy (BEIS) and the Centre for the Protection of National Infrastructure (CPNI), to determine which of our sites need to be specifically protected. We then agree site-specific measures with BEIS and apply for funding from Ofgem for these works.

We also explained the types of physical threats we need to protect against, both now and in the future.

Given the nature of this process, there is little scope for change as a result of broader stakeholder input, but we still wanted to check what workshop attendees thought of this approach, and whether anything else should be incorporated into the decision-making process.

We used the following questions as prompts for facilitated discussions at each of the tables:

- What are your views on whether our current approach goes far enough?

- What other aspects do we need to be considering in our approach?

Summary of stakeholder comments and questions

- Several stakeholders, including Ofgem, recognised that it is difficult to comment on the appropriateness of the current approach when BEIS and the CPNI are the people who best understand what the correct investment is

- Actions need to consider possible future threats as well as current

- It was highlighted that physical security needs to be coordinated by Government (e.g. across transmission and distribution networks) and we gave reassurances that this is happening

- Some stakeholders saw a physical attack as being secondary to a cyber attack, for example, in terms of its potential impact on the network

- It was felt that we need to be proportionate, as with our overall approach to resilience, and again look at likelihood versus impact

- An attack on a non-critical site, whilst potentially creating local disruption, would not have a national impact

- Reacting to a physical attack is important, as well as trying to prevent one

- Some stakeholders noted the potential threat from National Grid staff, and we clarified that measures are in place to ensure we employ rigorous security checks, maintain the right levels of physical access to site, train staff appropriately, and that we also use social media monitoring, for example, to highlight any potential risks and/or threats

- We were also asked whether we simulated attacks as part of our employee training, and we gave reassurances that we do
- It was noted that innovative technologies could help to reduce the cost of physical security measures in future

4.3 Session 3: Cyber security

We opened this session by providing details of the changing cyber threat, including an example of a successful cyber attack in 2015, which resulted in the loss of electricity to over 200,000 consumers in Ukraine.

We explained how our current view of our future investment plans in cyber protection is largely determined by the Network and Information Systems (NIS) Regulations 2018, which were established to:

a) Manage cyber security risk

b) Protect against cyber attack

c) Detect cyber security events

d) Minimise the impact of cyber security incidents

We showed where utilities currently sit on the scale of cyber resilience in comparison with other industries and asked stakeholders for their views on whether there is a need for this to change.

We used the following questions as prompts for facilitated discussions, and provided indicative costs relating to the impact on consumer bills for the different possible options:

- Where do you think National Grid's ambitions should lie in comparison with other industries?
- What role should National Grid Electricity Transmission play in supporting industry/other sectors' cyber security plans?

Comparative scale of cyber resilience, as discussed at the workshop

Summary of stakeholder comments and questions

- There was a general view from all tables that cyber security is a/the key consideration at the moment when ensuring overall network resilience

- A number of stakeholders noted the interdependencies between different industries and within the energy industry itself, and therefore commented that levels of cyber resilience should be appropriately aligned. For example, if banking is dependent on electricity, cyber resilience for the GB electricity system should be on a par with banking. Similarly, transmission and distribution networks should be aligned.

- It was questioned whether all parts of the energy industry should carry the same cyber resilience level, e.g. does generation require the same as transmission and distribution?

- Some felt that the country's reliance on electricity means that we have to invest in cyber, but that somehow showing the size of cost versus benefit is important when deciding what the level of investment should be – there is a conflict between greater levels of cyber resilience and reducing consumer bills

- Some attendees felt that it's easier to make the argument for investment because of the potential for loss of life if power is lost (and because of this, cyber resilience for transmission needs to be the same as for banking and nuclear)

- Working with others is important from a knowledge sharing and alignment perspective, but integrating systems with others could potentially make everyone more vulnerable

- Protecting against a lone attack compared to a coordinated nation-state attack (such as the one in Ukraine) require different approaches, and this is where stakeholders would expect the Government to advise

- Educating and training staff is important to spot the signs of a potential attack, as is segregation of systems (e.g. emails and internet versus control systems)

- One stakeholder commented that we shouldn't just be investing in trying to prevent an attack, we should also be investing in how we respond to and recover from an attack if it was successful

4.4 Session 4: Extreme weather

We explained our approach to protecting our sites against flooding, using a 1 in 1,000 target recognised by the National Flood Resilience Review (2016). We provided details of what we are currently doing/have done in RIIO-T1, and what we're planning for RIIO-T2 (2012-26), including the impact of these plans on domestic electricity bills.

We illustrated how we assess sites against flood risk and showed some of the alternative ways we can protect against flooding (e.g. hard solutions such as concrete walls versus softer solutions to protect against surface water risks).

We then covered the other threats associated with extreme weather and how some of these link to each other.

We used the following questions as prompts for facilitated discussions about our approach to extreme weather resilience, relating activities to their impact on consumer bills wherever possible:

- Is this the right approach, or should we be considering a different one?

- What areas have we missed?

- What hazards or combined hazards could we coordinate with you on to find solutions?

Summary of stakeholder comments and questions

- Stakeholders felt this is an uncertain area, and therefore our approach needs to be flexible and able to adapt to future change. For example, the effects of climate change may mean that a 1 in 1,000 likelihood is not the same in a few years' time as it is now.

- We need to be using the latest available information to anticipate the future as best we can. Past trends are not the best indicator for this topic.

- It was suggested that our approach should be on a site-by-site basis, meaning that (for example) we use hard flood defences on some sites, softer/green defences on others where geography allows, or invest in smaller defences in some cases to delay the need for larger-scale investment – green defences were seen by some as being preferable wherever they are feasible

- As with other topics, we need to balance the risk related to the criticality of our assets with the cost to protect them

- We should work with others to find the best solutions, potentially collaborating more with the Environment Agency, other utilities and local authorities (including coordination of flood barrier deployment, for example)

- We should share learning with others (e.g. on solar weather)

Headlines:

Extreme weather risks will change over time and are likely to become more of an issue in the future

Our strategy needs to be up-to-date and flexible – we cannot fix on one solution now

Headline:

We need to work with, and learn from, others

- Some stakeholders were supportive of us considering approaches already used by others, such as an 'adaptive pathways' approach, where investment is made when pre-agreed triggers are activated

- Stakeholders said we should also consider potential future risks including:

  - Jetstream changes bringing the possibility of more ice storms

  - Risks to buried cables from ground movement or sink holes

  - The impact of a general rise in temperature on overhead lines

  - The impact of fracking near our assets

4.5 Session 5: Black start

We described what 'black start' is – the condition where the electricity system has shut down – and what could cause it, explaining that this is low probability but very high impact, and using examples from other countries.

We explained the potential impacts, how power would be restored, and our role in this. We also explained that we were unable to share details of our black start plans because of the sensitivities associated with our critical assets.

We then used the following questions as prompts for facilitated table discussions:

- How self-sufficient should National Grid be to recover from a black start scenario?

- What are your views on the appropriateness of our plans to remove barriers to restoration?

Summary of stakeholder comments and questions

- Stakeholders generally felt that our current approach to assets and employees (numbers and capabilities) is appropriate when it comes to preparing for black start, although some also commented that it's difficult for them to offer an informed view without seeing the details of our plans

- Some questioned whether we could be expected to have control over everything (e.g. telecommunications), although others mentioned that some distribution networks had found alternatives to mobile phones to mitigate against the loss of communication networks

Headline:

There was general support for our approach, although stakeholders found it difficult to comment without seeing the detail

- There was a general feeling that our need to return the system to service based on technological need would be put under severe pressure by Government should a black start situation occur, i.e. technological need and political need may not be aligned

- Stakeholders' expectations regarding the time taken to recover from a black start would likely be shaped by:

  - The area of the country they live/work in (expectations possibly higher in the South)

  - The time of year (e.g. potentially more critical in winter when it's cold and dark)

- Working with local authorities was suggested to coordinate the overall approach to black start (it was mentioned that depending on the causes of a system loss, there could be many other issues to deal with as well as loss of power). This should include the emergency services.

- As with other topics, alignment between transmission, distribution and the system operator was felt to be important, and also potentially with other countries via interconnectors

- Some stakeholders commented that we should consider future changes when looking at black start requirements. For example, what's the impact of more electric vehicles (positive or negative)? Could more, smaller-scale, local generation ease the burden on the transmission network?

Headline:

Black start recovery plans need to be coordinated across all relevant stakeholders

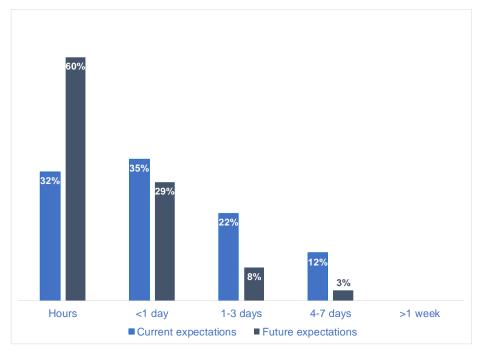## Society and business expectations exercise

At the end of this session, we ran an exercise on each of the tables to help us understand stakeholders' views on different expectations for restoration time following a significant event resulting in widespread power losses across England and Wales, or after a black start.

The exercise looked at heavy industry, cities, towns, villages and rural communities and asked attendees to put themselves in the position of each set of stakeholders. Summary views were as follows:

- Not surprisingly, attendees felt that expectations would be greatest in areas where there is a greater concentration of the population, so expectations of quicker restoration times would be greater in cities and towns (hours) than in villages or rural communities (days)

- This could partly be attributed to their heavier reliance on electricity (for communications and commuting, for example), but also because they are less used to power cuts as part of everyday life (unlike people living in more rural areas where it's accepted that power cuts will occasionally happen, and who may therefore be more prepared)

- Similarly, industry's expectations would be high, given the impact (financial and otherwise) of being without power

- Some stakeholders felt that expectations would vary depending on *why* there was a loss of power. For example, a countrywide storm

Headline:

Unsurprisingly, demand for the recovery of power in cities, towns and industry is expected to be higher than in more rural areas, but expectations will be high from those most reliant on electricity in all areas

is a more obvious threat than a cyber attack, and therefore people may be more accepting of a power cut for a longer period of time.

- Others commented that levels of vulnerability, rather than geography, would determine the expectations for restoration of power

- When asked about current versus future expectations for restoration times, attendees felt that expectations would be shorter in the future, with restoration times expected to be within hours of an event happening. Some stakeholders commented that expectations may even reduce to minutes rather than hours for some parts of society.

- The graph below shows the combined responses from 39 attendees when asked about expectations for heavy industry, cities, towns, villages and rural areas (expectations for all areas were expected to shorten in future).
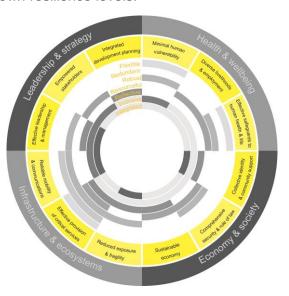

(Combined responses from 39 respondents for industry, cities, towns, villages and rural areas)

5. Measuring resilience

We ended the workshop with two short presentations, including one by Dr Juliet Mian from Arup. These presentations focused on how learning can be shared across sectors, and how we might use existing frameworks to measure our own resilience levels.

Dr Mian explained how the City Resilience Framework and the City Water Resilience Framework have been developed, and we then discussed how these, or other frameworks and/or metrics could be applied to transmission.

We invited stakeholders with an interest in this area to work with us and would like to hear from others who are interested in this topic (contact details below).

6. Next steps

We would like workshop attendees to confirm whether we have correctly captured and interpreted the feedback provided. Any comments should be provided to our Stakeholder Engagement Manager, Gary Stokes, at gary.stokes@nationalgrid.com.

We will incorporate what we heard at the workshop with feedback from other engagement activities, and with input from our Stakeholder Group and Ofgem's Consumer Challenge Group, use this to develop our RIIO-T2 business plans.

Specifically based on what we heard at the workshop, we will:

- investigate whether/how we can better coordinate with other energy companies/utilities to build resilience as a whole and support each other

- look at whether we can do more to prepare to respond to potential events, as well as looking at how we might prevent them

- use stakeholders' feedback on expected restoration times and work with government, Ofgem and other networks to investigate ways to close any gaps in expectations

- continue to work with others to see if there are additional ways we can better forecast extreme weather events and trends, by using new sources of information, for example

- investigate further into a GB industry-wide resilience measure, which we can apply to establish our resilience capability and potential

We will publish the first draft of our plans in 2019, so that stakeholders can review our proposals and let us know whether we've correctly interpreted their requirements.

We will continue to share updated plans with stakeholders before final submission to Ofgem in December 2019.

Thank you

Thanks again to all who have contributed to our consultations so far. If you have any questions, would like to suggest additional topics for engagement, or would like to get involved in further engagement activities, please email gary.stokes@nationalgrid.com.