Chapter 10
Innovation

I want you to be innovative

Electricity Transmission

nationalgrid

10. I want you to be innovative

What this stakeholder priority is about

This chapter focuses on the innovation, research and development work we are doing. It is about creating new and improved technologies, systems and services that make things better for our customers and consumers in the future.

These initiatives are also about driving culture change and different ways of working within our organisation and our partners. This will help to increase the speed at which we, as an industry, move with the environment around us.

Ofgem is consulting on the innovation incentives and funding for T2. In this chapter we are assuming that the T2 regulatory framework will still provide the strong incentives and funding required to drive innovation.

Summary of what our stakeholders have told us so far

You have told us that you want us to:

- Proactively engage with you and be clear about the opportunities and barriers around innovation.
- Be a leader and co-ordinator of innovation.
- Develop new approaches that help us continue to provide high-quality services as the energy system changes.
- Help small and medium-sized enterprises (SMEs) develop and implement their innovative products.
- Lead the way on energy decarbonisation by developing a future network that meets the UK's economic and environmental goals.
- Deliver low-carbon and low-cost solutions for our customers so that they can be set up easily, efficiently and quickly.
- Contribute to academic research projects both financially and by providing our skilled people.
- Support the development of future engineers by giving them the right skills and experience.

Types of innovation

We are focused on three types of innovation:

- Core innovations involve short-duration projects to create value within the current price control. They aim to improve existing processes, assets or technology; to reduce costs; and/or improve the quality of services for our customers and consumers.
- Adjacent innovations create value for customers and consumers in future price controls. These innovations are higher risk because we make assumptions around the regulatory framework of the future and social and usage trends.
- Transformational innovations involve developing and inventing breakthrough technologies to create value for the customer and consumer of the future. These projects are high risk because we need to make significant assumptions around the future market needs.

These types of innovation help us improve performance for our customers, consumers and drive wealth across the nation. This chapter focuses on our research and development into adjacent and transformational innovations.

Our current performance on innovation

In the current T1 period there are several innovation allowances and incentives in place for electricity network companies. Ofgem introduced these to encourage network companies to develop innovation projects that benefit consumers and the environment, which would not otherwise happen under the core RIIO framework. In other words, they are important incentives for us to drive innovation.

We have responded to these incentives. For example, during 2017/18 some 85 researchers and engineers spent more than 14,000 hours on NIA and Network Innovation Competition (NIC) projects. We also closed 34 projects during 2017/18.

We presently have 48 active projects under way, in which we collaborate with SMEs, equipment manufacturers, contractors and academic institutions.

One example is the conclusion of a 3-year project into extending the life of our overhead line fittings. We now have a better understanding of how the environment affects our overhead lines. We are using what we have learned to fine-tune our plans for when assets are replaced. We can now focus our spending on the assets with the highest risk of developing faults and failures. So far, by analysing 480km of overhead lines, we have reduced our T1 period spending by £20m. Other utilities are now carrying out this work to help them improve their asset management.

We have also created a test centre for new transmission technologies: the Deeside Innovation Centre. This five-year innovation programme began in January 2016. It aims to research, deliver and demonstrate a platform for moving useful, innovative technologies into our business faster than ever before. It will allow us to bring benefits to consumers more quickly and will also help us explore more complex, disruptive innovations with less financial and operational risk.

You can find out more about our innovation work by downloading our Network Innovation Annual Summary.

The need for innovation funding

Our ability to innovate depends on there being sufficient innovation funding available to incentivise long-term, high-risk investments spanning several price controls. After consultation with our stakeholders, we believe a lack of funding stifles innovation for various reasons:

- Radical innovation involves significant technological development and considerable changes in business models which take time to develop and implement.
- It is very hard to achieve long-term, risky and uncertain innovation within short price control periods. They do not provide a sufficient payback period to fund these innovations. Also, cost savings resulting from innovations are shared with consumers reducing the incentive to innovate further.
- Innovations lead to lower cost allowances in future price controls reducing the incentive to innovate if there is not dedicated funding.

Ofgem discusses the T2 regulatory framework for innovation funding on pages 65 to 75 of its RIIO-2 sector-specific methodology consultation. We consider there needs to be more innovation funding available for us than Ofgem currently proposes if we are to pursue the innovation themes below in the T2 period. We are engaging with Ofgem and our stakeholders about the level of innovation funding for the T2 period.

Our direction of travel following stakeholder feedback so far

We are in the process of building our business plan with our stakeholders. In this section, we will playback the feedback we have heard from you – and ask for your views on what we suggest could happen next.

The benefits to consumers

Our plans for innovation during T2 will benefit consumers by:

- Enabling the decarbonisation of the energy system.
- Helping to lower costs across all electricity networks.

During T2, we will become even more transparent about the potential barriers and opportunities for innovation that we see. We will work collaboratively with partners, including SMEs, academia and government organisations to expand our innovation ideas and find solutions to the barriers that stand in their way.

Here are six innovation themes we would focus on during the T2 period, should there be appropriate innovation incentives and funding available:

Digitising our network

You want us to be a leader in innovation and to play a central role in making it possible. The future energy system will have more renewable generation, while electricity, gas and transport networks will interact more than ever before. Our stakeholders also believe the energy market will be more dynamic, with trading possibly taking place every five minutes or less.

To respond to these challenges and your feedback, our direction of travel for the T2 period is to transform our business through digitisation. To do this we could:

- Develop sensors, technologies and artificial intelligence algorithms that provide the data needed to operate the electricity network of the future.
- Use this data to understand how an integrated energy network, combining electricity, gas, heat and transport, could work.
- Develop a joined-up programme of work, or support an existing one, to study how different technologies might support an integrated energy system that has a zero-carbon footprint by 2050.

These innovations would benefit consumers in several significant ways. The future energy system would operate more efficiently, costs would be lower, and Great Britain would transition to a low-carbon energy sector.

Reducing our environmental impact

Our stakeholders want us to lead the way on decarbonising energy. As discussed in Chapter 9, we have a significant carbon footprint. Innovation will be vital in reducing the impact we have on the environment.

Our intention for the T2 period is to promote the development of:

- Alternative technologies that mean we no longer have to buy equipment that uses SF_6 (a potent greenhouse gas) as an insulating gas.
- Alternative technologies that help us reduce the SF_6 gas already installed on our network.

These innovations would allow us to reduce carbon emissions from our network more cost-effectively, which would benefit consumers.

Working together to decarbonise industrial processes

Industry in the UK is responsible for around 17% of total delivered energy and 20% of CO_2 emissions. Just six sub-sectors account for 71% of those emissions: steel (25%), chemicals (19%), cement (8%), food and drink (7%), paper (6%) and plastics (6%).

Our aim for the T2 period is to:

- Engage with key members of the industrial sector who want to decarbonise their processes.
- Support the development of innovation projects that help to decarbonise those processes.

These innovations would benefit consumers by helping the sector find more cost-effective solutions to reducing carbon emissions.

Improving the management of our assets and remaining reliable

As we move towards the energy system of the future, we also need to provide a reliable service for our customers and consumers. To do this, we need to get the best out of our existing assets, and run today's network with the future in mind. We also need to research and develop new equipment and systems that can be replaced, added and modified quickly, so we can manage unexpected events or needs on the network.

Our direction of travel for the T2 period is to develop innovation projects that help us understand how the performance of our assets declines over time. With this information, we will be able to make the best decisions about when to intervene and we will develop technologies that help us do this.

These innovations would benefit consumers in the long term by allowing us to keep our network reliable at a lower cost.

Improving how we make decisions under increased uncertainty

Our stakeholders want us to develop ways to keep delivering high-quality services as the energy system changes. We regularly make both investment and operational decisions under uncertain conditions. We do this by using data, information and expert engineering judgement. Going forward, we expect the number of decisions we have to make to increase – but to have less time to make them. This is because the system is growing ever more complex, as more local generation and more interconnection on the system creates more variable flows of energy.

In this landscape, it's important we improve our data and decision-making models. The importance of adequate data modelling for large infrastructure organisations was underlined by the case of the West Coast Main Line rail franchise. Its collapse in 2012 was due to incorrect and misused model outputs. This ultimately cost the taxpayer more than £50m.

To respond to this challenge, our intention for the T2 period is to improve the data and models that we rely on to make major decisions.

These innovations would benefit consumers by allowing us to improve the decisions our business makes. This would improve the quality of our services and/or lower costs in the long term.

Creating a testbed to trial and accelerate the use of new technologies

The energy sector is developing an increasing number of original technologies, including those that support the shift to a low-carbon energy system. However, these technologies can only be implemented when they've been shown to work in practice.

Our aim for the T2 period in this area is to:

- Expand our Deeside Innovation Centre to include a facility to trial gas (hydrogen and liquefied natural gas) integration, electric transport technologies, and novel zero-carbon generation technologies.
- Work with our stakeholders to develop an agreed programme of work for understanding the effectiveness and performance of new technologies.
- Provide the facilities for UK academia and SMEs to test their technologies that could benefit energy consumers.
- Share our findings annually and publish suggestions and calls for technologies that we believe are required to fill gaps.
- Support the commercial journey of technologies in the UK, where appropriate.

These innovations would benefit consumers by speeding up the use of new technologies, and bringing forward better service quality and cost savings.

Embedding innovation into our everyday business

Our stakeholders have told us they want us to be a leader in innovation, as well as providing value for money. We consider that strong incentives to drive down costs and improve service are critical to embed an innovative culture.

One of the challenges of disruptive innovation is that it can involve changing processes that are already working well. To make the most of disruptive innovations we need to properly establish them into our day-to-day operations. We aim to create an even stronger culture of embedding innovation during T2 by:

- Putting more emphasis on identifying and quantifying the benefits of each innovation during the development stage.
- Changing the way we report our business plan to make innovations more visible and spell out the benefits they have brought for consumers.
- Taking on more risk, so we succeed, or fail, fast – and learn more quickly.

These approaches would benefit consumers by helping us realise the full potential of innovation. When new innovations are properly established, any cost saving or boost to service standards will be maximised.

Support for innovation through regulatory incentives

Currently, three regulatory incentives are in place to stimulate longer-term and transformational innovation in network companies:

- The Network Innovation Allowance (NIA).
- The Network Innovation Competition (NIC).
- The Innovation Roll-Out Mechanism (IRM).

There are also output incentives and a strong totex incentive mechanism (TIM) to stimulate core innovations that lower costs or improve services during a price control period.

Together, these incentives encourage innovation for the benefit of consumers. Without them, network companies would not have a strong reason to pursue innovation projects.

What it could cost

Our current average annual spending on innovation is around £20m. This comes from innovation allowances and incentives, as well as our totex allowance. The data we are presenting in this consultation is rounded to the nearest £0.05bn, as a result, £20m rounds to zero.

Whether we include innovation costs in our business plan depends on Ofgem's approach to innovation for the T2 period, which it is currently consulting on. In other words, innovation might be funded in T2 through a different route than our current allowance.

For the T2 period, Ofgem has signalled it wants to continue offering innovation incentives. The regulator wants to focus this funding on supporting the transition to a future energy system and aims to co-ordinate these funds with other public sector innovation funding. It is also looking to increase the role of other energy third parties in supporting innovation funding.

Our stakeholders tell us it is important to them that there is certainty around the availability of innovation funding in T2. We'll continue to engage with Ofgem and our stakeholders on what will deliver the most benefits for consumers.

How we will continue to engage with our stakeholders

We welcome feedback on this chapter on innovation. In particular, we would like to know your thoughts on our suggested areas of research and development for the T2 period. We also welcome your feedback on what our level of ambition for innovation should be for T2 and what the appropriate methods of funding should be.

We will continue to collaborate with our research partners from academia and other businesses and listen to their ideas for innovation in the future. We are continuing to engage with our suppliers, at both national and international level, on our approach to innovation. We are holding an innovation workshop with our stakeholders in February.

We welcome your views:

Question:
How ambitious should we be in relation to innovation in the T2 period?

Submit your feedback online here:

How to use this document
We want your feedback

Who is this consultation aimed at?

We are interested in the views of all stakeholders who are impacted by what we do or interested in shaping the future of electricity transmission. This includes the views of all users of our network, government, regulatory bodies and energy industry professionals.

Tell us what you think

This consultation is open until 31 March 2019. You may give us feedback in the ways outlined below. We particularly seek your views in response to the specific questions we have posed. These are summarised on page 9. You may respond to all questions or just those relevant to your specific views.

Ways to feedback:

Make notes

Throughout the document, we have provided space for you to read and make notes at the start of each chapter (opposite). Use the section numbering as a way to reference accurately. You can then type up your notes and send them in an email or submit them online.

Interactive pdf notes

Alternatively, we will be sending out editable pdf versions of this document with note fields for you to type directly into.

Email

We have a dedicated email address specifically for your feedback to this document. We welcome your thoughts at: **gary.stokes@nationalgrid.com**

Alternatively, you can put your thoughts in writing and send to: **Gary Stokes, National Grid House, Warwick Technology Park, Gallows Hill, Warwick CV34 6DA.**

Online

You can go directly to the website and submit your comments here.

You can learn more about how we are working with stakeholders by visiting our website. This site makes it easy to follow our progress and shows you how to get involved.

Please share your thoughts:

Type here>