In 2015, we published our first Innovation Strategy. In 2017, we refreshed the document to reflect feedback we had received from stakeholders trying to engage with us for idea and project development. In response, that year, we undertook a complete refresh of the way we operate the Innovation department. We had a thorough look at our processes and procedures to understand how we could improve them and most importantly how we could make it easier and more accessible for customers, companies, innovators and general stakeholders to engage and collaborate with us.

This document aims to reflect these changes we have gone through but also remind you, our stakeholders, why we innovate and how we do it. Since then, the industry has moved on significantly, our customers’ needs are evolving and the changes we make to our Innovation Strategy aim to reflect this.

For example, in May this year, the Committee on Climate Change published its ‘Net Zero’ report detailing the UK’s progress so far to reduce greenhouse gas emissions. We have now seen an uptake of over 70,000 EVs across our network; we have over 2GW of accepted storage connection offers and over 9GW of distributed generation. We continue to see first-hand how our customers, motivated by technology efficiencies, clean air and carbon challenges, commercial propositions, new technologies, and government policies can drive radical change in how we operate our networks. In this context, we can only be successful through increased collaboration.

In the last year alone, we undertook more than 64 innovation external stakeholder engagement sessions to connect with industry, and conducted our popular Better Networks Forum where we were able to share several of our solutions with other networks and the wider industry. We continue to promote innovation internally and externally by including innovation content across our company and stakeholder events. This allows us to develop ideas and engage early with the end users of each innovation solution.

Our innovation initiatives have already delivered over £183m of savings in the last four years. And innovation has enabled us to react to our customers’ needs as we ensure the network is ready for low carbon technologies. We continue to innovate in order to make our service more reliable, more affordable, easier to connect to, cleaner and safer.

Innovation has become an ever more important part of running the GB distribution networks. Across the country, the distribution of electricity is an essential service for customers. It is the hidden lifeblood of the economy. Our role as a distribution network operator is clear, as we serve over eight million customers by delivering electricity and network services to roughly a third of the UK.

Innovation provides us the flexibility to respond better, faster, or more cost-efficiently to the changing requirements of our customers, both today and tomorrow. We are collaborating with our industry partners to ensure that we all prepare for the future. For example, we are active members of the EV Energy Task Force that seeks to align the industry towards accelerating EV uptake, and we have taken on board the Energy Data Task Force recommendations that seek consensus on how best to share data and use it to enable the energy transition.

New technologies such as power electronics, modern sensor and control systems and data analytics are revolutionising the way we distribute electricity. We continue our journey from Distribution Network Operator (DNO) to a Distribution System Operator (DSO), providing more active, market-focused services to our evolving customers.

Our refreshed Innovation Strategy comes at a time when the opportunities and the challenges facing electricity distribution have never been greater. Our strategy sets out why we innovate, how our stakeholders inform our strategy, how we develop and deliver our innovation programme and the challenges and areas of focus moving forward.

We are encouraged by the volume of ideas that come through our innovation pipeline and the vast portfolio of projects that continue to grow. We welcome your view on the direction we are heading and the challenges we are addressing. Please continue to get in touch – innovation@ukpowernetworks.co.uk – share with us your ideas, challenge our approach and continue to hold us to account.

Ian Cameron
Head of Innovation
Innovation in numbers

£183 million
Savings through innovation (2015-2019)

71
Total number of innovation projects kicked off in ED1

33
Industry Awards won for Innovation in ED1

£60 million
Value of all projects in delivery

6
Fast follow projects into BAU in ED1

30
Solutions deployed into BAU in ED1

£45 million
Invested in Innovation in RIIO-ED1 so far

77%
NIA funding to third parties

42%
Projects in ED1 that are in collaboration with other DNOs
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td><strong>Innovation as part of the Corporate Vision</strong></td>
<td>5</td>
</tr>
<tr>
<td>What it means</td>
<td>6</td>
</tr>
<tr>
<td>Why do we innovate?</td>
<td>7</td>
</tr>
<tr>
<td><strong>Stakeholder Engagement</strong></td>
<td>8</td>
</tr>
<tr>
<td>Our range of stakeholders</td>
<td>9</td>
</tr>
<tr>
<td>The value of engaging with stakeholders</td>
<td>10</td>
</tr>
<tr>
<td><strong>Our Focus Areas</strong></td>
<td>11</td>
</tr>
<tr>
<td>Efficient and Effective</td>
<td>12</td>
</tr>
<tr>
<td>Net Zero Ready</td>
<td>13</td>
</tr>
<tr>
<td>Future Ready</td>
<td>14</td>
</tr>
<tr>
<td><strong>How we innovate</strong></td>
<td>15</td>
</tr>
<tr>
<td>Sourcing Innovation ideas</td>
<td>16</td>
</tr>
<tr>
<td>Portfolio prioritisation and project selection</td>
<td>18</td>
</tr>
<tr>
<td>Funding Innovation</td>
<td>19</td>
</tr>
<tr>
<td>Innovation delivery life-cycle</td>
<td>20</td>
</tr>
<tr>
<td><strong>Transitioning Innovation into BAU</strong></td>
<td>21</td>
</tr>
<tr>
<td><strong>Benefit realisation and reporting</strong></td>
<td>22</td>
</tr>
<tr>
<td>Creating a common measurement framework</td>
<td>23</td>
</tr>
<tr>
<td>Principles of analysing benefits</td>
<td>24</td>
</tr>
<tr>
<td><strong>Conclusion</strong></td>
<td>25</td>
</tr>
</tbody>
</table>
Introduction

UK Power Networks owns, operates and manages three of the 14 regulated electricity distribution networks in Great Britain. Our networks deliver electricity to 20 million people (8.3 million homes and businesses), 28% of the United Kingdom’s population.

We operate and maintain the electricity distribution networks. We do not generate or buy electricity, nor do we sell it to customers. We make sure electricity travels from generation to homes and businesses and back into the grid.

Our three regulated networks are:

- Eastern Power Networks Plc, serving North London and East Anglia
- London Power Networks Plc, serving inner London
- South Eastern Power Networks Plc, serving South London, Kent, East Sussex and parts of West Sussex

Our responsibility is to keep the lights on for the customers connected to our network. We:

- Maintain the safety and reliability of our electricity networks
- Efficiently connect new customers to our electricity networks including power generation
- Restore supply as quickly as possible to customers who experience an interruption
- Innovate to continually improve efficiency and the service we provide to our customers
- Facilitate a net zero environment by investing in services, assets, processes and initiatives that enable low carbon technology to be connected to our network
- Extend and upgrade the network to meet our customers’ future needs.

This document, influenced by our stakeholders for our stakeholders, aims to increase visibility of our focus and our processes and provide a means to expand collaboration with our innovation stakeholders and partners.

It sets out UK Power Networks’ Innovation Strategy: how innovation fits into the overall corporate vision and why and how we innovate. We advise how our customers and stakeholders shape our innovation projects, the areas of focus for innovation and how our customers benefit from the work we have been carrying out throughout the RIIO-ED1 price control period.

This strategy demonstrates that we are exploring levers at all stages:

- From continuous improvement to making our network more efficient and effective, to revolutionary change in the service we deliver to customers, and
- Trialling and rolling out new smart solutions that enable our networks to be more flexible and resilient as we move to a more decentralised, digitised and decarbonised energy system.

This document also maintains our commitment to publish, review, and update our Innovation Strategy for all our stakeholders’ benefit. We aim to ensure the Innovation Strategy remains relevant, therefore we will continue to review and update it every two years.
Innovation as part of the Corporate Vision

Our vision is to be consistently the best-performing Distribution Network Operator.

<table>
<thead>
<tr>
<th>An Employer of Choice</th>
<th>A Respected and Trusted Corporate Citizen</th>
<th>Sustainably Cost-efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>The safest with an exemplary safety record</td>
<td>The most reliable networks</td>
<td>The lowest cost electricity distributor</td>
</tr>
<tr>
<td>A place where people love to come to work</td>
<td>The most satisfied customers</td>
<td>Deliver on our commitments</td>
</tr>
<tr>
<td>Embracing diversity</td>
<td>The most innovative</td>
<td>Deliver profitable growth in our Services and Connections businesses</td>
</tr>
<tr>
<td>An appropriately skilled workforce for both today and the long term</td>
<td>The most socially and environmentally responsible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ensure we meet the needs of our vulnerable customers, both now and in the future</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enabling the low-carbon transition for all as the leading UK Distribution System Operator</td>
<td></td>
</tr>
</tbody>
</table>

Performance focused within a set of values:

Integrity – Respect – Continuous Improvement – Responsibility – Unity – Diversity and Inclusiveness

Our Innovation Strategy aligns to our corporate vision, which underpins our mission and provides clarity of purpose to the organisation. A key success indicator in delivering our vision is to be classed as the ‘Most Innovative Distribution Operator’.

A successful innovation programme supports all three elements of our corporate vision, for example, innovation is a central component of our strategy continuing to be the lowest cost electricity distributor in GB. However, innovation is broader than only cost efficiency and we are committed to explore and benefit from the value of innovation as part of our continuous improvement culture.
Innovation can have many definitions and interpretations depending on the context and the user. At UK Power Networks, we define Innovation as: the development and implementation of any approach which enables us and our stakeholders to achieve our objectives faster, more affordably, safer, or to a higher standard, and which uses unconventional methods in the context of our business.

More simply put, to innovate is to deliver value to our customers and stakeholders by testing new solutions that are inherently riskier than our traditional methods, allowing ourselves to prove if they work or not and deploying at pace those solutions that have demonstrated benefits.

Our industry is undergoing rapid and extensive change and thus innovation is the critical tool with which UK Power Networks must respond. We are proud to have met our vision of being the best performing DNO group in Great Britain by having improved our performance on Customer Interruptions (CIs) and Customer Minutes Lost (CMLs), improved our cost efficiency and significantly increased our customer satisfaction scores.

We have also achieved class-leading savings through deploying smart solutions as business as usual. Innovation has a significant impact on the company’s public reputation, demonstrating to our diverse customer base how we are enabling a low-carbon future. We evidence the impact of our external relations through independent monitoring of positive sentiment, which the Innovation team has delivered through written, online and social media.

Below we set out important traits of innovation that shape our strategy and how we deliver it:

• Innovation occurs throughout our business on a day-to-day basis. It is wider than those activities benefiting from innovation funding or those delivered by our central innovation team. We look at best practice and opportunities across our business, from other utilities and across the world.

• Innovation is more than research and development (R&D), i.e. solutions at a low technology readiness level; many innovative ideas may be highly practical and involve existing technology, but it is the activity or the scale to which we apply them that creates greater opportunities.

• Innovation involves taking higher risks in order to achieve improvements in performance and added value. This is managed carefully and is reflected in our rigorous approach to the selection, governance and delivery of innovation project.

• We recognise that some innovation will ‘fail’, i.e. not proceed into Business as usual. We don’t necessarily wait for the outcomes of the project or until after the project has ended. Our ‘Fast Fail’ process enables us to halt a project when we believe it no longer delivers value for customer’s money or is no longer expected to generate the expected learnings.

• We focus on capturing the learning from such projects and believe that the greater failure would be to always accept the status quo.

• We focus on the projects that have most impact and provide most value first.

All projects we undertake are unique and involve some level of uncertainty. Generally, these projects, once implemented, will involve changing something in the way we currently operate our business. However, innovation is not the same as change, as not all change projects apply unconventional techniques or accept the risk of challenging accepted practices in order to deliver value – both of which characterise innovation.

Many improvements are achieved by smaller step-by-step developments. At UK Power Networks we include in our portfolio both:

• Incremental innovation – continuous evaluation to achieve gradual improvements of our business efficiency. For example our project Network Vision is developing an operational planning and tracking tool to enable GB DNOs to plan outages on the distribution networks at the lowest possible cost across multiple programmes (capex deployment, connections) whilst considering distributed energy resources (DER) export.

• Disruptive or transformational innovation – redefining the way we run our business or network, such as interacting with the transmission network to offer reactive power support from DER connected to our network. For example, our project Power Potential is creating a completely novel way for us to interact with the transmission system operator while allowing DERs to participate in wider markets.

Our innovation approach is not restricted to engineering ideas. It also covers non-asset solution, solutions for contacting and serving our customers better, providing commercial alternatives that bring value to them, improving our health and safety culture, and changing our business processes to enhance our performance.
We continue to demonstrate that innovation brings value to the business.

The reasons we innovate include:

- **Deliver value for consumers** – by maximising the smart savings we deliver against traditional solutions and ensuring we have a strong conversion rate for transitioning innovative solutions into business as usual
- **Deliver measurable social, environmental and safety benefits** – including CI, CML, carbon emissions and safety performance
- **Facilitate a low carbon system** – by improving network access through reducing time and cost to connect low carbon load, generation, and storage technologies
- **Prepare for the uptake of electric vehicles and electric heat** – we must ensure we have the right skills and processes in place, we have the best forecast and data available, we monitor locations where we think issues could appear and we deploy smart solutions before investing. Ultimately, we then strategically identify locations where more capacity will be required for these technologies
- **Be recognised as a collaborative, thought leader in innovation**, evidenced by the number of opportunities we have created for dissemination, the number of innovation projects delivered jointly with our peer utilities, external recognition achieved, and our industry working group involvement
- **Be the benchmark for innovation** and best DSO practice nationally and internationally by leading on BAU rollout of DSO capabilities to ensure safe, reliable and cost effective networks.

**Why do we innovate?**

INNOVATION AIMS TO DELIVER OUR VISION WHILE BRINGING VALUE AND HAVING IMPACT ACROSS OUR BUSINESS AND OUR COMMUNITIES
Stakeholder Engagement

In 2017, our stakeholders told us that it was challenging to get new ideas into our pipeline of innovation projects. The Small and Medium Enterprises (SMEs) provided particularly low scores on how handovers between personnel are managed well and how likely it is to get timely responses to correspondence\(^1\). As a result, we have renewed our innovation idea capture process and improved the way we share our challenges with SMEs, the number of contact points, and the way we effectively manage our relationships.

At UK Power Networks, we firmly believe that innovation is key to delivering the best service and best value for our customers and stakeholders. This is the primary influence for each element of our Innovation Strategy.

As shown in Figure 1, our corporate engagement strategy focuses on four strategic areas informed by the views of our stakeholders:

1. How we are meeting our customers’ evolving needs by improving existing services and shaping new ones
2. Being clear on our role in caring about the environment by reducing the environmental impact of our operations and enabling our country’s net zero transition
3. Demonstrating how we go above and beyond for our communities, such as our industry-leading public safety campaign that reached over 470,000 people this year alone
4. Highlighting how we support our customers in vulnerable circumstances and ensure they are not left behind during the complex energy transition

Innovation is critical to all of these focus areas, and we recognise that for our innovation initiatives to be successful, they must be informed and guided by our stakeholders throughout. We are committed to applying best practices of stakeholder engagement at all levels: when shaping our Innovation Strategy, assessing and reviewing our innovation portfolio, when scoping a project and finally over the lifetime of the project.

As we drafted this document, we consulted experts in this matter, such as the Energy Innovation Centre, to make sure we were covering all aspects of the strategy that are relevant to their communities and the innovators we hope to collaborate with.

Next steps

We are continuously looking for feedback on our Innovation strategy and how we innovate. There are three key points throughout the year at which we will focus on gaining feedback.

- First of all, we are again coming together with our fellow regional utilities, joining the water companies Anglian Water and Essex and Suffolk Water at the Innovate East festival, a three-day event where we will be meeting customers and innovators to work through key cross-sector challenges.
- A second point of contact will be at Utility Week Live, which is arguably the UK’s largest utility industry event bringing together all utilities and supply chain. It gives us an opportunity to share our challenges and get feedback from a huge range of stakeholders alongside our network partners.
- Finally, each year we participate in the Low Carbon Networks Innovation conference, where we have a stand to share progress on all our innovation projects. It represents a great opportunity to have in-depth discussions with our industry peers, suppliers, academia and SMEs on our Innovation portfolio and gain feedback on where we should focus our next efforts.

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Our range of stakeholders

Figure 2 outlines the breadth of customers and stakeholders we continuously interact with. Given the diversity of the stakeholders interested in our industry innovation, we recognise that one engagement approach does not work for everyone. We therefore identify and profile our stakeholders according to their interest and needs in order to define the best engagement approach to adopt with individual stakeholders or the different groups of interest. This is also conducted at a project level due to the diversity of our innovation portfolio.

We maintain a stakeholder register on a regular basis as we recognise a dynamic approach is required to reflect the evolving nature of innovation and the continuous changes in the industry and policy framework.

We place a high value on seeking out the best ideas to improve our performance for our customers, from start-ups to established industry leaders. We actively support SMEs to develop and demonstrate their solutions through the Energy Innovation Centre.

This continued initiative has also developed the highest volume of cross-network collaboration of any year to date, with the inclusion of gas network partners and cross vector projects now being developed as a norm. As part of our vision to be a respected corporate citizen, we collaborate with research and demonstration centres such as the Power Networks Demonstration Centre, focussing their research towards overcoming our key industry challenges.
The value of engaging with stakeholders

To achieve our vision, we actively engage with relevant stakeholders, across the business and beyond, in order to meet three key objectives.

**OBJECTIVE 1**

**Access to great ideas, responding to real challenges**

**BENEFITS**

- Be the most innovative, embedding the latest views from the industry and beyond
- Support the delivery of the RIIO-ED1 commitments, and therefore the achievement of customer benefits
- Ensure the most promising ideas are explored to improve business practices and better customer service

**OBJECTIVE 2**

**Collaborate with partners to take an idea forward and innovate**

**BENEFITS**

- Ensure the best people with the right skillsets are involved in our innovation projects and activities, either directly or indirectly
- Reach out to other DNOs to increase collaboration to maximise opportunities
- Ensure innovation projects deliver the highest value in the most effective way by ensuring that stakeholders are driving why we innovate
- Ensure prompt implementation of successful projects into business as usual

**OBJECTIVE 3**

**Communicate our findings and explain the benefits from our innovation projects with industry and stakeholders**

**BENEFITS**

- Share learnings within the business, with other DNOs and the wider industry to maximise the value for society

By meeting these objectives, we ensure that we deliver key benefits to individual projects, to the business and the wider industry, and ultimately to our customers.

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**How we engage**

Depending on the interest and the influence of each stakeholder, we deploy three key approaches: ‘keep informed’, ‘consult’ and ‘work in collaboration’.

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**Inform**

We maintain effective communication with key stakeholders at both project and programme levels through regular meetings, team briefs, newsletters, working groups, technical boards and external events.

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**Consult**

Consulting with our customers, government, the regulator, other network operators and subject matter experts is fundamental when scoping a new project, during the project delivery and beyond the project lifetime to reassess the realised benefits.

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**Collaborate**

A collaborative approach is at the heart of everything we do. It ensures that we have the right people and the required skillset in each project, delivering the highest value in a cost-effective way. Stakeholder engagement is a continuously evolving picture; effectively, our stakeholder engagement mechanisms are continuously refined as we identify new and better channels to communicate and work with our internal and external stakeholders.
Our Focus Areas

We have three innovation pillars that set the direction on which we focus our initiatives. We have adopted our pillars to reflect the constantly evolving low carbon agenda, changing our Low Carbon Ready focus to Net Zero, as shown below.

At UK Power Networks, we understand we need to prepare our business for significant future change; this change will bring challenges to our existing business model. Our three innovation pillars (see Figure 3 below and pages 12, 13 and 14) help us categorise the focus areas and challenges needing to be addressed.

We have also updated the challenges based on feedback from our critical friends’ panels and the evolving government agenda. Set out below are examples of the challenges within each pillar.

To ensure we have a balanced portfolio, and customers benefit from reduced costs through RIIO-ED1 and beyond, we package projects into three time horizons:

- **Immediate term business as usual funded innovation which deliver benefits in the short term**
- **Medium term readiness to deploy following the project completion**
- **Long term R&D to test, learn and adapt research solutions into deployable ready benefits**

We have worked on over 70 projects since the start of ED1 that are addressing one or several of these challenges, and continue to plan how to address these challenges in the coming years. We provide detail on individual projects on our innovation website at: [http://innovation.ukpowernetworks.co.uk](http://innovation.ukpowernetworks.co.uk).

Additionally, our Environment Report and our NIA Annual Summary report contain good summaries of the work we do and the benefits it brings.

The following section provides examples of how we are addressing the challenges mentioned previously and some of the ideas we are pursuing next.

Across these challenges and within our categories, we are very open to ideas. If you have a solution that you think we should be aware of that addresses these areas of focus, please get in touch at [innovation@ukpowernetworks.co.uk](mailto:innovation@ukpowernetworks.co.uk)

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**Efficient and Effective**

Delivering value to customers and the business through innovation by enhancing network performance and reliability at the lowest possible cost

**Net Zero Ready**

An enabler of the low carbon transition, connecting electric transport, heat, generation at storage at the lowest cost, as well as ensuring sustainability of our operations

**Future Ready**

A future-ready distribution system providing new services, to meet the needs of tomorrow’s customers
Efficient and Effective

Delivering value to customers and the business through innovation by enhancing network performance and reliability at the lowest possible cost

Quality of supply, keep customer interruptions (CIs) and customer minutes lost (CMLs) to the minimum

Keeping the lights on is the most essential part of what we do. Improving our performance by reducing CIs and CMLs involves not only operating the most reliable network, but also giving the best customer service. We have run several projects with the focus of improving quality of supply including Link Alert, improving reliability and safety of inspection and operation of link boxes and Pressurised Cable Active Control and Monitoring, a project producing an active control unit to minimise fluid leakages from cables to enable safer installation and cleaner environment.

Going forward we are looking at advanced transient fault detection and increased fault level monitoring.

Increased safety performance

We are proud of our safety culture and performance and seek to maintain and improve it. One project, Mobile Asset Assessment Vehicle (MAAV) aims to identify LV faults proactively by detecting voltage leakage, allowing the network operator to prioritise the asset replacement programme. Early intervention enabled by the MAAV is a more efficient way to address LV faults in a planned manner and avoid safety problems where these faults could occur.

We are going to test how we can update our network records from other people’s underground surveys. Our USX project will improve our data quality and the safety of anyone working in those areas in the future.

Utilise data efficiently and develop appropriate systems and processes to maximise its value and interactions

In the future, a combination of substation monitoring installed on our network, combined with smart meters, smart appliances, and analytics will help us to ensure that the network stays within safe limits, and that we continue to provide a reliable power supply, as well as cheaper and quicker connections for our customers.

We now have more and more digital data regarding our assets. For example, we have started to use geographical images to help us assess asset condition. The project Automatic Overhead Asset Assessment through Visual Data will develop an image processing system which will provide automated inspection and health condition assessment of overhead electricity assets in order to reduce the work required in non-automated inspection.

Going forward we see a clear need to focus on how we share data externally, and access external data, while looking for solutions that minimise the burden and cost of doing so.
**Net Zero Ready**

An enabler of the low carbon transition, connecting electric transport, heat, generation at storage at the lowest cost, as well as ensuring sustainability of our operations.

**Challenges Addressed**

- Enable the Net Zero targets by facilitating connection of Low Carbon Technologies (LCTs), including electric transport at the lowest cost to consumers
- Delivery of environmental and social obligations
- Reduced cost and time to connect for LCTs
- Maximise HV network utilisation
- Play an active role in addressing the challenge of decarbonising heat
- Reduce our own carbon footprint

**Enable the low carbon transition by facilitating connection of low carbon technologies, including electric transport at the lowest cost to consumers**

In the last four years EVs have been a major focus of our innovation portfolio. We have a full portfolio of enablers, commercial and technical solutions in our toolbox that are helping us understand the evolving needs and expectations of our customers and preparing our network for 4m EVs by 2030.

Building on previous projects like Black Cab Green, Recharge the Future and Timed Connections Software Development, the Network Innovation Allowance (NIA) continues to play a crucial role in allowing us to keep the electrification of transport moving at the lowest possible cost for our customers. In 2018/19 we have focused on exploring how EVs can support the network at certain times and can participate in flexibility markets by changing their charging patterns (smart charging) or releasing the electricity stored in their batteries (through vehicle to grid technology, V2G).

We have been very active in this space. However, we see a need to ensure we do not leave anyone behind in the energy transition. Our focus going forward will be on supporting Local Authorities and small and medium enterprises (SMEs) through the transition, understanding their needs and collaborating with them to enable their requirements. For example, the project White Van Plan will aim to understand how SMEs will transition to EVs, and if that is the case explore how we can support them.

**Delivery of environmental and social obligations**

As responsible corporate citizens, we have continuously aimed to gather around the table a variety of stakeholders to address the environmental and social challenges as part of the energy transition. energywise has engaged with vulnerable and fuel poor customers to support them in maximising the benefits of smart meters, energy saving and Demand Side Response opportunities. Going forward we are using Urban Energy Club to test how virtual allocation of shared asset can support a more inclusive approach of procuring network flexibility from domestic customers living in blocks of flats.

**Maximise HV network utilisation**

In 2018 we kicked off the project Active Response which aims to demonstrate innovative ways in which network operators can maximise the capacity of their existing assets. By using advanced automation and installing new power electronic devices we can connect networks together and proactively move spare capacity around to where it is needed, reducing the need for time-consuming reinforcement.

**Play an active role in decarbonising heat**

In our 2012 Low Carbon London project, we started to assess the impact of electric heat in our network. Since then the 2050 Net Zero targets and the publication of documents such as BEIS’s Clean Growth – Transforming Heating Report published in December 2018 as well as the ban on fossil fuel heating for new homes from 2025, suggest that we will soon start to see a shift into electrification of heat.
Our Focus Areas

Future Ready

A future-ready distribution system providing new services, to meet the needs of tomorrow’s customers

Challenges Addressed

- Ensure we meet our customers’ evolving needs
- Ensure no one is left behind from the benefits of the energy transition
- Provision of Services for Distributed Energy Resources (DERs)
- Whole system optimisation
- Transmission and Distribution interface and greater collaboration
- LV Network resilience: Visibility, monitoring and control

Innovation Pillar

Future Ready

Provision of Services for Distributed Energy Resources

A further, significant factor in this transition will be the impact of wider flexibility markets on the distribution network. From changes in the balancing mechanism and the introduction of the capacity market to reducing system inertia and the evolving TO and TSO response and reserve programmes, the wider electricity markets are changing how distribution-connected customers use our network. We recognise that these changes will require a business model based on more active participation in the wider market.

Our ground breaking projects Shift and our V2G portfolio Transpower are looking at how EVs could provide services to the networks. We continue to design new services as we progress on our flexibility road map.

Meeting our customer’s evolving needs

Our customers are changing and their requirements from DNOs are evolving. For example, as we transition to a DSO, we are starting to call on our Distributed Energy Resources for flexibility services.

Our innovative project Network Vision aims to develop a planning and tracking tool that will allow GB DNOs to plan outages on the distribution network at the lowest cost possible across multiple programmes (capex, deployment, etc.) whilst taking into account DER input. The project is developing a scalable network Outage Planning Tracking Tool (OPTT) that has a customer-facing portal web portal to provide information about generation customer curtailments and shutdowns to our customers, and it will provide an interface for our customers to engage with Outage Planners.

Transmission and Distribution interface

Our flagship project in collaboration with National Grid ESO, Power Potential, is implementing a Distributed Energy Resources Management System to enable generation connected to our network in the South East to offer their services and access a new revenue stream by providing active and reactive power services to transmission. A complex system integration and customer trial, this is an example of how a DSO system can open up a new service and market – a world-first regional reactive power market to manage transmission voltage.

We are also looking at how in the future we would need to interact with the energy system in an event of a blackout with projects such as Cold Start.

We are keen to understand how we can build greater value for distributed connected DERs from wider system needs. We are keen to provide more value to our already connected customers.
Collaboration is key to successful innovation. We are working on live projects with traditional technology vendors, software start-ups, energy suppliers, vehicle and fleet operators, local public bodies and the Government’s department for Business, Energy and Industrial Strategy. We collaborate with international partners to look for new technologies that can unlock value from our existing assets. Collaboration will enable us to deliver the solutions that will put the infrastructure we need in place at the lowest possible cost to our customers.

We have a defined approach to ensure a rich stream of ideas and a consistent approach to reviewing and considering which idea we should pursue. This includes a combination of internal and external stakeholder engagement to capture challenges and solutions from diverse sources. In 2017 we took on a complete refresh of our innovation process. We analysed the full delivery life-cycle and updated it to address some of the concerns from our collaborators. See our innovation delivery lifecycle, Figure 5 on Page 20.

We have a proven track record of identifying and delivering successful innovation projects from concept, through to delivery and transfer into business as usual. This is enabled by a rigorous and structured approach to portfolio management which begins with the process of evaluating, assessing and prioritising ideas. This is then further supported by a governance process that enables the effective and efficient exploration and execution of project ideas. The process involves a rigorous project management focus that ensures successful delivery of innovation projects. This covers aspects such as best project management practice, budgeting, planning, reporting and the essential checks and balances provided by procurement, legal, regulation, other internal experts and leadership teams. The governance process is structured to ensure the project is successful and delivers value for money in alignment with our Innovation Strategy.

We have a responsibility to share the learnings of our innovation projects, which is why we hold a number of knowledge dissemination events such as our first ever Better Networks Forum held in January 2019 at the IET London, the LCT forums and DER forums. Our projects are also communicated throughout UK Power Networks through learning events such as learning lunches, webinars, team briefs, and internal updates. Furthermore, as these benefits are scalable across DNOs we also engage with other DNOs to share learning – directly through drop in sessions, through our Energy Networks Association (ENA) working groups, our public stakeholder and dissemination events, and more generally through the annual LCNI conference and the Smarter Networks Portal.

To ensure reduced costs and ultimate end customer savings, we will continue tracking and reporting on the benefits innovation projects deliver and continue to deliver throughout the regulatory period. The E6 tables are used as an active reporting mechanism in outlining compliance and success to Ofgem; a full regulatory framework is completed annually to maximise business uptake and use of the solutions.
How we innovate

Sourcing Innovation ideas

At UK Power Networks we are open for innovation! We know that great, disruptive ideas can come from anyone at any time inside or outside our business and we have around 200 ideas come in each year. In 2017, we understood that for example SMEs were struggling to engage with us and understand our challenges. To manage this we have set up a structured approach to ensure a flowing stream of ideas come in and we review them consistently and fairly in a timely manner.

At a high level, all ideas must align with our Innovation focus areas, or within the wider industry innovation strategy themes, as reflected in the Energy Networks Association Innovation Strategy. From time to time, we also publish challenges specific to UK Power Networks and opportunities as we see them, to source innovative solutions from the market – these are uploaded on to our website, through the Energy Innovation Centre and/or through Achilles. This gives us the best ability to engage with our existing supply chain and new disruptive SMEs.

This year, the feedback from SMEs indicates that the amount of contact (face-to-face and indirect) and the impact of cultural difference and sharing responsibility have all improved for UK Power Networks since 2017.

However, we have been made aware that there is still more work to do in breaching the disparity between how good we think we communicate our challenges, roles and skills, with how SMEs perceive us. As per recommendations by the EIC, in 2020 we will consider how best to organise workshops to bridge these gaps.

How to get in touch about innovation

If you have an idea for us, first take a look at your idea from our perspective. Does the idea address some of the key challenges we have outlined in this document. Or does it address the key areas of focus that the industry is challenged with? This will help you communicate how your idea can benefit network customers, which will help us understand why we should pursue it.

Second, look at what has already been done – on our website https://www.ukpowernetworks.co.uk/ or on the Smarter Networks Portal https://www.smarternetworks.org/. These sites will give you a good idea of what sort of projects have been undertaken by us or other network operators, and whether your particular idea has been looked at before. We are keen to not replicate efforts, but build on results from previous trials.

Third, submit your idea! We have several ways for you to send us your idea:
  - **On our website** You can submit your idea on our innovation website by clicking on the ‘Submit an Idea’ link and filling out the form. Keep it high level, as this will be input into our new internal idea management platform, MyIdea where our employees can comment before we formally review it. We will confirm receipt within three days and review the idea within a month.
  - **Register with the EIC** UK Power Networks is a member of the Energy Innovation Centre and they can help you shape and form your idea and pitch it to us and other networks. They also have some problem statements and specific calls for ideas from us or other networks. https://www.ukeic.com/
  - **Submit it on the ENA Collaboration Portal** Our trade association has a portal to enable anyone to submit innovation ideas to all their members. These get reviewed at the following Electricity Innovation Managers Group or Gas Innovation Governance Group and a response provided https://www.nicollaborationportal.org/

If you aren’t sure whether to submit but would like to talk to us about a specific idea come visit one of our Critical Friends panels or find us at an event and we will be happy to sit down with you for a few minutes to talk the idea over. The Energy Innovation Centre is our key partner in helping companies navigate the sector and articulate ideas in a way that highlights network and customer benefits. We also host a number of local dissemination events and through the ENA annual Low Carbon and Innovation Conference (LCNI) and other opportunities for stakeholders to engage with our Innovation team.

We particularly look to build our innovation ideas and projects in collaboration with other utilities, partners, academics, and customers, taking into account their existing projects and experience. To that end UK Power Networks is an active contributor to The Institution of Engineering and Technology, CIRED, ENA working groups, the ENA Collaborative Energy Programme (CEP), the Energy Innovation Centre, and the Power Networks Demonstration Centre.
How we review and develop ideas
Since 2017 we have improved the way we review ideas. Our vision and ambition is to continuously improve. This year we are extremely excited to have launched our MyIdea platform. This website allows us to crowdsource ideas from our staff and serves as a way to get everyone to assess external ideas. All ideas, unless they are highly confidential, are submitted into our MyIdea platform. This allows us to get input and feedback from the right people across our business, which is helpful when it comes to verifying whether the problem proposed to be solved is in fact a real problem. From day one the potential users of a solution can comment and help push it forward or shape the development.

We then carry out a formal review of the idea chaired by our Opportunities and Bids lead. We consult specialists across UK Power Networks in this review to ensure we make the best decision we can on the information available. We have set up this robust process to ensure value for money for our customers, and therefore focus on identifying which category each idea falls under:

1. **This idea is not addressing one of our key areas of focus at this time.** Maybe because somebody has already pursued this idea, it is not applicable to our business, or from the information available, it is clearly not either technically or commercially viable.

2. **We need more information.** There might be potential in the idea but we cannot say for sure. We would then ask for more information from the idea submitter to be able to make a clear decision.

3. **We want to take the idea forward as a trial or a project.**

If the idea is a market ready product we often conduct a free/at cost trial. We see ourselves as a technology testbed; as such, we push the limits of the way we do things currently and are willing to test new solutions. This gets a tool, equipment or process to the people who would use it to give it a go and see if it works for us. If it does, we will then assess how we can roll it out or make it available to our business. We pass about 25 ideas like this to our business each year of which we adopt five or six.

Often ideas need some development, or to trial them we would incur significant cost. In these cases, we set up a project and allocate a lead from our Innovation team or wider business. This involves us developing a project plan, detailed business case and follows the innovation delivery life-cycle. We scope out about 30 of these a year, and take most of them forward into projects.

We recommend that for anything submitted to us, Intellectual Property is protected. If you want to share anything with us that is not yet protected we have a standard confidentiality agreement we are happy to share with you to cover more detailed discussions but value the opportunity to discuss the idea at a high level first.

**Our commitment**
Whilst we cannot guarantee that we will take forward a project idea, we will commit to providing feedback. The information provided to UK Power Networks will be put into our internal idea management system so although consideration will be given it will be accessible by any of our employees. We will get back to you in three days and aim to review the idea within a month.

We consider the proposals up to a senior management level and feedback will typically be sought from experts from across UK Power Networks before a decision is made.
Portfolio prioritisation and project selection

We want to ensure we have a balanced innovation portfolio, one that targets innovation investment against our focus areas and is best positioned to deliver benefits. To achieve this aim we have a structured prioritisation framework that provides a mechanism to choose which solutions to pursue, which solutions to wait for further development and determine how much resource is required to deliver them.

At UK Power Networks we have three categories we score within: effort to make ready, expected benefit, and business fit. These are described in more detail in Figure 4.

**Effort to make ready**
We consider the maturity of a proposed solution and the cost and time required to develop it to a business as usual deployable solution. This includes considering the technology readiness level (TRL) of a solution at project start and completion and thus the level of development required before the solution delivers benefits. We seek an innovation portfolio that has a balance of high and low TRL solutions that we are confident will deliver short term benefits as well as form the groundwork for more-fundamental, further-reaching innovation. We also consider the complexity and integration requirements of a solution. Sometimes simple and cheap solutions can require significant effort to, for example, integrate with our complex and world leading network control system.

**Expected benefits**
We consider the magnitude of potential benefits, which is the crucial, outcome-oriented measure of the value of pursuing innovation activity, and the type of benefit. This is both the net benefit ‘per scheme’ and the scale of deployment (i.e. applicable activity or deployment volumes) in comparison to the cost involved in deploying the solution. We have seen many great ideas stumble at this challenge, technically brilliant solutions that don’t align with our vision to deliver electricity at lowest cost to our customers.

**Business fit**
We consider how a project and its solutions fit in with our business objective to deliver value. This focuses on how any benefits will materialise within our business and considers a range of non-financial benefits as well as financial returns. We can compare a project focusing on how we improve our service to our most vulnerable customers that delivers a stakeholder benefit with a project looking at how we release more capacity for low carbon technologies and improve our network load indices.
Funding Innovation

At UK Power Networks, we innovate through a variety of routes. Some innovation has a high chance of success and delivers a return quickly. This type of activity enables us to better operate our business and deliver great service at a lower cost to our customers. For all of our innovation activities, we work to ensure that we pursue the most appropriate source of funding, including innovation mechanisms, price control allowances, and direct funding from our business.

We, and our regulator Ofgem, recognise that some innovation carries a higher risk than our everyday practices, and is not always best conducted through our primary allowance mechanisms. It is inappropriate use of our main provision of customers’ money as, within period, it increases our costs even if it forecasts longer-term benefits. This is the basis for funding mechanisms such as the Network Innovation Allowance (NIA) and Network Innovation Competition (NIC), which reflect the innovation risk and reward balance by sharing up-front costs with customers. They provide for industry-wide sharing of benefits and intellectual property arising from innovation enabling it to benefit all customers as well as setting out additional protections and governance.

**Network Innovation Competition**

As part of the RIIO price controls Ofgem introduced the Electricity Network Innovation Competition (NIC). This is an annual opportunity for electricity network companies to compete for funding for the development and demonstration of new technologies, operating and commercial arrangements. Funding is provided for the best innovation projects, which help all network operators understand what they need to do to provide environmental benefits, cost reductions and security of supply as Great Britain (GB) moves to a low carbon economy. Up to £70 million per annum is available through the Electricity NIC. This figure will reduce to £40m from 2021/22.

**Network Innovation Allowance**

As part of the RIIO price controls Ofgem have introduced the Network Innovation Allowance (NIA). This is a set allowance each network licensee receives as part of their price control allowance. The NIA provides limited funding to RIIO network licensees to use for two purposes:

- To fund smaller technical, commercial, or operational projects directly related to the licensees network that have the potential to deliver financial benefits to the licensee and its customers, and/or
- To fund the preparation of submissions to the NIC which meet the criteria set out in the NIC Governance Document.

We also source funding of innovation projects through a number of other mechanisms including:

**EU Research and innovation funding – Horizon 2020**

**Innovate UK**

**Industrial Strategy Challenge fund**

Finally, through our connections teams we innovate to ensure we deliver lowest cost, effective access to our network, and we offer customers innovative connection options where appropriate and where it saves our customers time and money to connect.

In all cases, innovation must be focused on delivering value to our network customers, either through performance gains that recoup costs within a short time period, or long-term savings recouped through savings built into our business plan in future price control periods.

We are conscious of our responsibility to utilise this funding from customers and shareholders with due care, which reinforces the requirement for the governance we have in place to assess, structure and deliver projects that will bring benefits to customers.
In 2017, as our Innovation portfolio continued to grow, we realised that we needed to streamline our templates and processes and undertook a full review of the delivery cycle. This led to a refreshed innovation procedure that outlines how we deliver innovation projects.

Our Innovative Solutions are at various stages of roll-out. Throughout their life-cycle they undergo a process of assessment, development and monitoring through to a completed roll-out to business as usual. This process is captured in our Innovation life-cycle process, that follows six gates, as shown in Figure 5 below.

**Pre-Gate A: Idea Generation & Review**
The Innovation life-cycle begins with a rigorous and structured approach of internal and external stakeholder engagement to capture challenges, problems and solutions from diverse sources supported by a governance process of evaluating, assessing and prioritising ideas.

**Gate A: Concept Approval**
This represents UK Power Networks’ commitment of time and support to develop a detailed cost benefit analysis and to scope out the work required to further develop the idea.

**Gate B: Idea Development/Project Delivery**
In this stage we define a fully approved opportunity assessment, cost benefit analysis, innovation project scope, resources, and/or contracts to deliver an innovation project to develop the solution.

Gate B approval also involves intent to pursue detailed design, procurement, and developing the commercial agreements with the intent to commit effort towards a relevant innovation project. This stage also involves the agreed commitment of funding.

**Gate C: Project Delivery**
For higher value projects we will have a second approval gate in most cases before the key project spend. The position in the project timeline is determined on a project by project basis to provide the most efficient project control.

**Gate D: Project Handover and Closure**
This stage is to confirm that the required outputs of the project have been delivered in line with the project execution plan approved for the project. Project closure will be formally approved and any ongoing responsibilities will be handed over to business as usual.

**Gate E: Deploy and Track**
This stage tracks and reviews the benefits achieved by the project which will help the business to report, learn and re-tune future projects ideas to be considered. From this stage, we conduct a full benefit assessment based on our regulatory framework periodically, to ensure we maximise business uptake and use of the solution.

![Innovation Life Cycle Process Diagram](image-url)
Our Innovation Strategy sets out to prepare the network for the future while delivering a safer, more sustainable, cost-efficient and reliable network for today. The greatest measure of our success is the benefits that innovation unlocks for our customers. Our innovation projects will deliver quantifiable benefits if we embed the new knowledge solutions into our BAU practices to improve the way we work and serve our customers.

To assist the transition to BAU at an increasing pace of our innovation solutions, we work closely with the Smart Grid Development team within our Asset Management department. This team supports the successful transfer of innovation into BAU by defining business change processes, setting clear development strategies, and agreeing the new business capabilities and skills from within. Crucially, this team highlights UK Power Networks’ commitment to innovation and smart grids and leads our strategic focus on the transition from a Distribution Network Operator to a Distribution System Operator.

Delivering these new solutions into BAU requires cross-company collaboration, so the central Innovation Team, the innovation sponsors within the business, and the Smart Grid Development team coordinate closely together to promote a culture of innovation across all teams including Asset Management, Connections, Network Operations and Control, Strategy and Regulation, Innovation, Business Planning, Information Systems and the wider business.

If we extract the transition to business as usual (the ‘deploy and track’ element of the life-cycle), the process conducts a co-ownership period between the innovation team and the business solution owner. Once the project is handed over to the business, a full benefits assessment is completed annually to maximise business uptake and use of the solution. We have integrated this systematic approach into our company policies and procedures. It includes management oversight through project sponsorship and tracking mechanisms to ensure closed-loop governance as illustrated in Figure 6.
Benefit realisation and reporting

Innovation helps our customers and stakeholders benefit through:

A safer, more reliable and cost-efficient supply
- Delivering our committed outputs in our RIIO-ED1 plan at the lowest cost to customers
- Improving safety and reliability of the network by reducing interruptions and durations through automation, modern monitoring and control techniques
- Delivering great service to our customers through investment in simple digital interaction platforms and wide choice service offerings.

A network open to facilitate low carbon technologies
- Ensuring we are enablers of the low carbon transition by facilitating connection of electric transport and heat
- Developing and deploying innovative solutions to ensure we keep down the costs to connect low carbon technologies
- Reducing time to connect by developing technical and commercial solutions for connection
- Providing information to allow customers to make informed decisions
- Collaborating with industry to design best practices for data sharing.

A future ready network
- Enabling the digital and automatic future with programmes such as visibility, monitoring and control
- Supporting whole system coordination and optimisation
- Facilitating provision of system services from Distributed Energy Resources (DER) to provide customers new revenue streams.

UK Power Networks has a process for monitoring the progress of innovation solutions to ensure that, when they are ready, the business deploys them to achieve benefits and that we quantify these benefits. We apply best practice processes consistently to identify, track, and manage benefits across our portfolio. We are committed to ensuring innovation delivers value to our customers and our business.

To date innovation and smart grid expertise at UK Power Networks has enabled us to deliver over £183 million of savings. You can read more about these solutions and their performance annually in our published Environment and Innovation Report.

Our innovation performance

Whilst the benefits achieved by deploying innovative solutions is the first measure of our innovation success, the performance of the innovation function at UK Power Networks is also measured in a number of other ways.

Firstly, we score ourselves on the quality of our delivery and follow through. For each innovation idea that we select to proceed with in the form of an innovation project, we are committed to tracking the delivery of milestones, outputs, and the benefits delivered by the solution on a regular basis. The progress on the delivery of these key project aspects is then reported to the whole of the innovation team, our business and the senior management team but also to our regulator, Ofgem, other DNOs and the public on different occasions.

Secondly, we regularly seek feedback from our stakeholders and quantify levels of engagement and satisfaction. This includes internal and external stakeholders, innovation suppliers and partners, network customers, internal business customers, the regulator and government. Informal feedback, formal recognition and awards as well as quantified survey results are used to understand the quality of the service that innovation provides.

Finally, we look at the volume of innovative solutions developed for use in UK Power Networks business as a measure of our innovation scale and ambition. As discussed, innovation by its nature carries risk and thus will always have an attrition rate. But through applying rigour at all stages of the innovation cycle and by focusing on business and market awareness, quality CBAs, and capturing lessons learnt from previous innovation we can maximise the effectiveness of this Innovation Strategy.
Creating a common measurement framework

At UK Power Networks, we understand that we need to be able to measure the benefits of any innovation funding in a consistent way across our three networks. Electricity distribution networks are the only networks with a requirement to report in a regulatory table (E6) the benefits of ED1 innovation. We have worked closely with the majority of gas and electricity network operator members of the Energy Innovation Centre to propose a framework for the next price control, RIIO-2 that is now being adopted by the ENA. Ofgem has welcomed the collaboration displayed by those networks and is interested in how we might use such a framework to report against commitments and company innovation strategies, considering the business plans and in line with the Customer Engagement Groups (CEGs).

The objective of this framework is to propose how to:
- Improve reporting
- Build on the EIC’s Innovation Measurement Framework
- Consider stakeholder feedback and lessons learned from existing projects
- Define how it can be implemented
- Allow the network operators to develop their innovation plans, influenced by stakeholders and governed by the CEG.

The framework is able to measure collaboration and knowledge sharing across networks. One of the key measures of risk for innovation projects is the TRL, which should also provide transparency of the type of innovation being deployed. The framework could include outcome measures with supporting indicators as a balanced scorecard to assess network company performance. For example:
- The number of external parties involved in a trial
- The percentage of annual revenue spent on innovation projects
- The annual average number of innovation ideas
- The percentage of mature innovation deployed as BAU.

The analysis for this work highlighted that there are many activities and data around innovation projects that are not captured and shared efficiently with stakeholders. We look forward to continuing the discussion with our fellow network operators and Ofgem to ensure the best innovation governance, in the interest of consumers, for the next price control.

Figure 7 outlines the framework, which consists of key outcome measures – based more around outputs delivered and seven supporting secondary indicators. The collective set of measures acts as a balanced scorecard to assess network company performance.

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<th>Strategy &amp; Vision</th>
<th>A clear innovation strategy linked to what consumers and stakeholder value – including plans for roll out</th>
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<td>A strategy is in place and has been approved by Ofgem</td>
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<td>Extent to which the strategy focuses on improving the areas of service which consumers value</td>
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<th>Organisation &amp; Culture</th>
<th>A culture of innovation (Survey)</th>
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<td>Number of external parties involved in trials</td>
<td>Percentage of network company funding in innovation trials</td>
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<td>Percentage of network company funding in innovation trials</td>
<td>Number of FTE working on innovation projects</td>
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<th>Capability &amp; Technology</th>
<th>% Days</th>
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<td>Annual average number of innovative ideas</td>
<td>Average time taken to deploy projects</td>
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<td>Distribution of the readiness level of projects by volume and funding</td>
<td>Average time taken to deploy projects</td>
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<tr>
<td>Percentage of ideas taken forward</td>
<td>Average time taken to deploy projects</td>
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<tr>
<td>Forecasting and tracking innovation benefits</td>
<td>Average time taken to deploy projects</td>
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<tr>
<td>Percentage of mature innovations moved into BAU</td>
<td>Average time taken to deploy projects</td>
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Figure 7 outlines the framework, which consists of key outcome measures – based more around outputs delivered and seven supporting secondary indicators. The collective set of measures acts as a balanced scorecard to assess network company performance.
Principles of analysing benefits

Benefit analysis of innovation must:

Be performed at all stages of a solution life-cycle
- To justify initial investigation efforts
- To justify investment/deployment at scale once trialled
- As ongoing tracking and reporting of performance once deployed
- Where benefits are not or will not be realised, the decision may be made to stop a project prematurely in cases.

Quantify benefits in a systematic, comprehensive framework
- As the difference between deploying the solution and ‘what would likely have happened if not for the solution’ (the counter-factual)
- As far as possible all types of benefits should be monetised to allow equivalent comparisons. However, not all benefits are immediately financial. All solutions must be demonstrably in the interest of our customers
- That considers the time value of money and present benefits in net present value terms.

Include thorough, quantified understanding of the solution feasibility and thus the scale of the opportunity.

Under these guiding principles, the benefits assessment framework we have developed meets the needs of the innovation prioritisation process outlined in this strategy, our business priorities, and the Ofgem innovative solutions reporting requirements. The Ofgem CBA is used throughout, without any changes being made to the template.

Our core function as Innovation is to deliver value to our stakeholders and customers. Having a thorough methodology and clear principles of how and why we quantify benefits is essential to provide transparency of our investments and ensure our stakeholders get the most from our endeavours.
Conclusion

Our ambition is to continue to be the most innovative DNO group in the UK. Our continual challenge is to find and develop the best ideas, cultivate a portfolio of successful innovation projects, transfer innovation solutions into business as usual as quickly as possible, and accurately measure the benefits.

Successful innovation depends on more than just ambition and creativity. It also requires structure and discipline, to ensure that our efforts deliver the best possible value for our customers and a culture where every one of our employees is empowered to innovate. That is why we have refreshed our strategy to set out the principles, processes, and governance that we believe will lead to great innovation.

Innovation does not happen in a bubble, and that is why it is so important to recognise the role of collaborating with our customers, other utilities and our wider stakeholders. We embrace good ideas, regardless of whom or where they come from. Whether you are a start-up working from home, or a multi-national company, we want to work with you to develop your innovation into a real project on our network. We hope that this document helps you understand our most pressing challenges.

Looking forward, we need to remain agile as our customers’ needs and expectations evolve. Disruptive and rapid changes will catch many off guard, although by innovating alongside the disruptors, we prepare ourselves for the challenges and opportunities that are ahead. By continuously listening to our customers and collaborating with our peers, we can proactively develop the solutions to the problems of today and tomorrow.
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