Electricity Transmission

nationalgrid

Innovation Strategy 2025

Contents

Welcome to our interactive National Grid Electricity Transmission Innovation Strategy 2025

Look out for this symbol for interactive content throughout the document. If you experience any difficulty viewing the interactivity, click here for the online version.

Welcome to our Innovation Strategy 2025

This document sets out our refreshed innovation strategy, following our previous publications in 2020 as part of our RIIO-2 engagement activities, and in 2023.

Since we last published our strategy, the enormous volume of infrastructure work we need to do as an organisation to support a low-carbon economy has become far clearer. There's also a renewed focus on the UK's net zero goals with the introduction of the Government's Clean Power 2030 agenda – notably the formation of Mission Control for Clean Power 2030, which will seek to speed up the connection of new power infrastructure to the grid.

It's crucial that the innovation work we do to support the drive towards net zero provides real benefits for consumers, customers and our industry. So we've made sure our strategy demonstrates how we'll deliver these benefits, with greater emphasis on rollout, implementation and tracking how our innovations perform once they become business-as-usual.

Stakeholder input to our strategy

We've made sure that the themes you'll read about in this publication align with the Energy Networks Association's Innovation 2024 strategy, as well as that of the wider National Grid group. We've also consulted stakeholders – both within our own business and externally – where we discussed our strategy's themes, ambition and objectives with more than a hundred organisations.

We gained valuable input and feedback, including the importance of considering the needs and concerns of communities and vulnerable customers as we scale up delivery of new infrastructure.

We have taken these factors into account and will broaden our approach to supporting a sustainable network – developing innovations that address environmental considerations beyond reducing CO_2 emissions.

Feedback also included a desire for greater transparency and wider collaboration. One way we'll address this is by communicating far more widely about the rollout of our innovations and the benefits they bring. This will include publishing case studies of our own projects and work we're doing with other networks.

The pace of decarbonisation also means we need to achieve benefits faster and more efficiently than we've ever done before. So we'll be examining the processes we use for our innovation projects to determine where there's scope to be more agile and get to implementation more quickly.

Collaboration and whole system thinking

The UK's decarbonisation ambition is truly the challenge of our times. We believe that to reach the country's targets, we need to work with you – our stakeholders – closer than ever before, and in a more coordinated way. For example, we need to work closer with other networks to better understand where our innovation ambitions and planning align. I believe that by doing this we can focus our efforts more efficiently and leverage one another's innovations.

No industry is going to be untouched by the need to decarbonise. This means we need to not just think about what's changing within the energy sector, but far beyond it too. Other industries will be innovating to support the transition to a low-carbon economy.

So we anticipate far greater collaboration with other whole system partners, including industries that we don't normally work with – because when we think about whole systems, we ultimately need to think about the whole of society.

"It's crucial that the innovation work we do to support the drive towards net zero provides real benefits for consumers, customers and our industry."

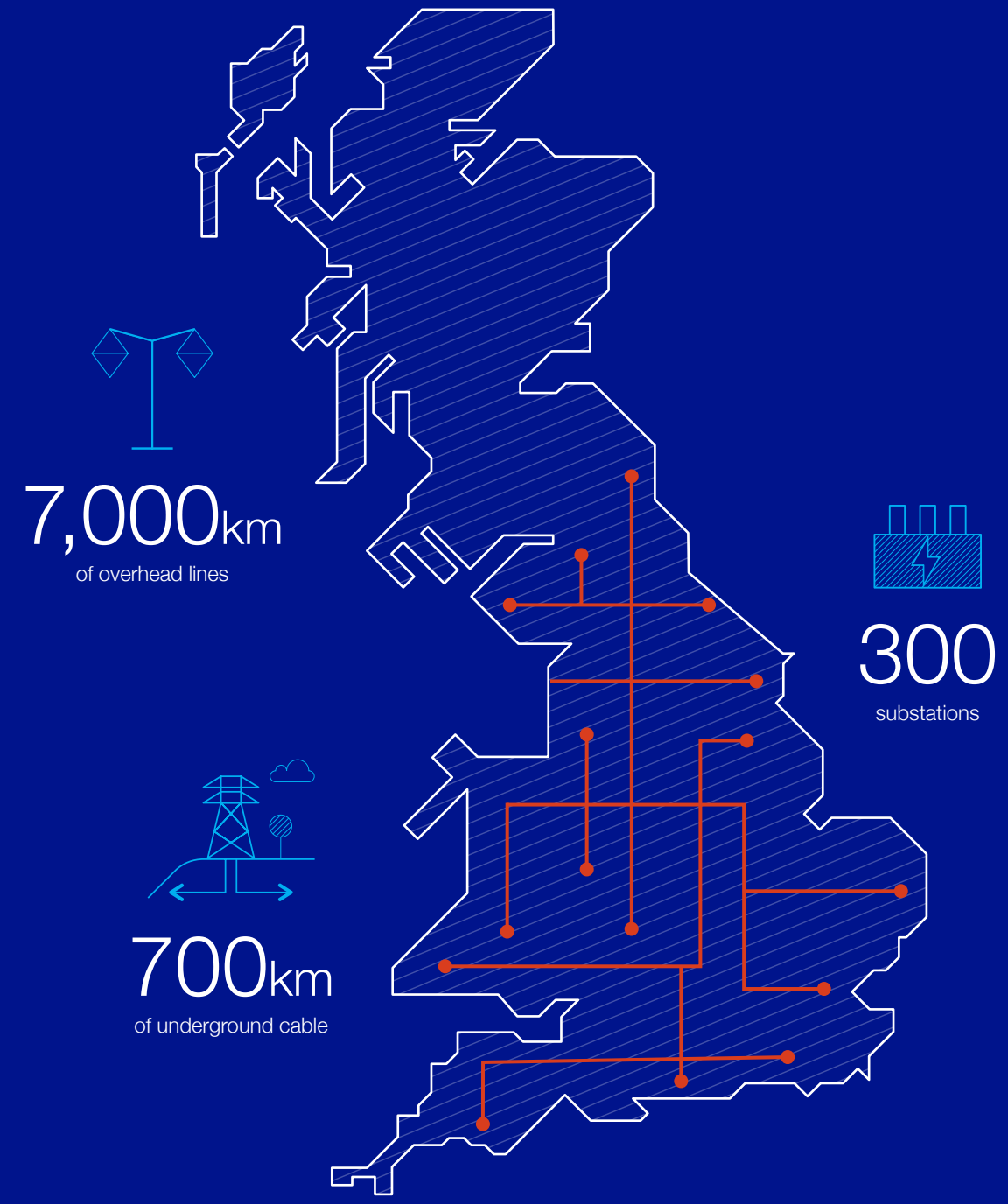
Simon Orr
Head of Strategy and Innovation

Who we are and what we do

National Grid Electricity Transmission (NGET) owns and maintains the high-voltage electricity transmission network in England and Wales. Every time a phone is plugged in, or switch is turned on, we've played a part, connecting you to the electricity you need.

We take electricity generated across England and Wales, from windfarms or power stations, and transport it through our network, consisting of more than 7,000 kilometres of overhead line, 700 kilometres of underground cable and over 300 substations, on to the distribution system, so it reaches homes and businesses.

We're investing in the network, connecting more and more low-carbon electricity – it's a crucial role and pivotal in turning the UK's net zero ambitions into reality.



Our purpose, vision and values

Click on this symbol below to read more.

Our purpose

We bring energy to life

Our vision

To be at the heart of a clean, fair and affordable energy future

Our strategic priorities

In National Grid, we have five strategic priorities to deliver our vision:

- Enable the **energy transition** for all
- Build the **networks of the future** now
- Deliver for our **customers**
- Operate **safely and efficiently**
- Build **tomorrow's workforce** today

Our values

- **Do the right thing**
- **Find a better way**
- **Make it happen**

Our innovation ambition

On page 5 we describe how National Grid's vision is to be at the heart of a clean, fair and affordable energy future.

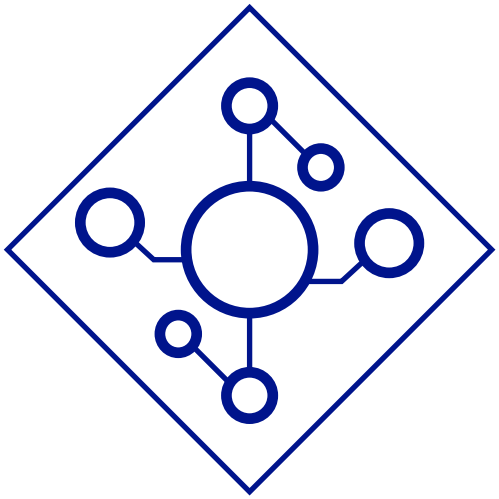
We know that the transition to net zero means we have to innovate; we cannot do things the way we always have. Therefore, our ambition is that NGET will be the most innovative and pioneering energy network company in the world, with innovative mindsets and capabilities part of our DNA.

We will work in collaboration with new and existing partners to deploy and scale transformational technologies and asset management approaches at pace.

How we invest in innovation

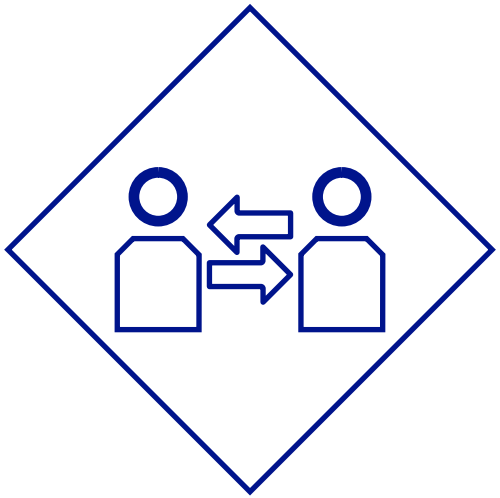
Refreshing our innovation strategy

We've created four focus areas and updated our outcomes:



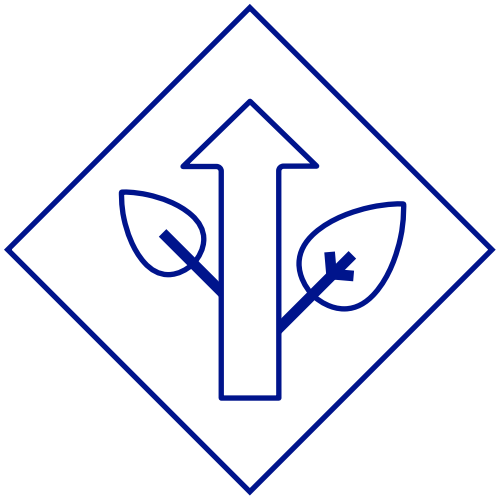
Build the Future Network

- Maximise the capacity of our current infrastructure
- Deliver significant new onshore and offshore network infrastructure
- Reduce supply chain constraints
- Enhance the intelligence of our network infrastructure.



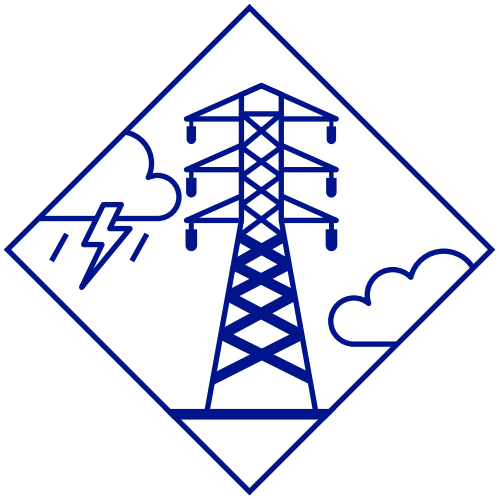
Accelerate Customer Connections

- Find new ways of connecting the growing number of customers to our network
- Maintain system operability and stability as the energy system decarbonises
- Facilitate system access as the energy system decarbonises.



Enhance Sustainability

- Eliminate emissions across our operations and construction activities and from our supply chain
- Ensure our infrastructure benefits communities and the environment.



Improve Resilience

- Maintain the reliability of our asset base efficiently and economically
- Improve our resilience against a changing external threat landscape, including from natural climate events and cyber events.

How we'll innovate

1 Business Challenges Identified
The business defines their key challenges and problem statements with innovation support. This can be broader where challenges are defined at networks or whole systems level to drive collaboration.

2 Business Challenges Prioritised
The business prioritises their innovation problem statements to ensure resources are deployed in the right way.

3 Innovation Optioneering
The most appropriate innovation approaches and stakeholders are considered and selected to address the problem. This could be identifying market ready solutions, delivering an innovation project, etc.

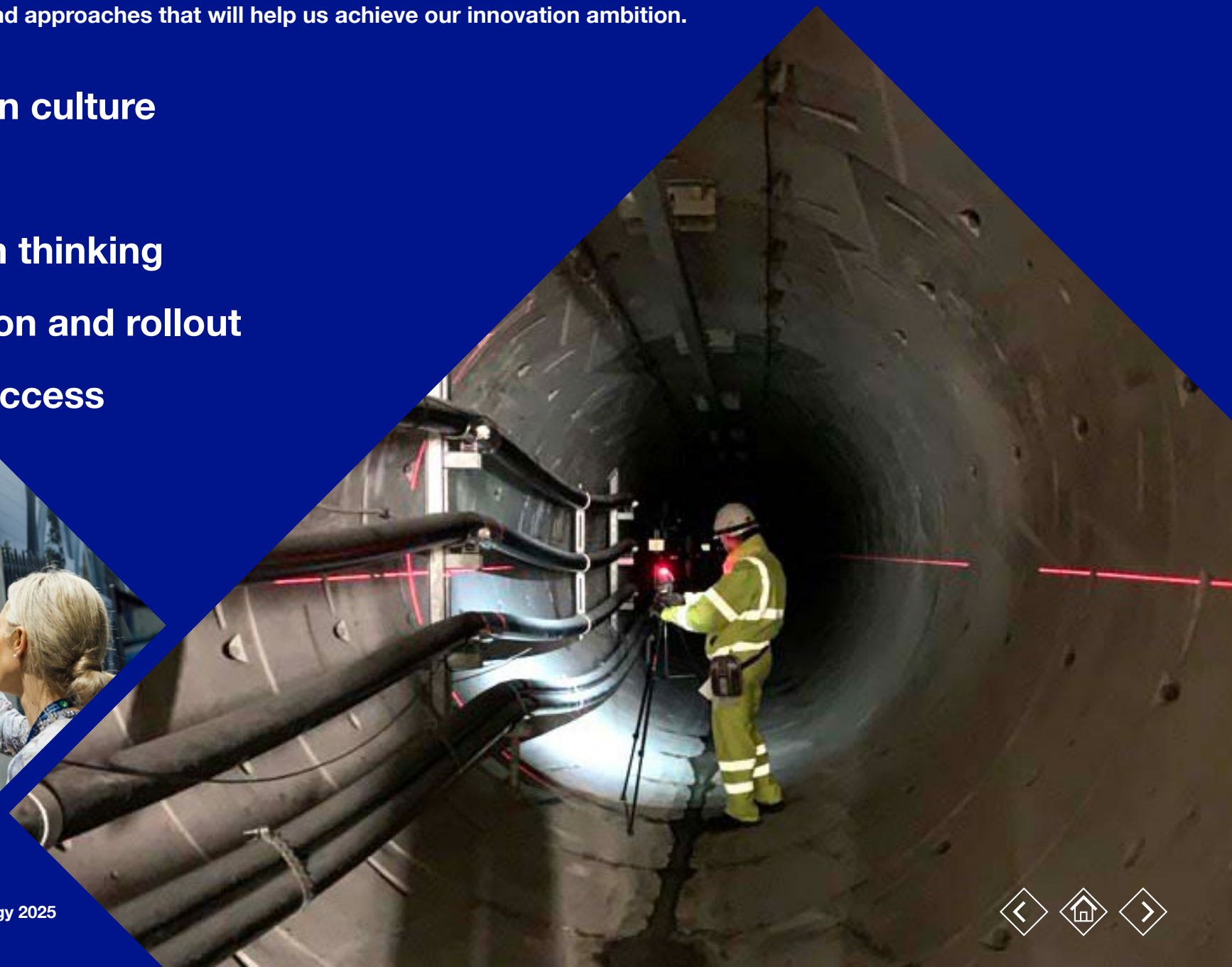
4 Innovation Approaches Deployed
The chosen innovation approach(es) are deployed. For example, an innovation project is set up and run.

5 Innovation Rollout / Implementation
The solution is implemented and/or rolled out into the business. This could be a technology or process rollout, updates to standards and asset management practices, a follow-on project, etc.

How we'll achieve our innovation ambition

We have critical enablers and approaches that will help us achieve our innovation ambition. These are:

- Our innovation culture
- Collaboration
- Whole system thinking
- Implementation and rollout
- Measuring success



Innovation culture

As our innovation portfolio matures and projects conclude, new ways of working and fresh technology will be introduced to our business. We believe it's important that innovation is a core part of our culture, so our people both develop and are receptive to new ways of working and technology.

To support delivery of our ambition, NGET and other networks are collaborating with UK Research and Innovation (UKRI) and Ofgem to determine what a good innovation culture looks like, as well as the practical steps we can all take to get there. As one of the lead networks involved, we're able to develop a NGET-specific plan for improving our culture.

To date, we've looked at our existing culture and developed an 'innovation exemplar' – in other words, a model of what an ideal innovation culture should look like. Based on this, we've identified five areas we need to work on, ranging from how we ensure our leadership embraces innovation, through to how we embed an innovative mindset throughout NGET.

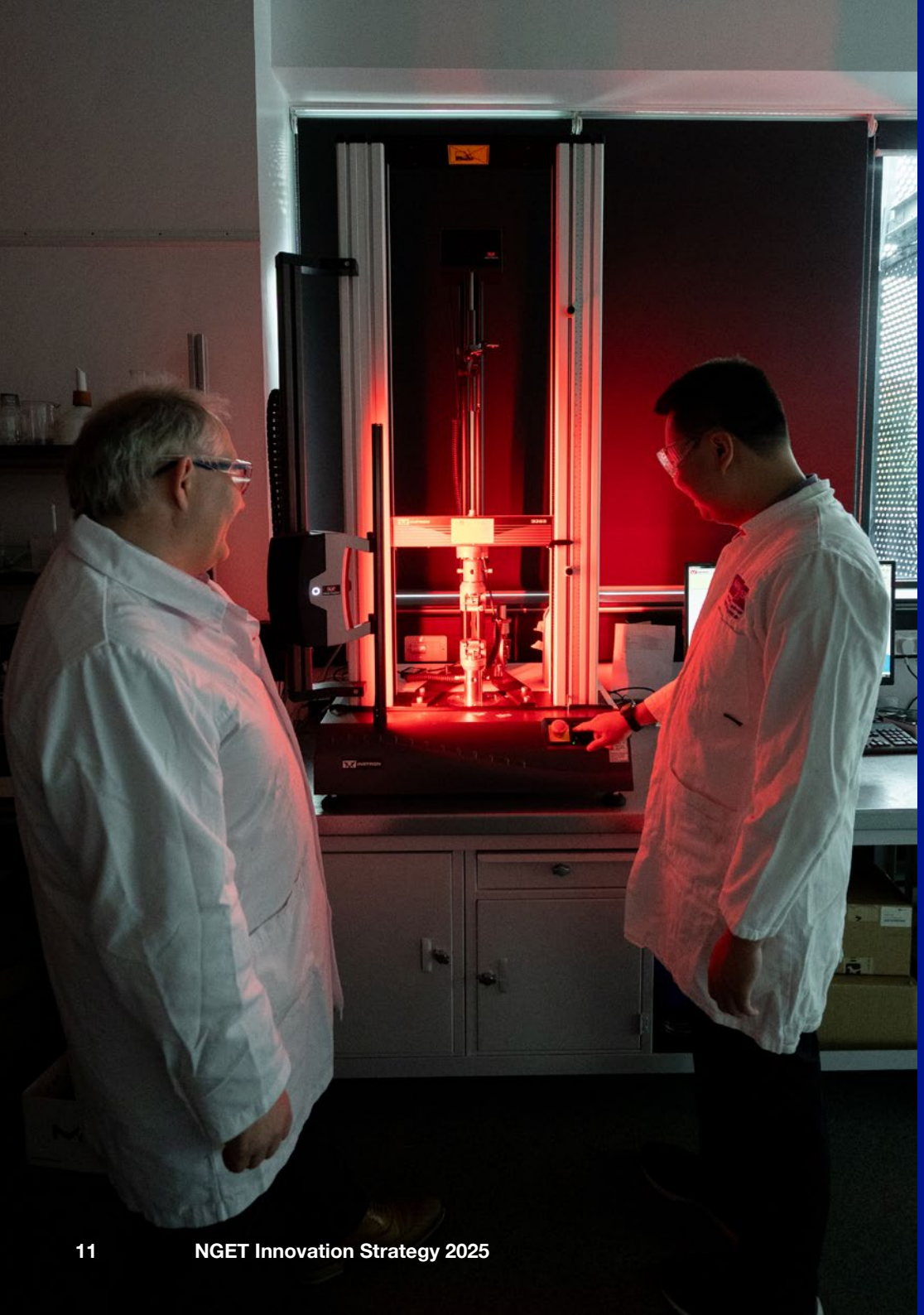
We're now working through these actions – some are long-term cultural change plans, which we're looking at how to approach; while others are more readily achievable, such as how we transfer innovation into business as usual.

We have had multiple deployments of innovation into our operations, such as our SF_6 leak sealing solution rollout, which has already saved 7,500 tonnes of CO_2 equivalent leaking into the atmosphere. This equates to nearly 2,000 cars off the road.

Deployment of innovation will be a big focus for us over the next few years because we're coming close to finishing many of the innovation projects we're working on and looking ahead to RIIO-T3 and beyond.

Other culture initiatives we're focusing on include working with other teams within National Grid on campaigns to crowdsource innovation ideas. We're also sharing case studies that highlight the rollout into business as usual of some of our projects, building awareness of the value innovation brings.

It's important that innovation is a core part of our culture, so our people both develop and are receptive to new ways of working.



Collaboration

Our strategy focuses to a large degree on the challenges we face and what we need to do to achieve our objectives. A big part of how we'll get there lies in our ways of working – and collaboration is central to our approach.

We're open to exploring different ways of collaborating and trying out new ideas to engage with prospective partners. These would add to our current ways of working with others, which include:

- An annual programme of stakeholder engagement events, both virtual and in person.
- Industry partnerships with organisations, which currently include the Energy Innovation Centre (EIC), Energy Networks Association (ENA), the Infrastructure Industry Innovation Partnership (i3P), Leading Edge Only, the Electric Power Research Institute (EPRI), and CIGRE. These enable us to learn, share best practice and find opportunities for collaboration.
- University partnerships to facilitate closer working on innovation projects, focusing in particular on those that are part of our innovation framework for RIIO-T2.
- Calls for innovation, where we invite businesses to help find solutions to a specific technical challenge we're facing. These may be directly from National Grid or through third-party organisations.
- Collaborative research. Through our EPRI membership, this covers research on cables and substation assets, cybersecurity, data analytics, distributed generation, health effects of Electric Magnetic Fields (EMF) and transmission planning.
- Collaborative innovation projects, such as our Network Innovation Allowance (NIA) funded work. Every NIA project we work on includes at least one third party.

How to work with us

We're always on the lookout for new ideas and opportunities to partner on innovation projects. If you'd like to find out more about the way our innovation process works, the NGET Innovation team will be happy to speak to you and share details of our innovation portfolio.

You can contact us via:

- Our website
- Our LinkedIn page
- Email: box.NG.ETInnovation@nationalgrid.com

Whole system thinking

The whole energy system encompasses the interaction between electricity, gas and liquid fuels, and how these energy sources best contribute to delivering net zero greenhouse gas emission energy for technology, communications, transport, heat, water and other industries.

Traditionally, the electricity, gas and oil industries have worked separately to meet energy needs. Similarly, infrastructures for water, transport, technology and communications have also been designed independently of each other.

The UK needs to adopt alternative sources of energy to power homes, transport and businesses reliably and reduce greenhouse gas emissions. This will require a collaborative and holistic approach to infrastructure from organisations across multiple industries.

Our role in a whole system
A new energy system will help to achieve the UK's ambition of a net zero economy by 2050, and we recognise the key role we have to play.

We will accommodate growth in embedded generation, electrolysis and hydrogen generation and the entangled climate change resilience challenge across all our critical infrastructure by using a whole system approach to derive the best solutions for these challenges.

How we'll develop a whole system approach
To develop our approach, as an industry we need to establish an effective innovation eco-system. The initial steps will be:

- In sector – to confirm roles and responsibilities for an eco-system within sector, this will include electricity and gas network businesses, EIC, ENA, Ofgem and UKRI.
- Beyond sector – to include water, telecoms, supply chain and wider partnerships. This will build upon the work we've done during the current price control period, facilitated through our partnership with the EIC.

The outcome of both initiatives will reduce duplication, provide simplification of access to the industry for new market entrants, accelerate innovation into business-as-usual and make the best use of resources across the economy.

Collaborating to develop whole system working
By its very nature, whole system working is not something we can do alone and will require collaboration with stakeholders. In our approach, we shall aim to be targeted, tailored and proportionate, seeking to strike the right balance to achieving net zero.

To do this, we shall:

- Agree our approach with our stakeholders and communities
- Identify the right network and infrastructure solutions through a collaborative approach
- Create value for the UK economy by innovating, improving and promoting whole system solutions.

Implementation and rollout

Innovation is driven by our strategic priorities. This means that we'll have a focus on innovation as an organisation from the top down – not just on engineering solutions, but also on technology, better processes, developing our knowledge, and informing the decisions we make about managing our assets.

We're also building on the learning we've had from previous successful rollouts, such as our Grid-Enhancing Technologies (GETs) innovation deployments including Dynamic Line Rating (DLR) and Smart Wires. Our DLR approach using a combination of innovation funding has resulted in additional capacity on the network. In the past three years, this money spent on enhanced services has resulted in a reduction of constraint costs and provided a consumer saving of £150m. Most of these enhanced services have been enhanced ratings enabled by these projects. Our Smart Wires project has delivered 2GW of additional north-to-south power flow capacity. In addition, our Visual Inspection and Condition Assessment Platform (VICAP) project sees our business using drones and Artificial Intelligence (AI) to monitor our overhead lines daily.

Our Deeside Centre for Innovation will have an important role to play in helping us deliver our innovation strategy. It will enable us and all GB network licensees to test assets associated with electricity networks, and trial new technologies and methods to address climate change and maintain security of supply – while optimising investments in a controlled, off-grid environment, 24 hours a day, seven days a week.

The centre will also collect valuable data by monitoring performance of assets on site. The facility will underpin the effort we, along with energy industry stakeholders, are investing in innovation and will play an essential role in delivering innovations in RIIO-2 and beyond.

As a commercial test facility, our partners can also use Deeside Centre for Innovation to support their own technology development. Additionally, we can use the centre for training. This is part of the way we're evolving our innovation culture.

Collaborating for successful rollout
As we've described on page 11, collaboration has a crucial role to play in helping us achieve our innovation ambition. Implementation of our innovation work will achieve greater success if we collaborate more effectively.

This means working ever more closely and collaboratively with both external partners and our internal teams across our business.

We'll continue developing our thinking around the 'value' proposition of innovation (see page 15), making sure it aligns to delivering business outcomes and supports the flow of innovation into reality. We're now using a business-as-usual checklist, which provides a framework for developing and rolling out our innovations. We check preparedness factors such as:

- Route to commercialisation, such as how the innovation will be scaled up and licensed
- Considering who will need to be trained to use the innovation
- Reviewing the market, to determine whether similar solutions are becoming available
- Whether the cost-benefit of the innovation has changed during the project
- Identifying the steps needed to implement the innovation into business-as-usual.

The framework has a total of 14 business readiness indicators. These will help us make sure that when our innovation projects conclude, we've paved the way for implementation as effectively as possible.

This will build on the cost-benefit analysis work that we do, so we can fully understand and articulate the benefits for the teams involved. This is critical to ensuring innovation is implemented successfully and will help us create a 'pull' for innovation across our organisation.

We're now using a business-as-usual checklist, which provides a framework for deploying our innovations.

How we'll measure success

All the projects we undertake must be aligned to the focus areas and outcomes we've set out in this strategy. Beyond this, we must then understand the value proposition that each project presents.

Value within our portfolio will cover a broader range of benefits other than financial savings that relate directly to NGET's investment processes. It's critical that we consider a much broader definition of value, so we can ensure the right decisions are made for consumers and society. Some of these value areas are quantifiable and some are qualitative.

We'll conduct a cost-benefit analysis (CBA) on all our innovation projects beyond a certain maturity level, so we can measure their impact. Examples of the quantifiable metrics we use to make sure this is a holistic assessment include:

- Constraint cost savings (the cost of operating the network)
- Emissions impacts
- Reducing the cost of maintenance or investment in the network.

We'll also consider the qualitative impact of our innovation work. Initially this work will involve reviewing how our innovation projects improve areas such as biodiversity and socio-economic factors.

We'll continue to evolve our thinking and processes to broaden our understanding of value created by our different innovation projects.

Our ambitions for measuring success include using additional rollout metrics. These include tracking:

- Which solutions get deployed
- The speed of their deployment
- Fast-follow examples
- The cost of deployment
- The benefits delivered from deployed solutions.

How our projects are funded during RIIO-2

We receive funding for our innovation portfolio from two main sources – the Network Innovation Allowance (NIA) and Strategic Innovation Funding (SIF).

NIA

Ofgem's NIA provides an allowance to network licensees to fund research, development and demonstration trials that meet six specific eligibility requirements.

Each must:

1. Facilitate energy system transition and/or benefit consumers in vulnerable situations
2. Have the potential to deliver a net benefit to consumers
3. Involve research, development or demonstration
4. Develop new learning
5. Be innovative
6. Not lead to unnecessary duplication.

There's no maximum or minimum spend criteria for projects, and each should carry a risk profile.

Network licensees need to demonstrate why they cannot fund such a project as part of their business-as-usual activities.

SIF

For RIIO-2, Ofgem replaced its Network Innovation Competition (NIC) framework with Strategic Innovation Funding (SIF), with £450m available for GB networks over the five-year regulatory period.

SIF aims to help transform gas and electricity networks for a low-carbon future. It funds projects that could speed up the transition to net zero at the lowest cost to the consumer as part of the RIIO-2 price controls.

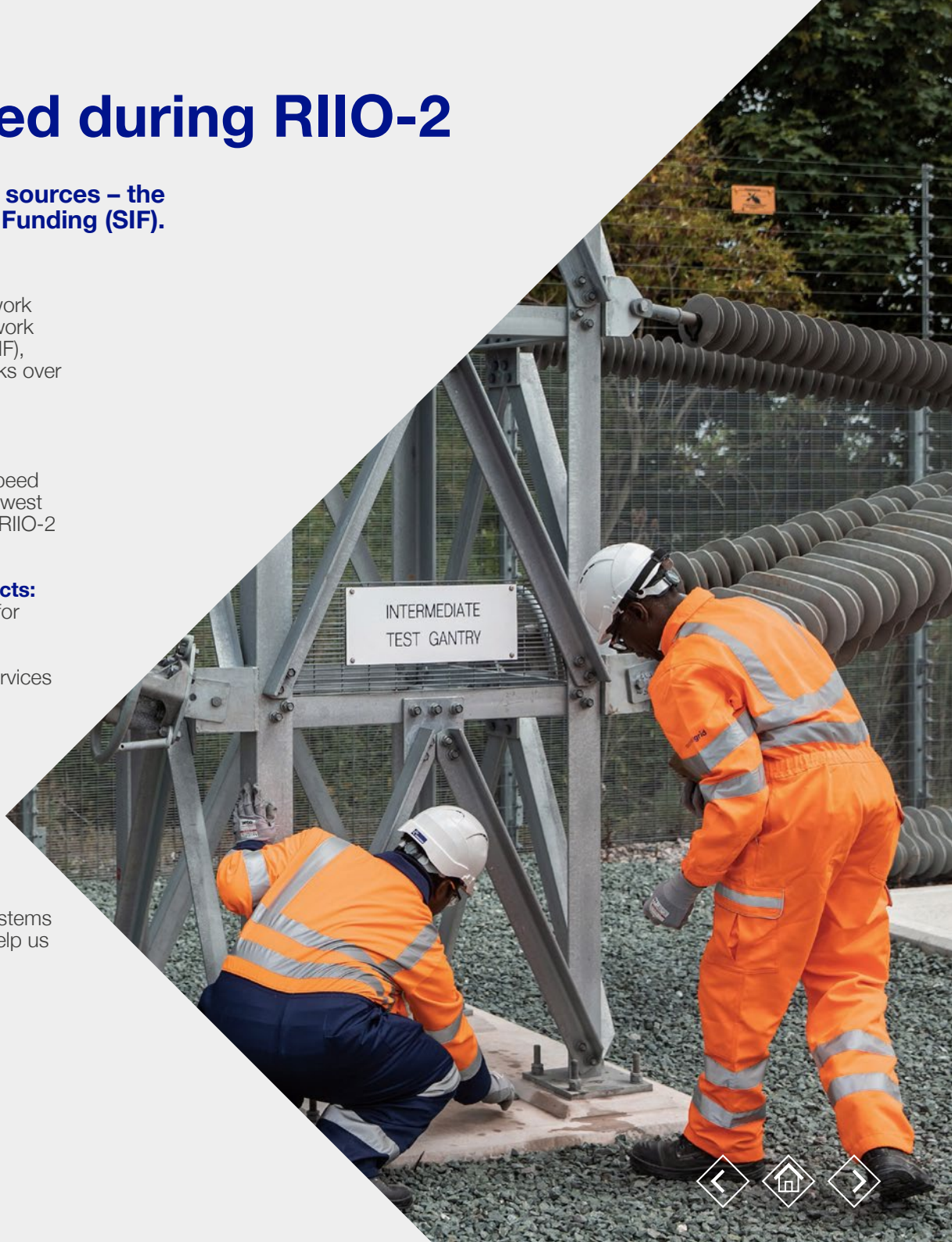
For energy consumers, SIF projects:

- Reduce costs and increase value for money
- Create innovative products and services
- Provide energy security.

For businesses, SIF projects:

- Finance growth and scalability
- Help with collaboration
- Encourage more investment.

SIF projects will make our energy systems more resilient and robust. This will help us achieve our net zero targets faster.



Contact us

We'd really like to hear from you – our communities, consumers, customers, employees, investors and stakeholders. We want to make sure we're focusing on the right areas and delivering the right results.

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