



Scottish & Southern  
Electricity Networks

Powering our  
community

# Transmission Innovation Strategy

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## Our interpretation of Innovation

We see innovation as extending beyond technology and hardware; we can innovate in our ways of working, and apply innovations across all areas of the business, including commercial and service functions as well as network operations, to the benefit of all our stakeholders. We take a broad interpretation of innovation, and regard it as a business-wide imperative, rather than a narrow specialisation focused on engineering.



## 1. Value-Driven Innovation

This document lays out the innovation strategy of SHE Transmission Ltd, part of Scottish and Southern Electricity Networks, and which owns and operates the Transmission network in the North of Scotland. The purpose of innovation is to improve the performance and management of the transmission network, to enable us to provide energy in a safe, reliable, sustainable, and economical way, ensuring delivery of value to our customers.

Our innovation process underlies the continuous improvement of our business, our ability to respond to the changing demands of future requirements, and the implementation of our vision for the development of the transmission network. It is driven, like all that we do, by our corporate values: Safety, Service, Efficiency, Sustainability, Excellence and Teamwork.

- **Safety** is our first concern. We will not compromise this principle in anything we do, and will adopt innovative ways to improve the safety of our workforce and the public.
- **Service** means that we put the current and future needs of our customers at the heart of everything we do. We believe that what is best for our customers is best for our business, and that being focused on their needs will keep us nimble in our innovative responses.
- **Efficiency** drives us to know our asset base inside out, how it's performing, and how we can manage it to make it as productive as it can be. We will use innovation to reduce costs, avoid waste, and deliver the best possible value.
- **Sustainability** underlies our commitment to improving our environmental performance. We have due regard for natural assets, such as land and materials, and work to lessen the impact of our business operations and assets on the environment. Innovation proposals are assessed on their sustainability benefits as well as their economic ones.
- To achieve **Excellence**, we need to deliver best in class performance, and to maintain thought leadership within our industry. We need to be outward-looking so we can learn what we need to change; and ensure we fully exploit successful innovations across our business.
- **Teamwork** is not only an internal value, but applies to our relationships with other network operators, our collaborative institutions, and the projects which we support together. We work to share the learning from innovation efforts, and learn from the projects of others.

The financial resources used for innovation efforts include the Network Innovation Allowance (NIA), the Network Innovation Competition (NIC), and the investment of shareholders' funds.

Our overall strategy includes all processes by which we:

- put our values into practice through innovation
- identify the areas of our business in which innovation could deliver value
- identify specific opportunities to innovate
- launch and execute innovation projects
- implement successful innovations across our business to realise the benefits
- innovate throughout the business, not just in isolated projects labelled as "innovations"

## 2. Our Network Vision

### Long Term View

As the owner/operator of assets which comprise a significant element of the national infrastructure, and which have multi-decade operational lifetimes, we take a long term view. We must also take account of long term national goals, such as the 80% reduction of carbon dioxide emissions (using a 1990 baseline) by 2050. Progress towards the accomplishment of this goal has already had a significant impact on our region, which contains the greatest concentration of both new wind generation plant and our long-established hydroelectric capacity. We therefore have a vision of a transmission system which will be fit for the needs of the next several decades, and which is able to adapt to the many changes which will occur in that time.

In this landscape of change, we intend to:

- be guided in all we do by our corporate values
- listen to the views of our stakeholders
- maximise the productivity of our assets to deliver capacity and connections
- optimise the maintenance of our assets so as to maximise their useful life and value
- facilitate further connections at all voltage levels
- continually improve network performance and management
- support the development of the power system while obtaining optimum value for money

To accomplish these aims, we will need a range of innovations, some of which are currently at an early stage. In order to bring these to a higher Technology Readiness Level (TRL), we will support research by ourselves and others; and to work with partners in academia and industry. We do this by supporting development facilities such as the National High Voltage, Direct Current (HVDC) Centre and the Power Networks Demonstration Centre (PNDC), where innovations at a low readiness level can be advanced.

### Medium Term

In the medium term, our business operates under a price control regime known as the RIIO-T1 Price Control Financial Model. This also determines the annual allowance for NIA projects. The current price control period runs until 31st March 2021, providing us with a medium term framework for our innovation efforts, and determining the level of resources over a period of several years, allowing us to plan an effective program of innovation. Over this timescale, our efforts are aimed at evaluating and assessing innovations which are at a relatively high TRL level, and bringing them to the point at which they are ready for adoption in business as usual (BAU).

### Short Term

Our immediate focus is on the effective management of current projects, and on those about to begin. We also predict, and subsequently monitor, the delivery of benefits from the adoption of successful innovations throughout the business. The focus in the short term is on projects which deliver innovations to TRL 9 – at which they are ready for adoption – and on driving them into BAU.



### 3. Our Stakeholders

As a regulated monopoly and national infrastructure developer, we have a responsibility to many others beyond our shareholders. These include the communities we serve, whether geographically defined, urban or rural, domestic or industrial. We have particular regard for the needs of communities which are remote, including island communities; and those which have a high proportion of fuel-poor and vulnerable customers. Our relationship with those who use our transmission network, and ultimately pay for it, is typically a stakeholder one, rather than a direct contractual one.

We serve the interests of a broad range of stakeholders, including:

- electricity bill paying consumers in domestic and commercial premises
- heavy industrial users
- generators and developers
- DNOs
- industrial partners and suppliers
- Government and the Public Sector
- collaborative institutions including the Energy Networks Association (ENA), the Energy Innovation Centre and the PNDC
- academia
- our peer organisations in the energy networks industry; the system operator and other transmission operators

We see innovation as extending beyond technology and hardware; we can innovate in our ways of working, and apply innovations across all areas of the business, including commercial and service functions as well as network operations, to the benefit of all our stakeholders. We will look for new and better ways to engage with our stakeholders, and to understand what they are thinking and saying to us.



### 4. Principal Business Drivers

We have a combination of internal and external business drivers.

In 2015, SHETL completed an £800m capital project, the Beaulay-Denny line, and we are currently engaged in the £1.1bn Caithness-Moray subsea cable project, which is due for completion in 2018. Following a period in which our transmission business has been focused on delivering these very large capital projects, our focus will shift to the challenges of efficient operation of our assets, new and old; and from the management of very large capital expenditures, to smaller capital projects and ongoing operational expenditures. This shift will be reflected in our innovation priorities, as we move from asset design and construction issues, towards asset operation and maintenance; minimising losses; and devising more proactive ways to maximise useful asset life and productivity. We therefore have internal drivers to innovate so as to improve our processes and systems.

This will require us to develop and exploit new ways to measure and monitor asset health, and to drive maintenance based on asset condition.

Our external business drivers will lead to changes in technology, the regulatory framework, markets and competition. We will continue to facilitate the changing composition of generation. Our network must be flexible, as the contribution to the nation's energy needs from centralised, fossil fuelled generation plant declines, and the output from renewable generation resources increases. We expect to facilitate the integration of high capacity international interconnectors and the connection of HVDC systems.

We will continue to face issues relating to voltage control which arise as a consequence of the evolving nature of the load and the changing generation mix; and the interfaces between our transmission network, the national System Operator, and the Distribution Network Operators, as the responsibilities for aspects of System Operation are shared in new ways.

We will address developing patterns of energy use, the changing nature of both industrial and domestic loads, and the evolution of the commercial relationships between energy generators, the transmission system, and our end users, as data analysis and communications technologies open up new possibilities.

We can also expect changes in the public policy arena, associated with our trading relationships with the EU, and also in areas such as regulation, our RIIO incentives, and new utility industry structures such as Distribution System Operators and the expansion of competition in the transmission system.

The uncertainties in the landscape described above will require us to be innovative across the whole range of our activities. We take a broad interpretation of “innovation” and regard it as a business-wide imperative, rather than a narrow specialisation focused on engineering.

## 5. Delivering Innovation

Our values and our business drivers lead us to identify key themes and priority areas for innovations:

### Asset health and Productivity (Service, Safety)

- A more complete and holistic understanding of the life cycle of our network assets
- Completing the implementation and exploitation of Condition-Based Risk Management and delivery of the benefits
- Cost effective asset monitoring and accurate knowledge of the state of our assets
- New methods of asset health assessment
- Optimising the timing and nature of interventions

### Network Reliability/Availability and Efficiency (Service, Efficiency)

- Network Performance according to operational targets and contractual obligations
- Voltage control
- Reliability of supply, reduction of outages and faults, rapid and effective response to faults
- Maintaining high system availability and the optimum level of redundancy
- Interface with System Operator(s)

### Commercial innovations (Service, Excellence, Teamwork)

- Constraint management
- Disintermediation; cyber security; blockchain transactions
- Big data analytics; machine learning and automation
- Service provision and supply chain evolution; identification of hidden costs
- Improved decision-making, procurement, standardisation, and policy
- Optimised planning, timing and sizing of load-related investments

### Environmental and Safety impact (Safety, Sustainability)

- Reduction/elimination of SF6
- Health and safety performance improvement
- Impact reduction of site access
- Flood protection

### Management of losses (Service, Efficiency)

- Understanding where losses occur
- Optimising loads for efficiency
- Asset security, protection, and countering metal theft

Having identified the priority areas, we can focus on particular opportunities for innovation and performance improvement. Most of these will involve devising and developing ways to address challenges we face in the areas above. Some will focus on the trial and evaluation of solutions brought to us, which are already developed by others, or the fast-follower adoption of ideas tested by our peer organisations. We will also scan the horizon for new possibilities, by working with our supply chain to find solutions to our immediate problems, and through calls for innovation via the EIC and ENA.

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