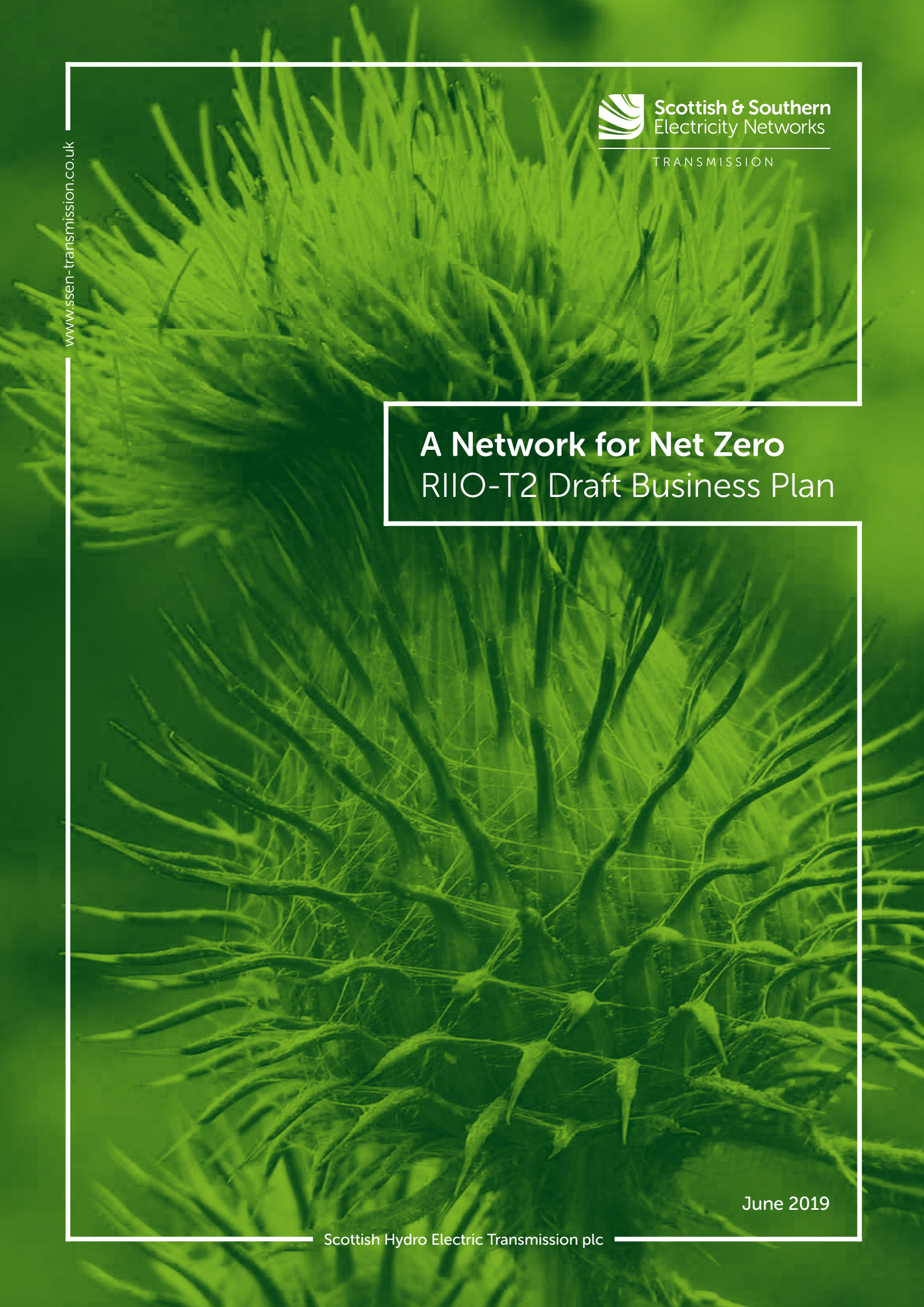


Scottish & Southern Electricity Networks

TRANSMISSION

www.ssen-transmission.co.uk

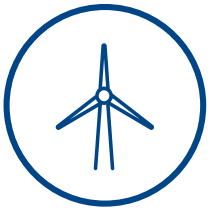
A Network for Net Zero

RIIO-T2 Draft Business Plan

June 2019

Scottish Hydro Electric Transmission plc

Five years. Five clear goals

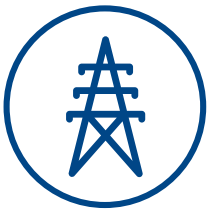


Transport the renewable electricity that powers 10 million homes

Build electricity network flexibility and infrastructure that can accommodate 10GW renewable generation in the north of Scotland by 2026

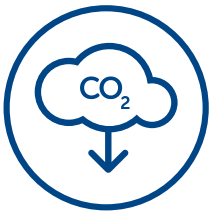
100% network reliability for homes and businesses

Make cost-effective investment in new technology to achieve 100% transmission system reliability for homes and businesses by 2026



Every connection delivered on time

Provide every network connection, tailored to meet our customers' needs, on time and on budget



One third reduction in our greenhouse gas emissions

Reduce the scope 1 and 2 greenhouse gas emissions from our operations by 33% by 2026, consistent with 1.5 degree climate science pathway

£100 million in efficiency savings from innovation

Through targeted new technology and ways of working, achieve £100 million customer benefits by 2026

Delivered for around £7 a year

Foreword

Welcome to this first full draft of our RIIO-T2 Business Plan for the electricity transmission system in the north of Scotland between 1 April 2021 and 31 March 2026.

We share this draft Plan for consultation against the background of an ongoing lively debate about the future of the GB energy industry as it goes through transformative change – to decarbonise, digitise and decentralise. We are encouraged by the democratisation of this debate, which we have experienced over the past two years as we have sought views and ideas to develop this draft Plan.

In 2010, when we began consulting on our RIIO-T1 Business Plan, there was some scepticism about the scale and pace of decarbonisation that we envisaged. Nearly a decade later that scepticism has all but gone. Most commentators, governments and wider society recognise climate change to be a significant, if not the most significant, threat to our way of life. Just in the last few weeks the Committee on Climate Change has called on the UK to adopt a 'net zero' target for greenhouse gas emissions by 2050.

As we now look forward to 2026, decarbonisation and the transition to a low carbon economy remains our strategic objective and primary business driver. Our exceptional track record in delivering infrastructure on time and under budget has meant that renewable generation connected in the north of Scotland has more than doubled since 2010. We put forward proposals in this draft Plan to facilitate the connection of at least a further 3 GW of renewable generation. This would provide enough renewable energy to power 10 million GB homes and make a material contribution to the UK's international commitments under the 2016 Paris Agreement.

There is, of course, much more to running an efficient and sustainable transmission network than the timely connection of renewable generation. Our draft Plan includes ambitious programmes and targets for, amongst other things, network reliability and availability, the role of stakeholders in shaping our activities and 'Net Gain' biodiversity outcomes. We also include steps to ensure that the capabilities of our organisation keep pace with the growth of the network and GB customers' expectations.

Our ambition for the RIIO-T2 period is captured in Five Goals shown on the opposite page that are designed to set clear, measurable targets on the things that matter most to our stakeholders.

We welcome your views on our proposals. We have sought to strike the right balance between the need for expenditure – to decarbonise, modernise and be sustainable – and the cost to the cash-squeezed household. Do you think that we have got this balance right? Is there more, or less, that we should be doing?

My team and I will be continuing the conversation about our Business Plan over the summer and autumn, and I hope to speak to many of you directly then.

Rob McDonald
Managing Director
Scottish Hydro Electric Transmission

Introduction

About us

We are Scottish Hydro Electric Transmission (SHE Transmission), part of the SSE Group, responsible for the electricity transmission network in the north of Scotland.

We operate under the name of Scottish and Southern Electricity Networks, together with our sister companies, Scottish Hydro Electric Power Distribution (SHEPD) and Southern Electric Power Distribution (SEPD), who operate the lower voltage distribution networks in the north of Scotland and central southern England.

As the Transmission Owner (TO) we maintain and invest in the high voltage 132kV, 220kV, 275kV and 400kV electricity transmission network in the north of Scotland. Our network consists of underground and subsea cables, overhead lines on wooden poles and steel towers, and electricity substations, extending over a quarter of the UK's land mass crossing some of its most challenging terrain.

We power our communities by providing a safe and reliable supply of electricity. We do this by taking the electricity from generators and transporting it at high voltages over long distances through our transmission network for onwards distribution to homes and businesses in villages, towns and cities.

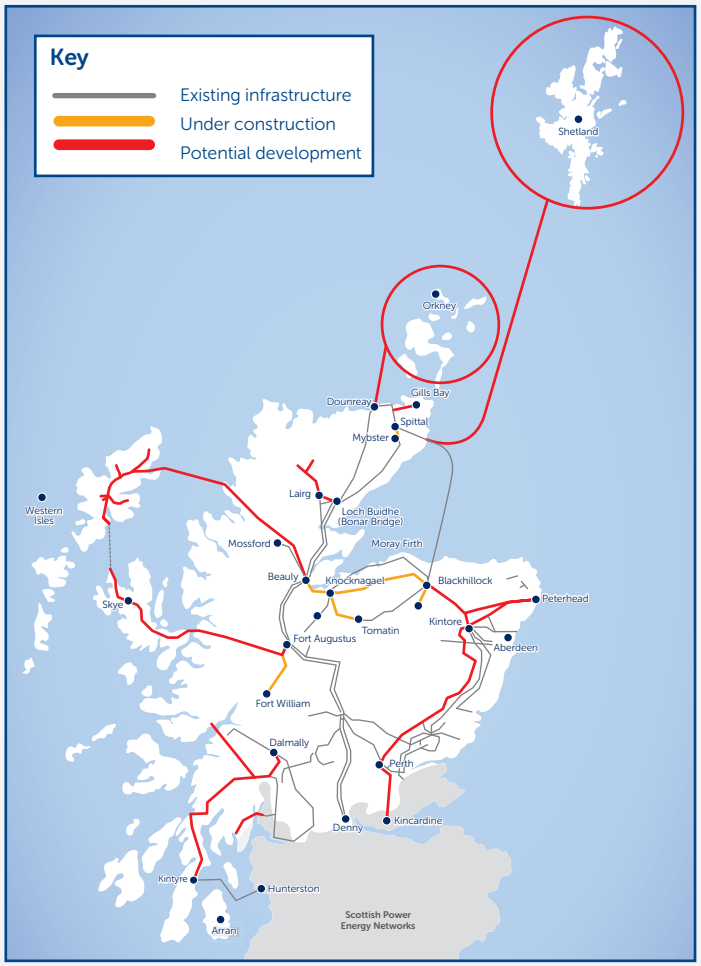
About this consultation

This document is a full draft of our RIIO-T2 Business Plan. It sets out our proposed strategy, ambitions, targets, activities and costs for the period 1 April 2021 to 31 March 2026.

We publish this draft Plan following two years of consultation with stakeholders across GB. Much of that consultation has been issue-specific, and we recognise there is a desire from our stakeholders to see the complete Plan in one document. We welcome views on any part of this draft Plan. A full list of specific consultation questions and details of how to respond can be found on page 179-180.

We will publish our response to this consultation in October 2019 setting out the changes that we propose to make for our final RIIO-T2 Business Plan that we will publish in December 2019.

You can find out more about RIIO-T2 on our website: www.ssen-transmission.co.uk/riio-t2-plan



On 24 May 2019, Ofgem published its Sector Specific Methodology Decision for RIIO-2[1].

Our assurance and governance requirements have meant that we are not fully able to take account of Ofgem's decision in the draft Business Plan. We are considering the detail of Ofgem's publication and will publish a paper later in the summer setting out our views on the regulatory framework and how it might impact upon our proposals.

Our final RIIO-T2 Business Plan in December 2019 will take full account of Ofgem's decision and further planned regulatory directions (including updates to the Business Plan Guidance).

[1]ww.ofgem.gov.uk/network-regulation-riio-model/network-price-controls-2021-riio-2/riio-2-publications-and-consultations

Contents

Note, all financial values shown in this consultation are in 2018/19 prices unless stated otherwise

Summary

Enabling the transition to a low carbon economy

The north of Scotland is rich in renewable energy sources: onshore and offshore wind, hydro, wave and tidal. These resources are essential to the national transition to a low carbon economy.

The Committee on Climate Change[2] report that 75% of UK emissions reductions since 2012 have come from the power sector. Emissions from electricity generation fell by 59% between 2008 and 2017, while security of supply was maintained and average energy bills fell.

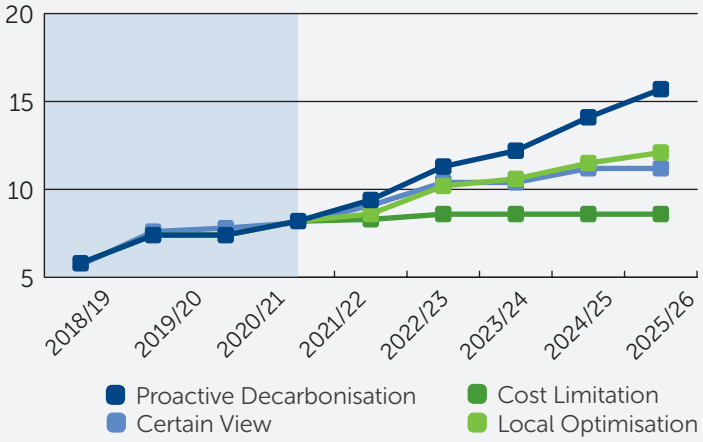
These reductions have occurred disproportionately in Scotland, where grid intensity in 2016 was approximately 55 gCO_2e/kWh[3]. This contrasts with a full UK grid intensity of around 300 gCO_2e/kWh.

The Committee on Climate Change also report that the UK is not on course to meet the legally binding fourth and fifth carbon budgets. The Committee argue that further decarbonisation of electricity generation and electrification of transport are essential to getting on track. In particular the Committee contend that decarbonising power is a low-cost opportunity. In May 2019, the Committee advised the UK Government to set the target of reducing greenhouse gas emissions to zero by 2050[4]. This recommendation was accepted by the UK and Scottish governments.

This draft Business Plan takes as its starting point the critical role of the power sector in the transition to a low carbon economy, as the UK Government set out in its Clean Growth Strategy[5]. Accordingly, we are planning for a further increase in the installed capacity of renewable generation and for decarbonisation of heat and transport in line with the Scottish Government's Energy Strategy[6]. Our planning is for a range of possible outcomes, up to and including the 1.5 degree warming scenario recommended by the 2016 Paris Agreement **(Figure 1).**

As we have worked with stakeholders over the past two years to prepare this draft Plan, there has been a consistent message about the success of Scotland's decarbonisation to date and the need for this to continue, even accelerate, during the coming decade.

Figure 1 North of Scotland Future Energy Scenarios (GW)



Three key proposals in this draft Plan are intended to support the national decarbonisation objective:

1 **Infrastructure Investment**
Cost-effective reinforcement of the transmission network in the east of Scotland to increase power transfer capability for renewable generation;

2 **Ease of Connection**
Policy steps to address barriers in gaining access to the GB transmission system, so accelerating the connection of at least a further 3 GW of low carbon generation by 2026; and

3 **Flexible Arrangements**
An outputs-based regulatory model that enables fast response to changes in network requirements, for example for growth in electric vehicles or availability of new technologies.

Together, these proposals will ensure the north of Scotland transmission network is capable by 2026 of transporting the renewable energy needed to power 10 million GB homes.

Our Certain View, on which this draft Business Plan is based, forecasts capital investment of £1.8 billion during RIIO-T2. In our highest capital investment 'Proactive Decarbonisation' scenario, equivalent to 1.5 degree warming, a further £1.5 billion expenditure (or potentially more) might be required. As this investment is currently uncertain, we do not propose to commit to this investment now, but only proceed when the need can be demonstrated.

[2]www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf
[3]Emissions intensity metric: gCO_2e/kWh is grams of carbon dioxide equivalent per kilowatt hour of electricity generated
[4]www.theccc.org.uk/2019/05/02/phase-out-greenhouse-gas-emissions-by-2050-to-end-uk-contribution-to-global-warming/
[5]www.gov.uk/government/publications/clean-growth-strategy
[6]www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/

Reliable and affordable energy

While decarbonisation is a national policy objective, our customers and stakeholders are clear that they are not prepared to compromise security of supply or pay much more to achieve it.

This draft Plan adopts this direction.

Reliable energy

The reliability of the north of Scotland transmission system is near 100%, with a small number of power cuts affecting homes and businesses each year **(Figure 2).**

Maintaining current levels of reliability and availability depends on effective day-to-day network management through inspection, maintenance and asset replacement. The significant investments that we have made in asset information and systems over the past decade mean we can plan these activities with confidence.

From risk-based modelling of the current network, we have identified 29 asset schemes where the risk of failure of that equipment will become unacceptable during RIIO-T2. We propose to invest £703 million to replace these assets. At this time, we propose to maintain the risk of failure on the network at current levels, but we will review this proposal for the final Business Plan based on consultation feedback and further analysis.

Our ambition is for homes and businesses to never experience a power cut due to a fault on the north of Scotland transmission network.

Many surveys, including Willingness to Pay research[7] which we undertook for this draft Plan, show that security of supply is highly valued by customers and society. New technologies, such as smart monitoring and data analytics, mean achieving 100% network reliability for consumers is now achievable without increasing energy bills.

We are evidence-based in our approach to investment: only deploying new technology when analysis shows that the benefits are greater than the costs (including "do nothing" options). Hence we propose a measured roll-out of new technology during RIIO-T2, in part this will be through our ongoing asset replacement programme and, in part, targeted deployment of new equipment.

The north of Scotland transmission system has grown significantly since 2010 and is likely to grow further during RIIO-T2. We propose to continue the development of our network support capabilities and organisation to keep these commensurate with the scale of the network.

This includes upgrading our control operations, management of spare equipment and emergency response along with investing in the skills of our workforce.

Affordable energy

By the end of the RIIO-T1 period, the average GB household will pay around £4.90 a year for the north of Scotland transmission system[8].

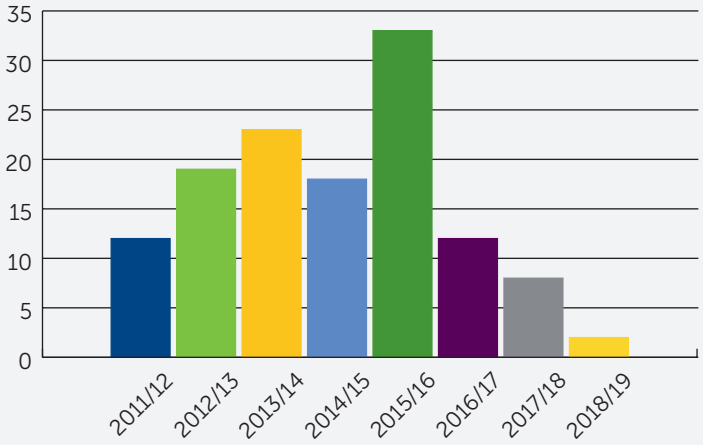
While our stakeholders believe this is a fair cost for the services we deliver, some would not support material increases even for better outcomes.

Under our operating licence, we can only undertake activities that are essential to running an efficient, co-ordinated GB transmission system. This means we can't stop doing thing to save money, and so we must focus on the cost-effectiveness of how we do things. Our experience has shown that targeted innovation can deliver significant capital and operational cost savings.

We have included in our draft Plan an assumption that we will achieve at least £100 million of efficiency savings through innovation during RIIO-T2.

The total expenditure forecast for the Certain View that we set out in this draft Business Plan is £2.2 billion. In this scenario, the average GB household would pay around £6.97[8] in 2026 **(Figure 3).**

Figure 2 Reliability of the north of Scotland transmission network: Number of interruptions (>3 minutes duration)



[7]https://www.ssen-transmission.co.uk/media/3400/1consumers-willingness-to-pay.pdf
[8]We have included an estimate for inflation of 2% pa. in our estimates for the cost to the average GB household

A sustainable transmission system

A safe and secure supply of electricity is essential to our daily lives and the functioning of our economy. Society expects the businesses that provide this critical service to operate to high ethical standards. We agree.

We seek to operate sustainably, acting responsibly in the long term interests of customers, society and the environment. Our holistic Sustainability Strategy[9] sets out a clear vision for what this means in RIIO-T2 and beyond. Through this, we can play our part in meeting the United Nations Sustainable Development Goals.

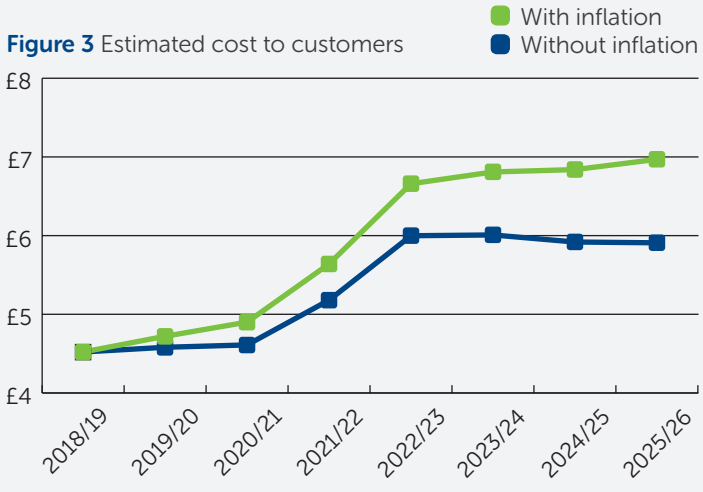
For stakeholders

As we have developed this draft Business Plan, we have sought to understand what our customers and wider stakeholders expect from us in the future. There is a clear and strong desire for greater and earlier involvement in our business planning, and for our network to be tailored to users' needs.

In response to this feedback, we have fundamentally revised our Stakeholder Engagement Strategy and Connections and Commercial Policy. These identify three themes: (i) improving the experience of working with us; (ii) embedding actions to involve stakeholders in our activities; and (iii) working together to shape the energy future.

Our goal is for all new generation connections to be delivered on time.

Figure 3 Estimated cost to customers



Average GB consumption 3,100 kWh. Inflation assumption 2% pa

For society

In 2013 we became a Living Wage accredited employer and in 2014 we gained the Fair Tax Mark. We advocate ethical working practices and require our supply chain to meet our standards. Our focus during RIIO-T2 will be the promotion of fairness through development of a workplace culture of inclusion and diversity.

Transparency is a pre-requisite. We propose a new performance reporting framework for RIIO-T2 that uses a clear and consistent approach to explaining financial, service and societal outcomes.

For the environment

We operate in the north of Scotland, a rich environment for land and marine biodiversity, and visual amenity. Stakeholders highly value this landscape and so expect us to be ambitious in our environmental policies and outcomes.

This draft Plan is based on best practice in environmental management. We propose to focus on woodland and forestry, oil management, noise and visual amenity during RIIO-T2. Building on our award winning approach to biodiversity, we are adopting the biodiversity 'Net Gain' principle for development set out in DEFRA's Environment Plan[10].

Looking beyond the contribution to climate change mitigation that we can make by timely connection of renewable generation, we plan to reduce our own operational emissions by one third in line with the 1.5 degree climate science pathway.

An ambitious Plan for the grid we need

Over the past decade there has been a dramatic transformation of the electricity system in GB, and the north of Scotland has been at the vanguard. Energy is increasingly clean, reliable and sustainable. This draft Business Plan sets out our proposals to build on that success.

With the support of our customers and stakeholders, and underpinned by a strong legislative and regulatory framework, we show that the 1.5 degree warming scenario is achievable. It is also affordable, without compromising the safe constant supply of electricity our homes and businesses need.

[9]www.ssen-transmission.co.uk/sustainability-and-environment/sustainability-strategy/
[10]www.gov.uk/government/publications/25-year-environment-plan

Scottish & Southern Electricity Networks

TRANSMISSION

About the Energy Industry and our Role

A Network for Net Zero
Draft RIIO-T2 Business Plan

Scottish Hydro Electric Transmission plc

Overview

What's in this section?

How the energy industry is changing... exemplified by the four Ds : decarbonisation, decentralisation, digitisation and democratisation. The scale of the challenge, the action needed and the impact on the north of Scotland transmission network.

About our role... as an essential facilitator of the changes our society and economy needs and as an advocate for the needs of north of Scotland energy stakeholders

Our performance to date... on the origin of the electricity grid in the north of Scotland and how it has grown to accommodate renewable generation over the past decade. Our performance during RIIO-T2 on safety and reliability, environment, customer satisfaction and stakeholder engagement, and connections.

A strategy for GB... the outcome of a review of our Srategic Objective – to enable the transition to a low carbon economy – and the definition of our four strategic themes: stakeholder-led strategy, safe and secure network operation, sector leading efficiency and leadership in sustainability.

Dealing with uncertainty... how we use scenarios of future energy generation and demand to help with the planning of the north of Scotland transmission network.

How our draft Business Plan has been developed... we followed a four-step approach that involved collaboration with all stakeholders including the RIIO-T2 User Group and Scottish and Southern Electricity Networks (SSEN) Stakeholder Advisory Panel including examples of how stakeholders have shaped our draft Business Plan.

Governance and assurance... our 'three lines of defence' model for ensuring the quality and accuracy of data and information, but noting that this is a draft plan so will change. The SSE approach to corporate governance and culture.

The future of the energy industry

The transition to cleaner economic growth is one of the grand challenges of the UK Industrial Strategy[1]. As the name suggests[2], there is no simple solution or quick route to success, and it will require co-ordination across numerous sectors if it is to be achieved and targets met.

Our changing relationship with energy

This ambition is set against our evolving relationship with energy. In GB, there is an ever-increasing reliance on electricity as we move away from traditional carbon dense power sources, such as gas to heat our homes and petroleum to drive our cars. At the same time, we rely ever more on electrical appliances and these, in turn, are becoming ever more energy efficient.

The consequences of these changes have the potential to profoundly impact upon electricity demand. At a GB level (but not, as our research shows, in the north of Scotland), electricity consumption has fallen in recent years **(Figure 2.1).** Looking forward, many models predict rising demand as transport and potentially heat are electrified.

The generation of electricity has also changed **(Figure 2.2).** Again, this shift has been away from the traditional carbon dense sources of power: oil, coal and (to a lesser extent) gas. Power derived from the wind and sun has become the norm, aided by dramatic reductions in the price of the technology. An existential question remains over the future of nuclear power in GB.

A further shift in the generation of electricity has been in location. The historic view of large centralised power stations has been replaced by small-scale community generation. From solar panels on suburban rooftops to single wind turbines in the local farmers' fields.

Responding to change

The GB energy sector has responded rapidly and effectively to the transition to cleaner economic growth. Yet, while much has been achieved within the electricity generation sector, much remains to be done. The key challenges as we look ahead are in energy efficiency and the decarbonisation of heat and transport.

[1]Industrial strategy, the grand challenges (BEIS, 2019) available at: www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges
[2]Industrial strategy, building a strategy fit for the future (BEIS,2019) available at: www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future

The Energy Industry

Our role as the owner of the north of Scotland high voltage transmission network is to ensure that electricity continues to be transported safely and reliably from the changing sources of electrical power to meet the needs of homes and businesses.

As we look to the future and the transition to enable cleaner economic growth, we identify four significant societal shifts that are impacting on the way electricity networks are designed, built and operated:

Decarbonisation

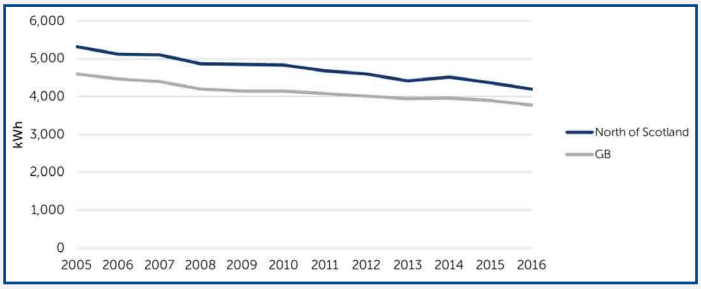
The growth in capacity and output of low carbon generation.

Decentralisation

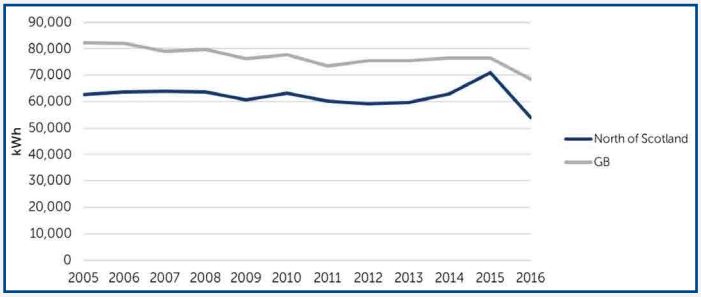
Energy being produced and stored, close to use.

Figure 2.1 Non-weather adjusted average electricity consumption per point of supply[3].

(a) Residential



(b) Industrial and Commercial



Digitisation

The use of new information communications technologies and analytical tools to improve performance without increasing cost.

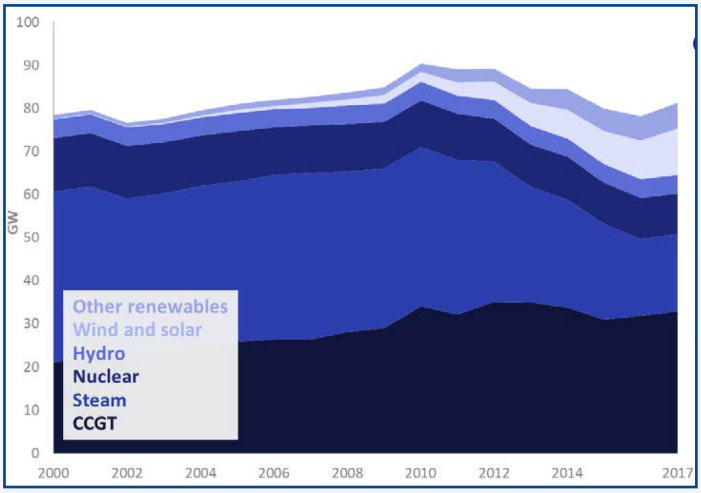
Democratisation

The collaboration of customers and stakeholders in designing our energy future.

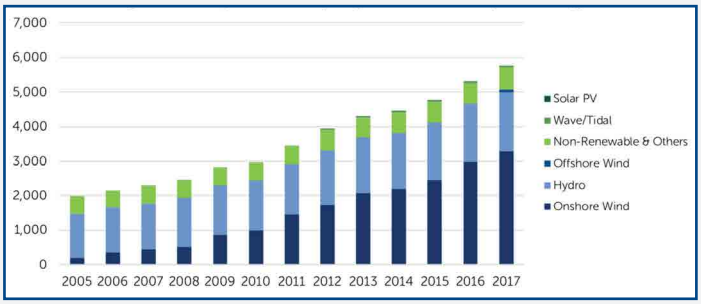
We explore each of these shifts, and the potential impacts on the north of Scotland transmission network, in the following pages.

Figure 2.2 Generation capacity by technology[4].

(a) GB



(b) North of Scotland



[3]Future Energy Scenarios (SSEN Transmission, 2018) available at: www.ssen-transmission.co.uk/information-centre/industry-and-regulation/future-energy-scenarios/
[4]Digest of UK Energy Statistics (DUKES) 2018: main report (BEIS,2018) available at: https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2018-main-report

Decarbonisation

The challenge

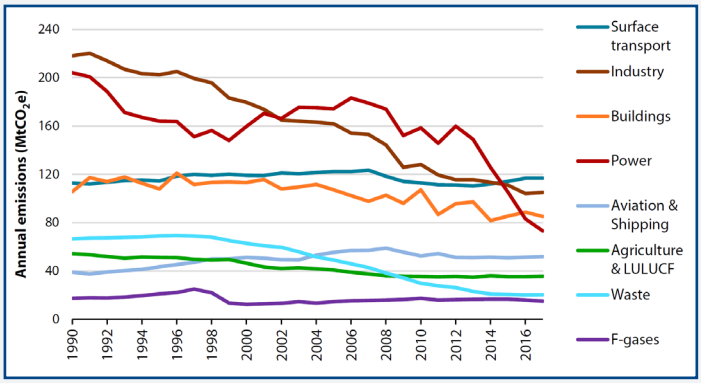
Energy is used to heat, light, transport and power our lives, our homes and our businesses; making that energy cleaner and greener is central to both the UK[5] and Scottish[6] governments' ambitions to deliver economic growth and decrease emissions.

Considerable progress has been made over the past decade, disproportionately driven by the decarbonisation of the electricity generation sector **(Figure 2.3).** At the end of September 2018[7], the UK's renewable generating capacity totalled 43 GW (of 82 GW total installed generation) and, during the preceding quarter, low carbon generators (including nuclear) accounted for 56% of electricity consumed. At the time of writing our draft Business Plan, a record of 18 days without coal-fired generation had just come to an end.

While this change in the electricity generation sector has been rapid and profound, more remains to be done. Electrification has an important role to play in removing the carbon emissions from gas[8] (96% of use is for heating) and petroleum (86% is used for transport).

In June 2019, the UK Government set a target of net zero greenhouse gas emissions by 2050 (see box on the right), and in May 2019 the Scottish Government set a target for 2045.

Figure 2.3 UK greenhouse gas emissions[10]



Action needed

The Committee on Climate Change (CCC) describe a range of technologies and behaviour changes that can help reduce emissions split into:

- Core options include lower-cost energy efficiency and extensive decarbonisation of the power and transport sectors;
- Further ambition options for electricity generation, Greenhouse Gas Removals industry, buildings, agriculture, transport and aviation;
- Speculative options that currently have very low levels of technology readiness, very high costs and/or significant barriers to public acceptability.

Core options are those low-cost low-regret options that make sense under most strategies to meet the current 80% carbon reduction by 2050 target. For the core options, by 2050:

- The share of low carbon generation is 97%;
- Consumption of low carbon electricity increases 3.5x;
- Low carbon heat is in 80-100% of homes and businesses; and
- Cars and vans are 80% electric.

For the electricity sector, this means supporting rapid electrification and greater build rates of low-carbon generation capacity, accompanied by measures to enhance the flexibility of the electricity system to accommodate high proportions of inflexible generation (e.g. wind). The CCC argues that the Energy White Paper planned for 2019 should aim to support a quadrupling of low-carbon power generation by 2050.

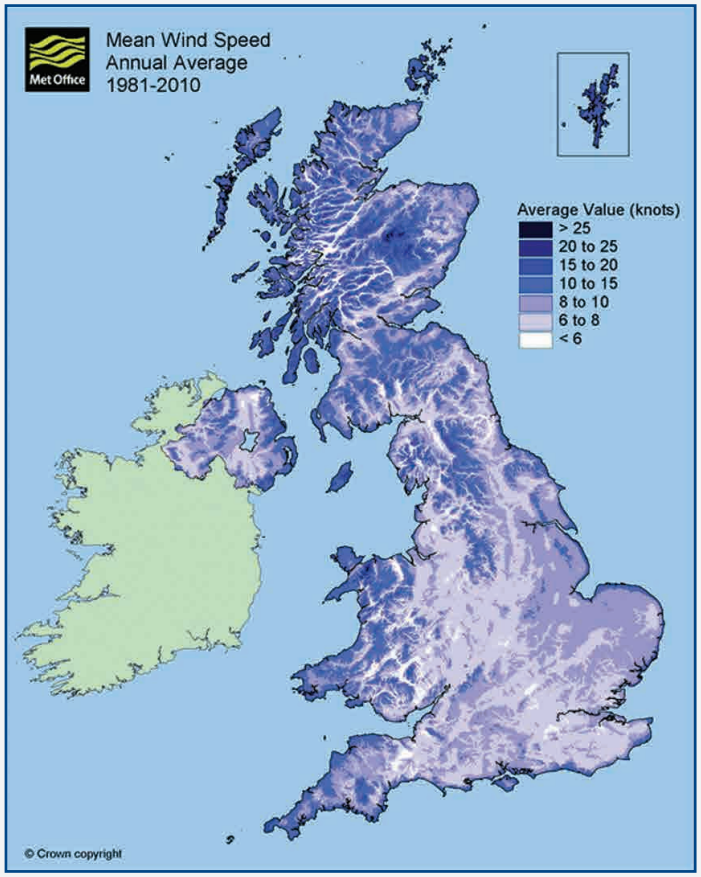
Impact on the north of Scotland transmission network

The north of Scotland has an exceptional renewable energy resource **(Figure 2.4)**, and is likely to continue to make a disproportionate contribution to the transition to low carbon electricity generation.

We have a strong track record in planning, developing and constructing the necessary infrastructure to facilitate the connection of renewable generation. This includes GB first deployment of innovative and flexible connection arrangements.

[5]Clean Growth Strategy (BEIS, 2017) available at: www.gov.uk/government/publications/clean-growth-strategy
[6]Scottish energy strategy future energy Scotland (World Commission on Environment and Scottish Government, 2017) available at: www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/
[7]Energy trends 2018 (BEIS, 2018) available at: https://www.gov.uk/government/collections/energy-trends#2018
[8]Energy consumption on the UK (BEIS, 2018) available at: www.gov.uk/government/statistics/energy-consumption-in-the-uk

Figure 2.4 Met Office GB average wind speeds[9]



However, facilitating high volumes of renewable generation on the system poses operational challenges for electricity networks as a result of weather dependent intermittent output often in remote locations and far from population centres. These challenges must be planned for and actively managed to ensure they do not negatively impact on system security and reliability.

As well as the physical and environmental challenges to timely network development and operation, facilitating more renewable generation brings additional, less tangible challenges. Renewable generators are high capital and low operational cost. Maintaining the affordability of network connections is essential for renewable energy generation development in markets with reduced subsidies and challenging economics.

The distinction between the operation of the high voltage transmission and low voltage distribution system is also breaking down. Increasingly, all energy sector participants must work together to establish and deliver timely, cost effective solutions for the GB consumer.

The Committee on Climate Change (the CCC) is an independent, statutory body established under the Climate Change Act 2008.

The purpose of the CCC is to advise the UK Government and Devolved Administrations on emissions targets and report to Parliament on progress made in reducing greenhouse gas emissions and preparing for climate change.

In May 2019[10], the CCC advised the UK Government to set an ambitious new target to reduce the nation's Greenhouse Gas Emissions (GHGs) to zero by 2050. Given Scotland's greater potential to remove carbon pollution from its economy than the UK overall, the CCC further advised that Scotland should target reaching net-zero GHGs by 2045.

A net-zero target would require a 100% reduction in GHGs. It is referred to as 'net' as the expectation is that it would be met with some remaining sources of emissions which would need to be balanced by removals of CO_2 from the atmosphere – by growing trees, for example.

The CCC argues that, with strengthened policy direction and support, net zero GHG is necessary, feasible and of manageable cost to the GB economy. The CCC highlight the essential role of renewable electricity to achieving a net zero outcome.

In June 2019, the UK Government accepted the CCC recommendation and laid the necessary legislation to amend the Climate Change Act 2008.

"Standing by is not an option. Reaching net zero by 2050 is an ambitious target, but it is crucial that we achieve it to ensure we protect our planet for future generations." Theresa May, UK Prime Minister, 12 June 2019

[9]Where are the windiest parts of the UK? (Met Office, 2010) available at: https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/wind/windiest-place-in-uk
[10]Net Zero – The UK's contribution to stopping global warming (CCC, 2019) available at: www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

Decentralisation

The challenge

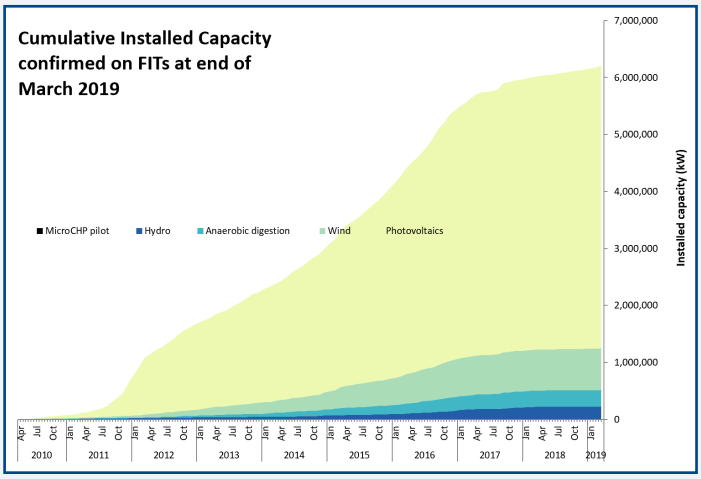
Decentralisation means energy being produced, and increasingly stored, close to where it will be used. This includes both 'off grid' local energy systems (not connected to the GB interconnected grid) and local small-scale generation with peer-to-peer trading. Rapid technological development is making decentralisation possible and increasingly viable, through distributed generation and storage solutions, including renewable and battery technologies.

The scale of decentralisation is evidenced through the 6.2GW of installed capacity under the Feed in Tariff (FiT) scheme, covering nearly 850,000 installations across GB **(Figure 2.5).** In the north of Scotland, around 0.5GW of capacity is installed at nearly 30,000 locations[11].

Action needed

The Scottish Government has already exceeded their target of 500MW of community owned and locally owned renewable energy capacity operating in Scotland by 2020. New targets aspire to 1GW of operational capacity by 2020, and 2GW by 2030. It aims to ensure that, by 2020, at least half of newly consented renewable energy projects will have an element of shared ownership.

Figure 2.5 Cumulative installed FiT capacity[12]



Impact on the north of Scotland transmission network

Energy networks must develop to provide access to these new entrants, while continuing to support local electricity security of supply.

One consequence of decentralisation in the north of Scotland is significant over production (at times) compared to local use. Already, over 40% of the generation connected to the north of Scotland transmission network is indirectly connected via the local voltage distribution network. Yet the power that is generated flows onto the transmission system.

New industry arrangements are required to manage this flow of power to ensure it reaches the homes and businesses that need it. Industry reform projects must be undertaken for the whole of GB, for example the Energy Networks Association (ENA) Open Networks[13] project.

The Open Networks Project is a major energy industry initiative that will transform the way our energy networks work, underpinning the delivery of the smart grid.

This project brings together nine of the UK and Ireland's electricity grid owners and operators, respected academics, non government organisations, Government departments and the energy regulator Ofgem.

The significant increase in the number and type of distribution connected generation and their changing network requirements will require new customer services for providing connections and network access.

System operations are also changing to accommodate decentralisation. With fewer large thermal plants to provide services to the Electricity System Operator (ESO), distributed energy resources will increasingly need to be enabled to provide services to support system operation. Whole system planning must also adapt to consider whole system implications of changes at the distribution level. This will ensure the optimum solution is identified, whether this requires investment on the transmission system, distribution system, or the provision of services from flexibility markets.

[11]Feed in tariff statistics (BEIS, 2013) available at www.gov.uk/government/collections/feed-in-tariff-statistics
[12]Monthly Central Feed-in Tariff register statistics (BEIS, May 2019) available at: https://www.gov.uk/government/statistical-data-sets/monthly-central-feed-in-tariff-register-statistics
[13]ENA open Networks project available at: www.energynetworks.org/electricity/futures/open-networks-project

Digitisation

The challenge

Digitisation means the use of new Information and Communications Technology (ICT) and analytical tools to improve the performance - in particular, the reliability and productivity - of electricity networks. Digitisation is an enabler for a more dynamic and intelligent energy system delivering improvements in efficiency and resilience.

Technology is developing rapidly and value appraisal is required to maintain cost-effective outcomes for consumers and the resilience of the network to cyber threats.

The World Economic Forum estimates that $1.3 trillion[14] could be generated by digitising the electricity sector worldwide between 2016 and 2025. It highlights five high-impact initiatives:

1. Better management of asset performance
2. Real-time measurement of supply and demand
3. Real-time network controls
4. Integration of energy storage
5. Integration of alternative energy solutions.

This conclusion was reinforced in June 2019 by the report of the Energy Data Taskforce, commissioned by Government, Ofgem, and Innovate UK. The taskforce[15] describes the benefits of data and digitisation to asset management, operations and market development. However, it also identifies the prerequisite for accurate, real-time data and effective data management systems.

Action needed

As the UK Government set out in the Smart Systems and Flexibility Plan[16], data availability and digitisation are essential in maximising the benefits of a smart, flexible energy system. The plan recognised that in the future, the energy system will need more skills in the area of data and digitisation and to address this, the Government is incorporating digital transformation into the developing skills pillar of their Industrial Strategy.

Digitisation for energy networks is most commonly proposed in four areas:

- Digitising customer interfaces
- Applying sensors and big data analytics
- Utilising new technologies and
- Digitisation/automation of processes.

Digitisation can require potentially significant upfront costs and careful assessment is required to ensure improved productivity can make these investments worthwhile when both capital and operations costs are considered on a whole life basis. Such assessment needs to account for the behaviour of others not least threat vectors and the consequences of taking no action.

Impact on the north of Scotland transmission network

Digitisation has an important role in the adaption of the north of Scotland transmission network to address the challenges of the energy system transition, in particular decarbonisation and decentralisation.

Asset life cycle management encompasses the technology solutions that enable real-time, remote control or predictive maintenance for extending the life cycle or operating efficiency of assets. Operational recommendations can be generated in real time by using data captured from connected devices, plant equipment and sensors, and applying algorithms to this data. Plant managers can immediately identify actions that decrease maintenance costs and can predict and prevent unplanned downtime. Engineers can be more productive by making better-informed decisions; this can eventually lead to a more diverse and specialised workforce.

Grid optimisation is made possible through real-time load balancing and network controls, enabled by connected devices and advanced monitoring capability. Real time network controls enable real-time adjustment to changing loads. Such adjustments can also be made to increases or decreases in generation and to failure conditions of the network.

Digital initiatives can target resilience, enabling higher levels of integration of renewables with less difficulties and at scale, helping networks play their part in meeting challenging mandates on the reduction of emissions.

[14]Digital Transformation Initiative (World economic forum, 2019)
www.reports.weforum.org/digital-transformation/electricity-an-industry-ready-for-digitization/?doing_wp_cron=1560770332.2543120384216308593750
[15]Energy Data Taskforce makes five key recommendations (Catapult, 2019) available at:
https://es.catapult.org.uk/news/energy-data-taskforce-makes-five-key-recommendations/
[16]Upgrading our energy system: smart systems and flexibility plan (BEIS,2017) available at:
https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan

Democratisation

The challenge

Energy democratisation means involving customers and stakeholders from across GB in the way that the industry is changing; evidencing that the interests of consumers are at the heart of decision making.

The scope of democratisation is as wide as stakeholders' interests. Broadly, there are three areas:

1 **Democratisation of information: about priorities, plans and performance**

2 **Democratisation of investment: in the planning and decision making**

3 **Democratisation of intent: that the decisions being made are in the interests of all, including vulnerable customers and communities.**

In addition, democratisation in participation can be achieved through demand side management and demand side response to new models such as peer-to-peer trading. For this to be democratic there should not be material barriers to entry.

Action needed

The Scottish Government's Energy Strategy responds to the challenge of democratisation through public engagement. It sets out core objectives to: raise awareness, encourage a greater sense of ownership and find better ways to share ideas. The Climate Conversations initiative encourages a discussion about how we can reduce the emissions that cause climate change, and prepare for a changing climate.

At GB-level, the UK Government's Smart Systems and Flexibility Plan focuses on actions to increase participation of new technologies and parties in the energy sector, including reforming the regulatory regime for storage and the access framework for demand side response.

Impact on the north of Scotland transmission network

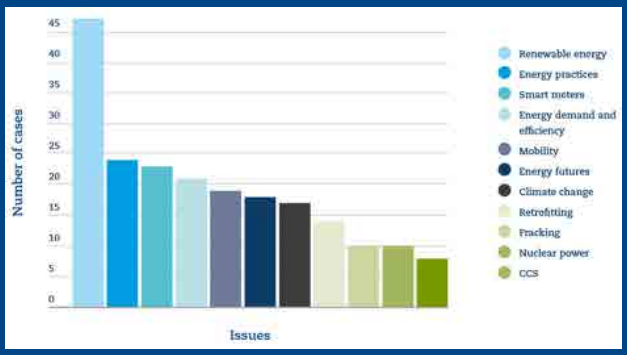
The democratisation of energy is a broad concept, extending from individuals and communities that want to actively participate, to others just wanting to know what is going on. The range of potential impacts on the north of Scotland transmission network is equally broad. We focus on two impacts:

1. **Transparency**
   There is evidence of societal distrust in the energy sector[17]. Customers and stakeholders must have ready access to clear information about the priorities, targets and outcomes. Decision making (and its costs and benefits), must be visible and meaningful to all stakeholders. Individual industry participants, regulators and governments all have a role to play in making the energy sector transparent.

2. **Co-creation**
   Non-industry experts can have ideas and innovations to make our energy system better, or provide a different perspective on the challenges we face and solutions we propose. We must establish networks, be available to share those ideas and work together to co-create solutions.

The future of the energy industry

Research conducted by the UK Energy Research Centre[18] shows that, while there has been broad and diverse public engagement on energy, engagement tends to focus on specific parts of the energy system. The figure below shows the issues identified from systematic mapping of UK public engagement with energy between 2010-2015. The researchers recommend a broader whole systems approach to engage society in low carbon transition discussions by strengthening our understanding and use of diverse forms of public engagement.



Source Public engagement with energy: broadening evidence, policy and practice, UKERC briefing note, October 2017

[17]Paying for energy transitions: public perspectives and acceptability available at: (UKERC, 2019) www.ukerc.ac.uk/publications/paying-for-energy-transitions.html
[18]Public Engagement with Energy: broadening evidence, policy and practice (UKERC, 2017) available at: www.ukerc.ac.uk/publications/public-engagement-with-energy.html

Our role in the future of energy

Our role today

As the owner of the high voltage electricity network in the north of Scotland we are responsible, through legislation and our operating licence, for the economic and efficient development and operation of the transmission network.

In our day-to-day activities, we work closely with Scottish Hydro Electric Power Distribution (SHEPD), the owner of the contiguous low voltage distribution network, Scottish Power Energy Networks (SPEN) the owner of the electricity networks in the south of Scotland and Wales and with National Grid the Electricity System Operator (ESO) of the GB transmission network.

By working collaboratively, we can identify and deliver the most efficient whole system, whole life solutions.
The north of Scotland is, in many ways, a challenging operating environment for energy networks. The communities that require a reliable supply of power are geographically dispersed across mountainous terrain and islands. The weather and climate mean heat and light are essential for habitation, but the associated cost of high energy consumption can place undue pressure on vulnerable households and communities.

We understand the needs of the customers and communities that work and live in the north of Scotland – never forgetting the need to keep the lights on and the cost of energy down.
Electrical infrastructure can be considered intrusive or damaging to the natural environment. These challenges present opportunities too. Renewable energy is endemic, in the form of hydro, wind and, potentially, marine. Community engagement in the energy transition is high, with over 1,000 community-owned renewable projects[19].

The north of Scotland has the renewable energy to make a big contribution to GB decarbonisation. While this is important, so is managing the impact on the local environment and affected community.
Technological innovations, such as active network management and modular composite structures, have had their first GB deployment to meet the needs of customers in the north of Scotland. Likewise, commercial innovation, for example our Orkney Alternative Approach[20], has been driven by the needs of local generators.

Thoughtful and targeted innovation can result in better outcomes for our customers and stakeholders.

Leading the way ahead

We have an important and ongoing role in enabling the clean energy transition:

- To provide the necessary network infrastructure and policies for the cost-effective connection of renewable generation. While the power sector in Scotland has significantly decarbonised, the sector is expected to expand to facilitate reductions in other areas through electrification and export to the rest of GB.
- To participate in and support the industry changes necessary for decentralisation through locally owned and operated energy systems. This will require whole system approaches with SHEPD, the ESO and other stakeholders.
- To engage with our north of Scotland electricity consumers, network users and wider stakeholders to ensure their needs are fully expressed and addressed in the national clean energy transition.

Our draft Business Plan sets out our proposals to achieve this during the RIIO-T2 period.

[19]Community energy reports (Energy saving trust, 2018) available at: www.energysavingtrust.org/scotland/communities/community-renewables/community-energy-reports
[20]Orkney Alternative Approach (SSEN Transmission, 2018) available at: www.ssen-transmission.co.uk/news-views/articles/2018/6/solving-orkney-s-catch-22/

Our performance

A network for renewable energy

The north of Scotland electricity network was historically designed to bring power to communities in the highlands and islands; a geographically vast area with physically challenging terrain, it encompasses one third of the UK landmass, with dispersed pockets of remote and sparse population. The network was originally sized and designed to meet that relatively low demand and located to connect the hydro electric power stations within those remote communities. It was principally constructed from the late 1940s through to the 1970s **(Figure 2.6).**

The potential for renewable generation in the north of Scotland is exceptional. A second phase of renewable energy development began in the early 2000s with the Renewables Obligation (RO)[21]. The RO placed an obligation on electricity suppliers to source a proportion of electricity from renewable sources. The proportion increased each year, so promoting investment in renewable generation capacity.

However, prior to 2010, the north of Scotland transmission network was effectively 'full' meaning it was not possible to connect further generation. This constraint was resolved, in part, by the introduction of the Connect and Manage access reforms[22]. These reforms allowed generators to connect before network reinforcement.

In 2010, around 3.5GW of generation was connected to the north of Scotland electricity network. Over 10GW had applied for connection. Two Government-chaired forums[23] – the Renewable Energy Transmission System (RETS) study in 2002 and Electricity Networks Strategy Group (ENSG) vision in 2009 – defined a programme of network reinforcement across GB to accommodate this growth in renewable generation.

The Beauly Denny reinforcement project was granted consent in 2010, marking the first major milestone in transforming our network and enabling the connection of large volumes of renewable generation in the north of Scotland.

Over the last decade, we have invested nearly £3 billion in the growth of the network, including over £2 billion on large strategic upgrades such as Beauly-Denny, the Caithness-Moray High Voltage Direct Current (HVDC) link and the Kintyre-Hunterston 220kV subsea cable. In addition, we have made significant investment to provide local connection infrastructure for the new generation sites.

This has been achieved in a relatively short time period, in remote and challenging working environments, while being sensitive to the unique natural environment of the north of Scotland. All of our strategic capital investments have been delivered on time and under budget. Innovation and close working relations with all our stakeholders has enabled this achievement.

Renewable energy for everyone in GB

The impact on the GB energy industry as a direct result of the significant demand from renewable generation for connection in the north of Scotland has been profound.

Since 2010, the capacity of renewable generation connected in the north of Scotland has more than doubled. This encompasses all technologies at all scales from local community energy schemes to large offshore wind farms. Our insights analysis demonstrates the potential for this to double again by 2026.

The consequence of connecting large volumes of renewable generation has been a major shift in power transfer trends in GB. Historical dominant power flows from south to north have been reversed. The north of Scotland is now a renewable energy powerhouse to the benefit of all GB consumers and is making a substantial contribution to the national climate change targets.

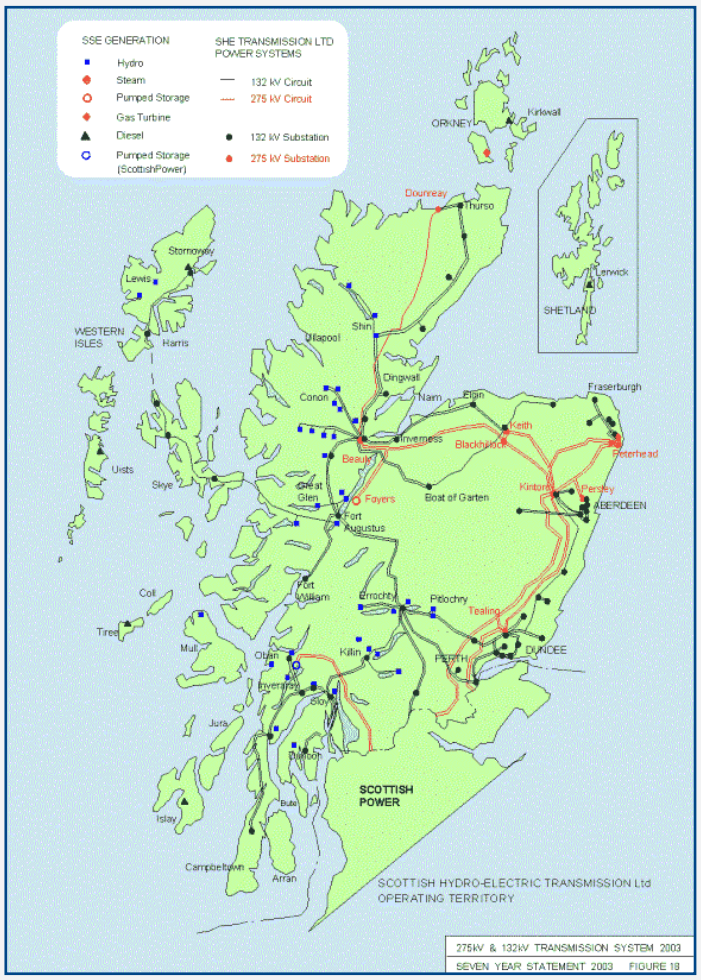


Figure 2.6 Hydro electric generation and the pre-2010 north of Scotland transmission system

[21]Ofgem RO (Ofgem,2019) available at: www.ofgem.gov.uk/environmental-programmes/ro/about-ro
[22]Electricity network delivery and access (BEIS,2016) available at: www.gov.uk/guidance/electricity-network-delivery-and-access
[23]Electricity Networks Strategy Group (BEIS,2017) available at: www.gov.uk/government/groups/electricity-networks-strategy-group

An exceptional track record

As the (CCC) reports[24]: "Scotland is leading the UK on renewable electricity" contributing 33% of the GB renewable generation in 2018. This would not have been possible without the £3 billion investment that we have made since 2010 in upgrading and growing the network in the north of Scotland.

This contribution to national climate change objectives has been achieved without compromising the safety, reliability and availability of the north of Scotland transmission system, or the service that we provide to our customers and stakeholders. The energy industry regulator Ofgem assesses us to have "performed well"[25]. It uses four measures, which it calls primary outputs, to measure the performance of electricity transmission network owners. These are: reliability, connections, environment and customer satisfaction.

Given the importance of providing connections for new renewable generation, Ofgem also reports on progress in providing new network capacity.

Table 2.1[26] shows our performance against these measures for the five full years of the RIIO-T1 price control period completed to date. More information about our performance can be found in our annual reports.

Safe and reliable

The health and safety of our employees, contractors and members of the public remains our number one priority. Our aspiration continues to be for everyone involved in our activities to go home safe each and every day.

We measure our safety outcomes using the Total Recordable Incident Rate (TRIR), the total number of recordable incidents for employees and contractors per 100,000 hours worked. During the RIIO-T1 period, our TRIR has been between 0.23-0.90.

In 2016 we empowered our workforce to feel more confident intervening where they had safety concerns through the introduction of a safety licence: "if it's not safe, we don't do it". This has been supported by bespoke training for all of our employees and contractors.

The reliability of the north of Scotland transmission system is measured using Energy Not Supplied (ENS). ENS is the estimated volume of electricity that has not reached homes and businesses due to an incident that interrupts the flow of power on the transmission system.

For the five full years of the RIIO-T1 price control period completed to date, there have been 73 incidents resulting in a loss of supply. This equates to an overall system reliability in excess of 99.999%.

More information about the reliability and availability of the GB transmission system can be found in the ESO annual reports[27].

Table 2.1 Our measures of performance for the current price control period

Primary Output	Metric	Annual target	Outcome
Reliability	Energy Not Supplied	Less than 120MWh	Five-year average 34MWh
Connections	Timely Connection Offers	100% on time	Achieved target in all years
Environment	SF_6 Leakage Environmental Discretionary Reward	Less than 151kg Score >50% is proactive	Five-year average 305kg Five-year average 57%
Stakeholder Satisfaction	Stakeholder Satisfaction Survey Key Performance Indicators Stakeholder Engagement Incentive	Score of 7.4 out of 10 89% of weighted KPIs Score of 4 out of 10	Five-year average 7.8 Five-year average 80% Five-year average 5.22
Connection Works	**Metric**	**Eight year target**	**Outcome**
Connections Infrastructure	New MW connected	Baseline 1,168MW	Forecast 1,572MW
Shared Infrastructure	New MVA installed	Baseline 1,006MVA	Forecast 4,096MVA
Boundary Increase (or equivalent)	Named projects: Beauly Blackhillock Kintore, Beauly Mossford, Kintye Hunterston, Caithness Moray	n/a	All projects completed on time, under allowance

Outcome for the five full years of the RIIO-T1 period: Exceeds target by more than 10% | Within +/-10% of target | More than 10% below target

[24]Reducing Climate change in Scotland (CCC, 2018) available at: www.theccc.org.uk/publication/reducing-emissions-in-scotland-2018-progress-report-to-parliament/
[25]Available at: www.ofgem.gov.uk/network-regulation-riio-model/current-network-price-controls-riio-1/network-performance-under-riio
[26]In line with 2017/18 annual regulatory reporting for SHE Transmission
[27]www.nationalgrideso.com/insights/transmission-performance-reports

Award winning

We have been widely acknowledged for our safe and sustainable approach to capital delivery.

Saltire Civil Engineering Award
Greatest contribution to Scotland 2017:
Beauly Denny

Network Magazine Awards
Engineering Project of the Year 2018:
Caithness Moray

Utility Week Star Awards
Health and Safety Champion:
Initiative 2018

Royal Institute of Chartered Surveyors Awards
Scotland Project of the Year 2018:
Caithness Moray

The Green Apple Environmental Awards
Best Environmental Practice:
Thurso Substation

BIG Biodiversity Challenge Awards
Overall winner: Thurso Substation

The Beauly-Denny team collecting the Saltire Award

Environment

In May 2018, following extensive customer and stakeholder consultation, we published our sector-leading Sustainability Strategy[28]. Of the six ambitions in our strategy, three target environmental concerns:

1. Tackling Climate Change
2. Promoting Natural Environment
3. Optimising Resources

We publish an annual statement on our progress against these ambitions on our website.

There are three regulatory metrics for environmental performance during RIIO-T1:

1 **Leakage of SF_6 gas, for which we have improved from 100% above target in 2013/14 to at target levels since 2016/17.**

2 **Business carbon footprint, which has fallen by two-thirds over the past five years.**

3 **Ofgem's Environmental Discretionary Reward, where we were awarded Leadership status in 2017/18.**

Our performance has improved year on year during the RIIO-T1 period.

Customer satisfaction and stakeholder engagement

Each year we ask an independent research company to undertake a survey of the experience of our customers and stakeholders working with us. As part of this survey, we asked respondents to rate their overall satisfaction with us on a scale from 0-10. The average rating for the five full years of the RIIO-T1 price control period completed to date is 7.8 **(Table 2.1).**

[28]SSEN Transmission Suitability Strategy (SSEN Transmission, 2018) available at: www.ssen-transmission.co.uk/sustainability-and-environment/sustainability-strategy/

The responses to our stakeholder surveys highlighted that our customers believe we provide a strong service in our areas of activity (such as providing connections), but we could play a broader role in advocating for the needs of north of Scotland network customers.

In 2017, we began a fundamental review of our stakeholder engagement strategy and reporting. This has resulted in the development of new Key Performance Reporting Indicators[29] (KPIs) and a new Stakeholder Engagement Strategy[30] (currently subject to consultation ending 28 June 2019). Our new strategy is intended to meet the expectations of our stakeholders, for collaborative working to deliver benefits through customers and society.

Connections

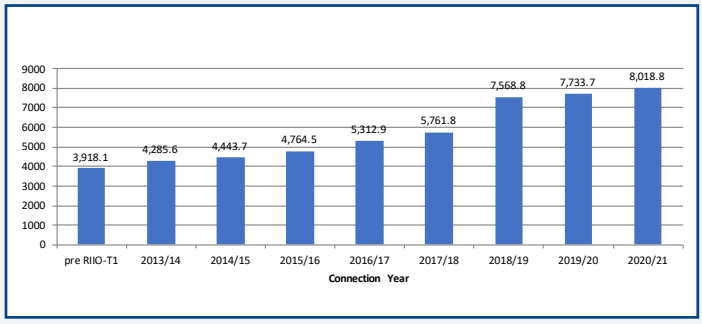
The total generation capacity connected to the north of Scotland transmission system is forecast to be 8GW by 31 March 2021 **(Figure 2.9).** This comprises 85% renewable generation including onshore and offshore wind, hydro, solar and marine technologies.

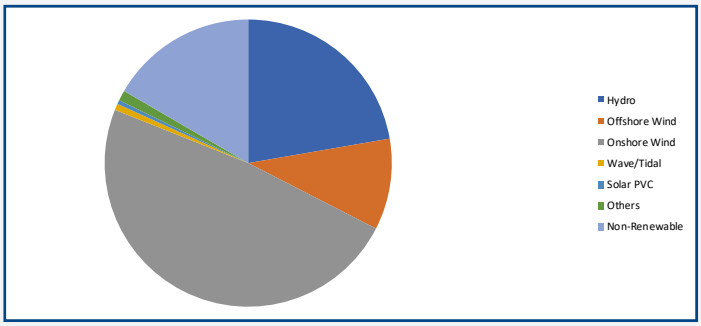
We have made all connection offers within the timescales specified in industry codes and we work with our customers to develop and deliver the energisation of their connection to the timescales they require. This has meant introducing innovative technologies, ways of working and connection designs to facilitate accelerated connections. As a consequence, around one quarter of our connected customers have flexible connection arrangements.

Connection of this volume of additional generation has been possible due to the successful construction of the large strategic capital investments, as well as the significant local infrastructure required to connect the new generation onto our network.

Our ability to develop and construct a significant programme of high value, bespoke and complex transmission projects has been a key factor in our overall performance over the past decade. This has allowed the connection of large volumes of generation on time and under budget.

Figure 2.9 Generation connected to the north of Scotland transmission network (31 March 2021 forecast)





[29]SSEN Transmission Stakeholder Key Performance indicators (SSEN Transmission, 2018) available at: www.ssen-transmission.co.uk/information-centre/industry-and-regulation/stakeholder-satisfaction-incentive-proposed-key-performance-indicators/
[30]SSEN Transmission Stakeholder Engagement Strategy (SSEN Transmission, 2019) available at: https://www.ssen-transmission.co.uk/information-centre/industry-and-regulation/stakeholder-engagement-strategy-review/

A Strategy for GB

What is a strategic objective?

Our strategic objective determines how our business operates. It provides the direction and scope of our business in the long term and how our resources will be allocated to meet the needs of customers and stakeholders.

All of our employees can draw direct links between our strategic objective and the work that they are doing. So too should customers and stakeholders be able to draw direct links between their interests and our strategic objective.

The boundaries of our strategic objective are influenced by: the needs of our customers; the scale of our ambition and the pressures of our business environment; as well as our role as a regulated owner of Critical National Infrastructure.

Our role as a regulated owner of Critical National Infrastructure

As a licenced electricity transmission network owner, the scope of our strategic objective must sit within our statutory duties and our licence obligations.

Set out in the Electricity Act of 1989, and governed by the Gas and Electricity Markets Authority, our general duties are:

- To develop and maintain an efficient, coordinated and economic transmission system; and
- To facilitate competition in electricity supply and generation

In addition, it is required that we:

- Shall have regard to preserving natural beauty, of conserving flora, fauna and protecting sites, buildings and objects of interest; and
- Shall do what we reasonably can to mitigate any effect on the natural beauty of the countryside.

Our other obligations include: safety of our system for the public; secure supply of demand; connections of generation and demand and non-discrimination; system planning and development; and making the system available to the ESO and ensuring it is fit for purpose.

Our Strategic Objective

We defined our strategic objective in 2010 and it has underpinned our activities since then.

Our Strategic Objective is to enable the transition to a low carbon economy.

Our values

Safety
If it's not safe, we don't do it

Service
We are a company customers can rely on

Efficiency
We focus on what matters

Sustainability
We do things responsibility to add long term value

Excellence
We continually improve the way we do things

Teamwork
We work together, respect each other and make a difference

SSE has four sustainability objectives linked to the UN Sustainable Development goals. These objectives are directly linked to executive performance measures – putting sustainability right at the heart of SSE's strategy and operations.

Cut our carbon intensity by 50%

Help accommodate 10m electric vehicles

Treble renewable energy output

Champion fair tax and a real living wage

Our Strategic Objective

Reviewing our Strategic Objective

During 2017 and 2018 we reviewed our strategic objective.

This was motivated by the ongoing changes in the energy sector and questioned whether our current objective was consistent with the requirements for the transition to cleaner economic growth now and looking forward to 2026 and beyond. More broadly, we wanted to understand if customers' and stakeholders' expectations from the energy networks were changing and, if so, what they thought we should be focused on.

A stakeholder-led review

For our strategy to be meaningful and effective, it is essential that we have robust and high-quality engagement with our stakeholders on their future needs and expectations. Thus we followed a methodology for our review that was designed to gather stakeholder input from across a wide spectrum and to bring together technical and statutory requirements with customer and societal expectations.

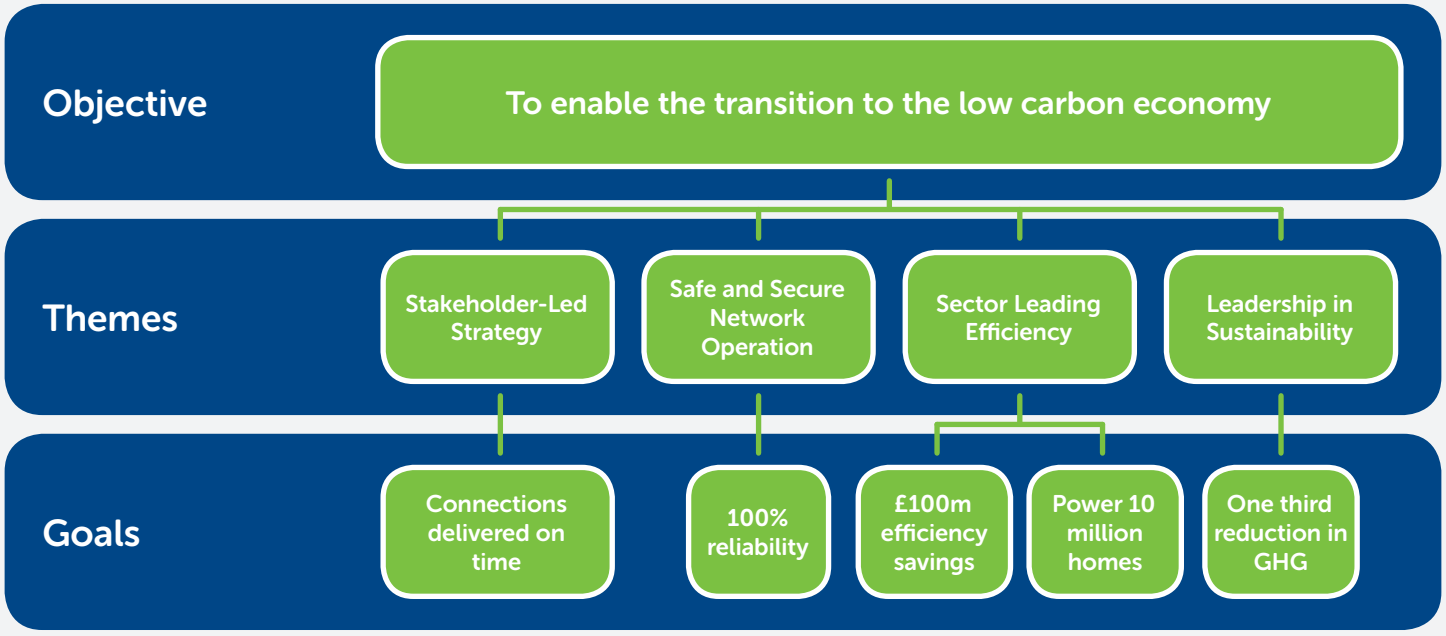
The full findings of our review are on our website[31].

The findings from the review highlighted both the continuity and ongoing significant changes in the energy sector:

- As has been shown in many studies, local network users (generators and consumers) emphasise the importance of network access, availability and security of supply;
- At the national scale, a key concern is the impact on bills - again for generators as well as consumers;
- There is strong support for the decarbonisation of the whole energy sector and for the role of energy networks in enabling the transition to the clean energy economy; and
- However, trust in the energy industry, including network operators, is low and customers worry about 'big business' behaviours.

Customers' and stakeholders' views have reaffirmed our Strategic Objective, but we have been challenged to think about how this can be better explained to demonstrate we are aligned with the outcomes our customers and stakeholders expect.

Following this review we have retained our Strategic Objective, but also developed four strategic themes that explain how we will achieve that objective. Together these four strategic themes will drive our contribution to cleaner economic growth through decarbonisation, decentralisation, digitisation and democratisation.



[31]SSEN Transmission Strategic Objective report (SSEN Transmission, 2019) available at: www.ssen-transmission.co.uk/media/3222/engaging-on-our-strategic-objective.pdf

Our Strategic Themes

Stakeholder-Led Strategy

Taking a whole system approach to network operation and development to meet current and future customers' needs

Energy networks are built and operated to meet the needs of current and future customers and so those customers' needs must be the drivers of all our activities.

The development of our new strategic themes confirmed that all our stakeholders want to see customer service, engagement and participation at the centre of our business and the forefront of our strategy. This expectation is not limited to any specific group. It is shared across GB by our customers, our communities, governments, our regulators, our broader stakeholder group and our employees and shareholders.

Through our strategy engagement our stakeholders advised us that delivering this will require us to be more open with our knowledge and information and more active in our advocacy of customer and consumer interests in transition aims. It will also require that we develop new approaches to engagement that increase the depth of stakeholder involvement. Collaboration and partnership are essential.

Our stakeholders advised that, building on our strong project engagement, to be truly stakeholder led in our strategy we need to increase stakeholder contributions to future focussed topics including: Future Energy Scenarios, energy policy, whole system planning and operations, innovation, connections and the DSO transition.

Adopting this across our activities requires a new engagement strategy that is formed from this stakeholder expectation. It will include new reasons for engagement, new methods of engagement and include new parties in that engagement. It must be outcomes driven to keep the focus on benefits for customers and stakeholders and have accountability built in.

You can read about our proposals to deliver on this strategic theme in the remainder of this section 2.

Safe and Secure Network Operation

Using data efficiently to understand, predict and get the best network performance.

In our strategy development engagement, stakeholders told us that network reliability is essential. There is a high economic and social cost for households and businesses if their supply of electricity is interrupted. Unsurprisingly both household and business electricity users report that they would pay significant sums to avoid power cuts.

Government stakeholders reinforced the position of electricity as an essential public service, underpinned by safe and secure energy networks. The government defines Critical National Infrastructure[32], such as energy networks, as assets and associated systems which if lost could result in major detrimental impact on essential services or national security. Our strategy review confirmed that planning to manage the risks we face, including business continuity following an incident, remains an essential part of what we do.

While recognising that investment over the past decade means that the reliability of the GB transmission system is now greater than 99.99%; stakeholders are concerned that that the prevailing security of supply cannot be taken for granted. Energy sector changes such as decarbonisation and decentralisation along with emerging global risks - including climate change, cyber security and physical security - could impact our network and must be managed.

Responding to these challenges, our strategic theme is focused on reliability for consumers, availability for generators and market participants, and resilience to threat.

Stakeholders recommended that this should include better use of network data and monitoring to inform our asset management and operation. They also considered risk-based approaches to be the best method of determining cost effective action.

You can read about our proposals to deliver on this strategic theme in section 3.

[32]Critical National Infrastructure (Centre for the Protection of National infrastructure, 2019) available at: https://www.cpni.gov.uk/critical-national-infrastructure-0

Sector Leading Efficiency

Integrated approach to whole life development and operation, using risk-based engineering to deliver value.

Energy networks must be affordable to consumers, and be open about the trade-offs when making investment decisions. This is important during RIIO-T2 as we invest for local and national benefits to achieve the clean energy transition.

Our strategic engagement confirmed that costs were a concern for household and business energy consumers at the level of their overall bill. For generation customers, transmission charges were a concern, not least due to reduction and removal of subsidies. This included the need for more transparency on costs.

Stakeholders supported energy transition aims but wanted assurance that these were being delivered efficiently and that unnecessary spend was avoided. They wanted confidence that investment decisions are not based purely on lowest capital cost but instead include the long-term whole life and whole system cost implications of operations, maintenance and replacement or decommissioning.

To this end, our strategic theme is based on an integrated approach to development and operation. This ensures that we consider whole life costs and will deliver value for current and future customers. We will be open about the trade-offs between costs in the delivery of the clean energy transition.

Stakeholders also wanted clarity on the trade-offs between local community impacts, environmental impacts and costs. Our strategic optioneering assessments and extended cost benefit analysis will be re-designed to provide this.

This strategic theme also addresses the need for efficiency in our engineering, procurement and the productivity of our business.

You can read about our proposals to deliver on this strategic theme in section 4.

Leadership in Sustainability

Trusted partners of customers and communities, realising long-term benefit for society, economy and environment.

Stakeholders strongly and consistently emphasised their desire for us to show ambition and leadership in sustainability. This is consistent with external drivers for change and the social narrative.

Societal expectations on sustainability are rising and stakeholders want companies to take broader accountability outside of their own operations. We agree. We are determined to play a leading role in the years ahead: meeting our stakeholders' expectations and helping to build a sustainable energy system.

There are major challenges to overcome around the world. The world is warming faster than we thought. Social performance and issues such as modern slavery, wages and tax are under closer scrutiny. The Paris Climate Agreement and UN's Sustainable Development Goals challenge government and businesses to act on these issues.

As a result, our customers and stakeholders are looking for organisations they can trust to offer leadership. Delivering practical business action inspiring and leading our industry to more sustainable practices is how we will contribute.

Our holistic stakeholder-led Sustainability Strategy provides a clear vision of a sustainable business. This encompasses the full range of social, environmental and economic considerations. Following our stakeholders' expectations, we have set stretching ambitions to achieve this and be at the forefront of best practice. To deliver these sustainability ambitions we are collaborating and working in partnership with our stakeholders and supply chain.

You can read about our proposals to deliver on this strategic theme in section 5.

Our Future Energy Scenarios

Uncertainty – for example in the timing and pace of the electrification of heat and transport and the timing and location of future generation technologies – clouds our view of the future need to transport electricity.

To be able to meet customers' needs in a timely manner, we must understand the range of potential outcomes and the effects that these would have on the transmission network. Our range of views of potential futures will determine the preparations we take now to be ready for investment that could be required over the next decade.

Our transmission network also impacted by uncertainties being felt first on the distribution network, such as the increasing proportion of embedded generation and growing ownership of electric vehicles. Cumulatively, these changes on the distribution network will impact the power flows on the grid.

Why we developed our own scenarios

Every year the GB ESO produces their Future Energy Scenarios (FES) which identify a range of credible energy solutions for the next 30 years and beyond. These consider how much energy GB might need and where it could come from.

At a macro level, the FES[33] is a powerful tool as it captures a range of potential national political, economic, social and technological possibilities. However, the application of the FES assumptions on a regional level is limited. As a GB model it does not have scope to accommodate targets and ambitions of devolved and local governments, or different social and economic drivers prevailing in a particular region.

In the north of Scotland, we have seen developments that have not always matched the prevailing GB trends. Examples include the continued growth in onshore wind generation, greater proportion of decentralised generation, and the slower, highly clustered uptake of electric vehicles. These and other trends were explored in our North of Scotland Energy Trends papers published in 2017 and 2018.

Our customers and stakeholders confirmed that there is significant uncertainty and regional variation in energy system developments in the north of Scotland. Working together, we determined that additional granularity, provided through localised future energy scenarios for the north of Scotland, would best meet energy users' needs.

Scenario analysis is an effective method of building an understanding of potential outcomes. This approach allowed network requirements to be modelled in detail for our north of Scotland network area to ensure we recognised the specific local and regional energy network users' needs.

How we developed our scenarios

The process of developing our north of Scotland Future Energy Scenarios started in 2016 when we ran our first business wide workshop to identify areas of uncertainty in the future of our network. This workshop identified some of the specific challenges of our network and considered that localised scenarios may be required.

We undertook an initial consultation, supported by our first north of Scotland Energy Trends paper in August 2017, to assess stakeholders' views on the merits of developing local scenarios. Support for this was universally positive and so we designed a scenario development methodology that included a series of external engagements, alongside our internal analysis. This external engagement was essential for gathering further insight, and for guiding and reviewing our internal analysis, to ensure that the scenarios we developed included the views and expectations of our customers and stakeholders.

There were four stages in our scenarios engagement approach:

1. Targeted interviews with customers, experts and high interest groups to: confirm the need for localised scenarios, identify issues affecting customers and stakeholders, and agree best methods for future engagement.

2. Broad, public research and consultations on identified areas of uncertainty with a regional element. We consulted on five papers in 2017 and 2018[34]:

   - North of Scotland Energy Trends
   - North of Scotland Onshore Wind Repowering
   - North of Scotland Electric Vehicles
   - North of Scotland Energy Efficiency and Heat
   - North of Scotland Generation and Storage

3. Reviewing consultation findings (including a range of potential outcomes) and proposed scenario development methodology with targeted expert stakeholders.

4. Publication of the north of Scotland Future Energy Scenarios Report and Summary paper. The report included a summary of the feedback received through the consultations and stakeholder engagement and how this feedback was incorporated into our scenarios.

[33]Future Energy Scenarios (National Grid ESO, 2019) available at: www.fes.nationalgrid.com/
[34]All SSEN Transmission Future Energy Scenarios documents (SSEN Transmission, 2017/8) available at: www.ssen-transmission.co.uk/information-centre/industry-and-regulation/future-energy-scenarios/

Throughout the process customers and stakeholders were invited to agree or challenge the treatment of the feedback and the resulting scenario proposals. These confirmations and challenges were used in the refinement of the methodology and scenario assumptions. Some of the most fundamental changes as a result were lowering our base scenario to accommodate a view from stakeholders that current policy measures will not deliver decarbonisation aims and adjusting our high decarbonisation scenario to show what would be required on a pathway to limit climate change to 1.5 degrees in line with current climate science.

The scenarios developed were independently peer reviewed by Professor George Wright a leading scenarios expert at the University of Strathclyde.

The outcome was three different Future Energy Scenarios for the north of Scotland that captured a broad but realistic range of potential outcomes to 2030 as listed in the boxes below.

Proactive Decarbonisation

Scottish consumers are supportive of decarbonisation, increasing their use of renewables and engage in the benefits of decarbonisation and decentralisation at local levels.

The focus is on capital investment in large scale projects and policy is in place to stimulate the development of less established, low carbon energy technologies.

Local Optimisation

Scottish consumers and businesses are driven by cost reduction as well as decarbonisation, investing in decentralised, domestic micro-generation to reduce their spend on energy.

The focus is on delivering decentralisation and decarbonisation through democratisation of energy supply to deliver improved affordability for consumers and businesses.

Cost Limitation

Scottish consumers are less inclined to invest in micro-generation and renewable heating technologies, but energy efficiency continues to be a focus of national and local Government.

The focus is on delivering cost reduction in energy bills. Decarbonisation is a secondary consideration, as a result there is low uptake in domestic micro-generation and little focus on decentralisation.

Comparison with other scenarios

ESO FES
The ESO scenarios apply across all GB and present a narrower range of outcomes than the North of Scotland Future Energy Scenarios. The highest decarbonisation scenario presented by the ESO FES is consistent with a 2 degree warming pathway. The least change scenario in the ESO FES shows around 15% greater decarbonisation than our Cost Limitation scenario.

The 2019 FES will be published on 11 July 2019.

ENA 'core view'
In 2018, Ofgem and the RIIO-2 Challenge Group (CG) requested licenced network operators across transmission, distribution, gas, and electricity to agree a set of common factors and assumptions for developing a 'core view' of the future for RIIO-2. The core view is a single scenario developed using historic data and without any stakeholder engagement. It fits within the range of the North of Scotland Energy Scenarios.

The ENA core view is published on the ENA website[35].

[35]ENA Core View (ENA,2018) available at: www.energynetworks.org/assets/files/ENA%20Common%20RIIO2%20Scenario%20report%20-%20March%202019%20FINAL.pdf

Development of our draft Business Plan

Our approach

Every day, across all activities at every level of our business, we engage with people (our stakeholders) who have an interest, or are affected by what we do and how we do it. Business planning for a price control is different from this everyday engagement.

Price control reviews involve a fundamental consideration of business priorities and delivery approaches across our sector. This presents an exciting opportunity where stakeholders, and we ourselves, can influence at a strategic level; building on what has worked in the previous price control and challenging areas that are not delivering.

Price control planning spans subjects from expected changes in energy demand and supply through project planning to network operations. It also includes topics such as energy security considerations as well as the regulatory and financial mechanisms that will be used to ensure efficient delivery of outputs.

Not all stakeholders will be interested in, or affected by, every aspect of our plan. We have adopted a targeted engagement programme which focuses on the most pertinent issues for each stakeholder group.

A four-step process

We have followed a four-step process in the development of our RIIO-T2 Business Plan.

1 Meet our legal obligations
We operate under rules set out in legislation and our licence that are overseen by regulatory bodies. We must follow these rules.

2 Understand current and future customers' needs
Energy networks are long life, and we make decisions today that will affect customers many years into the future.

3 Identify options
Once we have identified the need to act, then we must identify all of the different options to achieve that outcome.

4 Preferred option
The decision on the preferred option will consider a wide range of factors including legal obligations, cost to the customer, technical solutions and environmental impacts.

We have sought to involve stakeholders in all four steps of this process. Mindful of the risk of "engagement fatigue", we have endeavoured to take a co-ordinated approach to engagement. In late 2018 we published an overview of our approach[36].

Some of the topics we have engaged with stakeholders on over the past two years are:

- Long term strategic goals
- North of Scotland Future Energy Scenarios
- Customer service
- Innovation and whole system thinking
- Commercial and Connections policy
- Sustainability objectives and environmental impacts
- Network resilience
- Project development and construction
- Cost and Willingness to Pay.

You can read all the reports from our engagement on our website[37].

[36]Stakeholder engagement: an overview of our approach (SSEN Transmission, 2019) available at: https://www.ssen-transmission.co.uk/media/3117/riio-t2-stakeholder-engagement-ssen.pdf
[37]SSEN Website (SSEN Transmission, 2019) available at: https://www.ssen-transmission.co.uk/

Involving all stakeholders

Our stakeholder classification ensured we engaged with the full range of GB stakeholders and to date we have used 16 different methods of communication and participation.

Where we could, we have sought to be collaborative with our customers and stakeholders in planning for the RIIO-T2 period. This has been from the 'big picture' of the review of our strategic objective down to the detail of which options we should choose to meet a network investment need.

To do this, we have engaged widely with energy industry experts and interest groups. However, we know that it is essential that the interests of end consumers (bill payers) are captured in the development of our draft Business Plan. Our approach to this has included:

- Secondary research on consumer interests and priorities for energy and networks using publicly available sources;
- Interviews, discussions and consultation with consumer representative organisations such as Citizens Advice and Citizens Advice Scotland; and
- Willingness to pay research carried out with end consumers.

These consumer views have been applied in our planning alongside results of engagement with expert stakeholders that represent the consumer voice.
Throughout our draft Business Plan we explain the customer and stakeholder views that have contributed to the development of our proposals. We illustrate a small number of examples on the following pages.

We will publish a full report on our approach, findings and response to stakeholder engagement with our final Business Plan in December 2019.

User Group

In August 2018, we established an independent User Group to scrutinise our Business Plan development. The Group provides input and expert challenge to ensure stakeholders are at the heart of our future plans.

In late 2019 the User Group will prepare a technical report detailing its views on our RIIO-T2 Business Plan and the report will be made to Ofgem alongside our submission.

For more information on the User Group please visit:
www.ssen-transmission.co.uk/talk-to-us/user-group/

Stakeholder Advisory Panel

Our Stakeholder Advisor Panel was established in early 2017. The Panel advises our Board on matters as these relate to customers and stakeholders. There is close engagement between the Panel and User Group.

The Panel has provided direct challenge on the development of our RIIO-T2 Business Plan, including the strategic objective, scenarios, sustainability, and customer service and stakeholder engagement.

More on our Stakeholder Advisory Panel can be found here: **www.ssen.co.uk/StakeholderEngagement/Panels/**

Stakeholder-Led planning for RIIO-T2

Key outcomes

The views of our customers and stakeholders have influenced all aspects of our planning for the RIIO-T2 period.

We are issuing our draft Business Plan as a consultation to test whether we have accurately captured the views and insights that have been shared with us and we welcome all further comments.

You can see the impact of our stakeholder engagement throughout our draft Business Plan, but we highlight a few key outcomes here.

Sustainability ambitions

Having initially considered action on sustainability to be a longer-term ambition, engagement with our stakeholders demonstrated that it is a critical priority now and that material sustainability issues must be addressed urgently and be central to our RIIO-T2 planning.

As part of our RIIO-T2 engagement programme, we consulted stakeholders at a workshop in November 2018, a round table in March 2019 and through consultation on our Sustainability Action Plan in February 2019. This built on previous engagement for our May 2018 Sustainability Strategy.

Overall, our stakeholders endorsed our planned actions, confirmed our proposed activities are material and will be impactful and validated our timescales as suitably ambitious.

Our stakeholders also called upon us to take action in additional areas:

- On carbon - to act on climate change adaptation;
- On waste and resources - to minimise waste; demonstrate resource efficiency and use sustainable materials; and
- On natural environment - to act on visual amenity and wider environmental improvements.

We also had detailed discussions with our stakeholders about our role in communities and supporting vulnerable customers. While stakeholders expressed strong views that we shouldn't undertake activities best delivered by others, we still had a role to play. In light of these discussions, we are consulting in our draft Business Plan on a new ambitions for Supporting Communities.

Network resilience

In March 2019 we brought together a group of 46 customers and expert stakeholders in a workshop to gather views on cost effectiveness of different levels of ambition for safe and secure network operations.

At the workshop our business experts presented costed options across four areas: intelligent network control; managing and storing our materials; our asset replacement programme; and black start and network resilience. For each, three options were presented that required increasing levels of investment for enhanced outcomes.

Following round table discussions the attendees were first invited to vote for their preferred option before and after costs were revealed **(Table 2.2).** In two instances, the preferred option changed after costs were revealed:

1 **Protection and Communications**
Support for a Progressive Network Enabler approach (as described in the stakeholder report) increased. Stakeholders stated that the incremental cost difference between the two options was more than justified by the level of improvement provided. We have followed this direction in our draft Business Plan.

2 **Black Start**
Support for a Responsible Operator approach (as described in the stakeholder report) reduced. Stakeholders concluded that the major cost implications were unjustifiable at present. We have followed this direction, at a saving of £200 million.

A full report on this event and associated consultation can be found on our website[38].

Progressive Network Enabler	After			
Responsible Operator	Before	Before	Before / After	Before / After
Minimum Standard		After		
	Protection and Comms	**Black Start**	**Stores**	**Asset Replacement**

Table 2.2 Stakeholder views at operations workshop

[38]https://www.ssen-transmission.co.uk/media/3220/the-future-operation-of-our-network.pdf

Engaging on future network requirements

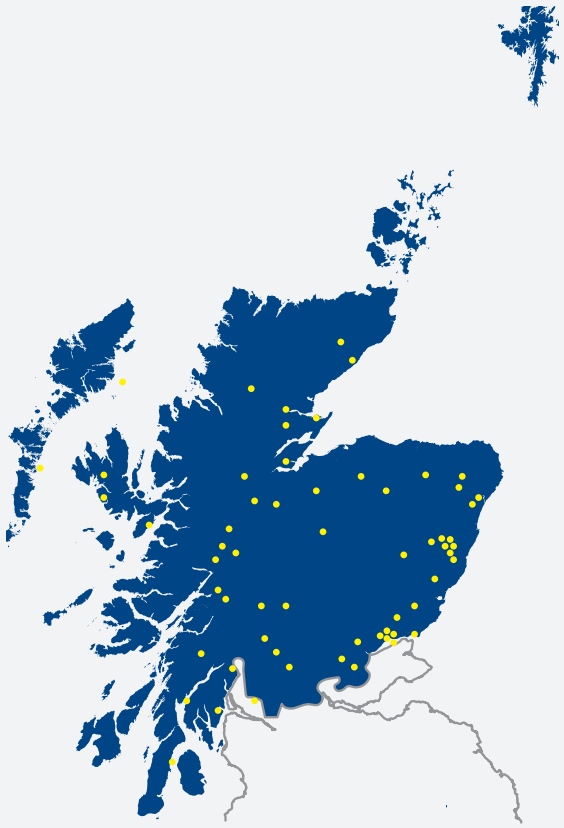
Our stakeholder-led North of Scotland Future Energy Scenarios, developed through 2017 and 2018 (see pages 26-27), developed detailed views of energy use that we could use for planning the transmission system.

One aspect of this work was to determine stakeholders' expectations for changes in electricity demand and generation at the local level caused by electrification of transport and heat, and increasing local generation.

This stakeholder insight has been applied in our assessment of requirements to upgrade Grid Supply Points (GSP), where our network connects with the distribution network, to accommodate changes in local energy use. Using the stakeholder-led scenarios, we modelled the overall impact at winter peak and summer minimum, and whether this change would cause a need for investment to upgrade our network during RIIO-T2.

The results showed that changes in generation and demand will likely lead to a requirement to upgrade GSP during the RIIO-T2 period as shown on the map below.

Figure 2.10 RIIO-T2 GSP upgrades



Project development

In September 2018 we ran a public consultation seeking stakeholder views and suggestions on the effectiveness of our engagement with communities during the development of our projects.

The feedback was generally positive on our approach, but stakeholders highlighted a key improvement would be to explore potential impacts at a programme rather than a project level. This would give a strategic view of investment plans, providing local stakeholders with better information on the overall impact of works in their area.

In response to this, we will be running regional roadshows on our RIIO-T2 investment programme:

- Aberdeen, Monday 12 August
- Inverness, Wednesday 14 August
- Perth, Friday 16 August
- Oban, Tuesday 20 August
- Glasgow, Thursday 22 August

See our website for more details.

Commercial and Connections service

From the second half of 2018 we undertook engagement and consultation on future expectations from our commercial and connections service.

The feedback from this engagement was that our proposals lacked ambition and we should be aiming to provide a whole life, tailored service that met individual customer's needs. This was tempered by a concern about the cost of connection and a desire for affordable solutions.

In light of this feedback, we fundamentally revisited our proposals. In May 2019 we again consulted on a second iteration. Majority of stakeholders reported that they were satisfied with our new policy initiatives. Greatest satisfaction (4.1/5) was for our proposals to deliver an optimal tailored connections solution.

You can read our revised Connections and Commercial Policy proposals on our website[39].

[39]https://www.ssen-transmission.co.uk/media/3405/ssen-riio-t2-commercial-connections-policy-paper-28pp-22782-artwork.pdf

Audit and assurance

We take the quality and accuracy of the data and information we use and publish seriously.

We operate a 'three lines of defence' model to the management and control of risk, including in relation to the assurance of regulatory submissions such as our draft Business Plan. The three lines are:

1. Within our business through management controls, business assurance and individual accountability.
2. The independent compliance function that reports to the SSEPD Board, undertaking a risk-based approach to reviews.
3. The SSE Audit Committee, supported by the independent audit and risk management functions.

All three lines of defence have been involved in the preparation of our draft Business Plan, with a specific Project Management Office established to ensure and control assurance activities.

This is a draft Business Plan. As such, the data and information presented is provisional and subject to change in the final Business Plan to be published in December 2019.

A comprehensive, but 'light touch' assurance programme has been completed for our draft Business Plan. All elements of the Plan have been subject to peer review, and lines 1, 2 and 3 assurance processes.

However, as this is a draft for consultation, the information presented here is provisional. Proposed activities, outputs and targets remain open to modification following the views of stakeholders. Forecast costs are currently at development-stage and continue to be refined.

Our final Business Plan, to be published by 9 December 2019, will be subject to assurance requirements of a 'critical' irregular submission[40].

Governance

SHE Transmission is a wholly-owned subsidiary of SSE plc. SSE adheres to the highest standards of corporate governance, in line with the UK Corporate Governance Code 2016 and as set out in its annual Corporate Governance Statement[41].

"Doing the right thing" is at the heart of SSE's ethical business culture and is embodied within the agreed vision, purpose and strategy as set by the SSE Board. The SSE SET of core values underpin this approach, which seeks to go beyond compliance and ensure that the interests of all stakeholders and society are respected. It is these values which remain the guide to responsible business behaviour and decision making at every level within the organisation. Further details of the agreed principles, policies, standards and cultural initiatives which support and help employees understand what is expected of them, can be found within SSE's annual Sustainability Report[42].

This rigorous approach to corporate governance and culture is also applied to Scottish and Southern Energy Power Distribution (SSEPD), the holding company for SHE Transmission under the trading name Scottish and Southern Electricity Networks (SSEN).

Prior to the publication of our draft Business Plan for consultation, a six week governance process was followed that sought comment and approval from: the Transmission Executive Committee, the SSEPD Board, the SSE Chief Executive Officer and the SSE plc Board. In addition, comment and guidance was sought from the RIIO-T2 User Group and the SSEN Stakeholder Advisory Panel.

On 19 June 2019, the SSEPD Board approved our draft Business Plan to be issued for consultation.

[40]As defined by Ofgem's Data Assurance Guidelines (Ofgem, 2016) available at: https://www.ofgem.gov.uk/publications-and-updates/data-assurance-guidance
[41]Director's report- corporate governance: a year of change (SSE, 2019) available at: www.sse.com/media/603178/CorporateGovernanceStatement_2019.pdf
[42]SSE Report and Results (SSE, 2019) available at: www.sse.com/investors/reportsandresults/

Scottish & Southern Electricity Networks

TRANSMISSION

Stakeholder-Led Strategy

A Network for Net Zero
Draft RIIO-T2 Business Plan

Scottish Hydro Electric Transmission plc

Stakeholder-Led Strategy

Strategic Objective

Stakeholder-Led Strategy
Taking a Whole System approach to network operation and development to meet current and future customers' needs.

Energy networks are built and operated to meet the needs of current and future customers, and so customers' and stakeholders' needs must be the drivers of all activities.

By taking a Whole System approach we will ensure that our actions are informed by the needs and priorities of all energy system users, not just those that are directly connected to our network.

Clear goal

Every connection delivered on time
Provide every network connection, tailored to meet our customers' needs, on time and on budget.

Targets for RIIO-T2

We are developing a set of targets by which our stakeholders can judge our progress against our strategic objective and specific outcomes that we have set ourselves. The indicative targets currently proposed are set out below with reference to current performance as a benchmark where available.

		2018/19	2025/26
Timely Connections* Proportion of offers for connections to the transmission network made to customers within the time periods set out in the industry code, currently 60 days.	Percentage proportion delivered on time	100%	100%
Quality of Connections* Measures connection customer satisfaction through the results of targeted surveys throughout the customer experience.	Percentage score	Not applicable	(TBC)
Stakeholder Satisfaction Measure of broad stakeholder satisfaction that combines results of a stakeholder satisfaction survey, performance on KPIs agreed with stakeholders, and an independent audit of our engagement activities.	KPIs: Percentage score	87%	>95%
	Assurance: Compliant/ Non-compliant	Compliant	Compliant
	Survey: score out of 10	8.2	>9.5
Compliance with our Enhanced Reporting Framework Publication of a reporting package that covers service performance, financial performance and performance for society. All reporting must be easy to understand and accessible , consistent and comparable over time where appropriate.	Compliant/non-compliant	Not applicable	Compliant

*Financial incentive

Overview

What's in this section?

Some context... on why we believe it is important to be a stakeholder-led organisation and what we mean by stakeholder-led.

Some background... on the things we have done over the last five years to be stakeholder-led.

Who are our stakeholders... the difference between stakeholders and customers, and our obligations to the north of Scotland and the whole of GB.

Our approach to fundamentally reviewing our Stakeholder Engagement Strategy... we have gathered views from stakeholders about our current approach and their expectations from us in the future; this says we need to change to embed the needs of stakeholders across our activities. We have followed a thorough process, including a review of best practice, to develop a draft Stakeholder Engagement Strategy with a new purpose, ambition, objectives and principles.

The Stakeholder-Led Commercial and Connections Policy... that will deliver tailored products and services for our customers, building an ongoing relationship with them to ensure an exceptional experience from project scoping right through to repowering. This includes our commitment to deliver all connections on time.

An Innovation Policy designed to deliver value for stakeholders... through an open and collaborative approach to identification of innovation, a value driven approach to selection, development, delivery and adoption of new ideas, both technological and commercial.

Our thoughts on how to ensure transparency on our performance... we propose a new framework for transparent performance reporting in RIIO-T2 that goes beyond regulatory reporting. Covering service performance, financial performance and performance for society it is designed on the Citizens Advice principles for RIIO-2.

Overview

Energy networks are built and operated to meet the needs of current and future customers, and so customers' and stakeholders' needs must be the drivers of all activities. This is what we mean by being stakeholder-led, putting the interests of customers and stakeholders at the centre of our strategy.

The need for this approach was strongly expressed by stakeholders during the 2017/18 review of our strategic objective[1]. Prioritising stakeholder-led, safety and security, efficiency, and sustainability, our stakeholders have set our strategic direction for the next decade and expect that involvement and influence to continue in RIIO-T2.

In collaboration with stakeholders we have developed a draft Stakeholder Engagement Strategy designed to embed this. It sets out our engagement purpose, ambition, objectives and principles. This strategy will take our engagement to the next level, making us truly stakeholder-led.

The Stakeholder-Led Strategy that we are advocating goes far beyond Business as Usual engagement. It goes beyond the best practice of utility organisations and will take us to the forefront of engagement practice. By implementing the proposals described here, our ambition is to show leadership in engagement.

This new strategy is embedded in our Commercial and Connections and Innovation policies. These policies have been designed through the stakeholder-led approach and apply our engagement principles and objectives to practical delivery. The benefits of these policies are seen across the whole business plan.

Our connections customers asked for a more collaborative and accessible process. Through improved accessibility and tailored products and services we will meet the specific needs of different customers based on increased insights.

Our Innovation Policy is founded on the advice from stakeholders that we build on our successful delivery of cost effective innovation in RIIO-T1. The new policy focuses on understanding scope for innovation to deliver benefits for stakeholders. It uses increasingly open sourcing of ideas to broaden our opportunities and uses the measurement of value for stakeholders to determine the case for investment and whether trials have been a success.

[1]RIIO-T2: Engaging on our strategic objective. A summary of our approach and outcomes (SSEN Transmission, January 2019) available at: https://www.ssen-transmission.co.uk/media/3222/engaging-on-our-strategic-objective.pdf

What is a Stakeholder-Led Strategy?

The case for being Stakeholder-Led

With energy market transformation well underway, we have seen huge changes in the stakeholder engagement landscape over recent years driven by a supportive policy and regulatory context.

In addition to this focus on the needs of consumers, our stakeholders expect us to ensure that our plans are sustainable. What we mean by this is that in meeting the needs of current consumers we will not compromise the interests of future generations. This includes our impact on the environment and wider society.

While there is significant policy uncertainty in our sector, the direction of travel is clear. Decentralisation, decarbonisation, democratisation and digitalisation are underway, seeking to move us to a post-trilemma world where clean, secure and affordable energy provides a basis for clean growth in our economy.

As the transition continues, traditional approaches and business models will become inefficient and even irrelevant. Organisations that are entrenched in industry norms and resist progress will fail to meet the expectations of customers, society and regulators.

But the requirements of this new world are not clearly defined or visible as far ahead as the timescale of the price control require planning for. There are trade-offs to be made between short and long-term goals, and between the interests of different customer and stakeholder groups.

An increasingly decentralised and decarbonised energy system creates different technical challenges. It will be operated in new ways and used to provide new solutions to energy demands. While digitalisation will increase efficiency in the longer term, it comes at a capital cost that may impact short term affordability. Democratisation requires involvement of consumers in markets and decisions traditionally considered too complex for mass involvement.

We recognise that we do not have all the answers. Meaningful stakeholder involvement will be essential to finding solutions to these challenges. This requires involvement of a much broader group of stakeholders, including energy innovators, first to understand the needs that must be met, and then to work together on designing solutions to meet these needs.

We propose that Stakeholder-Led Strategy must respond to both the challenges and opportunities our customers are experiencing today and be working with customers and stakeholder to design and develop responses to the challenges of the future.

Our experiences over the past few years have shown us that taking stakeholder engagement to the next level, putting it at the centre of our strategy development, planning and decision making, can deliver increased customer satisfaction, better outcomes for consumers and society, and real progress on energy transition aims.

Our ambition for our draft Business Plan is that it:

- Delivers on the needs of our customers - current and future - in challenging markets;
- Meets the energy transition ambitions of our governments;
- Comes at a cost that is acceptable to end consumers and supports the vulnerable;
- Has a positive impact on the natural environment;
- Delivers security and opportunity for our employees; and
- Provides value to our shareholders and society.

We also want to ensure that our approach to any required trade-offs between these priorities is transparent; and, that the outputs and outcomes we are targeting are meaningful indicators of delivery to which our stakeholders can hold us to account.

This is what it means for us to be Stakeholder-Led in developing and delivering our draft Business Plan.

Being Stakeholder-Led

Our experience of being Stakeholder-Led in RIIO-T1

Since 2010 the primary focus of our activities has been developing the infrastructure required to enable the connection of large volumes of renewable energy generation in the north of Scotland. Connections provision and project development were our main activities, and this is where our engagement focused. Over that time, we have learned and adapted, making significant improvements in our approaches to engagement for capital infrastructure development.

Having learned from the Public Inquiry into the Beauly Denny project in 2006, we now engage earlier with stakeholders, working together with other organisations to design decision-making frameworks that incorporate their priorities and concerns. We have built a customer and communities team that takes our plans and considerations into affected communities to gather their views and address their concerns.

In this we have continuously improved. Our adoption of new tools and technology such as 3D modelling has addressed stakeholder feedback about the complexity of messaging on one of their main concerns – visual impact; and delivered increased value for money in our engagement activities.

Through this improved engagement we have delivered over 4GW of new connections and increased stakeholder satisfaction to over 80%.

We engage with our suppliers and small businesses to develop innovative solutions to stakeholder concerns and to increase efficiency to benefit the end consumer.

Through our best practice Meet the Buyer events and our Open 4 Business web platform we have opened up access to local businesses, providing increased opportunities for local procurement.

More recently, we have identified several areas where more in-depth engagement with stakeholders was required to inform our decision-making at a strategic level.

One example of this was the development of our North of Scotland Future Energy Scenarios[2]. Stakeholders worked with us to identify the key drivers for change in energy demand in the north of Scotland, including the potential for new electricity demand from the electrification of heat and transport. Our stakeholders challenged us to include a scenario where policy ambition was not realised, and another where ambitious decarbonisation was delivered in line with climate science. In total, over 150 stakeholders were engaged in developing our three robust, credible future energy scenarios.

These experiences have taught us the benefits of engagement, involvement and collaboration. When successful, this can lead to greater customer satisfaction, better solutions and outcomes, and cost savings for consumers.

Our May 2018 Alternative Approach engagement event

Working with our customers in Orkney

By listening to our customers, we identified the main barriers to connection:

- Lack of government support for remote island generation;
- Connection timescales misaligned with regulatory approvals;
- Connection costs and liabilities that were prohibitive – particularly for smaller customers/ communities.
- First come, first served connection queues; and,

Working collaboratively, we developed the Alternative Approach[3] to address these barriers and unblock progress. This is an example of a Stakeholder-Led process to drive commercial innovation.

[2]Future Energy Scenarios (SSEN Transmission, 2018) available at: www.ssen-transmission.co.uk/information-centre/industry-and-regulation/future-energy-scenarios/
[3]Orkney Alternative Approach (SSEN Transmission, 2018) available at: www.ssen-transmission.co.uk/news-views/articles/2018/6/solving-orkney-s-catch-22/

The survey was conducted independently by Social Market Research (SMR) and is based on interviews with a sample of 111 stakeholders. The survey results provide us with valuable insight on the business activities that matter to our stakeholders and also help to inform and shape our future engagement. We are extremely proud of our fourth consecutive year of scoring above 80%.

8.2

Overall Satisfaction Score 2018/19

2015/16 – 8.2
2016/17 – 8.7
2017/18 – 8.0

Connections Customers

>95%

of connection customers were satisfied with the connection services provided by SHE Transmission

Perceived Relationship with SHE Transmission

81%

of stakeholders perceived their relationship with SHE Transmission as that of either a partner, friend or colleague;

33%

increase from 2017/18

Website

100%

of visitors to the website were **satisfied** by it and found the information they were looking for.

+ SHE Transmission Staff

Customers and stakeholders were universally positive when describing their experience of SHE Transmission staff

Contact with SHE Transmission

>80%

of customers and stakeholders had quarterly contact with SHE Transmission

Communication

>96%

of customers and stakeholders were satisfied with how SHE Transmission handles communication

Stakeholder Identified Strategic Priorities

RIIO-T1 (2013 – 2020): safety, sustainability and service
RIIO-T2 (2021 – 2025): safety, security of supply and environment

In the survey we asked our stakeholders to describe SHE Transmission's personality in one word or phrase. The responses are captured in the word map below with common themes being reliable, helpful, approachable, trustworthy, confident and professional. This valuable insight, positive and negative, was used to inform and shape the development of our new engagement strategy which we will implement during 2019/20.

Who are our stakeholders?

Customers

As a transmission system owner, our direct customer is National Grid ESO and indirectly the electricity generators, large demand customers and distribution network owners that are directly connected to our network.

With a significant proportion of the generation feeding on to our network being directly connected to the distribution network, we also consider these parties to be our customers.

Consumers

However, our ultimate customer is the energy consumer, be they domestic or industrial and commercial users of energy. The 705,000 households and 74,000 businesses in the north of Scotland are dependent on our operational performance. The GB consumer, as the bill payer, has an interest in the investments we make, the funding for which is recovered through bills.

There are numerous bodies who represent the interests of consumers, some general and some focussed on specific groups of consumers, e.g. those that are vulnerable or in fuel poverty. These groups are also stakeholders.

Stakeholders

Because our activities have an impact on local communities, our supply chain and the environment, these stakeholders are additional parties interested in and seeking to influence our business planning and our delivery.

Communities are a major stakeholder in our project development and our operations. Landowners who provide us with access to build and maintain our infrastructure are another important group.

In the interest of co-ordinated development and minimising impacts on communities, we work with other infrastructure companies such as Scottish Water and Transport Scotland.

At a strategic level, the UK and Scottish Governments are also stakeholders in our business plans. As a developer of Critical National Infrastructure, they rely on us to enable the delivery of their policy ambitions. Local authorities are also increasingly influential. Our regulator, Ofgem, has responsibility for ensuring that we meet our statutory duties and licence requirements. In addition to Ofgem, the environmental impacts of our development and operations are regulated by SEPA.

The increasing interdependencies between energy networks has made other network owners priority stakeholders in our business planning and operations. This is not limited to electricity, gas network owners can also be impacted by, and impact on, our network.

With increasing decarbonisation in other sectors, the expectation of electrification as a route to decarbonisation of other sectors including transport and heat has increased the need for us to engage actively with parties in these sectors. This can stretch as far as auto manufacturers and developers of new heating solutions.

Shareholders are a major stakeholder for our business with engagement concentrated on strategy and performance.

Our own employees are also a major stakeholder in our business. It is these employees that deliver our performance and they have expectations in terms of job security, skills alignment and opportunities for progression.

Future customers

One of our hardest to reach stakeholders is future customers.

The end consumers of 2030 will be largely those of today. Some stakeholders have advised us that drastic changes in their expectations are unlikely over the period of the price control. However, new consumption habits such as charging electric vehicles at home, could influence the expectations of this group.

Other future customers include young people who will ultimately become bill payers. Young people in the UK are generally more environmentally conscious than older generations. They prioritise climate action, are digitally literate and expect personalisation of service and communications[4].

Their expectations on corporations to be inclusive, and to make a positive contribution to society is an expansion of the wider social trend on expectations for corporate social responsibility and fairness in tax and wages.

Some of our future customers are not yet visible. Energy innovators designing new solutions to energy challenges are still forming and will continue to form as new markets develop.

In RIIO-T1 we have relied on these organisations identifying themselves to us and seeking out discussions, often as part of connections processes which were not designed for exploratory and creative discussions. However, in our innovation and industry change projects we are actively identifying potential future customers. In RIIO-T2 we will be more involved in innovation and collaboration being led by others, and will provide access, information and scope to influence for those that recognise their role as future customers of our system.

[4]Public Attitudes tracker (BEIS, 2019) available at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/800429/BEIS_Public_Attitudes_Tracker_-_Wave_29_-_key_findings.pdf

- Transmission connected generation and demand customers
- Distribution network owners and other utilities
- Consumer representative groups
- Energy consumers
- Government
- Local Authorities
- Contractors
- Consultants and specialist professionals
- Supply chain participants
- Landowners
- Statutory consultees
- Transmission owners
- Electricity System Operator
- Trade bodies
- Developers
- Regulators
- Academia
- Non-governmental organisations and voluntary bodies
- Communities
- Employees
- Shareholders
- Energy innovators
- Development agencies

Our stakeholders

Enhanced engagement

RIIO-T2 User Group integration with the Stakeholder Advisory Panel

Within the development of the RIIO-2 framework, Ofgem introduced an enhanced stakeholder engagement model which proposed the creation of a distinct stakeholder User Group for the RIIO-T2 price control.

As the Stakeholder Advisory Panel's tenure had reached one year when this was announced, best practice from this Panel was applied to the set-up of the planning, recruitment and induction of the RIIO-T2 User Group.

In addition, the User Group Chairperson attended the Stakeholder Advisory Panel to understand the objectives and nature of the topics discussed. This has been complemented by the recruitment of a serving Panel Member to the RIIO-T2 User Group providing further alignment.

The Panel are providing comprehensive support to the RIIO-T2 plan, dedicating an additional two days to review and challenge our Business Plan drafts before submission to the regulator.

More on our Stakeholder Advisory Panel can be found here: **https://www.ssen.co.uk/Stakeholderengagement/Panels/**

Being Stakeholder-Led during RIIO-T2

A new Stakeholder Engagement Strategy

We know from the most successful companies that good performance is inextricably linked to effective engagement. It helps us to understand our place in society; holds us to account; ensures we can adapt to the rapidly changing external environment in which we operate; and ultimately improves the services we offer our stakeholders and the decisions we take on their behalf.

In an era of social, technological and environmental disruption, where new forms of collaboration are emerging and demands for transparency are transforming regulated industries, there are growing calls for companies to find more effective ways to engage with stakeholders.

This rate of change, particularly in the energy industry as we transition to a low carbon economy, is creating a far more complex environment to operate in and our stakeholder engagement strategy must evolve to reflect this.

Stakeholder-Led activities, such as our North of Scotland Future Energy Scenarios which was developed with extensive engagement with over 150 experts, have shown us that taking stakeholder engagement to the next level, putting it at the centre of our strategy development, planning and decision making, can deliver: increased customer satisfaction, better outcomes for consumers and society, and real progress on energy transition aims.

However, our stakeholders have highlighted that, whilst in some of our activities we are highly engaged and responsive, we are inconsistent in our approach

Their expectation is for high quality engagement to be replicated across all our activities as standard. Stakeholders are calling for us to adopt best practice not just from our industry but from other sectors that are leading.

To achieve this, we have worked with stakeholders and engagement experts to design an engagement strategy that steps up to that challenge.

The following pages are the results of that review, demonstrating how we intend to build upon our positive experiences during RIIO-T1 and become leaders in stakeholder engagement.

Methodology

To create a meaningful and significant step-change in our stakeholder engagement approach, it is essential that we carry out robust and high quality engagement with our stakeholders to determine their expectations.

Our employees engage day to day with our stakeholders. They hear and share stakeholders' frustrations and have valuable insights that can create a new achievable approach to stakeholder engagement. Our external stakeholders hold the information on what customers and society expect from us and will be directly impacted by our Stakeholder Engagement Strategy. Our methodology was designed to gather stakeholder input from across the spectrum, and to rationalise what is achievable with customer and societal expectations.

In addition to gathering input from our stakeholders, we also conducted research on stakeholder engagement best practice with the help of Corporate Culture – external specialists in employee and stakeholder engagement, and strategic and creative delivery.

Our RIIO-T2 User Group and our Stakeholder Advisory Panel have contributed to the development and review of our methodology and analysis, helping shape our strategy and ensuring we have interpreted our stakeholder needs effectively.

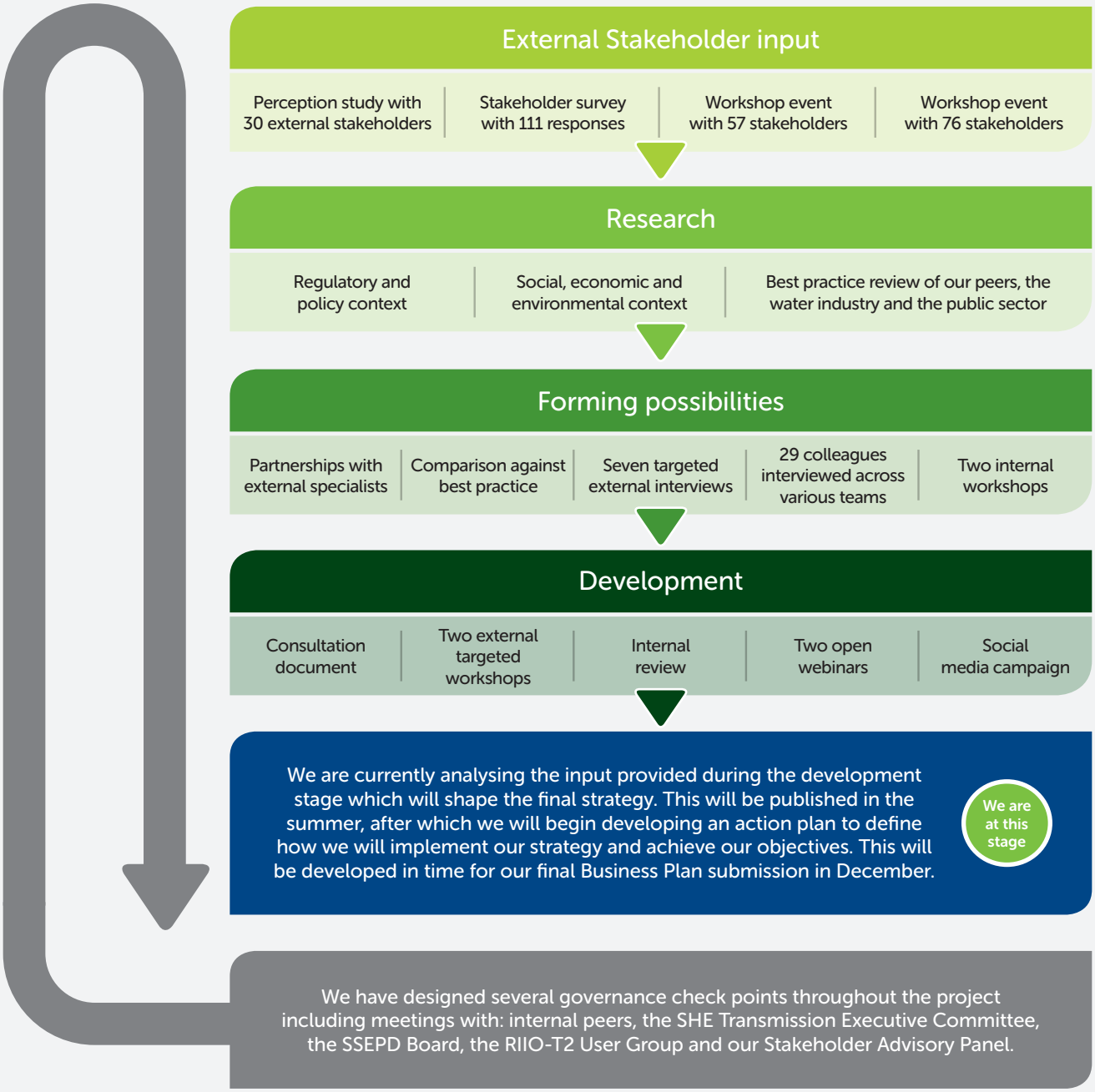
Our draft Stakeholder Engagement Strategy pulled together the results of this input and was consulted on throughout June 2019. We are now starting the results analysis which will shape the final strategy.

We've learnt that successful businesses require a transformative approach to stakeholder engagement so that it improves continuously over time. This means it isn't subject to a regular review cycle but evolves organically. As a result, our stakeholder engagement strategy document will be updated on an annual basis to incorporate any improvements which are developed.

Therefore, we still welcome your views and opinions on our draft strategy which is included in this plan.

For more details contact Communications Policy Manager, Sarah Dooley: sarah.dooley@sse.com

How we have developed our draft Stakeholder Engagement Strategy



Best Practice

We looked within and beyond our sector for best practice including: our peers in the energy industry, new market entrants and Distribution Network Operators; the water industry and their experience of PR19[5]; and the public sector across Great Britain. From this review it was clear that the businesses leading in stakeholder engagement had several key attributes which we have incorporated into our draft Strategy.

A clear stakeholder ambition and objectives
Leaders put stakeholder needs at the centre of their business and adopt service-led goals, using the stakeholders voice to drive continuous, measurable improvement aligned to higher-level social needs.

Robust processes and governance structures
Leaders use governance and processes to embed the stakeholder voice in all decisions.

Transparency on issues and successes
Leaders understand that trust is vital to build lasting relationships.

Segmented stakeholders and tailored engagement
Leaders identify a broad range of stakeholders aligned to issue areas, including future customers, those directly impacted and those who have specific needs in their market.

A whole-system view and wide collaboration activities
Leaders bring together a broad range of stakeholders to share perspectives and co-design possible approaches, and to share data and knowledge openly in a timely fashion to ensure all stakeholders have access to the same information.

Clear feedback loops and evidence of engagement leading to action
Leaders monitor stakeholder interactions, with timely feedback loops in place to report back openly on the outcomes and highlight any areas of disagreement or 'compromise'.

Focus on improving the customer experience
Leaders understand who their customers are, they are aware of their needs and look to adapt services to maximise the benefits they receive.

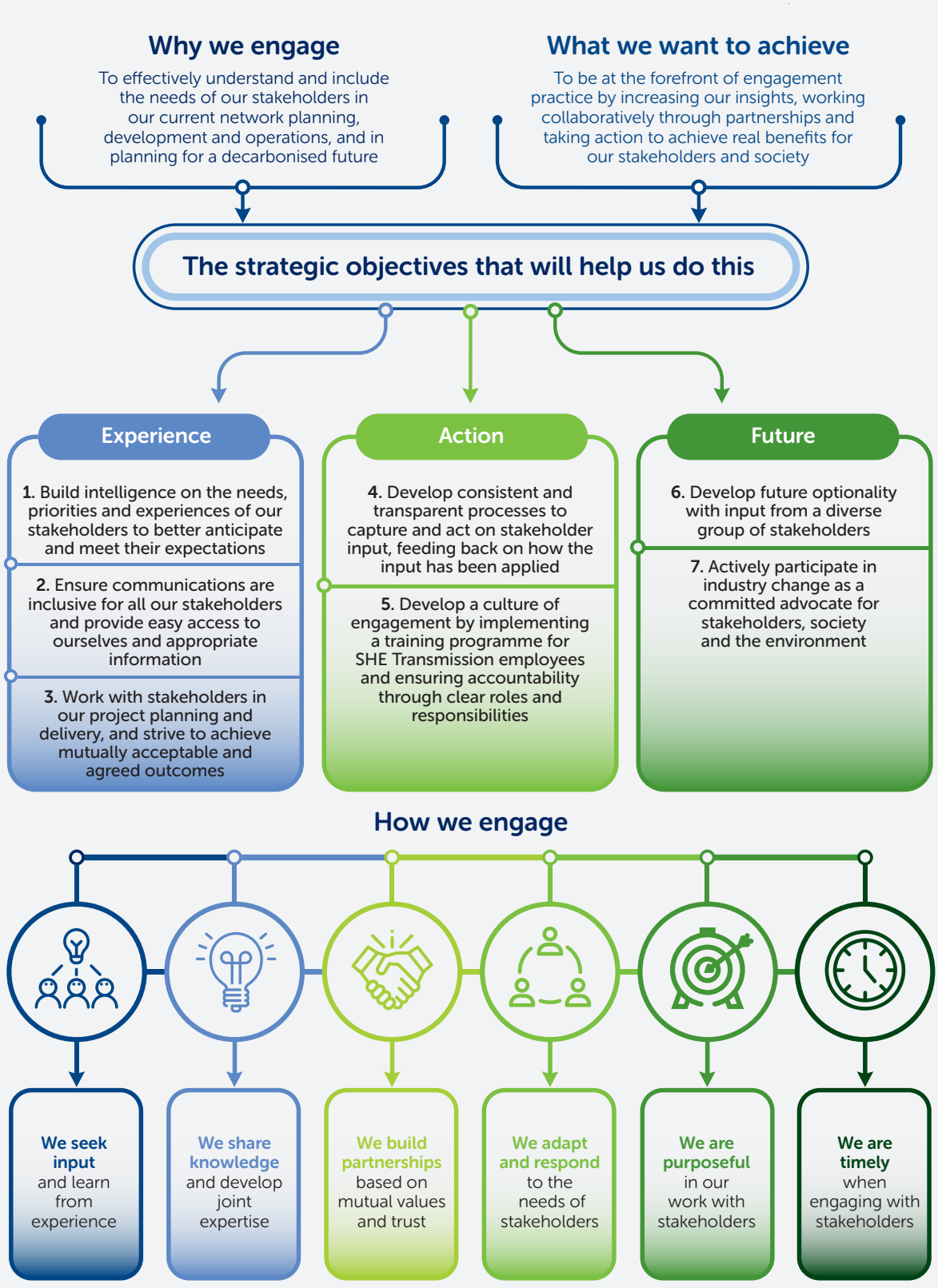
Views and Analysis

In developing our strategy, we asked stakeholders for anonymous feedback on their experiences and expectations. Some examples of this are shown in the table below.

Area for improvement	Stakeholder input	Our response
Reasons for engaging	People want us to take on an ambitious step change in our stakeholder engagement. They want us to develop a stronger understanding of our stakeholders and align our priorities, putting the needs of stakeholders at the centre of what we do.	We share this ambition and have shaped our strategy to show our commitment to this new approach, particularly in our purpose and ambition.
Engaging with people	Many want us to improve our engagement to limit stakeholder fatigue, use joint events to optimise stakeholders' resources, provide more tailored events and increase our online channels.	We recognise we have not always followed best practice and have designed objectives under "experience" to improve.
Consistency	People noted that our business can be inconsistent in our messages, our methods of engaging and our approach to using stakeholder input. They see areas of success but can also become frustrated in others.	We have developed objectives under "Action" to address our processes and our culture of engagement.
Change	People have stressed the need to use stakeholder engagement to continuously improve and use their input to create stronger business plans. It was also requested that we drive policy change, influencing where we can on behalf of our stakeholders who may not have a voice.	We share this sense of responsibility and have created objectives under "future" to help us develop this.
Approach	All stakeholders highlighted the quality and importance of strong working relationships and praised our people. However, they noted several areas for improvement including our transparency, timeliness, and our desire to seek and adapt to stakeholders' input.	We are proud of our people and feel that by enhancing our principles and our use of them, we will increase this positive reputation.

[5]PR19 is OFWAT's Price Review for water companies for the period 2020-25. More information is available at: https://www.ofwat.gov.uk/investor/pr19/

Our draft Stakeholder Engagement Strategy



Principles

Our principles describe the ways in which we engage with our stakeholders. They help us deliver our ambition by defining and facilitating the culture we need and the behaviours we are adopting. They help our colleagues when deciding who, how and when to engage.

Our principles were built upon the Accountability AA1000 Stakeholder Engagement Standard[6] and help steer our improvements in engaging with stakeholders. Our principles also incorporate the additional improvement areas that were raised during our engagement.

We seek input and learn from experience
When we proactively reach out to stakeholders, we achieve more efficient outputs because they are informed by a diverse range of insights. This allows us to meet the needs of our stakeholders, increase innovation within the business and develop our continual improvement process.

We share knowledge and develop joint expertise
We recognise to solve the energy challenges we face, we need external expertise, but we also have knowledge that can help our stakeholders. By sharing knowledge, we can speed up the learning process, develop innovative solutions, and improve our stakeholders' satisfaction as it gives them information they require to meet their needs.

We build partnerships based on mutual values and trust
To deliver whole-system outcomes that offer the most benefit to the end consumer, we need to work as partners. This means we need to develop stronger relationships which enable open and honest discussions and encourages shared responsibility where appropriate.

We adapt and respond to the needs of stakeholders
Energy networks are built and operated to meet the needs of current and future customers. To do this, we sometimes need to make decisions which may not satisfy all stakeholders; particularly where the interests of different parties are in conflict. However, we will adapt where possible and provide clear information on decisions and reasoning.

We are purposeful in our work with stakeholders
We are purposeful in our work with stakeholders We understand that our stakeholders have wider priorities beyond those that we share. We also acknowledge that they may have resource constraints. Therefore, we will create a culture that drives us to create purposeful engagement opportunities that are focused on achieving tangible outputs.

We are timely when engaging with stakeholders
Our stakeholders have specifically told us to improve our planning as timely engagement is important to them. When we engage too late during a project, issues can arise that are not easily fixed, which wastes time and risks a breakdown in trust.

[6]AA1000 Stakeholder Engagement Standard (AccountAbility, 2015) available at: https://www.accountability.org/wp-content/uploads/2016/10/AA1000SES_2015.pdf

Objectives

Experience

How we will improve our stakeholders and customers experience when engaging with us.

Objective 1: Build intelligence on the needs, priorities and experiences of our stakeholders to better anticipate and meet their expectations

Our range of stakeholders is extensive and they each have their own goals, needs and challenges. To ensure we provide a service that meets these varying needs is challenging. For example, our connecting customers may have needs which conflict with land owners and communities. Therefore, it is not enough to just gather information on who our stakeholders are, we need to develop our understanding of their individual wants and needs.

Objective 2: Ensure communications are inclusive for all our stakeholders and provide easy access to ourselves and appropriate information

To ensure we don't limit who our stakeholders are or their access to the information they require, we will ensure everyone can access the information they need where we are permitted to do so, in a form that is suitable to them and their needs – including those who may not have engaged with us before, who will need help getting to the right place.

Objective 3: Work with stakeholders in our project planning and delivery, and strive to achieve mutually acceptable and agreed outcomes

We have a proven track record of successfully delivering large infrastructure projects in the challenging north Scotland terrain (in terms of its geography and climate). With every project our approach to engagement has evolved, from the Public Inquiry for the Beauly to Denny overhead line back in 2006, to Ofgem's recent consultations on Orkney, Shetland and the Western Isles. Going forward we want to take this evolution further ensuring we engage in a timely fashion with stakeholders when looking for the right solution.

Action

The significant action we are taking to create a step change in our approach to stakeholder engagement.

Objective 4: Develop consistent and transparent processes to capture and act on stakeholder input, feeding back on how the input has been applied

Since the start of RIIO-T1 the north of Scotland transmission network has grown substantially. From 2010 we have invested £3 billion to provide new connections for renewable generation by upgrading and growing the transmission network in the north of Scotland. Whilst this growth has led to significant changes within the business, the development of our process have not been consistent. This will be addressed through a thorough review and update.

Objective 5: Develop a culture of engagement by implementing a training programme for our employees and ensuring accountability through clear roles and responsibilities

As our business and industry matures and we move into the RIIO-T2 price control period, we want to ensure all areas of our business are focused on engagement and delivering in the interests of our customers, society and the environment. To do this, we will build on our existing strengths to shape behaviours that put customers and stakeholders at the centre of our activities.

Future

How we will work with stakeholders to shape a resilient energy future.

Objective 6: Develop future optionality with input from a diverse group of stakeholders

In planning for the north of Scotland's future energy system we need to account for the region's unique geographical, topological and socioeconomic features to ensure we can continue to meet customers' needs. To do this we must understand which technologies are likely to impact energy generation and demand, and how energy users might use the network in the future. Our ambition is to bring together a wide range of stakeholders – from experts in this area and influencers, to current and future end users – to share information which will help us define potential futures.

Objective 7: Actively participate in industry change as a committed advocate for stakeholders, society and the environment

Throughout RIIO-T1 we have been operating in an uncertain political and economic environment of changing governments, referendums and policy regimes. This is coupled with increasing technology innovation, the ever-changing energy landscape and the desire for GB's energy system to transition towards a low-carbon economy. Going forward we will actively join and start conversations on change, to ensure key decision makers such as regulators and government are aware of and have given due consideration to the needs of our stakeholders, society and the environment.

Next steps

The consultation period for the Stakeholder Engagement Strategy ends on Friday 28 June. The input provided by stakeholders will be reviewed, analysed and used to create a final Strategy.

Some of the early feedback on our draft Stakeholder Engagement Strategy has included the need for us to emphasise (and explain) why and how we will feedback to Stakeholders following their input. We agree with this and work has already begun on drafting this content for the final document.

Once the Strategy has been finalised we will work with stakeholders to create a supporting Action Plan. This document will call out how we will put this strategy in to practice: highlighting the specific initiatives required to deliver our strategic objectives; the measures and targets required for each objective; and who will own the actions within the business to drive them forwards. For example, the following actions may be defined to deliver objective five and create a culture of engagement:

- Carry out a business wide Training Needs Assessment;
- Review and update all Role Profiles to ensure inclusion of stakeholder engagement responsibilities; and
- Create specific opportunities for employees to trial new stakeholder engagement activities to learn and progress.

We plan to work closely with a range of stakeholders to develop this Action Plan and if you would like to get involved, please contact our Communications Policy Manager, Sarah Dooley: **sarah.dooley@sse.com**

Our Team

To support this strategy a new Transmission business model has been put in place which includes a new role, Director of Customers and Stakeholders.

This recognises the important role that customers and stakeholders have in shaping our current and future business plans. The new structure will drive change and deliver our ambition of becoming a recognised leader in engagement. The teams within the new directorate have been strengthened with six additional staff covering community liaison, stakeholder engagement, communications policy and digital material design. This growth of the team will continue in RIIO-T2 to support the expanded engagement programme and the new Commercial and Connections policy.

In addition, to provide greater visibility and governance we have introduced bi-weekly stakeholder engagement practitioner meetings and monthly review meetings chaired by a member of the Transmission senior management team.

The Customer and Stakeholder team will develop and manage all transmission related communication and engagement with both internal stakeholders (i.e. employees within SHE Transmission, SSE Networks and the wider group) and all external customer and stakeholder groups (e.g. Developers, Landowners, Statutory Consultees etc).

SSEPD Board

Managing Director, Transmission

Director of Base Capex and Customer Connections Delivery

Director of Business Planning and Commercial

Director of Capital Development and Delivery

Director of Customers and Stakeholder

Director of Finance

Director of Operations and Asset Management

Head of Regulation

Transmission Executive Committee

"The creation of this role is to recognise the importance of stakeholder engagement in our business, by having the function reporting directly into me.

This will deliver an effective customer approach that enables simple and clear lines of communication, placing customer requirements at the centre of our strategy. This will include internal communications, stakeholder engagement, community liaison and commercial contracts and will work closely with the Corporate Affairs team."

Rob McDonald (Managing Director, Transmission) on the new role of Director of Customers and Stakeholders

Commercial and Connections Policy

We play a key role in providing customers with a route to the GB energy market by connecting them to our network. In RIIO-T2, achieving our Strategic Objective to enable the transition to a low carbon energy economy requires the connection of significant additional low carbon energy generation, demand and flexibility services. All technologies looking to connect to our network are our customers. Regardless of the size or type of low carbon technology looking to connect to our network, we must provide all customers with a quality connections service to achieve our Strategic Objective.

Our connections customers are one of our core stakeholder groups and so our RIIO-T2 Commercial and Connections Policy was developed using the same fundamental principles and objectives as our wider engagement strategy. We think this is an evident example of how our proposed strategy, principles and objectives could be applied to our business in practice. We've structured this section based on the objectives under experience, action and future and called out objectives that apply to both the development and content of this policy.

Developing our Commercial and Connections Policy

Looking back on RIIO-T1 our primary focus was providing connections offers and working with customers to deliver their connection on time to meet customers' needs (mainly driven by the government subsidy regime available at the time - the Renewables Obligation). Our focus reflected our customers' needs and the RIIO-T1 regulatory framework at the time. We believe we met our customers' needs during RIIO-T1, demonstrated by achieving over 95% customer satisfaction (on average) with our connections service.

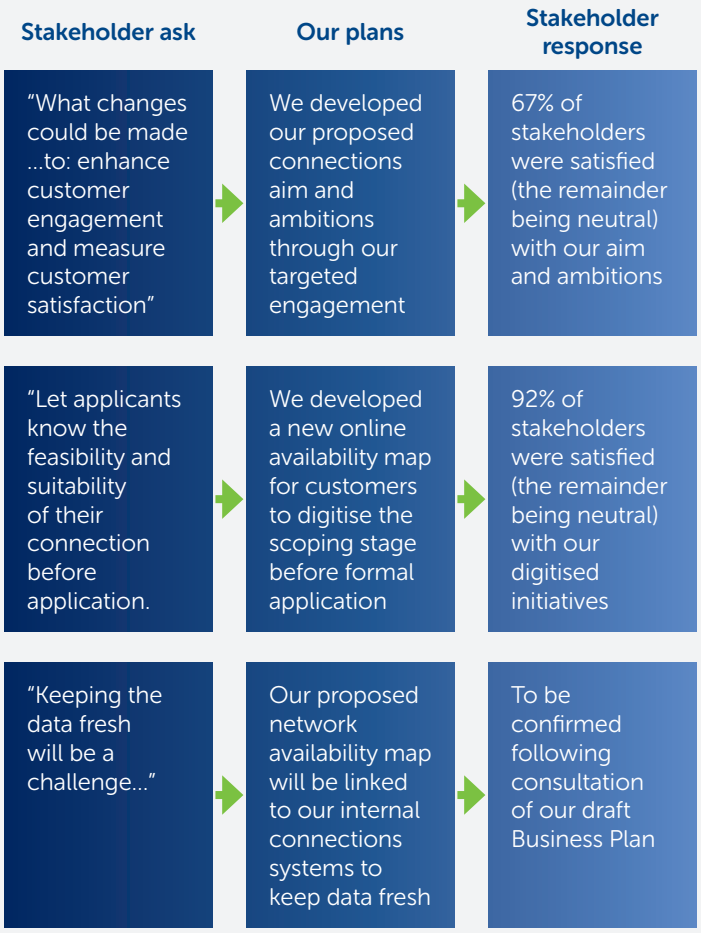
During RIIO-T1 we also learnt customers' expectations go beyond the provision of offers and connections delivery. We worked closely with customers to overcome obstacles and get them connected to our network, including introducing innovative commercial and physical connections solutions.

The industry direction of travel points towards a potential subsidy free (or low subsidy) market. This means we are likely to see a change in customer behaviour. We expect customers focus on affordability and flexibility and the overall quality of their connection will increase as we move towards a low carbon economy. Customers' expectations of us to provide a quality service and solution are high.

From our Future Energy Scenarios, we know that the location, type and size of our future connection customers requiring our connection services is uncertain. But we do know that it is essential that we get customers connected on time and provide a quality experience and solution. Given this uncertainty and the rate of change in the energy industry being able to adapt our service to meet our customers' expectations has been included in our commercial and connections policy aim.

We built our own intelligence of what the future may hold for our connections business but we know the most valuable intelligence will come from our customers and stakeholders. Aligning with stakeholder objective two, we wanted to make sure any engagement was as accessible as possible for all stakeholders and used a variety of methods to target customers and stakeholders interested in connections. This included face to face events and meetings, online consultations and webinars and phone calls.

From late 2018, we engaged directly with over 100 stakeholders over a six-month period (not including those who attended industry events or wider RIIO-T2 events), facilitated four events, attended four industry events as well as gathering feedback from customers directly. Aligning with stakeholder objective three, over this six-month period we worked with stakeholders in our project planning, from the initial connections aim and ambitions phase to the development of our detailed policy initiatives. Aligning with stakeholder objective 4, we've shown an example at the bottom of the page of how stakeholder feedback has been captured and acted upon.



Aligning with stakeholder objective one, to anticipate the needs of our current and future customers we had to build intelligence of what their needs could be. To do this we looked back at our own and other network operators experience, looked across the industry and GB energy policy landscape to understand the potential future opportunities and challenges of our connections customers. We also asked our connections customers and stakeholders through a targeted engagement programme.

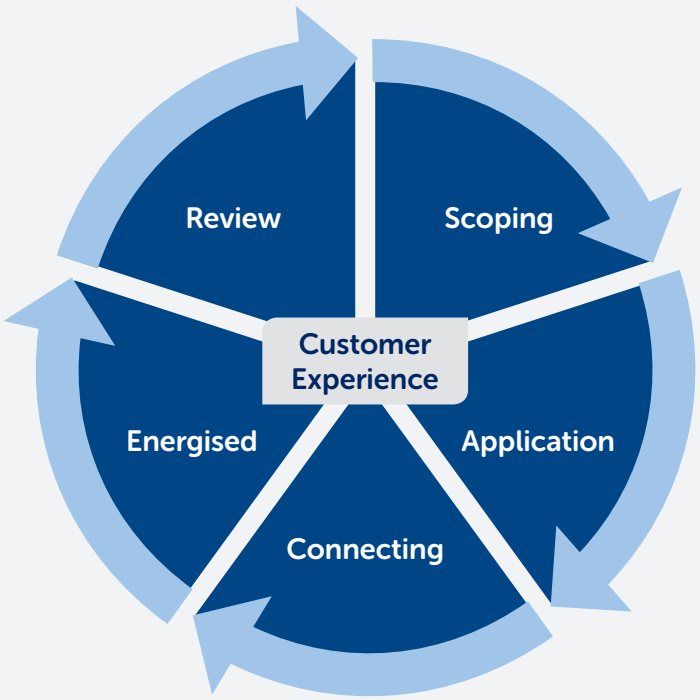
We know from our experience from RIIO-T1, Future Energy Scenarios and stakeholder feedback we can achieve more working in partnership with customers beyond the minimum expectation of delivering on time application and delivery. From building this intelligence we have realised we have already begun to transform our role as a Transmission Owner from having an indirect, transactional approach to connections to becoming a customer centric business with engaged customer partnerships.

Our May 2019 Commercial and Connections round table

Experience: Our Commercial and Connections Policy
Meeting our customers' needs during RIIO-T2 requires solutions with increasing complexity, innovation and whole system thinking. Our RIIO-T2 Commercial and Connections Policy encourages continuous improvement to meet customer's expectations which are high and fluctuating and ensures adaptability to customers' needs above and beyond the licence and codes.

In line with objective two of our Stakeholder Engagement Strategy, we have designed our new Commercial and Connections Policy to provide clear and open communications for connections customers and provide access to information.

All our connected customers – existing and future – expect and deserve an exceptional customer service throughout their entire customer experience. As we move towards a low carbon economy and a flexible energy system our customers told us our service must go beyond the application and connecting stage to achieve our strategic objective



Our connections aim for RIIO-T2 is to: provide tailored solutions and services for all our connection customers throughout the customer experience that are also optimal for the wider GB energy consumer.

Through targeted engagement with commercial and connections stakeholders and review of customer feedback, we have collaboratively designed our RIIO-T2 Commercial and Connections Policy ambitions and framed our proposed policies around the following three ambitions:

1. Optimal connection solutions

We will work with our customers to ensure their connection solution is optimal for their individual project economics and timescales, whilst ensuring it is also the optimal solution for the wider network and GB consumers.

2. Tailored customer services and products for our existing and future customers

From project scoping to repowering we aim to provide the services and products that matter to our customers today and in the future throughout the customer experience

3. Accessible connections process

We will make sure the customer experience is simple, transparent, efficient and fit for the future by being advocates for our customers

To achieve the above ambitions (and our goal of all connections delivered on time), with stakeholders we have developed eight policy initiatives to deliver during RIIO-T2. Within these initiatives we have proposed 12 new tailored products and services to meet customer expectations.

To deliver value to these stakeholders through an optimal connection solution we have focused on digitising our current process. Aligning with stakeholder objective two, this will make the process more accessible for stakeholders. This includes a new live network availability map allowing stakeholders to keep up to date with our networks current and future planning and for customers to scope their projects efficiently before application. We've also proposed a new online portal to allow stakeholders to digitally store all their connections documents, track their connection's progress, monitor their projects performance and to directly contact the member of our team working on their connection. Digitising the connections process aims to unlock collaborative benefits of whole system thinking, customer partnerships and innovation.

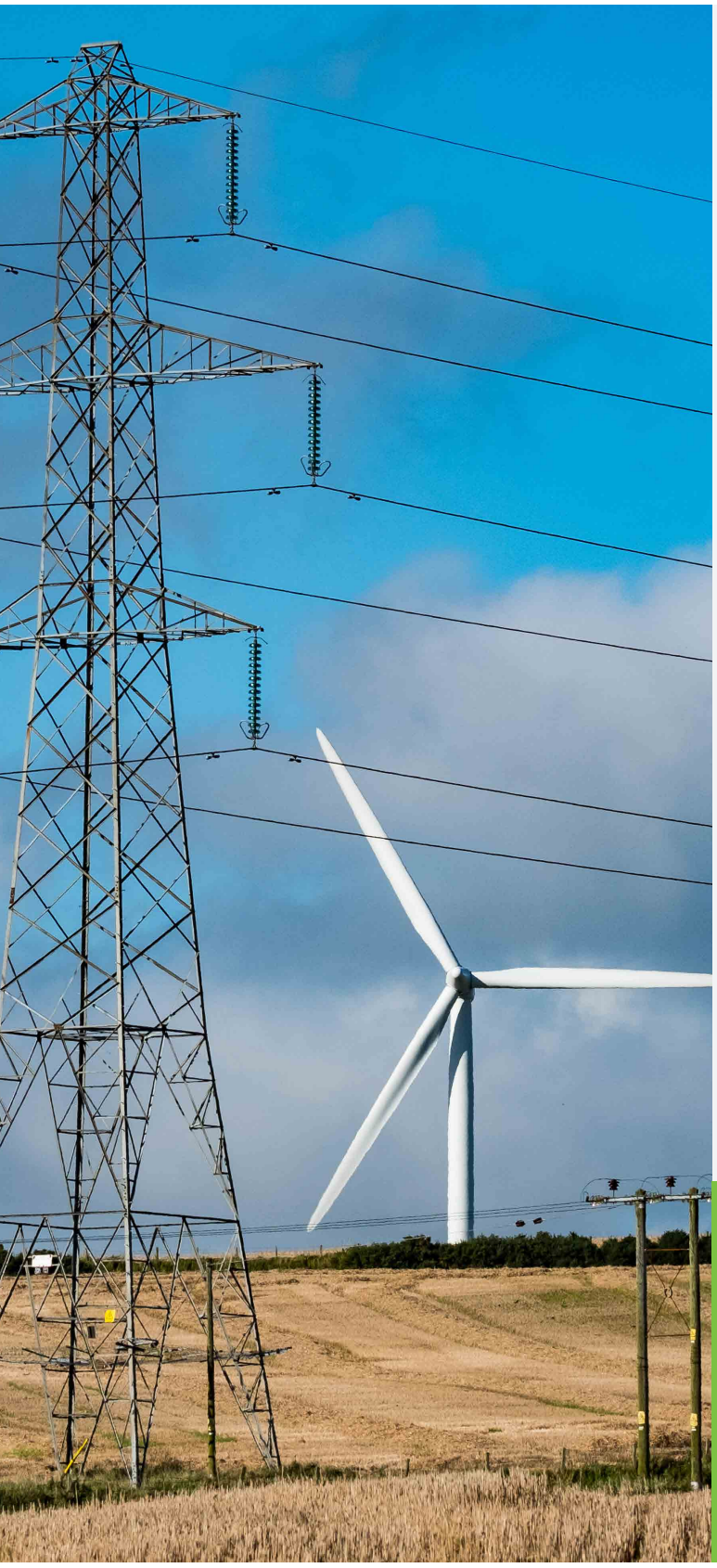
Aligning with stakeholder objective one, to deliver tailored customer services and products we are introducing new products and services to suit customers' needs adding flexibility in the application and connecting process. This includes a new energised service to minimise business disruption for our stakeholders during planned outages. Aligning with stakeholder objective three, the new energised service will share more information and collaborate with stakeholders on solutions from the project planning through to delivery stage. This includes a new proactive review service which makes sure our energised customers are on the optimal connection solution.

Taking action to implement and measure success of our Commercial and Connections Policy

These approaches are not currently business as usual for networks. Delivering this policy will require business and cultural change. The structure of the new Customer Experience team will be aligned to this policy and the stakeholder engagement strategy. Aligning with stakeholder objective five, the customer centric approach will be included in the Action objectives of the stakeholder engagement Action Plan to ensure that it is embedded in our processes, systems and culture.

We mentioned in the key outcomes section that the initial feedback we received from stakeholders was that our proposed plans lacked ambition. However, following our focused engagement, the majority of stakeholders reported that they were 'satisfied' with our policy initiatives to deliver each of the three ambitions rating their satisfaction at 4.1 out of 5 on average.

The best measure of success in implementation of the Commercial and Connections Policy is the satisfaction of our customers throughout their customer journey. By the end of RIIO-T2 our goal is to achieve customer satisfaction. Aligning with stakeholder objective four, this will be measured through specially designed surveys and reported in our annual service performance report. These results will allow stakeholders to hold us to account for our performance and will provide encouragement for continuous improvement.



Future: Policy development and engagement

To deliver ambition three, aligning with stakeholder objective seven, we will enhance our engagement and relationship with customers by being advocates for them in wider industry policy debates. This includes keeping customers up to date with industry policy changes and horizon scanning for any new market opportunities. We've also proposed a new collaboration service to enable the efficient connection of multiple customers through co-location and consortia arrangements. This includes a new customer forum page and a 'register interest' feature on our website to capture feedback and create a space for collaboration between customers.

Throughout the RIIO-T2 price control we will continue to engage with connections stakeholders to ensure we continue to meet their expectations by adapting our connections products and services as we continue our transformation to a customer centric business enabling a route to market for low carbon technologies.

We have published a draft of our Commercial and Connections Policy[7] alongside the Business Plan and are inviting customers to collaborate with us in further developing and refining these.

What do you think of our ambitions and initiatives for connections? Do these align with your future needs?

Are there any specific services or policy initiatives we should consider for connections?

What do you think of our proposed customer satisfaction survey to measure our success? Is there another way we should measure our success?

[7]Commercial and Connection Policy (SSEN Transmission, 2019) available at: https://www.ssen-transmission.co.uk/media/3405/ssen-riio-t2-commercial-connections-policy-paper-28pp-22782-artwork.pdf

Innovation Policy

Innovation, both technical and commercial, is an essential part of our way of working. We will continue to innovate and move quickly to keep pace with changing stakeholder needs. To do this we must be open and transparent with our stakeholders so that together we can develop new ideas and information.

We see innovation as a way of identifying and proving new ways of working for the long-term benefit of our stakeholders and ourselves. This is a broad interpretation and recognises that innovation can deliver value across our business operation, as demonstrated in our RIIO-T1 innovation performance. It also aims to drive a long-term view of benefits to all stakeholders, not just us.

In support of the definition we defined an objective for applying innovation. Aligning with our company's strategic objective we aim to assist the transition to a low carbon economy, whilst at least maintaining high levels of reliability in electricity supply and ensuring energy remains affordable for all.

The influence of stakeholders is at all stages of our Innovation Policy.

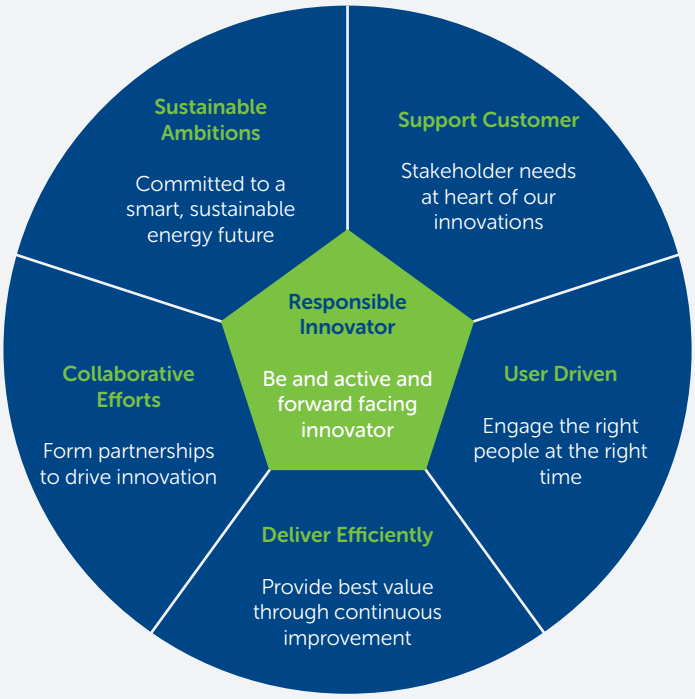
The first stage of this is identifying potential innovations that could deliver value. We will have an open approach that encourages input from, and collaboration with, both current and future stakeholders. Whether that be customers, supply chain, new entrants to the sector, they all provide insights and expertise that can lead to valuable innovation. Formal or informal, through relationships, feedback or calls for ideas, we will look outside our organisation more for project identification.

Our innovation priorities are based on the same stakeholder priorities that formed our strategic objectives, ensuring that our innovation projects are also focused on stakeholder priorities.

This stakeholder-led approach to innovation is captured in our innovation principles. Built with our stakeholder-led approach, in collaboration with stakeholders and building on best practice in RIIO-T1, they share many of the principles of the engagement strategy such as collaboration and partnerships, accessibility and targeted engagement. This provides consistency of approach across engagement and innovation.

To us, a responsible operator means that we identify the right innovations to develop, we work with the right people to deliver them, and we deliver value for stakeholders across our business operations.

Partnerships in particular are a critical part of our Innovation Policy. By sharing risk and capturing benefits to multiple parties, we reduce the risk to the consumer and increase the likelihood that successful innovations will be more widely adopted across the industry.



Delivering innovation benefits

One of the clearest asks of stakeholders when it came to our Innovation Policy was to measure and demonstrate the value that innovation is delivering. Our approach to this is to adopt Cost Benefit Analysis (CBA) at each stage of a project.

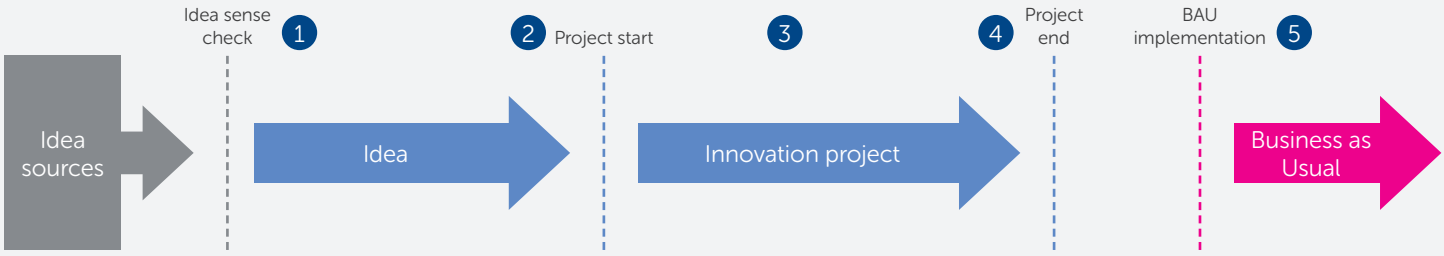
At the initiation stage we identify where the project value lies and whether it is worth pursuing further. At the opportunity assessment stage we start to quantify the potential value streams, where and when the value will be realised. This helps determine whether a project should be funded through project budgets or whether external funding is required (generally where benefits accrue outside the price control time horizon or to other parties).

During the Research and Development phase the CBA analysis is used to monitor the project results against expected value. If these are outside allowed margins, then the project can be stopped until these margins are adjusted.

This can lead to projects being cancelled where value is not being realised as expected. This happened in RIIO-T1 with our modular substation project and saw the unspent funds returned to the consumer.

Post project, in the evaluation, the CBA will allow us to determine whether the innovation provides a sufficient case for wider adoption in Business as Usual (BAU) approaches. If the expected value has not been realised, this could mean revisiting the project to identify where value was lost, holding the project until the situation is right for its adoption, or closing the project with recognition that the hoped for benefits have not materialised.

Through these measures we will deliver value to our stakeholders by innovating on the right things with the right people, whilst ensuring that consumer cost is outweighed by the potential benefits.



1. Assess the Technology Readiness Level of project and identify suitable CBA approach. Start collecting data to undertake CBA
2. Undertake the CBA. Identify key variables which the trial will assess performance against and forecast that performance in CBA
3. Monitor the outturn performance against the key variables in the trial and re-run CBA during the trial
4. Re-run CBA at the end of the trial based on final results. Compare the results to those forecast
5. Monitor outturn results of roll-out to check that impact is similar to that observed in the trial

We welcome views on our Stakeholder-Led approach to innovation.

Are there any innovation areas we should target in RIIO-T2?

Building trust

Trust and transparency

Trust is an essential part of the social contract between businesses and the customers and communities they serve. Strong relationships based on openness and respect will endure, creating mutual benefit for both parties.

This requirement is set against an often-challenging perception of business behaviour. A recent survey[8] examining public trust showed that 30% of respondents thought that the way business works today is not ethical, with corporate tax avoidance being identified as the issue most in need of being addressed.

For regulated energy networks, there is an extra dimension. As natural monopolies delivering a core public need, it is essential that consumers have faith that the companies they help fund are operating, performing and behaving in the public interest.

As part of a publicly-listed, responsibly-financed organisation, we fully recognise our enhanced public interest obligation and are leading the industry in improving levels of trust and transparency.

In 2018, we achieved the Living Wage accreditation for the fifth year in row and matched this with our fifth consecutive achievement of the Fair Tax Mark. We have also sought to encourage and support improvements in transparency and responsible business practice by others in the sector.

However, more can be done, including in the important area of transparency of reporting. In our view, the principle of transparency of financial structures and business performance is a minimum expectation for network businesses. Consumers and investors increasingly demand a wider and deeper insight into how businesses operate and licensees can, and should, go further to show that their activities and actions are serving the public interest.

Our Board's commitment to acting in the public good

"The nature of our business - delivering a lifeline service - places additional expectations on us. It is right that consumers know how network companies - that they help fund - are operating, performing and behaving, and that they are doing so in the public interest.

We must take the opportunity that RIIO-2 provides to create a model that allows consumers to have visibility and clarity of the way we do business. This means going further than we are already, listening to a wide range of views and, importantly, shining a light on areas where we know there is work still to do."

Statement from Gregor Alexander, SSEPD Board Chairman

[8]Attitudes of the British Public to Business Ethics 2018 (Institute of Business Ethics, December 2018) available at: https://www.ibe.org.uk/userassets/surveys/ibe_ attitudes_survey_2018.pdf

We are committed to go beyond what is required by the regulatory process, enhancing and improving our reporting to include performance against key societal measures and packaging it in a way that is accessible so that consumers and stakeholders can fully understand and assess our performance and behaviours.

Performance for society is closely related to Corporate Social Responsibility. Thus, our Annual 'Responsible Business' Report will include: Gender Pay Gap, Inclusion and Diversity measures, Living Wage policies, Modern Slavery Statement, socio-economic contributions including fair tax, greenhouse gas emissions, and waste and resource policies.

Fair Tax

Since 2014 we have been Fair Tax Mark accredited, an independent accreditation for businesses that proactively demonstrate they pay the right amount of tax, in the right place at the right time.

Living Wage

We have been a Living Wage employer since 2013, meaning our employees, and those working regularly on our behalf, earn an hourly rate that exceeds the National Living Wage.

Since 2014 we have been rolling out the real Living Wage across our supply chain through the inclusion of a Living Wage Clause in all relevant contracts. By the beginning of RIIO-T2, all our contracts will have been updated to include this clause.

UN Global Compact

Our parent, the SSE Group, is a signatory to the UN Global Compact the world's largest corporate sustainability initiative.

The UNGC supports companies to take a sustainable approach to business and align strategies and operations with ten universal principles around human rights, labour, environment and anti-corruption. As a signatory to the Compact, we reinforce our sustainability values and demonstrate our commitment to a responsible business approach to stakeholders.

Inclusion and Diversity

Diverse and inclusive organisations are more likely to be innovative and commercially successful. Our action to embed inclusion and attract and retain a truly diverse workforce have been included in our Sustainability Action Plan and Workforce Resilience Strategy.

Gender Pay Gap

We currently have one of the most significant gender pay gaps in the SSE Group at 27%. Targets and action to address this have been set and will continue during the RIIO-T2 period.

Performance and reporting

A new approach to transparent reporting

Effective reporting on performance is essential if stakeholders are to track our delivery and hold us to account against our commitments.

Given the complex nature of the price control process, providing a clear and easy-to-understand view of the performance of regulated businesses can often be a difficult task. Current reporting obligations, including those mandated by Ofgem, tend to be technical in nature and can require an existing detailed knowledge of the energy industry, its regulations and the region in which the network licensee operates. Ofgem's recent work in this area is welcome, but its RIIO Accounts activity has focused mostly on financial performance.

Consumers and investors are increasingly demanding a wider and deeper insight into how businesses operate and perform. Thus a focus on reporting financial or regulatory outcomes is, arguably, too narrow an outlook.

We agree with Citizens Advice that there is a strong desire from customers and stakeholders for transparency in the activities and performance of energy networks. This was evident at our March 2018 workshop which considered our reporting of Key Performance Indicators. Stakeholders at the event highlighted that reporting should be customer (rather than regulator) driven, be clear and accessible, and be broad in scope encompassing Corporate Social Responsibility. Similar views are reported by other network licensees.

To this end, we worked with Citizens Advice to develop a new reporting framework that will meet and exceed their principle that called on companies to publish "complete information on their performance, financial structures, gearing and ownership" during the RIIO-2 price control and beyond.

This new framework, which is split into three parts: Service Performance, Financial Performance; and Performance for Society, will help shine a light on all aspects of our performance through clear, meaningful reporting. We believe this step is essential to our governance and are open to, and welcome, the challenges that may come from this additional transparency.

The Citizens Advice RIIO-2 principles

What must be delivered in order for the next price control to really deliver for consumers.

1. **Profits are lower than the previous price control, to more accurately reflect the relative low risk for investors in this sector.**

2. **The value of any unspent funding for infrastructure projects is returned to consumers promptly and in full.**

3. **Industry business plans and regulatory decisions are directly informed by consumer (including future consumer) feedback and research.**

4. **Companies are required to publish complete information on their performance, financial structures, gearing and ownership.**

   Increasing transparency in a monopoly essential service will help to ensure that consumers are getting value for money. At present, Regulatory Accounts don't provide a complete picture of how firms are operating under the RIIO framework. These should change to include the impact of different capital structures, financial outperformance, derivative portfolios and how returns differ from the regulator's assumptions.

5. **Innovation funding and incentives support consumers in the transition to a low-carbon future, particularly those consumers in vulnerable circumstances.**

Annual performance reporting

Our annual reporting framework will provide an overview of our performance across the areas of interest to our stakeholders: service, financial and to society.

As we have done during RIIO-T1, we will ensure that wherever possible we will provide performance of previous years in our reports to ensure stakeholders can track performance over time.

We will also endeavour to use widely applied measures wherever practical, rather than adopt industry specific measures that may be difficult for stakeholders to interpret and compare against other organisations.

To meet the interests of specific stakeholder groups in particular aspects of our performance, we will also publish targeted performance reports in addition to the annual summary, for example, a Losses Report which explains the amount of energy that was lost during transmission on our network

Key Performance Indicators (KPIs)

During 2018 and early 2019, we consulted on new KPIs and have used views gathered through that process to inform our selection of reporting topics and approach. Our proposed KPIs were developed and refined with input from our Stakeholder Advisory Panel which allowed for a more in-depth discussion than was possible through the published consultation.

These KPIs will be reported from 2019 onwards to provide time for review and refinement ahead of RIIO-T2.

Service performance	Financial performance	Performance for society
Purpose Customers and stakeholders can easily assess energy networks' performance and service levels (such as reliability and customer satisfaction) within each year and over time.	**Purpose** Customers and stakeholders have visibility of energy networks' operating structures, governance arrangements and key financial policies, and the interdependency with networks' performance and service levels.	**Purpose** Customers and stakeholders can see the contribution that energy networks make to society through the delivery of an essential public service.
Outcomes Easy-to-understand and access reporting; performance measures that are consistent and comparable over time; performance measures that are meaningful to customers.	**Outcomes** Easy-to-understand and access reporting; Financial reporting that is consistent and comparable over time; transparency in the correlation of service and financial performance.	**Outcomes** Easy-to-access reporting; evidence of the impact of activities on communities and society.
Approach To publish each year to an agreed timetable: (i) Annual Network Performance and Service Report, (ii) Key Performance Indicators, and (iii) Declaration of Compliance with Licence Obligations.	**Approach** To publish each year to an agreed timetable: (i) Regulatory Accounts, (ii) Policy Statement on Organisational Structure and Governance, and (iii) Annual Financial Outcomes Statement.	**Approach** To publish each year to an agreed timetable: (i) Annual 'Responsible Business' Report.

Is our new reporting framework clear and transparent?

Is there anything else we should consider including?

Stakeholder-Led Strategy: next steps

One of our four strategic themes is for Stakeholder-Led strategy. This theme was developed following a review of our Strategic Objective, when stakeholders were clear that we needed to embed our engagement and collaboration with customers and stakeholders at the heart of our activities. We have set a principle goal of ensuring 100% customer satisfaction.

We have described in this section our draft proposals to achieve a Stakeholder-Led Strategy:

Our new **Stakeholder Engagement Strategy**, developed through a fundamental review of best practice and comprehensive stakeholder engagement, which provides new purpose, ambition, objectives and principles.

Proposals for our new **Commercial and Connections Policy** that steps up to the challenge from stakeholders to be more ambitious and deliver an exceptional experience for connections customers through all their engagement with us, not just at point of application and connection.

An open and collaborative approach to innovation in our **Innovation Policy** which is focused on delivering value for stakeholders through new technical and commercial approaches. Aligned to our strategic theme, innovations will be assessed on value through comprehensive Cost Benefit Analysis which will help determine which projects are suitable for investment and adoption into Business as Usual.

How we propose to give stakeholders the tools to track our performance and hold us to account through our commitment to a new framework for **transparent reporting**.

Our ambition is to be a leader in stakeholder engagement that informs and directs our activities and operations. We want to be seen as an advocate for the needs of our customers and stakeholders. The proposals that we have set out here are intended to enable us to achieve that ambition during RIIO-T2.

Over the summer we will be working with stakeholders to co-create our engagement Action Plan. This will set out our programme for delivery of the seven objectives in the strategy, including targets and measures. Designing this in collaboration with stakeholders will ensure that the programme meets their expectations.

The Action Plan will be a live plan that will grow and adapt to meet the needs of stakeholders throughout RIIO-T2 as identified through ongoing engagement and an annual review.

Find out more...

Stakeholder Engagement Strategy
Connections and Commercial Policy
Innovation Policy
Reform in RIIO consultation

Tell us what you think

We invite your views on the proposals we have set out here. We welcome comment on any aspect of our activities, and in particular on:

- **What do you think of our ambitions and initiatives for connections? Do these align with your future needs?**
- **Are there any specific services or policy initiatives we should consider for connections?**
- **What do you think of our proposed customer satisfaction survey to measure our success? Is there another way we should measure our success?**
- **Are there any innovation areas we should target in RIIO-T2?**
- **Is our new reporting framework clear and transparent?**
- **Is there anything else we should consider including?**

If you have any comments on the Stakeholder Engagement Strategy, contact our Communications Policy Manger:
Sarah Dooley, sarah.dooley@sse.com

Scottish & Southern Electricity Networks

TRANSMISSION

Safe and Secure Network Operation

A Network for Net Zero
Draft RIIO-T2 Business Plan

Scottish Hydro Electric Transmission plc

Safe and Secure Network Operation

Strategic Objective

Safe and Secure Network Operation
Using data efficiently to understand, predict and get the best network performance.

Energy networks, and especially the high voltage transmission motorways, must be reliable, available and resilient to changing circumstances, be these opportunities or threats.

Clear Goal

100% network reliability for homes and businesses
Make cost-effective investment in technology to achieve 100% transmission system reliability for homes and businesses by 2026.

Targets for RIIO-T2

We are developing a set of targets which our stakeholders can judge our progress against our strategic objective and clear goal. The indicative targets currently proposed are set out below, with reference to performance during the RIIO-T1 period as a benchmark where available.

		RIIO-T1	2025/26
Energy Not Supplied* The volume of electricity that is not supplied to homes and businesses due to interruptions of longer than three minutes on the transmission network. Excludes specified events	MWh pa.	46†	TBC
Faults Total number of unplanned interruptions, of all durations and with no exclusions, on the transmission network	Number pa.	131†	72
Coverage of smart monitoring Critical plant items with smart monitoring equipment installed and operational	Number of critical sites	0‡	61
Network monetised risk Value of asset-driven interventions as assessed by the Network Asset Risk Methodology (delta target)	£ billion	N/A	1.92
International benchmarking - Operations Out-turn position in the composite service-cost metric in the International Transmission Operations and Maintenance Study (ITOMS)	Relative position	Quartile 3 (Lower right)‡	Quartile 4 (Upper right)
International benchmarking – Asset Management Out-turn position in the composite service-cost metric in the International Transmission Asset Management Study (ITAMS)	Relative position	Quartile 1 (Lower left)‡	Quartile 4 (Upper right)

* Financial incentive
† Average of full six years completed
‡ At end 2018/19

What's in this section?

Being safe... our safety licence – "if it's not safe, we don't do it" – covers everything we do, and our draft Business Plan adheres to our best in class safety practices.

Security of supply... the role of networks in providing security of supply and what that means to our main stakeholder groups.

About resilience... the four strategic components of infrastructure resilience – reliability, redundancy, resistance, and response and recovery – that together provide a framework for safe and secure network operation. What each of these four components mean for the operation of an electricity transmission network.

Improvements we have made during RIIO-T1... keeping pace with the growth of the network and the needs of stakeholders, including the cost effective use of targeted innovation.

Proposals for reliability... for ongoing inspection and maintenance, and a gradual transition to risk-based operations. How we have used a risk-based methodology to identify the need for intervention on 29 existing asset schemes during RIIO-T2, along with the business case for a modern secure Control Centre.

Proposals for redundancy... how we actively assess the cost effective level of installed redundancy on the network. Our proposals to upgrade the storage of back up assets.

Proposals for resistance... including the ongoing programme to replace obsolete system protection and control systems, and to target growing physical threats, natural hazards and cyber security.

Proposals for response and recovery... as part of the Business Continuity Planning we undertake as a provider of Critical National Infrastructure. We propose investments in our substation systems, communications equipment and provision of temporary transmission masts.

Overview

The safe and secure operation of the north of Scotland transmission system provides security of electricity supply to homes and businesses. It also ensures that generators have network availability to transport the power they produce to energy consumers.

Safe and secure operation is needed 24/7 and, in our modern energy dependent society, customers expect a fast response to any event that disrupts supply. Our and others stakeholder research consistently concludes that energy consumers place a high value in continuity of electricity supply.

There are many elements to providing a safe and secure network, but fundamentally it requires excellence in asset management. Our ambition is for world class asset management. We will measure our performance through participation in international benchmarking studies. We have set a clear goal that we will demonstrate world class asset management – that goal is 100% network reliability for homes and businesses.

We have used the strategic components of infrastructure resilience to put in place a comprehensive programme of activities for RIIO-T2 that are necessary for safe and secure network operation. This includes incremental improvements, where it is cost effective, to gradually reduce the risk of faults on our network.

Reliability is the day-to-day design and operation of the network. The GB transmission system is currently >99.99% reliable. This is achieved through inspection, maintenance, and asset intervention. As monitoring technology improves, we propose to adapt our processes and procedures to modernise how this is performed. In RIIO-T2 we also propose to replace our control centre with a more secure, modern facility to improve network management.

Redundancy is concerned with the availability of back up should the network be disrupted. Our requirements for back up equipment has grown as the network has grown and so we propose to establish new warehouse facilities.

Resistance requires providing protection from natural hazards or malicious acts. Threats continue to emerge, and technological advancement rapidly makes existing systems obsolete.

Finally, response and recovery is about the preparation for a fast and effective response to disruptive events. Much of the preparation for catastrophic failure is undertaken at GB level, but there are cost effective actions that we propose to take to improve our business continuity.

What is a safe and secure network?

Energy networks, such as the north of Scotland transmission system, provide an essential public service to GB society and its economy. Everyone needs energy to conduct their daily life and everyone expects reliable access to energy when and where it is needed.

A safe network

Electricity can be dangerous. There are very high voltages in transmission networks which can kill if not managed correctly.

The day-to-day running of a transmission system also brings dangers. In addition to live electricity, it involves construction, working at height or in confined spaces, and the use of toxic liquids and gases, amongst many other risks to our employees and the public.

All GB energy networks operate to the highest safety standards in partnership with the Health and Safety Executive. Through our trade body, the Energy Networks Association (ENA), we share best practice and learning with a shared ambition for continual improvement.

Our approach to safety is simple: if it's not safe, we don't do it **(Figure 3.1).** All of our employees and contractors we work with are given this mandate to be able to stop work if they believe the situation is unsafe. We celebrate and take learning every time this safety licence is used.

Everything in our draft Business Plan adheres to our best in class safety practices.

Figure 3.1 Our safety licence

A secure network

In the context of the energy industry 'secure' means that the energy reaching homes and businesses is certain and dependable. Many will refer to the security of supply, or to network reliability.

Security of supply is the fundamental objective of the businesses involved in producing, transporting and supplying energy. If the end consumer cannot access the energy they need then, overall, the industry has failed.

Security of supply

Each year the UK Government reports to Parliament on security of supply[1]. The Government will intervene when required to ensure consumers have the electricity and gas they need. A recent example of such intervention was the establishment of the Capacity Market which makes payments to parties that can balance supply and demand when required.

The criticality of security of energy supply to the GB economy cannot be understated.

There is a high economic and social cost for households and businesses if their supply of electricity is interrupted. A report commissioned by the Scottish Government forecast that a total shutdown of the Scottish electricity networks would cost the Scottish economy in the region of £930 million per day.[2]

It is unsurprising, therefore, that both household and business electricity users report that they would pay significant sums to avoid power cuts. A recent European study reported the value of 1kWh of energy, equivalent to boiling a kettle ten times, to be €4.62-15.90 (approximately £4-14) depending on the consumer group and duration of the power cut[3].

We commissioned a GB Willingness to Pay study to measure the value that domestic and non-domestic consumers place on the service provided by the electricity transmission network. Consistent with similar previous studies, consumers placed a high value on avoiding power cuts. To reduce the duration of power cuts from six to four hours, households report an average willingness to pay of £7.70 and businesses £43.30[4].

[1]Statutory security of supply report (BEIS, 2017) available at: https://www.gov.uk/government/collections/statutory-security-of-supply-report
[2]EY Report to the Scottish Government, "Black Start Event – Assessment of the Socio-Economic Costs and Recovery Standards for Scotland", April 2018
[3]Study of Value of Lost Load (VoLL) in electricity supply (ACER, 2018) available at:
http://cepa.co.uk/news-details-acer-publishes-study-on-the-value-of-lost-load-in-the-electricity-supply?selYear=2018
[4]Willingness to pay (2019) available at: https://www.ssen-transmission.co.uk/information-centre/industry-and-regulation/riio-t2/

The role of networks in security of supply

There are three essential parts to this role:

1. To make sure there is a **continuous** network between generators and consumers;
2. To provide sufficient **capacity** for the maximum volume of electricity that needs to be transmitted; and
3. To maintain the power **quality** within the levels that can be safely used in homes and businesses.

For electricity transmission networks, such as the our network in the north of Scotland, the consequences of failing to achieve any one of these three parts can be severe.

This is because many electricity consumers depend on the operation of a single overhead line for their energy. Thus, a failure in the operation of the transmission system can result in a power cut to homes and businesses across a significant geographic area (see Quioch Landslide example below).

The security of supply performance of the GB transmission system is measured by:

- Availability of the transmission system
- Loss of supply events: number, duration and impact
- Power quality: voltage and frequency

The Electricity System Operator (ESO) publishes a performance report each year.

Overall, the GB electricity transmission system has a high standard of performance. For the most recent reporting year 2017/18, the reliability of the GB transmission system was 99.999975% and there were 21 events that resulted in a loss of supply to customers[5].

The exceptional performance of the electricity transmission system reflects the ongoing focus of the network operators on security of supply. Continued high expectations from consumers, changes to the use of the network and emerging global risks mean that providing a secure network remains one of our strategic themes for the RIIO-T2 period.

Quioch Landslide

On 12 November 2018, a massive landslide of 9,000 tonnes of rock and soil occurred near Loch Quoich in the northwest Highlands. The landslide cut across the 132kV transmission overhead line that provides electricity supplies to more than 20,000 homes and businesses in Skye and the Western Isles. Emergency plans, including welfare services and back up generators, were implemented to restore power within 24 hours. A temporary line was constructed within seven days. The road which was also destroyed by the landslide is not expected to re-open until mid-2019.

[5]National Electricity Transmission System Performance Report 2017–2018 (National Grid, 2018) available at: https://www.nationalgrideso.com/insights/transmission-performance-reports

Stakeholder-led outcomes

Different stakeholder groups have different expectations for the secure operation of the north of Scotland transmission network.

In section 2, we have discussed who our stakeholders are but, for the purposes of security of supply, we broadly recognise three groups:

End consumers

These are the homes and businesses that consume electricity.

In the north of Scotland, there are only two demand customers that are directly connected to the electricity transmission system. In addition, there are 740,000 homes and businesses connected to the local distribution network, in turn connected to the transmission system at a Grid Supply Point (GSP). Increasingly these end consumers are also micro-producers of electricity with solar panels.

For end consumers, a reliable supply of electricity is consistently reported to be their number one expectation from electricity networks. This expectation was re-affirmed in the most recent research undertaken for RIIO-T2 **(Figure 3.2)**, including Willingness to Pay expressed preferences[6].

We are the only GB transmission licensee to offer a compensation scheme for homes and businesses affected by a power cut on our network.

Figure 3.2 Factors affecting electricity transmission

Factors	Score (1-10)
Security of supply	9.46
Environmental impact	8
Cost to customers	7.88
Economic impact (local / national)	7.2
Impact on local communities	6.88
Consequences for employees	6.44

From Stakeholder Workshop, March 2018[7]

Connected customers

These are the generators of electricity that are connected to the electricity network in the north of Scotland.

Around two thirds of the generating capacity in the north of Scotland is connected directly to the electricity transmission system. These customers are wind farms, hydro electric power stations and the Peterhead gas-fired power station. Some of these customers have connection agreements that limit access to the transmission system at certain times.

The remaining third of the generating capacity in the north of Scotland is connected to the distribution network, i.e. is embedded. Some of these customers will export onto the transmission system and may be compensated where they are requested to cease generating by the ESO (known as 'constraint payments') for certain network conditions.

All connected generators, whether direct to the transmission system or embedded, rely on network access to get their generated power to market. Put simply, without an available network, the power station cannot operate and so does not produce electricity to sell.

Connected generators rank network availability as their number one expectation from electricity networks[8]. Where these customers have connection agreements that limit their access they want good information about when these constraints will occur.

Future consumers and customers

As the energy system changes, future consumers and customers might have different expectations from current consumers and customers for the secure operation of the north of Scotland transmission network. This is an important consideration when actions we take today can have consequences for many years ahead.

We take direction from national policy objectives (see Section 1) to decarbonise and digitise the economy. The consequence of this is likely to be continued focus on network reliability and availability (including for new capacity).

Our research indicates that security of supply is the priority of our stakeholder groups. **Is this an appropriate assumption for the duration of RIIO-T2 until 2026?**

[6]Willingness to pay (2019) available at: https://www.ssen-transmission.co.uk/information-centre/industry-and-regulation/riio-t2/
[7]Our Stakeholder Workshop (SSEN, March 2018) available at: www.ssen-transmission.co.uk/media/2730/ssen-transmission-stakeholder-workshop-report.pdf
[8]https://www.ssen-transmission.co.uk/media/3405/ssen-riio-t2-commercial-connections-policy-paper-28pp-22782-artwork.pdf

Resilience

Being resilient

Our engagement with stakeholders has led us to conclude that a secure network remains a priority for the RIIO-T2 period, where they place significant value on not having power cuts.

End consumers expect reliability and connected customers require network availability. Our attention is focused on having a network that is resilient to the events that might affect these outcomes.

We use the definition of Resilience from the Cabinet Office report on Keeping the Country Running: Natural Hazards and Infrastructure[9]:

"Resilience is the ability of assets, networks and systems to anticipate, absorb, adapt to and / or rapidly recover from a disruptive event."

The report identifies four principle strategic components to infrastructure resilience: Reliability; Redundancy; Resistance; and Response and Recovery **(Figure 3.3).** For the risks facing our network, we must act proportionately on all four of these components to deliver the most cost effective risk management response.

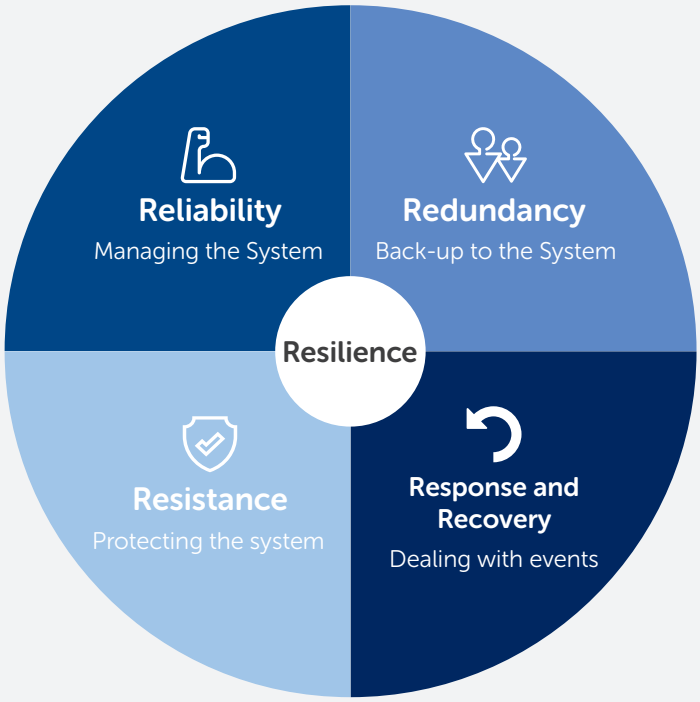


Figure 3.3 Components of network resilience

Reliability

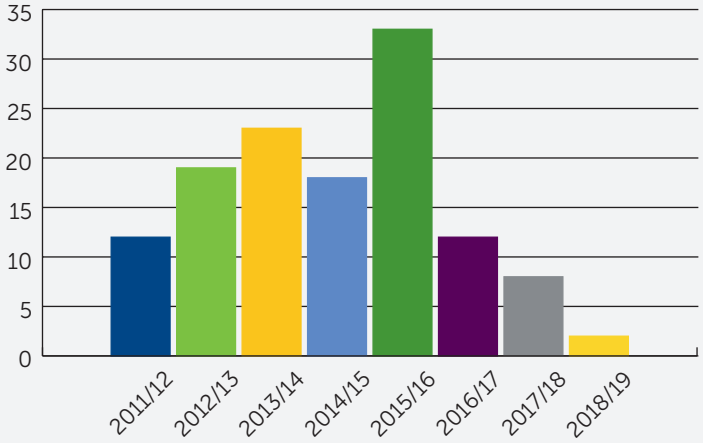
The reliability component of resilience is concerned with the design and operation of the network under a range of conditions. It includes taking steps to maintain, replace or refurbish assets before their performance deteriorates below expected standards.

Reliability performance is measured using the lagging indicator of the number of loss of supply events and the impact of these on the end consumer **(Figure 3.4).** Since 2010, we have had 127 loss of supply events that have resulted in power cuts for end consumers. The longest duration event in 2013 lasted 1,450 minutes (around 24 hours). This was due to a tower collapse in blizzard conditions.

For some connected customers, we have agreed that they will not have 100% network reliability. For example, when we are undertaking essential maintenance and there is no network back-up. For these customers, our planning for future network availability and engagement in this planning process is critical.

Over the past five years, working with the other Transmission Owners and Ofgem, we have been working to develop a leading indicator for reliability. This is called the Network Asset Risk Methodology (NARM). In essence this is a risk-based approach to assessing the need for asset replacement or refurbishment.

Figure 3.4 Loss of supply events



From ESO System Performance Reports. Loss of supply events of >3 minutes duration resulting in a power cut to end consumers.

[9]Keeping the Country Running: Natural Hazards and Infrastructure (Cabinet Office, October 2011) available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/61342/natural-hazards-infrastructure.pdf

Redundancy

The redundancy component of resilience is concerned with the availability of back-up installations or spare capacity. These back-ups would enable operations to be switched or diverted to alternative parts of the network in the event of disruptions to ensure security of supply.

The design of the GB transmission system is governed by a common standard: the Security and Quality of Supply Standard (SQSS). We are obliged under our licence to comply with the SQSS[10].

For large demand centres (such as towns and cities) and the main parts of the transmission system, the SQSS requires redundancy in planning and operation. This means that if one part of the system were to fail then a back-up would already be installed and there would be no interruption to service.

However, for more remote parts of the network and for many generator connections, redundancy is not a requirement of the SQSS. This is the norm for the transmission system in the north of Scotland. There is no common standard or methodology for redundancy over the requirements of the SQSS.

When the system fails without redundancy the options are (i) non-transmission network power sources, and (ii) replacement of the failed assets. In the example of the Quoich landslide (see box on page 65), the first step was to use back-up generation already installed for this risk. This restored power to consumers while a new transmission line was constructed.

The availability of spare equipment is essential for timely restoration. New transmission equipment like transformers and cables can take many months to manufacture. For us, as we install new types of equipment on our network (including High Voltage Direct Current (HVDC)) we must make sure we have plans in place, and the spares available, to deal with asset failure.

Resistance

The resistance component of resilience is concerned with providing protection from natural hazards or malicious events.

The safe operation of an electrical network requires inherent system protection from, for example, poor power quality, electrical overloads and network damage. This system protection is similar to a fuse box where disruption to the flow of power will trigger the fuse and protect the wider system. Our fuse box comprises automated and remotely operated communications equipment, electrical switches and relays.

Physical threats to the integrity of the GB transmission system can be by accident or due to criminal activity. The security of our sites must be sufficient to deter or avoid such threats. Over recent years we have worked closely with the national security services to protect key sites.

Natural hazards also present a physical threat to the network. In recent years we have experienced flooding, wild fires, landslides and extreme weather. Most commentators expect the frequency and intensity of these events to increase.

An emerging concern, again expected to increase, is cyber security. In common with much of the economy, we now rely on information systems in our business. We distinguish between operational systems necessary for security of supply and business systems that are used for non-operational reasons. For example: word processing and financial systems.

Under the Network and Information Systems Regulations 2018 we are an Operator of Essential Services. This means we have a statutory responsibility to manage cyber security and cyber resilience in such a way as to minimise the threat.

[10]Security and Quality of Supply Standards (National Grid ESO, 2011) available at: https://www.nationalgrideso.com/codes/security-and-quality-supply-standards

Response and recovery

The response and recovery component of resilience aims to enable a fast and effective response to and recovery from disruptive events. The effectiveness of this element is determined by the thoroughness of efforts to plan, prepare and exercise in advance of events. It can be referred to as Business Continuity Planning.

Business Continuity Planning is for significant events, typically at a national scale. No business can be free from such risks, and hence active risk management is essential. We operate under the risk framework of the SSE Group. This framework includes regular simulation events to test preparedness and procedures[11].

As a provider of critical national infrastructure, we also participate in national forums such as the Centre for the Protection of National Infrastructure. This ensures we can share learning and maintain best practice.

The most significant event that could occur on the GB transmission system is a full or partial shut down; termed a Black Start (see box).

The current standard for a Black Start event, set in 2010 by the Energy Emergency Executive Committee (E3C), is for the main substations to be resilient against loss of system supplies for a minimum period of 72 hours. This time is considered the duration that may be required to achieve a full system restoration. This is reflected in the industry standard Engineering Recommendation G91[12].

In light of changes to the GB energy system, the Government and Ofgem are currently reviewing the GB restoration standard for a Black Start. Our stakeholder feedback has demonstrated strong support for this review of the Black Start expectations, and the necessary investment to be able restore power in a timely manner[13].

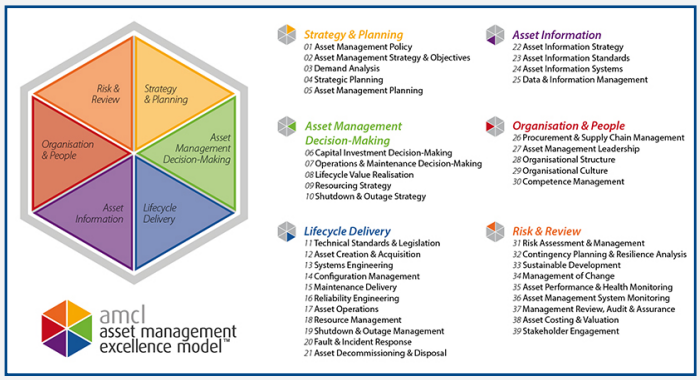


Figure 3.5 AMCL Asset Management Excellence Model

World class asset management

To deliver a resilient network - reliability, redundancy, resistance, and response and recovery – effective asset management planning and delivery is required. The SSE Group has a strategic ambition to be a "world class asset and infrastructure business", and we share that ambition.

To assess and measure our asset management capabilities, we use the Asset Management Excellence Model developed by international consultancy AMCL[14] **(Figure 3.5)**. This provides a comprehensive framework of 39 business activities that are essential to world class asset management outcomes.

For our stakeholders, excellence in asset management means no power cuts. Hence we have set a clear goal of 100% network reliability for homes and businesses.

Black start

Black Start is the rare and unlikely situation where the GB transmission system has shut down, in whole or part, and needs to be re-energised. Historically, large thermal (gas or coal) power stations would have been used to restore the system. However, as the GB energy industry has decarbonised, these large power stations have been closing down. This is of particular concern in Scotland, where the ESO, TOs and Government have been working to establish a new Black Start procedure


Peterhead gas-fired power station

[11]SSE plc Group risk report 2017/18 (SSE plc Group, 2018) available at: https://sse.com/media/522431/sse_plc_risk_report_2018_interactive.pdf
[12]Energy Networks Association engineering documents (ENA) available at: http://energynetworks.org/electricity/engineering/engineering-documents/engineering-documents-overview.html
[13]In response to our Emerging Thinking consultation, Future Operation of our Network consultation and stakeholder events.
[14]https://www.amcl.com/

Improvements during RIIO-T1

We have an operating model of continuous improvement and, as shown in the examples below, during RIIO-T1 we have made significant improvements in our network resilience.

Asset information and systems

At the time of preparing our Business Plan for the RIIO-T1 period, we relied on dated IT systems and business processes for the management of our network assets.

As a consequence of these legacy arrangements, our Business Plan was based on incomplete asset information. This meant, as we gathered accurate data after the price control was set, we identified the need to do more asset replacement works than we had planned.

We have remedied this business weakness by investing in new asset information systems. In parallel, we have undertaken a fundamental review of our asset information including condition and performance data for each lead asset. Lead assets are the primary assets on our network and include transformers, underground cables, circuit breakers, reactors and overhead lines.

Our Business Plan for RIIO-T2 is based on these new systems, along with the risk-based NARM for making asset intervention decisions.

Protection

The resistance of the transmission system to electrical damage is due to the protection and control "fuse box".

In April 2014, we had a major loss of supply event that affected more than 200,000 homes and businesses in the north and west. The investigation into this event identified weaknesses in the procedures for setting and managing the network protection and control in some substations.

An 18-month project undertook a re-design of our protection and control arrangements. A key part of this was to verify and risk assess all of the existing network communications equipment.

High fault circuits

Analysis during RIIO-T1 identified that the majority of interruptions on our network are short duration (<3 minutes), and cluster in discrete parts of the network. We have targeted the assets with high events. Our fault volumes have fallen significantly over the price control to date, from their peak of 182 in 2014/15 to just 79 in 2017/18.

Outage planning

At the start of RIIO-T1 we introduced our Network Availability Policy[15] (NAP). This has fundamentally changed our approach to the planning and delivery of network outages.

Generator communications

We have provided forecast outages for up to five years ahead for customers. This has resulted in generators modifying their inter-trip arrangements, or connections, via already established procedures with the ESO to reduce the impact of some of these future outages. For RIIO-T2, we propose to enhance this service by submitting outage plans for the full price control period to the ESO in advance. This means both the ESO and customers have a clear picture of the draft outage programme and can plan accordingly.

Accuracy of outages

Over the course of RIIO-T1, motivated by the needs of our customers and the ESO, we have focused on improving the accuracy of our outage plans. This has resulted in significant improvements in the accuracy of the start date, the duration and the completion of outages.

Enhanced service provision

Through industry working groups, we have supported the establishment of a process whereby the ESO can request modifications to outage delivery plans to reduce constraint costs. A fund of around £1.5 million is available each year to use the constraint cost savings to invest in this provision.

Asset Fleet Hubs

These groups have been created to develop and implement strategies for the whole lifecycle management of each key equipment type and are a key component of our Asset Management System.

The asset fleet hubs bring together subject matter experts from across our organisation to review the performance of each asset family (including assessment of condition monitoring results, faults, defects and investigation reports) and the impact of asset performance. These reviews have led to the development of enhanced policies and strategies to ensure that plant runs optimally and revisions to intervention/replacement approaches.

The hubs also explore new technologies and innovation, and how these might be applied to the technical specifications for our assets.

[15]Network Access Policy RIIO-T1 (ofgem, 2012) available at: https://www.ofgem.gov.uk/sites/default/files/docs/2012/10/7_network_access_policy_shetlandsptl_0.pdf

The role of innovation

Cyberhawk

Cyberhawk[16] is a company that SSE helped establish and develop through partnership funding. Together we have jointly developed an inspection and database system.

Visual inspections are completed via drone or our employees for overhead lines and by employees for substations. The results of these inspections are fed into databases which allow us to build up a condition matrix of our network. As this way of working has been developed and rolled-out over the past five years, this has become our standard maintenance procedure.

Benefits include:

- Efficiency in our maintenance programme;
- Better investment decisions supported by a higher resolution of asset condition information; and
- Supporting better management of our network defects.

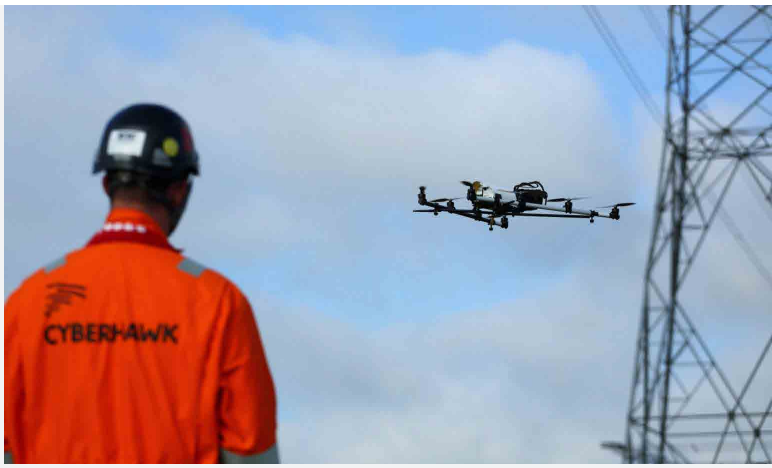
SF_6 camera

Sulphur Hexafluoride, or SF_6, is an excellent insulating medium and is commonly used within switchgear and busbars on electrical networks. However, it is very bad for the environment, with a Greenhouse Warming Potential (GWP) of 23,000 times that of Carbon Dioxide.

To reduce our SF_6 leakage, we have deployed FLIR[17] GF306 infrared cameras. We have a long-standing relationship with FLIR for other inspection equipment. They developed this camera to detect SF_6 leakage from network assets. Initially we used this reactively to respond to SF_6 leakage alarms. However, as we built up an understanding of its capabilities we moved to more proactive use as part of our standard maintenance procedures. Benefits include:

- Quicker identification and location of leaks against previous standard process;
- Faster leak repair times; and
- Reduction in leakage volumes.

A good example of this was when a design issue was identified with one of our standard fleet of 132kV circuit breakers. The design flaw led to a leakage from a consistent place on the switchgear, which allowed us to proactively check for leakages, thereby reducing the amount of gas leaked, whilst a permanent solution was identified.



Future innovation focus

These two innovations are part of a number that have delivered benefits to stakeholders in RIIO-T1. We use innovative approaches across our operations and asset management such as new asset types, technologies and design standards, and ways of working.

We see innovation as an important tool to help us better understand and manage risk associated with future network and industry change. In this way, we see that innovation will continue to deliver value to stakeholders as long as our trials are specifically aligned with our strategic objective and measurable stakeholder benefits.

The Innovation Policy published alongside our draft Business Plan lays out a framework for how all innovation will be delivered, regardless of topic or funding source. The framework defines our core principle of being a responsible innovator. This ensures that we do the right things at the right time for our current and future stakeholders. All innovation must: support the customer; be user driven; delivered efficiently; maximise collaborative efforts; and support our sustainable ambitions.

Building on that framework, we have defined what we will innovate on to achieve our strategic objective and principal goals. It is essential that opportunities are assessed for alignment before being developed. In this way our innovation programme will only test topics that support a transition to a low carbon future and are what our stakeholders have told us is important. In this way we can guarantee targeting value for our current and future stakeholders.

Read more about our Innovation Policy and the benefits of targeted innovation here:
https://www.ssen-transmission.co.uk/media/3390/111regulatory-framework_final-draft.pdf

[16]www.thecyberhawk.com
[17]www.flir.co.uk

Planning for RIIO-T2

We have used the four principle components of infrastructure resilience in our planning for safe and secure network operation during RIIO-T2.

Drivers for Change

There are substantial differences in our planning for infrastructure resilience during RIIO-T2 when compared to the RIIO-T1 period **(Table 3.1).**

Three of these are of particular importance:

1. The north of Scotland transmission system

In terms of asset value, the system is three-times the scale it was in 2013. It has a different age profile, topology and technology. It now incorporates 220kV and HVDC assets on land and subsea.

2. Our organisation

As the network has grown, so we have had to change our organisation, ways of working and capabilities (see box on next page).

3. Data as an asset

Communications and analytical technologies have changed dramatically over the past decade. The evolution and cost reduction of sensor technology, advances in mobile data capture, storage of data, speed of access and machine learning mean that the capabilities of the Transmission Owner can be greatly enhanced, and data driven evidence means that timely intervention in the asset's life cycle are justifiable, efficient and improve safety, resilience and availability of the network.

Table 3.1 drivers for change in RIIO-T2

Component	Key change from RIIO-T1 period	Material impact on...
Reliability	• Generator type and location • Consumer behaviour and energy use • Implementation of NARM • New technology, including digitisation and dynamic data	• Risk-based decisions on asset replacement and refurbishment • Risk-based approach to inspections and maintenance • Constraint costs and consequences of unavailability for generators • Cost-effective to implement smart monitoring and data control room
Redundancy	• Network growth • New technology • Risk-based approaches to planning and operations	• Risk associated with critical single points of failure • Need for asset spares and warehousing
Resistance	• Network growth • New technology • Growing physical and cyber threats	• Need for physical site security • Many protection systems now obsolete • Consequences of a changing climate
Response and Recovery	• Generator type and location • New Government standards (tbc)	• Business Continuity Planning • Expectations for emergency response • System tools available for Black Start

Uncertainty during RIIO-T2

Although we have confidence in our plans for a secure network during RIIO-T2, there are always things we don't know.

NARM

At the time of writing our draft Business Plan, the NARM has yet to be fully developed for use during RIIO-T2. This means we have not yet established a baseline position or a methodology for deriving our risk-based target. This Business Plan is prepared on a provisional basis and we expect these issues to be resolved for our final December 2019 Business Plan.

As NARM is a new methodology, and only applies to lead assets, we expect improvements to be made during RIIO-T2. Such improvements, and new information, might result in changes to the intervention outcomes. As such we believe a relative (or "delta") target and 'substitution' process are essential to avoid inefficient actions driven by a position fixed at the time of the price control settlement.

Black Start

We expect the standards for Black Start restoration to be revised either before or during RIIO-T2. As part of this revision, it is likely that consideration will be given to market-based options. Given this uncertainty, we believe it is prudent to establish a regulatory mechanism where the ESO can direct TOs to take action when the need is established. The price control settlement should then 'flex' to allow the TO to recover the efficient cost of meeting the ESO's requirements.

Cyber security

Cyber threats are quickly evolving, as are the actions available to Operators of Essential Services to manage cyber security and resilience. It is extremely challenging to apply the five-year forward planning horizon of the RIIO price control process to cyber security. We propose that outputs and allowances for cyber security are 'reopened' in summer 2023 to account for new information.

Subsea cable faults

While we take all the actions we can to ensure that we have no faults on our network, it is not always possible to avoid events outwith our control. For subsea cables, this might be due to subsea landslides or third party damage. Should a fault occur on a subsea cable the time and cost associated with repair can be significant. In this circumstance we propose a mechanism to allow us to recover the efficient cost.

Our changing organisation

As our network has grown, so has our capability for managing and operating the asset.

Some of the key changes over the past decade are:

November 2013
International benchmarking of our operations starts through ITOMS

April 2014
New asset management team established to begin development of NOMs / NARMs begins

May 2015
Protection Task Force established

October 2015
Field operations team brought in-house, with transfer of 90 employees

October 2015
Kintyre - Hunterston 220kV subsea cable energised

November 2015
Beauly – Denny final energisation – first 400kV network in north of Scotland

December 2017
International benchmarking of asset management delivery starts through ITAMS

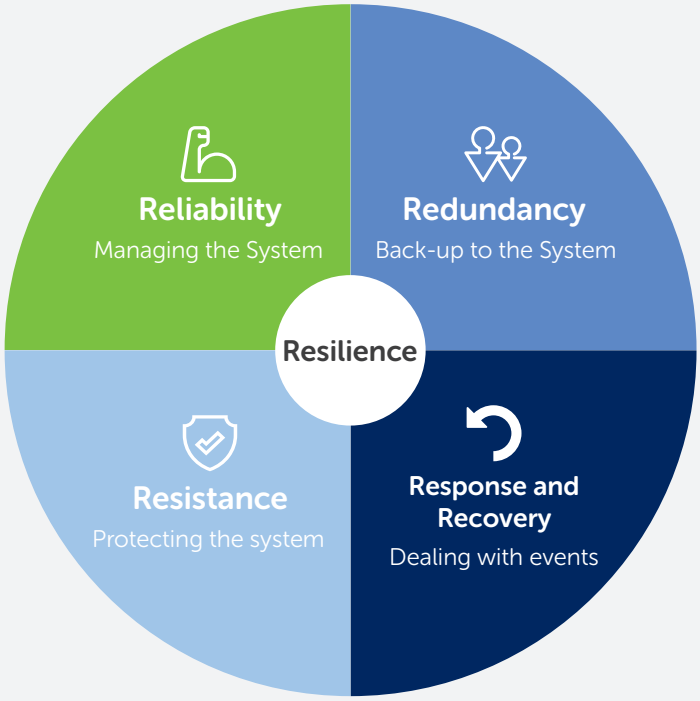
April 2018
Customer interruptions for 2017/18 due to faults on our network reduced to 2 (from a peak of 33 in 2013/14)

December 2018
Energisation of Caithness Moray HVDC

March 2019
Operations team has grown to 170 employees coveting all aspects of AC and HVDC operations on the north of Scotland network

April 2019
New governance model implemented

Our RIIO-T2 Plans: Reliability



The reliability component of resilience is principally concerned with the day-to-day management and operation of the transmission network.

Fundamentally, the focus of reliability is on delivering the security of supply that customers want and expect. For consumers, many surveys (including the Willingness to Pay research we have carried out for this Business Plan) evidence the high value placed on uninterrupted, unconstrained access to electricity.

Participants in the GB energy market, such as generators, storage providers or demand-side solutions, pay for access and use of the transmission system. For these customers, the unavailability of the network means they are not able to run their business and meet their commitments to their customers.

Our day-to-day operations are the front line of providing a reliable, available network to our customers. We break these operations activities into four main elements:

1. Inspections and maintenance
2. Risk-based asset interventions
3. Control Centre
4. Network availability

Each of these elements is risk-based and seeks to balance the efficient cost with network outcomes.

Inspection and Maintenance

Undertaking inspection and maintenance of installed assets, and the surrounding environment, is fundamental to the operation of any infrastructure business.

Inspection allows us to collect information about the condition, performance and operating environment of the equipment on the network. Routine maintenance activities and inspection ensure that the assets are in the best possible operating condition and environment.

It is through inspection and maintenance that we meet many of our statutory and licence obligations for the safe and secure operation of the network. The information gathered is a critical input to our risk-based asset intervention decisions.

Historically inspection and maintenance has been undertaken to time-based schedules that follow manufacturers' recommendations and industry best practice. For example, there are specified activities every 6 and 12 months for transformers. Vegetation management, likewise, is done to a routine schedule. This approach allows for scheduling of site visits and tasks for weeks and months ahead, supporting efficiency in operations.

We intend to continue to follow time-based schedules for inspection and maintenance during the RIIO-T2 period. We forecast the cost of these activities to be at least £101 million for the Certain View, and higher if the network continues to grow (section 4).

As we look forward beyond 2025, and as we develop our risk-based approach to asset management, we expect the opportunities of new technology will allow us to change our inspection and maintenance model. Integrated monitoring of asset condition and performance, including the collection and analysis of real time data, will enable risk-based inspection and maintenance. In the first instance we expect this would supplement time-based schedules but, over time, would become the standard approach.

We are taking a cautious approach to the introduction of new monitoring equipment such as drones, robots and sensors. We are mindful of the cost associated with large-scale roll out and, hence, are applying Cost Benefit Analysis to direct targeted projects. These projects are of material value to high access cost locations in the remote north of Scotland and islands.

Integrated monitoring

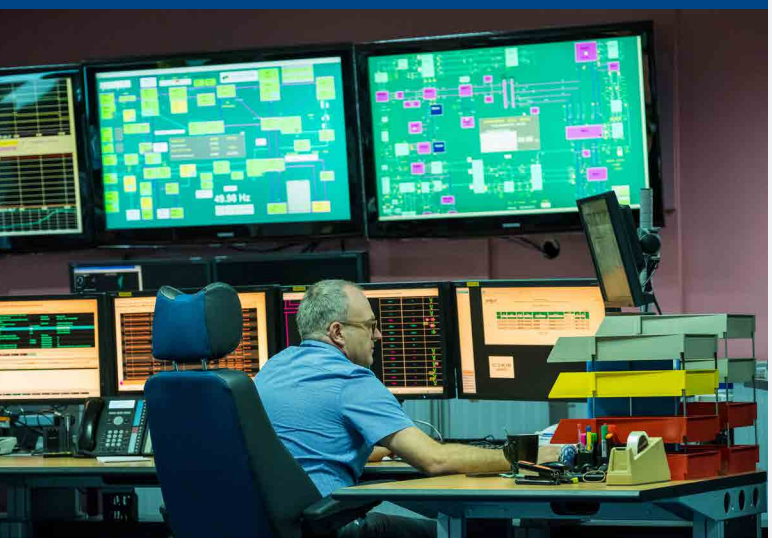
Effective system and condition monitoring within asset management plays a significant role in improving the performance, reliability and longevity of electrical and mechanical assets. Accurate and timely diagnosis of critical or high value, long lead time assets, such as power transformers, is critical for the reliable and cost-effective operation of the transmission network.

During the RIIO-T2 period, we forecast expenditure of £13 million to undertake projects at 61 sites across the network. These projects will deliver integrated condition monitoring of key assets, along with the development of data collation and analytical tools.

Integrated monitoring will enable us to view the performance and operation of plant on our network in real time, undertake trend analysis and enable risk-based intervention on equipment to ensure the network is performing optimally. It removes the need to undertake maintenance on a routine, time based frequency, instead allowing us to take action when required. This should realise operational efficiencies, in addition to improved network performance.

A key component of integrated monitoring is the use of IEC 61850, an international standard for communications in substations. It enables integration of all protection, control, measurement and monitoring functions and facilitates high speed substation protection applications.

The roll out of this technology in our substations will further improve network operation and the availability of real time information.



Monitoring and improving the efficiency of our direct operations remains a primary concern. Our inspection and maintenance costs have increased from £3 million in 2013/14 to forecast nearly £20 million by 2025/26.

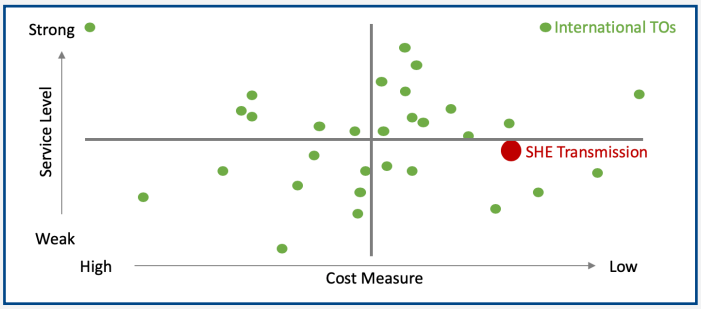
This increase in costs is unsurprising given the significant growth in the number and type of assets installed on the north of Scotland transmission network. It also reflects the increasing age of the pre-2010 network and the associated greater need for regular maintenance.

To ensure that the network growth does not mask the introduction of inefficiencies, we participate in a number of international benchmarking studies of our direct operating costs and service outcomes.

The most significant of these is the International Transmission Operations and Maintenance Study (ITOMS), which we are currently engaged in the fourth cycle of benchmarking. Our performance in previous ITOMS benchmarking has shown that for our service outcomes, we benchmark as in Quartile 3 – Lower Right **(Figure 3.6).** Our target during RIIO-T2 is to rank in Quartile 4 – Upper Right.

We take lessons and best practice from each ITOMS iteration that we use to drive performance improvements across our operations. Previous action plans have focused on emergency response planning, performance monitoring of our Control Centre, and management of stock.

Figure 3.6 Results from 2017 ITOMS benchmarking



The graph above shows relative cost on the horizontal axis and network performance on the vertical axis. We are low cost compared to most of the peer group and network performance is around average.

Risk-based asset interventions

One of our clear goals for the RIIO-T2 period is 100% network reliability for end consumers. We defined this goal from the strong and consistent view from electricity users of the importance of security of supply.

At the heart of achieving this goal is successful asset management. Asset management is a rigorous and systematic approach to achieving the desired performance of individual or network assets over the whole asset lifecycle. When successful it enables cost-effective performance outcomes.

All of the GB TOs have developed, and are in the process of implementing, a common risk-based model for asset management during RIIO-T1. This approach is used to determine the asset risk held on our network with a focus on lead assets (transformers, reactors, circuit breakers, cables, overhead line conductor, overhead line fittings and towers). The need for intervention can be assessed using the Network Output Measures (NOMs) Methodology[18].

We will continue the use of this model into RIIO-T2 (though it will now be known as NARM). We would highlight that this model is still relatively immature, and so we expect it to continue to develop and improve during the RIIO-T2 period. For example, we intend to incorporate the dynamic data being delivered by the integrated condition monitoring project into the NARM modelling approach to ensure that our long-term planning is supported by the best possible data.

Asset type	Volume	
275kV Transformers	11	nr
275kV Circuit Breakers	3	nr
132kV Transformers	24	nr
132kV Circuit Breakers	62	nr
132kV Overhead Lines	451	km
132kV Underground Cables	12	km
Reactors	12	nr

Table 3.2 Schedule of assets for intervention during RIIO-T2

We also have plans to develop new risk-based models during the RIIO-T2 period to expand the type of assets covered by the metric. Our objective is to have models established by 2026 that cover all electrical assets. This will provide a complete picture of network risk and support an improved decision-making process to deliver best value for the consumer.

For the purpose of our draft Business Plan we have made three key assumptions about the application of the NARM to inform our programme of asset management interventions:

1. The NOMs methodology as published on 14 June 2018 will apply;
2. The risk-based target for the RIIO-T2 period will be for relative monetised risk (i.e. a 'delta' target) and substitution will be permitted; and
3. Our target for 31 March 2016, assuming no network growth, will be for level of monetised risk to be the same as our forecast for 31 March 2021.

There remains ongoing development of the monetised risk target, and how this will be applied to RIIO-T2 interventions. We continue to engage with stakeholders during this process and adjust our assumptions as required.

For our Business Plan, we have identified 29 asset schemes (each of multiple assets) that will require intervention in order to maintain the monetised risk target on the network **(Table 3.2).** Each of these assets has been taken through our Strategic Optioneering Methodology to determine the preferred option for intervention, as described in the next section.

Attendees at our March 2019 workshop supported the undertaking of work in RIIO-T2 where it can be demonstrated to lead to more efficient outcomes in the future. **Do you support this approach?**

[18]NOMs Methodology Issue 18 (ofgem, 2018) available at: https://www.ofgem.gov.uk/system/files/docs/2018/08/noms_common_methodology_issue_18.pdf

Network Asset Risk Metric

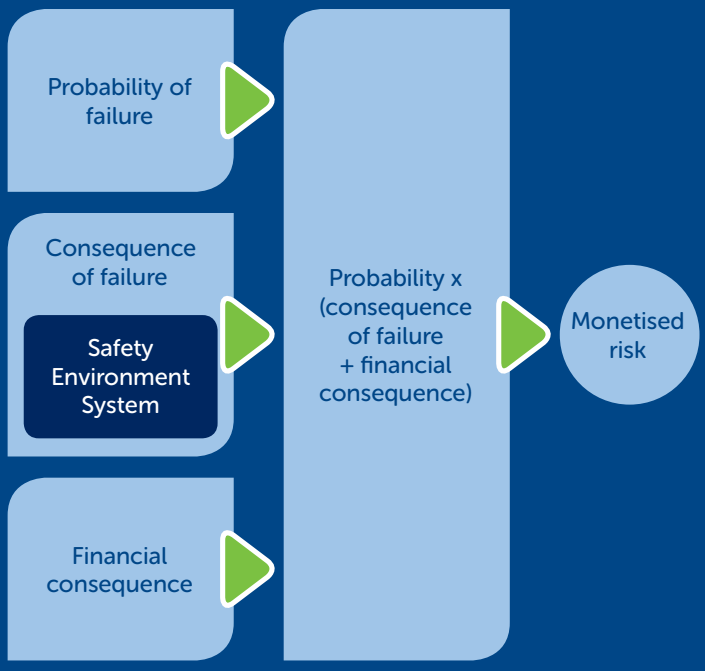
Since 2014 the three TOs have been working, with the guidance of Ofgem, to develop a common risk-based approach to assessing the need for asset intervention. This has resulted in the Network Output Measures (NOMs) methodology.

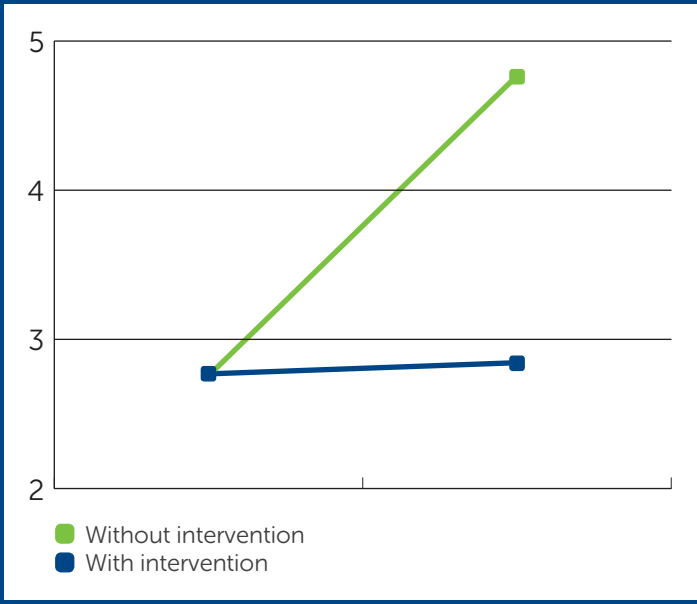
The diagram below illustrates the components of the monetised calculation of Network Asset Risk. This is done for each asset, and then aggregated to give an overall network view.

The probability of failure is largely a function of many data points of asset condition information gathered through regular inspection with specific condition monitoring for early indications of the deterioration of an asset. This information is input into a system, Condition Based Replacement Monitoring (CBRM), to determine the probability of failure.

Non-condition failure (e.g. extreme weather) is not considered in the model.

The consequence of failure takes asset and site-specific information to form a holistic view of the societal impact of the asset failing for a wide range of external factors grouped into categories of system, environment, financial and safety. Each consequence of failure is given a notional financial value. For example the cost to consumers of loss of supply.





The monetised risk is determined by multiplying the probability of failure of an asset within a given time period by the total financial consequence of that failure. As monetised risk can be determined for each asset, it is possible to rank the relative risk of assets and so prioritise the need for asset intervention.

As shown on the illustration above, asset condition degrades through time so without intervention overall network risk will increase. Our target during RIIO-T2 is to broadly maintain existing network risk.

It is important to note that this is a modelling tool and the financial consequences are notional, so critical engineering judgement is an essential part of the process. Moreso the input information is dynamic. For example the cost of carbon and cost of energy move daily. Thus monetised risk, and Network Asset Risk, are not fixed. To address this, a risk trading or substitution mechanism is required.

Monetised risk (£ billion)	
Start of RIIO-T2	2.77
End of RIIO-T2, without intervention	4.76
End of RIIO-T2, with intervention	2.84
Delta target	1.92

Control Centre

Our Control Centre works with the ESO and other TOs to manage the flow of electricity on the north of Scotland transmission system. For the majority of the time this is controlling power from renewable generation down to the Scottish Central Belt and on to England and Wales. As such, the Control Centre is a vital part of the national infrastructure.

We have a single Control Centre, with a back-up facility on a separate site. The Control Centre has been located in our main office in Perth for over 20 years. It is integrated into the open plan office environment. Overall the building is host to many SSE businesses, over 2,000 employees and daily external visitors. The area allocated for the Control Centre is shared with the SHEPD Control Centre.

As part of our organisational development to ensure our capabilities and facilities match the scale and challenges of our network, we undertook a review of the Control Centre. The key findings of this review were:

- Opportunities to strengthen site security and access to the Control Centre
- Space requirements to accommodate controls for real time system operation of a renewable-dominated system
- Planned expansion of the Control Centre function to incorporate real time asset monitoring
- The need for the back-up facility to include commissioning capability and operate for longer duration than current capability
- Learning from developments made by the ESO, other TOs and internationally in Control Centre facilities

Taken together, the findings of this review recommended significant improvement in our main and back-up Control Centre facilities.

Given the materiality of investing in our Control Centre, we undertook specific stakeholder engagement on the need, benefits and possible options. At our March 2019 Edinburgh event[19], we invited views on what we might do during RIIO-T2.

None of the stakeholders in attendance thought 'do nothing' was a preferred option. Two third of attendees favoured establishing new main and back-up Control Centres; and one third favoured the establishment of two full duty Control Centres. These new Centres would be secure and purpose-built to house the technology and personnel required to support our dynamic monitoring of the electrical and asset systems.

In line with the majority stakeholder view, we are proposing to establish new main and back-up Control Centres during the RIIO-T2 period. Our forecast cost for these works is £8 million.

Network Availability

Availability is the space, or capacity, which can be used at any specific time by our customers, typically generators exporting power. There are two aspects to availability:

- The available network capacity for new customer connections; and
- The available network capacity for the transportation of power.

It is of note that the GB transmission system is not designed to accommodate all of the electricity that can be generated from connected power stations at any one time. There are circumstances when generators may want to export, but are prohibited from doing so due to lack of network availability.

New connections

The energy market is increasingly diverse, which provides greater opportunity for these customers to share network availability and access. Higher utilisation avoids reinforcement to create new capacity, so saving customers money, but can restrict availability during periods of high usage.

The sharing of network availability and access is sometimes called flexible connections. Under these connection arrangements, generators agree upfront to the conditions under which export will be constrained. The flow of power can be managed by communications networks, such as intertrips or active network management schemes. Around one quarter of our customers have a form of flexible connection, and we expect this number to grow during the RIIO-T2 period.

Using the principles of Whole System Planning[20], this approach requires close collaboration with the customer, the System Operator and SHEPD. Flexible connections increase the complexity of network operations and can change the way that assets on the system are used.

In our stakeholder engagement about connections for RIIO-T2[21], customers have told us that their primary concern is that we must work together to arrive at the most optimal connection solution for their project, our network and the wider GB consumer. Specifically that they want a connection offer that meets the needs of their investment - whether this is a new connection, or the customer is looking to repower, or redesign their existing connection. The offer of optimal connections solutions, that would include quicker and low-cost flexible connections, is a key part of our Commercial and Connections Policy[22] ambitions for the RIIO-T2 period.

[19]www.ssen-transmission.co.uk/riio-t2-plan/
[20]www.ssen-transmission.co.uk/riio-t2-plan/
[21]RIIO-T2 Connections, Innovation and Whole Systems: Stakeholder Engagement Event, February and May 2019 output reports available at: https://www.ssen-transmission.co.uk/information-centre/industry-and-regulation/riio-t2/
[22]https://www.ssen-transmission.co.uk/media/3405/ssen-riio-t2-commercial-connections-policy-paper-28pp-22782-artwork.pdf

Network availability

In the most recent ESO report on the GB transmission system performance[23], the availability of the north of Scotland network was 97.29% (and 98.68% at winter peak). This figure is the % of the total circuits that are available to the ESO for the transport of power. As most circuits have a back-up, a circuit being unavailable generally does not interrupt supplies to consumers.

The main reason for network unavailability is construction during the summer months **(Table 4.3).** For both construction and maintenance there can be the need to de-energise the existing network in order to undertake works safely.

For this work to be done with the minimum impact on system security to consumers and users of the network, a process has been established that involves the ESO and Scottish TOs working closely together, known as the Scottish TO Network Access Policy[24] (NAP). The NAP covers the planning approach taken by the TOs and the ESO as well as describing the necessary consultation and stakeholder engagement that may be required.

Key to the success of the NAP is a flexible approach to outage planning and timing; close working with other stakeholders; innovative solutions to network issues; and a focus on cost-effective outcomes.

For our generation customers whose network access will be affected by planned outages, we are proposing a new outage engagement service. This forms part of our ambition to provide tailored customer services and products for our existing and future customers as set out in our Commercial and Connection Policy ambitions. This includes the customer being equipped with more information on our indicative outage plans as well as a dedicated contract manager post connection.

This would include an 'outage solution' product to work with customers to seek to minimise the disruption to them by either accelerating the outage or having alternative connections in place. At our May 2019 engagement event on connections, a majority of attendees said that they were satisfied with our ambition to provide this new service (the remaining attendees were neutral with no disagreements).

Table 4.3 Circuit unavailability (%) by reason, 2017/18

	System construction	Maintenance	Unplanned	Total
Apr	2.71	0.35	0.21	3.27
May	2.36	0.39	0.20	2.94
Jun	3.14	0.63	0.21	3.99
Jul	3.37	0.38	0.22	3.97
Aug	2.51	0.49	0.33	3.33
Sep	2.21	0.53	0.57	3.31
Oct	2.54	0.47	0.38	3.39
Nov	1.72	0.18	0.05	1.96
Dec	1.04	0.08	0.30	1.42
Jan	0.75	0.12	0.20	1.07
Feb	1.06	0.13	0.28	1.47
Mar	1.59	0.68	0.29	2.56

[23]National Electricity Transmission System Performance Report 2017–2018 (National Grid, 2018) available at: https://www.nationalgrideso.com/document/126551/download
[24]www.ssen.co.uk%2FWorkArea%2FDownloadAsset.aspx%3Fid%3D6131&usg=AOvVaw3o1y4rZbdbs7NGYyqxO_Yd

Our RIIO-T2 Plans: Redundancy

The redundancy component of resilience is, in essence, the availability of a back-up should something go wrong on the network. Redundancy addresses both equipment failure and unavailability. An asset might be temporarily unavailable due to the requirements of planned maintenance or during construction.

Our approach to redundancy is predicated on risk management. In this regard it complements our risk-based approach to reliability described above. While reliability is intended to pre-empt asset failure, redundancy plans for the timely resolution of asset failure or unavailability. This recognises that some circumstances that result in an asset not being in service cannot be predicted and avoided, for example extreme weather events.

A risk management approach to redundancy involves continual assessment of the consequence of failure or unavailability, and identification of the most cost-effective solution (including the 'do nothing' option).

With the changes to the nature and use of the north of Scotland transmission network, we have had to materially revise our actions on redundancy over the past decade. We anticipate this will continue during the RIIO-T2 period and redundancy will remain a key business focus.

Types of Redundancy

We define two types of redundancy:

1. Duplicate equipment or spare capacity that is installed on the system; and
2. Back up assets that are stored and can be quickly put into service.

The first of these has a 'near zero' time to deploy. Most commonly, this is the approach to planned maintenance. For example, a substation will have two transformers installed. When one transformer is being maintained, the other transformer continues to operate and there is no interruption to service.

The second has a material time to deploy, perhaps of several days. Back up assets are used where there is no duplicate already installed, or where the full system has been taken out of service. Most commonly, this situation arises for generator connections where no duplicate is installed.

Installed redundancy

The GB transmission system is designed and operated under common criteria and methodology: the Security and Quality of Supply Standard (SQSS). Adherence to the SQSS is one of our licence obligations.

The SQSS sets out the minimum standards for the design of the GB transmission system, noting that higher standards can be economically justified. In many, but not all circumstances, the minimum standard is for no loss of supply in the event of planned outages or faults. Thus the SQSS mandates installed redundancy for much of the GB transmission system.

Our risk-based approach to redundancy focuses on those parts of the network where the SQSS does not require installed redundancy. Examples of this are:

- Generator connections, where the generation customer has opted for a design variation to reduce the network design below the SQSS minimum standards; and
- Some small consumer demand connections, where the SQSS does not require immediate recovery from loss of supply.

While these potential single points of failure are acceptable, the associated risk must be actively managed.

For our Business Plan, we propose three main actions for installed redundancy:

1. We are committing to work with our generation customers to undertake regular design reviews of their connection arrangements. You can read more about this in our Commercial and Connections Policy.

2. There are single points of failure on the network where there is not an economic case for installing duplicate assets. We have risk management plans in place for each.

3. We will apply our new cost benefit analysis methodology to our assessment of single points of failure to determine whether there is a case for investment. We explain this new analytical approach on page 102.

In addition to these actions, we will maintain our compliance with the SQSS for installed redundancy. Some aspects of the SQSS are under review as part of the changes to decentralise and digitise energy networks (see whole system planning standard box).

Part of our risk management is to assess the economic justification for installed redundancy where it is not mandated by the SQSS. Using cost benefit analysis we can model whether the cost of duplicate equipment is outweighed by the benefits that result. We consider this on a 'whole system' basis, working with SHEPD and the ESO to determine whether duplication of equipment is the most cost-effective solution.

As the inputs to our cost benefit analysis or the options to achieve redundancy change then we must repeat this assessment.

A whole system planning standard

With increasing capacity of generation and flexible resources such as battery storage, microgeneration and demand side response on SHEPD distribution's network, we are seeing a greater need for working more collaboratively with SHEPD to understand the impact of this on power flows on the transmission system. Coupled with the increasing capacity of large renewable generation on the transmission system, we are seeing significant variability of power flows both on the transmission system and at the interface points with SHEPD (Grid Supply Points).

Currently, transmission system planning is underpinned by the SQSS, a largely deterministic standard, which was developed based on the traditional power system planning model with large centralized power stations and inflexible demand. Clearly, the system has transformed and is continuing to do so at pace, with the planned introduction of the DSO and management of flexibility services through the market to maintain the safe, secure and economic operation of the GB electricity system.

The level of installed redundancy stipulated by the SQSS depends on the size of demand and generation, both of which are increasingly flexible.

We are working collaboratively with the ESO to develop probabilistic system analysis tools to understand the likely curtailment of generation or demand and the risk this may cause to the safe, secure and economic operation of the system. This also helps us to identify cases where deviating from the redundancy criteria of the SQSS is the right thing to do. Where this is less than the SQSS compliance level, we seek derogation from the relevant SQSS criteria. An example of this is the derogation on the proposed rebuild of the 132kV line between Beauly and Loch Buidhe substations which was deemed uneconomic at this time by the Network Options Assessment (NOA) process. Equally, where a higher standard is justified, we demonstrate this based on balancing the costs of the additional redundancy against the benefits on a whole system basis.

We participate in the industry review of the SQSS and we are currently working with the ESO and other TOs to scope the review of the standard to address these challenges.

Back up assets

Back up, or spare, equipment that is stored with deployment plans is an essential part of redundancy.

Prior to the RIIO-T1 period and the significant growth of our network, it was not economic for us to establish and run warehousing facilities. We used operational locations as secure storage facilities, and worked with other network owners to ensure we had access to the spare equipment that we might need.

Over the past decade, as the north of Scotland transmission network has grown, so too has our stock of spares. In late 2018, our stock value was around £100 million.

The new technologies that we have energised mean it is less possible to share equipment with other networks. Our asset base now includes: HVDC, 220kV subsea cables, high voltage Gas Insulated Switchgear, Static VAR Compensators (SVCs) and Statcoms. In addition to electrical equipment, we have essential protection and control technology.

A detailed review of our approach to warehousing and stock controls has identified significant benefits from moving to a centralised approach. This approach would also enable improved physical and cyber security measures to be adopted.

We have explored a number of options to find the most cost effective approach to the storage of back up assets. Our assessment has taken into account the whole life costs of the options, including the time to deploy and risk of damage to or speed of degradation of stored equipment **(Figure 3.7).**

For our Business Plan, we are proposing a multi-element plan that continues to use equipment sharing and service level agreements with manufacturers. However we are also proposing:

1. Two new staffed warehouse facilities, with non-staffed secure satellite storage in strategic locations. Overall storage capacity would be increased from the current levels, and indoor storage would extend the life and ease of deployment of spares.
2. Secure Inventory Management System to manage stock incorporating prevailing order lead times. This would recognise the international demand and availability of critical network assets.

We forecast the cost of this will be £37.3 million.

Our proposed investment in warehousing and spares has been developed following a detailed review of the options. We presented three options to stakeholders at a workshop in March 2019: (i) single warehouse, (ii) two warehouses, and (iii) two warehouses with adjacent operations centre. We presented these options without and then with the associated cost.

There was a strong consensus of stakeholders in favour of the two warehouse option, both before and after the cost was revealed. Stakeholders also emphasised the importance of inventory controls and stock management systems to ensure back up equipment is maintained in good condition ready for immediate deployment.

Figure 3.7 Transportation of major infrastructure equipment

Our RIIO-T2 Plans: Resistance

The resistance component of resilience is about protecting the safe and secure operation of the network from natural hazards or malicious events.

Types of resistance

We define five types of resistance:

- System protection
- Control systems
- Physical threats
- Natural hazards
- Cyber threats

The first two types of resistance relate to the tools that are used to operate the transmission system and control the flow of electricity. We want to avoid too much or the wrong type of electricity damaging equipment or being a threat to people.

The latter three types of resistance relate to events that are outwith our control. These include malicious damage, theft, extreme weather or hacking. Again these events might damage equipment or threaten people.

System protection

System protection acts as a fuse box that immediately isolates parts of the transmission system that are faulty or damaged. The aim is to protect people and equipment, whilst maintaining security of supply.

On the high voltage transmission system, protective relays are deployed across the network to detect faults and send signals to circuit breakers to open. Relays operate at timescales of a few thousandths of a second. Modern relays are digital and so require a power source, input operational setting and communication channels to the switchgear.

In 2018, an industry protocol (STCP 27-01) was introduced which established arrangements for appropriate and accurate synchronised data to monitor asset and overall system performance. This data enables the cause and sequencing of system events to be established, and so improve system protection.

Like any asset with both hardware and software components, system protection requires both maintenance and risk-based replacement.

During RIIO-T2, we propose to replace 86 protection schemes.

This is largely to replace obsolete relay schemes, often where the software or operating systems are no longer supported by the original suppliers. These relay systems also do not have the capability to communicate with modern protection schemes and cannot provide the necessary data to comply with required monitoring standards such as STCP 27-01, mentioned above. This limits our ability to fully manage the transmission network and comply with expected UK grid standards.

We forecast the cost of these interventions to be £27 million.

Innovation: Digital substations

Ways for keeping the network resistant are closely linked to technology development. The fast paced technology changes driving digitisation and democratisation of the industry creates many opportunities for system and stakeholder benefit. System protection is one of those.

During RIIO-T1 we have applied innovation to this area by developing our use of the international standard IEC 61850 through business-as-usual funding. This standard looks to break substation design down to its component parts, identify the data requirements of each part and how they aggregate at a substation level. We have one of the first examples of an operational substation using multi-vendor IEC 61850 in the UK at our Spittal substation (below).

The initial benefits from this include less use of metallic cable and thus to reduced substation foot prints. As our understanding progresses then our substations will be safer and quicker to build as well as not being locked in to single suppliers.

Control systems

In order to monitor, process and act in real time to control the operation of the transmission network we use a supervisory control and data acquisition (SCADA) system. This is a package of automated hardware and software elements that gather data and issues commands.

As with most computing technology, the useful life of SCADA system components is short, typically less than 10 years. Technological improvements are rapid, so obsolescence occurs before the end of physical asset life. The speed of change also limits the opportunity for cost-effective repair and availability of spares.

In our Business Plan, we are proposing to invest £9 million to replace and upgrade 48 substation control systems. This investment includes third party testing of cyber security.

Physical threats

Physical security means ensuring the north of Scotland transmission network is resistant to physical interference, intended or accidental, and that the public is protected from coming into contact with electrical equipment.

Our objective is:

To deter Dissuade third parties from approaching or entering the transmission system by making the boundary appear too physically and technically difficult to overcome without likelihood of detection, failure or capture.

To detect Verify an intrusion that initiates the response by:

- Identifying suspicious behaviour at the perimeter boundary;
- Observing unauthorised intrusions across the boundary line;
- Raising an alarm to initiate further investigation; and
- Verifying all perimeter intrusion alerts with an appropriate timely response.

To delay Prevent the intruder from reaching the asset (including measures to minimise the consequences of an intrusion):

- Maximising the time taken for an intruder to breach the perimeter once detection has taken place
- Prevent an intruder from breaching the perimeter

We use a combination of measures to achieve this objective, but the starting point is identifying and understanding the risk to physical security.

We have an obligation to comply with the Electricity Safety, Quality and Continuity Regulation 2002 (ESQCR). The ESQCR requires us to continually undertake risk assessments on overhead lines and substations. Through these assessments we monitor the impact of changes to the electrical infrastructure and its local environment.

Based on our risk assessments, we are proposing in our Business Plan that we replace fencing at 27 substation sites, install CCTV and alarms at 35 network locations, and upgrade anti-climbing devices on around 1,000 transmission towers.

We forecast the cost of these actions on physical security would be £9 million.

The benefits of these interventions include ensuring that the safety of the public is maintained, enhanced protection against theft and contributing to the reliability of the network. Our rolling programme of works is designed for cost-effectiveness, and the timely deployment of new technologies.

In addition to these specific activities, we will continue to work with the national security services to ensure appropriate physical security for sites designated as critical national infrastructure.

Natural hazards

Environmental, climatic and landscape hazards pose a natural threat to the safe and secure operation of the transmission network. This includes extreme weather, landslides, wild fires and flooding.

While this has always been the case, the nature and potential impact of the threat is evolving and so must be kept under constant review. Many commentators argue that changes to our climate are causing new and increased risks.

For our Business Plan, we are proposing:

1 **Flood alleviation works at ten network locations**

2 **To maintain our programme of environmental risk assessment taking into account new forecasts and guidance.**

We forecast the cost of these activities to be £1.4 million.

You can read more about our plans to reduce our impact on the natural environment on pages 140-143

Cyber threats

The global profile, prevalence and sophistication of malicious cyberattacks continues to increase with a corresponding increase in the risk to the operation of the north of Scotland transmission network. This is compounded by the technological advances driving digitisation and democratisation as they see the expansion of connectivity and control.

As an Operator of Essential Services designated under the Network and Information Systems Regulations 2018, we must manage cyber security and cyber resilience in such a way as to minimise the threat. Managing this risk means regularly reviewing the design and operation of key systems, internal and third party testing, and employee and contractor training and awareness. We participate in national bodies that oversee the cyber security threat.

For our Business Plan, we have assumed that there will continue to be a significant cyber security threat and that the techniques for managing this threat will also continue to improve. We propose that in mid-2023 there is a review of requirements for the remainder of the RIIO-T2 period.

Wildfires spread across the north of Scotland in April and May 2019, impacting on the safe operation of the transmission system. This appears to be a growing issue and we are developing our understanding of these events, our planning to protect the network and our response. This includes participating in an international wildfire forum for electricity networks to share best practice from, for example, Australia, California and southern Europe.

Our RIIO-T2 Plans: Response and Recovery

The response and recovery component of resilience is to enable a fast and effective response to and recovery from disruptive events.

Business Continuity planning

We define Business Continuity as our capability to continue to operate the north of Scotland transmission network at acceptable predefined levels following a disruptive incident.

Business Continuity Planning is the overall management process that identifies potential threats and the impacts to operations that those threats, if realised, might cause, and which provides a framework for building organisational resilience with the capability of an effective response that safeguards the interests of its key stakeholders, customers and necessary activities.

For the RIIO-T2 period, we have identified four activities necessary to maintain our capabilities for response and recovery:

- Black start
- Substation systems
- Communications
- Temporary masts

These activities have been identified through our comprehensive business continuity planning processes.

All parts of our organisation regularly review their business continuity arrangements using a four-step approach:

1. **Business Impact Analysis**
2. **Business Continuity Strategy**
3. **Business Continuity Action Planning**
4. **Exercising and improvement**

The resultant Business Continuity Plans are tested during simulation exercises that we conduct and that we participate in at a national level.

As a provider of critical national infrastructure, we also participate in national forums such as the Centre for the Protection of National Infrastructure. This ensures we can share learning and maintain best practice.

Black Start

Black Start is the process of restoring power to the transmission system after a full or partial shut down. These events are infrequent, but not uncommon as typically two or three such events occur globally each year.

As we describe on page 69, the decarbonisation of the energy system and associated closure of coal-fired power stations, has resulted in a review of the GB Black Start arrangements. In the north of Scotland, hydro and wind might provide significant energy enabled by system tools to provide inertia and voltage. There is sufficient capability to supply Scottish demand and provide surplus energy to assist further south.

It is our view that a GB-wide approach needs to be undertaken in planning for Black Start events. While we have a critical role to play in that planning and will continue to make an active contribution, it is the ESO that should co-ordinate the effort and take the lead in putting in place the arrangements to manage the GB transmission network in the event of a Black Start.

As a consequence, we have not proposed any significant investments for Black Start preparation in our Business Plan. Instead we propose to act at the direction of the ESO.

We propose the ESO should direct Black Start requirements for Scotland. **Do you support this approach?**

Substation systems

We design substations to be able to operate for a limited time without a mains supply of electricity using batteries or diesel generation. This is essential to maintain security of supply should there be an interruption in the local network or in a Black Start situation.

Our standard is for 72 hours of standalone operation, and all substations we have built during RIIO-T1 comply with this standard. A review of our older substations has identified 76 sites that do not meet the standard. In many cases the existing provision is inadequate for increased load of modern substation usage and operational technology networks (OTN).

In our Business Plan, we propose a programme of work to bring all substations up to standard. The most cost-effective solution is 72 hours of standby diesel generation capability and 12 hours of battery capacity. However, local constraints and network criticality mean the requirements at an individual site may vary.

We forecast the cost of these works to be £42 million.

Employee communications

Secure and reliable communication between our employees is essential for the safe operation of the network. For example, between the control centre and substations, between substations, and between field units activity across the north of Scotland. All methods of communication rely on electrical power and many of these systems are not resilient to a loss of power.

The substations we have built since 2010 are equipped with Voice-over-IP (VoIP) telephony. This supplements the public switched telephone network (PSTN) provided by OpenReach over copper circuits. The PSTN is resilient and designed to continue operating during power outages of several days. However, due to its age and technical obsolescence, we understand that the PSTN will be decommissioned by 2025 at the latest.

Our standard is for every substation to have two communications systems to ensure redundancy and to mitigate against the weaknesses of each. Our primary solution is VoIP, with a backup system using Personal Mobile Radio (PMR) where coverage allows. We propose to implement this two-part communications approach during the RIIO-T2 period and prior to the cessation of the PSTN.

We forecast the cost of the required 489 communications installations to be £1 million.

Temporary masts

During the Quoich landslide, customers on the Western Isles and Skye were off supply and reliant on diesel generation backup until a new transmission circuit could be constructed. This required design to be carried out in real time. A review of this event has highlighted that temporary towers would have enabled a faster response to secure customers supply via the grid and thus reduce the environmental impact from diesel generation. Cost savings would also have been significant, given the operational cost of the diesel power station.

In response to this, we propose to purchase 12 temporary towers at a cost of £1 million. The towers we have selected are in use by other UK transmission owners and therefore we will be able to pool resources and share their use in the event of a major system fault.

Safe and Secure Network Operation: Next steps

One of our four strategic themes is for safe and secure network operation. During the RIIO-T2 period, this means getting the best network performance through the effective use of data to manage risk. We have set a clear goal of ensuring 100% network reliability for homes and businesses.

We have described in this section our draft proposals to achieve safe and secure network operation using the four components of resilience:

Reliability of day-to-day network operation through cost-effective inspections and maintenance, risk-based asset intervention, engaged control room capabilities and optimising network availability;

Redundancy for assets being unavailable using installed system capability and back-up equipment;

Resistance to threats through strengthening our protection and control systems, and strengthening our physical and cyber security; and

Response and Recovery to disruptive events by business continuity preparations, including for a Black Start system recovery following full or partial shut down.

All four of these components are risk-based. We are continually assessing the network for risks that might interrupt safe and secure operation. We are planning and taking steps to manage and cost-effectively minimise those risks.

Our proposals are intended to reduce, as far as is cost-effective, the risk of network events and put in place cost-effective measures to address the consequences of any events that do occur.

Tell us what you think

We invite your views on the proposals we have set out here. We welcome comment on any aspect of our activities, and in particular the questions in this consultation that will inform our final Business Plan proposals for:

Our research indicates that security of supply is the priority of our stakeholder groups. **Is this an appropriate assumption for the duration of RIIO-T2 until 2026?**

Attendees at our March 2019 workshop[25] supported the undertaking of work in RIIO-T2 where it can be demonstrated to lead to more efficient outcomes in the future.

We propose the ESO should direct Black Start requirements for Scotland. **Do you support this approach?**

Find out more...

The Future Operation of our Network consultation
NOMs methodology
Network Access Policy
ESO System Performance Reports
Connections and Commercial Policy
Innovation Strategy
Whole System Thinking consultation
Reports from stakeholder engagement events

March 2019 stakeholder event on the future operation of the network

[25]www.ssen-transmission.co.uk/riio-t2-plan/

Scottish & Southern Electricity Networks

TRANSMISSION

Sector Leading Efficiency

A Network for Net Zero

Draft RIIO-T2 Business Plan

Scottish Hydro Electric Transmission plc

Sector Leading Efficiency

Strategic Objective

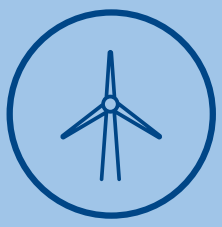
Sector Leading Efficiency
Integrated approach to whole life development and operation, using risk-based engineering to deliver value.

Energy networks must be affordable to consumers, and be open about the trade offs between cost and investment for local and national benefits to achieve the transition to a low carbon economy.

Targets for RIIO-T2

We are developing a set of targets by which our stakeholders can judge our progress against our strategic objective and goals. These indicative targets currently proposed are set out below for the Certain View with reference to equivalent forecast outcomes during the RIIO-T1 period as a benchmark where available.

Clear Goals



Transport the renewable electricity that powers 10 million homes
Build electricity network flexibility and infrastructure that can accommodate 10GW renewable generation in the north of Scotland by 2026.

£100 million in efficiency savings from innovation
Through targeted new technology and ways of working, achieve £100 million customer benefits by 2026.

		RIIO-T1	RIIO-T2
Renewable Energy Installed renewable generation capacity directly or indirectly connected to the north of Scotland transmission network by the end of the period.	Total GW*	6.8GW	9.9GW
Shared Use Infrastructure Capacity Increase in shared use infrastructure capacity facilitating the connection of new renewable generation during the period.	Total MVA	4166MVA	1327MVA
Energy Transport Capability Increase in boundary transfer capability due to strategic network investment during the period.	MW (Boundary)	2717MW (B0,B1,B3)	1090MW (B4)
Innovation Benefits Innovation projects underway or completed, and estimated benefits during the period.	Number Benefits (£m, NPV)	41 projects / £29m benefit	61 projects / £100m benefit
Early Engagement Number of regional and community engagement events on north of Scotland future energy scenarios and strategic network development planning	Number of events per annum	N/A	5

*1.3GW non renewable also connected

Target for Network Asset Risk Metric (NARM) have still to be confirmed

What's in this section?

Some context... on customers' concerns about the cost of energy and why it is important that we strive for sector leading efficiency.

Some background... on what we mean by cost efficiency, how we can measure it and what we have learned over the past five years about how to improve our efficiency.

Being efficient... how our past and proposed expenditure is made up, and where in our draft Business Plan we explain how our activities and expenditure are efficient.

How we identify the need to spend... on a whole GB system basis, working with Electricity System Operator (ESO) and other Transmission Owners (TOs), through industry network planning using future energy scenarios.

How stakeholders are involved in the Strategic Optioneering Assessment to identify the preferred investment option... this being a comprehensive, multi-year process to identify a range of viable options to meet the network need and then narrow these down to a preferred option based on technical, environmental and cost factors along with the views of stakeholders.

The detail of our proposed capital investments for the RIIO-T2 Certain View... sets out in a series of regional maps and project descriptions.

How we deliver capital investment efficiently, while minimising the impact on local communities... by having a well understood scope for delivery, working effectively with the industry supply chain and using innovation to deliver measurable whole life project benefits.

Overview

The electricity transmission network is made up of high cost equipment. Individual specialist pieces of plant can cost many millions of pounds to buy and install. However, once in operation, the equipment will last for many years of service and benefit homes and businesses across GB.

Consumers are concerned about the cost of their energy bill. While electricity transmission makes up a small proportion of that bill (the north of Scotland transmission system is less than 1% of the total), consumers expect that we provide the service they need for as low a cost as possible.

Electricity transmission is unusual in that the activities necessary to run the network are bespoke and specialised. This makes it difficult to do year-on-year or network-by-network comparisons of expenditure to assess productivity and efficiency of operation. The international studies we participate in shows we benchmark close to the median for service and cost.

Our own analysis of (and lessons we have learned from) our historic performance is that the greatest savings can be achieved through:

1. **A strong justification of the need to spend**
2. **A thorough optioneering assessment to identify and define the best solution to meet that need**
3. **The targeted use of innovation – new technology and ways of working**
4. **An effective procurement approach that considers the whole network need, not just the individual project**

We have applied this approach to the development of our proposed capital investment programme for RIIO-T2. This section describes the process we have followed to identify a strong, evidence-based and justified need for £1.8 billion* investment in new and existing network assets. This includes significant investment to upgrade the existing transmission circuits between Aberdeen and Dundee, so as to relieve a system 'bottleneck' and reduce the cost of constrained energy.

The investment programme we describe is for a Certain View, that is for activities where we can show a justified need now. We anticipate further investment requirements will have a need during the RIIO-T2 period. We do not propose that these are agreed and funded upfront, but that uncertainty mechanisms are used to release funding only once the need is confirmed.

*Includes circa £200 million expenditure associated resilience (excluding asset replacement, see section 2)

Why Sector Leading Efficiency?

Concerns about the cost of energy

The cost of energy is of significant concern to consumers and wider stakeholders.

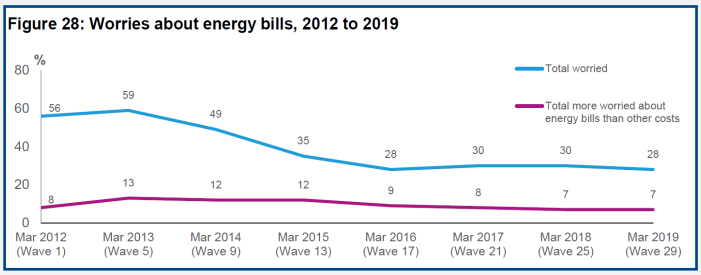
The Public Attitudes Tracker survey[1], run four times a year by the UK Government, consistently reports a significant proportion of respondents being worried about paying their energy bills **(Figure 4.1).** The same survey indicates that around three-quarters of people are concerned about steep rises in energy prices in the future.

This is consistent with the feedback we have heard. In March 2018 we asked workshop attendees to rank the most significant factors affecting electricity transmission in the future[2], cost to customers was ranked second behind security of supply.

"As a domestic customer, I would say that cost is the most important factor." – Attendee at our stakeholder event

Respondents to our February 2019 Emerging Thinking consultation[3] highlighted the cost of energy, with many advocating for the cost of the north of Scotland transmission network to be kept as low as possible. However this was tempered with support for the decarbonisation of energy and the need to maintain security of supply.

Figure 4.1 Worries about energy bills, 2012-2019



Source BEIS Public Attitudes Tracker, March 2019 (Wave 29)

Fuel poverty and vulnerability

Electricity transmission network costs make up £37 (3%) of the typical duel-fuel energy household bill of £1,117 each year[4]. Of this £37, the north of Scotland transmission network is around £4.50 (12%).

For some, this bill is hard to afford.

In Scotland[5], a household is in fuel poverty if: in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income on all household fuel use. Extreme fuel poverty indicates that a household would have to spend more than 20% of its income to maintain a satisfactory heating regime.

In 2017[6], 24.9% of households in Scotland were estimated to be in fuel poverty, with 7.0% living in extreme fuel poverty. The highest rates of fuel poverty are in the north **(Figure 4.2):** Highland (52%) and the Islands (50-59%).

The impact of fuel poverty is felt across society. The Scottish House Condition Survey notes that:

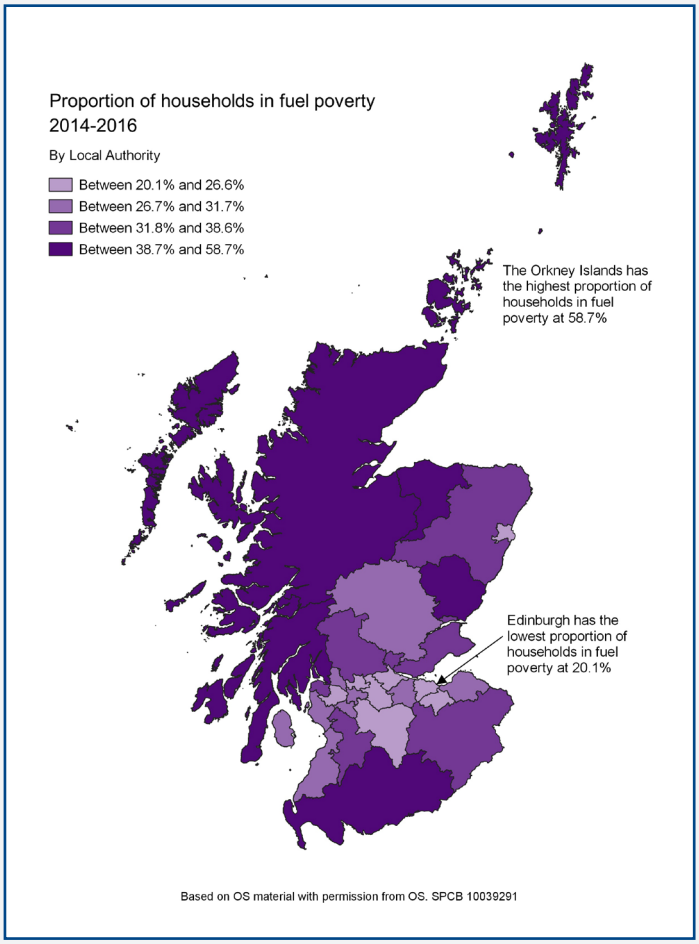
"Fuel poverty is affected by levels of household income, the price of fuel required for space and water heating, and the energy efficiency of housing. Fuel poverty under the current definition is distinct from poverty in that, while low income is an important driver, it is not a prerequisite... fuel poor households are found in all income bands."

Fuel poor households can also be vulnerable. Vulnerability issues are complex, and there are many ways in which consumers can be vulnerable. With our colleagues in the north of Scotland distribution network, Scottish Hydro Electric Power Distribution (SHEPD), and working with partner organisations, we believe we have an important role to support those who are in vulnerable situations or require additional advice or assistance.

You can read more about our approach and proposals to support communities, including the fuel poor and vulnerable consumers, in section 5.

[1]BEIS Public Attitudes Tracker, (BEIS, March 2019) available at: www.gov.uk/government/statistics/beis-public-attitudes-tracker-wave-29
[2]SSEN Transmission Stakeholder Workshop, (EQ, March 2018) available at: www.ssen-transmission.co.uk/media/2730/ssen-transmission-stakeholder-workshop-report.pdf
[3]Emerging Thinking, Your Plan, Our Future: RIIO-T2, (SSEN, February 2019) available at: www.ssen-transmission.co.uk/information-centre/industry-and-regulation/riio-t2/emerging-thinking-documentation
[4]Bills, prices and profits (Ofgem, May 2019) see: https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits
[5]In June 2018, the Scottish Government published a Bill that would introduce a new definition of fuel poverty that would target households in financial need.
[6]Scottish house condition survey: 2017 key findings, (Scottish Government, Dec 2018) available at: https://www.gov.scot/publications/scottish-house-condition-survey-2017-key-findings/

Figure 4.2 Proportion of households in fuel poverty 2014-2016



Source The Scottish Parliament background to the Fuel Poverty (Target, Definition and Strategy) (Scotland) Bill[7]

Responding to concerns about cost

Keeping costs down matters

While the north of Scotland transmission network element of the average household energy bill is relatively small (less than 1%), we understand that every part of the bill must be kept as low as possible. This was strongly expressed by stakeholders in response to our forecast household bill impacts for the RIIO-T2 period in our Emerging Thinking consultation.

The north of Scotland transmission network provides an essential public service: a safe and secure supply of electricity to homes and businesses. This includes the transportation of clean renewable energy, and being resilient to threats. There is a cost to providing this essential service and so our focus is on providing the service that our stakeholders want at an acceptable cost.

Being cost efficient

We define efficiency as the optimal use of resources (time, materials, people and money) to achieve a necessary outcome.

Broadly, in practice this means following a rigorous justification process before progressing a course of action:

- What is the desired outcome - is this supported by customers and stakeholders?
- What are the options to achieve that outcome?
- What are the relative costs and benefits of each option, including the timescale for achieving the outcome?

In some instances, where permitted by law and our licence, the conclusion of this process might be to do nothing. For example, stakeholders might express a desire for an outcome, but change their mind when faced with the associated costs or environmental consequences. As we described in section 3, we had examples of this when we presented stakeholders with options for investment during RIIO-T2.

We also believe there is an important role for third party providers and the competitive market in striving for cost efficiency. We do not have all of the answers about the options to achieve an outcome and do not always have the specialist expertise to deliver most cost-effectively. Through our Innovation Policy[8] and Capital Delivery Strategy[9] we seek to maximise the benefits to consumers through working with others.

Our experience of being cost efficient

The cost efficiency of electricity transmission can be challenging to assess due to the non-comparability of the networks and activities undertaken.

Academic studies

A major study of productivity in GB gas and electricity networks since 1990 undertaken by the University of Cambridge for Ofgem[10], showed productivity improvements for electricity transmission taking into account quality of service improvements. However, this study also highlighted the challenges of achieving and measuring productivity growth in industries with high capital investment and where wider benefits (such as decarbonisation and environmental improvements) are not taken into account.

The results and conclusions of the University of Cambridge study are consistent with a recent study by NERA that we commissioned to assess network productivity. We have two further studies underway on capital and operational efficiency.

[7]Fuel Poverty (Target, Definition and Strategy) (Scotland) Bill, (Greig Liddell, June 2018) available at: https://sp-bpr-en-prod-cdnep.azureedge.net/published/2018/9/3/Fuel-Poverty--Target--Definition-and-Strategy---Scotland--Bill/SB%2018-52.pdf
[8]https://www.ssen-transmission.co.uk/media/3390/111regulatory-framework_final-draft.pdf
[9]www.ssen-transmission.co.uk/riio-t2-plan/
[10]Productivity growth in electricity and gas networks since 1990, (Energy Policy Research Group, University of Cambridge, Dec 2018) available at: \https://www.ofgem.gov.uk/system/files/docs/2019/01/ofgem_productivity_report_dec_2018_1.pdf

Comparison with other transmission networks

The small number and big differences between the GB electricity transmission networks makes comparison of relative efficiency very difficult. Hence such benchmarking is explored using an international dataset of transmission operators.

We participate in a number of international benchmarking studies and use the findings to inform our business improvement activities. The most important of these studies are:

- The International Transmission Operations and Maintenance Study (ITOMS), which we are currently engaged in the fourth cycle of benchmarking. Our performance in previous ITOMS benchmarking has shown continual improvement and we now benchmark close to the median for both cost and service levels (see Figure 3.6 in section 3).
- The International Transmission Asset Management Study (ITAMS), which we participated in for the first time in 2018. ITAMS does not include cost benchmarking, but we have adopted best practice and learning from other network operators.
- The Council for European Energy Regulators (CEER) study to assess the relative cost efficiency of European electricity transmission operators. This study is underway having been delayed due to difficulties in achieving consistency in data inputs for the different networks.

Through participating in these types of study, we have established collaborative relationships with international transmission operators. We use these networks to share best practice in all of our activities. In the past year we have undertaken exchange visits with comparable networks in Finland and Australia.

Lessons learned

Our internal business procedures mandate lessons learned reviews following completion of all major projects and events. This includes capital investment, new IT systems, events resulting in network interruptions and implementation of new ways of working.

This can include the appointment of independent consultants or our internal assurance functions to undertake the lessons to learn review. We might also involve third parties, in particular the supply chain, in the review.

The learning from these ex-post reviews are shared widely and action plans put in place to address the findings. Given the significant scale of our capital investment, over £3 billion between 2010 and 2021, a focus of these reviews has been the cost-effectiveness of our approach to capital project development and delivery.

"Following the completion of our independent review, in general terms, we conclude that outturn costs on the project have been incurred on an efficient basis. SHE Transmission has demonstrated that effective and appropriate project governance has been applied throughout the project duration. Good cost controls have been in place to efficiently manage any changes deemed necessary. Cost variances relative to the original Asset Value Adjustment Event (AVAE) allowance are clearly understood and considered reasonable." – Independent audit of the Beauly Denny project

Three lessons from the RIIO-T1 period are central to our approach to achieving sector leading efficiency:

1. The criticality of comprehensive pre-construction works to achieve cost-effective project delivery. Our ex-post review of realised risk events during construction has resulted in an increased scope of pre-construction activities to remove or mitigate these type of events occurring.

2. Timely and targeted use of innovative technology and ways of working. Our decision to use the new Aluminium Core Composite Conductor (ACCC) allowed us to accelerate customers' connection works and realise benefits of £7.5 million within RIIO-T1.

3. Tailoring the procurement model to the overall programme of works. For RIIO-T1, the scale and remote location of the complete programme of capital investment meant securing appropriate and sufficient contracting resources was a significant risk and our procurement strategy was designed to manage this.

Many of the challenges we will face during the RIIO-T2 period are similar to those we have addressed over the past ten years. By building upon our experience, we are well placed to manage these challenges and so deliver cost-effective outcomes that keep down the household energy bill.

Efficient expenditure

Being efficient

There are four main categories for our controllable expenditure **(Figure 4.3):**

1 **Our day-to-day operating costs**
This includes the cost of inspection and maintenance, and the cost of responding to unexpected events (such as landslides, see page 65). We explain our approach to efficiently planning these activities in section 3.

2 **Other operating costs**
This includes IT, protection and control systems and running the control centre. We explain our approach to efficiently planning these activities in section 3.

3 **Capital investment in existing assets**
To maintain, refurbish or replace equipment on the network that is worn, damaged or at the end of life. We explained the risk-based approach to identifying the need for this type of investment in section 3. In this section we consider how we determine the most appropriate option for investment and set out our proposed investments during RIIO-T2.

4 **Capital investment in new assets**
For example, to grow the network to connect new renewable generators or to ensure the reliable performance of the network. In this section we explain how we identify the need and preferred option for this investment and set out our proposals for RIIO-T2.

For the eight years of the RIIO-T1 period, we forecast total controllable expenditure across all these categories of £3.3 billion or, on average, £410 million each year.

Figure 4.3 Controllable expenditure by category

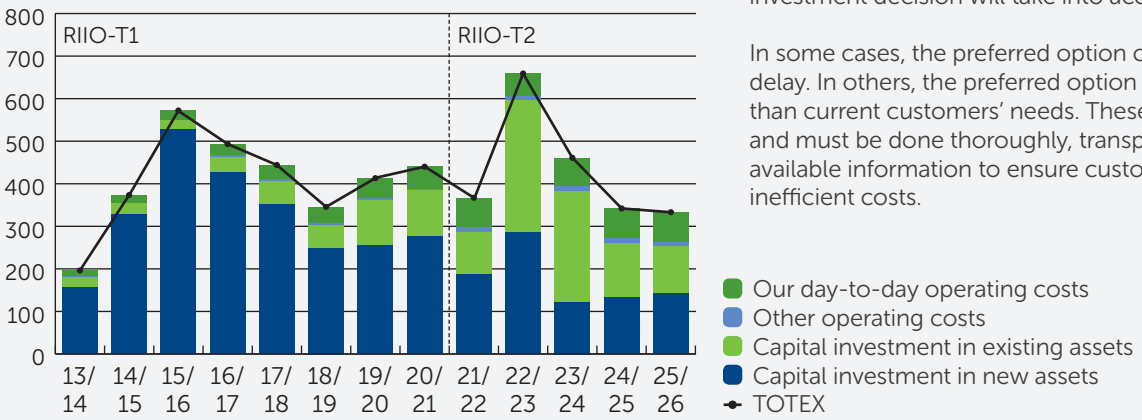
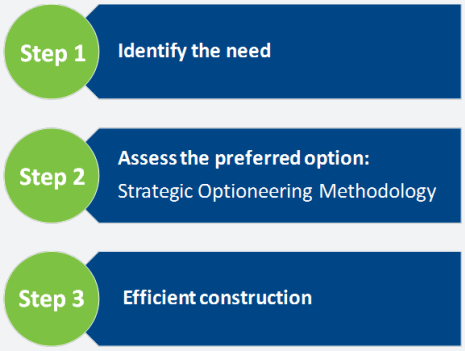


Figure 4.4 Overview of approach to capital investment



In our draft Business Plan, we present our 'Certain' scenario for RIIO-T2. This forecasts total controllable expenditure over the five years of £2.2 billion or, on average, £432 million each year. The majority of this expenditure is capital investment in existing or new assets, equating to £1.8 billion (82%). Given the quantum of the proposed investment, even small efficiency improvements can result in significant savings to the GB energy consumer.

This section of our draft Business Plan considers how we can be confident in the efficiency of our proposed capital investment programme due to the rigorous approach to identifying need, assessing the preferred option and efficiency in construction **(Figure 4.4).**

The most important thing we do, in the context of cost to customers, is decide there is a justified need for efficient expenditure. For this reason we invest significant time and analysis, including engagement with customers and stakeholders, in the pre-construction phase. We will spend up to 10% of the final investment cost in this phase.

This pre-construction assessment process can be complicated by the long life and high cost of transmission infrastructure. A decision to invest will impact our current customers and also future customers of whom we might not be aware. A balanced investment decision will take into account the needs of both.

In some cases, the preferred option can be to do nothing, or to delay. In others, the preferred option might be to build larger than current customers' needs. These decisions are a forecast and must be done thoroughly, transparently and with the best available information to ensure customers are not exposed to inefficient costs.

Identifying the need for investment

Scope

We explain here how we identify the need for capital investment in new assets to grow the network capacity or capability[11].

Drivers for investment

There are two principal drivers for investment:

1. Growth, or 'load related', drivers result from changes in connected generation and/or demand, including consequential changes in network operating characteristics.

2. Asset, or 'non-load related', drivers result from asset risk and other system needs such as resilience, black start and system access and system operability requirements (see section 3).

When we consider the need for capital investment in new assets (i.e. growth drivers), we also consider the local asset drivers. We can commonly realise significant savings by undertaking growth and asset driven capital investments at the same time.

The simplest case of a growth driver is the connection of a new generator through construction of the necessary transmission equipment. Similarly, growth in electricity demand may require the uprating of an existing, or installation of a new transformer to accommodate the increased power flow without unacceptable overloading. In the context of the wider transmission network, the aggregated effect of these changes will bring more significant capacity improvement requirements to the fore.

The role of the Electricity System Operator (ESO)
The new, legally separate ESO was established on 1 April 2019. The ESO is responsible for the real time balancing of supply and demand in electricity across GB. To do this, the ESO operates the electricity transmission network in real time including the procurement of balancing and system services. To prepare for future users' needs, the ESO works with the TOs on medium to long term network planning. The ESO also has specialist teams that provide a central connections and charging function for the GB transmission sector.

You can read more about the ESO here:
www.nationalgrideso.com/

nationalgridESO

A GB approach

When we consider the drivers and need for investment in the wider north of Scotland transmission network, it is essential to take a whole GB system approach.

The north of Scotland network does not operate in isolation. There are significant flows of power across the network boundary with the south of Scotland and shared operating characteristics. Efficient and co-ordinated network operation and development looks at the whole GB system (and, to an extent, the local distribution networks).

The GB transmission system has a common Security and Quality of Supply Standard (SQSS)[12] that stipulates the planning and operational criteria. All TOs and the ESO are obligated by licence to comply with the SQSS. We work with the other TOs and the ESO to apply the SQSS in the interests of all GB electricity network customers.

The SQSS sets out deterministic criteria for the outcomes that the GB transmission system must achieve. For example, it prescribes restoration times for interruptions in demand under specified system conditions. It is these criteria that large demands must be immediately restored that results in double (or triple) circuit security investments (i.e. construction of a back-up).

Power system studies reveal conditions which could lead to breaches of the SQSS criteria such as overloading of circuits, voltages outside planning limits or system instability. Breaches of the SQSS criteria could result in damage to assets or threaten system shutdown, leading to loss of supply.

The application of the SQSS through power system studies is forward looking. Thus we must make assumptions about the future use of the transmission network. For this, we use future energy scenarios.

Energy scenarios

ESO Future Energy Scenarios

Since 2011, the ESO has been preparing and publishing an annual suite of Future Energy Scenarios (FES) that outline credible pathways for the future of energy in GB for the next 30 years and beyond. The scenarios consider energy demand and supply on a whole system basis, incorporating gas and electricity across the transmission and distribution networks.

[11]The explanation of how we identify the need for capital investment in existing assets is in section 3
[12]Security and Quality of Supply Standards (National Grid ESO), available at: https://www.nationalgrideso.com/codes/security-and-quality-supply-standards

Future energy scenarios

The 2018 FES[13] set out four scenarios **(Figure 4.5):**

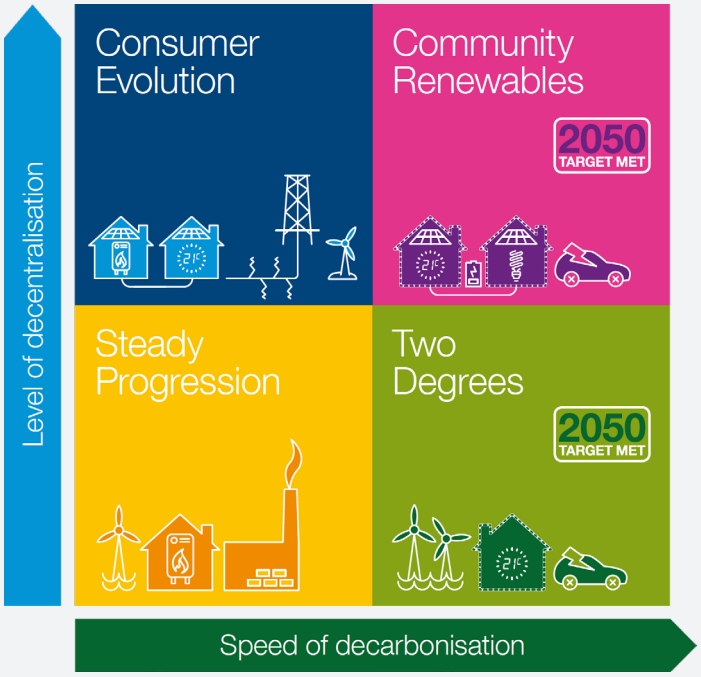
- Community Renewables under which the UK 2050 decarbonisation target is reached through decentralised energy sources;
- Two Degrees under which the decarbonisation target is met with large, centralised technologies;
- Steady Progression where current UK trends continue and the decarbonisation target is not met; and
- Consumer Evolution under which there is some decentralisation and some decarbonisation, but the targets are not met.

The FES takes a whole GB view of the future, with a focus on the UK's target to reduce greenhouse gas emissions by at least 80 per cent from 1990 levels by 2050.

North of Scotland Future Energy Scenarios

We work closely with the ESO in the development of the FES, and this has highlighted to us that there are significant differences in electricity use in the north of Scotland when compared to the GB average. For example, while commercial electricity consumption was declining at a GB level, it was increasing in the north of Scotland.

Figure 4.5 ESO Future Energy Scenarios 2018



Stakeholder-Led scenarios

Stakeholders were central to the development of the North of Scotland Future Energy Scenarios. Over 150 individuals and organisations were involved including through events, workshops, working papers, consultation and bilateral meetings.

"I have very much appreciated the opportunity to take part in the Future Energy Scenarios workshop."
– Argyll and Bute Council

In August 2018, following an 18-month Stakeholder-Led process, we published our North of Scotland Future Energy Scenarios (NoS FES)[14]. These scenarios complement the ESO FES, but consider in more detail the regional variations in potential energy supply and demand.

A key concern from stakeholders was to ensure that we prepare for the most and least ambitious decarbonisation outcomes recognising the important role of the north of Scotland in achieving UK targets. Hence we set out three scenarios:

- **Proactive Decarbonisation** where Scottish consumers are supportive of decarbonisation, increasing their use of renewables and engage in the benefits of decarbonisation and decentralisation at local levels;
- **Local Optimisation** where Scottish consumers and businesses are driven by cost reduction as well as decarbonisation, investing in decentralised, domestic microgeneration to reduce their spend on energy; and
- **Cost Limitation** where Scottish consumers are focused on cost reduction in energy bills. Decarbonisation is a secondary consideration, as a result there is low uptake in domestic microgeneration and little focus on decentralisation.

We are continuing to develop the NoS FES, and in particular work with SHEPD to expand these to a whole system basis encompassing transmission and distribution in the north of Scotland.

[13]The 2019 FES will be published on 11 July, and taken into account in our final RIIO-T2 Business Plan.
[14]North of Scotland Future Energy Scenarios (SSEN Transmission, August 2018), available at: www.ssen-transmission.co.uk/information-centre/industry-and-regulation/future-energy-scenarios/

Identifying the need for investment

Long term network planning

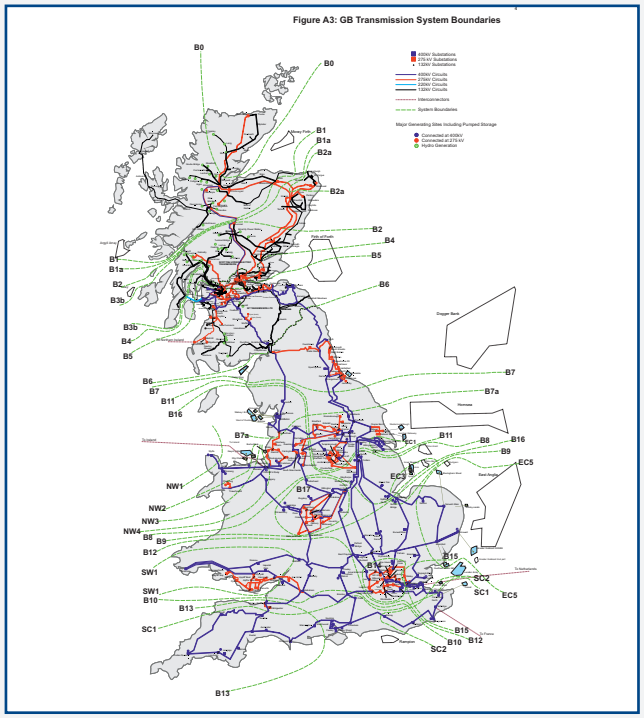
There is an existing framework for long term investment planning under the annual Electricity Ten Year Statement (ETYS)[15] and Network Options Assessment[16] (NOA) processes for GB:

- The ETYS presents the results of system modelling, using the SQSS and ESO Future Energy Scenarios, that describe future GB transmission system development requirements; and
- From the results of the ETYS, the TOs produce asset solutions to meet the required capability needs. These options, alongside system options are assessed through the NOA.

The outcome of the NOA is recommendations to the TOs to delay or continue identified capital investment options. In the January 2019 NOA report, we were given three "proceed" recommendations: for the Peterhead to Drax High Voltage Direct Current (HVDC link), the East Coast onshore 275kV upgrade, and the East Coast onshore 400kV incremental reinforcement. All three of these projects are in the Certain View material parts of our draft Business Plan.

Both the ETYS and NOA are whole GB system plans and, as such, consider the critical paths – known as boundaries **(Figure 4.6)** – for the bulk transport of power. The need for capital investment between boundaries is undertaken by the local TO.

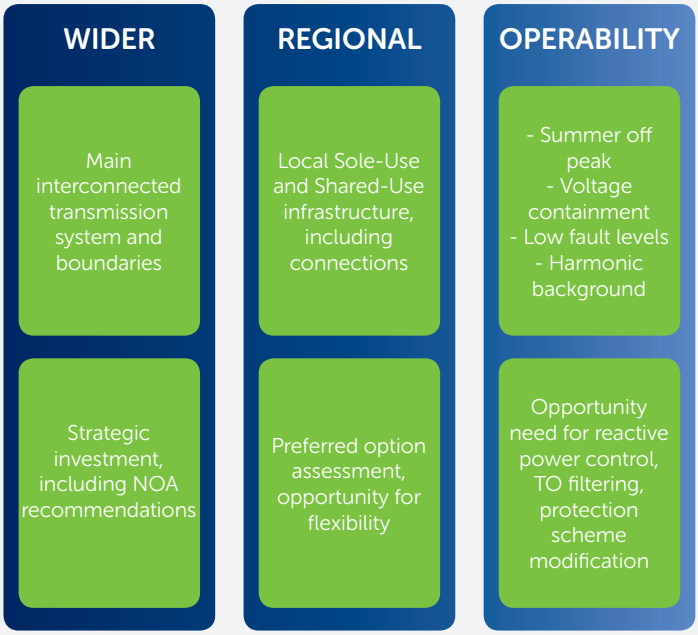
Figure 4.6 GB transmission system boundaries



The need for investment during RIIO-T2

Our approach to defining the need for capital investment to accommodate network growth during RIIO-T2 builds upon the existing industry framework and long term network plans. There are three parts to this work **(Figure 4.7).**

Figure 4.7 Our approach to RIIO-T2 planning



Wider system

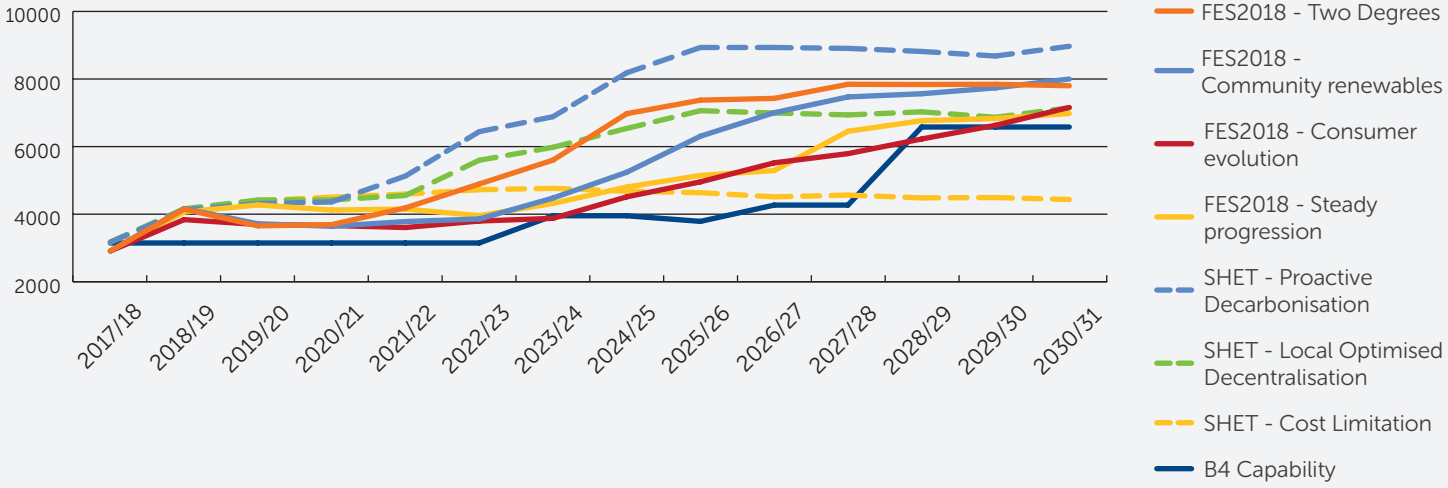
The growth of renewable generation in the north of Scotland, coupled to date with the relatively static gross demand, has seen an increase in the magnitude of north to south power transfer. This has driven significant network reinforcements over the past decade.

Both the North of Scotland FES and the ESO FES show a continuing need for boundary capacity increase during RIIO-T2 (with only the Cost Limitation scenario suggesting that modest further reinforcement may be required). **Figure 4.8** shows the expected required transfer of power across our southern boundary (B4).

It is based on this modelling that the NOA recommends we proceed with reinforcement options. The NOA also considers commercial solutions to reduce the costs due to network constraints. These solutions can allow the ESO to manage constraints pending the delivery of infrastructure reinforcement. We are continuing to work with the ESO[17] and customers on opportunities for such commercial solutions during RIIO-T2.

[15]Electricity Ten Year Statement, (National Grid ESO, November 2018) available at: www.nationalgrideso.com/insights/electricity-ten-year-statement-etys
[16]Network Options Assessment 2018/19, (National Grid ESO, January 2019) available at: www.nationalgrideso.com/insights/network-options-assessment-noa
[17]We propose that the ESO has the ability to direct investment under a new licence condition

Figure 4.8 Required power transfers at our southern boundary (B4)



Regional

Our regional approach maintains compliance with the SQSS between the critical system boundaries. In general, this is driven by the need to connect new generation. However our NoS FES also identifies potential SQSS issues arising from changes in the nature of demand, in particular the electrification of transport. We define two types of investment:

1. Sole-Use infrastructure, with a single user of the transmission equipment. Most commonly this is the local connection infrastructure to connect a generation customer to the nearest point on the existing network.

2. Shared-Use infrastructure, where there are multiple users (generators and demand) of the network assets. Shared-Use infrastructure is not critical path that crosses a system boundary.

The need for Sole-Use and Shared-Use infrastructure can be highly uncertain due to the uncertain nature of the drivers. For example, the certainty over which customer will connect and when. For this reason we set out in our draft Business Plan our Certain View only, based on consented customer projects with known investment pathways. Like the RIIO-T1 period, we propose that uncertainty mechanisms are put in place to facilitate the currently uncertain Sole-Use and Shared-Use infrastructure.

We will work with current and future customers to understand their needs and network requirements

Operability

The growth in renewable generation customers connected to the north of Scotland transmission network (including the use of flexible access arrangements) has created particular challenges for the Safe and Secure Operation of the Network:

- A drop in voltage performance. To address this, we invest in reactive compensation equipment;
- Conversely high voltage events in low wind conditions. Specialist equipment, e.g. STATCOMS, can provide dynamic voltage support at strategic network sites;
- Widening extent power quality issues such as flicker and harmonic distortion. We can use equipment (for example, filters) to remedy these disturbances; and
- Reduced fault currents, requiring re-setting of protection systems.

These operability issues are exacerbated by the closure of conventional thermal generating stations. The loss of these stations weaken the historic response to a Black Start situation, and we are working with the ESO to identify network solutions (e.g. synchronous condensers) that would provide whole system benefits.

Innovation, whole system and flexibility

Throughout our approach to long term system planning, we are active in pursuing new means to achieve better outcomes for customers and end consumers.

Given the unique characteristics of the north of Scotland energy system, we have long developed whole system options working with customers, SHEPD and more recently the ESO. As a consequence, over a quarter of our connected generation customers use active network management schemes.

We also target innovations that meet system planning needs. Considering, for example, the need to maximise line ratings we have developed real time line ratings, new tower types and new conductor technology.

Identifying the preferred investment option

Scope

From our risk-based approach to managing our assets (section 3) and GB-wide approach to system planning (above), we can identify a clear and justified need for capital investment during RIIO-T2 in four categories:

1. Strategic boundary capability reinforcement to accommodate increased north to south power flows, largely due to increasing installed renewable generation in the north of Scotland and interconnection to other jurisdictions. This is **Strategic Infrastructure.**

2. Regional investments to connect new renewable generation and accommodate changes in the use of energy due to electrification. This is **Sole-Use and Shared-Use Infrastructure.**

3. System driven investment to ensure the operability of the network with a more flexible generation and demand mix, and provide commercial alternatives to reinforcement. This is **System Infrastructure.**

4. Asset risk driven investments to replace assets in poor condition, performing below expectations or of undue risk to the environment or public, and maintain the integrity of the existing transmission system. This is **Non-load Related Infrastructure.**

These categories are not progressed in isolation from each other. Asset risk driven investment, work to address operability or network access issues, or black starting of the system may have overlaps with growth driven reinforcement requirements. These overlaps can influence the preferred option. These aspects are considered in an interactive approach that takes initially independent drivers and considers opportunities to accommodate these in a combined and coordinated solution.

We also seek to develop the network in a way that maximises existing route corridors and infrastructure where practicable. This supports our wider sustainability and environmental considerations (see section 5). Thus we will explore:

- Network management options;
- Reconfiguration (for example of busbar running arrangements or circuit connection points);
- Uprating of existing circuits (for example by reprofiling to operate at higher temperatures or reconductoring with higher capacity conductors); and
- New build infrastructure alongside or in place of existing network assets

To be efficient is essential that we identify the most cost effective option to meet this system need.

Strategic optioneering assessment

The purpose of strategic optioneering is to gather all of the necessary information to be able to make an informed and justified selection of the preferred option to meet a network outcome. This accounts for all synergies between scheme types and drivers across a geographical region and thus ensures the overall system delivered provides a holistic benefit.

Doing this thoroughly and effectively results in:

- A robust regional solution that takes account of multiple drivers;
- Comprehensive input to CBA for investment justification;
- Fully developed project solutions ready for delivery as part of a co-ordinated regional plan.

Therefore an investment can be delivered most cost-effectively and on time.

We have published with our draft Business Plan our Strategic Optioneering Methodology. This follows consultation on our transmission asset development process in late 2018. The key findings from that consultation was the need for us to be more transparent, to engage earlier in the project development lifecycle and to engage on the long term strategic development of the network (in addition to individual investments). We accept all of this feedback and have revised our methodology accordingly.

The building blocks of the strategic optioneering assessment are shown in **Figure 4.9**.

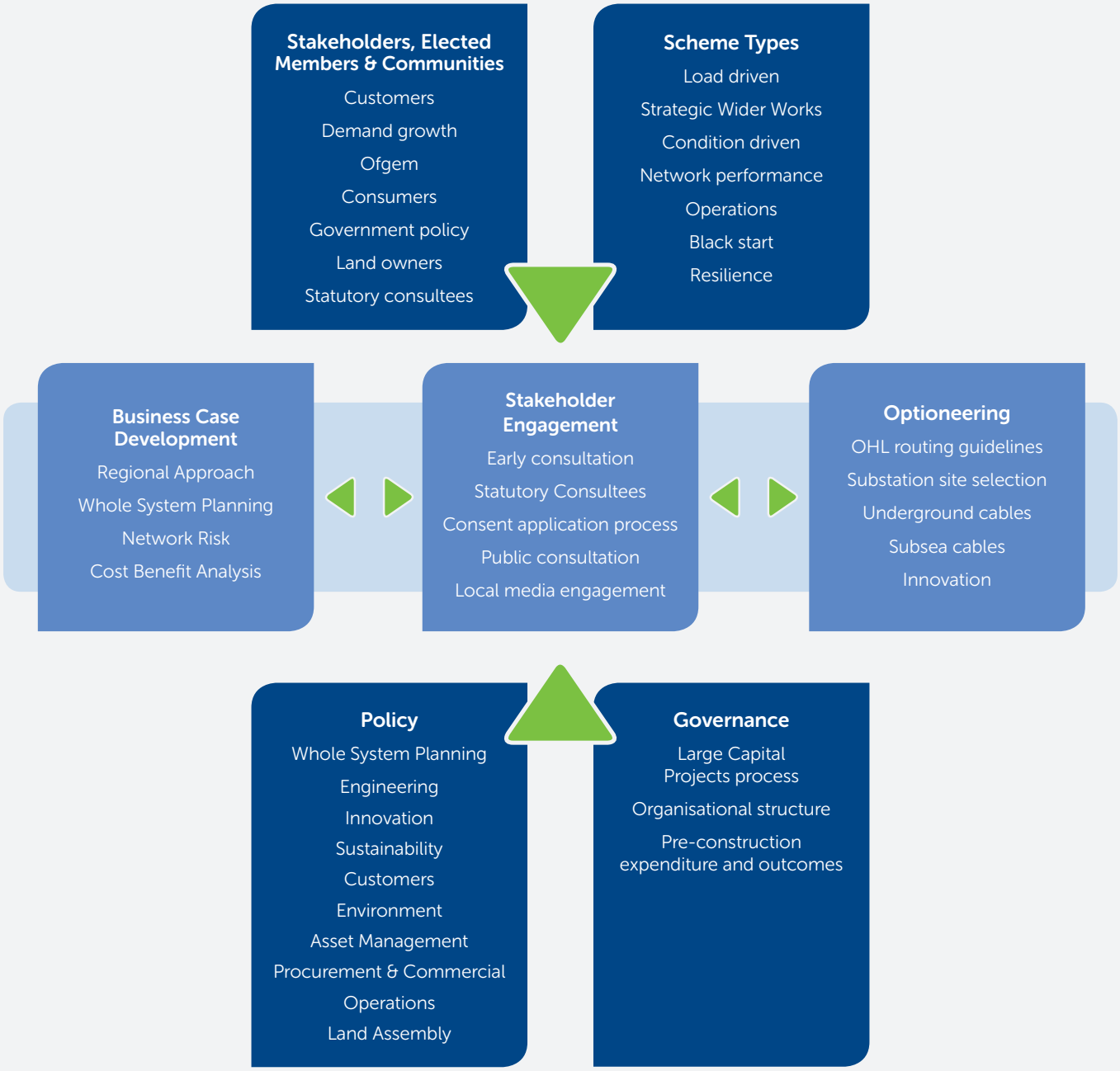
Regional approach

We undertake strategic optioneering by region, with a lead manager responsible for all network developments in that area. Each region has specific characteristics, both electrically and geographically. The multi-disciplinary regional team, using their knowledge and experience of that region, are tasked with developing an economic and co-ordinated whole system solution.

The regional team includes stakeholder and community liaison specialists. The active engagement of local stakeholders (communities, businesses and statutory authorities) occurs throughout the optioneering process and will strongly influence the outcomes (see case study on page 103).

Strategic optioneering assessment

Figure 4.9 Strategic Optioneering Methodology for transmission investment



Options development

For a clearly defined network need, and with a continual programme of stakeholder engagement, the initial stage of strategic optioneering assessment is the identification of viable options to meet that network need and society.

The definition of options uses a comprehensive body of internal policies, such as: health and safety specification; engineering and technical standard; environmental management and impact; asset management and network risk; and operational procedures. These policies are not static, but incorporate national and international standards, new legislation, learning and business practice, and our Strategic Themes.

Taking these policies together, the regional development team will establish a long list of viable options. At this point there might be an initial filter of, for example, high cost or high environmental impact options.

The next stage, which can take many years to complete, is the detailed options development. This starts with a holistic regional view of, for example, existing land use, water courses, ground conditions, and environmental designations. Defining potential locations requires close engagement with local land owners, statutory authorities, communities, businesses and other interest groups.

Through these investigations, a preferred route corridor and/or preferred sites will be identified. These preferences will be established through balancing:

- Technical factors, such as ease of connectivity to the existing network, access, ground conditions, proximity of watercourses, proximity to other infrastructure, topography, altitude and physical size of asset;
- Environmental factors, including avoiding international and regional designated sites, proximity to urban environments and major settlements, amenity of land use, areas prone to flooding, impact on biodiversity and noise;
- Cost, considering the whole life cost of options and the associated whole life benefits; and
- Impact on stakeholders, including but not limited to, local communities and businesses, visitors and interest groups, the customers that will benefit from the infrastructure, and the impact on consumers

Further detailed studies are then undertaken to refine the alignment of linear infrastructure (overhead lines or cable) and static sites (substations or switching stations). These studies are comprehensive: habitat surveys, landscape and visual assessments, peat probing and ground sampling, local water use. Again stakeholder engagement is essential throughout. For example, 3D visualisation of specific options can assist in understanding the potential impacts and aid refinement.

Option selection

It is only after this comprehensive, multi-year process that a final option is selected. We have a best practice gated-based governance process to ensure that all of the necessary steps are followed and evidence gathered before the final option can be selected.

Once the final option is selected, we will undertake further detailed environmental assessments in accordance with the relevant Environmental Impact Assessment (EIA) regulations where this is identified as a requirement. For projects that do not fall under these regulations, we undertake voluntary environmental appraisals to ensure all potential environmental impacts are assessed and appropriate mitigation measures put in place for the construction and operational phases of the development.

Cost Benefit Analysis

Cost Benefit Analysis (CBA) is a valuable modelling tool that we use to assist in strategic optioneering assessments.

The principle of CBA is to systematically consider the strengths (benefits) and weaknesses (costs) of alternatives to determine which of the options, if any, present the greatest net benefit. As far as possible, CBA is quantified; that is, a monetary value is ascribed to each of the strengths and weaknesses. Also the CBA will be conducted over the whole cost and the whole life of the options.

Traditionally in energy networks, CBA will compare capital costs and energy transported (measured by avoided constraints). This is increasingly recognised as a very narrow view of the role of energy networks given the wider socio-economic and environmental impacts of energy. As part of our Sustainability Strategy (page 134), we are committed to develop and implement a full variable CBA methodology.

We also use a variant of CBA in the assessment of system need and in the risk-based approach to determining the need for asset replacement.

The importance of the pre-construction period for the identification and development of the preferred investment option cannot be understated. This includes the involvement and participation of the impacted communities (Case study 1 below) and identification of environmental factors (Case study 2 below). Without comprehensive and rigorous pre-construction to identify and mitigate project risks, a suboptimal option might be chosen with consequential increases in cost, delays or undue socio-environmental impacts.

Case study 1

Lairg Loch Buidhe overhead line
In order to enable the connection of new renewable customers in Caithness, we have undertaken a five year consultation to understand and address the needs of local residents.

Initial options were discussed with the community in 2013-15 which highlighted complex concerns with visual amenity and landscape impacts, proximity to dwellings, and construction disruption. Following further discussions in 2016 and early 2017, we undertook further studies and put forward revised proposals in late 2017. At the request of community members who could not attend, we repeated this session and then held a final event three months later to address residual concerns.

An important part of this consultation was the use of our innovative 3D visualisation technology, which allows users an immersive experience of the proposed infrastructure.

As a result of this detailed consultation and engagement, we changed both our preferred substation location and the routing of the overhead line around Lairg.

Lairg Loch Buidhe is included in the Certain View on which our draft Business Plan is based. You can read more about the project and this engagement at **www.ssen-transmission.co.uk/projects/lairg-loch-buidhe/**

Case study 2

New transmission infrastructure to connect the Orkney Isles
In response to the need of renewable energy customers looking to connect, we have developed proposals for new transmission infrastructure to connect the Orkney Isles to mainland Scotland. Critical to the finalisation of the subsea cable route and substation location archaeological considerations were explored during the pre-construction subsea surveys and site-specific digs.

Scapa Flow has rich natural, cultural and archaeological interest. Wrecks in Scapa Flow are designated as Scheduled Monuments, and the Scottish Government is currently consulting on designating Scapa Flow a Historic Marine Protected Area. Detailed subsea surveys were essential to the determination of the cable route, to avoid and minimise the impact on that environment and archaeology.

Neolithic monuments on the Orkney mainland were proclaimed an UNESCO World Heritage Site in 1999. As part of pre-construction works for the main substation location near Finstown we have commissioned extensive archaeological investigations of the site, extending this programme in conjunction with Orkney Historic Scotland, in light of early discoveries. This has uncovered domestic structures, a burial cist and pottery.

Bronze Age Cist discovered at the proposed Finstown Substation Site, Orkney.
www.orca-archaeology.org

Proposed capital investment during RIIO-T2

Overview of proposed investment

The following pages set out, by region, the proposed capital investment projects during RIIO-T2 for the Certain View. This is: strategic investment, Sole-Use and Shared-Use infrastructure, non-load related infrastructure and system infrastructure. Some individual investments meet multiple network needs, e.g. for growth and asset replacement. These investments have been identified and defined using the process described in the preceding pages:

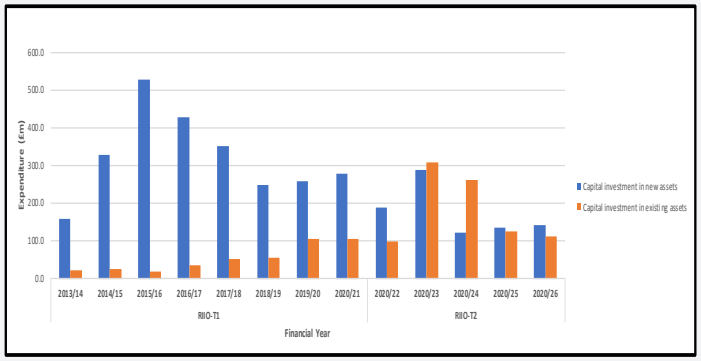
1. A clear, evidence-based and justified need; and
2. Comprehensive strategic optioneering assessment to determine the preferred option.

For some of the proposed investments, given the time gap between our draft Business Plan and the start of construction, the detailed options development is still ongoing. This includes engagement and statutory planning requirements. Our December Business Plan will be updated for this ongoing work.

Of particular note, we are currently undertaking an options review for the growth and asset driven need on the Fort Augustus to Skye overhead line. This has been based on stakeholder feedback and changing customers' requirements. Our final proposal for this project will be in the December Business Plan.

In our draft Business Plan, for the Certain View, we forecast capital investment in existing or new assets of £1.8 billion over the five years of RIIO-T2, or on average £356 million each year **(Figure 4.10).** This compares with an equivalent average annual capital expenditure during RIIO-T1 of £375 million.

Figure 4.10 CAPEX for RIIO-T1 and RIIO-T2



Overview of proposed investment

Our rigorous approach to assessing the need for future development of the north of Scotland transmission network involves undertaking modelling many potential futures, each a future energy scenario. The scenarios we use are the ESO FES and our North of Scotland FES.

These scenarios are invaluable in our planning to, for example:

- Provide insight into the local drivers impacting future development and how these vary regionally;
- As a platform to consider other areas of the energy system (distribution, heat, transport) as we move towards a whole system planning approach; and
- To quantify the range of uncertainty and, hence, how this can be most effectively managed to avoid inefficient expenditure or outcomes.

However, we cannot present a Business Plan for each of these possible futures. Taking the four ESO FES and three NoS FES for connected generation alone, this envisages a range of outcomes by 2025/26 of between 8.6GW and 15.7GW **(Figure 4.11).** There is also a mismatch between scenarios based on hypothetical outcomes, and a Business Plan which must be based on evidence-based and justified need.

To resolve this, we consider our draft Business Plan with two parts:

1. The Certain View which incorporates all outputs and expenditure that have a known, well justified need, i.e. a 'bottom up' view of demonstrable network requirements. This includes asset driven investments, along with generation connections already 'in flight' and strategic investments with a strong NOA "proceed" signal. It also includes the associated operational expenditure.
2. An additional Uncertain element, from which we know something will be required but we can't be certain what at this time. A "known unknown". This incorporates future generation connections where we have a connection agreement with the customer, but the decision to proceed is not yet certain. It also uses the energy scenarios as a basis for medium to long term network planning and strategic optioneering.

Our draft Business Plan presents the Certain View only. We are confident in the case for delivering these outputs in the RIIO-T2 period. Thus this presents a certain view of the outcomes, expenditure forecast and cost to consumers. In December, we will propose this Certain View for Ofgem upfront funding approval.

For the Uncertain element, we do not believe it is appropriate to present a case for outputs and expenditure that, at this time, cannot be justified. Instead we propose that regulatory mechanisms are put in place to release funding for outputs only once that justification can be made. This approach avoids exposing customers and ourselves to unnecessary risk and cost.

The following pages set out the capital investments from the Certain View that we propose to take forward during RIIO-T2.

The ENA Core Scenario

As part of the RIIO-2 regulatory process, Ofgem and its RIIO-2 Challenge Group[18] asked the GB energy networks to work together to establish a common 'core' future energy scenario. This work has been co-ordinated through the Energy Networks Association (ENA).

The approach adopted to establishing this core scenario was to identify the key drivers of energy networks for the RIIO-2 period. Initially these drivers were to apply across all four types of energy network (gas and electricity, transmission and distribution), but given the resultant range this was subsequently refined to key drivers for each of the four sectors.

A summary of the identified drivers for electricity transmission are shown in the table below. This table indicates the degree to which the named driver is material across the whole of GB, highlighting the regional variability in network drivers. This regional variability is reflected in our North of Scotland Future Energy Scenarios.

Category	Key Drivers	Sub-elements	Majority view (based on Dec '18 work)	2017 position	FES 2030 Lower end	FES 2030 Upper end
Generation	Onshore wind (GW)	Transmission connected only	Medium - Broad consensus	6.1	9.3	12.4
Generation	Nuclear (GW)	Large nucler only	Low - broad consensus	9.2	1.2	9
Generation	Distribution Connected Generation (GW)	Solar, waste, biomass, hydro	Medium - Broad consensus	20.4	29.6	52.5
Generation	Other Gen (GW)	Hydro, CCGT, Marine, CCS, Coal	Low - wide range of views	31.73	23.02	41.1
Balancing	Interconnectors (GW)		Medium - Broad consensus	0	9.8	19.8
Balancing	Storage	Pumped Hydro, Distribution batteries, transmission batteries and other storage	Medium - Broad consensus	0	5.49	9.16
Demand	Low Carbon Vehicles (m)	PEVs, PHEVs, Number (m)	High - broad consensus	0.06	2.67	10.62
		Demand (GW)		0.1	2.6	8.1
Demand	Heat ('000 properties)	Number of heat pumps, properties served by district heating	Low - broad consensus	488	1050	5440
Demand	Underlying Peak demand (GW)	All demand, balancing and DG components	High - broad consensus	59.4	60.8	62.9

Figure 4.11a NGET Future Energy Scenarios

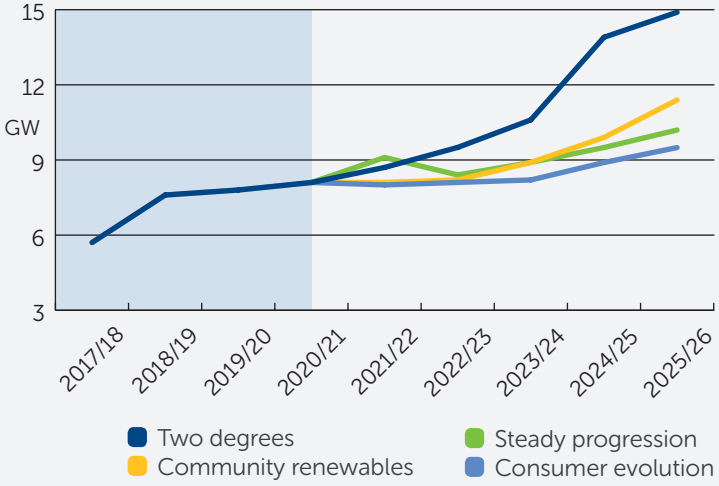


Figure 4.11b North of Scotland Future Energy Scenarios

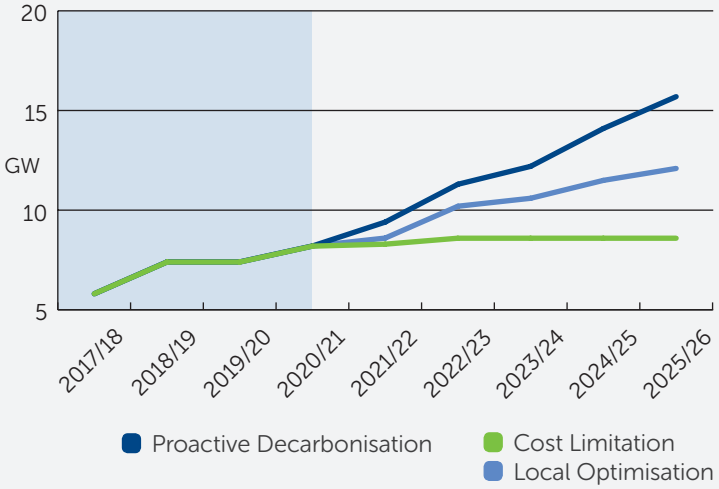
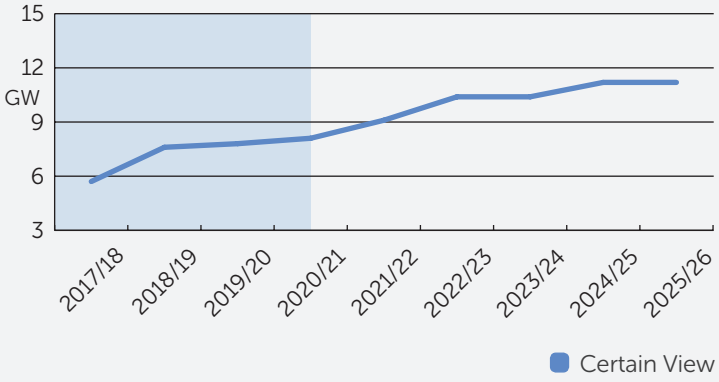


Figure 4.11c Certain View



[18]The RIIO-2 Challenge Group was established by Ofgem to provide independent scrutiny of networks' Business Plans. See Challenge Group Terms of Reference, (Ofgem, November 2018) available at: www.ofgem.gov.uk/publications-and-updates/riio-2-challenge-group-terms-reference

Certain View: Eastern

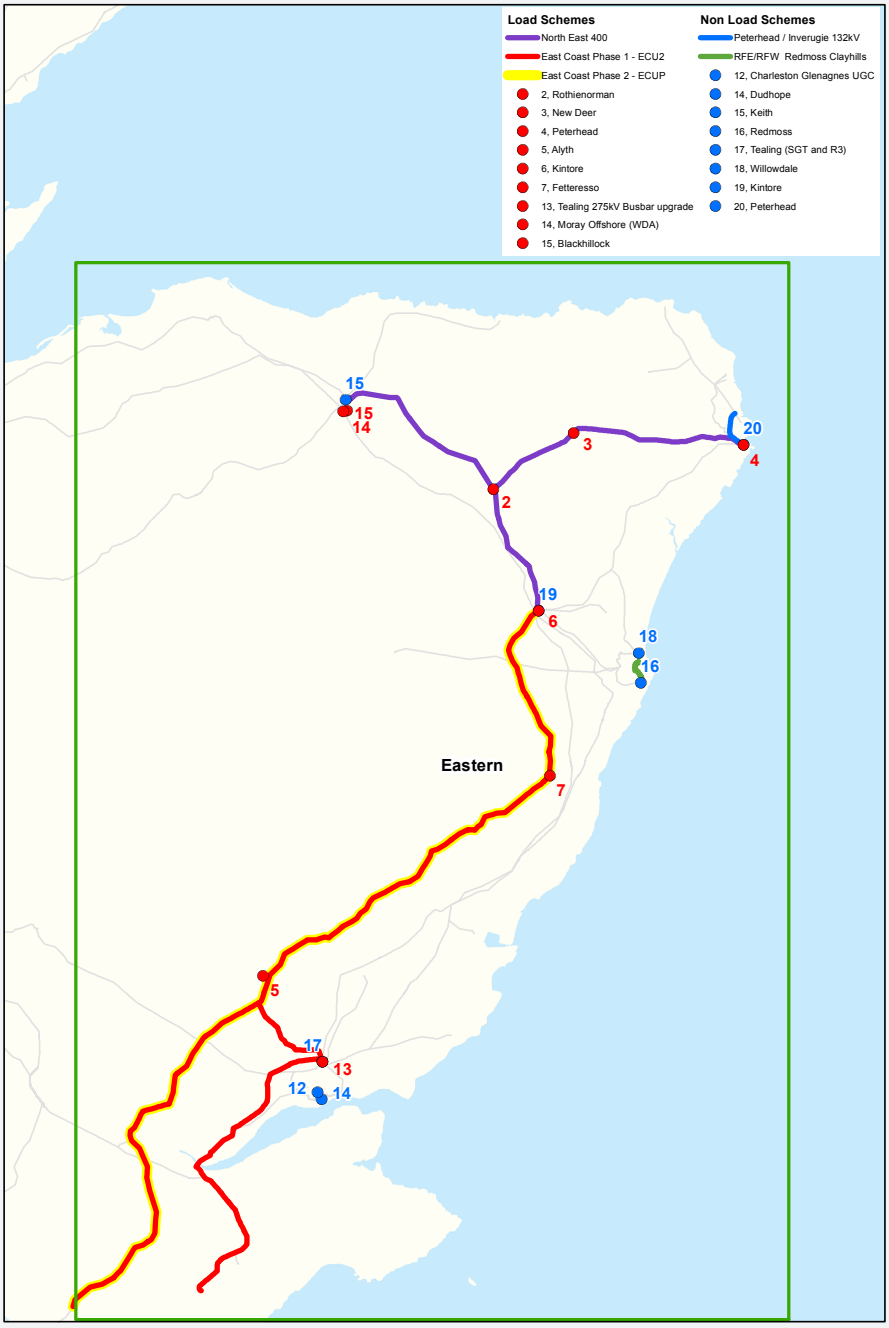


Figure 4.12 Eastern region Certain View schemes

Background

Significant amounts of offshore wind customers as well as the new interconnector to Norway (North Connect) are driving the portfolio of works in the region as well as asset condition considerations. The portfolio in this area demonstrated large volumes of renewables generation and therefore bulk power transfer requirements across the key transmission network boundaries. We also expect an increased demand for the connection of battery and photovoltaic customers during the RIIO-T2 period.

Certain View - costs and outputs

Anticipated RIIO-T2 Expenditure - £857m

Offshore Wind – 1875MW

Onshore Wind – N/A

Additional Shared Use Capacity - 720MVA

Boundary Uplift – 1090MW, Boundary B4

NARMS Output TBC

Your feedback

Regional roadshows will take place at various locations during August this year to invite feedback from our key stakeholders on our proposed plans and expenditure during the RIIO-T2 period.

12th August – Aberdeen
16th August – Perth

Certain View - Load Related Schemes					
Scheme Name	Asset Category	Scheme Description	Output	RIIO-T2 Cost	Scheme duration
Moray Offshore WDA	Sole Use	New 400KV Bays @ Blackhillock s/s	800MW	£6 million	2022-2023
Tealing 275kv Busbar	Shared Use	Connection for Firth of Forth Offshore w/f	1075MW	£19 million	2018-2023
North East 400			**720MVA**	**£165 million**	
Kintore substation extension	Shared Use	2 x 400/275kV transformers	inc above	inc above	2019-2024
New Deer 400kv Upgrade	Shared Use	Convert exisiting s/s to 400kV operation	inc above	inc above	2019-2024
Peterhead 400kv Busbar	Shared Use	New 400kV susbstation & transformers	inc above	inc above	2017-2024
Peterhead to Rothienorman 400kv Upgrade	Shared Use	Reinsulate & Conductor Replacement	inc above	inc above	2017-2024
Rothienorman 400kv Upgrade	Shared Use	New 400/275kV transformers (x4)	inc above	inc above	2019-2024
East Coast Phase 1 - ECU2:			**610MW, B4**	**£180 million**	
Alyth Substation	SWW	New 275kV switching station	inc above	inc above	2017-2024
Errochty Intertrip	SWW	Intertrip scheme	inc above	inc above	2019-2024
Kintore / Fetteresso / Alyth 275kV (224km DC tower line)	SWW	Reprofiling of existing OHL circuit	inc above	inc above	2020-2026
Tealing PSTs	SWW	Installation of new Phase Shifting Tx's	inc above	inc above	2019-2024
East Coast Phase 2 - ECUP:			**480MW, B4**	**£245 million**	
East Coast 400kv OHL Upgrade	SWW	OHL Reinforcement to operate @ 400kV	inc above	inc above	2022-2026
Kintore 400kv Busbar	SWW	Substation ext to operate @ 400kV	inc above	inc above	2022-2026
Alyth 400kv Upgrade	SWW	Substation ext to operate @ 400kV	inc above	inc above	2022-2026
Fetteresso 400kv Upgrade	SWW	Substation ext to operate @ 400kV	inc above	inc above	2022-2026
Blackhillock PSTs	SWW	Installation of new Phase Shifting Tx's	inc above	inc above	2022-2026
Total				**£615 million**	

Certain View - Non Load Related Schemes					
Scheme Name	Asset Category	Scheme Description	Output	RIIO-T2 Cost	Scheme duration
CGN/CGS (Charleston (Elmwood)/Glenagnes)	NLRE	Replacement of 3.6km 132kV UGC	NARM	inc below	2019-2023
Dudhope GSP	NLRE	Replacement of existing Tx's	NARM	inc below	2021-2026
Keith	NLRE	Replacement GIS switchgear	NARM	inc below	2021-2025
Kintore	NLRE	Replacement GIS switchgear & Tx's (x4)	NARM	inc below	2021-2025
Peterhead	NLRE	Replacement Tx's (x2)	NARM	inc below	2021-2025
Peterhead / Inverugie 132kV (8km DC tower line)	NLRE	Replacement tower fittings	NARM	inc below	2021-2024
Redmoss	NLRE	Replacement Tx's & Switchgear	NARM	inc below	2022 -2023
RFE/RFW (Redmoss/Clayhills)	NLRE	Replace existing 132kV UGC (4.8km)	NARM	inc below	2021-2024
Tealing (SGT and R3)	NLRE	Replace SGT3 & Reactor R3	NARM	inc below	2021-2026
Willowdale	NLRE	Replacement of GT(x2) & switchgear	NARM	inc below	2022-2026
Total				**£242 million**	

Case study - Eastern upgrades

Background

The need to reinforce the transmission network in the east and north-east of Scotland has been demonstrated through the Network Options Assessment (NOA) process. The latest NOA report (published in January this year) recommended investment in the east coast network by 2026 in a two-stage approach and in the HVDC link from Peterhead to England with the associated AC onshore works at both ends by 2029.

North East 400 reinforcement

The local connections driving the North East 400 reinforcement are the contracted connections - 900MW Moray East Offshore windfarm (2021), 800MW Moray West Offshore windfarm (2024), increase in Peterhead capacity to 1180MW (requires works to be delivered by 2021) and the 1400MW NorthConnect interconnector to Norway (2023). The scope of the North East 400 reinforcement includes the construction of New Deer and Rothienorman 400kV substations by 2021 and the Peterhead 400kV busbar by 2023 to support these local drivers. The North East 400 reinforcement will be delivered ahead of the NOA recommended dates to facilitate these customer connection dates.

East Coast phase 1 & 2 reinforcements

The NOA options for the east coast onshore reinforcement include (i) the Eastern 275kV Onshore Reinforcement (ECU2) in 2023, (ii) the Eastern 400kV Onshore Incremental Reinforcement (ECUP) in 2026, following ECU2 and (iii) the Eastern 400kV Onshore Reinforcement (ECU4) in 2025.

The NOA considered two paths for the east coast onshore upgrade to 400kV namely; (a) ECU2 followed by ECUP (i.e. East Coast phase 1&2 reinforcements) and (b) ECU4. The NOA CBA results indicated that the combination of ECU2 and ECUP outperforms ECU4 in all 2018 Future Energy Scenarios (FES) by £84m to £415m as shown in the table below. The lower benefit of £84m is based on the Consumer Evolution scenario which is an outlier for our area. The benefit of the phased approach is due to the capacity delivered by ECU2 earlier in 2023 which significantly reduces constraints on the SHE Transmission/SPT border (boundary B4).

2018 Future Energy Scenario

	Two degrees	Community Renewables	Consumer Evolution	Steady Progression
Benefit of (ECU2 + ECUP) vs ECU4	£278m	£415m	£84m	£199m

ECU2 delivers significant capacity on B4 in 2023 ahead of the alternative ECU4 which would deliver the same capacity as (ECU2 + ECUP) later in 2025. A further capacity increase on B4 will be realised by the Peterhead to Drax HVDC link (E4D3) in 2029. It is important to note that the NOA CBA also indicated that further reinforcement is required beyond the HVDC link and also that any advancement in these eastern reinforcements will reduce the overall costs to GB consumers (indicative benefit from ESO of c.£400m/annum for advancement of E4D3). The required boundary transfers show that transmission reinforcements are trailing the requirements in the majority of the scenarios including our own North of Scotland FES **(Figure 4.8).**

Condition assessment of the existing conductors between Blackhillock, Rothienorman and Peterhead have established that the conductors should be replaced between 2026 and 2031.

Considering the NOA recommendations, local drivers and asset condition, an opportunity assessment has identified an approximate capital cost saving of £56m through the removal of abortive works and reduction in construction outages by up to 70 weeks. This assessment concluded that the most coordinated, economic and efficient strategy for delivering the North East 400 reinforcement is to align delivery of the Peterhead 400kV busbar and the connection of NorthConnect in June 2023, and to concurrently reinsulate and reconductor the overhead lines between Blackhillock, Rothienorman and Peterhead.

Certain View: Caithness, Orkney and Shetland

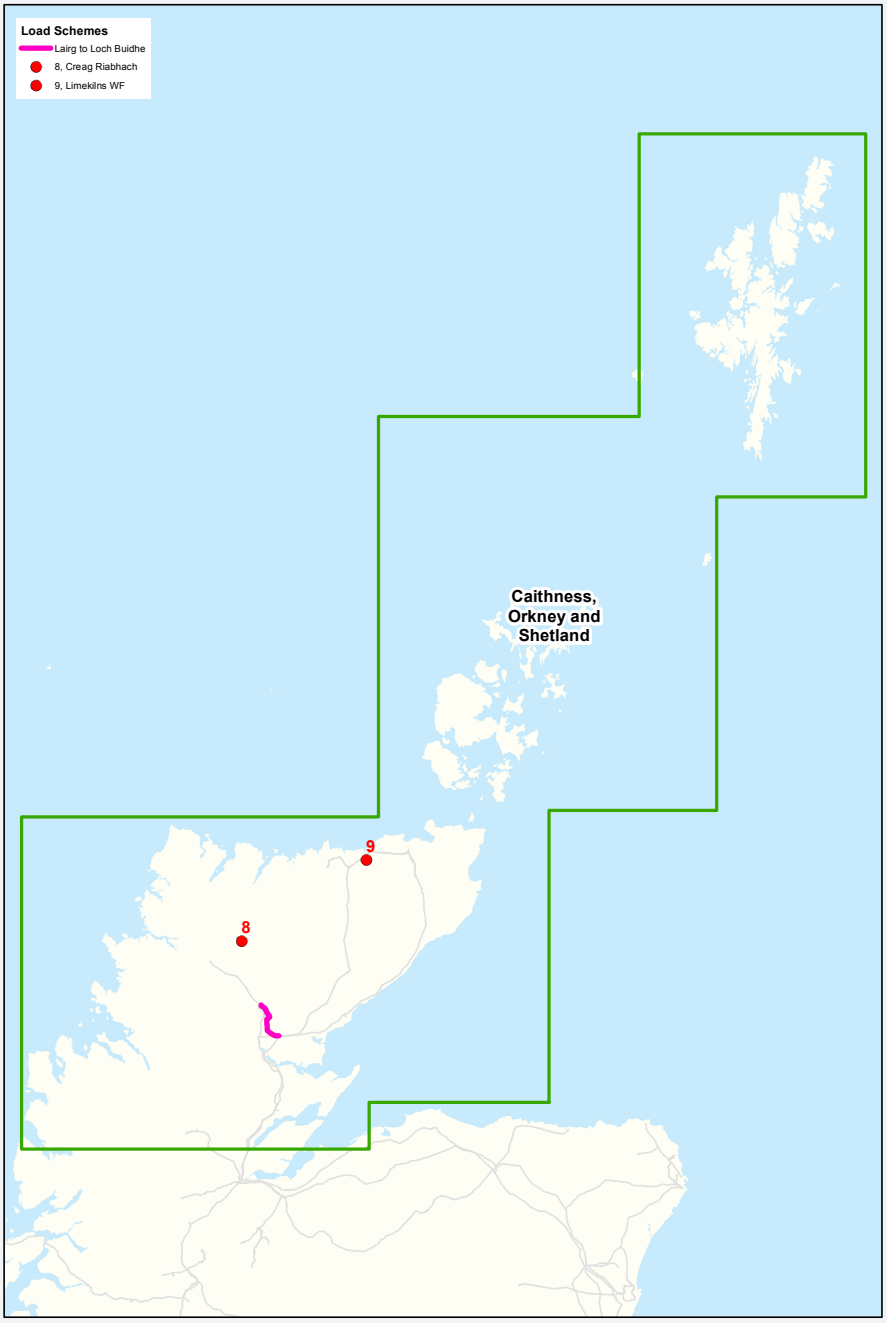


Figure 4.13 Caithness, Orkney and Shetland region Certain View schemes

Background

The existing assets in this region are in good health and there are no non-load driven pieces of work in the regional portfolio. The mainland works are driven by the continued demand for the connection of local customers, with a number of schemes currently under development and scheduled to connect in the early part of the RIIO-T2 period.

The Orkney and Shetland island subsea connection are subject to an ongoing approval process driven by customer connections. If approved, both schemes would result in connection of significant levels of generation (and associated infrastructure).

Certain View - costs and outputs

Anticipated RIIO-T2 Expenditure: £55m

Onshore Wind – 169.2MW

Additional Shared Use Capacity - 607MVA

NARMS Output TBC

Your feedback

Regional roadshows will take place at various locations during August this year to invite feedback from our key stakeholders on our proposed plans and expenditure during the RIIO-T2 period.

14th August - Inverness

Certain View - Load Related Schemes					
Scheme Name	Asset Category	Scheme Description	Output	RIIO-T2 Cost	Scheme duration
Creag Riabhach	TCA/Sole	22km OHL Connection	79.2MW	inc below	2018-2023
Limekilns	TCA/Sole	5km OHL Connection	90MW	inc below	2018-2022
Lairg - Loch Buidhe	Shared Use	16km 132kV OHL tower & new s/s	607MVA	inc below	2017-2023
Total				**£55 million**	

Island connections

We've not presented any of our island schemes within our Certain View for the following reasons:

- Although a Needs Case has been submitted for the Orkney, Western Isles and Shetland Links, there remains uncertainty over progression of these links;
- Recent generation connection requests from customers in Skye have resulted in a review of our overall development strategy taking account of both generation and asset drivers.

Our expectation is there is, subject to approvals, likely to be significant investment requirements for island schemes spanning both the RIIO-T1 and RIIO-T2 price control periods.

Orkney Islands	220kV Subsea Link from Dounreay to a newly created GSP at Finstown, plus associated 132kV island infrastructure and connection assets for each generator
Project Driver	Customer connections
Contracted Generation	300.8MW
Target Delivery Date	2024
Anticipated Costs (Strategic)	c£260m
Status	Approval process underway

Western Isles Islands	600MW HVDC Link from Beauly to Arnish Point in the Western Isles, plus associated 132kV island infrastructure and connection assets for each generator
Project Driver	Customer connections
Contracted Generation	330MW
Target Delivery Date	2024
Anticipated Costs (Strategic)	c£624m
Status	Approval process underway

Shetland Islands	600MW HVDC Subsea Link from Sinclairs Bay in Caithness to Kergord in Shetland, plus associated 132kV island infrastructure and connection assets for each generator
Project Driver	Customer connections and demand
Contracted Generation	649.3MW
Target Delivery Date	2024
Anticipated Costs (Strategic)	c£709m
Status	Approval process underway

Skye	New 132kV Overhead Line from Fort Augustus to Skye plus refurbishment of existing section of Overhead Line
Project Driver	Customer connection & asset condition
Contracted Generation	87MW
Target Delivery Date	2024
Anticipated Costs (Strategic)	TBC
Status	Recent generation developments and review of existing asset condition has led to an overall review of the development strategy for Skye

Case study - Lairg to Loch Buidhe reinforcement

Background

The proposed reinforcement of our network between Lairg and Loch Buidhe is being driven by growth of renewable generation in the area to the north and west of Shin. There are two generation schemes driving the network reinforcement:

- Sallachy Wind Farm (50MW)
- Creag Rhiabhach Wind Farm (79.2MW)

There is already 49.35MW of renewable generation connected at Lairg including the 38MW Achany wind farm and 16.6MW of hydro generation at Cassley which is connected to the overhead line circuit.

Consequently, the connected and contracted customer will significantly exceed the capability of the existing 132kV network in the area (89MVA summer pre fault rating) and reinforcement is therefore required on this network.

The relevant connected, contracted and scoping generation is shown in the table below:

Customer drivers for the Lairg Loch Buidhe

Customer	Connection point	Capacity (MW)	Connected (MW)	Contracted (MW)	Scoping (MW)
Achany	Lairg GSP	38	38		
Lairg - Smalls	Lairg GSP	11.3	11.3		
Sallachy Wind Farm	Cassley 132kV	50		50	
Cassley - Smalls	Cassley GSP	22.8	16.6	6.2	
Creag Riabhach Wind Farm Ltd	Lairg 132kV	79.2		79.2	
TOTALS (MW)			**66**	**135**	**207**

Options assessment and recommendation

The transmission reinforcement solution was assessed to reflect both the latest generation background within the Lairg region and updated project cost estimates.

Significant consultation has been undertaken with the local community and key stakeholders throughout the development of the scheme.

The Options Assessment considered four generation scenarios spanning a range from connected plus contracted and consented customers only, through to connected plus contracted plus all customers known to be in scoping. Several potential transmission reinforcements and their phasing to meet the power flow requirements arising from the generation scenarios were considered. These have ranged from reconductoring the existing Lairg - Shin circuit to building a high capacity new build 275kV double circuit that would, by default, be capable of uprating to 400kV.

Technical studies have been undertaken to assess each reinforcement options' ability to achieve National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS) compliance while accommodating the generation scenarios. Local network assessments have been undertaken considering the SQSS Generation Connection Criteria, while the Wider network assessments have been undertaken considering the SQSS Design of the Main Interconnected Transmission System (MITS), focussing on the impact on Boundary B0. The studies comprised load flow, contingency, voltage step and reactive compensation.

The cost estimates for the various reinforcement options have been used to carry out a high level economic assessment that consider the Net Present Value (NPV) of various development paths and also the Least Worst Regret option.

Based on the technical and economic results, the reinforcement option that has been recommended to be progressed is a 132kV new build. The new build consists of a new overhead 132kV tower line between Lairg and Loch Buidhe and construction of a new 132kV switching station at Dalchork. The results from the technical analysis have shown that this option meets compliance for three of the four generation scenarios, while the economic analysis showed that this option carries the Least Worst Regret. The cost of work required to upgrade this option to meet the full scoping generation scenario has been included within the economic analysis.

Construction of the works will commence in 2020 with anticipated completion date of April 2022, the main elements of the project are:

- New 132kV substation (Dalchork substation);
- New 132kV overhead line tower circuit between Lairg to Loch Buidhe fault rating of 348MVA per circuit;
- Modifications at the existing Loch Buidhe 275/132kV Substation to provide connection for the new overhead tower line; and
- Dismantling of the existing Lairg to Shin 132kV OHL Circuit.

Certain View: Argyll, Central and Western Isles

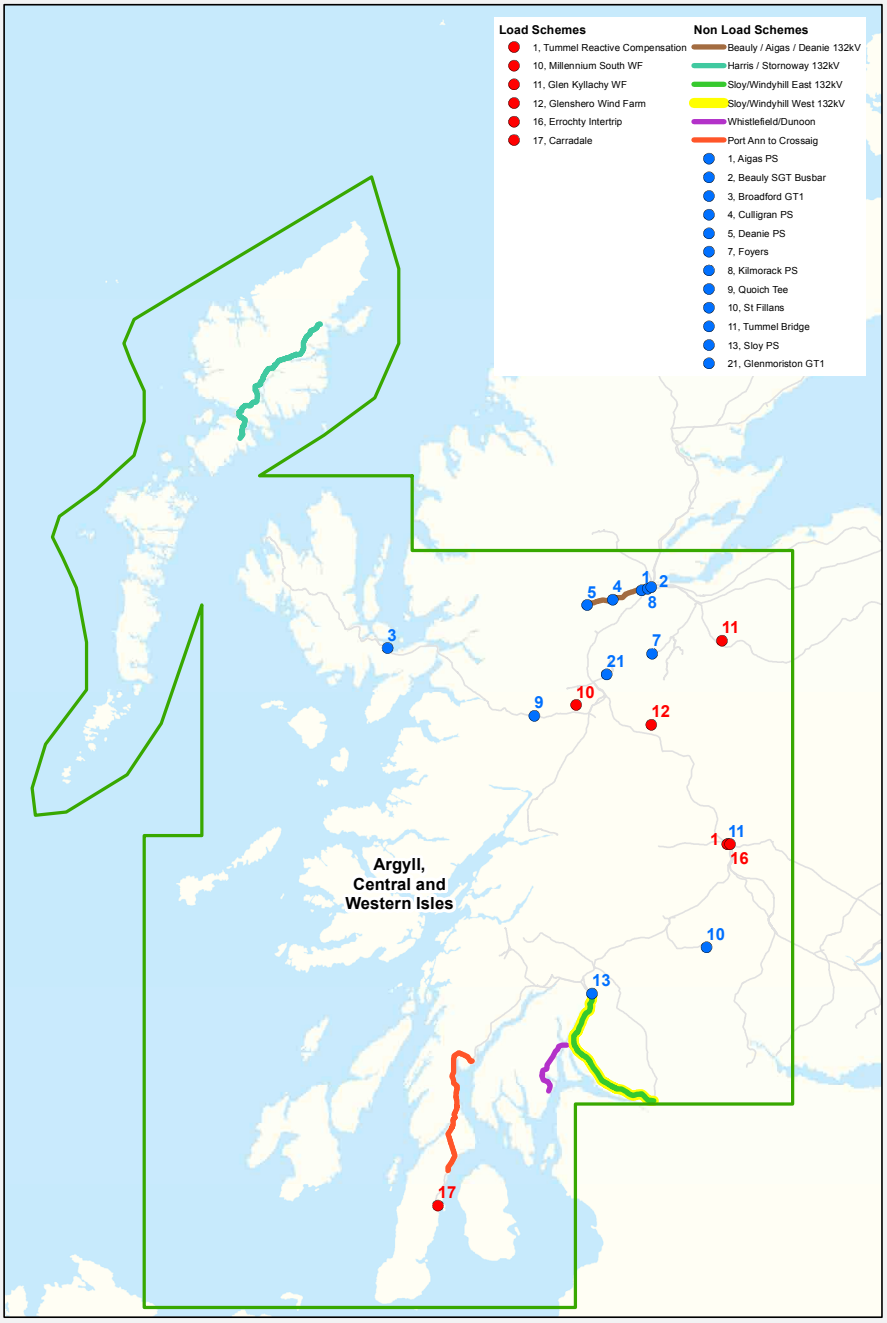


Figure 4.14 Argyll, Central and Western Isles region Certain View schemes

Background

The Argyll and Central region portfolio is driven by the asset condition of an ageing 132kV network and the continued demand for the connection of local renewable generation at both Transmission and Distribution level. There are also network performance issues to be addressed. This region covers a wide variety of challenging geography which means there are several large schemes with significant cost drivers. A holistic approach has been undertaken across this region, taking account of the multiple drivers, to ensure development of the most economic and efficient schemes. We have developed a robust strategy for the development of infrastructure in the Argyll region during RIIO-T1 and this continues into our RIIO-T2 plan. Recent generation connection requests in the Skye region has led to a review of the requirements taking into account these changes in conjunction with existing generation and asset condition drivers.

The Western Isles connection is subject to an ongoing approval process driven by renewable generation connections.

Certain View - costs and outputs

Anticipated RIIO-T2 Expenditure: £540m

Onshore Wind – 328.2MW

Additional Shared Use Capacity - TBC

Additional Reactive Capacity - +325/-75MVAr

NARMS Output TBC

Your feedback

Regional roadshows will take place at various locations during August this year to invite feedback from our key stakeholders on our proposed plans and expenditure during the RIIO-T2 period.

14th August – Inveraray
16th August – Perth
22nd August – Glasgow

Certain View - Load Related Schemes					
Scheme Name	Asset Category	Scheme Description	Output	RIIO-T2 Cost	Scheme duration
Millennium South	TCA/Sole	New terminal tower & Switchgear	25MW	inc below	2018-2022
Glen Kyllachy	TCA/Sole	3.0km OHL/UGC Connection	48.5MW	inc below	2018-2022
Glenshero	TCA/Sole	200m 132kV UGC from Glenshero EnergyPark S/s to Melgarve S/s	168MW	inc below	2018-2023
Carradale GSP Reinforcement	TCA/Sole	Transformer Upgrade (x4)	86.7MW	inc below	2018-2022
Tummel SVC	Shared Use	SVC Install at Tummel	+325/-75 MVAr	inc below	2020-2024
Total				**£92 million**	

Certain View - Non Load Related Schemes					
Scheme Name	Asset Category	Scheme Description	Output	RIIO-T2 Cost	Scheme duration
Port Ann / Crossaig 132kV (49km DC tower line)	NLRE	Re-build of existing 132kV OHL	NARM	inc below	2021-2025
Sloy	NLRE	Replacement of 132kV GT's	NARM	inc below	2021-2024
Sloy / Windyhill East 132kV (15km DC tower line)	NLRE	Tower painting & earthwire replacement	NARM	inc below	2021-2023
Sloy / Windyhill West 132kV (15km DC tower line)	NLRE	Tower painting, replacement fittings & foundation repairs	NARM	inc below	2021-2023
Whistlefield / Dunoon 132kV (17km DC tower line)	NLRE	Re-build of existing 132kV OHL	NARM	inc below	2019-2024
Aigas PS	NLRE	Replacement of GT1 and associated plant	NARM	inc below	2022-2026
Beauly (SGTs) & Busbar	NLRE	GIS Substation Build & replace GT2/4/6	NARM	inc below	2020-2024
Beauly / Deanie 132kV (23km SC tower line)	NLRE	OHL full refurbishment	NARM	inc below	2020-2023
Broadford (Condition Driven GT1)	NLRE	Replacement of SGT1 & SGT2	NARM	inc below	2021-2026
Culligran PS	NLRE	Replacement of GT1 and associated plant	NARM	inc below	2022-2026
Deanie PS	NLRE	Replacement of GT1 and associated plant	NARM	inc below	2022-2026
Foyers	NLRE	Replacement of Gen Tx & swithgear	NARM	inc below	TBC
Glenmoriston GT1	NLRE	Replacement of GT1 and switchgear	NARM	inc below	TBC
Invergarry T 132kV (2.4km SC tower)	NLRE	Tower painting & Conductor replacement	NARM	inc below	2023-2025
Kilmorack PS	NLRE	Replacement of GT1 and associated plant	NARM	inc below	2022-2026
Quoich Tee	NLRE	Replacement disconnectors & Earth Switch	NARM	inc below	2022-2024
St Fillans	NLRE	Replacement of GT1 and associated plant	NARM	inc below	2019-2026
Tummel Bridge	NLRE	Replacement Tx's & Switchgear	NARM	inc below	2019-2026
Harris / Stornoway 132kV (58km Wood pole)	NLRE	Full rebuild with composite pole.	NARM	inc below	2018-2024
Total				**£448 million**	

Case study - Argyll reinforcement

Background

Development of the network in Argyll and Kintyre has been ongoing for some time and it follows on from the reinforcement to the network provided by the Crossaig to Hunterston sub - sea cable circuits commissioned in 2015. The connected and contracted generation customers background was continuing to grow at that time, driving a need for further network reinforcements, including this project to rebuild the overhead line between Inveraray and Crossaig.

An opportunity to combine several separate developments into a more coordinated, strategic development was explored during 2015 and 2016. This resulted in an options assessment considering a range of overall development paths for the region as well as addressing ongoing asset condition concerns. This work identified that the preferred development should ultimately be centred on developing a radial network from Scottish Power Transmission (SPT's) Dalmally substation via a new substation in north Argyll and running down the Kintyre peninsula to Crossaig.

A significant volume of additional customers contracted and forecast renewable generation developments were, at one stage, seeking connection in the Inveraray and Kintyre peninsula area. The contracted dates associated with many of these schemes were in 2020 and 2021 and made the load related reinforcement timescales consistent with the existing non-load related refurbishment commitments included as an output in the RIIO-T1 period. The withdrawal of subsidies for onshore windfarms from 1st April 2016 resulted in a significant reduction in the volume of generation seeking near term connection.

These changes in circumstance made it appropriate to review the continuing need and basis for the transmission construction works to upgrade the Inveraray to Crossaig double circuit based on asset condition, and the connection of contracted generation in Kintyre.

The requirement to undertake non load related refurbishment of the line was identified in the RIIO-T1 Business Plan. This included for re-conductoring the section between Inveraray and Port Ann. Subsequent to this the section of line between Port Ann and Crossaig suffered a tower failure due to an extreme weather event in 2013

The existing 132kV OHL circuit between Inveraray and, originally, Carradale was constructed over 55 years ago, and the towers and associated foundations have deteriorated considerably over time. In addition, the OHL circuit, constructed without an earth wire has a poor performance record and is subject to frequent, unplanned outages, possibly due in part to lightning strikes. The section of 132kV OHL between Carradale and Crossaig was rebuilt under the Kintyre – Hunterston project, to accommodate new generation customers in Carradale.

In addition, to the asset condition driver for refurbishment there are several contracted generation customers in the Argyll and Kintyre area that impinge on the power flow in the Inveraray – Crossaig circuits. The volume of connected and contracted customers south of Inveraray is beyond the current capacity of the existing overhead line; meaning any works need to take into account future customers levels.

A summary of the contracted generation in the region is shown in the table below. The table on the next page shows generation customers who in the last six months have submitted connection applications, or have discussed potential applications through pre-application meetings.

Contracted generation

Customer	Site name	MW	Generation type	D or T	TOCO connection date	Requested Distribution connection date	LT40	Customer consents Y/N
SPR	BAT III (Beinn an Tuirc)	50.0	Wind	D	01 April 2022		Y	Yes- 23/02/17
Good Energy Development	Willow	45.0	Wind	T	01 April 2023		Y	No
							95	**MW**

Details of scoping generation customer activity in the Kintyre and Argyll network area

Customer	GSP	Rating (MW)	Type	Status	Connection Date
Clachaig	Carradale	47	Wind	Offered	Apr 2022

Options Assessment and Recommendation

A multi criteria options assessment covering capital cost, system performance, technical and environmental considerations has been completed looking at options for reinforcing the network in Argyll. It concluded that the option comprising development of a reinforced overhead line down the Kintyre peninsula and a new substation in Argyll connected to the existing Dalmally substation consistently ranked highest across all criteria weightings applied.

Consideration was also given to reconductoring the existing line in order to defer a larger reinforcement, however there is significant difficulties associated with this approach.

There was particular concern over the feasibility of this option on review of the necessary modifications. Levels of steelwork strengthening were considered unusually high and it is likely that replacement of the entire structures would be more suitable than developing a strengthening regime. Similarly, it was considered impractical to provide an earthwire peak on existing towers which would provide shielding to the top phase conductors. Also, due to the significant volume of steel replacement required, double circuit outages were considered necessary. Reconductoring was therefore discounted as a feasible option.

A detailed analysis has been completed to determine the optimal design of the replacement overhead line taking into account anticipated future generation levels in Kintyre. The conclusion from this analysis is that the replacement overhead line should be constructed with the capability of operating at 275kV in the future, therefore providing enough capacity to meet future generation customer requirements.

The upgrading of the line will be undertaken in stages:

Stage 1 (Existing RIIO-T1 Commitment – Completion Date 2021)
Replacement of the of the existing overhead line between Inveraray to Port Ann circuit with a new overhead line rated to operate at 275kV but operated initially at 132kV.

Output – Improved asset condition.

Stage 2 (RIIO-T2 – included within our Certain View)
Replacement of the existing overhead line between Port Ann to Crossaig circuit with a new overhead line rated to operate at 275kV but operated initially at 132kV.

Output – Improved asset condition and additional generation capacity for connecting renewable generation in the region.

Stage 3 (RIIO-T2 – uncertain)

New substation within Argyll (Creag Dubh) and new overhead line circuit to Dalmally, radial link operating at 275kV established to provide significant additional capacity for connecting renewable generation in Kintyre.

Capital Delivery Strategy

Capital Delivery Strategy

Having undertaken a rigorous and comprehensive approach to determining the need and identifying the preferred option, the final step is timely and cost effective delivery. The objective of our capital delivery is to ensure that we build the right thing, at the right time for the safe and co-ordinated operation of the GB transmission system, for the benefit of the GB consumer, economy and environment, and for the most beneficial whole life cost.

Effective procurement

We are subject to laws that require us to undertake competitive procurement for all of our capital investment and associated works. As our capital investment is around 80% of our total expenditure, achieving efficient outcomes from this competitive process is essential to the overall efficiency of our activities.

Our full time procurement and commercial team determine the optimum supply chain procurement solutions for our current and future capital delivery programme. The objective of this approach is to determine the most economic procurement strategy to delivering projects whilst ensuring we do not compromise project delivery or other requirements such as safety, environmental and land assembly. In developing the strategy, the team apply a variety of procurement tools including market analysis, stakeholder engagement and lessons learned.

On an individual project basis, the team will undertake: cost estimating, cost reporting and Cost Breakdown structure (CBS) analysis, supply chain engagement, procurement and tendering, contract and commercial management, and supply chain performance monitoring and management. Our supply chain includes all of the major international engineering and capital delivery companies, such as ABB, Siemens, Nexans, GE and Balfour Beatty.

A critical part of our procurement and commercial activity is the allocation of risk between delivery parties. Risk allocation is complex and subject to the peculiarities of each project – by the very nature of our network and its location – no two projects are the same. The result being our procurement processes can be complex with significant analysis undertaken on the differing contractual positions bidders take to determine a basis of lifetime cost of a project.

Bespoke procurement approaches

East coast

As shown on pages 106-109, we have a significant programme of works required on the east coast of Scotland during the RIIO-T2 period.

We have developed an holistic approach to the commercial and contracting strategy for the full programme of East Coast work. An overarching strategy identifies synergies in the nature of works, procurement activities/milestones, contract awards and construction dates. From this, supply chain engagement is also being considered holistically. Early engagement, including local Meet the Buyer events, are intended to identify potential challenged and risks to the delivery of the works in line with the proposed programmes.

The information gained from this will inform our detailed work allocation strategy, after integration with system constraints for example detailed outage programmes. Individual project requirements will also be taken into account. For example, Alyth substation requires Reactive Compensation which is not suited to be being procured under our substation frameworks. Preliminary market engagement for a standalone regulated tender has already commenced to engage the specialist knowledge required. However, to ensure the project delivers the best efficiency approach, the tender is likely to include the option to provide the substation and reactive compensation elements as a single lot each, as well the option to provide a full turnkey solution if best value can be demonstrated.

Shetland

While the links to the Scottish islands are not part of our Certain View (pages 110-111), these are important projects for the development of our Capital Delivery Strategy.

During RIIO-T1 we delivered, on time and under budget, the Caithness Moray HVDC link. Using the experience gained from the Caithness Moray investment, we have a strong and capable internal team for HVDC technology, high value project interface management and management of subsea risks.

This experience and capability has led to the development of a multi-contract strategy for the Shetland HVDC link. This applies our learning on the definition of works information and contractual terms and conditions. This approach, compared with the turnkey approach for Caithness Moray, brings greater responsibility for project and risk management in-house. We can apply our experience and capability to realise productivity improvements for customers.

[19]www.ssen-transmission.co.uk/riio-t2-plan/

Learning from RIIO-T1

We successfully delivered, on time and under budget, a significant programme of capital investment to grow the north of Scotland transmission network and so double the capacity of connected renewable generation. Key learnings from the success of that programme that we have also applied, and built upon, for the RIIO-T2 period are:

- Demand planning and strategy: to assess the ten-year ahead programme of work across the network and engage with the supply chain on deliverability. This was overseen by a Steering Group of senior management;
- Delivery risk management: considering the long term programme of work, potential challenges and constraints. Internal resources, capability and business processes, procedures and governance were key;
- Independent governance: a Large Capital Project gate process ensured efficiency as project progression was contingent on governance assurance and oversight at each gate. An independent assurance function focussed on programme, risk management and outturn cost; and
- Supply chain management: midway through the programme, we reviewed the contracting model and renegotiated terms with framework contractors to realise the efficiency gains.

The key challenge for the efficient delivery of the capital programme in the north of Scotland has been securing appropriate and sufficient contracting resource. The north of Scotland is remote and can be inhospitable, with limited local supply chain. To address this, and give confidence to our customers on timely delivery, our contracting strategy for key work categories (overhead lines, substations and underground cable) was based on five-year framework agreements. The competitive tender resulted in framework price schedules incorporated into the contracts.

The benefit of a multi-year, multi-project contracting strategy was to give confidence to the supply chain in a portfolio of work. The selected contractors were able to effectively manage and plan for projects, commit necessary resources and capabilities in the north of Scotland and thus reducing costs of supporting infrastructure and overheads, consider innovation in design and construction and take less adversarial risk to project risks (and associated costs) through long-term 'partnership' approach.

Cost analysis undertaken at the time of framework award demonstrated savings when compared with historical procurement approaches. A subsequent review of the contracting model confirmed these savings, and renegotiation further reduced rates. These opportunities could not have been delivered through discrete, one-off tenders. The final gate of the governance process requires a thorough lessons to learn exercise, with these lessons applied to subsequent capital investments.

Case study - Beauly Denny 400kV Overhead Line Project

The Beauly Denny 400kV Overhead line project was one of our flagship projects delivered during the RIIO-T1 period. The new overhead line was constructed to accommodate increased renewable generation in the North of Scotland, representing the first stage in transforming our network to enable transfer of large volumes of renewable energy on our network. The scope of works included construction of the new 200km double circuit overhead line, construction of five new substations and numerous ancillary works ranging from road infrastructure upgrades to undergrounding of existing 132kV overhead lines.

The project was constructed through four winter periods and had to overcome significant environmental and logistical issues with the final expenditure ~£700m.

The project was constructed through engagement with a number of supply chain partners to meet and overcome the significant challenges associated with constructing a linear project in some of the most challenging terrain in the UK. The project team had to manage a significant amount of technical, interface and constructability issues to ensure the project was delivered successfully. Through effective project, programme and risk management, the outturn costs were deemed by an independent consultant to have been incurred on an efficient basis.

Protecting customers from uncertainty

Uncertainty is an inevitable element of any forecast.

The RIIO-T2 price control settlement will fix the amount that we are allowed to charge, and the outcomes we must deliver for that money, between 1 April 2021 to 31 March 2026. One of the challenges in making this settlement is how to deal with uncertainty about what might be needed and when.

It is essential that customers are not asked to pay for things that are not needed or do not actually happen. Likewise that we are not exposed to the risk of being required to do things that were not envisaged in the fixed price control agreement. One consequence of such a risk is to increase our cost of capital (see section 6), so increasing the cost to customers.

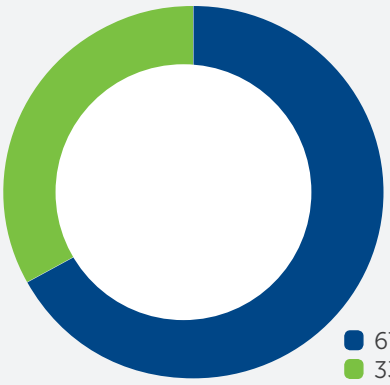
Our RIIO-T1 settlement demonstrates how this challenge can be successfully addressed – making an upfront agreement for costs and outputs that are certain and known, and then adjusting the settlement later when the need for additional outputs is confirmed. This approach uses a combination of upfront allowances and uncertainty mechanisms.

For RIIO-T1, our upfront allowances were for asset-driven investment where the need was known, for a prudent forecast of growth investment and for day-to-day operating costs. In addition, uncertainty mechanisms were agreed that were automatically triggered when additional customer needs were identified. The most significant of these were:

- The volume driver that released a pre-determined investment allowance per MW of new generation connecting (or per MVA of new infrastructure) and
- The Strategic Wider Works (SWW) re-opener mechanisms where Ofgem could review the case for additional strategic investment within the price control period.

Together this regulatory framework ensured protection for customers without compromising the network growth necessary for decarbonisation.

RIIO-T1 forecast



Citizens Advice RIIO-2 Principle 2

The value of any unspent funding for infrastructure projects is returned to consumers promptly and in full

We propose to adopt the same combination of upfront allowances and uncertainty mechanisms for RIIO-T2.

Certain View

The Certain View is our proposal for upfront costs and outputs for RIIO-T2. This comprises all investment and outcomes where there is a strong, evidence based need for the activity. Where the need is known, and can be demonstrated, there is no risk that customers are being asked to pay for an outcome that is not required or going to be undertaken.

Our Certain View forecast expenditure is £2.2 billion comprising growth, asset and resilience investment, IT and data investment, and day-to-day operating costs.

Uncertainty mechanisms

We have separately identified potential outcomes during RIIO-T2 where we do not have certainty, at this time, of the scope, timing or cost of the activity. Rather than seek upfront allowances, we propose to use uncertainty mechanisms. Examples of these outcomes are:

- Generation connections in excess of the 11.2 GW capacity for the Certain View. For our full contracted background, the total investment required would be around £850 million;
- The three Scottish islands links and associated on-island infrastructure (investment up to £1.5 billion) that are currently subject to detailed scrutiny of the need;
- For the evolving cyber and physical threats we face. These are fast moving and the actions required in the medium to long term are difficult to forecast accurately; and
- The requirements of the ESO for the safe operation of the GB transmission system, including for Black Start. For Black Start alone, potential expenditure could be in excess of £200 million.

There are different approaches to designing the right uncertainty mechanism. You can read more about our proposals for uncertainty mechanisms in our RIIO-T2 Regulatory Design paper[20].

[20]https://www.ssen-transmission.co.uk/media/3390/111regulatory-framework_final-draft.pdf

Effective delivery

Effective delivery

By the point at which a decision is made to proceed with an investment, most of the work to achieve an efficient outcome should have been completed **(Figure 4.12).** A thorough strategic options assessment and tailored procurement approach will mean that the project has the components in place for successful delivery.

However there are efficiency gains to be realised through good execution.

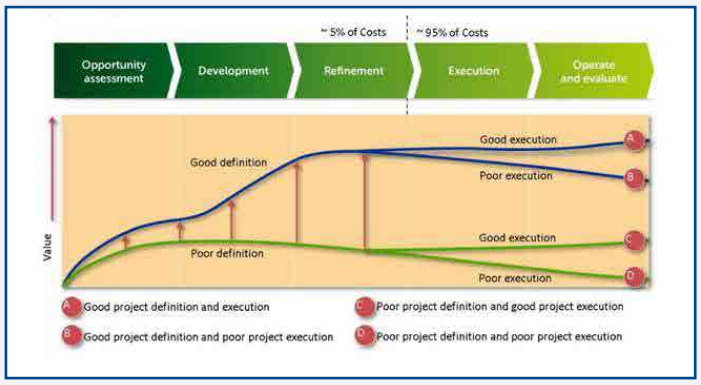
Under our capital delivery model, the key components for successful project delivery are:

Health and safety
For asset integrity and mitigation or control measures to the design, construction and operational safety risks. Hazards are understood and the appropriate detailed risk studies have been done resulting in an inherently safer and environmentally compliant design approach being adopted.

Environmental management
Documenting how environment related pre-commencement conditions have been, or shall be, satisfied, including any requirements for a Habitat Management Plan (HMP). Also setting out how environmental and sustainability objectives will be met, Construction Method Statements (CMS) and Environmental Statement requirements are in place.

Security
The key aspects of asset security. The operational, IT (including cyber-security) and physical security strategies shall be documented.

Figure 4.12 Impact on value of pre-construction definition



Project execution
With a clear project scope, delivery strategy, objectives and drivers. Project resources, including a Project Manager, are in place with Suitably Qualified and Experienced Personnel (SQEP) for Site Supervision and Quality intervention roles. The project schedule shall detail key activities and interfaces (integrated and logic-linked), which must be aligned to customer requirements. Change control processes, constructability and operability reviews, and project commissioning phase considerations are documented. Stakeholder engagement requirements, communications interfaces, community and public relations, legal, reporting and consent issues are clearly identified and subsequent actions defined. Transmission system outages are planned and booked.

Land and consent
Planning permissions and consents are secured and detailed responses to appropriate conditions are documented and discharged. All land titles are secured with an associated stakeholder engagement plan.

Commercial and procurement
Key contracts are developed and agreed, ready for signature following review and approval by Procurement and Commercial, Legal, and Insurance.

Design management
Project technical specifications are complete. Project design development and definition are finalised based on design. The process for design change control and review is documented and approved. The operational and system security strategies are finalised.

Project commissioning
An initial Commissioning Plan is prepared to ensure that risks and constraints to commissioning are identified, costed and accounted for. Any outages required are scheduled. Commissioning Panel responsibilities and resources are documented and Commissioning Panel meetings scheduled.

Project quality
A Risk Based Quality Interventions (RBQI) workshop has been undertaken and schedule of quality interventions has been developed and resourced for manufacturing, construction, installation and commissioning works.

Risk management
Documenting the management of risk during execution, including risk identification and development, the deployment of effective risk mitigations and risk management performance. A Quantified Risk Analysis (QRA) has been undertaken and a register of risks is in place, complete with planned responses and costed mitigation.

Summary

One of our four strategic themes is for Sector Leading Efficiency. This theme was developed following a review of our strategic objective, when stakeholders were clear that, while the decarbonisation of energy is important, we must also be concerned about the cost of our network to the household bill payer. We have set two principle goals:

- Transport the renewable energy that powers 10 million GB homes
- £100 million in efficiency savings from innovation

We have described in this section our draft proposals to achieve Sector Leading Efficiency:

The approach we take to establishing a **justified need for investment**. The best way to keep costs down for bill payers is not to do anything. However there can be significant inefficiency in doing the wrong thing at the wrong time. Working with the ESO, other networks and stakeholders, we undertake long term network planning for a range of possible outcomes (or scenarios). This complements our risk-based approach to determining the need for intervention on existing assets. Through this we can be confident that investment is needed and justified.

The importance of strategic optioneering assessment. Once a network need has been identified, there will be different viable options to meet that need. Our strategic optioneering assessment is a multi-year process to explore the technical, environmental and cost of the options and determine the preferred option for investment. Stakeholders are central to this process, both local communities and businesses directly impacted by the infrastructure and the wider GB household who will pay the bill.

How **we continue to learn from the success** of our capital delivery programme to date, and have applied this learning to ensure timely, cost-effective delivery during RIIO-T2. As over 90% of this expenditure is subject to competitive procurement, we emphasis the criticality of our procurement strategy and supply chain relationships.

We set out £1.8 billion of proposed capital investment for our RIIO-T2 Certain View.

Our ambition is to build on our track record for capital delivery, and demonstrate sector leading efficiency. This will be achieved by focus throughout the project development and delivery lifecycle. The proposals that we have set out here are intended to enable us to achieve that ambition during RIIO-T2.

Find out more...

North of Scotland Future Energy Scenarios
Network Options Assessment 2018/19
Consultation on Transmission Asset Development Process
Capital Delivery Strategy
Innovation Strategy

Tell us what you think

We invite your views on the proposals we have set out here. We welcome comment on any aspect of our proposals, and in particular on:

The Certain View and our proposal that investments with uncertain need are not agreed upfront

Whether the approach we take could be improved for greater benefits to GB bill payers

We are holding a number of events to seek views on our proposed capital investment programme during RIIO-T2 during the summer:

12 August	Aberdeen
14 August	Inverness
16 August	Perth
20 August	Inveraray
22 August	Wick
27 August	Glasgow

Scottish & Southern Electricity Networks

TRANSMISSION

Leadership in Sustainability

A Network for Net Zero
Draft RIIO-T2 Business Plan

Scottish Hydro Electric Transmission plc

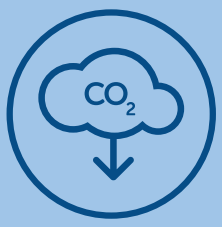
Leadership in Sustainability

Strategic Objective

Leadership in Sustainability
Trusted partners of customers and communities, realising long-term benefit for society, economy and environment.

Our holistic stakeholder-led Sustainability Strategy provides a clear vision of a sustainable business. We have set six stretching ambitions to achieve this and be at the forefront of best practice. In our draft Business Plan we set out our proposed actions to deliver a truly sustainable transmission network into the next price control and beyond.

Clear goal



One third reduction in our greenhouse gas emissions
Reduce the scope 1 and 2 greenhouse gas emissions from our operations by 33% by 2026, compared to 2018/19 levels, consistent with 1.5 degree climate science pathway.

Targets for RIIO-T2

We are developing a set of targets by which our stakeholders can judge our progress against our strategic objective and six sustainability ambitions. The indicative targets currently proposed are set out below with reference to our current performance during RIIO-T1 as a benchmark where available.

		2018/19	2025/26
Connecting for Society			
Projects assessed through our new Cost Benefit Analysis framework	Percentage	0%	100%
GB homes powered by renewable energy transported through our network	Number	5.3m	10m
Tackling Climate Change			
Reduction in scope 1 and 2 greenhouse gas emissions from 2018/19 baseline	Percentage	Baseline*	33%
SF_6 leakage target**	Leakage Rate (kg)	TBC*	TBC
Promoting the Natural Environment			
Biodiversity 'No Net Loss' outcome in projects gaining consent from 1 April 2020	Percentage	N/A	100%
Environmental Incident rate	Annual Target	0.58	0.45
Optimising Resources			
Waste sent to landfill (excluding compliance waste) across all waste streams	Percentage	TBC*	0%
Recycling, recovery and reuse rate across all construction and demolition waste	Percentage	TBC*	70%
Supporting Communities			
Employees trained to recognise and support vulnerable consumers and communities	Percentage	0%	100%
Approved suppliers located in licence area	Percentage	27%	>25%
Growing Careers			
Employees trained to promote inclusion and diversity	Percentage	0%	100%
Apprentice, Graduate and Technical Staff Trainee intake is representative of local demographics	Percentage	Unknown	TBC

* Data is not currently available or the methodology is being developed
**Financial incentive

A roadmap to sustainability

What's in this section?

Some context...on our purpose to enable the transition to a low carbon economy, the importance of sustainability, and what we mean by sustainability.

Our thoughts on Leadership in Sustainability...we explain our principles for sustainability leadership, our six broad and bold sustainability ambitions and how we seek to contribute to the UN Sustainable Development Goals.

Our approach to embedding sustainability across our operations... based on our stakeholder-led Sustainability Strategy we have undertaken thorough analysis to develop and integrate this Sustainability Plan into our business processes. To deliver our sustainability ambitions, we are collaborating with our value chain and pursuing innovations for sustainability.

How stakeholders have been involved in the development of this draft Business Plan... the comprehensive targeted methodology we have followed, how the engagement to date has influenced and changed our proposals and includes our approach to costing these proposals.

A roadmap for each sustainability ambition... our draft Business Plan summarises our proposed activities for the next stage of our sustainability journey to 2026. We have identified outcomes that we expect to be industry norms during the RIIO-T2 period – we call this 'Business as Usual'[1]. Alongside these, we have identified 'Stretching Ambitions' that provide better outcomes and represent step changes for leadership in sustainability. We are consulting on how far we should adopt our proposed 'Stretching Ambitions'. These are outcomes that can be measured, enabling stakeholders to hold us to account.

Our next steps... we will continue to develop this draft plan in collaboration with our employees and stakeholders for the final business plan submission. To refine our plan and targets, we will bench mark our key sustainability goals against government policy and industry best practice where possible.

Overview

Stakeholders have strongly and consistently emphasised their desire for us to show ambition and leadership in sustainability. Our holistic stakeholder-led Sustainability Strategy provides a clear vision of a sustainable business. This encompasses the full range of social, environmental and economic considerations.

In our draft Business Plan we set out our actions to deliver a truly sustainable transmission network into the next price control and beyond. We have set six stretching ambitions to achieve this and be at the forefront of best practice. This plan presents a roadmap for each sustainability ambition with defined sustainability goals to 2026.

Connecting for Society
Working collaboratively to deliver a whole system solution that promotes affordability, considers societal benefits and supports community renewable connections.

Tackling Climate Change
Managing resources over the whole asset lifecycle to reduce greenhouse gas emissions in line with climate science and become a climate resilient business.

Promoting the Natural Environment
Delivering biodiversity net-gain and driving environmental stewardship best practice.

Optimising Resources
Managing resources for a circular economy; achieving zero waste to landfill, increasing resource efficiency and using sustainable materials.

Supporting Communities
Meeting the needs of vulnerable consumers and maximising the local benefit of our investments.

Growing Careers
Ensuring a safe inclusive culture for our employees; adding value through good jobs, training and development.

To deliver these sustainability ambitions we are collaborating and working in partnership with our stakeholders and supply chain.

[1]For our final Business Plan, our business as usual outcomes will incorporate the minimum level of ambition for the environment mandated by Ofgem.

Introduction

Our strategic objective: Enabling the transition to a low carbon economy

As a business at the forefront of the transition to a low carbon economy, operating in some of Scotland's most precious landscapes, we are extremely proud of our contribution and commitment to helping tackle climate change. We have an equally strong commitment to positively manage the impact of our activities on the local environment and communities in which we live and work.

Leadership in Sustainability is one of our strategic themes and one of the four parts to our RIIO-T2 Business Plan. We define Leadership in Sustainability as being:

Trusted partners of customers and communities, realising long-term benefit for society, economy and environment.

You can read more about our strategic objective and strategic themes on pages 22-25.

The importance of sustainability

Sustainability now goes far beyond environmental issues, as society expects businesses to act responsibly, transparently and accountably in all of its current and future operations and impacts.

The actions of shareholders and businesses are demonstrating that sustainability is moving from the business side-lines into core mainstream activities and becoming integral to business strategy. The latest research[2] shows that sustainability is now seen as vital to companies' future success and sustainability related commitments are delivering real change.

The fundamental goal of a sustainable business strategy is to have a positive impact on the environment and society.

How do we define sustainability?

Sustainability, or sustainable development, seeks to balance environment, social and economic objectives to deliver long term equitable growth.

We follow the widely applied Brundtland definition of sustainable development[3]:

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Our commitment to sustainability

SHE Transmission is owned by the UK-listed SSE plc Group. SSE's vision is to be a leading energy provider in a low-carbon world.

As a responsible energy company, the SSE Board and senior management are passionate advocates of sustainability. This is captured in SSE's long-standing sustainability value:

"Our actions and decisions are ethical, responsible and balanced, helping to achieve environmental, social and economic well-being for current and future generations."

The SSE Chief Sustainability Officer is a Director of SHE Transmission and a member of our Board Sub-Committee on sustainability.

Earlier this year, SSE set stretching new targets for 2030 in a bid to tackle climate change and support the UN's Global Goals for Sustainable Development (the SDGs)[4] **(Figure 5.1).**

Cut our carbon intensity by 50%

SUSTAINABLE DEVELOPMENT GOALS

Help accommodate 10m electric vehicles

SUSTAINABLE DEVELOPMENT GOALS

Treble renewable energy output

SUSTAINABLE DEVELOPMENT GOALS

Champion fair tax and a real living wage

SUSTAINABLE DEVELOPMENT GOALS

Figure 5.1 SSE Group 2030 goals

Read more about SSE's commitment and actions for sustainable business: **www.sse.com/sustainability/**

[2]See, for example, UN Global Compact-Accenture Strategy CEO Study (UN, 2016) available at: https://www.accenture.com/gb-en/insight-un-global-compact-ceo-study
[3]From Our Common Future report (World Commission on Environment and Development, 1987) available at: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf
[4]www.un.org/sustainabledevelopment/

Our journey to Leadership in Sustainability

Defining Leadership in Sustainability

Stakeholders have strongly and consistently emphasised their desire for us to show ambition and leadership in sustainability. Societal expectations on sustainability are rising and stakeholders want companies to take broader accountability outside of their own operations. We agree. We are determined to play a leading role in the years ahead:

- Meeting our stakeholders' expectations,
- Being at the forefront of best practice, and
- Helping to build a sustainable energy network.

Cambridge University Institute for Sustainability Leadership (CISL) defines sustainability leadership as **"someone who inspires and supports action towards a better world."**[5]

We are living through a period of significant change. The world is warming faster than we imagined even a few years ago. Social performance and related issues such as modern slavery, wages and tax are under closer scrutiny. The Paris Climate Agreement and the 17 SDGs challenge government and business to imagine a very different future. Our customers and stakeholders are looking for organisations they can trust to offer leadership, now and in the future.

Our approach to leadership in sustainability is based on three underlying principles:

1 **Adopting a holistic approach for true sustainability.**
Moving away from a narrow vision of environmental sustainability to include full socio-economic sustainability.

In the past, the energy networks industry has focused on decarbonisation and environmental sustainability. This is reflected in the RIIO-T2 price control framework high level objective for network owners "to mitigate the impact of their networks and business activities on the environment and to support the transition to a low-carbon energy future".

While enabling decarbonisation in pursuit of climate change goals is the most material contribution that we can make to sustainability, our economic, social and environmental impacts are also significant. Our stakeholders believe broader sustainability is equally important and expect our approach to consider socio-economic and resource sustainability.

Leadership in sustainability is implicitly about creating change in social contract with stakeholders and society. Moving away from a narrow vision of environmental sustainability will help support a truly sustainable low-carbon energy transition.

2 **Taking stretching and ambitious action.**
Committing to step change actions for continuous improvement and, ultimately, moving the frontier.

Taking broad and ambitious action based on informed decisions aims to drive continuous improvement and step changes for a sustainable energy system. Stretching commitments, targets and activities can be achieved through hard work, innovation, investment and collaboration.

Within our Sustainability Plan we have identified sustainability goals we expect to be industry norms during the RIIO-T2 period- we call this 'Business as Usual'. In addition, we have also identified 'Stretching Ambitions' that provide better outcomes for customers and encourage step changes for sustainability leadership. Our key sustainability goals will be benchmarked against government policy and industry best practice where possible to support the finalisation of our business plan.

Delivering leadership action will require more openness and rigour in how we approach the measurement and reduction of our impacts. Ongoing reporting and stakeholder engagement will be required to ensure performance accountability and transparency.

3 **Supporting and influencing positive change.**
Collaborating and engaging internally and externally to promote new thinking and the application of best practice.

We want to challenge the status quo in the GB energy networks sector and, through this challenge, encourage positive action from all for transformational change in our sustainability ambitions.

Internally, we will work with the SSE Group sustainability activities and organisational culture to promote the application of best practice across the organisation.

Looking beyond our business activities, we will engage and collaborate with other Transmission Owners, our supply chain, the wider network industry and cross-sector peer organisations, to share learnings, pursue thought leadership and encourage change.

[5]Sustainability Leadership: Linking Theory and Practice (Cambridge Institute for Sustainability leadership, University of Cambridge, 2011) available at: https://www.cisl.cam.ac.uk/resources/sustainability-leadership/sustainability-leadership-linking-theory-and-practice

Our sustainability ambitions

An ambitious plan

In late 2017 we started a conversation with our stakeholders about what a sustainable business would look like for us.

The insight provided by our stakeholders, along with our own experience and research, highlighted that we should:

- Expand our ambitions beyond standalone decarbonisation aims, and
- Ensure that our activities are mindful of other social, economic and environmental issues.

Based on that consultation, we published our stakeholder-led Sustainability Strategy in May 2018. This sets out six ambitions to deliver an overarching sustainability ambition to enable a smart, sustainable energy future **(Figure 5.2).** These ambitions are broad and bold.

Figure 5.2 Our sustainability ambitions

Contributing to the UN Sustainable Development Goals (SDGs)

The UN SDGs provide a common framework for targeting improvements in wider sustainability. As a responsible business that is part of the SSE Group, we are determined to play our part, alongside governments, civil society and individuals, to ensure that these goals are reached.

As part of the development of our Sustainability Strategy, we undertook a materiality assessment of how we contribute to the SDGs to identify those that we should incorporate into our sustainability ambitions.

In order of materiality, the SDGs we actively support are:

You can read our Sustainability Strategy and annual reports: **www.ssen-transmission.co.uk/sustainability-and-environment/sustainability-strategy/**

A plan for action

Embedding sustainability across our operations

Embedding our Sustainability Strategy within our processes and operations will ensure we deliver our commitments, create innovative solutions and drive sustainable decisions as business as usual.

Following the publication of our Sustainability Strategy, we have undertaken a thorough review of existing business practices to define the actions required to meet our ambitions. This review showed that adopting our Sustainability Strategy will involve new approaches and ways of working, requiring a process of change management. Central to the change will be cross-functional team engagement to develop new working practices.

Longer term and on-going implementation responsibilities will sit within the appropriate business teams once the sustainability processes are firmly established in business operations.

An adaptable planning framework

We appreciate that solutions to some of today's challenges may not have been developed yet and planning our sustainability work will be an iterative and adaptive process. We have established a Sustainability Planning framework to continually assess progress and ensure we continue to apply best practice, pilot new approaches and innovate to drive sustainability leadership **(Figure 5.3).**

Following this framework, we will prepare every two years a Sustainability Plan setting out our proposed actions to implement our six sustainability ambitions, and report on progress to date.

Figure 5.3 Our Sustainability planning framework

Our Sustainability Plan: turning ambitions into action (2019/21)

In February 2019, we published our Sustainability Plan for consultation. This forward plan sets out the key activities to achieve our Sustainability Strategy ambitions with timebound milestones against which our performance will be measured, enabling our stakeholders to hold us to account.

The development of our Sustainability Plan formed part of our preparatory work for our draft Business Plan. The milestones within the Sustainability Plan aligns with our business preparations for RIIO-T2:

- Short term activities (2019) will further define the sustainability initiatives (methods, KPIs);
- Medium term activities (2020-2021) will ensure the necessary system and processes are in place; and
- The long-term activities are defining and shaping the processes to ensure the business can deliver continuous sustainability improvements during the next price control.

You can read our Sustainability Plan:
http://www.ssen-transmission.co.uk/sustainability-and-environment/sustainability-strategy/

Looking ahead to 2026

Our long-term Business Plan sets out the next stage of our sustainability journey which seeks to fully deliver our Sustainability Strategy during the RIIO-T2 price control. This draft plan presents a roadmap for each sustainability ambition with defined sustainability goals to 2026.

Each ambition of the Sustainability Roadmap does not attempt to cover everything that might be possible to fully embed and implement our Sustainability Strategy. As we understand more from implementing these activities, we will revise and update our approach through our biennial Sustainability Plans and annual strategy reviews.

This draft business plan therefore sets out our proposals for the next stage of our sustainability journey to deliver our Sustainability Strategy during RIIO-T2. We set out here a roadmap for each of our six sustainability ambitions with proposed business as usual and Stretching Ambitions for 2026.

Collaborating with our value chain

Sustainable procurement

Value chain sustainability is the management of environmental, social and economic impacts and the encouragement of good governance practices throughout the full lifecycles of goods and services.

To achieve the step change we want, we must look beyond our own operations and take responsibility to address environmental, social and economic issues across our entire value chain.

To deliver each of our sustainability ambitions we are collaborating and working in partnership with our supply chain and stakeholders.

Procurement is a powerful instrument for organisations wishing to behave in a responsible way and contribute to sustainable development. By integrating sustainability in procurement policies and practices, organisations can manage risks (including opportunities) for sustainable environmental, social and economic development across their value chains[6].

Sustainable procurement can therefore be defined as, **'using procurement to deliver long term social, economic and environmental benefits'.**[7]

What we're going to do

There are increasing societal expectations for supply chains to minimise impact on the environment, respect human rights and increase transparency. Building on our Responsible Procurement Charter, we will engage and collaborate with our contractors and suppliers throughout RIIO-T2 to communicate our sustainability commitments, explain requirements and set improvement targets[8]. To achieve this, we will:

- Hold regular contractor and supplier engagement forums on sustainability to discuss best practice and opportunities for improvement;
- Introduce sustainability commitments and requirements (supplier code) into our procurement framework agreements to deliver sustainable outcomes from the materials, works or services provided by our supply chain; and
- Consider sustainability credentials in our tender evaluation criteria and processes to ensure sustainability is factored into investment decisions.

Responsible Procurement Charter

SSE takes a responsible approach to procuring goods and services. It has developed a range of tools to encourage responsible business practices, including its Responsible Procurement Charter and new clauses to cover sustainability topics in its standard contract forms.

It has zero tolerance of modern slavery in all its different forms, both in its business and in its supply chain and is a champion of the real living wage across its supply chain.

Read more about SSE's responsible procurement charter: **www.sse.com/sustainability/reporting-and-policy/policies/**

Creating partnerships for sustainability

Partnerships are a valuable tool to drive change towards more responsible, inclusive and sustainable growth. It is essential to actively engage with industry, government and leading organisations to define and promote sustainability best practice.

During the RIIO-T1 price control we have engaged in several partnerships to support our environmental programmes. For example, we have participated in the Scottish Infrastructure Circular Economy Forum (SICEF) and partnered with the Scottish Environment Protection Agency (SEPA) on the Technology Steering Board VALUES (Valuing Land Use change and Ecosystem Services) Project. This project delivered a tool that can be used to value potentially affected ecosystem services (such as erosion and landslide control, flood risk, drinking water, pollination and seed dispersal, preservation of archaeology, hydroelectricity and peat extraction) because of development planning.

During RIIO-T2 we will continue to collaborate and establish partnerships with other transmission owners, our supply chain, the wider network industry and cross-sector peer organisations to support our sustainability ambitions. This will allow us to share learnings, promote new thinking and the application of best practice.

[6]Sustainable Procurement – Guidance ISO 20400:2017 (International Organization for Standardization 2017) available at: https://www.iso.org/standard/63026.html (accessed 26 June 2019)
[7]Supply Chain Sustainability – A Practical Guide for Continuous Improvement (UN, 2015) available at: https://www.unglobalcompact.org/library/205
[8]SSE Responsible Procurement Charter (SSE, 2018) available at: www.sse.com/media/530653/Responsible-Procurement-Charter_0818.pdf

Innovation for sustainability

Innovation

The energy industry is undergoing significant change driven by the need to provide affordable, clean and secure energy. Innovation will therefore play a central role in improving the sustainability performance of our network.

Our innovation policy sets out our framework for how we will approach and implement innovation across our business. We define innovation as **"identifying and proving new ways of working for the long-term benefit of our customers and stakeholders".**

By embracing innovation, we aim to assist the transition towards a low carbon economy. Our innovation approach seeks to support our strategic priorities and continually improve the performance and management of our transmission network. This will enable us to provide energy in a safe, reliable and economical way, ensuring delivery of long-term benefit for society, economy and environment.

We will seek to develop and promote innovations during RIIO-T2 to support each of our sustainability ambitions, providing the framework to assess different options and make fact-based decisions for activities to become Business as Usual.

Innovation opportunities for sustainability will be identified and explored relating to the following three themes:

1. **Maximising benefit for our customers: connecting for society and supporting thriving communities.**
2. **Mitigating climate change: energy efficiency, optimisation and carbon saving innovations.**
3. **Reducing our environmental impact: promoting the natural environment and optimising resources.**

You can read our Innovation Policy:
www.ssen-transmission.co.uk/media/3390/111regulatory-framework_final-draft.pdf

Creating a blueprint for future action

We need to find new ways to address stakeholder expectations while balancing technical practicalities. We appreciate that solutions to some of today's challenges have not been developed yet and planning our sustainability work will be an iterative and adaptive process.

Implementing our sustainability roadmap will involve new approaches and new ways of working. It will require a process of innovation, applying best practice, learning and change management to integrate these initiatives across our network.

To support this transition, we provisionally propose to design and deliver a demonstration project at the outset of RIIO-T2 aiming to implement these new approaches and bring these initiatives to life. Representing our six sustainability ambitions, the project aims to introduce a wide range of pioneering initiatives proposed in our plan such as using SF_6 alternatives, micro-generation, energy efficiency measures biodiversity enhancements, waste minimisation practices and using alternative sustainable materials where feasible. The project would also provide an opportunity to deliver tangible social benefits to local communities and the participation of local businesses in the supply chain.

Creating and implementing a vision for a more sustainable network of the future will encourage higher sustainability performance, demonstrate best practice and stimulate further innovation. This is an ambitious project that we hope will act as a blueprint for future projects to follow by developing the systems and processes to accelerate our sustainability roadmap roll out across the network.

As part of our RIIO-T2 planning we are in the process of scoping the practicalities and feasibility of undertaking this project at a suitable site.

Case Study – Sulphur Hexaflouride (SF_6) Alternative
SF_6 is an excellent insulating medium which we use in our high voltage assets as an insulating medium and to extinguish electrical arcs. However, it is around 23,500 times more harmful to the environment than carbon dioxide.

We have been working with equipment manufacturers to test alternatives to SF_6 and we are currently in trial stages for two new technologies. These projects have progressed without innovation mechanism funding, demonstrating our commitment to engage with contractors and suppliers where there are clear environmental benefits.

Meeting stakeholders' expectations

Stakeholder-led outcomes

As the transmission network owner in the north of Scotland, we seek stakeholder input on all aspects of our activities. To understand the expectation of our customers and stakeholders for sustainability in our business, we have undertaken a targeted programme of engagement and consultation since late 2017. We have consulted specifically on the development of our Sustainability Strategy and Plan. These consultations have informed this draft Business Plan alongside our targeted RIIO-T2 engagement programme.

Sustainability Strategy consultation

In developing our Sustainability Strategy, we have sought to understand the views and needs of our stakeholders. We developed our sustainability ambitions based on our internal analysis and the views of our stakeholders informed our decisions, goals and materiality of different issues.

In February 2018, we published our draft Sustainability Strategy for consultation. The responses to the consultation were used to refine our Sustainability Strategy and to help us with setting specific targets. For example, feedback indicated that there was a need for increased focus and targets on resource use which led to the development of an additional ambition on Optimising Resources and the material inclusion of SDG 12 responsible consumption and production.

Overall, the tone of responses was positive with stakeholders, including Government, welcoming our approach and acknowledging the alignment of our sustainability ambitions with current climate change and energy policy ambitions. There was also a strong and widely-held view that our targets should be short, measurable and ambitious.

Sustainability Plan consultation

In February 2019, we consulted on our draft Sustainability Plan that includes proposed activities to implement our Sustainability Strategy. The consultation provided stakeholders with the opportunity to ensure our action on sustainability is fit for purpose and meets their reasonable needs and expectations.

Feedback from the Sustainability Plan consultation indicated that our proposed activities are material, likely to be impactful and timescales are suitably ambitious. Further suggestions were also made that the following areas should receive greater focus and action: climate change adaptation; visual amenity; focus of the SSEN community fund; and sustainable procurement. This feedback has been incorporated into our Sustainability Strategy update and this draft Business Plan.

RIIO-T2 stakeholder engagement

As part of our RIIO-T2 engagement programme, we consulted a wide stakeholder group at a RIIO-T2 stakeholder workshop in November 2018. We also held an environmental roundtable event with experts to consult on our environment plans in March 2019.

We consulted stakeholders at the RIIO-T2 workshop on our approach to carbon reductions, sustainable resource use and our community support. Specific feedback indicated that focus should also be placed on reducing Scope 3 (supply chain) carbon emissions as contractors and suppliers expressed interest and support for carbon reduction initiatives. Stakeholders also highlighted that there is a significant opportunity for us to support the circular economy. Relating to our optimising resources activities, stakeholders felt that commitments relating to minimising waste, resource efficiency and sustainable materials were equally important.

Our targeted environmental roundtable event held in March 2019 provided experts the opportunity to comment and provide feedback on our environment policies for biodiversity, landscape and visual amenity, forestry and woodland, noise and oil management. Feedback strongly reinforced our decision to include biodiversity as a core ambition of our plan and that visual amenity considerations is a key topic of interest during project consultations. Stakeholders were supportive of plans to improve communications on visual amenity and agreed our approach to oil and noise management should be risk based. This feedback and input refined this draft Business Plan and Sustainability Strategy Review update.

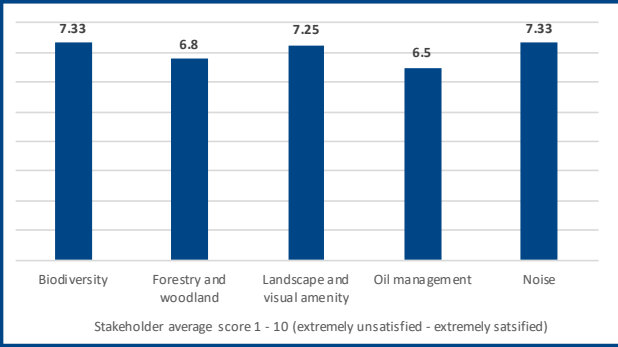
You can find the reports from the consultation events we have held about RIIO-T2: **www.ssen-transmission.co.uk/information-centre/industry-and-regulation/riio-t2**

Further engagement

We are committed to continuing dialogue with our stakeholders as we progress our sustainability journey. There are consultation questions throughout this draft Plan for each sustainability ambition which we welcome your input and feedback. The responses will be used to refine and finalise this Sustainability Roadmap.

Over the summer we will also assess the findings of the willingness to pay research for environmental and sustainability considerations and we plan to further consult our supply chain on our sustainability goals ahead of the final Business Plan submission.

The cost of these proposals



As shown above, attendees at our environment roundtable event expressed satisfaction with our environment proposals in all five areas. Respondents to our Emerging Thinking Consultation argued for bolder action: "enable carbon free future", "strive for Environmental Net Gain" and "welcome positive work on transparency".

How much will our proposals cost?

This draft Business Plan does not include the costs of delivering the proposed outcomes. Our approach to costing is as follows.

Business as Usual goals

For each of our six sustainability ambitions, we have clearly set out the goals that we view as business as usual.

We have defined business as usual as outcomes that are necessary to meet UK or Scottish Government policy targets or the minimum standards for our business plan set out in regulatory guidance . We also view existing and future legislative obligations as business as usual.

All business as usual goals will be incorporated into the efficient costing of the activity to deliver the outcome. We do not believe it is practical to meaningfully separate out this cost. Examples of this approach include:

- The Scottish Government national target for recycling, re-use and recovery of 70% of construction and demolition waste by 2025. The majority of our waste is associated with our construction activities, and the achievement of this target is costed into our capital investment forecast (including the contractual obligations we place on our supply chain partners).
- The minimum targets that will be set by Ofgem for SF_6 leakage. We have included the efficient cost of managing leakage within our capital investment and operating costs forecasts for our draft Business Plan, and will update this as we get visibility of Ofgem's expectations.

We note that Ofgem has proposed financial penalties where some minimum standards are funded but not met, including for SF_6 leakage target described above. We fully support this approach.

Stretching Ambitions

For each of our six sustainability ambitions, we have also proposed goals that we call stretching ambitions.

Stretching Ambitions go beyond business as usual, and seek to provide better outcomes and a step change that shows leadership in sustainability. We have identified our proposed areas for stretching ambitions from the views of customers and stakeholders about where we should be more ambitious.

An example of a stretching ambition is our proposals to support vulnerable customers and communities. Our regulator has been clear that this is not a business as usual activity for transmission licensees. However our stakeholders have told us that we do have a role to play – so long as we do not seek to duplicate or replace services best provided by others (including civil agencies and distribution licensees).

We have not included the cost of delivering our stretching ambitions outcomes in our draft Business Plan. We are seeking views on our proposals. We will engage further to develop these proposals over the summer, including presenting costed options and ideas for appropriate funding mechanisms.

Back office costs

There are costs associated with the delivery, assurance and reporting of our Sustainability Strategy. This is largely our internal employees' costs, along with third party costs for audit, assurance and specialist consultancy.

We have included an operating cost of £1.7 million for these back office costs during the price control.

Connecting for Society

Working collaboratively to deliver a whole system solution that promotes affordability, considers societal benefits and supports community renewable connections.

Our goals

Business as Usual

Apply the new social, environmental and economic Cost Benefit Analysis framework on all new projects for the start of the price control.

Meet the quality of customer experience targets throughout the price control period[9].

Stretching Ambition

Implement activities to actively support local community renewable energy connections by the end of the price control.

What does it mean

Our main strategic driver over the past decade has been the timely delivery of large-scale capital investment in new infrastructure to accommodate increasing levels of renewable electricity generation across the north of Scotland. Connecting customers remains our primary business driver for the RIIO-T2 period.

There are three parts to this ambition:

1. To deliver the 'optimal' connection solution, taking into account technical, social, environmental and economic aspects.
2. To deliver timely and efficient connections.
3. Being stakeholder-led, so continuing to be responsive to customers' and stakeholders' needs for low carbon energy connections.

This sustainability ambition compliments our wider Whole System Planning Strategy and Commercial and Connections Policy.

Why are we doing it

Government and regulators continue to support our primary focus on delivering effective decarbonisation of the energy network. Customers and stakeholders have also consistently told us about our critical role in providing the route to market via network capacity for renewable generation, hence contributing to GB's ambitious climate change targets.

Social, environmental and economic Cost Benefit Analysis

Where we are now

It is widely recognised that conventional accounting practices and economic analysis are failing to fully quantify impacts and risks, particularly those associated with environmental and social aspects[10] (often referred to as natural and social capital).

What we are doing

We are working to expand the scope of our planning by analysing and quantifying wider social, environmental and economic impacts of projects to inform decisions. Our ambition is that the measurement of environmental and social impacts become essential to our decision making.

During 2019, we are developing a new Cost Benefit Analysis (CBA) methodology that incorporates social, environmental, economic and stakeholder values.

This methodology will use whole-life costing and assess whole-system solutions. This should enable the identification of alternative 'non-standard' approaches to system planning and network development, including the implementation of our innovation strategy, where these can deliver better value, whether that value is economic, social or environmental. We will share the outcomes with our stakeholders to show the trade-offs we make in our decision making.

To develop our new Cost Benefit Analysis methodology, we have reviewed previous Cost Benefit Analysis work undertaken and best practice from other networks and wider industry.

[9]Ofgem has proposed a financial incentive with penalties for not meeting and rewards for exceeding business as usual targets.
[10]Accounting for Sustainability, (A4S,2019) available at: https://www.accountingforsustainability.org/en/index.html

What success looks like

- We will apply our new Cost Benefit Analysis framework to all major and innovation investment decisions during RIIO-T2;
- We will integrate the learning from projects using innovative approaches (such as new system designs, new commercial arrangements, or new technologies) into our standard business specification and policies; and
- We will report annually on our progress and the estimated carbon displaced by the low carbon technologies that we have connected.

Delivering timely connections solutions

Where we are now

Industry standard arrangements tend to be 'one size fits all', and so do not always provide the connection solution or service needed for our customers' individual projects' economics and timescales. In some instances, this could inhibit or delay low carbon energy connections that are essential to contribute to meeting renewable energy and decarbonisation targets.

What we are doing

We have developed our Commercial and Connections Policy proposals for the RIIO-T2 period based on our customers' feedback that we must focus on the quality of the connection service during each stage of the customer experience. Importantly, to arrive at the most optimal connection solution for the customer, the connection service, solution and products must be accessible and tailored to suit each individual customers' need. For example, for customers who wish to connect earlier we have proposed the implementation of a new queue management service with a new acceleration product to facilitate the acceleration of their connection date.

You can read the details of our Commercial and Connections Policy proposals: **www.ssen-transmission.co.uk/media/3405/ssen-riio-t2-commercial-connections-policy-paper-28pp-22782-artwork.pdf**

What success looks like

- We will collaboratively develop connection and services solutions with connections stakeholders, for accelerated connections, including a queue management service to accomodate accelerated requests;
- We will set an annual target to accept and deliver on all reasonable requests for acceleration of connection dates, and report on outcomes; and
- We will meet targets outlined in the new Quality of Customer experience satisfaction survey.

Supporting community and locally owned renewable energy projects

Where we are now

As our energy system democratises, Scotland's Energy Strategy[11] argues for "a smarter local energy model" with a commitment to: "Empower our local communities, supporting the development of innovative and integrated local energy systems and networks".

Community engagement in the energy transition is high across Scotland, with over 1,000 community-owned renewable energy projects[12]. We understand from our conversations with stakeholders that this is likely to grow further during RIIO-T2 and potentially expand in scope.

Who our future connection customers will be is uncertain, as outlined in our Future Energy Scenarios; this could range from an increase in offshore marine and wind project or a move towards a more democratised energy system. Regardless of the type of customer, our connections process should be accessible to all including community and local energy projects.

Our thinking

The customer experience should be accessible with simple, transparent and efficient processes which are fit for the future. To achieve this accessibility our draft Business Plan aims to represent, collaborate and be advocates for our customers. Although this applies to all customers, this aims to support the development of local and community renewable energy.

We are reviewing the challenges that our current connections processes pose for customers to determine the steps required to remove barriers and facilitate their connections. This review will determine our approach for supporting community and locally owned renewable energy projects during RIIO-T2 and will support our plans for an accessible connection process.

We welcome views on how we can best support community and locally owned renewable energy projects, **and what outcomes (if any) we should strive for during RIIO-T2?**

[11]The future of energy in Scotland: Scottish Energy Strategy (Scottish Government, 2017) available at: https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/
[12]Community Energy reports (Energy saving trust, 2018) available at: www.energysavingtrust.org.uk/scotland/communities/community-renewables/community-energy-reports

Tackling Climate Change

Managing resources over the whole asset lifecycle to reduce our greenhouse gas emissions in line with climate science and become a climate resilient business.

Our goals

Business as Usual

Set a science-based greenhouse gas emission reduction target for the start of the price control.

Provide transparent greenhouse gas emission reporting by emission scope (including losses) for consistent reporting across the price control

Introduce substation energy efficiency programme on new sites by the middle of the price control.

Pilot substation micro-generation on new substations by the middle of the price control.

Reduce SF_6 leakage relative to network holding and asset growth (target tbc) during the price control[13].

Update climate risk assessments and integrate into business planning by the end of the price control.

Stretching Ambitions

Introduce a programme for alternative fuel use operational vehicles during the middle of the price control.

Deliver greenhouse gas emission reduction programme across new and existing sites to meet the science based carbon target and introduce supply chain reduction initiatives by the end of the price control.

Adopt SF_6 alternatives where technically and commercially viable to support the science-based target carbon reductions during the price control.

What does it mean

Climate change is no longer a distant threat, but a visible reality. The most recent report by the UN Intergovernmental Panel on Climate Change (IPCC) highlighted again the very real and serious risks that climate change represents[14].

As the owner of the transmission network in a region rich in renewable energy, our most material contribution to action against climate change is in enabling the transition to lower carbon electricity generation. While acting on this, we are also determined to:

1. Reduce our own greenhouse gas emissions; and
2. Make our business resilient to the future risks from climate change.

Why are we doing it

All our stakeholders, including our shareholders, want us to take ambitious action on climate change and reduce our emissions following best practice in climate science through the Science Based Target (SBT) initiative. Our ambition is to reduce our greenhouse gas emissions to facilitate the necessary level of decarbonisation critical to limit rising global temperatures by 1.5 degrees celsius.

Our stakeholders also tell us we need to adapt to the consequences of climate change. The Met Office[15] has recently published detailed analysis that indicate further significant and serious changes this century. Future climate scenarios suggest that summer temperatures could rise by 5.4 degrees celsius by 2070, making heatwaves the norm and flooding will be a major issue as sea levels around the country rise.

[13]Ofgem has proposed a financial incentive with penalties for not meeting and rewards for exceeding Business as usual leakage targets
[14]Global Warming of 1.5°C (The Intergovernmental Panel on Climate Change, 2018) available at: https://www.ipcc.ch/sr15/
[15]UK Climate Projections – UKCP18 (Met Office, 2018) available at: https://www.metoffice.gov.uk/research/collaboration/ukcp

Setting a Science Based Target (SBT) for our greenhouse gas emissions

Where we are now

During RIIO-T1 we have reported annually on the main components of our greenhouse gas emissions: business carbon footprint, SF_6 leakage and the electrical losses on our network. During this period, we have targeted SF_6 leakage improvements and targets to reduce building and transport emissions.

Following stakeholders' feedback, in May 2018 we committed to setting a SBT for greenhouse gas emissions as part of our stakeholder-led Sustainability Strategy. We committed to set our SBT by summer 2020, at the latest.

What we are doing

To improve the quality of our emissions reporting, we have established a quarterly business carbon footprint (BCF) reporting system and have introduced mandatory carbon reporting in contract requirements for all new projects. This gives us confidence in the baseline for setting our SBT.

We are now reviewing the different approaches to setting a SBT to determine the approach that is applicable to our business.

What success looks like

Setting a SBT will provide us with a clearly defined and transparent pathway that specifies how much and how quickly we need to reduce our emissions. Success will be achieving our SBT and we are committed to report annually to our stakeholders on progress.

Emerging thinking on setting our SBT

Work to-date indicates our SBT will require a 45% absolute reduction in scope 1 and 2 carbon emissions by 2030 to meet the 1.5-degree climate science pathway from a 2018/19 baseline. As our network is expected to continue to grow to accommodate renewable generation during this time period, this is a stretching and ambitious target.

What is a Science Based Target?
Targets adopted by companies to reduce greenhouse gas emissions are considered "science-based" if they are in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement – to limit global warming to well-below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C. You can read about the Science Based Target initiative here: **www.sciencebasedtargets.org/**

Scope 1[16]
Direct greenhouse gas emissions occurring from sources owned or controlled by the company e.g. our vehicles and SF_6 emissions;

Scope 2
Indirect greenhouse gas emissions from the generation of purchased electricity consumed by the company; and

Scope 3
All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions e.g. business travel, grid losses, production of purchased materials and contractor emissions

We want to be ambitious and drive business activities that reduce our carbon footprint throughout RIIO-T2 to meet our SBT at the trajectory to achieve zero net emissions. To achieve this, we have set a clear goal to reduce our scope 1 and 2 greenhouse gas emissions by a third compared to 2018/19 levels. This is challenging, has not previously been achieved and there is uncertainty of all actions required so a range of solutions may be developed for this. We are determining the treatment of uncertainty and network growth scenarios to our SBT and will provide an update on this in December.

To demonstrate the leadership our stakeholders demand, we also propose to set a scope 3 emission target that demonstrates best practice.

Our main material emission areas for scope 1 and 2 emissions are substation emissions (building electricity use), SF_6 emissions and operational transport emissions. These are the emission areas that will be prioritised for reduction. Other less material scope 1 and 2 emissions include office energy use and non-mobile generation fuel use.

Our scope 3 emissions include supply chain emissions, business travel, embodied carbon and losses. We are currently defining an appropriate approach and target for scope 3 emissions that meets best practice. Note that whilst losses on our network are a large emission source, they are predominantly influenced by the overall power dispatch, affected by the capacity and location of the generation and demand, and controlled by the Electricity System Operator (ESO).

Read our Losses Strategy:
www.ssen-transmission.co.uk/riio-t2-plan/

[16]GHG Protocol Corporate Accounting and Reporting Standard (2004) available at: https://ghgprotocol.org/corporate-standard <https://ghgprotocol.org/corporate-standard>

Delivering emission reductions across our activities

To achieve our SBT, we will be required to make targeted greenhouse gas emission reductions across our scope 1, 2 and 3 emissions as defined the Greenhouse Gas Protocol **(Figure 5.4).**

As part of the process of setting our SBT, we are identifying emission reduction initiatives for each of our emissions' areas. We are currently undertaking scenario analysis and technical feasibility assessments of the proposed measures that will form our carbon reduction plans for RIIO-T2.

Substation emissions

We propose to introduce energy efficiency measures and microgeneration to reduce electricity consumption, cost and carbon emissions. To achieve this, we will:

- Install electricity monitoring on a representative sample of existing substations and install electricity metering on all new substations;
- Install Photovoltaics (PV) or other suitable micro-generation on our existing and future sites to reduce their direct electrical consumption where viable;
- Implement an energy efficiency programme for existing substations built prior to RIIO-T1 and design new efficient substations; and
- Use a renewable "green" tariff for substations, subject to Cost Benefit Analysis.

SF_6 emissions

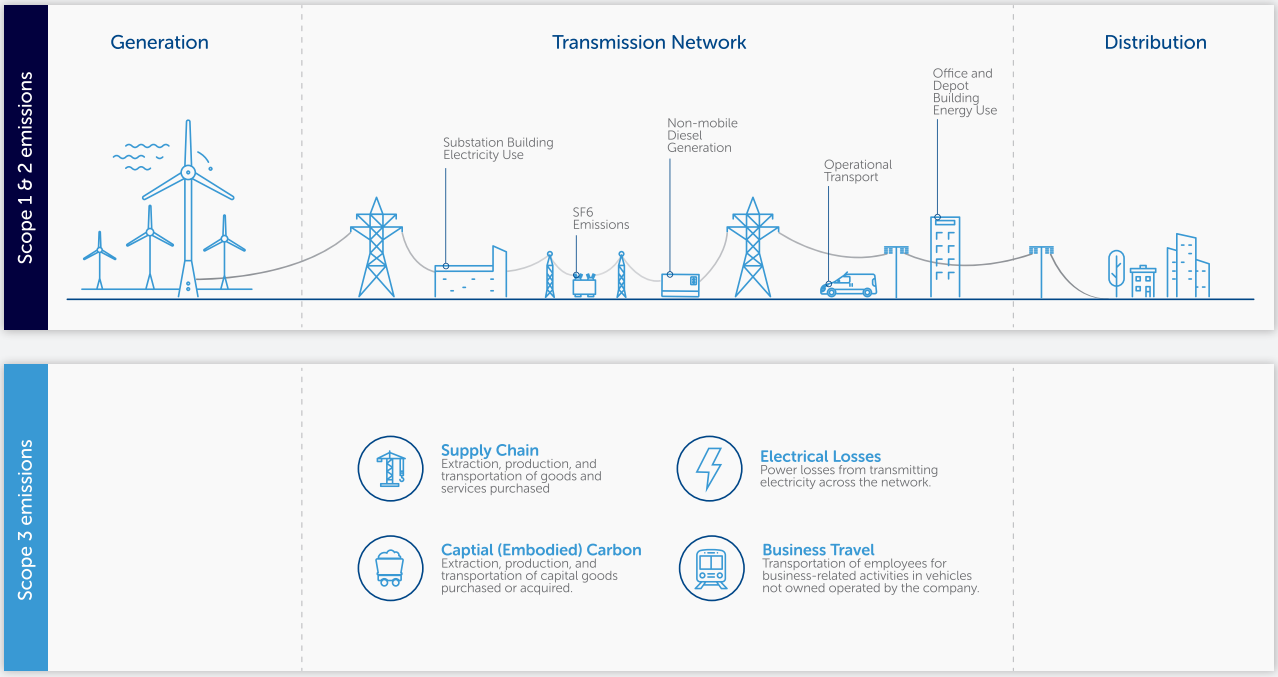
We propose to reduce our leakage rate and minimise our SF_6 mass holdings increasing due to network growth. To achieve this, we will:

- Set a SF_6 leakage reduction target for the RIIO-T2 period;
- Published our SF_6 strategy for stakeholder consultation;
- Introduce real time monitoring on all new GIS SF_6 installations;
- We will no longer install SF_6, where there is a technically and commercially viable alternative and subject to Cost Benefit Analysis; and
- Collaborate with our suppliers and other network operators to improve the viability of the SF_6 alternatives supply chain.

We will report on the outcomes from our SF_6 alternative trials of GE's g^3 gas at New Deer and Fort Augustus substations and Siemens blue SF_6 alternative at our Dunbeath substation.

We welcome views on our proposal to take a cost-benefit approach to adopting SF_6 alternatives and the decarbonisation of our operational fleet. **Is this acceptable, or should we go faster?**

Figure 5.4 Sources of Carbon Emissions from our Network



Operational transport emissions
We propose to introduce alternative fuel use vehicles where suitable vehicles are available for our operations. To achieve this, we will:

- Introduce fuel efficient and alternative fuel vehicles (hybrid, electric) in our operational fleet when viable; and
- Develop and implement a plan to reduce our operation vehicle mileage where possible without compromising quality of service to our customers and stakeholders.

Losses
We propose to increase visibility of losses in the development and operation of the network. To achieve this, we will:

- Publish our losses strategy for stakeholder consultation;
- Include losses accounting within our new Cost Benefit Analysis framework;
- Introduce a clear transparent methodology for calculating lifetime losses of new assets within our procurement process.

Supply chain
We will collaborate with our supply chain to target reductions in our scope 3 emissions from our contractor emissions and asset embodied carbon. We will:

- Work with contractors and suppliers to set carbon reduction targets in future contracts; and
- Include carbon accounting projections in contract tenders.

Planning for climate resilience

Where we are now
There are many definitions of resilience available, but we use the definition of resilience adopted by the Cabinet Office in their 2011 Natural Hazards and Infrastructure report:

"Resilience is the ability of assets, networks and systems to anticipate, absorb, adapt to and/or rapidly recover from a disruptive event."

Changes in land use over the last fifty years have caused changes to the natural environment, for example, the extent of flood plains. We must continually assess these changes and their impact on our assets.

Our operations in the north of Scotland are highly exposed to the impacts of extreme weather events and other landscape changes that have attributed by many commentators to climate change. During RIIO-T1 security of supply has been affected by both winter storms and landslides.

What we're going to do
The flood risk to substations was our focus in RIIO-T1, and we propose to focus on risk assessments for overhead lines during RIIO-T2. For new project sites, we proactively assess the risk of flooding and other environmental factors and introduce recommended control measures. Key actions for RIIO-T2 include:

- Keep our risk assessments in line with best practice, using the latest Met Office forecasts and climate change projections;
- Use Lidar assessment technology to assess landslide risk around our assets; and
- Undertake a proactive monitoring and sampling programme of the concrete foundations on sites near floodplains.

What success looks like
To ensure business resilience to climate change, we will proactively assess the material risks that extreme weather events poses to the resilience of the transmission network. We will continue to invest in maintenance and emergency response solutions identified for climate change adaptation.

Case study – substation flood prevention scheme
At our Tealing substation near Dundee, we introduced comprehensive flood defence work to protect the substation from a 1 in 1000-year weather event.

The flood prevention scheme was designed and constructed in collaboration with Angus Council and the Scottish Environment Protection Agency, as the substation had a history of local flooding from the adjacent Fithie Burn.

The risk of flooding in the local area has been significantly reduced safeguarding the infrastructure within the Tealing high voltage substation.

Tealing Substation flood prevention scheme

Promoting Natural Environment

Delivering biodiversity net-gain and driving environmental stewardship best practice.

Our goals

Business as Usual

Achieve biodiversity 'No Net Loss' on new projects gaining consent in 2020 onwards. Achieve biodiversity 'Net Gain' on projects gaining consent in 2025 onwards.

Attain 'No Net Loss' of native (or near native) woodland cover on new projects consented from 2021.

Apply modern interactive technology to inform stakeholders of possible changes to landscape and visual amenity in new project proposals. Publish a technical options position statement for new transmission infrastructure at the beginning of the price control.

Undertake a risk assessment of oil storage measures and contaminated land across existing substation sites. Deliver contaminated land remediation action at identified high risk sites by the end of the price control.

Undertake baseline noise monitoring and noise assessments for our strategically important substation sites at the beginning of the price control.

Stretching Ambitions

Participate in external forums to help develop, trial and where appropriate adopt a common approach to natural capital reporting by the end of the price control.

Expand our biodiversity planning to existing assets – define baseline and implementation plan by the end of the price control.

Engage stakeholders and define Environment Value improvement opportunities for the marine environment by the end of the price control.

Extend the scope of VISTA[17] outwith designated landscapes based on CBA and stakeholders' views.

Install synthetic ester-based transformer fluid at new high risk and environmentally sensitive sites where technology is available by the middle of the price control.

Implement noise management plans for strategic network sites that will support future projects and network flexibility during the middle of the price control.

What does it mean

Promoting our natural environment encompasses many areas including (but not limited to) biodiversity, woodland and forestry, visual amenity, oil and noise management. This broad definition is consistent with the international standard for environmental management, ISO 14001, under which we are being certified.

Based on our statutory obligations and stakeholders' views, we propose the following areas of focus for RIIO-T2:

1. Protecting and enhancing biodiversity
2. Woodland and forestry
3. Visual amenity
4. Oil management
5. Noise

The activities presented within this plan are based on our Environment and VISTA Policies.

Why are we doing it

There are strong views in the north of Scotland and across GB that our actions must be environmentally sensitive. Our consultations have strongly recommended that biodiversity planning across our portfolio be a core ambition of our future plan and visual amenity is a key topic of interest during project consultations. Stakeholders believe other areas of environmental values such as oil management and noise reduction should be prioritised on a materiality and risk basis.

As a responsible network owner, we have a responsibility to protect and promote the natural environment that we rely on. It is essential that we pursue environmental stewardship and ensure our activities are undertaken in a sustainable manner to protect our natural environment now and for future generations.

[17]Visual Impact of Scottish Transmission Assets (SSEN Transmission, 2018) available at: https://www.ssen-transmission.co.uk/sustainability-and-environment/vista/

While we work to ensure our operating policies follow best environmental practice (for example, for noise, oil leakage, woodland and forestry, species management), our stakeholders tell us we can, and should, go further.

The UK and Scottish Government alongside other environmental agencies are setting forward looking plans and targets for 2030 and beyond. For example, the Department for Environment, Food and Rural Affairs (DEFRA) 25-year plan[18] sets ambitious targets for the next quarter of century with the intention to pass nature on to the next generation in a better condition than in which they inherited it. The Scottish Government has also recently consulted on 'Scotland's Forestry Strategy – 2019-2029[24] that aims to promote sustainable woodland expansion, appropriate forestry management and integrating forestry with other land uses and businesses. All to support a strong economy and to play a great part in Scotland's Natural Capital.

Protecting and enhancing biodiversity

Where we are now

Whilst biodiversity[19] is valuable in its own right, it is also crucial to the maintenance of the natural systems on which we all depend such as the crop pollination, flood management and air quality.

The focus on biodiversity over the RIIO-T1 has been centred on impact minimisation and legal compliance. Biodiversity is currently considered throughout our project optioneering and development phase. This incorporates assessments of habitats and protected species when we select new routes for overhead lines and sites for substations. We manage our construction and operational works by following Species Protection Plans (SPPs) that have been agreed with Scottish Natural Heritage (SNH) to ensure that impacts are minimised.

We have been recognised for our forward-thinking approach to biodiversity management and were awarded two Scottish Green Apple Awards[20] for Environmental Best Practice in recognition of its Great Yellow Bumblebee biodiversity project at Thurso South substation in Caithness and its osprey mitigation works near Alyth in Perthshire. In addition, we were also awarded 'Overall Winner' of the BIG Biodiversity Challenge Awards in 2018.

What we're going to do

The outcome of our Sustainability Strategy consultation was that our activities should not only maintain the existing biodiversity balance, but help to enhance biodiversity, targeting a 'Net Gain'[21]. We will utilise the mitigation hierarchy by avoiding impacts by considering biodiversity in project design.

The Defra 25-year Environment Plan includes a key commitment to embed an 'Environmental Net Gain' principle for development, including housing and infrastructure.

Specifically, for the marine environment it also includes a commitment to reverse the loss of marine biodiversity and, where practical, to restore it.

As we plan for RIIO-T2 and based on a review of existing biodiversity guidelines and governance documents, we are developing 'Biodiversity Net Gain' assessment guidelines and a tool to calculate biodiversity units pre- and post- development of future infrastructure (on the land). These procedures will be incorporated into environmental impact assessments and construction contracts during 2019/20.

Over the past year we have trialled incorporating 'Biodiversity Net Gain' principles into substation design. This has proved successful with most substation projects capable of delivering a 'Net Gain' by incorporating changes in layout and landscape reinstatement design.

Our next steps include:

- Consulting on our 'Biodiversity Net Gain' approach
- Setting and monitoring biodiversity
- Develop and implement procedures for 'Net Gain' on new projects gaining consent from 2025 onwards
- Engage stakeholders and review operational Wayleave vegetation management activities of overhead lines to identify opportunities for reduce activity and enhancement.
- Engage stakeholders and review biodiversity management opportunities for marine projects.

What success looks like

To positively contribute to the UN and Scottish Government Biodiversity strategies[22], we aim to achieve an overall 'No Net Loss' on new infrastructure projects gaining consent in 2020 onwards and achieving 'Net Gain' on projects gaining consent in 2025 onwards.

Further thinking on Natural Capital

An emerging trend receiving attention in government policy is the promotion of the term 'Environmental Net Gain' / Natural capital[23]. However, the integration of biodiversity valuation into natural capital reporting is still in its infancy and there is currently no industry wide accepted methodology for these assessments. We propose to:

- Engage with our stakeholders to further understand the opportunity to use existing natural capital valuation methodologies in our busines decision making.
- Participate in external forums to help develop, trial and where appropriate adopt a common approach to natural capital reporting mechanisms in the future.

[18]We recognise this plan is for England and Wales, however, the principles are equally relevant to Scotland. A Green Future: Our 25 Year Plan (DEFRA, 2018) available at: https://www.gov.uk/government/publications/25-year-environment-plan

[19]The term Biodiversity, short for biological diversity, refers to the diversity of life forms, species, genetic variation, and ecosystems. UK Biodiversity Indicators, (DEFRA, 2018) available at: www.jncc.defra.gov.uk/pdf/UKBI_2018.pdf

[20]SSEN Transmission pips rivals to scoop prizes at Scottish Green Apple Awards (SSEN Transmission, 2019) available at: https://www.ssen-transmission.co.uk/news-views/articles/2019/3/ssen-transmission-pips-rivals-to-scoop-prizes-at-scottish-green-apple-awards/

[21]Net Gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand.

[22]2020 Challenge for Scotland's Biodiversity (Scottish Government, 2013) available here: https://www.gov.scot/publications/2020-challenge-scotlands-biodiversity-strategy-conservation-enhancement-biodiversity-scotland/

[23]Natural capital is a wider term for the stock of renewable and non-renewable resources that combine to yield a flow of benefits to people.

Woodland and forestry

Where we are now

In our operations and the development of our network we regularly interact with different types of woodland. This includes the felling of corridors for the construction of new overhead lines, or the selective felling of trees encroaching on safety and clearance distances.

Woodland and forestry resource are currently integrated at the earliest level of our planning and decision making. When we develop new overhead lines, we adopt a mitigation hierarchy for our impact on woodland on forestry. Where possible we avoid impacts. Any impacts that cannot be avoided are then assessed and where necessary measures to reduce these are identified. This can include activities such as encouraging the regeneration of previous corridors or planting new trees.

What we're going to do

We believe we can make an active contribution to the Scottish Government's vision for sustainable forest management[24].

Focusing on native and nearly-native woodland[25], we propose to adopt a combination of the following approaches:

- Promote appropriate natural regeneration of old corridors;
- Manage regeneration of new corridors; and
- Where there is still a 'Net Loss', the balance would be delivered through building partnerships and supporting local woodland.

What success looks like

Our aspiration is to attain 'No Net Loss' of 'native' and 'nearly-native' woodland for new projects consented from 2021.

Visual Amenity

Where we are now

We recognise that our infrastructure and activities have a landscape and visual impact on people and the natural environment. We are committed to minimise the impact of our infrastructure on the visual amenity of landscapes, while balancing the provision of cost efficiency and ensuring a safe and secure supply of electricity.

The landscape and visual implications of our infrastructure are one of the most important topics in our stakeholder consultations.

For new overhead infrastructure, landscape and visual considerations are an important part of each stage of site selection. Typically, our preferred approach is an overhead line solution due to efficiency, flexibility and fault detection benefits, and preventing environment risk from undergrounding.

Where it can be demonstrated that a particular impact associated with an overhead line is significant and alternatives such as re-routing will not sufficiently reduce the impact, we will consider the option of undergrounding.

What we're going to do

There is strong support for the steps we are taking under our Visual Impact of Scottish Transmission Assets (VISTA)[26] scheme to mitigate existing landscape and visual impacts and a desire from stakeholders for us to extend this further during RIIO-T2.

We will continue to learn from our experience and seek to adopt best practice in communicating with our stakeholders on landscape and visual amenity considerations.

From the beginning of RIIO-T2 we will:

- Publish a technical options position statement for new transmission infrastructure;
- Use modern interactive technology to help inform stakeholders and members of the public, of the possible changes in landscapes and visual amenity that are likely to result from our developments (e.g. 3D visualisation software, virtual reality and new technology) **(Figure 5.5).**
- We are going to propose an extension to the scope VISTA outwith designated landscapes based on Cost Benefit Analysis and stakeholders' views.

What success looks like

We operate in Scotland's most precious rural landscapes, yet our essential operations require infrastructure that can be to the detriment of visual amenity. Our ambition is to ensure that the visual impact of new infrastructure is fully considered in our projects from conception and is reduced as far as practical in line with our social, environmental and economic Cost Benefit Analysis. For new project proposals, we also believe it is important to consider new ways in which we can ensure stakeholders have the best possible information in which to inform their views and these are fully and transparently considered in our project development process.

Figure 5.5 Finstown Substation 3D visualisation. Read more: **http://www.ssen-transmission.co.uk/projects/orkney/**

[24]Scotland's Forestry Strategy 2019–2029 (Scottish Government, 2019) available at: http://www.gov.scot/publications/scotlands-forestry-strategy-20192029/
[25]Native and nearly native woodland is defined in Scotland's Native Woodlands - Results from the Native Woodland Survey of Scotland, (Forestry Commission Scotland, 2014) available at: https://forestry.gov.scot/forests-environment/biodiversity/native-woodlands/native-woodland-survey-of-scotland-nwss
[26]Visual Impact of Scottish Transmission Assets (SSEN Transmission, 2018) available at: https://www.ssen-transmission.co.uk/sustainability-and-environment/vista/ (accessed 26 June 2019)

Oil Management

Where we are now

To operate and maintain our network we store and manage large quantities of oil. Oil is a toxic substance and, if leaks occur, has the potential to harm the environment.

For all new substation sites and upgrades to existing sites, we design our oil storage, transformer bays and site drainage to the highest standards meeting all regulatory requirements[27]. This is further reinforced by a design agreement with the Scottish Environment Protection Agency (SEPA) that sets out the parameters and specifications that our contractors must meet.

However, a significant proportion of our transmission network was built in the 1950s and 1970s. Since this period, there has been a significant increase in the scope and granularity of regulatory requirements, for the design and construction of electricity transmission infrastructure, including in relation to oil management. While we have very few oil incidents, there is potential for contaminated land on our older sites (designed to historical requirements) that requires remediation.

What we're going to do

For existing sites, we propose to use risk assessments to categorise our sites identifying the risk of existing contaminated land or future releases of oil. It will identify where no action is required, ongoing monitoring and containment should take place, or where immediate remedial work should be instigated to protect the environment.

We will also consider the installation of:

- Synthetic ester-based transformer fluid (which is readily biodegradable) at new high risk and environmental sensitive substations sites where technology is available (currently 132kV assets).

What success looks like

Oil management is a key aspect of our ISO 14001 environmental management system. In the design and construction of new sites, we will continue to ensure regulatory compliance and apply best practice for oil storage. For pre-existing sites and legacy oil storage measures, we will adopt a proactive and risk-based approach to identify and undertake any remedial action required.

Noise

Where we are now

Noise impacts on residential properties are a material consideration in the planning process and it is necessary to demonstrate no adverse impact. In addition to noise considerations within the planning process, noise impacts can be considered by the local authority at any point under the statutory nuisance provisions[28].

As part of planning applications for new substations we routinely undertake a noise impact assessment with proposed noise reduction mitigation measures necessary to reduce noise to an appropriate level. We have updated our overhead line route selection and substation site selection guidelines to incorporate noise thresholds distances as part of our standard technical parameters.

What we're going to do

Alongside compliance with noise emission regulations, we will identify strategic hub substations that will require ongoing modifications as part of our network development activities. For these sites we will:

- Undertake baseline monitoring and establish noise assessment models;
- Design in future mitigation options (e.g. space for barriers, separate cooler banks on transformers) where necessary;
- Develop and implement long term noise management plans for sites at or near current noise capacity where necessary.

What success looks like

Local residents should not be unduly affected by noise from our assets. We will work proactively to address this issue, taking action in a timely, effective manner.

We welcome views on whether our proposals are sufficient, or too, ambitious. **In particular, we seek views on whether we should adopt our proposed Stretching Ambitions?**

[27]Oil management in Scotland is now regulated by the Scottish Environment Project Agency (SEPA) and controlled through the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)
[28]Environmental Protection Act (1990)

Optimising Resources

Managing resources for a circular economy; achieving zero waste to landfill, increasing resource efficiency and using sustainable materials.

Our goals

Business as Usual

- Provide transparent waste reporting for all waste streams from the start of the price control.
- Achieve recycling, re-use and recovery rates for construction and demolition wastes at or above the national target (70%) by the end of the price control.
- Provide transparent resource use reporting and establish efficiency targets by the end of the price control.
- Establish a management system for assessing and trialling innovations in sustainable materials by the end of the price control.
- Define industry approach for embodied carbon assessment, reporting and management by the end of the price control.

Stretching Ambitions

- Accelerate zero waste to landfill[29] across all waste streams by the middle of the price control.
- Achieve recycling, re-use and recovery rate target (70%) across all waste streams by the end of the price control.
- Introduce a re-manufacturing pilot scheme for "end-of-first-life" assets by the end of the price control.
- Implement sustainable material initiatives on large capital construction projects by the end of the price control.
- Ensure all new large capital construction projects are compliant with PAS 2080 Carbon Management in Infrastructure by the end of the price control.

What does it mean

Many of the resources we use in building our infrastructure are non-renewable resources, such as steel, aluminium and copper. Increasing material scarcity, the environmental impact of manufacturing these resources and inconsistency in local end-of-life material solutions, for example recycling facilities, that we need to work harder to ensure we make best use of resources.

These environmental pressures require us to rethink how we use, manage and dispose of materials to ensure we use resources in a responsible and sustainable way. Our ambition has three key areas of focus:

1. Minimising waste
2. Resource efficiency
3. Using sustainable materials

The activities presented within this plan are based on our Asset Management, Engineering and Procurement policies.

Why are we doing it

Stakeholder feedback on our Sustainability Strategy indicated that there was a need for increased focus and targets on resource use. It was highlighted that there is significant opportunity for us to support the circular economy through the reuse, repurposing and remanufacturing of assets.

There are also significant external drivers focused on sustainable resource use, with several national and international targets. For example, the Scottish Government Circular Economy Strategy[30] sets out clear priorities and targets to move to a circular economy, where products and materials are kept in high value use. The UK Government's 25-year environment plan[31] has also set our future direction and the ambition to work towards zero avoidable waste by 2050.

[29]Including construction and demolition waste, excluding compliance waste.
[30]Making Things Last: A Circular Economy Strategy for Scotland (Scottish Government, 2016) available at: www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/
[31]A Green Future: Our 25-year plan to improve the environment available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf

The UK Government and regulators such as the Scottish Environment Protection Agency (SEPA) are also increasingly interested in the assessment and reduction of embodied carbon in resources[32]. Embodied carbon can be defined as emissions that result from the production and manufacturing of materials used in the construction of new assets. Reducing this carbon helps realise cost efficiencies, drive innovation and enhance environmental improvement.

Emerging business management standards to support the circular economy and infrastructure carbon management are increasingly being promoted in the industry. For example, PAS 2080 'Carbon Management in Infrastructure' provides a management framework for the measurement and monitoring of carbon throughout an infrastructure project. In addition, the recently published BS8001 Circular Economy Standard provides the world's first practical framework and guidance to implement the principles of the circular economy in organisations.

Minimising waste

Where we are now

Much of our waste and resource use is associated with our construction and field-based activities. Waste from our construction activities is generally handled by our principal contractors and each of our projects are required to have site-specific waste management plans to ensure duty of care and waste regulation compliance.

To establish a baseline position for our performance, we are currently working with our supply chain and contractors to collect consistent data and define a streamlined reporting process. We are also updating our waste management procedures and introducing mandatory data reporting by waste streams in contracts for new projects. Going forward, improving our waste data quality will inform our hotspot analysis and the identification of improvement initiatives.

What we're going to do

Our aim is to substantially reduce waste generation from our main offices and sites through prevention, reduction, re-use and recycling. Specifically, we propose to target recycling, re-use and recovery rates across waste streams at, or above the Scottish Government National Target (70%), with an ambition to deliver continuous improvement against this target:

- Each year we will report on our waste sent to landfill, resource, re-use and recycling;
- We will work with our contractors to ensure that they follow the principles of zero waste to landfill on our projects from the outset of the price-control to meet our stretch target.
- Develop and roll-out site waste segregation best practice to all contractors to improve our recycling rates and meet our recycling targets; and
- External assurance of our waste reporting, zero waste to landfill and recycling targets.

What success looks like

We propose to accelerate our ambition to achieve zero waste to landfill and expand this commitment across all waste streams by the middle of the price control. This will prevent any waste material from our operations, being disposed of in landfill sites, in turn reducing our environmental impact.

Resource efficiency

Where we are now

The assets we install can have a life of up to 80 years. This means there is an opportunity to re-use assets when they are decommissioned before end-of-life.

We have also undertaken targeted innovations to re-use resources while upgrading infrastructure. For example, we have undertaken projects to reconductor parts of our existing network with more efficient Aluminium Conductor Core (ACCC) Monte Carlo conductors avoiding the need to build new infrastructure.

What we're going to do

In line with circular economy principles, we will seek to keep assets in use for as long as possible, extracting the maximum value from them whilst in use, then recover and regenerate products, materials and resources at the end of each service life. This includes:

- Introducing Building Information Modelling (BIM) technology to enable more efficient designs;
- Developing a materials passport methodology for buildings and update design specifications to enable more efficient materials recovery at "end-of-first-life;.
- Implementing targeted interventions on critical assets to increase lifespan through refurbishment based on risk analysis; and
- Developing a scheme for re-manufacturing of assets at "end-of-first-life".

[32]Strategic Infrastructure (Transport and Utilities) Sector Plan Consultation available at: https://consultation.sepa.org.uk/sector-plan/strategic-infrastructure-transport-utilities/

What success looks like

Our aim is to upgrade rather than replace assets wherever viable and, in cases where replacement is required, we aim to re-use as much as possible. We will ensure that asset life extension decisions factor into metrics of resource use.

Using sustainable materials

Where we are now

Due to the complex nature of assessing the impact of materials, there is no single accepted definition of 'sustainable materials'. To frame our approach, we define sustainable materials as;

"Those materials with lower environmental impacts through their production and life cycle, compared to their traditional counterparts".

We seek to use construction materials that are as sustainable as possible which reduce environmental impacts associated with their manufacture or transport to site. During the development of our construction projects, we deploy innovations to reduce the need for resources and use alternative lower impact materials.

During 2019, we are reviewing Life Cycle Assessment (LCAs) and responsible sourcing approaches across different industries to determine and inform our approach for assessing product sustainability during RIIO-T2. This will include approaches to managing embodied carbon.

What we're going to do

We will identify and adopt sustainable materials where feasible, including through our innovation process to enable us to more rapidly assess commercially available sustainable materials and reduce barriers to adoption.

We are exploring options for a management framework for assessing and managing embodied carbon in our construction projects that incorporates PAS 2080 compliance.

What success looks like

Where appropriate, we will seek to develop our network assets using materials which are as sustainable as possible, adopting new products to reduce our reliance on finite natural resources and considering our embodied carbon within project design and construction.

What actions do you think we should take on embodied carbon and by when?

Case study - composite poles

To connect the Dorenell Wind Farm to our Blackhillock substation near Keith, we installed 140 new composite poles instead of the traditional wooden poles or steel lattice towers. Using the composite poles reduced environmental impacts during construction and meant only one overhead line was needed rather two parallel lines that would have otherwise been used. These poles also demonstrate a longer lifespan, require no preservatives and can be repurposed or recycled at the end of their useful life.

Supporting Communities

Meeting the needs of vulnerable customers and maximising the local benefit of our investments.

Our goals

Business as Usual

Report on local content and the socio-economic impact of our large investments (>£100m) during the price control.

Introduce Meet the Buyer Events for large capital construction projects at the beginning of the price control.

Maintain employee volunteering in the community through the 'Be the Difference' programme during the price control.

Stretching Ambitions

Publish a company social value statement at the start of the price control[33].

Provide mandatory training for employees to recognise consumer vulnerability and have knowledge of the support services available by the middle of the price control.

Introduce accessible communications and consultation media at the start of the price control.

Create partnerships with third parties to help deliver and promote our activities in addressing consumer vulnerability by the middle of the price control

Deliver suitable community fund support (to be confirmed).

What does it mean

Our ambition is to ensure we meet the needs of vulnerable customers and support local supply chains when developing, constructing and operating assets so that communities benefit from our investments. We can also provide additional support to our communities across our network through our employees committing their time to support community projects and possible community support funds.

Why are we doing it

Stakeholders and society expect companies to introduce measures to support and contribute to the communities in which they operate. Supporting vulnerable customers and tackling fuel poverty is vital to ensure a fairer, socially just and sustainable future. The Scottish Government has also recently consulted on a draft Fuel Poverty Strategy for Scotland (2018) that sets ambitious targets to support the goal of eradicating fuel poverty.

There is no simple definition that captures every aspect of consumer vulnerability in the energy sector. Based on stakeholder feedback, we believe it is vitally important to address high-risk categories of consumers in the north of Scotland and islands. This includes customers living in rural communities, suffering from fuel poverty or reliant on electric heating.

A recent report commissioned by Citizens Advice Scotland (CAS)[34] on consumers in vulnerable situations highlights good practice in the energy sector in providing support but concludes there is not yet an integrated approach between essential service providers. As a result, not all vulnerable consumers eligible and wishing to receive additional support are aware of the services available. We are supportive of all policy measures that will help to support energy efficiency and reduce fuel poverty especially for our most vulnerable customers.

One of the most significant impacts we have on the areas we operate in is the local economic benefits created through some of our major development projects. Without the continued support of the communities, we would not be the business we are today or become the business we want to be in the future.

[33]Our regulator, Ofgem, has decided that transmission companies should not consider actions to support vulnerable customers and communities as business as usual. Hence we define these proposed goals as stretching ambitions. For further information please see: www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-decision

[34]Making it Easy: Simpler Registrations for Customers in Vulnerable Situations (Citizens Advice Scotland, 2018) available at: https://www.cas.org.uk/publications/making-it-easy-simpler-registration-consumers-vulnerable-situations

Meeting the needs of vulnerable consumers

Where we are now

Addressing consumer vulnerability has not previously been seen as a core function for GB transmission owners; however stakeholders' expectations have changed.

Whilst we agree the central provision of support should be provided by the most capable and directly relevant organisation, we believe we have a role to play in addressing consumer vulnerability and we want to do more in RIIO-T2. We have been actively engaging with stakeholders directly and via our Stakeholder Advisory Panel to understand where we can best contribute.

What we're going to do

We have identified five targeted actions for RIIO-T2:

- Create a social value commitment statement for our stakeholders and customers with relevant supply chain requirements;
- Deliver mandatory training to ensure employees are proficient in recognising signs of consumer vulnerability and have knowledge of the support services available;
- Introduce accessible communications and encourage accessible consultations events. We will adopt an accessibility software solution for our website that allows customers to view content in different languages and alter text sizes. This will promote accessible information that is particularly important for consultation documentation;
- Utilise a risk mapping tool already used by Distribution Network Operators (DNOs) to assess how many consumers may be impacted by a planned outage. This will allow us to make proactive contact with customers on the Priority Services Register; and
- Create partnerships with third parties to help deliver and promote our activities in addressing consumer vulnerability during our stakeholder engagement activities.

What success looks like

There is an opportunity for us to take a supporting role and co-ordinate activities with the DNO, Local Authorities and other agencies to support and meet the needs of vulnerable comsumers. It is important to ensure that the customers and stakeholders we interact with, who are both eligible and wishing to receive support are aware of the services available.

We have identified a difference of opinion between our regulator and our stakeholders in our role in supporting communities. **We would welcome your views on whether we should adopt the goals described here.**

Using local supply chains

Where we are now

Building on the SSE Responsible Procurement Charter[35] that encourages the use of local supply chains and ensuring that we continue to maximise the local benefit of our investments, we aim to support local employment and local supply chains where feasible during the development, construction and operation of our assets.

In 2012, SSE established the Open4Business (O4B) Highlands and Islands portal to link small and medium sized businesses in the Highlands and Islands to the business opportunities from our construction projects. Alongside the financial success of the portal, there have been several key achievements including over 750 opportunities posted, over 465 contracts awarded and over 1600 organisations registered. This portal is set to begin its next chapter of success under the stewardship of Highlands and Islands Enterprise (HIE).

Over the last few years, we have engaged independent consultants to quantify the contribution that our major projects make to the UK and Scottish economies. For example, this analysis has included the measurement of the local-socio-economic benefits of our Beauly Denny and Caithness Moray projects. The Caithness Moray project added approximately £643m of value to UK GDP, of which at least £265m will be contributed to the Scottish economy[36].

What we're going to do

We are committed to ensuring that the local supply chain is utilised where possible on our projects. Each of our project requirements are different, but there are a range of possible opportunities for local businesses. To build on our approach during RIIO-T2, we will:

- Hold meet the buyer engagement events between our primary project contractors and local businesses at the outset of large capital projects to discuss local business opportunities;
- Look to set a minimum threshold for the share of local content in our portfolio projects where practical under procurement regulations;
- Continue to promote the 'Open for Business' programme for the north of Scotland; and
- Undertake and publish socio-economic impact assessments for all investments >£100m.

What success look like

We will measure and understand the impact we have on communities, through the local socio-economic impact of each pound spent during our investments and the local content ratio of our major project investments.

[35]Responsible Procumbent charter (SSE, 2018) available at: www.sse.com/media/530653/Responsible-Procurement-Charter_0818.pdf
[36]Caithness Moray Delivering economic and social benefits (SSE, 2018) available at: www.sse.com/media/421062/Caithness-Moray-Delivering-economic-and-social-benefits.pdf

Giving back to communities

Where we are now

Our investments in these communities are not only financial. Our employees also commit their time to supporting projects in our communities through the SSE 'Be the Difference' programme; an initiative through which employees volunteer in the community for a day.

We also currently provide additional support to communities across our network area through our Resilient Communities Fund, allocating a minimum of 33% of any Stakeholder Engagement Incentive income that we receive to the communities in which we work. The fund is currently used to support projects that will help the community during extreme weather events or when electricity supply is lost, with a focus on vulnerable customers.

What we're going to do

We will continue to offer our employees the opportunity to volunteer through our 'Be the Difference' programme during RIIO-T2.

We want to ensure that our community support investments continue to benefit our local communities and maximise the benefits they receive. During 2019, we will review the suitability of our community fund support to determine our approach for RIIO-T2.

What success looks like

We want to ensure that our works continue to benefit our local communities and that we are maximising the benefit that they receive from our project investment, community support investment and local volunteering.

We currently provide support to communities through our resilience community fund, **are there other more impactful and beneficial ways to provide support to communities?**

Case study - Be the Difference programme

We value the importance of employees giving back to their local communities and offer them the opportunity to volunteer a working day each year through the 'Be the Difference' programme. We also match employee fundraising up to £150. In 2018/19 our employees volunteered around 1,185 hours with community groups and projects. You can read about the Be the Difference programme: **www.sse.com/communities/bethedifference/**

Growing Careers

Ensuring a safe and inclusive culture for our employees; adding value through good jobs, training and development.

Our goals

Business as Usual

Establish a 5-year resourcing plan that includes talent pipelines and succession plans that are reviewed annually for the start of the price control.

Ensure inclusive job advertisement and training delivered to all hiring managers from the start of the price control.

Provide mandatory Inclusion and Diversity (I&D) training to all employees by the middle of the price control.

Establish and adopt targets based on 2021 census demographic data for network area by the middle of the price control.

Ensure the Apprentice, Graduate and Technical Staff Trainee intake is representative of local demographics.

Stretching Ambitions

Undertake research programme to seek deeper insight into the behaviours and processes required for an inclusive workplace delivered at the start of the price control.

Provide inclusive meeting facilitation training to all managers by the middle of the price control.

Deliver a programme to influence inclusive workplace behaviours by the end of the price control.

Undertake a positive action campaign through university and career fair engagement by the end of the price control.

What does it mean

Our ambition is to attract, develop and retain a sustainable pipeline of highly engaged employees, and in doing so, help to address the skills shortage and lack of diversity in our industry.

Complementing the SSE Group strategy[37] on human capital, Inclusion and Diversity (I&D) and the Networks People Strategy, we have created a sustainable workforce strategy that forms the basis of this plan.

Why are we doing it

We rely on our people to be a successful business; our long-term success depends upon the people we can attract, retain and develop. The past decade has been a period of rapid change in the energy sector and, for Transmission, huge growth. Our workforce has grown significantly to support this. With an aging workforce and set against a projected industry skills gap in the future, our expanding network requires an increasing number of skilled employees to keep it running effectively and to manage the transition to an increasingly decarbonised and decentralised system.

While some stakeholders do not think I&D is a priority, Ofgem and the Government have called on the industry to tackle I&D and make real improvements. Ofgem have published a diversity and inclusion strategy[38] that focuses on three priorities: (1) reflecting the demographics of their customer base; (2) changing workplace culture; and (3) influencing other companies in the power sector to improve diversity.

In addition, the Scottish Just Transition Commission[39] has been established to advise on maximising the opportunities of decarbonisation, in terms of fair work, and tackling inequalities, while delivering a sustainable and inclusive labour market.

[37]SSE's Inclusion Strategy 2017 – 2020 Valuing Difference Report (SSE,2017) available at: www.sse.com/media/481527/DiversityReport_FINAL.pdf
[38]Ofgem diversity and Inclusions strategy (Ofgem, 2019) available at: www.ofgem.gov.uk/system/files/docs/2019/03/march_2019_diversity_and_inclusion_strategy_1.pdf
[39]Just transition commission (Scottish Government, 2019) available at: www.gov.scot/groups/just-transition-commission/

Where we are now
Our expanding network requires an increasing number of skilled employees to keep it running effectively and to manage the transition to an increasingly decarbonised and decentralised system.

We have taken a cautious approach to the growth of our workforce, making sure that we understand and are confident in the skills needed before recruiting. This has meant using contractor resource to manage 'peaks' in workload or fill short term skills gaps. When we do recruit, we have sought to offer high quality posts that have genuine opportunities to expand, achieve and develop.

To support a pipeline of new skilled employees into the business, we operate several training schemes – such as the Technical Staff Trainee (TST) programmes, apprenticeship and graduate programmes alongside targeted job role specific training. For example, we spend an average of £80,000 per TST to develop their talent. It's an investment in their future – and ours.

What we're going to do
Our network is developing and the skills we need and utilise is constantly evolving. We have a responsibility to ensure our workforce has the required skills and opportunities to meet our future business requirements; we are committed to investing in our employees and adding value through the creation of good jobs, training and development.

By doing this, it's not just us or the wider company that benefits – society and the individuals do too. For example, our TST programme has been estimated to provide £7.65[40] benefit to society for every pound spent through the programme.

Looking to the RIIO-T2 period, our workforce will change and so we propose to:

- Introduce a rolling 5-year resourcing plan, including talent pipelines and succession plans that are reviewed annually;
- Establish a 'Future Network' development framework to build leadership and project management capability for future network needs that complements job role specific training and personal development planning;
- Build talent, mentoring and coaching programmes, designed to build and test capability for future progression;
- Promote inclusive recruitment - ensuring job advertisements are as open as possible and ensure all hiring managers have undertaken diversity and inclusion training; and
- Work collaboratively as a sector to drive change by, challenging ourselves to do things differently, sharing best practice and delivering sector priorities.

What success looks like
We want to ensure we are able to provide opportunities within our organisation for people to develop and continue their careers with us.

Action not excuses - promoting fairness, inclusion and diversity

Where we are now
The energy industry has for many years been imbalanced, being viewed as a male dominated engineering sector. As a result, the diversity of our workforce does not reflect the communities and society we serve.

At the centre of SSE's inclusive and respectful culture is our longstanding commitment to the Real Living Wage in the UK as set by the Living Wage Foundation. Since April 2014, we have been rolling the Living Wage out through our supply chain.

What we are doing
SSE Group's strategy on inclusion and diversity has been to initially address gender diversity, however inclusion in its widest sense is also important. Women comprise around 18% of our workforce and we must take action to encourage women IN to our business, support women to stay ON in the company and help women progress UP in the organisation. We call this our 'IN, ON, UP' inclusion strategy. The SSE Group has several targets to implement this strategy such as making the Executive Committee and Direct Reports to the Executive Committee from 20% women at present to 30% women by March 2021.

In 2019, SSE was instrumental in the creation of the Energy & Utility Skills (EU Skills) sector wide inclusion commitment that encourages employers to focus on the real measurable action proven to drive more inclusion and diversity in our sector. We also have a 'Shadow Board' and see this as a key way to bring diversity of thought and fresh thinking to real business challenges, helping avoid the risk of group think, but also offering increased exposure of future talent to the leadership team.

[40]Valuable People: understanding SSE's Human Capital (SSE, 2014) available at: https://sse.com/media/306295/SSE-Human-Capital_Final_For-Web.pdf

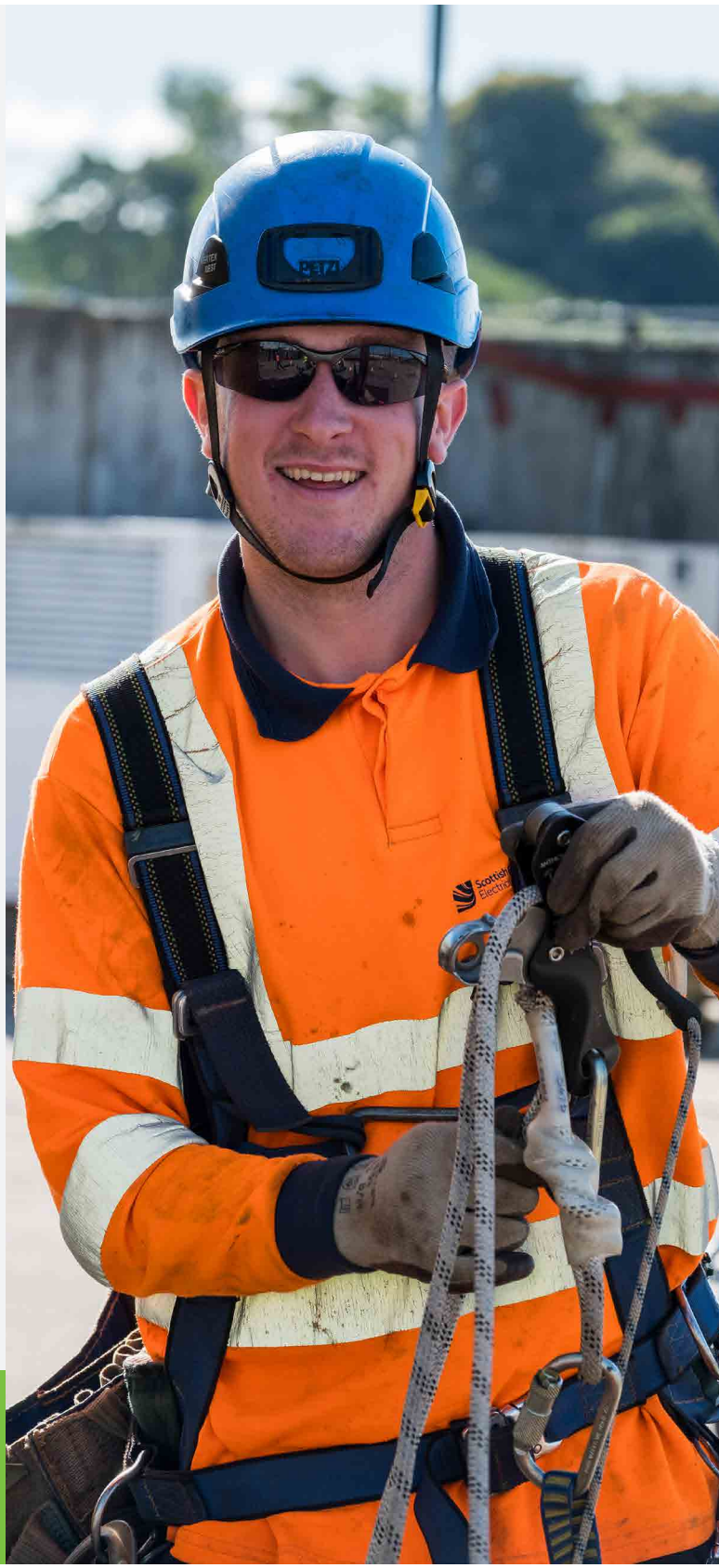
What we're going to do

We propose to use best practice to continue to evolve our workforce towards greater inclusion and diversity, including:

- **Targets:** Measure and report progress in our organisations and as a sector annually adopt targets based on 2021 census local demographic data that will encourage practical inclusive behaviour. We will benchmark our I&D scorecard against other TOs and other sectors. We also aim to ensure apprentice, graduate and TST intake is representative of local demographics by the end of the price control;
- **Training:** Deliver mandatory I&D training to all employees and inclusive hiring training to all our managers. With the aim to accelerate culture change we also propose to introduce inclusive meeting facilitation training for managers;
- **Benefits:** A working environment and benefits that reflect the real-world challenges of our employees, including flexible working and child care provision;
- **Workplace Culture Change:** to supplement the behavioural training we will seeking to gain deeper insight into the real and perceived challenges of our minority group employees through research and focus groups to inform a culture change programme. A compressive employee engagement and communication programme would then be delivered, promoting fairness, diversity and inclusion that conveys SHE Transmission as a good place to work for all; and
- **University engagement:** We aim to design and deliver a positive recruitment campaign through university and career fair engagement.

What success looks like

Our goal is for our workforce to reflect the diversity of the communities we serve, and to have a work culture of fairness, respect and dignity.



We welcome views on other steps we could take to provide rewarding and fulfilling careers

Transparency

Ongoing engagement

Our Sustainability Strategy, Sustainability Plan and draft ambitions for RIIO-T2 have been developed following detailed conversations and input from our stakeholders.

We are committed to continuing that dialogue as we progress our sustainability journey: does our Sustainability Strategy still meet stakeholders' expectations; is our progress with our Sustainability Plan, and our proposed activity, consistent with meeting our ambitions? We expect to do this through one-to-one meetings, industry events and specific consultations.

We will follow the principles set out in our new Stakeholder Engagement Strategy in undertaking this engagement.

Governance

Appropriate and effective governance is essential to giving stakeholders confidence in our plans, activities and outcomes. Increasingly there is a demand, in particular from shareholders, for specific governance in relation to sustainability.

SSE's Chief Executive has overall lead responsibility for sustainability across the SSE Group, including at board level. The three electricity networks owned by SSE plc are managed separately from other SSE plc businesses under the ownership of Scottish and Southern Energy Power Distribution (SSEPD) which trades under the name Scottish and Southern Electricity Networks (SSEN)

SSEPD has a separate Board with independent non-executive members. Under this structure, the Managing Director of Transmission has responsibility for implementing the Sustainability Strategy within our business.

The Sustainability Sub-Committee of the SSEPD Board was established in 2017 to oversee the development and delivery of the Sustainability Strategy, the transition to low carbon energy systems and high standards of environmental management. The remit of the Sub-Committee also includes ensuring consideration of sustainability in other business activities, including: strategy, network planning, connections, networks development, and innovation. It is chaired by the Managing Director of Transmission, and includes non-executive representation from other SSEPD Board members.

We intend to continue with this strong governance structure during RIIO-T2, adapting as required and in line with best practice.

A comprehensive reporting framework

Our approach to stakeholder engagement is based on a commitment to openness, transparency, and accessibility. This includes reporting.

As part of our development of our draft Business Plan, we consulted on proposals for a new reporting package to increase the transparency of the activities and outcomes of energy networks.

citizens advice

"Companies are required to publish complete information on their performance, financial structures, gearing and ownership" – RIIO-2 Principle

Building and expanding upon existing reporting obligations, we are proposing a reporting framework for RIIO-T2 that would cover three distinct areas:

1 **Service Performance**

2 **Financial Performance**

3 **Performance for Society**

Performance for Society report

Purpose: Customers and stakeholders can see the contribution that energy networks make to society through the delivery of an essential public service.

Outcomes: Easy-to-access reporting; Evidence of the impact of activities on communities and society.

Approach: The types of things that might be included in the Annual 'Responsible Business' Report are: Gender Pay Gap, Inclusion and Diversity measures, Living Wage policies, Modern Slavery Statement, socio-economic contributions, greenhouse gas emissions, and waste.

Reporting

Our commitment to transparent reporting

Sustainability outcomes

As part of our sustainability governance, we are committed to setting measurable targets and activities, and reporting on these so our stakeholders can monitor our performance. Internally, our Sustainability Sub-Committee track progress on a quarterly basis and oversee the delivery of the Sustainability Plan.

As we have set out in our draft Business Plan, we are committed to:

- An annual review of our Sustainability Strategy, with a public report on the outcome of that review;
- Any changes to our Sustainability Strategy will be developed through open and transparent consultation, and changes (and the reasons for them) clearly presented;
- Publishing every two years a Sustainability Plan that sets out measureable, time bound milestones for delivery against our sustainability ambitions. Open and transparent reporting of progress against those milestones;
- Any changes to our Sustainability Plan will be developed through open and transparent consultation, and changes (and the reasons for them) clearly presented; and
- An annual Sustainability Statement, incorporated into our Performing for Society report, that describes the progress that has been achieved in the past year.

You can read our sustainability reporting:
www.ssen-transmission.co.uk/sustainability-and-environment/sustainability-strategy/

SSE Group sustainability reporting

The SSE Group publishes an annual Sustainability Report on SSE's key policies, management and performance in relation to its economic, social and environmental impacts.

One of SSE's four strategic pillars is Being Sustainable. SSE defines a sustainable company as one that offers profitable solutions to the world's problems. In support of its vision, purpose and strategy, SSE has adopted four fundamental business goals for 2030 which are directly aligned to the UN Sustainable Development Goals (SDGs). These Goals put addressing the challenge of climate change at the heart of SSE's strategy at the same time as addressing sustainable social development. The aim is to enable the Group to realise its vision of being a leading energy company in a low-carbon world.

The SSE Group strategy also applies to our business and so the SSE Group reporting on sustainability encompasses our outcomes.

You can read SSE's Sustainability Report 2019:
www.sse.com/investors/reportsandresults/

Our regulator, Ofgem, has decided that we must publish an **Environmental Plan and an annual environmental report.** Our initial thinking is to incorporate this into our overall sustainability reporting. **We welcome views on this approach.**

SSE's Sustainability Report 2019 includes our Gender Pay Gap reporting

81% men, **19%** women

93% men, **7%** women in upper quartile pay band

27% Mean hourly pay difference between male and female employees

32% Median hourly pay difference between male and female employees

40% of men and **37%** of women receive a bonus

Leadership in Sustainability: next steps

One of our four strategic themes is for Leadership in Sustainability. This theme was developed following a review of our strategic objective, when stakeholders strongly and consistently emphasised their desire for us to show ambition and leadership in sustainability. This is aligned with external drivers for change and the social narrative. We have set a clear goal of a third reduction in greenhouse gas emissions.

Our **stakeholder-led Sustainability Strategy provides a clear vision** of the sustainable business we want to be. Our Sustainability plan provides the basis for this sustainability roadmap to 2026, with our governance processes and reporting to ensure transparency.

We have described our draft **goals and activities for each sustainability ambition** intended to achieve leadership in sustainability during RIIO-T2. We have identified sustainability goals we expect to be industry norms during the RIIO-T2 period- we call this 'Business as Usual' In addition, we have also identified 'Stretching Ambitions', that provide better outcomes for customers and encourage step changes for sustainability leadership. Our key sustainability goals will be benchmarked against government policy and industry best pracrice where possible to support the finalisation of our business plan.

We are continuing to work with our business teams and stakeholders to **refine and finalise our sustainability roadmap.** We are activity engaging with our supply chain to finalise our waste targets and appropriate supply chain carbon targets. We will also prepare our Environmental Plan (including assessment methodology) for the final business plan submission.

Further **consultation** on our approach for vulnerable consumers, workforce resilience, local energy support, losses and our community fund will inform our final plan.

Our ambition is to achieve leadership in sustainability and be a trusted partner of customers and communities, realising long term benefit for society, economy and environment. The proposals that we have set out here are intended to enable us to achieve that ambition during RIIO-T2.

Find out more...

Sustainability Strategy
Sustainability Plan
Losses Strategy (consultation)
Approach to implementing Biodiversity Net Gain (consultation to be published mid-July)
Connections and Commercial Policy
Innovation Policy
VISTA Methodology

Tell us what you think

We invite your views on the proposals we have set out here. We welcome comments on any aspect of our activities, and in-particular on:

Do you think the activities we are proposing are suitably ambitious?

Are there any other activities that you consider missing from our Sustainability Plan?

We would also appreciate if you could provide feedback on the following questions specifically related to our sustainability ambitions:

We welcome views on how we can best support community and locally owned renewable energy projects, **and what outcomes (if any) we should strive for during RIIO-T2?**

We welcome views on our proposal to take a cost-benefit approach to adopting SF_6 alternatives and the decarbonisation of our operational fleet. **Is this acceptable, or should we go faster?**

We welcome views on whether our proposals are sufficient, or too, ambitious. **In particular, we seek views on whether we should adopt our proposed Stretching Ambitions?**

What action do you think we should take on embodied carbon and by when?

We have identified a difference of opinion between our regulator and our stakeholders in our role in supporting communities. **We would welcome your views on whether we should adopt the goals described here.**

We currently provide support to communities through our resilience community fund, are there other more impactful and beneficial ways to provide support to communities?

We welcome views on other steps we could take to provide rewarding and fulfilling careers.

Our regulator, Ofgem, has decided that we must publish an **Environmental Plan and an annual environmental report.** Our initial thinking is to incorporate this into our overall sustainability reporting. **We welcome views on this approach.**

Scottish & Southern Electricity Networks

TRANSMISSION

Cost to Customers

A Network for Net Zero
Draft RIIO-T2 Business Plan

Scottish Hydro Electric Transmission plc

Cost to Customers

What's in this section?

Determining the allowed revenue... how we have estimated the amount we will be allowed to charge customers during RIIO-T2. This is based on the proposed expenditure for the Certain View that we describe in this draft Business Plan, and financial assumptions which achieve an investment grade credit rating

Financial parameters... while we present this draft Plan using Ofgem's Working Assumptions, we have some concerns with Ofgem's approach, and so also present Our Proposed Parameters. We explain our evidence based approach to determining the appropriate cost of equity, cost of debt, capitalisation and inflation. We propose cost of equity of 6.9% (CPI basis) and cost of debt using at least a 15 year trailing average of A/BBB iBoxx bond index

Fair tax... it is important that we pay our fair share of tax to GB society. We treat tax as a pass-through cost supported by Fair Tax Mark accreditation for tax transparency

A summary of our initial financeability assessment... we have evaluated Ofgem's Working Assumptions and our analysis shows that we have significant financeability concerns during RIIO-T2. We explain our analysis based on Credit Rating Agency methodologies with reference to both short and long term credit ratios and investment grade credit rating. We show that adopting Our Proposed Parameters will ensure we maintain our investment grade credit rating while presenting a fair return to shareholders and ensuring a fair deal for consumers

An estimate of the impact of our proposals on household bills... we use Ofgem's approach to the estimation of transmission charges to forecast the potential impact on average GB household electricity bills. Under Our Proposed Parameters and the Certain View, we estimate that each household will be charged £6.59 on average per year for the north of Scotland transmission system during RIIO-T2 (£5.80 excluding the effect of inflation)

Overview

The amount that we are allowed to charge to customers is determined by the energy industry regulator, Ofgem. Through the price control process, Ofgem undertakes an assessment of necessary investment and expenditure and applies financing assumptions to derive an allowed revenue. RIIO-T2 is the process for setting the allowed revenue for the period 1 April 2021 to 31 March 2026.

We do not charge users of the north of Scotland transmission network directly. Instead, we recover our allowed revenue from the Electricity System Operator (ESO). The ESO combines the total GB transmission network revenue recovery into the GB-wide Transmission Network Use of System (TNUoS) tariff levied on generators and electricity suppliers.

This section has two parts:

1 Determining the allowed revenue

We have followed the methodology set out by Ofgem to make an estimate of the allowed revenue for our draft Business Plan proposals for the Certain View (Figure 6.1).

A key part of this is our assessment of the appropriate financial parameters, including the cost of capital, and whether our proposals comply with our licence obligation to maintain an investment grade credit rating.

We set out analysis which shows that Ofgem's Working Assumptions do not result in a financeable Business Plan and we have developed alternative parameters (Our Proposed Parameters). Our evidence-based financial proposals ensure that the investment required to deliver our plan for stakeholders is financeable while ensuring our investors earn a fair return.

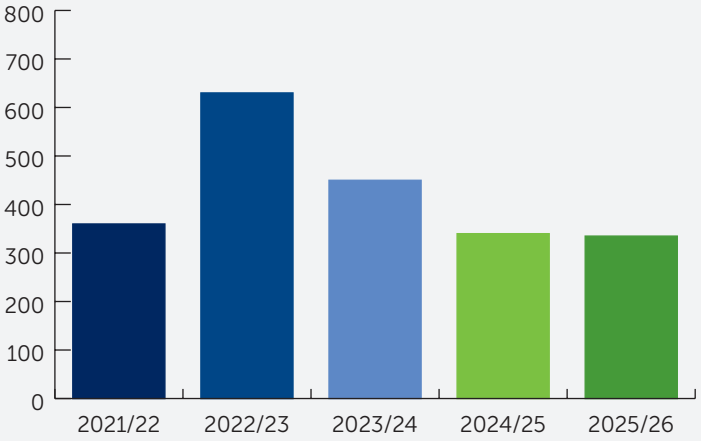
For Our Proposed Parameters and the Certain View, our allowed revenue during RIIO-T2 would be around £470 million on average per year (Figure 6.2).

2 Impact on household bills

The process for determining the cost of the north of Scotland transmission network to the average GB household energy bill is complicated, and requires a number of assumptions. We have followed the methodology used by Ofgem.

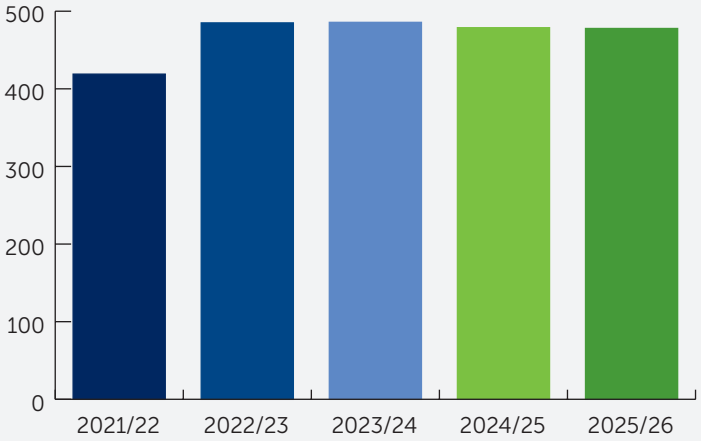
We estimate that the average GB household will be charged £6.59 on average per year for the north of Scotland transmission system during RIIO-T2 (£5.80 excluding the effect of inflation) (Figure 6.3).

Figure 6.1 Summary of total expenditure proposals for Certain View (£m pa.)



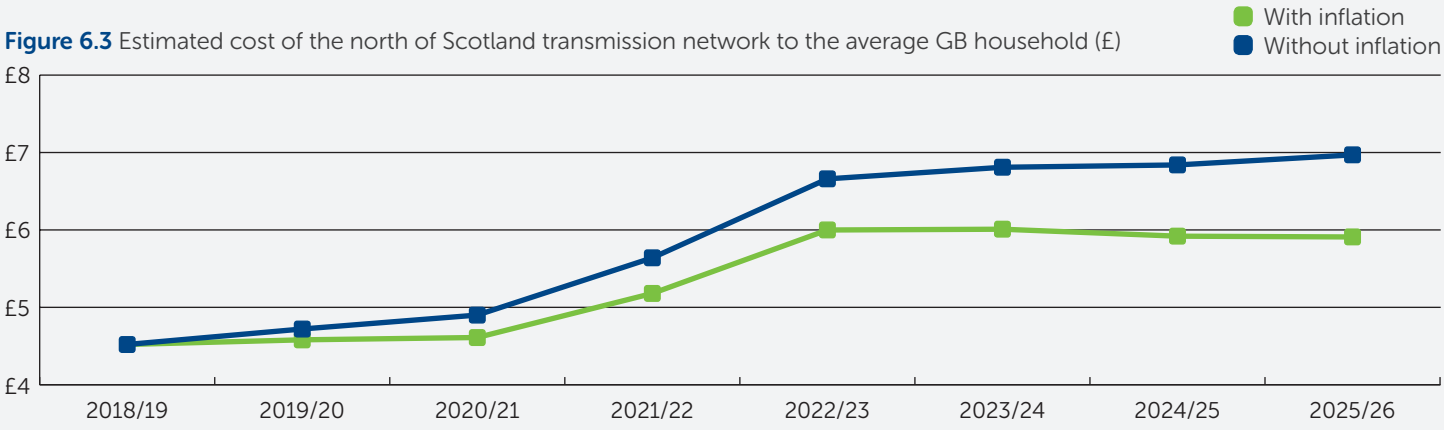
(£m 2018/19 prices)	RIIO-T2 Total
Growth Investment	877
Asset Investment	703
Resilience Investment	201
IT and Data	51
Operating Costs	331
Total	2,163

Figure 6.2 Forecast allowed revenue for Certain View (£m pa.)



Based on forecast expenditure shown in Figure 6.1 and Our Proposed Parameters

Figure 6.3 Estimated cost of the north of Scotland transmission network to the average GB household (£)



Average GB consumption 3,100 kWh. Inflation assumption 2% pa.
Certain View and our Proposed Parameters

Determining the Allowed Revenue

The price control

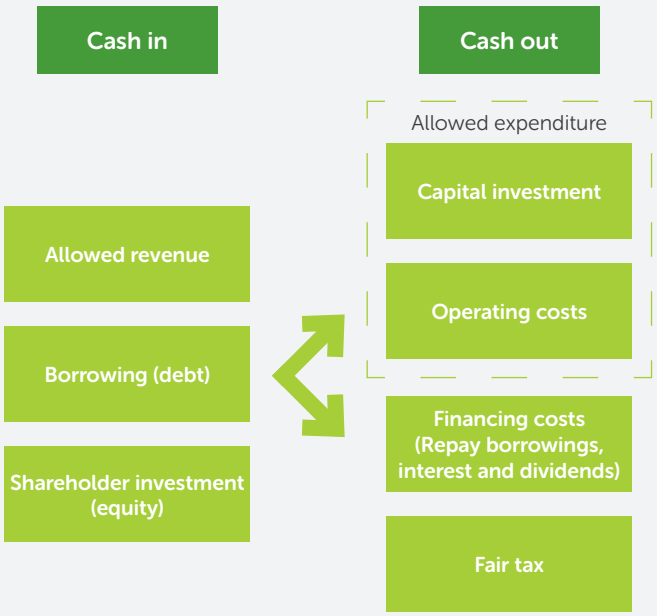
The amount that we are allowed to charge customers for using the north of Scotland transmission network is determined by the energy industry regulator, Ofgem. RIIO-T2 is the regulatory process for setting our allowed revenue for the period from 1 April 2021 to 31 March 2026.

Long life infrastructure such as electricity transmission is used by customers over many years, so it is important that the cost of that infrastructure is shared fairly between current and future customers. If, for example, we build a new overhead transmission line that has an expected life of 45 years, then the cost of building and operating that line should be fairly spread over the next 45 years[1].

This results in a mismatch where investment is made upfront, but income is spread over the lifetime of the asset. Thus, the amount we are allowed to charge customers in any one year does not equal our expenditure in that year. Any 'gap' is filled with borrowing or shareholder investment (Figure 6.4).

Ofgem has proposed a methodology for the determination of the allowed revenue for the RIIO-T2 period[2]. This methodology is still, in part, provisional. We have some concerns with Ofgem's proposals, and continue to work with Ofgem and other stakeholders towards a common approach.

Figure 6.4 Cash inflows and outflows



For the purposes of this draft Business Plan, and so that we are able to show the possible impact of our proposals on the average GB household energy bill, we have made an assessment of the calculation of our allowed revenue in line with Ofgem's draft methodology.

There are four steps to this (Figure 6.5):

1 Determination of allowed expenditure

Our total forecast expenditure during the RIIO-T2 period for the Certain View is £2.2 billion (Figure 6.1).

As we have described in this draft Business Plan, this comprises investment in the existing network, to grow the network and expenditure to undertake day-to-day operations. The outcomes of this expenditure are stakeholder-led to deliver a safe, secure and sustainable network for net-zero greenhouse gas emissions.

We assume that our Certain View is the basis of our allowed revenue.

2 Determination of efficient financing costs

Capital intensive businesses cannot fund the cost of their investment programmes from income received from customers in that year. As a consequence, companies need to be able to raise finance on reasonable terms in order to support essential investment programmes.

A key part of determining the allowed revenue is assessing the efficient cost of financing (cost of borrowing and cost to shareholders) and financial parameters (representative asset lives, proportion of capital investment and inflation). We also need to plan to pay our taxes.

We explain on pages 161-170 how we have determined efficient financing costs for this draft Business Plan.

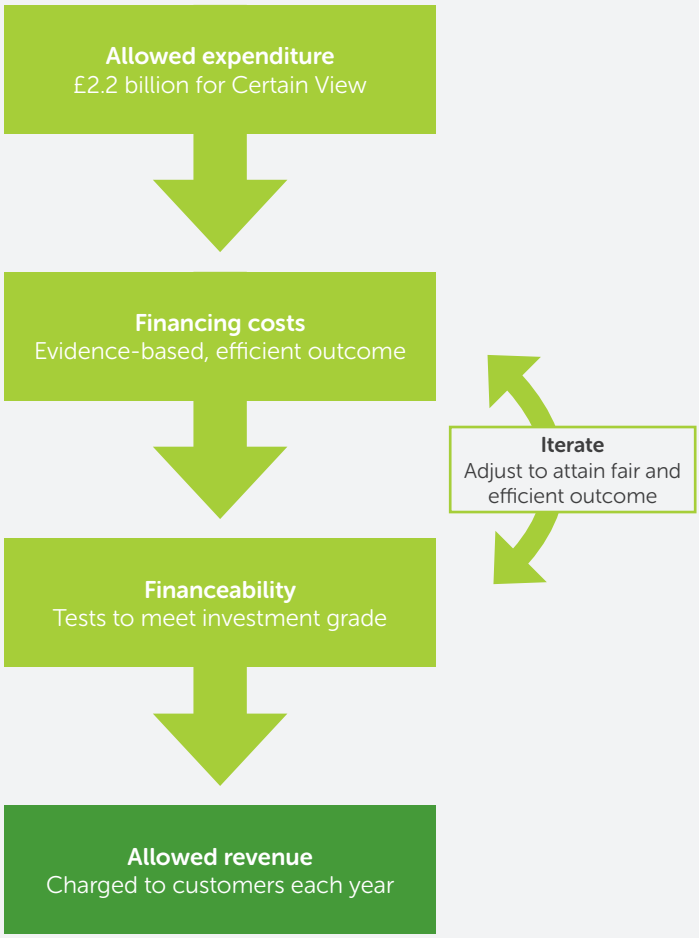
3 Assessment of financeability

We have an obligation under our licence to maintain an investment grade credit rating, and Ofgem has a duty under statute to ensure our business is financeable. This is important, not just to maintain our viability, but also to ensure we can borrow to invest at an efficient cost.

Our draft Business Plan proposals must be tested to make sure we meet the requirements of an investment grade Credit Rating that are specified by the main Credit Rating Agencies. This testing explores a wide range of possible outcomes to stress test our financial resilience.

[1]During TPCR4, the price control before RIIO-T1, costs were spread over 20 years. In RIIO-T1 a transitional arrangement was agreed to move towards spreading investment over 45 years. This either takes one or two price controls to reach this point so by the end of RIIO-T2 new investment is being spread over 45 years.
[2]RIIO-T2 sector specific methodology (Ofgem, 2019) available at: www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-decision

Figure 6.5 Determining the allowed revenue



We explain on pages 171-174 the financeability assessment that we have undertaken for this draft Business Plan.

4 **Determining the allowed revenue**
The final step is the use of a financial model to apply the financial parameters and determine allowed revenue. As Ofgem's RIIO-2 Financial Model is still under development, the results we present here are based on our own financial model. This does not make any adjustments, for example to re-profile allowances, or any assumptions for performance outcomes, for example financial incentive mechanisms.

We use the allowed revenue that is determined from this methodology to then estimate the cost to customers of our draft Business Plan proposals.

Efficient financing costs

Introduction

In line with Ofgem's guidance[3], we have presented our draft Business Plan based on the financial parameters set out in its Sector Specific Methodology Decision (SSMD). Additionally, as permitted under the SSMD, we have presented our draft Business Plan using Our Proposed financial Parameters based on evidence and analysis collated over the RIIO-2 development period. We have previously shared this evidence with Ofgem.

A summary of the RIIO-T2 financial parameters – Ofgem's Working Assumptions and Our Proposed Parameters – is shown in Table 6.1 set out against RIIO-T1 parameters.

In developing Our Proposed Parameters, we have considered the following:

- An analysis on financeability with reference to the Credit Rating Agencies (CRAs) and the licence obligation to ensure our credit rating is investment grade;
- Market evidence for core financial parameters, analysis of that evidence and regulatory precedents. This covers the cost of borrowing to finance capital investment (Cost of Debt (CoD)), the required rate of return for our shareholders (Cost of Equity (CoE)) and the level of debt or gearing required to finance our draft Plan over the RIIO-T2 period; and,
- The calibration of other financial parameters based on regulatory precedent and RIIO-T2 Business Plan analysis covering regulatory asset lives, capitalisation rates, inflation, Return Adjustment Mechanisms (RAMs) and the fair treatment of tax.

After considering all of these aspects, we conclude that our draft Business Plan would not be financeable under Ofgem's Working Assumptions due to their proposals for the CoE and CoD. Our analysis shows that we would find it challenging to remain financeable during RIIO-T2 as our credit rating would likely be downgraded. We set out Our Proposed Parameters as an alternative, financeable position.

[3]RIIO-2 Business Plans draft guidance published 3 June 2019 and Financeability Assessment for RIIO-2 Further Information published 26 March 2019 (Ofgem,2019) available at www.ofgem.gov.uk/network-regulation-riio-model/network-price-controls-2021-riio-2/riio-2-publications-and-consultations

Cost of Capital

Ofgem has proposed short term measures to address financeability problems in RIIO-T2. The measures proposed by Ofgem in the SSMD are to make changes to actual gearing, regulatory asset lives, and capitalisation rates.

Our analysis of these proposals show that these short term measures would lead to bills being potentially higher over the long term, thereby distorting fair allocation of costs between current and future consumers. As we explain further below, we do not believe this is in the best interests of our stakeholders and consumers.

In the following pages we set out our view on the primary areas of the financial parameters as follows:

1 **Setting the right cost of capital**

2 **Spreading investment costs across current and future consumers through capitalisation rates and asset lives**

3 **Adopting a transparent treatment of tax**

4 **Other Financial Parameters including inflation and RAMs**

For each financial parameter, we have set out our approach and what we have considered for each element prior to evaluating our draft Plan overall for financeability.

Setting the right cost of capital

The CoE is a component part of the price control methodology and comprises 40% of the Weighted Average Cost of Capital (WACC or cost of capital). The WACC is the rate of return included in the charge to consumers for the use of the electricity transmission network.

The value of the electricity transmission network is termed the Regulatory Asset Value (RAV) and also forms part of the price control formula for charging consumers. The remaining 60% of the WACC (termed the gearing ratio) is comprised of the CoD and is based on the appropriate market rate for borrowing capital to invest into the RAV.

Our approach to setting the WACC is through a balanced consideration of the evidence-base covering the CoE and CoD components. These are then calibrated based on our financeability analysis to ensure the gearing ratio is set to maintain financeability during RIIO-T2.

This approach is to ensure that our draft Plan provides an allowance sufficient enough to cover CoD and related transaction costs, and also provide an adequate return to our investors. We have set out our proposals for the CoE and CoD below with reference to the analysis and evidence we have considered[4].

Table 6.1 Summary of financial parameters

	Ofgem's working assumptions		Our proposed	RIIO-T1
Financial parameter	**December 2018**	**SSMD**	**Parameters**	
Cost of Equity (CoE)	4.0%	4.3%	6.9%	8.0%*
Cost of Debt (CoD)	10-year trailing	11-15 year trombone	15-20 year trailing	RAV Weighted mechanism
Gearing Ratio	60%		60%	55%
Inflation	CPI		CPI	RPI
Capitalisation Rate	Based on Business Plans		90%	90%
Asset Lives	No change from RIIO-T1		Continue transition to 45 years over one 5-year price control	Transition to 45 years over two 8-year price controls
Tax treatment	Notional allowance vs pass-through vs "double-lock"		Pass-through and Fair Tax Mark	Notional Allowance

*RIIO-T1 Cost of Equity was set in RPI terms at 7.0% which translates to 8.0% on a CPI basis.

[4]Evidence presented here has previously been discussed and presented to Ofgem

Cost of Equity

Our evidence shows that an appropriate range for the CoE is between 6.5% and 7.3% CPI-real, which compares to a CPI-real CoE in RIIO-T1 of 8.0%. We agree that evidence illustrates that returns have fallen since setting the CoE for RIIO-T1 and that this should be reflected in RIIO-T2.

Ofgem's Working Assumption for CoE for RIIO-T2 has been proposed as 4.3% whereby Ofgem intend to assess a notional company's financeability on 4.8%[5]. This is on the basis that Ofgem expect some form of outperformance in the price control which would improve cash flows and returns to investors by 0.5%.

When assessing the CoE we have adopted an approach consistent with regulatory precedent and what is deemed best practice for a regulator. This approach considers a broad range of evidence including observable information grounded in central finance theory as used by practitioners, as well as forward looking approaches. We have also factored in a number of cross checks in selecting the point estimate within a range which was proposed by Oxera[6] on behalf of the Energy Networks Association (ENA). Ofgem subsequently endorsed the use of cross checks in the SSMD.

Based on our evaluation of the balance of evidence, we do not believe that Ofgem has correctly set the range for the CoE and that Ofgem's Working Assumptions are too low. We have not responded to Ofgem's SSMD in this section of our draft Business Plan due to the short time available since SSMD publication. We intend to consider the SSMD in full as part of our final Business Plan submission in December 2019. Our initial response is that we do not believe that the base return has almost halved between RIIO-T1 and RIIO-T2.

In proposing our CoE point estimate we have considered a balanced range of evidence including observable market evidence, survey evidence and cross checks. We have placed more weight on observable market evidence to set the range for the CoE and utilised cross checks as a means to select the point estimate in our draft Business Plan.

In our view, the mid-point of the range of 6.9% is the most reasonable estimate, which is consistent with regulatory precedent and is a slightly more prudent approach than that supported by Dobbs[7] when setting the CoE which he argues should be in the 75th percentile of the range[8]. The mid-point in CPI terms is 6.9% and this is the CoE we have incorporated in our draft Plan (as set out in the financeability assessment).

Allowed vs Expected returns and the "outperformance wedge"

Ofgem's Working Assumption for RIIO-T2 CoE is 4.3% (CPI-real) with an underlying CoE of 4.8% (CPI-real) where Ofgem has made a deduction to the CoE of 0.5%. This deduction relates to what is termed as the Allowed vs Expected return adjustment ('AvE' or 'outperformance wedge'). The AvE adjustment is based on Ofgem's assertion that investors expect some outperformance in a price control which supplements the base return, and therefore there should be a deduction equal to that expectation from the base return.

As set out in our consultation response to Ofgem's proposals with supporting evidence from Frontier Economics, the wedge is considered arbitrary and is based upon an expectation of outperformance which is not funded as part of the price control. At this stage, any expectation of the overall financial package and therefore future out or under performance is unclear and uncertain.

In our view, to make an adjustment to the cost of equity which is subjective and inconsistent with both economic principles and regulatory precedent is not sound regulatory practice. As outlined by Frontier, price controls have historically been calibrated symmetrically and are not therefore a one-way bet so outperformance is not guaranteed.

Do you agree with our approach to setting the cost of equity including the point estimate for evaluating our Business Plan?

Do you believe that we should assume outperformance will occur in assessing our Business Plan (as Ofgem does)?

We welcome views on using cross checks to provide more detailed analysis for the cost of equity for RIIO-T2.

[5]Ofgem's proposed headline Working Assumption for RIIO-2 CoE is 4.3% (CPI-real) with the underlying CoE of 4.8% (CPI-real) where Ofgem has made a deduction to the CoE of 0.5% for what they have termed as the Allowed vs Expected return adjustment ('AvE'). However, Ofgem has assessed financeability of the notional regulated network company using a CoE 4.8% (CPI-real). We have not used any outperformance assumption in assessing our draft Plan for financeability. Therefore we have evaluated Ofgem's proposed financial parameters using 4.3.% compared to our proposal of 6.9% (CPI-real).
[6]Oxera report, The cost of equity for RIIO-2 – A review of the evidence, Prepared for the ENA (ENA, 2018) available at: https://www.oxera.com/wp-content/uploads/2018/07/ENA-cost-of-equity_2018-02-28.pdf.pdf
[7]Modelling Welfare loss Asymmetries Arising from Uncertainty in the Regulatory Cost of Finance (Dobbs, 2011) available at: https://link.springer.com/article/10.1007/s11149-010-9131-2
[8]Frontier Economics, Adjusting baseline returns for anticipated outperformance – An assessment of Ofgem's proposals, Prepared for the ENA (ENA, 2019)

Cost of Debt

In RIIO-T1, we had a company-specific arrangement whereby the CoD was annually indexed using a 10-year trailing average A/BBB non-financial iBoxx corporate bond indices with a bespoke weighting tracking the investment profile. This was due to the high capital growth which we forecast in the RIIO-T1 period[9].

Below we consider a number of CoD mechanisms with reference to Ofgem's principles[10]:

- Moving from RIIO-T1 to RIIO-T2
- Embedded debt costs
- Additional costs of borrowing
- Approach to evaluating CoD mechanisms

In undertaking our analysis, we have commissioned an independent study by Oxera[11]. This is in addition to a study undertaken by NERA[12] on behalf of the ENA for evaluating the CoD mechanisms used in RIIO-1 and extending those into RIIO-2.

Moving from RIIO-T1 to RIIO-T2

We anticipate significant investment in RIIO-T2 to deliver further energy decarbonisation.

However, the scale and extent of investment compared to the size of our current asset base is not as pronounced when comparing to RIIO-T1. During RIIO-T1 the RAV has grown fivefold whereas in RIIO-T2 we anticipate that RAV will grow by 30%-50% depending on the outcome of a range of uncertainty mechanisms to support increasing generation in the north of Scotland. We are therefore not currently considering a bespoke weighted CoD mechanism for RIIO-T2 albeit we intend to keep this under review until our final Business Plan submission, should market circumstances change.

Based on the evidence and analysis presented by the ENA through the NERA study[12], several notional and actual energy networks would underperform in RIIO-2 under the 10-year RIIO-1 mechanism. In order to remedy this, a longer-term average is appropriate as networks should be able to recover their CoD on a notional basis.

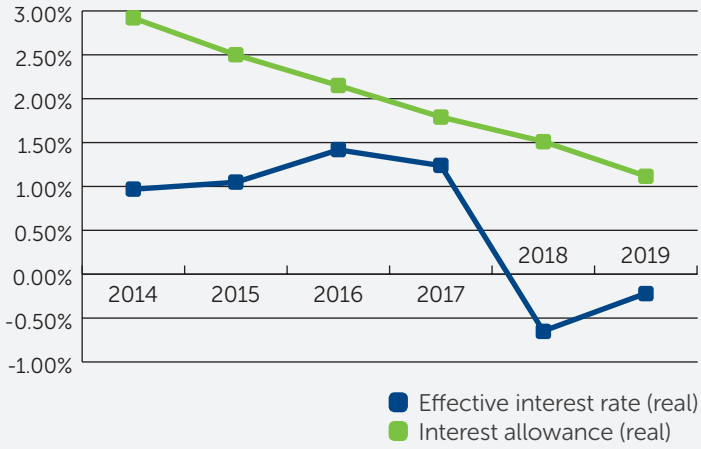
In the SSMD, Ofgem's Working Assumption is an 11-15-year trombone on A/BBB iBoxx index (compared to its previously proposed 10-year trailing A/BBB iBoxx index). We have evaluated Ofgem's revised proposal against other configurations of longer-term CoD index mechanisms to ensure that the CoD mechanism for RIIO-T2 delivers Ofgem's principles while supporting the delivery of our stakeholder-led outcomes.

Embedded debt costs

During RIIO-T1, we raised a significant amount of debt to finance our capital growth programme. We raised approximately £1.4 billion between 1 April 2013 and 31 March 2019 in order to fund this large capital investment[13].

Figure 6.6 shows an analysis of the RIIO-T1 CoD mechanism compared to our actual CoD during the price control. During RIIO-T1, our average real cost of debt was below the allowance when calculating this on a simple basis[14].

Figure 6.6 Actual CoD vs RIIO-T1 CoD mechanism



[9]RIIO-T1 SHE-Transmission Final Proposals (Ofgem, 2012) available at: www.ofgem.gov.uk/publications-and-updates/riio-t1-final-proposals-sp-transmission-ltd-and-scottish-hydro-electric-transmission-ltd
[10]RIIO-T2 framework consultation (Ofgem, 2012) available at: www.ofgem.gov.uk/publications-and-updates/riio-2-framework-consultation
[11]Oxera report, RIIO-T2 cost of debt and financeability assessment, Prepared for Scottish Hydro Electric Transmission plc, (SSEN Transmission, 2019 available at: https://www.ssen-transmission.co.uk/information-centre/industry-and-regulation/riio-t2/
[12]NERA report, Cost of debt at RIIO-2, Prepared for the ENA, March 2019 (not published)
[13]Based on the annual statutory financial statements between 31 March 2013 and 31 March 2019
[14]We refer to this as a simple basis as it deducts the real effective interest rate from the real interest rate allowance as opposed to making any other adjustments for additional costs of borrowing or other elements related to tenor or credit rating

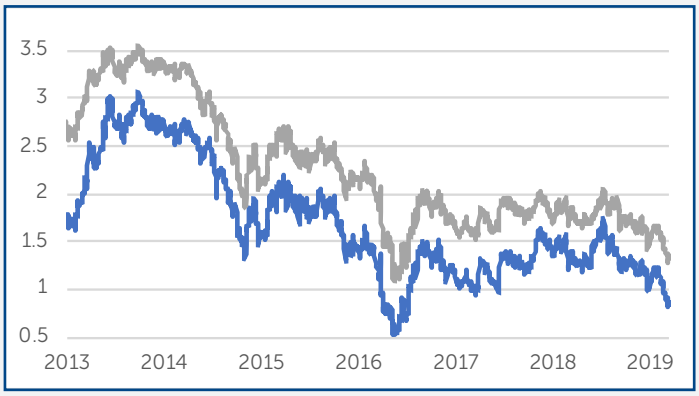
In considering additional borrowing costs and the term of our embedded debt during RIIO-T1, we believe the CoD mechanism in RIIO-T1 was only partly effective in delivering its outcomes. For example, having a market index to set the annual cost of debt is an effective way to ensure only efficient finance costs are funded by consumers while also retaining incentive properties.

However, we believe the mechanism did not provide for the 'all-in' cost of debt which resulted in us having to raise shorter term debt. The average age (or tenor) of debt issued during this period is 10 years[15], which is significantly shorter than the average A/BBB iBoxx index. A longer term averaging period was acknowledged as a reasonable match to interest costs across operators at RIIO-ED1 Final Determinations[16].

When we analyse Figure 6.6, considering the additional costs of borrowing and also the premium on issuing longer term debt (i.e. 20-year bonds vs 10-year bonds), it is clear we have been underfunded during RIIO-T1. In order to manage the costs during this capital intensive phase, we adopted a shorter term treasury policy by issuing 10-year debt to mitigate the impact of being underfunded. Figure 6.7 sets out the spread between general 10 and 20-year gilts from April 2013.

The premium on issuing 20-year debt compared to 10-year debt is approximately 60bps. Therefore, when considering the additional costs of borrowing and also the premium of 60bps on issuing 20 year debt, the comparison of the RIIO-T1 CoD mechanism and actual CoD in Figure 6.6, changes to Figure 6.8. This shows a shift downward in our funding levels for the CoD during RIIO-T1.

Figure 6.7 Comparison of rate of 10-year (blue) and 20-year (grey) gilts from 1 April 2013

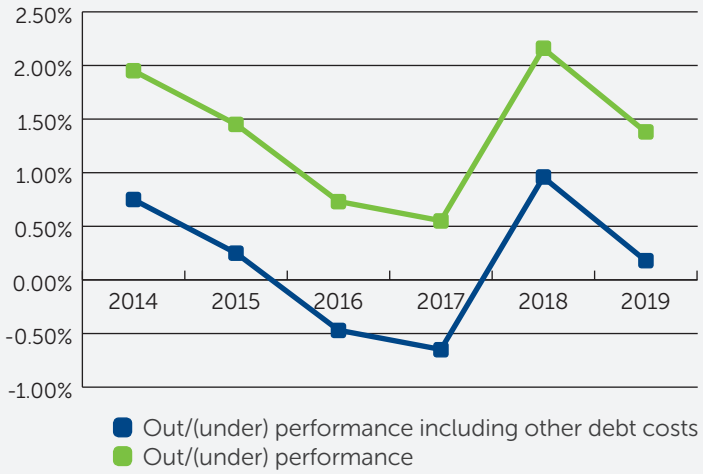


This analysis evidences that the embedded debt for RIIO-T1 is a function of the CoD mechanism which has led to us raising shorter term bonds (10 years) compared to longer dated bonds (20 years).

As of 31 March 2019, the weighted average term remaining on our debt is less than six years and we believe that issuing longer dated bonds would be an efficient and appropriate treasury policy to adopt in RIIO-T2. This is consistent with RIIO-ED1 which uses a 10-20 year trombone mechanism to reflect longer dated debt and is also in line with Ofgem's Working Assumption of adopting a 11-15 year trombone CoD mechanism.

Oxera have undertaken their analysis considering the impact of additional costs of debt and the premium associated with 20-year bonds compared to 10-year bonds. They conclude that when considering these elements, the CoD mechanism for RIIO-T2 would be more appropriately set using a 15-year trailing average compared to the 11-15 year trombone.

Figure 6.8 Out/(under) performance on the cost of debt in RIIO-T1 (comparing 'all-in' and additional premium costs on issuing 20 year debt)



Do you agree with our analysis of the RIIO-T1 CoD mechanism and the impact on SHET's embedded debt?

Do you agree with our analysis of additional costs of borrowing that should be funded through the CoD mechanism in RIIO-2?

Do you agree with our evaluation of CoD mechanisms and our proposed CoD mechanism? Are there any other CoD mechanisms that we have not considered?

[15]Weighted average term of debt raised during the period
[16]RIIO ED1 Final determination (Ofgem,2014) available at:
www.ofgem.gov.uk/publications-and-updates/riio-ed1-final-determinations-slow-track-electricity-distribution-companies

Additional Borrowing Costs

Ofgem's Working Assumption 11-15 year trombone is a more appropriate CoD mechanism for RIIO-T2 than a 10 year trailing average.

However, thorough analysis of the CoD mechanism demonstrates that this will not adequately fund the costs of borrowing during RIIO-T2. There are additional transactional related costs of borrowing, such as the cost of carry, that need to be taken into account. It is less likely that we would be fully funded on a notional basis if these additional costs are discounted.

The table below sets out our evidence based view of the additional costs of borrowing from discussions with our relationship banks and our own experience of borrowing in capital markets. We have identified that associated debt transaction costs are between 0.60% and 0.65% (or 60-65 basis points (bps)).

The calibration of the CoD mechanism must ensure that these other debt costs are efficiently funded.

New Issue Premium (20bps)
Costs associated with issuing new debt have previously been calculated and assumed to be 20bps by Ofgem and other regulators[17]. When considering market evidence and regulatory precedent, we believe these costs are still approximately 20bps albeit varying over time depending on market conditions. This includes bank underwriting fees, rating agency fees and new issue premiums.

Transaction and related costs of debt

	%	Bps
New Issue Premium	0.20	20
Costs of carry or Liquidity costs	0.15-0.20	15-20
Premium for issuing nominal debt	0.15	15
Spread on issuing BBB+ debt compared to A/BBB iboxx index	0.10	10
Total	**0.60-0.65**	**60-65**

Cost of carry (15-20bps)
As part of raising funds from debt markets, there is a requirement to pre-finance or raise funds in advance of needing the funds, in sufficient time to avoid liquidity issues. Raising funds in advance therefore carries a significant amount of costs which are unfunded due to both the cost of holding cash balances and the differential between interest returns on cash balances and the interest costs on borrowed funds. In our analysis, we conclude that this could cost as much as 15-20bps over a full year.

Analysis of the cost of carry for GBP A-Rated Corporates (10 year bonds)

Source Morgan Stanley

The costs in this figure illustrate an average cost of 35-40bps per six months on 10-year bonds, which equates to 17-20bps per annum (50% of this applies to the full year once spread over 12 months). This analysis is over a 10-year period where, with the expected rise in interest rates and rising credit spreads, the cost of pre-funding would continue at similar averages over the past 10 years in the next price control.

[17]See, for example, RIIO-ED1: Final determinations for the slow-track electricity distribution companies where Ofgem conclude that issuance and other costs for raising debt are around 0.2% or 20bps

Premium on issuing nominal debt (15bps)
Analysis of the differential between issuing index linked debt and nominal debt shows a premium is applied to issuing nominal debt. We have only issued nominal debt during RIIO-T1. Ofgem's assumption is that networks will issue 25% of their debt as index linked debt (real debt increasing with an inflation measure, typically RPI). For RIIO-T2 we expect to see around 15bps of additional costs on our nominal debt during the period.

Since 1997, RPI has averaged 2.83% while, over the same period, 10-year breakeven inflation (which is the rate the market will pay to receive inflation over 10 years) has averaged 2.98%. This is 15bps above realised inflation. This represents the risk premium that the market charges to hedge the inflation risk. Ofgem has assumed that at least 75% of the debt issued by regulated networks will be nominal debt and therefore this cost differential needs to be funded. In our case, 100% of our debt has been issued as nominal debt due to a lack of index linked bond investors.

Inflation implied in nominal Corporate Debt is higher than realised inflation

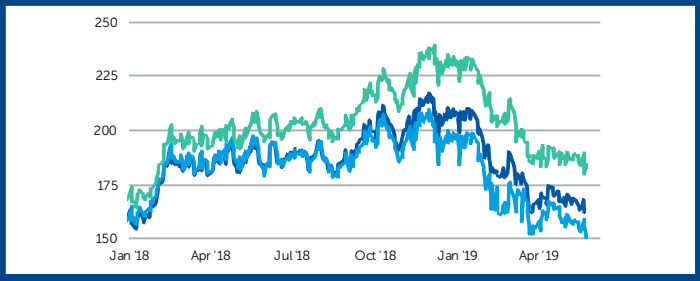
UK RPI YoY

10 year breakeven inflation

Source Morgan Stanley, Bank of England, Bloomberg

Spread on issuing BBB+ debt (10bps)
There is an evident cost differential between issuing BBB+ debt (our current credit rating) compared to averaging A/BBB iBoxx debt indices (the method used to set CoD). The differential amounts to 36bps annually and at least part of this differential would form an additional cost. When spread evenly between A and BBB, this converts to approximately 10bps of additional annual costs when raising BBB+ bonds compared to the average of A/BBB. Spread differentials remain historically tight, with increasing market pressure on credit fundamentals pointing to a higher difference going forward.

Credit spread of A and BBB bonds



Approach to Evaluating CoD Mechanisms

Our approach to evaluating potential CoD mechanism options for RIIO-T2 has been set out comprehensively by Oxera9. We have used this independent analysis to inform our proposals.

Table 6.2 sets out the mechanisms which have been considered by Oxera. This has involved applying their methodology and sensitivity analysis for future interest rates alongside considering variability around these interest rates and issuing debt on a longer-term basis consistent with the wider industry, regulatory precedent and Ofgem's SSMD.

All scenarios are modelled based on a simple average of yields on the nominal iBoxx A/BBB non-financial corporate bond indices. This is not exactly aligned with our credit rating of BBB+, which is a factor likely to contribute to underfunding of the cost of debt.

We have not repeated Oxera's methodology below in relation to the detailed calculations. However, we note that they have evaluated the CoD mechanisms compared to Ofgem's principles set out in the SSMD as well as considering the following elements:

- Maintaining our investment grade credit rating at BBB+
- The notional company cost of borrowing over the long term
- The impact of the additional costs of borrowing

In doing so, Oxera conclude that the 11-15 year trombone proposed by Ofgem is unlikely to fund our 'all-in' cost of debt during RIIO-T2 when considering the additional costs of borrowing. During a period of high interest rates, it is more appropriate to use a simple 15-year trailing average of A/BBB iBoxx non-financial corporate bond indices. This is illustrated in Figure 6.9.

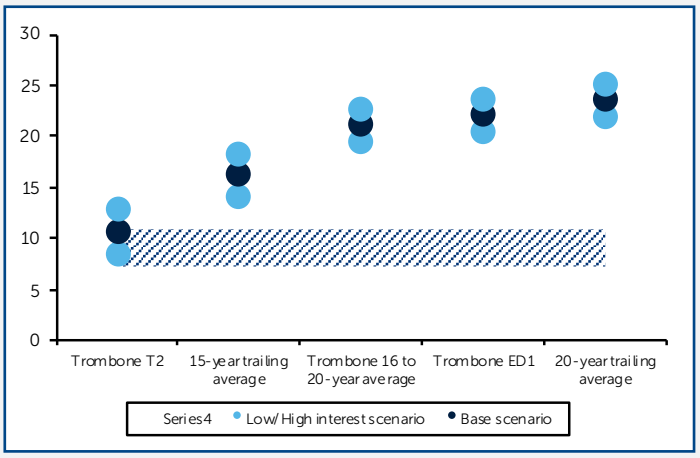
Oxera's analysis supports that a 15-year trailing average is the minimum required CoD mechanism to ensure the costs of borrowing are fully funded during RIIO-T2 for a notional company. There is enough evidence to move towards a 20-year trailing average or to a point between a 15-year trailing average and a longer-term average.

We intend to keep the CoD mechanism under review for our final Business Plan in December 2019[18] and to consider additional evidence, analysis and changing market conditions to ensure our proposed CoD mechanism fairly compensates for our borrowing costs while also maintaining the incentive to fund efficiently during RIIO-T2, in line with Ofgem's principles.

Table 6.2 Potential cost of debt indexation mechanisms in RIIO-T2

Cost of debt mechanism	Description
15-year trailing	15-year trailing average starting from November 2006
20-year trailing	20-year trailing average starting from November 2001
RIIO-ED1 trombone	10–20 year trombone starting from November 2002 (assumes continuation of ED1 trombone into RIIO-T2)
RIIO-T2 trombone	11–15 year trombone starting from November 2011
16–20 year trombone	16–20 year trombone starting from November 2006

Figure 6.9 Analysis of potential cost of debt indexation mechanisms[19]



Source Oxera

[18]In RIIO-ED1, the CoD mechanism design was changed at Draft Determinations (July 2014) before being finalised in Final Determinations (December 2014) as Ofgem kept options open for changing market conditions and additional analysis as the price control progressed

[19]Oxera's analysis does not include the full impact of issuing longer term bonds as we have proposed. When included the unfunded costs area increases significantly meaning at least 15 year trailing average looks more appropriate as a minimum

Spreading investment costs over current and future customers

Capitalisation Rates

The capitalisation rate for RIIO-T2 should reflect the extent of our forecast spend which is expected to be capital investment versus the spend that we are forecasting to operate and maintain our network. Our proposed spend profile will therefore give the best view of the capitalisation rate.

In RIIO-T1, our capitalisation rate was 90% (Table 6.3). This was driven by the large capital investment programme forecast. During RIIO-T2 we are expecting to continue to promote efficient investment in our network and hence, the vast majority of our spend will be capital related.

For this draft Business Plan and the Certain View over 85% of our spend is forecast to be capital based.

When considering the additional expenditure likely to be incurred on capital investment in relation to uncertainty mechanisms, the capitalisation rate would be appropriately set at 90%. The additional capital expenditure in the price control period could comprise of more than £1bn excluding any investment in Scottish Islands. Therefore, our Business Plan proposal incorporates a 90% capitalisation rate which we also believe more appropriately spreads costs of the assets over their useful economic lives and consumers. If set lower, it would increase the cost to current consumers unnecessarily.

Table 6.3 Capitalisation rates

£m	RIIO-T1 Allowance	RIIO-T1 Actual/ Forecast	RIIO-T2 Certain
Capex	3,246	3,597	1,882
Opex	253	254	316
Totex	3,499	3,851	2,197
Implied Capitalisation Rate	93%	93%	86%

Asset lives

In RIIO-T1, Ofgem decided that asset lives should transition to 45 years from 20 years for all transmission owners in order that regulatory asset lives better reflected the estimated useful economic lives of network assets[20].

For us, the period for this transition was to be across "two price control periods (16 years). The transition was agreed to be over two price control periods due to the intensity of the capital investment forecast for RIIO-T1 and to support financeability. As RIIO-T1 was an eight-year price control, it was assumed that the transition would be over a sixteen-year period. However, due to RIIO-T2 being a five-year period, we have assessed our Plan over a second price control period lasting five years and hence, asset lives will be 45 years by the end of RIIO-T2.

In evaluating our draft Business Plan we tested a range of assumptions and deemed that moving to 45 years immediately in the first year of RIIO-T2 would reduce cashflows unnecessarily and would be a deviation from Ofgem's policy decision in RIIO-T1. Therefore, we have proposed that depreciation is modelled with a five-year transition period for RIIO-T2.

Are there any other items that we should consider when assessing the appropriate capitalisation rate?

Should asset lives transition to 45 years by the end of RIIO-T2 or should the period be locked at sixteen years, meaning the transition will complete in the early years of RIIO-T3?

[20]RIIO T1 Strategy Decision (Ofgem, 2011) available at: www.ofgem.gov.uk/publications-and-updates/decision-strategy-next-transmission-price-control-riio-t1

Fair Tax and Inflation

Adopting a transparent treatment of tax

In RIIO-T1, the tax allowance for companies was set on a notional basis, with the allowance being estimated as the amount required for companies to recover corporation tax costs.

The notional allowance gives scope for an out or under performance on tax due to differentials on timing and effective tax rates. In RIIO-T2, our view is that it is important to ensure that companies are fully funded for their actual tax costs and that consumers only pay for those actual tax costs. We also believe that, as regulated networks, adopting some form of accreditation for transparency on tax would be a positive step for consumers. Thus, taxation should be treated as a pass-through cost with accreditation for tax transparency.

We support the Fair Tax Mark (FTM) which SSE plc has been accredited with for the past five years. Encouraging companies to achieve FTM status or provide additional disclosure requirements in line with FTM principles or another accreditation method gives consumers confidence that companies are paying a fair and reasonable amount of tax.

In considering the alternative mechanisms proposed by Ofgem in the SSMD, we believe that the notional tax allowance gives scope for recovery of tax which is different to the actual tax incurred. The double-lock mechanism, where companies recover the lower of notional allowance and actual tax costs, is likely to encourage companies to seek measures to reduce their tax costs below the notional tax allowance to ensure they are not underfunded. This is not in the best interest of consumers as it creates the wrong incentive on paying taxation.

What are your views on the FTM accreditation or an alternative accreditation for energy networks in RIIO-T2?

Do you agree with our conclusion that pass-through is the appropriate treatment of tax costs for consumers? If not, what mechanism or approach do you prefer and why?

Do you believe switching to CPI from RPI should be NPV-neutral?

Do you believe that RPI should be retained?

Other financial parameters

Inflation

We acknowledge Ofgem's decision to apply an immediate switch from RPI to CPI.

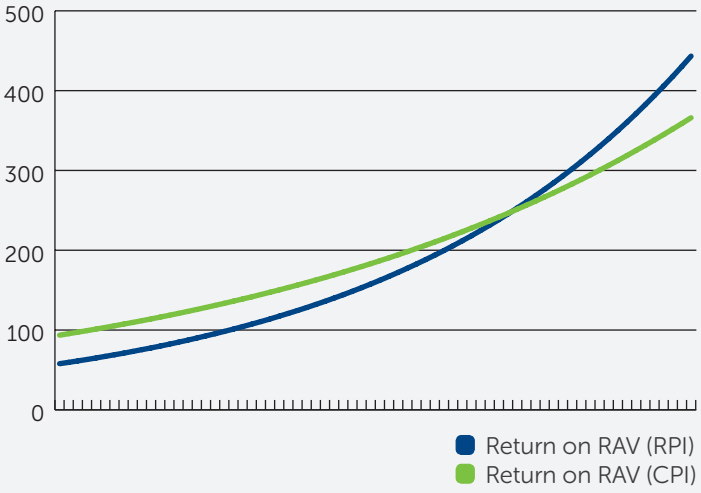
In reviewing this decision, we have considered the impact on consumer bills as well as how this would impact on short and long term financeability. Our analysis clearly shows that allowed revenue, and therefore consumer bills, will be higher due to the switch to CPI from RPI (Figure 6.10).

The switch to CPI results in a higher return on RAV as compared to RPI at the beginning of the switch. In future years however, consumers will pay less due to a CPI-inflated RAV base as opposed to an RPI-inflated RAV. In summary, consumers will pay more today but less in the future.

Recognising this, the water regulator Ofwat adopted a transitional arrangement when moving to CPI for PR19 to mitigate the impact on consumer bills[21]. Ofgem have decided not to consider a transitional arrangement.

We consider the impact of an immediate switch to CPI, and what this means for consumers, in our financeability assessment in the short and long term. We conclude that the change to CPI should be NPV-neutral across RIIO-T2. In particular it is not appropriate to use a change in inflation measure to support short term credit ratios at the expense of longer term financeability.

Figure 6.10 Allowed revenue impact of RPI to CPI switch



[21]Ofwat price control framework and methodology (Ofwat, 2019) available at: www.ofwat.gov.uk/regulated-companies/price-review/2019-price-review/pr19-final-methodology/

Financeability Assessment

Return Adjustment Mechanisms (RAMs)

RAMs are a new regulatory mechanism which, our analysis indicates, are more likely to cause harm than good to consumers in RIIO-T2[22]. In summary, our analysis shows that these mechanisms are akin to a tax on effort. They have a distortionary impact on incentives and their introduction has not been justified by means of a full and clear regulatory impact assessment.

These mechanisms are to the detriment to consumers over the long term by creating inadvertent consequences that are likely to increase costs to consumers and create uncertainty within a price control. EY undertook a review of the proposed RAMs for the ENA and found they provided little value compared to existing regulatory mechanisms[23]. There is not, therefore, any proven advantage to consumers or companies in introducing these complex mechanisms.

We have not therefore proposed any RAM type mechanisms in our draft Business Plan.

We welcome views on the potential benefits and risks of RAMs.

Do you believe we should include a RAM type mechanism in our final Business Plan and, if so, what mechanism do you think is the most appropriate?

Ensuring our Business Plan is Financeable

Network operators are required under licence to maintain an investment grade credit rating.

To ensure our draft Business Plan is financeable, we have undertaken an assessment of our credit rating ratios in line with the CRAs. We have commissioned Oxera11 to independently evaluate our draft Business Plan for financeability as well as consider Ofgem's approach to financeability. This evaluation allows us to test both Our Proposed Parameters and Ofgem's Working Assumptions. We have used this analysis to determine whether adjustments are required to Our Proposed Parameters to ensure there is an appropriate balance between financeability and the impact on customer bills.

Financeability is our ability to maintain investment grade credit rating at our current rating of BBB+ while being able to continue to attract and retain investment from existing and new shareholders. Both the CoE and CoD must be considered in this analysis, otherwise we are only considering a proportion of the funding required and costs associated with servicing these funds.

Approach to evaluating financeability

In previous price controls, Ofgem has evaluated business plans assuming no outperformance and has then applied sensitivities to evaluate the notional and actual company against a range of potential outcomes. We have adopted a consistent approach for our draft Business Plan albeit we do not have sufficient information to determine the potential outperformance available from the incentive mechanisms proposed in the SSMD. We intend to revisit our financeability analysis as part of our final Business Plan submission in December 2019 considering any changes in the incentive mechanisms that may have materialised during that period. Therefore we have assessed our draft Business Plan assuming no out or under performance in RIIO-T2.

For RIIO-T2 Ofgem has assessed financeability on a notional company basis in the SSMD assuming that there is 50bps (equivalent to 0.5%) of outperformance meaning they have used a cost of equity of 4.8% rather than the base cost of equity of 4.3%. As explained above, we do not agree with this approach and so have assessed Ofgem's Working Assumptions using a CoE of 4.3% rather than 4.8%.

[22]See, for example, our response to Ofgem's Sector Specific Methodology Consultation (SSEN Transmission, 2019) available at: https://www.ssen-transmission.co.uk/news-views/articles/2019/5/ssen-statement-on-ofgem-s-riio2-sector-specific-methodology-decision/

[23]Ernst and Young report, Evaluating the need for, and strengths and weaknesses of, fair returns mechanisms for RIIO-2, Prepared for the ENA, April 2018

Approach to Assessing Financeability

Table 6.4 below summarises the credit metrics we have used from each of the CRAs in assessing our draft Plan. We present here the findings of Oxera's analysis, but note that our own analysis has similar findings. Table 6.5 sets out the assumptions used when assessing the notional company. Oxera has undertaken additional sensitivity analysis in their report.

Analysis of Financeability for Ofgem's working assumptions

The assessment which we and Oxera have conducted shows that there is little headroom in key financeability metrics above the minimum thresholds required to retain our investment-grade credit rating.

We describe below the key credit ratios that the CRAs focus on including the Adjusted Interest Cover Ratio (AICR) or Post Maintenance Interest Cover Ratio (PMICR), and the Funds from Operations (FFO) to Net Debt. A full analysis of all credit ratios is included in the Oxera report. Figures 6.11 and 6.12 show the outcome for Ofgem's Working Assumptions on an accounting and economic[24] basis for these key ratios. Oxera considered the ratios across the RIIO-T2 period and beyond given the long term impact of the change to CPI on credit metrics.

Table 6.5 Main assumptions for notional company

Parameter	Assumption
Allowed cost of equity	Baseline estimate of 4.3% (real, CPIH)
Allowed cost of debt	11–15 year trombone[25]
Indexed-linked debt	Comprises 25% of total debt, indexed to CPIH
Interest expense	Equal to the cost of debt
Gearing	60% maintained in line with notional assumption through equity injection(s)
Inflation	CPIH of 2.0%
Dividend yield	4.3%. Equal to Ofgem's baseline cost of equity estimate (4.3%) for our base case. A sensitivity of zero dividend yield is also assessed
Capitalisation rate	90.0%
Depreciation	Transition to asset life of 45 years by end of RIIO-T2

Table 6.4 Indicative ranges for investment grade rating from the CRAs[26]

Ratio	Fitch		Moody's		Standard & Poor's	
Debt metrics	A	BBB	A	BAA	A	BBB
Net debt/RAV (%)	60	70	45–60	60–75	<70	>70
FFO interest cover, incl. accretions (x)*	4.5	3.5	4–5.5	2.8–4	>3.5	2.5–3.5
FFO interest cover, excl. accretions (x)*	4.5	3.5	4–5.5	2.8–4	>3.5	2.5–3.5
AICR (or PMICR) (x)*	1.75	1.5	2.0–3.5 or 1.6–1.8	1.4–2.0 or 1.2–1.4		
Notional PMICR (x)						
FFO (cash interest) /net debt (%)*			18–26	11–18	>12	8–12
FFO (interest expense)/net debt (%)*						
RCF/net debt (%)			14–21	7–14		

*Ofgem key credit metric in the SSMD

[24]Oxera note that average credit ratios in RIIO-T2 using Ofgem's economic form for the AICR and FFO/net debt (and RCF/net debt) are higher than the values using the accounting forms of the ratios. The analysis Oxera and we have undertaken focuses on the accounting form of the metrics which is consistent with CRAs methodology.
[25]Oxera assume that this is sufficient to fully fund the all-in costs of debt at BBB+ for the benefit of undertaking financeability analysis. Any change in investment grade to BBB would require a re-assessment of the Cost of Debt mechanism which we have not considered in our draft Business Plan
[26]A comprehensive derivation of these ranges is set out in Oxera's report. * denotes Ofgem's key credit metrics in the SSMD

Analysis of Financeability

Figure 6.11 AICR (or PMICR) analysis over RIIO-T2 for Ofgem's Working Assumptions (CPI)

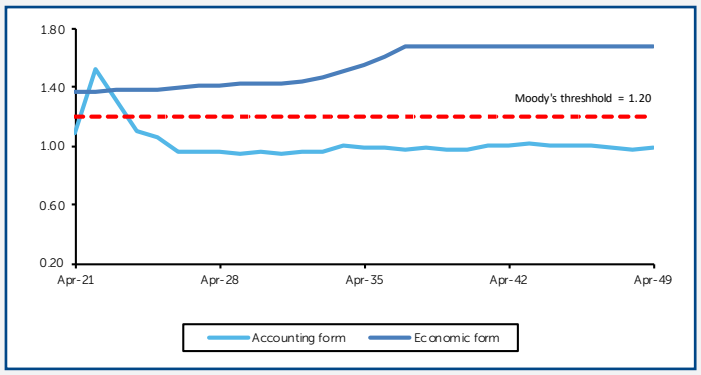
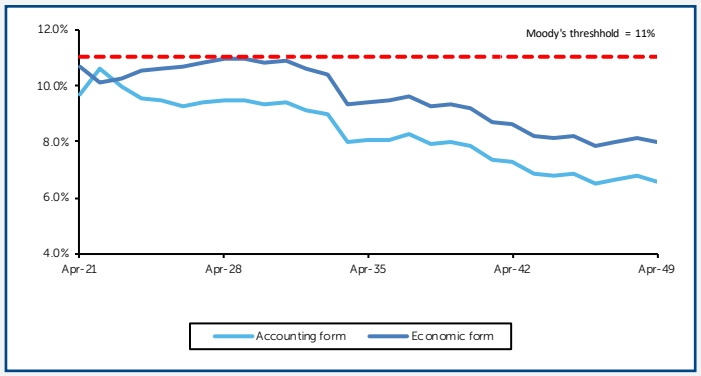


Figure 6.12 FFO/Net Debt analysis over RIIO-T2 for Ofgem Working Assumptions (CPI)



As shown in Figure 6.11, for the notional company during RIIO-T2, the AICR (or PMICR) falls below the bottom end of Moody's guidance of 1.2–1.4x and 1.4–2.0x (for a Baa rating) at 1.18 over the period. The AICR is also below Fitch's guidance of 1.5x for a BBB[27] rating. Furthermore, Figure 6.12 shows that the FFO/net debt (including and excluding accretion) is below Moody's guidance for a Baa rating of 11%[28].

The above analysis ignores both the long-term impact on credit ratios that deteriorate due to the change to CPI from RPI and the CoE being set too low in Ofgem's Working Assumptions. This evidences that Ofgem's Working Assumptions present financeability pressures when using CPI as the inflation measure. As part of our evaluation, we have also considered Ofgem's Working Assumptions if RPI were to remain the inflation measure for RIIO-2. In doing so we are evaluating Ofgem's Working Assumptions excluding the change in inflation measure, which has been noted as increasing short term cash flows[29] and therefore materially moving the credit rating ratios.

Transitioning to CPI 'skews' the analysis.

When analysing Ofgem's Working Assumptions, we have considered the impact of changing to CPI as the measure of inflation instead of RPI. Oxera undertook the same analysis independently (Figures 6.13 and 6.14). Oxera considered the impact across and beyond RIIO-T2 showing that CPI-related short term cash flow increases become neutral compared to RPI before inverting to a negative impact.

In Oxera's conclusions from the analysis of the impact of CPI to RPI on long term credit metrics they note that if Ofgem had retained RPI-based allowances instead of CPIH-based allowances, the AICR would have been even lower at around 0.89x. This is well below Moody's guidance threshold for a Baa2 rating (i.e. 1.2x) which is sub-investment grade. This demonstrates that but for the transition to CPIH inflation, the credit metrics would not have been consistent with the threshold guidance for investment-grade ratings and therefore our regulatory licence obligations.

If Ofgem were to retain RPI, price control financial parameters would not achieve financeability for the notional company and Ofgem's Working Assumptions would need to be changed to support financeability.

Figure 6.13 AICR (or PMICR) analysis over RIIO-T2 for Ofgem Working Assumptions (RPI)

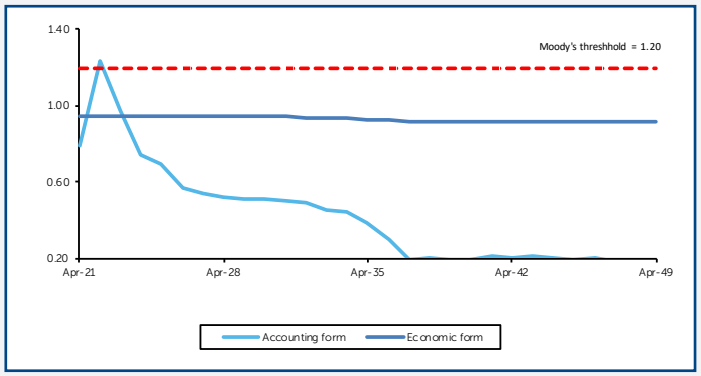
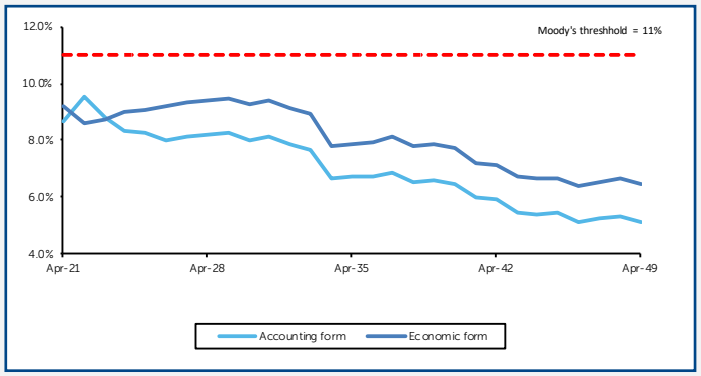


Figure 6.14 FFO/Net Debt analysis over RIIO-T2 for Ofgem Working Assumptions (RPI)



[27]Regulated electric and gas networks – UK. Risks are rising, but regulatory fundamentals still intact' p. 4. Moody's (May, 2019), Available at: https://www.moodys.com/credit-ratings-tab/IndustryResearch/546500?orgname=New-Haven-Water-Co-&rle=MIS

[28]Oxera focus on the accounting form which is the same basis in which the CRAs used compared to Ofgem's methodology for using the economic form of CRAs. Oxera explore this further in their report.

[29]The novel approach adopted reduces the TMR by 1%, which has been noted by Moody's in their analysis of RIIO-2. Moody's, Credit quality likely to weaken in RIIO-GD2 regulatory period (Moody's, Feb 2019) available at: https://www.ofgem.gov.uk/sites/default/files/docs/2012/10/7_network_access_policy_shetlandsptl_0.pdf

Sensitivity Analysis on Financeability

We have undertaken a number of sensitivities on our draft Business Plan including evaluating credit ratios on Our Proposed Parameters. Oxera have also independently assessed these sensitivities which are summarised as follows:

- Using a cost of equity of 6.9% (CPIH, real or 5.8% RPI, real), consistent with Our Proposed Parameters;
- Using Our Proposed Parameter of a 15-year trailing average of yields on A/BBB iBoxx non-financial corporate bond indices for the cost of debt[30];
- Measuring the change in the capitalisation rate required in order to achieve credit metrics that would be consistent with the upper bound of the guidance range from Moody's for a Baa1 rating25, in line with the Competition Commission's (2007) guidance on interpreting a 'solid' investment-grade rating.

The results of testing financeability under these scenarios are summarised in Table 6.6. All scenarios assume an equity return in line with the base case assumption for the notional company (i.e. 4.3%, CPIH real), unless otherwise noted. We conclude that:

- If Ofgem had retained RPI-based allowances instead of CPIH-based allowances, the AICR would have been lower at around 0.84x. This is well below Moody's guidance threshold for a Baa2 rating (i.e. 1.2x).
- Reducing the notional gearing to 55% in line with RIIO-T1 would improve credit metrics; i.e. AICR would increase to 1.31x, which would be slightly below the guidance threshold for a Baa1 rating (i.e. 1.4x).
- Changes to the dividend yield or asset life assumption are ineffective in materially alleviating pressure on interest coverage ratios[31]. Oxera outline in their report why the AICR is non-responsive to a change in asset lives.

Table 6.6 Sensitivity analysis of financeability metrics for the notional company

	Base case	RPI inflation	Cost of equity = 6.9%	Dividend yield = 0.0%	15-year trailing average	No inflation-linked debt	Capitalisation rate = 85.9%	Gearing = 55%
Debt metrics								
Net debt/RAV (%)	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	55.0%
FFO interest cover, incl. accretions (x)*	3.3	3.0	3.6	3.3	3.1	3.3	3.5	3.6
FFO interest cover, excl. accretions (x)*	3.8	3.7	4.2	3.8	3.6	3.3	4.0	4.2
AICR (or PMICR) (x)*	1.18	0.84	1.55	1.18	1.15	1.03	1.40	1.31
Notional PMICR (x)	1.8	1.8	2.1	1.8	1.7	1.8	2.0	2.0
FFO (cash interest) / net debt (%)*	9.8%	8.7%	11.1%	9.8%	9.8%	9.3%	10.7%	11.1%
FFO (interest expense)/net debt (%)*	9.4%	8.1%	10.7%	9.4%	9.4%	9.3%	10.3%	10.7%
RCF/net debt (%)	7.1%	5.9%	8.4%	9.8%	7.1%	6.6%	8.0%	7.8%

*Ofgem key credit metric in the SSMD

[30]The 15-year trailing average cost of debt index excludes the impact of transaction costs and the cost of carry. Oxera's analysis has not modelled this here but it is not intended to preclude the possibility of a different trailing average period

[31]Regarding the former, this is due to debt costs being driven by the maintenance of a constant notional gearing ratio in line with the projected RAV growth rather than by dividend policy. Regarding the latter, this is due to changes to the asset life assumption for depreciation being reflected in the calculation of the FFO, but then being offset by a revised estimate of RAV depreciation within the numerator for the AICR (or PMICR) ratio

Determining Allowed Revenue

- Revising the capitalisation rate to generate an AICR estimate of 1.4x, in line with a Baa1 guidance threshold, would require a reduction from a rate of 90% to below 85%. However, CRAs may look through adjustments that are NPV-neutral, such as modifying the capitalisation rate and the depreciation profile. For example, Fitch has indicated that it does not view alternative capitalisation or depreciation rates as helping PMICRs[32]. This would also inadvertently shorten the period over which costs are recovered on assets, which is not reflective of the analysis undertaken of our draft Business Plan.
- Assuming indexed linked debt is available, this improves ratings. Availability is not guaranteed which could lead to a deterioration in ratings close to the threshold for investment grade.
- Our proposed CoE of 6.9% (CPIH-real) shows a significant improvement in the AICR to 1.59x, which is consistent with a Moody's Baa1 rating.

The above analysis assumes that we are fully financed on all capital costs, there is no out or underperformance and the "all-in" costs of borrowing are fully funded. We intend to evaluate the range of outcomes once incentive mechanisms are further defined by Ofgem in advance of our final Business Plan in December 2019.

Conclusion on financeability analysis

Our analysis of financeability under Ofgem's Working Assumptions shows that there would be significant downward pressure on our credit rating. Under a range of sensitivities, including the impact of transitioning to CPI, we show that Ofgem's Working Assumptions would require material changes to support short term financeability. We believe this illustrates that Ofgem is using the short-term change to CPI to reduce the CoE to 4.3% in RIIO-T2.

To avoid any downgrading occurring under Ofgem's Working Assumptions, changes would be required to gearing or capitalisation rates alongside an increase in the cost of debt index to enable cash flows to support short term credit ratios. Such changes would lead to Ofgem setting other financial parameters 'inaccurately' to support financeability. This would have the effect of increasing costs to consumers in the short term and could potentially lead to higher bills in the longer term.

We believe that we should be financeable under both RPI and CPI.

Our Proposed Parameters are able to achieve this and will ensure that we maintain our credit rating while being able to attract and retain equity investment from new and existing shareholders.

Determining Allowed Revenue

Our allowed revenue is calculated using a regulated financial framework which is common to all transmission operators and is prepared on a "notional company basis" – that is, it ignores our actual funding structure and assumes that we are funded in line with what Ofgem defines as an efficient TO. The inputs to the framework are our expenditure requirements and the financial assumptions. The output of the framework is the base revenue which we are allowed to charge each year.

Our allowed revenue is made up of the following key components:

- A proportion of our allowed expenditure is capitalised and added to RAV ("slow money"). A return on RAV is earned based on the WACC. The RAV depreciation element also forms part of our revenue, with the amount of money we earn on this portion of our expenditure being spread over the life of the assets on which we spend our money.
- A proportion of our allowed expenditure is recovered as revenue in the year it is incurred ("fast money"), but with no return.
- Any expenditure incurred on areas which are outwith our control, such as business rates, are recovered in revenue in the year it is incurred, as long as Ofgem agrees that it is efficiently incurred.
- An allowance to cover our tax costs and the costs of any efficiently-incurred payments to cover pension scheme deficits from before April 2010 in accordance with specific guidelines including Ofgem's Pension Reasonableness Review.
- An allowance to cover any costs incurred in raising equity to fund our business.
- Any upfront incentives as set by Ofgem.
- Ofgem operates a Price Control Financial Model (PCFM) to undertake this calculation of allowed revenue. As the PCFM for RIIO-T2 is not yet fully developed, we have used our own financial model (based on the PCFM for RIIO-T1) to forecast our allowed revenue for the RIIO-T2 period.

[32]Fitch Rtgs: Ofgem's Credit-Enhancing Mechanisms Unlikely to Benefit Ratings', 28 February (FitchRatings, 2019),) available at: https://www.ssen-transmission.co.uk/media/3117/riio-t2-stakeholder-engagement-ssen.pdf

Forecast Allowed Revenue

Forecast allowed revenue

Figures 6.14 and 6.15 show our forecast of allowed revenue[33] for the RIIO-T2 period for the Certain View of allowed expenditure, respectively, Ofgem's Working Assumptions and Our Proposed Parameters.

There is an approximately £47 million per year difference between the average allowed revenue under Ofgem's Working Assumptions and Our Proposed Parameters. This largely relates to the difference in the CoE assumption.

As explained above, a higher CoE assumption is necessary to maintain the long term financeability of our business. In addition, the revenue is skewed by the transition to CPI which will increase revenues under Ofgem's Working Assumptions over the long term. In effect, there would be a transfer of costs from current to future customers.

Allowed revenue is forecast to increase by between £70-100 million between 2020/21 and 2022/23 under both Ofgem's Working Assumptions and Our Proposed Parameters. This is driven by the costs of a larger network (higher RAV) alongside changes to the regulatory treatment of pass-through costs, including business rates and corporation tax, between each price control. There is also an increase in depreciation following the large investment in the final years of RIIO-T1. Depreciation is a means to finance new investment as older assets deteriorate over a period of time.

Once Ofgem's Working Assumptions are amended to support financeability, as illustrated in our financeability analysis, the differential in revenue between Our Proposed Parameters and Ofgem's Working Assumptions would reduce significantly.

Figure 6.14 Forecast allowed revenue for Certain View and Ofgem's Working Assumptions (£m pa. 2018/19 prices)

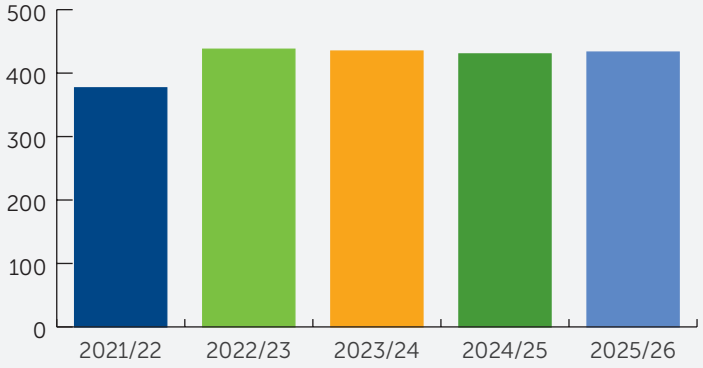
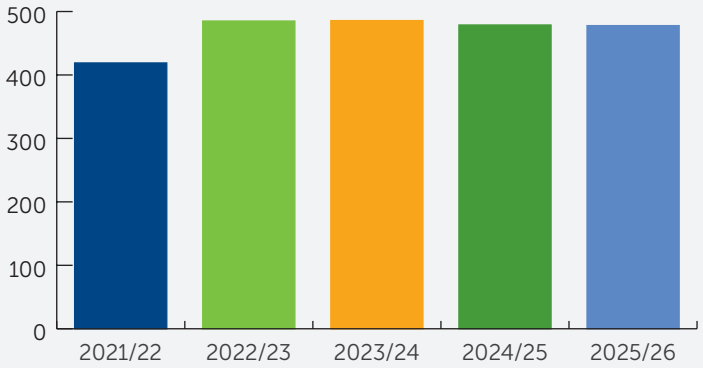


Figure 6.15 Forecast allowed revenue for Certain View and Our Proposed Parameters (£m pa. 2018/19 prices)



[33]This analysis does not include Excluded Services, such as connection charges levied directly on the connecting party e.g. generators. For modelling purposes, we have assumed that these charges will continue at similar levels

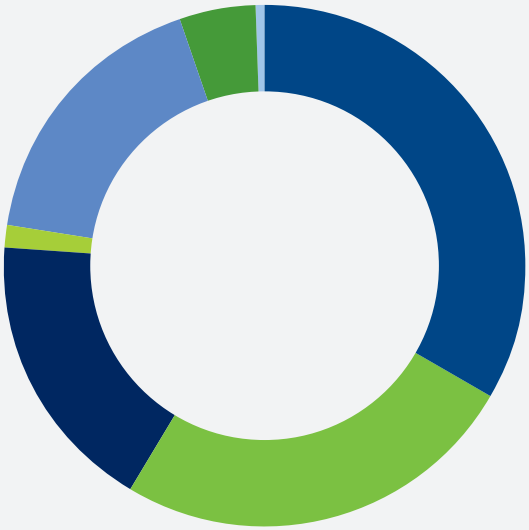
Cost to Customers

GB homes and businesses buy their electricity from the competitive retail supply market. Each supplier is liable for Transmission Network Use of System (TNUoS) charges based on their overall demand consumption. TNUoS charges recover the cost of installing and maintaining the GB transmission system. TNUoS charges are just one part of the overall electricity bill paid by homes and businesses. The electricity bill comprises wholesale, network, supplier and other costs. In addition to TNUoS, other network charges include the charge for the low voltage distribution system and the cost of the operation and balancing of the transmission system.

Ofgem estimates that the average GB household electricity bill is £577 (Figure 6.16), of which £37 (6%) is due to transmission network charges. This £37 is the total charge for all of the GB transmission network including SHE Transmission in the north of Scotland.

Using the methodology set out in the following section, we estimate that in 2019/20 the average GB household is paying around £4.70 for the north of Scotland transmission network. This equates to less than 1% of the total electricity bill, and less than 0.5% of the total dual fuel energy bill.

Figure 6.16 Components of average GB household electricity bill



- 33% Wholesale costs
- 26% Network costs
- 18% Environmental / social obligation costs
- 1% VAT
- 17% Operating costs
- 5% Other direct costs
- <1% Supplier pre-tax margin

Source Ofgem, May 2019

Assumptions: Cost to household customers

The revenue that we are allowed to recover under the price control is paid by all GB electricity network customers (households, businesses and generators).

The process for doing this is complicated and means that there is not a standard charge in your electricity bill. For the purposes of this draft Business Plan, we have used a simple top-down approach that is intended to follow the methodology described by Ofgem[34] with five steps:

1 **Start with our calculated allowed revenue for each year of RIIO-T2 (note that the RIIO-T1 period is based on the revenue that is charged to customers through the TNUoS tariffs for each respective year).**

2 **Calculate the proportion of this allowed revenue that is paid by demand customers:**

a) By multiplying Item 1 by 84% (which is the percentage of the TNUoS charge paid for by demand customers[35]); and then

b) by multiplying Item 2a by 62% (which is our best estimate of the demand proportion paid by households).

3 **In order to calculate the unit cost (£/kWh), divide the result from Item 2b by 142.3 TWh (which is the total electricity used by households[36]).**

4 **Households also pay for electrical losses on the transmission network, so increase the unit cost figure by 9% (which is the GB proportion of losses).**

5 **Finally, to calculate the cost of our network to the average GB household, multiply the unit cost by 3,100 kWh (which is the average domestic consumption value used by Ofgem).**

This approach is based on the charging methodology and inputs from 2018/19, so our forward looking estimates do not include for future changes to these variables.

The determination of TNUoS charges paid by generation customers is specific to each customer and not considered here. The ESO publishes five year ahead tariff forecasts.

[34]Understand your gas and electricity bills (Ofgem, 2019) available at: www.ofgem.gov.uk/consumers/household-gas-and-electricity-guide/understand-your-gas-and-electricity-bills
[35]Digest of UK Energy Statistics (DUKES) 2018: main report (BEIS,2018) available at: https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2018-main-report
[36]Transmission Network Use of System (TNUoS) charges (National Grid ESO, 2019) available at: www.nationalgrideso.com/charging/transmission-network-use-system-tnuos-charges

Figures 6.17 and **6.18** show our best estimate of the cost to the average GB household of the north of Scotland transmission network during RIIO-T2. This applies the assumptions and methodologies described above to our Certain View of expenditure and outcomes.

For Our Proposed Parameters, the annual average cost would be £6.59 per household (£5.80 excluding the effect of inflation). For Ofgem's Working Assumptions, the cost would be slightly lower but, as we illustrate above, this is not a financeable proposition and would cost customers more in the long term.

The increase in estimated bills in 2022/23 is driven by the costs of a larger network (RAV) alongside the treatment of pass-through costs, including business rates and corporation tax, between each price control. There is also an increase in depreciation following the large investment in the final years of RIIO-T1. The depreciation component is a means to finance new investment as older assets deteriorate over a period of time.

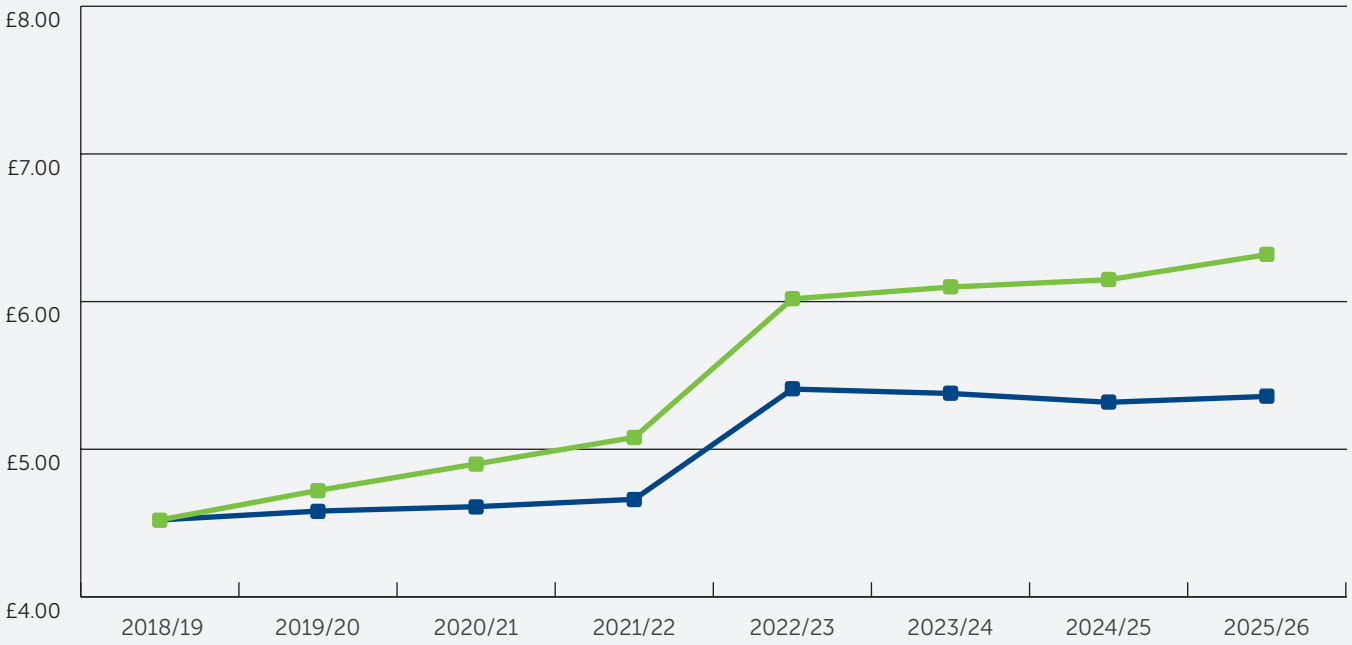
This is an estimate of the average GB household bill. There is a locational element to demand TNUoS tariffs, which means that (for the same demand) charges are higher in the south than north of GB. In 2019/20[37], the non-half hourly locational demand tariff in the north of Scotland is 2.82 p/kWh compared with 7.76 p/kWh in the southwest of England.

There is also significant variability in consumption around the notional average of 3,100 kWh, as we have illustrated in our north of Scotland energy trends papers[38]. Our analysis shows that electricity consumption in the north of Scotland is higher than the GB average and, at the extreme, the median customer in the far north can consumer nearly twice as much electricity as a customer in the south of England.

While the absolute value we present here are evidently not applicable to all GB households, in general the average GB household will pay around £7 for the north of Scotland transmission system by the end of RIIO-T2. This represents good value for the proposed service levels and contribution to the transition to the low carbon economy.

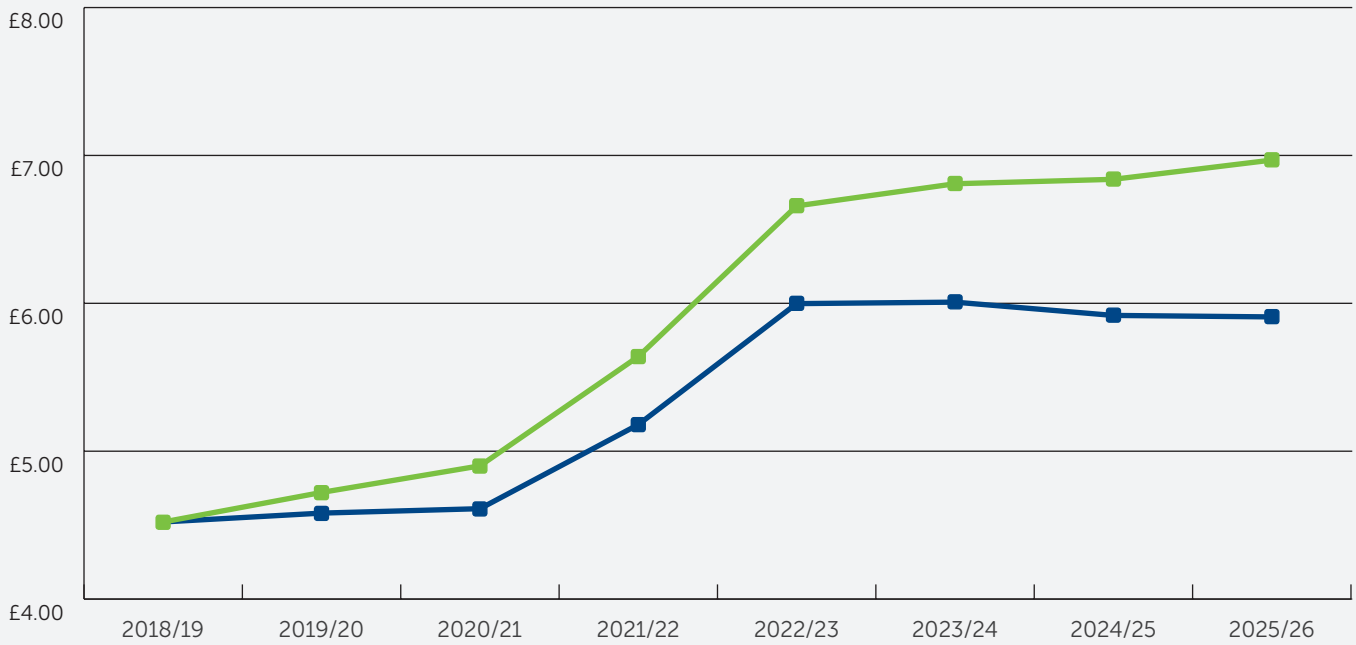
[37]Final TNUoS Tariffs for 2019/20 National Grid Electricity System Operator (National Grid ESO, 2019) available at: www.nationalgrideso.com/document/137351/download
[38]Future Energy Scenarios (SSEN Transmission, 2018) available at: www.ssen-transmission.co.uk/information-centre/industry-and-regulation/future-energy-scenarios/

Figure 6.17 Estimated cost of the north of Scotland transmission network to the average GB household for Ofgem's Working Assumptions(£)



Average GB consumption 3,100 kWh. Inflation assumption 2% pa.

Figure 6.18 Estimated cost of the north of Scotland transmission network to the average GB household for Our Proposed Parameters(£)



Average GB consumption 3,100 kWh. Inflation assumption 2% pa.

Consultation questions

Find out more

We have published the key reports that are referred to in this draft Business Plan on our RIIO-T2 webpage:
www.ssen-transmission.co.uk/riio-t2-plan

This webpage also has all of the presentations and reports from our stakeholder consultation events for RIIO-T2.
You can read more about our performance in RIIO-T1:
www.ssen-transmission.co.uk/information-centre/industry-and-regulation/transmission-price-control-review/

Questions for consultation

We welcome views on any aspect of this draft Business Plan. The specific questions we have asked are:

Section 2: Stakeholder-Led Strategy

- What do you think of our ambitions and initiatives for connections? Do these align with your future needs?
- Are there any specific services or policy initiatives we should consider for connections?
- What do you think of our proposed customer satisfaction survey to measure our success? Is there another way we should measure our success?
- Are there any innovation areas we should target in RIIO-T2?
- Is our new reporting framework clear and transparent? Is there anything else we should consider including?

The consultation on our draft Stakeholder Engagement Strategy has now closed. To get involved in the next steps, please contact our Communications Policy Manger: **Sarah Dooley, sarah.dooley@sse.com**

Section 3: Safe and Secure Network Operation

- Our research indicates that security of supply is the priority of our stakeholder groups. Is this an appropriate assumption for the duration of RIIO-T2 until 2026?
- Attendees at our March 2019 workshop supported the undertaking of work in RIIO-T2 where it can be demonstrated to lead to more efficient outcomes in the future. Do you support this approach?
- We propose the ESO should direct Black Start requirements for Scotland. Do you support this approach?

Section 4: Sector Leading Efficiency

We are seeking feedback on:

- The Certain View and our proposal that investments with uncertain need are not agreed upfront
- Whether the approach we take could be improved for greater benefits to GB bill payers

Our roadshows to discuss our proposed investments are:

- **12 August** Aberdeen
- **14 August** Inverness
- **16 August** Perth
- **20 August** Inveraray
- **22 August** WIck
- **27 August** Glasgow

Get in touch to register to attend: **YourPlanOurFuture@sse.com**

Section 5: Leadership in Sustainability

- We welcome views on how we can best support community and locally owned renewable energy projects, and what outcomes (if any) we should strive for during RIIO-T2?
- We welcome views on our proposal to take a cost-benefit approach to adopting SF6 alternatives and the decarbonisation of our operational fleet. Is this acceptable, or should we go faster?
- We welcome views on whether our proposals for the natural environment are sufficient, or too ambitious. In particular, we seek views on whether we should adopt our proposed Stretching Ambitions?
- What actions do you think we should take on embodied carbon and by when?
- We have identified a difference of opinion between our regulator and our stakeholders in our role in supporting communities. We would welcome your views on whether we should adopt the goals described here.
- We currently provide support to communities through our resilience community fund, are there other more impactful and beneficial ways to provide support to communities?
- We welcome views on other steps we could take to provide rewarding and fulfilling careers.
- Our regulator, Ofgem, has decided that we must publish an Environmental Plan and an annual environmental report. Our initial thinking is to incorporate this into our overall sustainability reporting. We welcome views on this approach.

Section 6: Cost to Customers

- Do you agree with our approach to setting the cost of equity including the point estimate for evaluating our Business Plan?
- Do you believe that we should assume outperformance will occur in assessing our Business Plan (as Ofgem does)?
- We welcome views on using cross checks to provide more detailed analysis for the cost of equity for RIIO-T2?
- Do you agree with our analysis of the RIIO-T1 CoD mechanism and the impact on SHET's embedded debt?
- Do you agree with our analysis of additional costs of borrowing that should be funded through the CoD mechanism in RIIO-2?
- Do you agree with our evaluation of CoD mechanisms and our proposed CoD mechanism? Are there any other CoD mechanisms that we have not considered?
- Should asset lives transition to 45 years by the end of RIIO-T2 or should the period be locked at sixteen years, meaning the transition will complete in the early years of RIIO-T3?
- Are there any other items that we should consider when assessing the appropriate capitalisation rate?
- What are your views on the FTM accreditation or an alternative accreditation for energy networks in RIIO-T2?
- Do you agree with our conclusion that pass-through is the appropriate treatment of tax costs for consumers? If not, what mechanism or approach do you prefer and why?
- Do you believe switching to CPI from RPI should be NPV-neutral?
- Do you believe that RPI should be retained?
- We welcome views on the potential benefits and risks of RAMs. Do you believe we should include a RAM type mechanism in our final Business Plan and, if so, what mechanism do you think is the most appropriate?

You can find details of how to respond, including a consultation response form on our website:
www.ssen-transmission.co.uk/riio-t2-plan

This consultation closes on 31 August 2019. We will publish our response in October 2019.

Scottish & Southern Electricity Networks

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