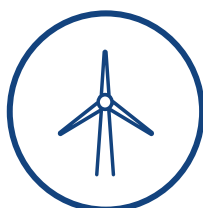




A Network for Net Zero RIIO-T2 Business Plan

December 2019

Five years Five clear goals



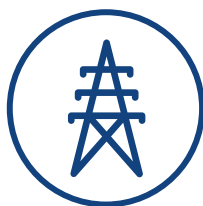
Transport the renewable electricity that powers 10 million homes

Our RIIO-T2 Certain View will deliver an electricity network with the capacity and flexibility to accommodate 10 GW renewable generation in the north of Scotland by 2026



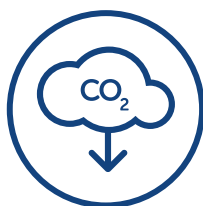
Aim for 100% transmission network reliability for homes and businesses

By investing in new technology and ways of working, when cost effective for customers to do so, we will strive for 100% transmission network reliability for homes and businesses by 2026



Every connection delivered on time

By 2026 we will provide every network connection, tailored to meet our customers' needs, on time, on budget and to our customers' satisfaction



One third reduction in our greenhouse gas emissions

Reduce the controllable greenhouse gas emissions from our own operations by 33% by 2026, consistent with a net zero emissions pathway



£100 million in efficiency savings from innovation

Our RIIO-T2 Certain View includes £100 million of cost savings through productivity and increased innovation, and we aim to go further to save more

Delivered for around £7 a year

Foreword

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

The Board of Directors fully supports this final RIIO-T2 Business Plan.

Scottish Hydro Electric Transmission has a strong track record in delivering for its customers and shareholders over the past decade. It has efficiently and effectively grown the north of Scotland transmission system enabling the connection of renewable generation and putting the nation on a pathway to net zero emissions.

This Business Plan builds upon that strong track record. We have confidence in the team's ability and commitment to deliver upon these ambitious goals to further grow the network, maintain a safe and reliable service, and achieve leadership in sustainability.

The consultation activities over the past two years to develop this Business Plan have been extensive and thorough. The role of customers and stakeholders in shaping the Plan is evident and welcomed by the Board.

The team has demonstrated the rigour and assurance that has gone into producing a high quality and accurate Business Plan. We have confidence that the Plan is both deliverable and that the outputs represent good value for money for the GB energy consumer.



Gregor Alexander

Chair

Scottish and Southern Electricity Power Distribution (SSEPD) Board

Since we published our full draft Business Plan for consultation at the end of June, I've been overwhelmed with the enthusiastic reception to our proposals from customers and stakeholders across GB, as well as our employees and supply chain partners.

This response is testament, I believe, to the national strength of feeling that we all need to play our part in tackling climate change. When asked, every single respondent to our consultation agreed that we are right to put net zero emissions at the heart of our business activities.

The consultation on our draft Business Plan resulted in some great feedback on how we could make the Plan even better. With the assistance of our RIIO-T2 User Group, we have carefully considered these ideas and incorporated many of them into this final Business Plan. I'd like to again extend my thanks to everyone who has generously worked with us over the past two years in the creation of this Plan.

Our experience over the past decade has given us an exceptional capability in delivering capital investment on time and on budget. We stand ready to deliver this Plan. Our people are ready, as are our critical supply chain. Pre-construction development work and competitive tendering is well underway, and we have detailed plans for delivery of the capital investment in the Certain View.

But it's now over to Ofgem. I'm looking forward to Open Hearings in spring 2020 where we can present our ambitious Business Plan and Five Clear Goals to Ofgem's Board. Everyone is welcome to come along and share their views, and I hope to see many of you there.



Rob McDonald

Managing Director

Scottish Hydro Electric Transmission

Main changes from 27 June first draft Business Plan

This final RIIO-T2 Business Plan follows over two years of extensive engagement and collaboration with consumers, customers and stakeholders in its development (pages 24-28).

In June 2019 we published a first full draft of our Business Plan. This was an open and wide-ranging consultation that responded to a request from stakeholders to have an opportunity to consider the Plan in its entirety before it was finalised. In order to make this consultation accessible to stakeholders across GB, we undertook an extensive campaign of promotion and engagement to reach and hear the views of as many individuals and organisations as possible. A focus was put on increasing reach with stakeholder groups that had previously been under-represented in the development of the Plan including: GB consumers, local communities, small developers and energy innovators.

A second draft of the Business Plan, with three supporting documents, was prepared for 1 October and published thereafter. This second draft considered the consultation findings and how we proposed to respond to stakeholders' views. It also included additional narrative information on aspects of the Business Plan specifically requested by stakeholders, Ofgem, the RIIO-T2 User Group and Ofgem's RIIO-2 Challenge Group.

The main stakeholder-led changes from our June draft and this final Business Plan are summarised in **Table 1** below. A full report on our 27 June consultation findings is available [here](#).

Content	Change
Strategy and Clear Goals	There was strong support for our strategy and the Five Clear Goals. Many stakeholders had suggestions for strengthening or clarifying the wording of the Goals, in particular the 100% Reliability Goal. We have worked with our RIIO-T2 User Group to make changes in response to these comments.
Net Zero and Uncertainty	Our commitment to net zero targets was widely acknowledged as one of the strengths of our June draft. Stakeholders asked us to provide more detail on our assumptions and to make an assessment of the likely outturn. We undertook this work, and published the paper Planning for Net Zero: Scenarios, Certain View and Likely Outturn .
Investment in the Network	Overall, our investment proposals were supported by stakeholders. Our presentation of detailed regional investment plans at consultation events was welcomed, as was our commitment to reuse existing infrastructure rather than build new. Again, stakeholders asked for more detail on our assumptions – in response to this we published the paper A risk-based approach to asset management . Some stakeholders expressed concern about whether our ambition was sufficient given net zero targets. The Scottish Islands' links were particularly highlighted in this regard. We have carefully considered these comments, and discussed them further with a range of stakeholders including our RIIO-T2 User Group, but decided on balance not to change our approach in this final Business Plan. Further explanation is provided in sections 2 and 4.
Sustainability and the Environment	Throughout the development of our Sustainability Strategy , stakeholders have consistently pushed for greater ambition in our approach. Again, while there was strong support for our commitment and the breadth of our strategy, stakeholders challenged the case for doing more. In response, we have strengthened our targets for woodland net gain outcomes and visual amenity of existing infrastructure. The further detail requested by stakeholders has been published in our Sustainability Action Plan .
Stakeholder Engagement	Our new Stakeholder Engagement Strategy was open for consultation at the same time as the June draft. The response to that consultation was highly encouraging. Our final Strategy, incorporating feedback, has now been published. At stakeholders' request, this is accompanied by a Stakeholder Action Plan .
Presentation of Business Plan	Stakeholders welcomed the open, accessible form of the June draft. For this final Plan, some stakeholders asked for changes to the structure and inclusion of more detailed content. All asked us to keep it as short and accessible as possible. These comments have informed the preparation of this final Business Plan document.

Table 1 Main changes from 27 June first draft Business Plan

Contents

About us and Our Track Record	06-07
At a Glance	08-17
A Network for Net Zero • Total Expenditure • A Safe and Reliable Network • Security of Supply • A Sustainable Network • Core Business Policies • Cost to Customers • Regulatory Settlement	
Section 1: Our Strategy	18-28
The Climate Emergency • A Network for Net Zero: Our Strategic Objective Themes and Goals • A Stakeholder-Led Business Plan • Our RIIO-T2 User Group	
Section 2: Building a Network for Net Zero	29-48
Summary of Targets and Expenditure • Scenario Planning and Net Zero Emissions Targets • The Certain View • Efficient Capital Development and Delivery • Certain View Growth Investment: Eastern • Certain View Growth Investment: Caithness, Orkney and Shetland • Certain View Growth Investment: Argyll, Central and Western Isles • Ready to Deliver Net Zero	
Section 3: Maintaining and Investing in the Existing Network	49-66
Summary of Targets and Expenditure • Aspiring for 100% Reliability for Homes and Businesses • A Risk-Based Approach to Asset Management • Identifying the Need for Asset Intervention • Certain View Asset Investment: Eastern • Certain View Asset Investment: Caithness, Orkney and Shetland • Skye • Certain View Growth Investment: Argyll, Central and Western Isles • Certain View Direct and Indirect Operations • Measuring Reliability and Target Outcomes	
Section 4: Security of Supply	67-78
Summary of Targets and Expenditure • Resilience and Security of Supply • Operating a Growing Network of Increasing Complexity • Certain View Asset Resilience • Certain View Network Control • Certain View Data and IT	
Section 5: Protecting consumers from an uncertain future	79-84
About Uncertainty Mechanisms • Volume and Need Uncertainty: Certain View, Likely Outturn and Net Zero • Unknown External Costs	
Section 6: A Sustainable Network for Current and Future Energy Consumers	85-103
Summary of Targets and Expenditure • Our Social Responsibility • A New Approach to Stakeholder Engagement • Meeting Stakeholders' Ambitions for Connections • Local Area Energy Plan and Community Energy • Leadership in Sustainability • Enhanced Reporting Framework	
Section 7: Financing our Plan	104-123
Next Steps	124-125
Appendix 1: Assurance and Governance of this Business Plan	126-127
Appendix 2: List of Supporting Documents	128-130
Appendix 3: Summary of core policies	131-150
Timely, Cost Effective Innovation • A Co-ordinated Whole Energy System • Our Stakeholder Engagement Action Plan • Our Sustainability Action Plan • Using Competition to get the Best Outcomes for Consumers	
Appendix 4: Supporting Tables	151-156
Snapshot Table: Outputs • Snapshot Table: Uncertainty Mechanisms • Snapshot Table: Consumer Value Proposition	
Appendix 5: Ofgem's Business Plan Guidance	157-159

About Us and our Track Record

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.



Our operating area and network in the north of Scotland

Building on an exceptional track record

This RIIO-T2 Business Plan builds upon the strong service and outputs performance we have delivered for our customers and stakeholders over the past decade.

Safe and reliable network

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). During the RIIO-T1 period, our TRIR has been between 0.23-0.90.

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 six full years of the RIIO-T1 price control period completed to date, there have been less than 100 incidents resulting in total ENS of 170.4 MWh (**Figure 1**). This equates to an overall system reliability in excess of 99.999%.

Facilitating the connection of low carbon generation

The total generation capacity connected to the north of Scotland transmission system is forecast to double during the RIIO-T1 period to 8.1 GW by 31 March 2021 (**Figure 2**). 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. 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.

Sector leading sustainability commitment

In May 2018, following extensive customer and stakeholder consultation, we published our sector-leading [Sustainability Strategy](#). During the RIIO-T1 period, we have reduced leakage of SF6 gas, our business carbon footprint and electrical losses.



Awarded Leadership scores in Ofgem's Environmental Discretionary Reward in 2017/18 and 2018/19

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 7.9 out of 10 (Figure 3).

Delivering outputs for less than allowances

We forecast outturn RIIO-T1 expenditure of £3.8 billion, around 4% lower than regulatory allowances (after adjustments) (Table 2). Over two-thirds of regulatory allowances have been made through in-period output driven uncertainty mechanisms. All agreed outputs have been delivered.

- We forecast savings of around 12% on our total capital expenditure for growth (Strategic Wider Works and Other Load). These savings reflect improvements in our project delivery capability, including management of risk, and productive relationships with the supply chain.
- In contrast, we expect to overspend our allowance for maintaining the existing network (Non-Load) by around 27%. This is due to delivering additional outputs not included in our RIIO-T1 Business Plan, required to maintain network performance.
- Also of note is our significant additional investment in non-operating costs. This relates to a programme of upgrading our core IT systems, including a new Work and Asset Management System, not planned for in our RIIO-T1 Business Plan.

A fair return for shareholders and customers

We forecast an outturn Return on Regulatory Equity (RORE) for the RIIO-T1 period including tax and debt performance of 9.1%. This equates to a Return on Capital Employed (ROCE) of 4.3%. These returns include the benefits of a 'fast track' settlement and are consistent with the return expectations for a strongly performing company set by Ofgem at the outset of RIIO-T1.

Customers have benefited from not just our strong service performance, but also our efficiency in expenditure. The sharing factor mechanism means that customers have shared half of all the expenditure savings we have achieved – around £85 million (after adjustments).

Overall, we have delivered dramatic growth in the north of Scotland transmission system for renewable energy. The network has been reliable and operated safely. We have built strong working relationships with our customers and stakeholders. Our approach to sustainability and social responsibility is sector leading.

This, we believe, is a track record to be proud of.

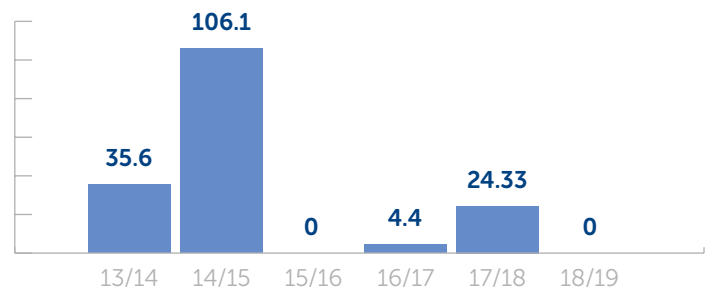


Figure 1 Energy Not Supplied, MWh pa.

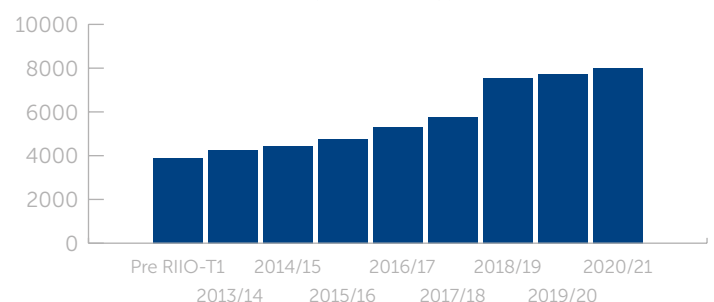


Figure 2 Generation connected (MW): actual and forecast

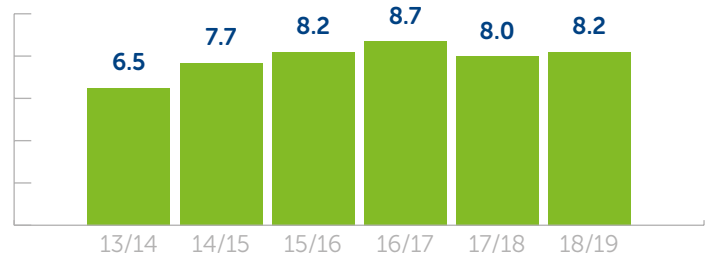


Figure 3 Stakeholder satisfaction survey scores (out of 10)

(£m)	Allowance	Expenditure	
Capital expenditure	3,845.7	3,511.5	334.2
-Strategic Wider Works	1,975.3	1,798.2	-177.1
-Other Load	1,531.2	1,283.8	-247.5
-Non-Load	339.2	429.5	+90.3
Operating costs	254.4	257.0	-2.7
Non-Operating costs	9.7	24.4	+14.7
Total	4,109.8	3,792.9	-316.9
Adjustments ¹			+145.7
Total (adjusted)			-171.2

Table 2 Forecast expenditure outturn for RIIO-T1

READ our RIIO-T1 Annual Performance Reports

www.ssen-transmission.co.uk/information-centre/industry-and-regulation/transmission-price-control-review/



A Network for Net Zero

¹Enduring Value Adjustments include assumed close out adjustments to the expenditure allowances. These adjustments have been assessed in line with Ofgem's Regulatory Financial Performance Reporting Guidance available at: www.ofgem.gov.uk/publications-and-updates/direction-introduce-regulatory-financial-performance-reporting-rfpr

At a Glance: What this Business Plan will Deliver

This RIIO-T2 Business Plan has **Five Clear Goals**



Transport the renewable electricity that powers 10 million homes



Aim for 100% transmission network reliability for homes and businesses



Every connection delivered on time



One third reduction in our greenhouse gas emissions



£100 million in efficiency savings from innovation

In delivering these Goals, we will:



Protect consumers from uncertainty



Involve our customers and stakeholders



Be open and transparent

We forecast this will cost:



Total expenditure of between £470 million and £750 million each year



Around £7 for the average GB household each year

This Business Plan will deliver:

1. **A Network for Net Zero** by enabling the growth of renewable generation and the electrification of heat and transport (section 2)
2. **A Safe and Reliable Network** that aims for 100% reliability for homes and businesses (section 3)
3. **Security of Supply** that protects critical national infrastructure from natural and man-made threats (section 4)
4. **A Sustainable Network** for current and future energy consumers, that is stakeholder-led and can be trusted (section 6)

This will cost the average GB household around £7 a year.

1. A Network for Net Zero

Enabling the growth of renewable generation and the electrification of heat and transport

Climate change is already affecting people, ecosystems and livelihoods around the world. Tackling climate change is the greatest challenge of our generation.

The largest role we play in combating climate change is through our part in the GB power sector. Considerable progress has been made in the decarbonisation of electricity generation over the past decade. While this change has been rapid and profound, more remains to be done.

Clean electrification has an important role to play in removing greenhouse gas (GHG) emissions from heat and transport. Smart, flexible grid networks will be an essential part of that transition. For that reason, the Committee on Climate Change argue that: "A relatively large expansion in [grid] capacity is likely to have low regrets" and consideration should be given to future-proofing to achieve net zero emissions targets¹.

The north of Scotland and its islands have a significant renewable energy resource from onshore and offshore wind, hydro and (potentially) marine and tidal. At the end of 2018, 15% of the UK's installed renewable generation capacity was located in the north of Scotland.

By the end of the RIIO-T2 period, we expect 8.1 GW of generation to be connected to the north of Scotland transmission system². Our modelling of the requirements to meet net zero emissions targets indicates that connected generation will increase to between 13.6 GW and 15.7 GW by 31 March 2026 (**Figure 4**). Our stakeholders are clear that we must provide timely, cost effective whole system solutions to ensure national net zero emissions targets are met. But importantly, we must be evidence-based and pragmatic in our investment decisions to protect consumers from rising costs.

Protecting consumers: The Certain View

The Certain View, on which this Business Plan is based, is an approach that balances the investment requirements for net zero targets with consumers' concerns about rising costs. Eighty per cent of attendees at consultation events on our draft Business Plan supported the Certain View approach[†].

There are two parts to this approach:

1. **Certain View** All of the investments and activities where there is strong evidence of need and the best option can be identified[‡]. This includes the ongoing safe operation of the network, investments in the existing asset base and for security of supply, and some investments to grow the network.

The total expenditure forecast for the Certain View is £2.36 billion over the five year RIIO-T2 period (Table 3, page 10).

2. **Uncertainty Mechanisms** Pre-defined regulatory mechanisms that allow us to increase expenditure during the price control period when the need can be demonstrated.

We have defined 16 mechanisms to accommodate a range of uncertain requirements (section 5). This includes mechanisms that release funding for new generation connections, to invest in strategic network growth and to improve system operation.

The Certain View alone will not result in the connected generation capacity required to meet net zero targets (Figure 4). Today, at the end of 2019, as we look forward six years we cannot be confident about what generation will connect, where it will connect or when. Thus, making an expenditure forecast would expose consumers (and us) to the cost of us having got it wrong. Uncertainty mechanisms protect consumers (and us) from poor forecasts.

Given that we can be confident about further generation connecting during the RIIO-T2 period, stakeholders have asked our view of the potential expenditure under uncertainty mechanisms to grow the network. We call this our Likely Outturn Assessment (Figure 4).

Our Likely Outturn Assessment is that the use of uncertainty mechanisms might result in an additional £1.27 billion expenditure in network growth over the RIIO-T2 period.



All of the Five Clear Goals are part of the Certain View

Stakeholders, especially generation developers, also expressed concern that the Certain View was insufficiently ambitious and risked delays to essential infrastructure investment. In response to this feedback, this Business Plan includes:

- Pre-construction expenditure as part of the Certain View to ensure growth investments are ready for construction when the need is confirmed. This avoids a potential multi-year delay to, for example, undertake environmental studies and gain planning consent.
- Uncertainty mechanisms that are automatically triggered, for example, by the energisation of new generators. This avoids potentially lengthy regulatory submission and approval processes.

This Business Plan will deliver:

- **Certain View capital investment of £761.9 million** in generation connections, regional and strategic infrastructure that has a certain need
- **£129.1 million of pre-construction expenditure** to ensure readiness to invest beyond the Certain View
- **Flexible uncertainty mechanisms** that protect consumers from uncertain investment, but enable investment to proceed when the need is confirmed

The Certain View ensures we can achieve a pathway to net zero emissions, without exposing consumers to unnecessary cost.

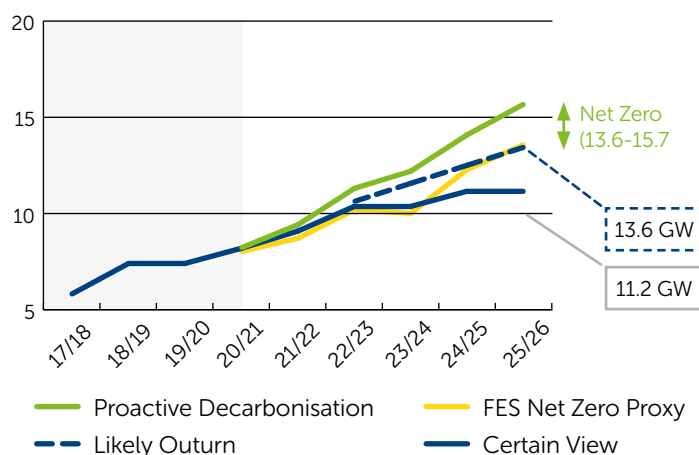


Figure 4 Net zero emissions pathways for generation connected in the north of Scotland (MW)

[†]For details see: www.ssen-transmission.co.uk/riio-t2-plan/draft-business-plan-consultation-report/

[‡]As part of this Business Plan, we have submitted to Ofgem detailed evidence-based justifications for each of the investments and activities in the Certain View

Total Expenditure

	Expenditure (£m)	Main Outputs [†] by 31 March 2026 (or annual, where stated)
Building a Network for Net Zero		Pages 29-48
New Sole-Use Infrastructure for onshore and offshore generation [†]	77.2	2,043 MW [†]
New or Upgraded Shared-Use Infrastructure	124.3	2,047 MVA
New or Upgraded Strategic Infrastructure	560.4	1,090 MW on B4*
Pre-construction	129.1	Undertaking all necessary development activities (e.g. options assessment, environmental studies, consents) to enable timely construction. Includes five early stakeholder engagement events per annum
Maintaining and Investing in the Existing Network		Pages 49-66
Replacing or Refurbishing Existing Network Assets	810.2	533 £Rm monetised risk reduction (relative to no intervention)
Direct Operations	87.3	Annual average Energy Not Supplied <90 MWh
Indirect Operations**	29.5	1,090 MW on B4* Upper quartile in international benchmarking for (i) operations and maintenance, and (ii) asset management
Security of Supply		Pages 67-78
Refurbished or Upgraded Protection and Control	65.0	64 protection schemes 33 real time control units
Improved Physical Site Security	33.9	23 deterrence schemes (e.g. fencing) 55 defence schemes (e.g. CCTV, alarms)
New and Upgraded Warehousing and Spares	53.6	2 specialist warehouse facilities
New and Upgraded Network Control Centre	16.3	1 new network control centre and back-up facility
New Smart Monitoring of Critical Assets	45.4	62 critical assets
Other	58.4	116 substations capable of 120 hour stand alone operation Compliance with Persistent Organic Pollutants regulations
Data, IT and Analytics	57.8	Business IT and Operational Technology, and enhanced cyber security
A Sustainable Network for Current and Future Energy Consumers		Pages 85-103
Customer and Stakeholder Engagement, including Connections	17.3	100% of connection offers made on time >9.0 out of 10 in stakeholder engagement annual survey Annual reporting under Enhanced Reporting Framework
Sustainability Policy and Reporting	9.7	33% reduction in scope 1 and 2 GHG emissions Annual average SF6 gas leakage <0.39% Five projects to improve visual amenity submitted
Other Expenditure		Pages 106-107
Indirect Operations	93.6	Activities that support network operations such as System Planning and Regulatory Reporting
Business Support	87.1	Back office activities such as Finance; Risk, Audit and Assurance; Legal; Regulation; HR; Corporate Affairs; and Property Management
	2,356.1	

[†]Includes expenditure (but no outputs) for Transmission Connection Assets and Sole Use Infrastructure subject to RIIO-T1 arrangements

[†]Excludes generation connections that started construction prior to 1 April 2021

*Boundary capabilities are based on a given generation and demand background. For the purposes of reporting cumulative deliverables, the boundary capability uplifts from the individual projects have been arithmetically added. However, the aggregate boundary uplift over time will not necessarily equal the arithmetic sum due to the sensitivity of the boundary capability to generation and demand backgrounds

**Asset management, network control centre and operational training

Table 3 Total expenditure forecast for the Certain View

2. A Safe and Reliable Network

Aiming for 100% reliability for homes and businesses

Everyone needs energy to conduct their daily life and everyone expects reliable access to energy when and where it is needed.

The importance of a reliable supply of electricity was reinforced at our stakeholder workshop in March 2019[†], when we asked attendees to decide what was the most important factor in the running of the north of Scotland transmission system. Security of supply was ranked the highest, with a score of 9.46 out of 10.

The reliability of the north of Scotland transmission system is very good (**Figure 5**). Homes and businesses rarely experience a power cut due to an event on the transmission system. We consider that continuing to strive for no power cuts on our network is central to what we do.

Asset management is how we look after and get the best from the equipment that makes up the transmission system. Our approach to asset management seeks to achieve the best possible network performance (measured by the reliability of electricity supply) for an efficient whole asset lifecycle cost. Our long term goal beyond 2026 is to be world class in asset management.

Asset management brings together data about:

- The condition and performance of network equipment
- Network users' requirements (including connected generators)
- The social, economic and environmental impact of loss of supply

Rigorous analysis determines when is the right time to replace or refurbish an asset, and what is the most cost effective intervention to undertake.

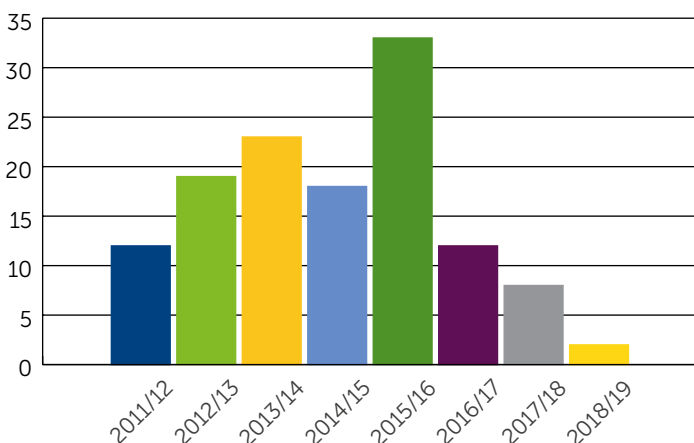


Figure 5 Loss of supply events

Source Loss of supply events of >3 minutes duration resulting in a power cut to end consumers. Data available at: www.nationalgrideso.com/insights/transmission-performance-reports

We are currently making the transition to a risk-based approach to asset management and network operations. This transition will continue during the RIIO-T2 and early RIIO-T3 periods. We have applied both risk-based and traditional methods in the development of this Business Plan.

This Business Plan will deliver:

- **Certain View capital investment of £810.2 million[†]** in replacing or refurbishing existing network infrastructure across 28 schemes
- **Direct operating costs of £87.3 million** to undertake inspections, maintenance and repairs, vegetation management and management of inventory
- **Improved network reliability** towards our goal, where cost effective to do so, of 100% reliability for homes and businesses by 2026
- **Enhanced capabilities in asset management and operations** to achieve upper quartile international service and cost outcomes



Our approach to safety is simple: if it's not safe, we don't do it. Our employees and the contractors we work with are able to stop work if they believe the situation is unsafe. Everything in this Business Plan adheres to our best in class safety practices.

3. Security of Supply

Protecting critical national infrastructure from natural and man-made threats

Society and the economy depend on critical infrastructure, yet this infrastructure can be susceptible to external threats. Many commentators argue these threats are increasing, for example due to climate change, international security risks and an increasing reliance on, and integration of, digital technologies.

Being responsible for critical national infrastructure, our Business Plan has carefully considered the risks facing our network, and the proportionate actions we must take to deliver the most cost effective risk management response. In this context, we have incorporated the increased requirements of our growing network: the actions to protect £5 billion of asset value (by 2026) are of greater scale than to protect £1 billion of asset value (in 2013).

[†]A full report of the stakeholder event is available at: www.ssen-transmission.co.uk/media/2730/ssen-transmission-stakeholder-workshop-report.pdf

[†]Includes £13.0 million in pre-construction for asset investments that will commence after 31 March 2026

We use the UK Cabinet Office¹ definition of Resilience:

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

Building resilience reduces vulnerability to natural and man-made threats. Following the Cabinet Office model, this Business Plan sets out actions in four areas:

1. **Reliability:** the design and operation of the network. To enable our transition to risk-based operations, we will establish new network control facilities, including the capability to collect and analyse real time information from remote monitoring equipment on critical assets.
2. **Redundancy:** the availability of back-ups or spare capacity. We intend to establish two specialist warehouse facilities to securely and safely store spares for critical assets.
3. **Resistance:** preemptive protection from hazards. A range of measures are required to improve physical security at substations and of overhead lines, to upgrade protection and control and communications systems, and protect against natural and environmental events such as flooding and landslides.
4. **Response and Recovery:** able to respond effectively to disruptive events. Our business continuity planning, co-ordinated with Government and national services, requires us to extend the duration for which our substations can operate without mains electricity.

Together, these actions will keep our resilience capability in line with the expectations for critical national infrastructure. We will continue to participate in national forums, such as the Centre for the Protection of National Infrastructure, to maintain best practice, share learning and undertake regular simulation exercises.

This Business Plan will deliver:

- **Certain View capital investment of £272.6 million** to refurbish, replace or upgrade network equipment and systems for security of supply (**Table 3**)
- **Data and IT investment of £57.8 million** in existing business IT and operational technology, and cyber resilience
- **Compliance with new regulations** including for environmental hazards, cyber security and network communications
- **Enhanced capabilities in business continuity** consistent with the larger north of Scotland transmission network and emerging threats

4. A Sustainable Network

For current and future energy consumers, that is stakeholder-led and can be trusted

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.

As part of the SSE Group – 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 essential to a sustainable company.

Involving stakeholders

With this Business Plan, we have published our new [Stakeholder Engagement Strategy](#) and [Action Plan](#). This is the result of more than 18 months’ work, with the input of over 130 stakeholders, to fundamentally redesign our approach to stakeholder engagement and the role of stakeholders in our activities and decision-making. To implement the strategy, we have restructured our organisation.

We have defined seven objectives for our engagement in three areas:

1. Improving our customers’ **experience**
2. Taking **action** on our ways of working
3. Working with, and advocating for, our stakeholders in the **future** energy landscape

We will measure our performance through an annual engagement survey of consumers and stakeholders. Our target is a satisfaction score of greater than 9 out of 10.

Delivering connections on time, on budget and to our customers’ satisfaction

While the vast majority of our connections customers are generation, they are diverse: from small community renewable developments to large offshore wind farms.

From late 2018, we undertook an active listening exercise with over 100 connections stakeholders to hear customers’ future needs and co-create our new [Commercial and Connections Policy](#). This sets out our ambition for the RIIO-T2 period:

Provide tailored solutions and services for all our connection customers throughout the customer experience that are also optimal for the wider GB energy consumer

To achieve this ambition we have set out nine initiatives for providing optimal connections solutions, tailored services and products, and making the connections process accessible. We will measure our performance through a new Quality of Connections survey.

Leadership in 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.

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. These ambitions are broad and bold.

Stakeholders have been clear and consistent in telling us that they have high expectations and ambitions for our sustainability outcomes. In response to this, we have set stretching targets for GHG emissions reductions, biodiversity and woodland net gain outcomes, SF6 gas leakage and waste and resource use.

Enhanced reporting framework

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. To this end, we have worked with [Citizens Advice](#) to develop a new reporting framework that will shine a light on all aspects of our performance through clear, meaningful reporting.

This Business Plan will deliver:

- **Stakeholders' satisfaction** with our engagement of more than 9 out of 10
- **Every connection offer made on time** and a new Quality of Connections service survey
- **Sector-leading sustainability outcomes** including in tackling climate change, promoting the natural environment, use of resources and supporting local communities
- **Open and transparent reporting** of service performance, financial performance and performance for society

Leading our sector in performance and ambition

As part of our [Sustainability Action Plan](#), we engaged independent consultants to undertake benchmarking of our current performance and ambitions against comparable UK and EU utilities.

Of the 21 categories that were benchmarked, we were:

- The leading performer in eight categories
- "In the pack" in ten categories
- Laggard performer in three categories¹

Of the organisations in the study, we demonstrate the strongest overall performance and ambition.

This outcome reflects our commitment to Leadership in Sustainability through:

- Our strategic objective since 2010 to enable the transition to the low carbon economy
- Being the first GB energy network to commit to set a Science Based Target for GHG emissions reduction
- Being the first GB energy network to commit to biodiversity net gain outcomes
- Being the only GB energy network to commit to woodland net gain outcomes
- Being the only GB energy network to commit to noise reduction measures
- Being the most progressive GB energy network in our commitment to waste reduction measures
- Showing leadership in our use of local supply chains
- Showing leadership in developing social, economic and environmental cost benefit analysis
- Showing leadership in the deployment of whole system solutions for the Scottish islands

This isn't just our opinion, over the past year we have won awards for Sustainable Reporting, Corporate Governance Reporting, Biodiversity Projects, Environmental Best Practice, Living Wage Champion and Health and Safety Champion.



¹This Business Plan has comprehensive actions to improve our performance in the three laggard categories: Connections Service, Resilience and Inclusion and Diversity

Core Business Policies

This Business Plan is based on the application of our internal policies, procedures and standards. In most instances, these are specific to the activity. However, in addition to our strategic objective and themes (pages 22-23), there are a number of core business policies that have informed every aspect of this Business Plan.

The five core business policies that have been applied in the development of this Business Plan are:

Enabling Whole Energy System Solutions



Sets out our objective and approach to planning and developing the north of Scotland transmission system as part of the wider energy system. We explain how we have applied whole system approaches to the development of our Business Plan, and how we plan to work with others to significantly develop these approaches during the RIIO-T2 period and beyond.

There is a summary of [Enabling Whole Energy System Solutions](#) on pages 136-139

Innovation Strategy



Sets out our plans and ambitions for getting the most from innovation before, during and after the RIIO-T2 price control period. It describes our innovation objective, definition and how this can be delivered through a targeted innovation framework. This includes the outcomes on which we will focus innovation and how we assess innovation opportunities.

There is a summary of our [Innovation Strategy](#) on pages 132-135

Stakeholder Engagement Strategy



Sets out why we engage, what we want to achieve and the three objectives that will help us achieve success. Seven specific action areas are described, along with the principles we will apply in our engagement activities. A separate Stakeholder Action Plan sets out the detailed actions we intend to undertake in each of the seven action areas.

There is a summary of our [Stakeholder Engagement Strategy](#) on pages 90-93, and [Stakeholder Action Plan](#) on pages 140-143

Sustainability Strategy



Sets out our strategic purpose, our six sustainability ambitions and associated targets. It describes how these ambitions and targets have been developed, based on our own internal analysis, current climate change and renewable energy policy, consideration of global sustainable development goals, and stakeholder feedback.

There is a summary of our [Sustainability Strategy](#) on pages 98-102, and [Sustainability Action Plan](#) on pages 144-148

The associated Sustainability Action Plan includes our Environmental Action Plan, and relates to our Losses Strategy, Our Strategy for the Management of Insulation and Interruption Gases, Our Approach to Implementing Biodiversity Net Gain and Visual Impact of Scottish Transmission Assets (VISTA) – Our Approach for RIIO-T2

Competition Strategy



Sets out our position on the potential to expand the role of competition during the RIIO-T2 period, and the interaction with whole energy system and innovation. This document includes our Native Competition Plan and assessment of RIIO-T2 capital investment projects against Ofgem's competition eligibility criteria.

There is a summary of our [Competition Strategy](#) on pages 149-150

Cost to Customers

The GB electricity bill

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, 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.

Impact of this Business Plan on household energy bills

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. We have made assumptions to allow us to illustrate the potential cost of this Business Plan. These are assumptions and the actual cost will vary by household and location; there is not a standard charge for electricity transmission in your electricity bill.

Our assessment considers:

- The Certain View and Likely Outturn
- The impact of inflation (2% per annum)
- Ofgem's assumptions for financing our Plan, including two assumptions for the Cost of Equity (4.3% and 4.8%)

Currently, the average GB household pays around £4.72 for the north of Scotland transmission system. We model an increase in the cost to between £5.43 and £5.96 in 2021/22 (the first year of the RIIO-T2 period). This is in part due to continued growth of the network and, in part, due to planned regulatory finance changes.

By the final year of the RIIO-T2 period, 2025/26, we forecast that the average GB household will pay between £6.73 and £8.02. (Figures 6 and 7)

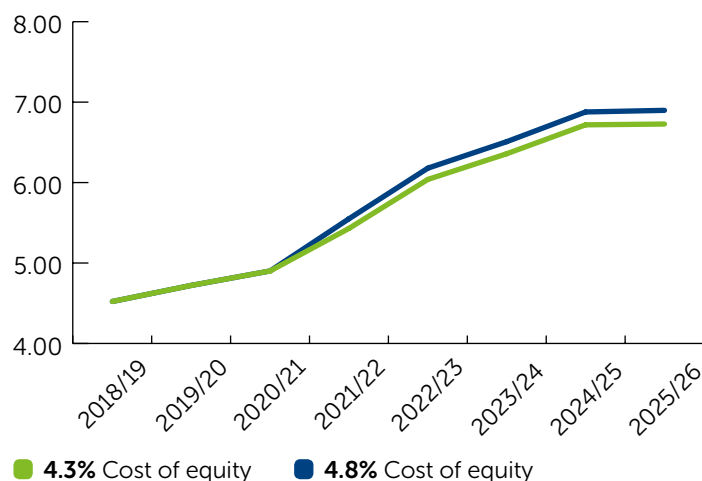


Figure 6a Estimated cost (£ per year) of the north of Scotland transmission network to the average GB household for Ofgem's assumptions: Certain View

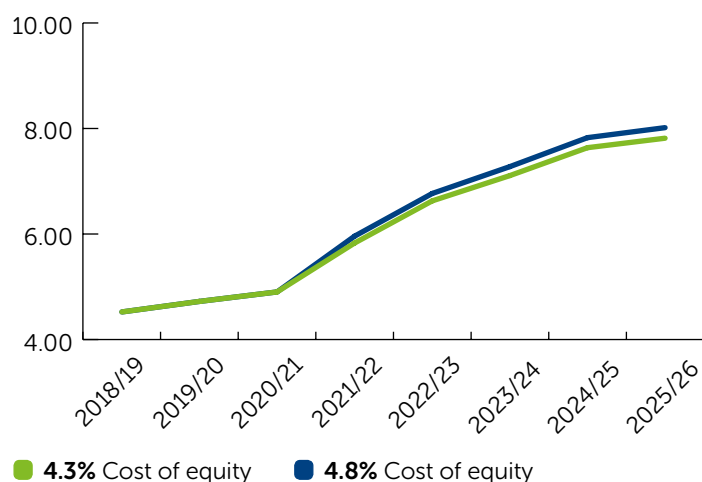


Figure 6b Estimated cost (£ per year) of the north of Scotland transmission network to the average GB household for Ofgem's assumptions: Likely Outturn Assessment

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

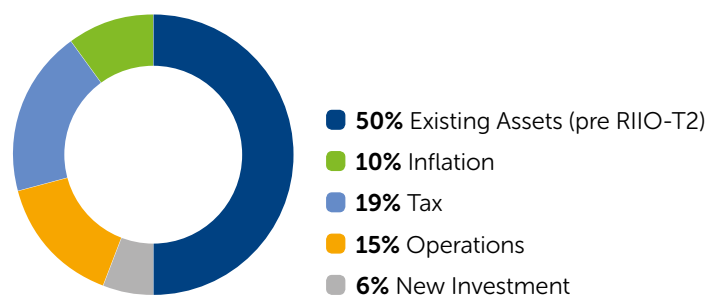


Figure 7 Make-up of the average household bill in 2025/26

Note The cost of borrowing and dividends to shareholders are included within the asset categories

Regulatory Settlement

Our RIIO-T2 Business Plan has been co-created to meet the expectations and needs of energy consumers, customers and stakeholders in the north of Scotland and across GB. The focus of this Plan reflects the ambition of our stakeholders: to tackle the climate emergency, to ensure a reliable and available transmission network, to improve resilience and security of supply, to act sustainably and earn the trust of our stakeholders, and to do this cost effectively.

This Business Plan is also a submission to our regulator, the Gas and Electricity Markets Authority (or Ofgem). We are seeking approval from Ofgem for this Plan, and to be allowed to recover the costs of delivering these stakeholder-led ambitions through household and business electricity bills.

The regulatory framework which Ofgem applies to all energy network companies across GB does not exactly match with the way we have presented this Business Plan. There are some differences in terminology and the way that costs and outputs are described.

Table 4 sets out this Business Plan in the framework described in Ofgem's May 2019 RIIO-2 Sector Specific Methodology Decision (SSMD). This decision is available at [here](#).

			Reference in this Plan
Expenditure Categories		£m Primary Outputst	
Load Related Expenditure	891.0	1,327 MVA 1,090 MW on B4	Pages 29-48
Non-load Related Expenditure	810.2	533 £Rm	Pages 49-63
Security of Supply	272.6	None	Pages 67-76
Non-operational Capital Expenditure	57.8	None	Pages 77-78
Operating Costs:			
Direct Operations	87.3	Energy Not Supplied	Pages 64-66
Closely Associated Indirect Operations	147.7	Timely Connections	Pages 85-103
Business Support	89.5	Environmental Action Plan	Pages 106-108
	2,356.1		
Proposed Business Plan Incentive Sharing Factor		To be confirmed by Ofgem We have made a working assumption of 25% (pre-tax)	Supporting Document 12A. Regulatory Framework – Outputs, Incentives, Consumer Value Proposition and Innovation
Uncertainty Mechanisms			
Included in the SSMD	<ul style="list-style-type: none"> • Third Party Driven Need (in part) • VISTA • Whole System Co-ordinated Adjustment • Licence Fees • Business Rates 		Pages 79-84 Supporting Document 12. Regulatory Framework – Uncertainty Mechanisms
Additional Mechanisms	<ul style="list-style-type: none"> • Volume Driver • Strategic Wider Works • High Value Transmission Projects • Pre-construction • Operating Cost Escalator • Sustainability Escalator • Landowner Compensation • Subsea Cable Faults • Operability and System Management, including Black Start • Brexit Import Tariffs • HVDC Centre 		

Table 4 Overview of our proposals for the RIIO-T2 regulatory settlement (continued)

			Reference in this Plan
Licence Obligations		Description	
Environmental Action Plan	To produce an Environmental Action Plan and report annually on performance		Pages 98-102 and 144-148*
Losses Strategy	To integrate the Losses Strategy and reporting into the Environmental Action Plan		Pages 98-102 and 144-148*
Network Access Policy	To have a consolidated NAP in place and act in accordance with it		Page 66*
Timely Connections	To make all connection offers on time		Pages 94-96*
Output Delivery Incentives		Target†	Type
Energy Not Supplied	<90 MWh pa	Financial: reward / penalty	Page 66
International Benchmarking: ITOMs‡	Upper quartile	Reputational	Page 65
International Benchmarking: ITAMs‡	Upper quartile	Reputational	Page 54
Timely Connections	100% offers on time	Financial: penalty only	Pages 94-96
Quality of Connections Survey	tbc	Financial: reward / penalty	Pages 94-96
New Infrastructure Survey	tbc	Reputational	Page 96
SF6 Leakage	<0.39% pa	Financial: reward / penalty	Page 100
Whole System and Innovation		Description	
Network Innovation Allowance*	£8 million funding, split 90:10		Page 132-135
Whole System*	Three part bespoke mechanism to support whole system framework development and solutions		Page 136-139
Consumer Value Proposition		Estimated Value (£m)	
Reducing the risk of consumers overpaying: <ul style="list-style-type: none">Our Certain View and output commitmentVolume driver unit cost allowance	75.0	Supporting Document 12A. Regulatory Framework – Outputs, Incentives, Consumer Value Proposition and Innovation	
	8.5		
Connecting for Society: <ul style="list-style-type: none">Bespoke commercial and connections services*Network Access Policy*Local Energy Area Partnerships	59.5		
	5.0		
	6.6		
Promoting the natural environment: <ul style="list-style-type: none">Biodiversity net gain*VISTA*Local supply chains	158.6		
	30.7		
	6.4		
	350.3		

[†]Proposed; subject to regulatory determination

[‡]Not in SSMD

*Also have supporting documents, as referred to in the Plan

Table 4 Overview of our proposals for the RIIO-T2 regulatory settlement (continued)



Our Strategy

Contents: Section 1

The Climate Emergency	19
A Network for Net Zero: Our Strategic Objective, Themes and Goals	22
A Stakeholder-Led Business Plan	24
Our RIIO-T2 User Group	28

The Climate Emergency

"The Committee on Climate Change recommends a new emissions target for the UK: net-zero greenhouse gases by 2050.



"In Scotland, we recommend a net-zero date of 2045, reflecting Scotland's greater relative capacity to remove emissions than the UK as a whole.

"We must now increase our ambition to tackle climate change. The science demands it; the evidence is before you; we must start at once; there is no time to lose."

Lord Deben
Chairman, The Committee on Climate Change

2 May 2019

The challenge

Climate change is already affecting people, ecosystems and livelihoods around the world. The international scientific community presents consistent and compelling evidence of anthropogenic climate change and the consequential far-reaching changes for the global environment¹.

In December 2015, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) reached a landmark agreement to combat climate change. The Paris Agreement's central aim is to keep global temperature rise this century to well below 2° Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5° Celsius. The UK ratified the Paris Agreement in late 2016.

Each year the United Nations Environment Programme (UNEP) publishes a report on global greenhouse gas (GHG) emissions and progress towards the ambition of the Paris Agreement. The most recent report² demonstrates continued global rise in GHG emissions, and a growing gap from the emissions pathways for the 1.5° Celsius goal (Figure 1.1).

In the UK, the national Government and Devolved Administrations established the independent Committee on Climate Change (CCC) to monitor progress on reducing emissions and provide advice on meeting carbon budgets.

In its July 2019 report to Parliament³, the CCC described the continued fall in UK GHG emissions – by 40% since 1990 (Figure 1.2). Much of this reduction has been achieved in the power sector and by industry. In Scotland, reductions in the power sector have been even greater – falling by 91% since 2012.

The CCC monitors 24 indicators of progress in reducing emissions and reports that only seven of these are on track. In light of the legislation for net zero emissions targets, the CCC argues for greater urgency in the development, implementation and delivery of necessary policy changes.

GB Stakeholders' views on climate change

The UK Government's quarterly public attitudes survey* on energy and climate change records a steady upwards increase in public concern about climate change. In the most recent survey, 80% of respondents were very or fairly concerned with 69% believing it was already having an impact in the UK. The survey documents consistent support for renewable energy at around 80% of the sample. Less than 5% report being opposed.

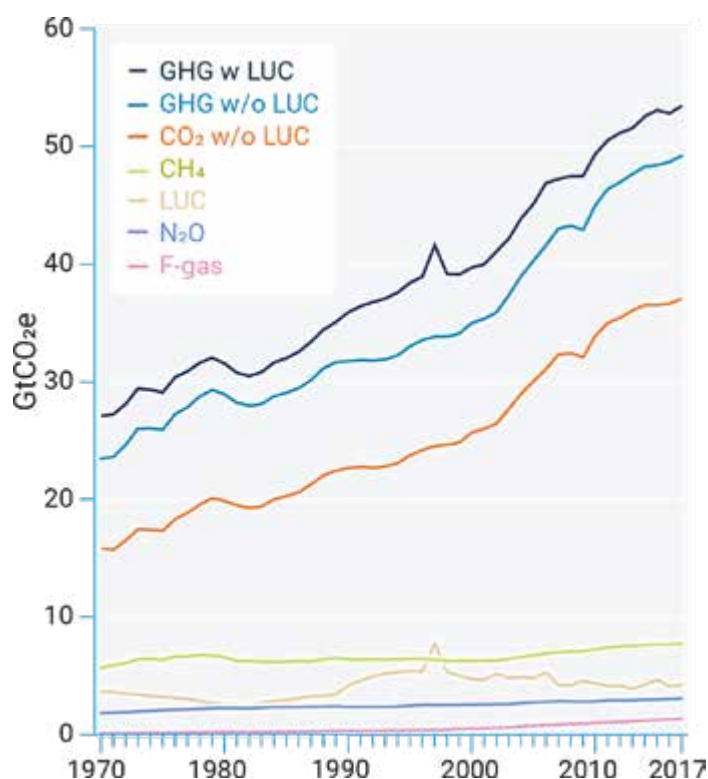


Figure 1.1 Global greenhouse gas emissions

Source: Figure 2.3, Emissions Gap Report 2018⁴
LUC = land use change. GtCO2e = gigatonnes of equivalent carbon dioxide

¹See, for example, United in Science, Science Advisory Group of the UN Climate Action Summit September 2019. Available at: https://public.wmo.int/en/resources/united_in_science

²Emissions Gap Report, UNEP, November 2018. Available at: www.unenvironment.org/resources/emissions-gap-report-2018

³Reducing UK emissions, 2019 progress report to Parliament, the CCC, July 2019. Available at: www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament/

⁴Public Attitudes Tracker: Wave 29, BEIS, March 2019. Available at: www.gov.uk/government/collections/public-attitudes-tracking-survey

National policy ambitions



In June 2019, the UK Government accepted the CCC recommendation and amended the Climate Change Act 2008 by introducing a target for at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) in the UK by 2050.

“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, former UK Prime Minister,
12 June 2019

www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy



Scottish Government
Riaghaltas na h-Alba
gov.scot

The Scottish Government has passed legislation to introduce the net zero target for 2045, with additional targets to reduce emissions by 75% by 2030 and 90% by 2040.

“There is a global climate emergency and people across Scotland have been calling, rightly, for more ambition to tackle it and safeguard our planet for future generations. Every single one of us now needs to take more action – not just the Scottish Government but also all businesses, schools, communities, individuals and organisations.”

Roseanna Cunningham, Climate Change Secretary,
2 May 2019

www.gov.scot/policies/climate-change/

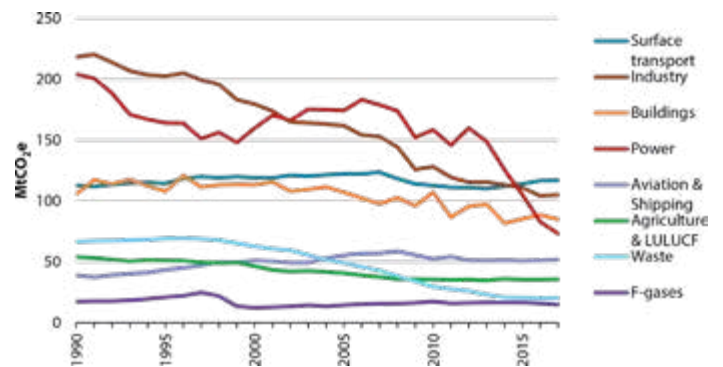


Figure 1.2 UK greenhouse gas emissions

Source Figure 5.2, Net Zero – the UK’s contribution to stopping global warming, the CCC, May 2019¹

LULUCF = land use, land use change and forestry. MtCO₂e = megatonnes of equivalent carbon dioxide

Implications for north of Scotland transmission

The largest role we play in combating climate change is through our part in the GB power sector.

Considerable progress has been made in the decarbonisation of the electricity generation sector over the past decade. While this change has been rapid and profound, more remains to be done. Electrification has an important role to play in removing the GHG emissions from gas (80% of domestic use is for heating) and petroleum (87% is used for transport)².

Looking to the near term in the 2020s, the CCC scenarios identify an around 60 TWh policy gap of low carbon generation by 2030. This gap is after known built and contracted-to-connect generation, and the full offshore wind ambition of 30 GW. To close this gap, the CCC argues for long-term contracts for mature renewables.

Renewable and low carbon generation sites are located distant from large population centres. This means the transport of power through flexible, smart grid networks is an essential aspect of policy implementation. This is recognised by the CCC, who argue that: “A relatively large expansion in [grid] capacity is likely to have low regrets” and consideration should be given to future-proofing to achieve net zero emissions targets³. This position is shared by the National Infrastructure Commission⁴.

The north of Scotland and its islands have a significant renewable energy resource from onshore and offshore wind, hydro and (potentially) marine and tidal. In 2018 the total installed generation capacity in GB was 101 GW, of which renewable generation was 44.3 GW⁵. Twenty four per cent of this renewable generation is located in Scotland and 15% in the north of Scotland (Figure 1.3).

¹Data available at: www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

²Energy consumption in the UK 2019, BEIS, July 2019. Available at: www.gov.uk/government/statistics/energy-consumption-in-the-uk

³Ofgem has published guidance on how energy networks should incorporate the CCC’s advice in their business planning, available at: www.ofgem.gov.uk/system/files/docs/2019/08/letter_to_networks_on_achieving_net_zero.pdf

⁴Strategic Investment and Public Confidence, National Infrastructure Commission, October 2019. Available at: www.nic.org.uk/

⁵Digest of UK Energy Statistics 2019, BEIS. Available at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

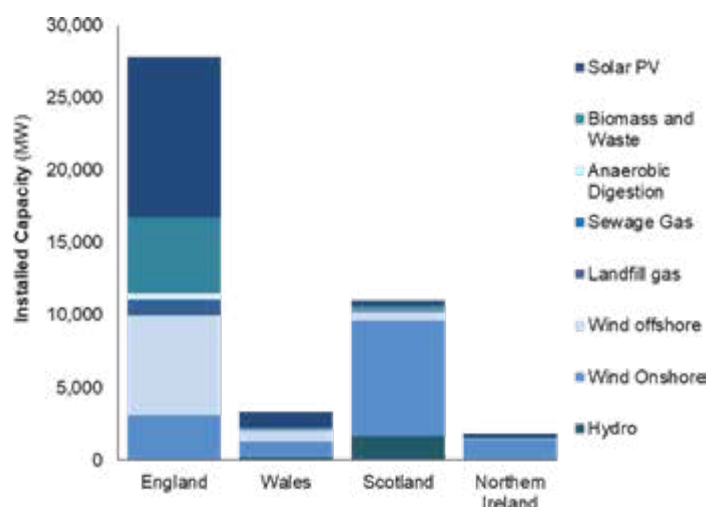


Figure 1.3 Renewable capacity at end 2018

Source Chart 1, Energy Trends, September 2019¹

Against this policy background, we have an important role to play in:

- Enabling the timely connection of renewable and low carbon technologies to the north of Scotland transmission network; and
- Ensuring the timely, cost effective strengthening of the network, working in collaboration with others to develop a smart, flexible whole energy system.

We have a second important role in combating climate change through our own business activities. While our own GHG emissions are relatively small as part of the GB total, we recognise that there are cost effective steps we can take to make reductions. Our main emissions are from F-gases², our buildings and transport, and the indirect consequences of electrical losses from our network.

Best practice in corporate sustainability is predicated on the monitoring and disclosure of environmental impact, including GHG emissions³. On this basis we can set a science-based target for reducing our GHG emissions in line with the ambitions of the Paris Agreement.

The Science Based Target Initiative (SBTi) is a collaboration between CDP, the United Nations Global Compact (UNGC), World Resources Institute (WRI) and the World Wide Fund for Nature (WWF). The SBTi defines and promotes best practice in science-based target setting and independently assesses and approves companies' targets.



Responding to the challenge

The GB energy industry is undergoing significant transformation. We identify four pervasive societal shifts that are impacting on the way electricity networks are designed, built and operated. Together, these trends – “the four Ds” – will be critical in our response to the climate emergency.



Decarbonisation

The growth in capacity and output of low carbon generation



Decentralisation

Energy being produced and stored close to use



Digitisation

Information communications technologies and analytical tools that can improve performance without increasing cost



Democratisation

Collaborating with consumers and stakeholders to design our energy future

The scale and speed of change within the energy sector underway and forecast is vast. It encompasses broader societal shifts – new technology, the consumer voice and environmental concerns – as well as shifts specific to the sector. However most commentators acknowledge that the primary driver is the climate emergency and decarbonisation (Figure 1.4).

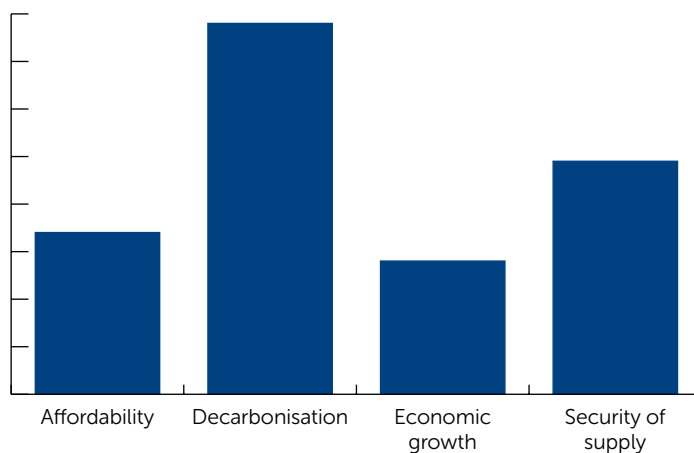


Figure 1.4 Survey of UK energy policy priorities to 2040: Issues identified as 'high priority' by industry experts

Source From Figure 8, Disruption and Continuity in the UK Energy Transition: What do the experts think?*

¹Energy Trends, BEIS, September 2019. Available at: www.gov.uk/government/statistics/energy-trends-september-2019

²Sulphur hexafluoride (SF₆), used as an electrical insulator, is a greenhouse gas with a global warming potential of 23,900 times greater than that of CO₂ over a 100 year period. Being a synthetic gas it is not absorbed or destroyed naturally

³See, for example, CDP Global www.cdp.net/en

*Disruption and Continuity in the UK Energy Transition: What do the experts think?, UKERC, June 2019. Available at: www.ukerc.ac.uk/publications/disrupting-uk-energy-system.html

Our Strategic Objective, Themes and Goals

READ the full report on our stakeholder engagement to review our strategic objective for the RIIO-T2 period

SUPPORTING DOCUMENT 1. [Engaging on our Strategic Objective](#)



Our strategic objective

In 2010 we worked with stakeholders to define our strategic objective: **to enable the transition to the low carbon economy**

This objective has been the primary driver of our activities over the past decade, evidenced by the doubling of connected renewable generation and the significant growth of the north of Scotland transmission network to transport renewable energy. We believe we have been successful in achieving this objective by working closely with customers and communities and, where cost effective, using new technologies, deploying new ways of working and instigating industry change.

In 2017 we decided to undertake a comprehensive, stakeholder-led review of our strategic objective. The review was motivated by the rising awareness of the climate emergency and the ongoing changes in the energy sector. Our review questioned whether our current objective was consistent with the requirements for the transition to cleaner economic growth for now and looking forward to 2025 and beyond. More broadly, we wanted to understand if customers' expectations from the energy networks were changing and, if so, what customers and stakeholders thought we should be focused on.



The primary finding of the review was **support for not changing our strategic objective**. Stakeholders thought it remained relevant and valid in the current and future policy landscape, and were confident that it was being acted upon. Stakeholders were strongly supportive of our role in decarbonising the GB economy.

However, stakeholders asked us to provide more context to our strategic objective; what did it mean in practice? In particular, our stakeholders asked how our strategy was delivering on the issues that mattered most to them. Our research and engagement showed that these issues were:

- Stakeholder engagement is critical
- Costs are important to everyone
- Performance on environment and sustainability is expected and increasingly important

Looking to the next decade, our stakeholders thought that environmental issues would be of increasing relative importance.

Strategic themes and goals

In order to provide context to our strategic objective, we have undertaken further consultation to develop our strategic themes and goals (**Figure 1.5**).

- Our four strategic themes describe what we will do to achieve our strategic objective. Through the themes we bring whole system approaches, data and technology, cost and value, and long term sustainable benefit to the heart of our day-to-day business operations.
- Our five clear goals set out the performance targets that we will use to measure our progress. Each goal is specific, measurable and timebound (within the RIIO-T2 period). In the consultation on our July draft Business Plan, 89% of roadshow attendees supported the five clear goals (page 26).

Our RIIO-T2 Business Plan is built around the stakeholder-led direction captured our strategic objective, themes and goals. There is detail on the specific steps we intend to take, the associated cost and performance targets throughout this Plan.



The impact of the clean energy transition on the fuel poor

At our stakeholder event in March 2018[†] there was complete agreement that security of supply was critically important for consumers, but cost was a key area of disagreement between attendees. Some participants, especially local authorities and voluntary groups, thought it was important to ensure that fuel poverty did not increase, whereas others argued that there was an inevitability of costs increasing during the clean energy transition. These stakeholders argued that costs would go up no matter what, but that it would be better to invest now to prepare for the future.

We subsequently shared this conflict with our RIIO-T2 User Group to seek their advice on how we should rationalise delivery of targets set by Government with consumer expectations on cost. The User Group's advice was that Government policy that is already in place, for example decarbonisation of energy, must be taken as a national requirement and, as such, has primacy over the views of individual stakeholders. Our role was to ensure cost effective delivery.

We agree and have adopted this approach in this Business Plan.

Strategic objective

What we are trying to achieve



To enable the transition to the low carbon economy

Strategic themes

How we will do things to achieve our strategic objective



Stakeholder-Led Strategy

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



Safe and Secure Network Operation

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



Sector Leading Efficiency

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



Leadership in Sustainability

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

Our goals

How we will measure success towards our strategic objective



Transport the renewable electricity that powers 10 million homes

Our RIIO-T2 Certain View will deliver an electricity network with the capacity and flexibility to accommodate 10 GW renewable generation in the north of Scotland by 2026



Aim for 100% transmission network reliability for homes and businesses

By investing in new technology and ways of working, when cost effective for customers to do so, we will strive for 100% transmission network reliability for homes and businesses by 2026



Every connection delivered on time

By 2026 we will provide every network connection, tailored to meet our customers' needs, on time, on budget and to our customers' satisfaction



One third reduction in our greenhouse gas emissions

Reduce the controllable greenhouse gas emissions from our own operations by 33% by 2026, consistent with a net zero emissions pathway



£100 million in efficiency savings from innovation

Our RIIO-T2 Certain View includes £100 million of cost savings through productivity and increased innovation, and we aim to go further to save more

Figure 1.5 Our strategic objective, themes and goals

A Stakeholder-Led Business Plan

READ the full report on our engagement for this RIIO-T2 Business Plan on how stakeholders have co-created our Plan

SUPPORTING DOCUMENT 2. [Report on RIIO-T2 Business Plan stakeholder engagement](#)

VISIT the [dedicated webpage](#) for our RIIO-T2 Business Plan engagement, events, consultation and reports



Our RIIO-T2 Business Plan is based on over two years of extensive and intensive stakeholder engagement, consultation and research which has taken us the length and breadth of the north of Scotland and far beyond. From project-specific public consultation events to wide-ranging bilateral engagements, workshops and events, we have deployed a range of communications and engagement methods to ensure all our stakeholders have had the opportunity to shape this RIIO-T2 Business Plan. Whilst our network operating area is clearly defined, we recognise that the impact of our activities, and by association our stakeholders, extends far beyond the north of Scotland. Not least in the critical role the north of Scotland transmission network plays in meeting GB energy needs and national renewable and climate change targets. The costs of the transmission system are ultimately spread across and recovered from GB electricity consumers.

Given our national role, we have been careful to engage across GB – all energy consumers, representative bodies, elected members and governments – to ensure our that we involved consumers and stakeholder groups beyond the north of Scotland. In particular, we have proactively targeted our public consultations to stakeholders across GB, from direct mailings to the extensive use of social media, to maximise the reach of our engagement.

We have followed a structured process in our stakeholder engagement and research for the development of this RIIO-T2 Business Plan (**Figure 1.6**):

We **started in 2017** by exploring strategic issues that would underpin the Plan: what do our stakeholders consider to be the most important things we do? What views do customers and stakeholders have about the future of energy?

From **late 2017 into 2018**, we started to engage on the topic-specific outcomes that our stakeholders expected; for example for the environment and a sustainable business.

By **mid-2018**, our research and engagement was focused on the processes that were key to delivering the policy outcomes: how we best develop and deliver capital investments? How could we improve the connections customer experience?

This phase of development concluded with the publication of our Emerging Thinking consultation in **February 2019**. This was in response to stakeholders' requests to see the entire picture in one place.

Building on feedback to the Emerging Thinking, in **spring 2019** we worked with customers and stakeholders on the detail of our Business Plan. This included taking into account the new legislative framework for net zero GHG emissions.

We published our full draft Business Plan for consultation on **27 June 2019**. This was accompanied by an intense programme of outreach and engagement to ensure that we had both accurately captured the views that we had heard to date, and that there was nothing we had missed.

The feedback from that consultation has resulted in a strengthened and improved final RIIO-T2 Business Plan.

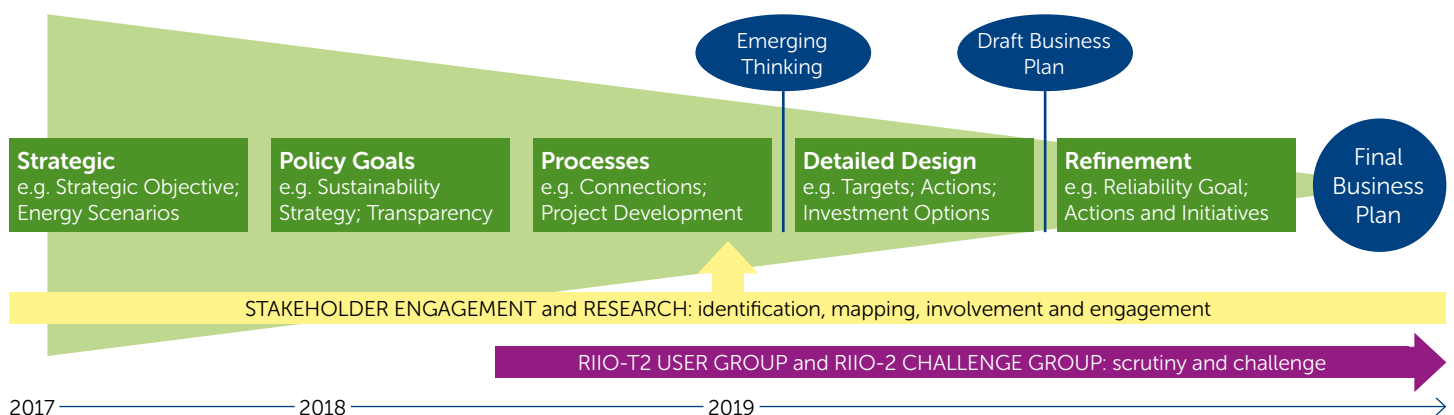


Figure 1.6 Approach to stakeholder engagement in the development of this RIIO-T2 Business Plan

In summer 2018 we appointed our RIIO-T2 User Group (page 28) and later that year Ofgem announced the RIIO-2 Challenge Group (below). Both have scrutinised and advised on behalf of the wider stakeholder community.

In addition, throughout, we have involved our organisation: from our shareholders and our Board to our frontline employees. Everyone has had an opportunity to contribute to the development of this ambitious Business Plan.

Inclusive, ambitious and transparent



2500+ engagements



14 events



18 consultations



50+ organisations involved



1700 consumers participated in willingness to pay



8 User Group members

The RIIO-2 Challenge Group

In March 2018 Ofgem decided to set up an independently chaired RIIO-2 Challenge Group[†] to assess network licensees' Business Plan proposals and report on their findings. In its RIIO-2 Sector Specific Methodology consultation[‡] Ofgem directed licensees to submit draft Business Plans to the Challenge Group on 1 July and 1 October 2019.

We have met with the Challenge Group four times and received feedback on our July and October draft Business Plans. The focus of this feedback has been largely to request further information on the detailed justification, efficiency and deliverability of our expenditure proposals, along with the design of regulatory mechanisms and the outcome of our financeability assessment.

The final report of the RIIO-2 Challenge Group will be published on Ofgem's website in early January 2020.

Willingness to Pay research

In early 2019 we undertook a joint Willingness to Pay study with other GB transmission licensees to help understand what is important to end consumers (both domestic and non-domestic). We aimed to quantify the value that GB energy consumers place on specific services; that is, how much they might be willing to pay for improvements in some of the services we provide.

Over 1,000 domestic consumers and 600 non-domestic consumers responded to the electricity component of the survey. The nine service attributes we asked consumers about were:

- Risk of power cuts
- Time taken to recover from blackouts
- Undergrounding of overhead lines
- Improving visual amenity of overhead lines
- Improving the environment around transmission sites
- Investing in innovation projects
- Supporting local communities
- Investing to make sure the network is ready for electric vehicle charging
- Investing to make sure the network is ready to connect renewable generation

Using econometric models, the research found that consumers are, on average, willing to pay for improvements in all the service attributes presented to them. The reported level of willingness to pay identified across each area typically exceeds the costs of the provision and, on the face of it, contributes to the justification for enhanced service provision. While the research undertaken was rigorous using best practice techniques, there are a number of known weaknesses with this approach. Accordingly, it recommended that the findings are used cautiously and not in isolation. We agree and, hence, have only used the outcome where appropriate to validate other analytical tools used in the development of this Business Plan.

The results support the wider stakeholder engagement that we have conducted – consumers want us to invest in reliability, being environmentally leading, supporting local communities and meeting the needs of the future – and are willing to pay for it. However, this Willingness to Pay research does not provide, in isolation, sufficient evidence for us to proceed with a particular investment or activity.

Read the final report here www.ssen-transmission.co.uk/media/3455/consumers-willingness-to-pay-final-0107.pdf

[†]www.ofgem.gov.uk/network-regulation-riio-model/network-price-controls-2021-riio-2/riio-2-events-seminars-and-working-groups/riio-2-policy-enhanced-stakeholder-engagement

[‡]www.ofgem.gov.uk/system/files/docs/2019/01/riio-2_sector_methodology_0.pdf



Response to our June consultation

Roadshows

Our senior management team led five roadshow events across Scotland in August 2019. These events presented our June draft Business Plan and gave stakeholders the opportunity to challenge our business experts.

At the events we used slido interactive technology to ask questions and gather feedback. The results from our four key questions are shown to the right.

Written responses

We received 1100 written responses to our June consultation from a range of key stakeholders.



"We are supportive of all 5 of the goals set out at the start of the plan. We think they are sufficiently ambitious and set a positive precedent."

Citizens Advice Scotland



"We welcome SSEN Transmission's leadership in sustainability, which has been demonstrated during the RIIO-T1 period and which we are keen to support during the RIIO-T2 period. Our view is that the proposals set out in the Draft Business Plan can help to deliver a Nature Rich Future for Scotland."

Scottish Natural Heritage



"Nothing obvious missing. Connections policy changes will address all things members have been saying."

Scottish Renewables

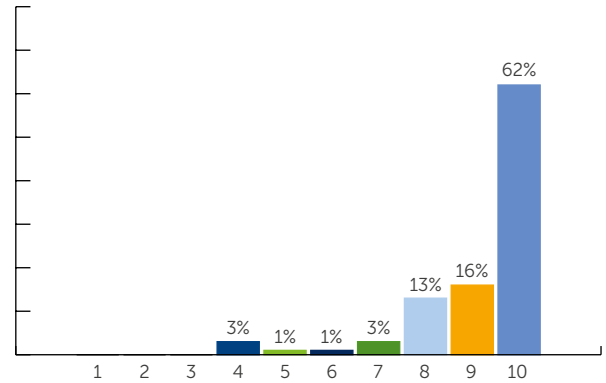


"Government have legislated for Net Zero, good to see our focus here. Pleased to see extent of stakeholder engagement and would encourage this to continue"

BEIS

The report on the consultation findings can be read [here](#).

On a scale from one to ten, how important do you think it is to achieve net zero emissions?



For investments that are currently uncertain, we propose that funding is only released as and when it is required, protecting bill payers from unnecessary spend. Do you agree with this approach?



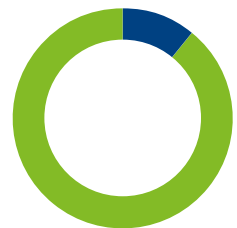
87% Yes
13% No

Our current share of a typical electricity bill is around £5 a year. We forecast this cost will rise to around £7 a year by 2026, which includes forecast increases in inflation. Do you think this is fair and affordable based on what you have heard today?



80% Yes
20% No

Do you believe that our five goals are the priority areas for our business and are suitably ambitious?



89% Yes
11% No

Figure 1.7 Response to our June consultation on the full draft RIIO-T2 Business Plan

How stakeholders have influenced this Business Plan

Our structured process for the development of this Business Plan means that stakeholders haven't just commented on proposals that we have presented, but our customers and stakeholders have, in many areas, been central to the shaping of the proposals, targets and actions.

Strategic objective While stakeholders supported our strategic purpose, they told us that it was not clear how this was influencing our day-to-day operations or how success would be measured. From this input, we worked with our stakeholders to develop the strategic themes and five clear goals.

GB impact Our RIIO-T2 User Group strongly advised on the importance of our GB role requiring GB-wide stakeholder input. From this, we sought to expand our reach; for example to Citizens Advice Bureau as well as Citizens Advice Scotland, and to Energy UK as well as Scottish Renewables.

Reliability goal In feedback to the consultation on our draft Business Plan, stakeholders questioned the cost of achieving 100% reliability for homes and businesses. With guidance from our User Group we have redrafted this goal to be clear that only cost effective actions will be taken.

Socio-environmental benefits In the context of sustainability, engagement, whole system and innovation, stakeholders (especially technical and consumer representatives) advised us to expand our methodologies to include social and environmental costs and benefits. We developed our cost benefit analysis methodology for this Plan to do this, and have set out actions to develop this further during the RIIO-T2 period.

Fuel poverty We sought advice from experts on whether we had a role to play, as the north of Scotland transmission system owner, in the battle against fuel poverty. Upon this advice, we have decided that we can take collaborative action where we are not duplicating or replacing actions better taken by others.

Uncertainty Many commentators, including Citizens Advice, expressed concern about uncertainty in the future of energy potentially leading to unnecessary expenditure or allowances that would drive up the cost for consumers. The approach to managing uncertainty that we have developed seeks to manage this risk openly and transparently.

Track record Our stakeholders, especially in the north of Scotland, told us that we have a track record to be proud of, not least in delivering capital investment on time and under regulatory allowances. Given this, we present this Plan as a continuation of our successes, and only setting out more material changes where stakeholders have told us that we could do better.



Uncertainty about net zero requirements

Our stakeholders have strongly and consistently supported our commitment to the achievement of GB net zero targets (**Figure 1.7**). Some have argued that we should go further; others have expressed concern about the potential for unnecessary cost to energy consumers. The approach we have adopted to ensure we efficiently achieve net zero targets during the RIIO-T2 period is:

- To assess the expenditure required under a 'fast' net zero pathway. We estimate this could be in excess of £5 billion
- Considering that expenditure forecast in detail, assess how much of that investment is justified now, i.e. there is low risk of regret in making the investment. We call this the Certain View with forecast expenditure of £2.4 billion.
- Of the expenditure not in the Certain View, design regulatory uncertainty mechanisms that allow for additional investment once it can be justified.

In response to stakeholders' feedback on the June draft Business Plan consultation, we have added a fourth step:

- Review the Certain View to ensure that allows for timely additional investment without undue or costly delay. This review has carefully considered our planned development expenditure to mitigate this risk (pages 38-39).

This approach – investing only when the need is certain – removes the risk to GB energy consumers of unnecessary cost (**Figure 1.8**).

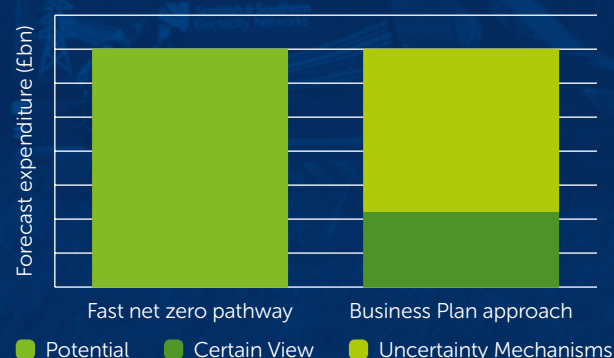


Figure 1.8 Our forecast of the potential expenditure to achieve the 'fast' net zero pathway: certain and uncertain

Our RIIO-T2 User Group

VISIT the dedicated webpage of our RIIO-T2 User Group.

The User Group's final report on our RIIO-T2 Business Plan will be published here in late December 2019.

www.ssen-transmission.co.uk/talk-to-us/user-group



During summer 2018 we undertook an open recruitment process to appoint our RIIO-T2 User Group. The Group comprises six independent members, including the Chair, along with representatives of the ESO and SHEPD (**Figure 1.9**).

While the appointment of a User Group was a mandatory requirement of the RIIO-2 regulatory process¹, we welcomed and supported this innovation. In establishing our User Group we sought to build upon and learn from the independent Stakeholder Advisory Panel² that we established in 2017 to bring insight and advise our Board on stakeholders' views. One member of the RIIO-T2 User Group is also a member of the Stakeholder Advisory Panel.

The role of our RIIO-T2 User Group is to "scrutinise and provide input and expert challenge to the transmission company's business plan". To do this, the Group has met regularly over the past 18-months and undertaken detailed examination of our past performance and future plans. The User Group has had unrestricted access to all aspects of our business planning and our people, including our Board and senior management team.

In all areas of our business planning the User Group has encouraged us to broaden and deepen our stakeholder engagement, to constantly assess the contribution of our Plan to GB net zero targets and, above all, to be ambitious in the interests of all GB energy consumers.

The User Group will make its final report to Ofgem on this Business Plan, and the process of developing it, in late December 2019.

Key topics where feedback from our RIIO-T2 User Group has influenced this Business Plan:

Future Energy Scenarios and Net Zero

The User Group scrutinised and challenged our use of scenarios in the development of the Business Plan, including the North of Scotland Future Energy Scenarios and the ENA Core Scenario, see pages 31-32. Ultimately the Supporting Document 3: [Planning for Net Zero: Scenarios, Certain View and Likely Outturn](#) was prepared in response to a User Group request to consolidate and detail this work.

Stakeholder Engagement Strategy

Our new [Stakeholder Engagement Strategy](#) for RIIO-T2 was reviewed by the User Group prior to consultation. The Group supported the ambition, yet advised further consideration be given to building relationships and identifying advocacy opportunities. These comments were brought into the final draft of the Strategy, see pages 90-93.

Commercial and Connections Policy

In a discussion on the first draft of our new [Policy](#) proposition for RIIO-T2, the User Group suggested that we strengthen our ambition and aim to be the connections provider of choice. They felt we could expand on the customer experience, enhance engagement and customer satisfaction. We incorporated these ideas into the final draft of the Policy, see pages 94-96.

Asset Management

Given the materiality of effective asset management to our customer service outcomes, the User Group intensively interrogated our approach and the basis of the reliability goal. In response to this, we have reframed our ambition and goal in the context of our growing network and the criticality of maintaining cost effective outcomes, see pages 51-57.

Deliverability

The User Group wanted to see our plans for the delivery of our RIIO-T2 Business Plan outcomes. 'Deep dives' explored our approach to effective capital delivery and the lessons we have learned from RIIO-T1. From this, we have undertaken further analysis of historic and forecast efficiency gains from native competition, see pages 40-41.



Figure 1.9 Our RIIO-T2 User Group meeting in Perth, May 2019



Building a Network For Net Zero

Contents: Section 2

Summary of Targets and Expenditure	30
Scenario Planning and Net Zero Emissions Targets	31
The Certain View	33
Efficient Capital Development and Delivery	38
Certain View Growth Investment: Eastern	42
Certain View Growth Investment: Caithness, Orkney and Shetland	44
Certain View Growth Investment: Argyll, Central and Western Isles	46
Ready to Deliver Net Zero	48

Building a Network for Net Zero

STRATEGIC THEME



Sector Leading Efficiency

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

CLEAR GOALS



Transport the renewable electricity that powers
10 million homes



£100 million in efficiency savings from innovation

Main targets

Our clear goal is the efficient and timely growth our network to accommodate the renewable generation necessary for the decarbonisation of the GB economy. The main targets below directly measure our progress towards achieving this goal under the Certain View.

Target	RIIO-T2 type [†]	Metric	RIIO-T1 Equivalent Output	RIIO-T2 Output
Shared Use Infrastructure Increase in shared use infrastructure capacity	PCD	MVA	Forecast outturn: 4,166 MVA	2,047 MVA by 31 March 2026
Reactive Power Increase in reactive power capacity	PCD	MVar	None	+325/-225 MVar by 31 March 2026
Strategic Network Capability Increase in boundary transfer capability	PCD	MW	Forecast outturn: 795 MW on B0; 1,390 MW on B1; 280 MW on B3b; 252 MW on B10 (sub boundary)	1,090 MW on B4 by 31 October 2026 [‡]
Early Engagement Regional and community engagement events on north of Scotland future energy scenarios and strategic network development	CVP(R)	Number per annum	None	5 events per annum

[†]Type is a regulatory categorisation: LO = Licence Obligation; PCD = Price Control Deliverable; ODI (P/R) = Output Delivery Incentive with financial Penalty and/or Reward; Rp = Reputational; CVP = Consumer Value Proposition; UM = Uncertainty Mechanism

[‡]Boundary capabilities are based on a given generation and demand background. For the purposes of reporting cumulative deliverables, the boundary capability uplifts from the individual projects have been arithmetically added. However, the aggregate boundary uplift over time will not necessarily equal the arithmetic sum due to the sensitivity of the boundary capability to generation and demand backgrounds

Cost of delivering our Certain View outputs (£m)

Our Certain View forecast expenditure during the RIIO-T2 period to deliver the capital investments described in this section, and achieve the targets above, is £891 million. A comparison with equivalent capital expenditure for load growth during the RIIO-T1 period is made on page 106.

Target	Cost category	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Sole Use Infrastructure For new and modified connections	Capital Load	59.8	13.3	4.1	0.0	0.0	77.2
Shared Use Infrastructure To increase network capacity	Capital Load	48.5	65.5	10.3	0.0	0.0	124.3
Strategic Network Infrastructure To increase boundary capability	Capital Load	112.0	159.1	120.6	83.6	85.1	560.4
Development of Future Infrastructure Network planning, design, development and engagement	Capital Load	23.6	23.6	27.3	27.3	27.3	129.1
							891.0

Scenario Planning and Net Zero Emissions Targets

READ about all the scenarios we have used to develop this Business Plan, and how these compare with the Certain View

SUPPORTING DOCUMENT 3. [Planning for Net Zero: Scenarios, Certain View and Likely Outturn](#)

SUPPORTING DOCUMENT 3A. [North of Scotland Future Energy Scenarios](#)



Use of scenarios in business planning

Scenarios are an important business planning tool that present alternative views of the future. Through considering a number of future scenarios, business plans can make an assessment of uncertainty and consider options to manage that uncertainty.

For electricity networks, scenarios focus on the potential future use of the network. Specifically the source of electricity that enters the network (typically, generation) and the consumption of electricity that exits the network (typically, consumer demand). The factors that influence these variables are wide ranging and include demographics and population distribution, the rate of growth of the economy and the pace of technological change. Scenarios must also consider the ability of the electricity network to operate safely and securely under the generation and demand assumptions.

Lessons from RIIO-T1

Scenarios were an important part of our business planning for the RIIO-T1 period. In 2008, the Electricity Networks Strategy Group (ENSG) – a cross-industry group jointly chaired by the UK Government and Ofgem – developed three scenarios: Slow Progression, Gone Green and Accelerated Growth (**Figure 2.1**).

Combining the three scenarios with stakeholders' views and the status of known generation developments, we assessed the credible minimum volume of onshore generation connections during RIIO-T1. This Baseline View was +1.1 GW, significantly below all three scenarios (+3-8 GW).

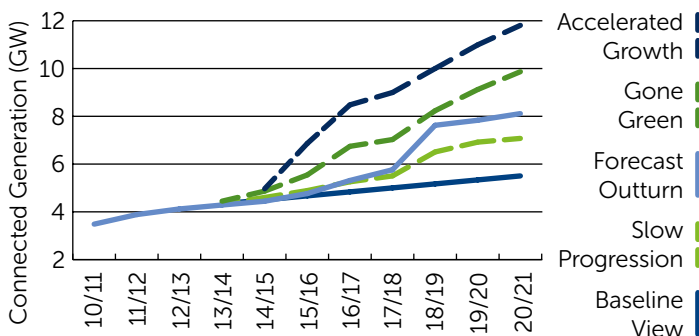


Figure 2.1 Use of scenarios for the RIIO-T1 business planning

The forecast outturn for RIIO-T1 is +4 GW: significantly above the Baseline View and between the Slow Progression and Gone Green scenarios.

The upfront capital investment programme set out in our RIIO-T1 Business Plan was based on connecting the Baseline View. Recognising that the three scenarios, along with other evidence, strongly argued that a higher volume of generation than the Baseline View was likely to connect during the RIIO-T1 period, we developed flexible regulatory funding mechanisms that have automatically allowed additional capital investment to enable these connections based on need. This approach was very successful in business planning for the RIIO-T1 period, and we are proposing similar approach in this RIIO-T2 Business Plan.

Scenarios used in our RIIO-T2 business planning

We have used three sources of future energy scenarios:

1. ESO Future Energy Scenarios

National Grid, in its role as the GB ESO, develops Future Energy Scenarios (FES) for the GB energy industry looking out by 30 years and beyond.

The current version of the ESO FES was published in July 2019[†]. This combines two drivers – speed of decarbonisation and level of decentralisation – to produce four scenarios: Consumer Evolution, Steady Progression, Community Renewables and Two Degrees (**Figure 2.2a**). The ESO FES is used to inform investment for large strategic upgrades to the GB transmission network, in particular in the annual Network Options Assessment (NOA) process[‡].

2. North of Scotland Future Energy Scenarios

Building upon the national political, economic, social and technological possibilities explored by the ESO FES, during 2017 and 2018 we undertook a detailed examination of the many unique factors and drivers that have the potential to influence future development requirements on our network. This resulted in our North of Scotland Future Energy Scenarios (NoS FES) with three scenarios: Proactive Decarbonisation, Local Optimisation and Cost Limitation (**Figure 2.2b**).

3. Energy Networks Association core scenario

In late 2018, as part of the RIIO-2 regulatory process, Ofgem and its RIIO-2 Challenge Group asked the GB energy networks, gas and electricity, to work together to establish a common 'core' future energy scenario. Co-ordinated by the Energy Networks Association (ENA), the networks worked together to identify the key drivers of energy networks for the RIIO-2 period using the 2018 ESO FES assumptions and, from this, make a subjective assessment of a core scenario (**Figure 2.2c**).

[†]Future Energy Scenarios, National Grid, July 2019. Available at: www.fes.nationalgrid.com

[‡]More information on the NOA process is available at: www.nationalgrideso.com/insights/network-options-assessment-noa

Taken together, the three suites of future energy scenarios described above represent nine different potential future pathways for energy in GB and the north of Scotland. For existing and new connected generation in the north of Scotland, the range of potential outcomes in 2025/26 varies between 8.6 GW and 15.7 GW.

The variety across the scenarios is intentional and welcome as it allows for comprehensive assessment of the capability of our RIIO-T2 Business Plan to accommodate the widest range of credible energy futures.

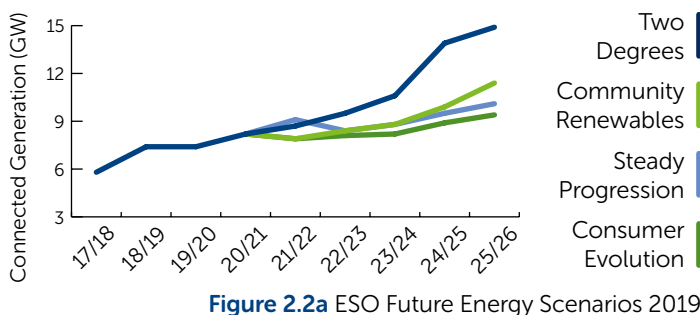


Figure 2.2a ESO Future Energy Scenarios 2019

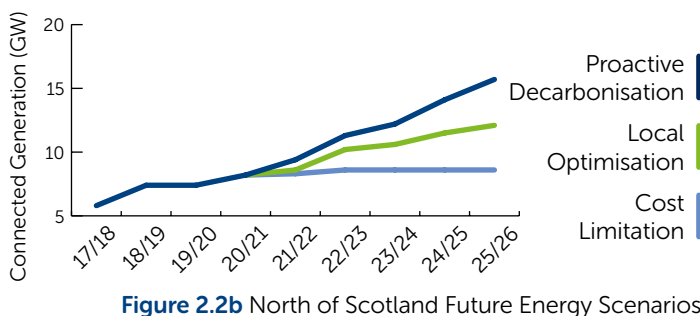


Figure 2.2b North of Scotland Future Energy Scenarios

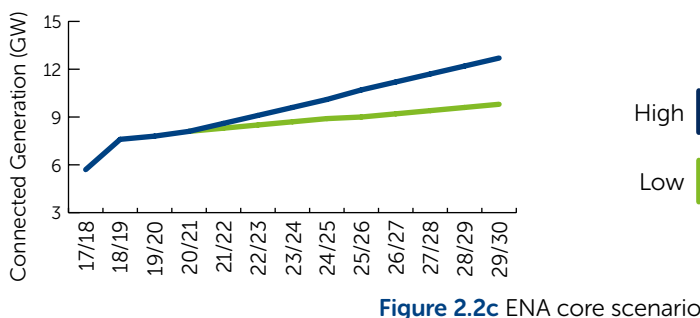


Figure 2.2c ENA core scenario

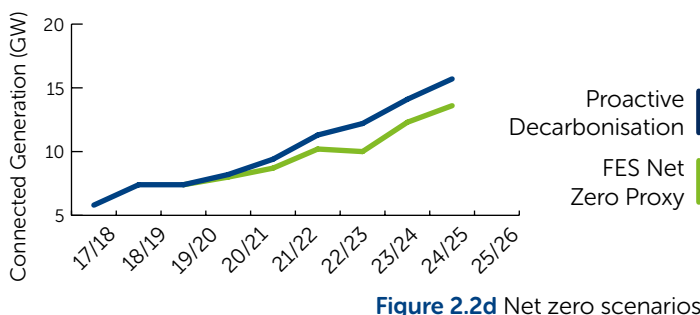


Figure 2.2d Net zero scenarios

This was a key stakeholder observation during the development of the NoS FES – that the scenarios should focus on defining the end member outcomes and, hence, stakeholders could have confidence that our Plan is capable of delivering in consumers' interests regardless of what the future holds.

Net zero scenarios

The future energy scenarios described above were developed prior to the CCC's recommendation, and subsequent Governments' adoption, of the net zero targets and so do not explicitly consider pathways to achieve the target:

- None of the scenarios in the 2019 ESO FES achieve net zero by 2050. The 'greenest' scenarios – Two Degrees and Community Renewables – are predicated on the 2° Celsius warming pathway.
- The Proactive Decarbonisation scenario in the NoS FES sets out the credible maximum decarbonisation of the energy system in the north of Scotland. This scenario is predicated on the 1.5° Celsius warming pathway consistent with net zero, however the NoS FES does not look beyond 2030.
- Net zero was not identified as a driver or consideration for the ENA core scenario.

In order to test the ability of our Business Plan to accommodate the net zero target, we have examined the available evidence to determine a credible generation and demand outcome for the end of the RIIO-T2 period consistent with net zero emissions by 2045. We have concluded:

- For energy demand, while it is credible to plan for some growth due to electrification (particularly of transport), the impacts on the electricity transmission system are likely to be negligible during the RIIO-T2 period. These are captured in the Proactive Decarbonisation NoS FES. However, more significant impacts are likely beyond 2026 and, hence, planning and development works are critical during RIIO-T2. These activities are a key part of our RIIO-T2 Business Plan outputs.
- For electricity generation, the Proactive Decarbonisation NoS FES is a net zero emissions pathway. To provide an alternative pathway, we have combined elements of the 2019 ESO FES Two Degrees and Community Renewables to create a FES Net Zero Proxy scenario. This suggests that connected generation outturn between 13.6 GW and 15.7 GW in 2025/26 would be required (Figure 2.2d).

North of Scotland Future Energy Scenarios We engaged with over 150 stakeholders

"Good to see SSEN consulting on this vital segment of the future energy system"

-Energy UK (energy efficiency, heat and electric vehicles)

The Certain View

Scenarios are a useful planning tool to assess the range of potential outcomes over a future time period.

However scenarios are, by design intent, based on broad assumptions. This can be termed a 'top down' approach. For example, an assumption that energy demand will increase by a specified percentage per year across a region. Within that broad assumption there can be significant local variability and/or regional uncertainty. Accordingly, scenarios have limitations when determining the detailed scope of specific investments or activities.

Every investment or activity in our RIIO-T2 Business Plan has been identified from a detailed examination of the underlying need and the options available to meet that need. This includes both future energy scenarios (top down) and all of the local factors (bottom up) that contribute to need. By combining all known relevant information, we can have confidence that our conclusion is the most cost effective output.

All of the investments and activities identified through this comprehensive approach are combined to give an overall view of the Business Plan – we have called this **the Certain View**. It is made up of investments and activities where there is strong evidence of need and where the best option can be identified.

Given the timescale of the Business Plan, being prepared in 2019 to cover the period out to 31 March 2026, there will be other investments and activities that are currently uncertain but will become certain during the lifetime of the Plan. Top down scenarios, such as the ESO FES and NoS FES, can be directly compared with the Certain View to provide an invaluable insight into the likely extent of uncertainty in the Plan.

Methodology for determining the Certain View

The Certain View is every activity and investment that we propose to undertake during the RIIO-T2 period where there is compelling evidence of need and we have concluded on a preferred solution. This encompasses:

- Capital investment to grow the network and accommodate new renewable generators and other system needs: this section 2
- The investment to maintain the network for safe and secure day-to-day operations: section 3
- Our planning and investment to ensure ongoing resilience from threats and security of supply: section 4
- The service we provide to customers and communities, and how we run our business sustainably in the interests of the environment and future energy users: section 6

The timing, location and capacity of new generation (including interconnection, storage and distributed generation) is the main uncertainty impacting the future of the transmission system in the north of Scotland. The nine future energy scenarios indicate the range of potential connected generation outcomes in 2025/26 varies between 8.6 GW and 15.7 GW.

Accordingly, the focus for the development of our Certain View has been on identifying where there is strong and certain need for capital investment to grow the network. However, this has not been done in isolation from our wider business planning, in particular achieving efficient integrated delivery of construction works (e.g. with nearby asset maintenance investments). Other forecast expenditure, such as IT and cyber security, operations and resilience, has been determined on the basis of the Certain View capital investment programme.

Our detailed 'bottom up' approach to assessing the need for capital investment during the RIIO-T2 period is built upon the existing industry framework and our long term network plans. There are three parts to our approach (**Figure 2.3**).

Wider system

The growth of renewable generation in the north of Scotland, coupled with relatively static gross demand (to date), 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 NoS FES and the ESO FES show a continuing need for boundary capability increase* during RIIO-T2 (with only the Cost Limitation scenario suggesting that modest further reinforcement may be required (**Figure 2.2a-d**)).

Long term network planning

There is an existing framework for long term investment planning under the annual Electricity Ten Year Statement (ETYS)¹ and Network Options Assessment² (NOA) processes for GB:

- The ETYS presents future requirements of the GB transmission system; and
- From the results of the ETYS, the TOs produce asset solutions to address the required capability needs. These options, alongside non-asset 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 most recent January 2019 NOA report, we were given three "proceed" signals: the East Coast Onshore 275kV Upgrade, the East Coast Onshore 400kV Upgrade and the Eastern HVDC link. Construction of two of these projects are in the Certain View (**Table 2.1**), along with the continued development of the Eastern HVDC Link.

¹More information on the ETYS is available at: www.nationalgrideso.com/insights/electricity-ten-year-statement-etys

²More information on the NOA process is available at: www.nationalgrideso.com/insights/network-options-assessment-noa

*Boundary capability is a measure of the wider system capacity. Details of the main GB transmission boundaries are available in the ETYS

Given the strong evidence for continued generation growth, the NOA recommends we proceed with reinforcement options. The NOA also considers commercial solutions to reduce the costs of 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 and customers on opportunities for such commercial solutions during RIIO-T2.

Regional

The regional part of our approach undertakes detailed system planning in local areas. In general, this is driven by the need to connect new generation. We define two types of investment need:

1. Sole-Use infrastructure, with a single user of the transmission equipment such as an onshore or offshore windfarm. Most commonly this is the local connection infrastructure or flexible access arrangement 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.

The need for Sole-Use and Shared-Use infrastructure can be highly uncertain due to the nature of the drivers. For example, the certainty over which customer will connect and when. For this reason, our Certain View includes only five such projects with known investment pathways (Table 2.1). Like the RIIO-T1 period, we have defined uncertainty mechanisms that will automatically release funding for additional uncertain Sole-Use and Shared-Use infrastructure once the need is confirmed (see pages 81-82).

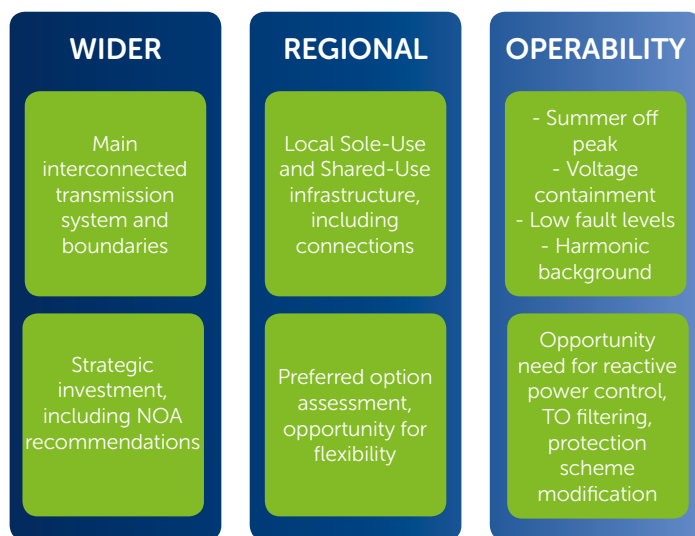


Figure 2.3 Approach to transmission system planning

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 decline in voltage performance. This can be reduced voltage or sudden, large changes in voltage during periods of heavy loading on the network. Conversely high voltages arise in low wind conditions. To address this, we invest in reactive compensation equipment including specialist equipment, e.g. STATCOMS, that 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 reduce the system inertia and also 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. Our Business Plan includes a regulatory mechanism that will allow funding to undertake such actions and investments that are required during the RIIO-T2 period to address operability issues when supported by the ESO (page 83).

"We are supportive of your inclusion of proposals for an uncertainty mechanism during the RIIO-2 period to reflect changing potentially requirements."

- ESO response to consultation on draft Business Plan

Growth capital investments in the Certain View

Excluding capital investment solely to replace or refurbish existing assets (section 3), there are four parts to our Certain View to grow the network (Table 2.1):

1. Strategic wider investments that have been given a consistent sustained 'proceed' signal by the NOA. The two projects to reinforce the East Coast transmission system were assessed as critical in the January 2019 NOA, driven by the need to increase boundary transfer capability between the SHE Transmission and Scottish Power Transmission regions. For both projects, the optimum delivery year is the same across all four ESO FES scenarios. While these investments are primarily growth-driven, the work is on existing assets so also improves condition, reduces risk of failure and reduces ESO system operation costs.

2. Sole-Use and Shared-Use infrastructure investments that commenced during RIIO-T1 and will be completed in RIIO-T2. All seven of these projects are to increase the regional capacity on the transmission system to accommodate growth in renewable generation.
3. Other investments with strong evidence of certainty now. The five investments included in this element have different drivers. The North East 400kV project combines risk based asset replacement requirements with increases to network capacity to accommodate new generation connections and the NorthConnect interconnector.
4. Activities required to ensure timely investment. Prior to starting construction, detailed design and development work is required for each investment we undertake. Our strategic optioneering assessment can take many years and cost up to 7.5% of the final expenditure in the investment. It is this work that ensures the right option is delivered at the right time.

Scheme name	Driver for investment
(1) Strategic wider investments that have been given a consistent sustained 'proceed' signal by the NOA	
East Coast Onshore 275kV Upgrade	To increase boundary transfer capability. Works include a new substation at Alyth, substation works at Tealing and reprofiling of existing 275kV circuits
East Coast Onshore 400kV Upgrade	To increase boundary transfer capability. Works include to reconductor and reinsulate existing overhead line and substation works at Alyth, Kintore, Fetteresso and Blackhillock
(2) Sole-Use and Shared-Use infrastructure investments that commenced during RIIO-T1 and will be completed in RIIO-T2*	
Abernethy GSP	Increased capacity at Grid Supply Point for the connection of new distributed generation, and the expansion of local transmission system capacity
Carradale GSP	Increased capacity at Grid Supply Point for the connection of new distributed generation
Creag Riabhach	New overhead line and substation for windfarm connection
Glen Kyllachy	New overhead line and substation for windfarm connection
Limekilns	New overhead line and substation for windfarm connection
Lairg - Loch Buidhe	New overhead line and substation to increase the local transmission system capacity to accommodate new generation connections
Millennium South	Overhead line and substation works for windfarm connection
(3) Other investments with strong evidence of certainty now	
Tealing 275kV busbar	Substation works to connect new offshore windfarm
North East 400kV	Combined asset- and growth-driven investments with delivery programme optimised to minimise abortive works. Works include conductor replacement on existing overhead line, and substation works at Kintore, New Deer, Peterhead and Rothienorman
Kinardochy Reactive Power	System driven investment to accommodate new generation capacity and increase boundary capability
Glenshero	New overhead line and substation for windfarm connection
Moray West Offshore	Works at existing Blackhillock substation to connect new offshore windfarm
(4) Activities required to ensure timely investment	
Variety	Preconstruction activity to develop future investments (including the Eastern HVDC) to ensure these works are ready to proceed to construction when the need is confirmed. Includes generation connections, risk based interventions and NOA options

*Excludes investments that energise before end 2021. These are assumed to be part of the RIIO-T1 Close Out mechanism (page 84)

Table 2.1 Capital load growth investments in the Certain View

Maps with the locations of these investments, along with further information on the regional network development planning and RIIO-T2 capital investment forecasts, can be found on pages 42-47.

Innovation, whole system and flexibility

In delivering the Certain View, and to better understand and deliver further uncertain investments, we will apply innovation and new ways of working. These are informed by what we have learned from delivery in RIIO-T1.

Carradale Grid Supply Point (GSP) required reinforcement to accommodate distributed generation. Initial system studies showed that the existing four transformers should be replaced with six new larger capacity assets. Through collaboration with SHEPD, the ESO and developers, we identified a whole system solution. Through SHEPD reconfiguring local network running arrangements and by offering flexible connections, the final design required two fewer transformers than the traditional solution. This enabled quicker connection of renewable generation, contributing to the net zero emissions targets, and saved cost for customers and end consumers. Building on this type of experience, our RIIO-T2 Business Plan Incorporates whole system schemes that apply innovation and flexibility.

The existing network that serves Skye requires intervention for asset and growth drivers. In seeking the right solution we have used a whole system approach to understanding network drivers in the local area. By engaging with SHEPD we have understood local GSP asset condition and potential growth requirements, as well as what flexible services there are in the area. Engaging the local authority and stakeholders has given us a long term view of decarbonisation plans including for transport and heating. Marrying these drivers to those of the new generation allows us to have a whole system view of what is needed from the network.



"When you consider the future energy requirements, it [whole system] is very relevant."

- Infrastructure / engineering representative

"SHE Transmission is uniquely positioned to work towards a whole system approach for distribution and transmission"

- Infrastructure / engineering representative

The generation capacity that is forecast to connect in the Certain View is 3.1 GW. This comprises 2.7 GW of offshore wind in the Moray Firth and near the Firth of Forth, along with 0.4 GW of onshore wind developments across the north of Scotland.

When added to the forecast 8.1 GW that will be connected to the north of Scotland transmission system by March 2021, this takes the total connected generation under the Certain View to 11.2 GW by the end of the RIIO-T2 period (**Figure 2.4**).

Certain View, scenarios and net zero

The investments included in the Certain View have largely been identified through detailed examination of the evidence that drives specific need and options (e.g. generation connection or risk based asset intervention), rather than through the output of top down scenario modelling.

The exceptions to this are the strategic investments that have been given a sustained 'proceed' signal by the NOA: East Coast Onshore 275kV Upgrade and East Coast Onshore 400kV Upgrade. The NOA takes a whole GB view of the economic development of the transmission system and specifically the strategic system boundaries. As such the options considered in the NOA are not contingent on single drivers, but rather the supply and demand across a region. The range of scenarios modelled results in a confidence of the need for that option, e.g. if the option is needed for all four scenarios then the confidence is high, or if the option is only needed in one or two scenarios then the confidence is low. For both onshore upgrades the need for investment is strong in all four ESO FES scenarios.

Ofgem and its RIIO-2 Challenge Group have requested us to illustrate our RIIO-2 Business Plan against the ENA core scenario – low. Should our Business Plan propose to deliver outputs above this scenario then we are required to provide justification for our proposals.

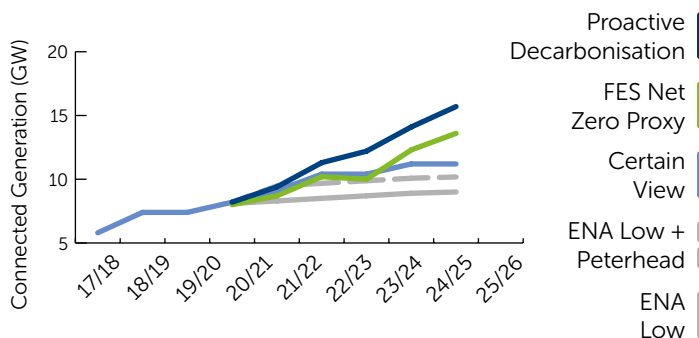


Figure 2.4 Certain View, scenarios and net zero

The ENA core scenario – low is a top down approach that uses the 2018 ESO FES assumptions to forecast that 9 GW of generation will be connected in the north of Scotland by 2025/26. The Certain View results in 11.2 GW of connected generation from the schemes listed in [Table 2.1](#). We note the following in respect of the difference between the two:

- The ENA core scenario – low has been determined using proportional allocation of a GB outcome, i.e. it is not based on named generation connections. The Certain View is, however, based on named generation connections and so provides a strong basis for our Business Plan.
- A key difference between the Certain View and the 2018 ESO FES is the treatment of Peterhead power station (1,180 MW), which is in the Certain View but not the 2018 ESO FES. We do not believe there is any basis for the exclusion of Peterhead, it is of critical system importance and is currently contracted to increase its connected capacity. The inclusion of Peterhead in the ENA core scenario – low would largely close the gap with the Certain View ([Figure 2.4](#)).

Our business planning does not identify any capital expenditure differential between the Certain View and the ENA core scenario – low. None of the investments listed in [Table 2.1](#) would be delayed or cancelled under the ENA core scenario – low.

Figure 2.4 illustrates a significant gap between the net zero pathways (Proactive Decarbonisation and FES Net Zero Proxy) and both the ENA core scenario – low and the Certain View. However, the investments in the Certain View do provide an ability to flex to accommodate pathways to the net zero emissions target.

The proposed sequential reinforcement of the East Coast transmission system – through North East 400, East Coast 275, East Coast 400 and pre-construction of a future offshore East Coast HVDC link – are critical, cost effective steps in the net zero journey. The comprehensive ‘no regret’ approach exhibits efficiencies in network access and asset and growth driver interactions. The 400kV system will reduce the rise in transmission losses and support options for further network future reinforcement.

The 400kV network expansion will further provide additional system strength, helping combat emerging issues around ‘weakening grids’ as more conventional thermal generation is closed or not connected continuously. Due to its proximity to the oil and gas infrastructure of the North Sea basin the north east is also a candidate for some of the Carbon Capture Use and Storage (CCUS) highlighted as playing an important part in the net zero scenario. The reinforcement of the network in this region will allow initial deployment of the technology around existing power generation and petrochemical processing facilities. Similarly the cities of Aberdeen and Dundee are potential hubs for future hydrogen deployment envisaged in national strategies for net zero.

The Kinardochy Reactive Power project is also a critical investment to provide improved network performance flexibility in the light of increased levels of intermittent renewable generation.

Likely Outturn Assessment

We have confidence in the Certain View because the need for investment is known and, in consultation with stakeholders, we have given detailed consideration to the preferred option (including whole system and ‘do nothing’ options) and its cost.

This is evidently not the case where the need is uncertain. At stakeholders request, we have undertaken an assessment of the potential for currently uncertain investment – we term this the **Likely Outturn Assessment**. We emphasise that this is only provided for illustration.

In deriving the Likely Outturn Assessment, we have considered:

- The status of known generation developments, contracted and in scoping, and the potential timeline for connection;
- The potential for continued growth of distributed generation; and
- The availability of transmission capacity for new generation connections and growth that could be delivered and utilised within the RIIO-T2 period.

This has been considered across the entirety of the north of Scotland, including the Scottish islands, Skye, Caithness, Argyll, East and offshore waters. From this, our Likely Outturn Assessment is for generation connected to exceed the Certain View by around 2.4 GW ([Figure 2.5](#)), i.e. total connected in 2025/26 to be around 13.6 GW.

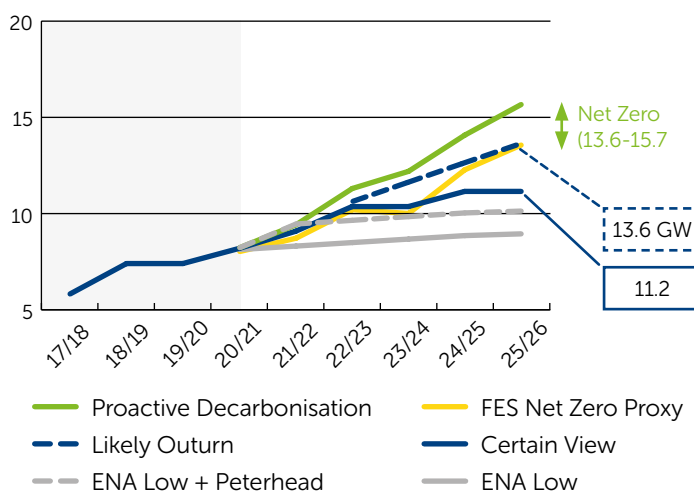


Figure 2.5 Likely Outturn, Certain View and net zero

Efficient Capital Development and Delivery

READ...

SUPPORTING DOCUMENT 4. [Strategic Optioneering Methodology](#)

SUPPORTING DOCUMENT 5. [Cost Benefit Analysis Methodology](#)

SUPPORTING DOCUMENT 6. [Capital Development and Delivery](#)



Being cost efficient

We define efficiency as the optimal use of resources (time, materials, people and money) to achieve a necessary outcome.

There are two parts to our approach to ensuring that we are cost efficient:

1. Strategic optioneering

In essence, this part asks whether an action is needed and, if so, what is the best action to take. It requires a rigorous justification process before progressing a course of action:

- What is the desired outcome - is this informed and supported by customers and stakeholders?
- What are the full range of available 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 describe in section 5, we had examples of this when we presented stakeholders with options for investment during RIIO-T2.

2. Cost effective delivery

The second part of our approach is to apply rigour and best practice in capital delivery. We achieve this through the application of an independently overseen large capital projects governance process. This has regular and comprehensive check points to challenge the investment delivery team.

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. By working with others, we seek to maximise the benefits to consumers.

Strategic optioneering

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 need. This takes into account electrical and geographic factors, environmental and social impacts, technical and engineering considerations, and stakeholders' views (**Figure 2.6**).

Doing this thoroughly and effectively results in:

- A robust regional solution that optimises multiple drivers;
- Comprehensive input to CBA to assess investment justification; and
- Fully developed project solutions ready for delivery as part of a co-ordinated regional plan.

Therefore an investment can be delivered cost-effectively and on time. We undertook a consultation on potential improvements to our strategic optioneering methodology in late 2018[†]. The key findings from that consultation were 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). In light of this stakeholder feedback, we have set a target for the RIIO-T2 period of holding at least five regional and community engagement events on strategic network development each year.

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.

An initial long list of viable options is defined and reduced in-house due to, 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 stage requires close engagement with local land owners, statutory authorities, communities, businesses and other interest groups.

Through detailed investigation, a preferred route corridor and/or preferred sites will be identified. These preferences will be established through balancing technical, environmental, cost and stakeholder impacts. Whole life CBA is used to systematically consider the strengths (benefits) and weaknesses (costs) of alternatives to determine which of the options, if any, present the greatest net benefit.

Option selection

It is only after this comprehensive, multi-year process that a final option is selected. We have a best practice gate-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.

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 occurs throughout the optioneering process and will strongly influence the outcomes.

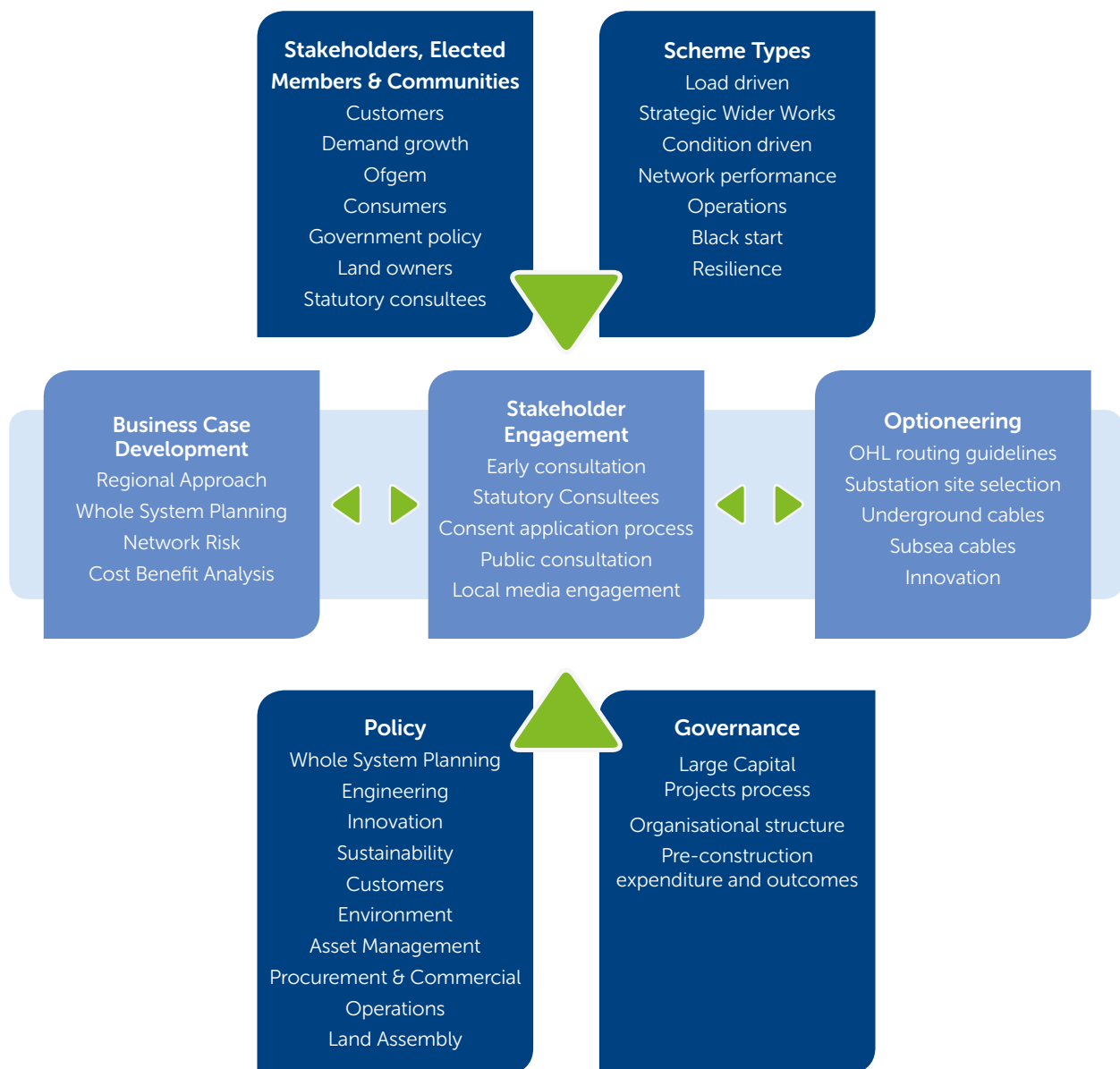


Figure 2.6 Strategic Optioneering Methodology for transmission investment

Cost effective delivery

Track record

Over the past decade we have 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:

- Independent governance: our Large Capital Project gate process and independent assurance function provides discipline and maintains best practice in capital development and delivery with a particular focus on programme, risk management and outturn cost;
- Supply chain management: midway through the RIIO-T1 period, we reviewed our contracting model and renegotiated terms with framework contractors to capture the efficiency gains to date. Learnings from this have been applied to our RIIO-T2 approach;
- Delivery planning and strategy: as we have been planning for the RIIO-T2 period we have engaged early with the supply chain on deliverability and potential future efficiencies; and
- Delivery risk management: considering the long term programme of work for RIIO-T2 and beyond, we have sought to identify and mitigate potential challenges and constraints.

Anticipatory investment

Cost benefit analysis is used in our strategic optioneering assessment to determine the optimal investment. This can include consideration of 'over sized' options, sometimes called future proofing or anticipatory investment. Anticipatory investment can be the most cost effective option where, for example, the incremental cost associated with over sizing is small.

Two schemes in the Certain View include an element of anticipatory investment:

1. Port Ann to Crossaig overhead line replacement (pages 58-63), which is primarily required due to the condition and performance of the existing 132kV asset. Our analysis demonstrates that it is cost effective to rebuild this line at 275kV capability given the small incremental cost and high potential for future generation growth in the area.
2. Kinardochy Reactive Power, which is primarily required for capacity and system performance reasons (pages 46-47). Our analysis demonstrates that it is cost effective to construct this substation at 400kV capability to allow for the future uprating of the Beauldy Denny overhead line.

Capital delivery model

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 2.7**). 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 execution phase starts after the necessary internal governance and Board approvals to confirm rigour in the competition of development and refinement, and confidence in the project delivery plan.

Options will be exercised to secure land rights, supply and construction contracts will be placed, the detailed design will be completed, all before on-site construction works are commenced. During the execution stage the investment team is significantly bolstered with experienced site personal and project-specific experts to assist with complexities of delivery. These can include safety management, engineering specialisms, the environment, archaeology and community officers.

Strict governance controls are applied throughout the lifecycle of the project but never are they more important than during the execution phase which sees the greatest expenditure.

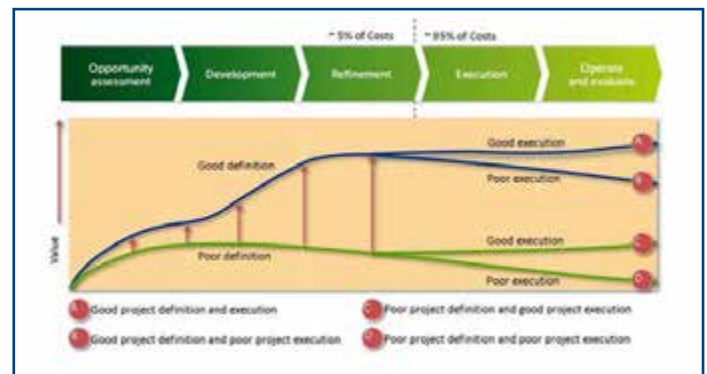


Figure 2.7 Impact on value of pre-construction definition

"Following the completion of our independent review... we conclude that outturn costs on the project have been incurred on an efficient basis."

– Independent audit of the Beauldy Denny project

Delivering efficient investment to the benefit of all GB consumers

Our capital delivery model has delivered investment on time and also, our analysis shows, cost efficiently. This is of benefit to both our customers that are seeking to connect and to all GB consumers by keeping household bills down.

The robust processes we have used to cost the investment required for the RIIO-T2 period means we can preserve the value created over the past decade. Moreso, our costing process seeks not just to maintain current levels of efficiency, but to improve further. Thus our forecast costs for the RIIO-T2 period are based on our efficient historic outcomes and incorporate stretch efficiency ambition.

In developing this Business Plan we have undertaken a detailed assessment of the efficiency of our historic capital investment and, hence, the ongoing efficiency gains we intend to realise during the RIIO-T2 period. Our approach can be summarised as follows:

1. **RIIO-T1 outputs have been delivered efficiently** demonstrating improvements in our procurement, delivery against allowances and quantified innovation benefit.
2. **Unit cost analysis** across core asset categories shows a strong efficiency trend. This is on the basis of empirical study of the cost of each asset category between price control periods, after adjustments for atypical factors and an assumed 0.8% per annum productivity improvement.
3. **Benchmarking** our allowances for costs such as pre-construction activity and risk. We have anchored how we forecast costs in these two material cost areas on our historic outturns. For risk, this means our starting costing assumption includes the execution efficiency gains we have realised to date and, hence, the associated cost savings.
4. **Third party expert review.** We engaged Oxera Consulting LLP and Arcadis LLP to assess relative efficiency against our peers, and Arcadis LLP to assure our costing process. Both reviews provide strong support for our current efficiency and our approach to forecasting costs.
5. **Detail breakdown of all atypical costs** to isolate and understand this cost driver. Investing in the north of Scotland comes with significant cost pressures as the infrastructure is in remote and challenging environments. This can skew comparisons with equivalent investments elsewhere.

Overall, this analysis clearly demonstrates the cost efficiency of our historic and forecast capital investment, and represents considerable value for money to our customers.



£100 million in efficiency savings from innovation

Our RIIO-T2 Certain View includes £100 million of cost savings from productivity and innovation, and we aim to go further

Delivering material efficiency savings is achieved by the culminative result of action across our activities.

The Certain View expenditure of £2.36 billion described in this RIIO-T2 Business Plan includes over £100 million of efficiency savings:

- By applying **lower unit costs** across our core assets than our historic expenditure
- By assuming **productivity improvements** will match above inflation price increases (real price effects)
- By maintaining and then repeating the **innovation benefits** delivered during the RIIO-T1 period
- By applying reductions in our assessment of the **cost of risk** building on historic execution learning

In total, our assessment is of at least £100 million of savings in this Business Case (when compared with not applying these factors and maintaining historic performance levels). Depending on the assumptions applied, the value of these savings might be up to £175 million.

This represents a significant benefit to our customers. We are confident that we have met, or exceeded, the clear goal we set for the development of this Plan. We now want to go further, both in delivering these forecast savings and more.

When we deliver our RIIO-T2 outputs, these benefits will accrue to our customers and GB consumers. If we can realise any additional efficiency savings, these will also flow to consumers through the sharing factor incentive. Put simply, for every pound we can save then consumers will share that saving.

Consumers can have confidence in the good value of our Business Plan. By showing that our costs have reduced from price control to price control, we demonstrate that the consumer is already the direct recipient of our efficiency improvements. Coupled with our commitment to output delivery, the benefits of our Certain View approach and the additional value from our Consumer Value Proposition, this Plan creates and delivers value to GB consumers, our customers and stakeholders.

Certain View growth investment: Eastern

Overview

The Eastern region of the north of Scotland transmission system covers the east coast from Perth to Peterhead, and the Moray Firth coast from Peterhead to Elgin (**Figure 2.8**). Electrically, the Eastern region is dominated by the 275kV system that interconnects Blackhillock, Kintore and Peterhead in the north with Tealing and Kincardine in the south. These circuits, together with the Beauldy Denny line to the west, allow for the bulk transfer of power, largely for the transport of renewable energy generated in the north of Scotland to energy consumers further south. Connected to the 275kV system are local 132kV networks that serve communities and cities, and local renewable generators.

Strategic network development

There has not been significant work on the Eastern region transmission system for around four decades. However, the growth of renewable generation in the north of Scotland means that the 275kV system is now 'full' and is a significant bottleneck for further renewable energy development.

We take a long term view when assessing the development pathway for the Eastern region that complements and builds upon the ESO's annual NOA process. This allows us to consider future generation and energy consumption; the best utilisation of the existing transmission system; and the costs and benefits of different types and timings of intervention.

Name	Type	Description	Output	RIIO-T2 cost (Total cost [†])	Delivery
(1) Strategic wider investments that have been given a consistent sustained 'proceed' signal by the NOA					
East Coast Onshore 275kV Upgrade	Strategic Wider	<ul style="list-style-type: none"> - New Alyth 275kV switching station - Reprofile 224km of existing 275kV overhead line - New phase shifting transformers at Tealing substation - Errochty intertrip scheme 	+610 MW* (B4)	155.1 (166.0)	End 2023/24
East Coast Onshore 400kV Upgrade	Strategic Wider	<ul style="list-style-type: none"> - Reinsulate and reconductor 170km of existing overhead line to 400kV operation - Upgrades to three existing substations to 400kV operation: Alyth, Fetteresso, Kintore - New phase shifting transformers at Blackhillock substation 	+480 MW* (B4)	215.0 (257.2)	End 2026
(2) Sole-Use and Shared-Use infrastructure investments that commenced during RIIO-T1 and will be completed in RIIO-T2					
1 Abernethy GSP	Sole Use / Shared Use	Work to upgrade existing Grid Supply Point to accommodate new generation	58.9 MW	16.5 (22.4)	End 2022/23
(3) Other investments with strong evidence of certainty now					
North East 400kV	Strategic Wider / Shared Use	<ul style="list-style-type: none"> - Replace the conductor and insulators on 83km of existing overhead line - Upgrades and extensions to existing substations: Kintore, New Deer, Peterhead, Rothienorman 	1,440 MVA	190.6 (212.4)	End 2024
6 Moray West Offshore Windfarm	Sole Use	Work at existing Blackhillock substation to accommodate offshore windfarm	800 MW	8.0	End 2023/24
Tealing 275kV busbar	Sole Use / Shared Use	Works at existing substation to accommodate offshore windfarm	1,075 MW	19.1 (38.9)	End 2021/22
(4) Activities required to ensure timely investment					
6 Eastern HVDC	Strategic Wider	Onshore and offshore pre-construction development works	Development	54.8	n/a
7 Other	Shared Use	Other onshore pre-construction	Development	15.1	n/a

[†]Some investments might incur costs during RIIO-T1 or RIIO-T3

*Based on the ESO FES 2018 Two Degree scenario background; actual output might change due to background conditions. Works are required to be completed by Scottish Power Transmission to deliver this output

Table 2.2 Certain View growth investments: Eastern

Our detailed analysis has led us to identify four stages for the optimal development pathway:

1. **North East 400kV** These investments uprate existing overhead lines and substations to 400kV operation. The works are a co-ordinated, minimum cost programme that delivers necessary asset replacement, new generation connections and overall system capability improvements.
2. **East Coast Onshore 275kV Upgrade** This upgrade is the first part of the phased strategic reinforcement of existing onshore transmission infrastructure on the east coast. This investment increases the north to south power transfer capability of the GB transmission network enabling the relief of existing constraints and increasing capacity for renewable energy generation.
3. **East Coast Onshore 400kV Upgrade** This upgrade is the second part of the strategic reinforcement, which increases the operational voltage of the north to south transmission infrastructure. This investment both increases transfer capability, allowing for more renewable energy connections, and replaces aged assets.
4. **Eastern HVDC** After the 400kV upgrade there are no further viable options to increase the capability of the onshore transmission system to the required timescale. The next stage of network growth is a subsea cable from the north east of Scotland to northern England. This investment requires further development and design during the RIIO-T2 period.

As the East Coast Onshore and the Eastern HVDC are strategic investments that would increase boundary capability, these are considered in the ESO's NOA. All three have been recommended to 'Proceed' in the 2017/18 and 2018/19 NOA reports.

Generation

Existing generation in the Eastern region is both large-scale onshore and offshore wind, and local distributed generation. The only large thermal power station in the north of Scotland is located at Peterhead.

We expect further generation to connect in the Eastern region during the RIIO-T2 period. This includes offshore wind, onshore wind and solar along with interconnection from Norway and storage devices. The connection of two offshore wind farms is included in the Certain View (Table 2.2). Expenditure on other connections would be funded through uncertainty mechanisms (section 6).

Demand

The transmission network in the Eastern region is electrically 'secure'. That means that security of supply to local demand – including the cities of Aberdeen and Dundee – is provided via more than one circuit, i.e. there is a back up circuit in the event of a fault.

Our NoS FES and local stakeholder engagement does not indicate that changes in net energy demand will drive the need to intervene on the transmission system during the RIIO-T2 period. However, beyond 2026 there are credible scenario for increases in electrical load for transport and heat. Given this, following a whole system approach, we are committed to work with local stakeholders on future energy city strategies for Dundee and Aberdeen over the coming years. We expect implementation of these strategies to be a key element of our RIIO-T3 Business Plan.

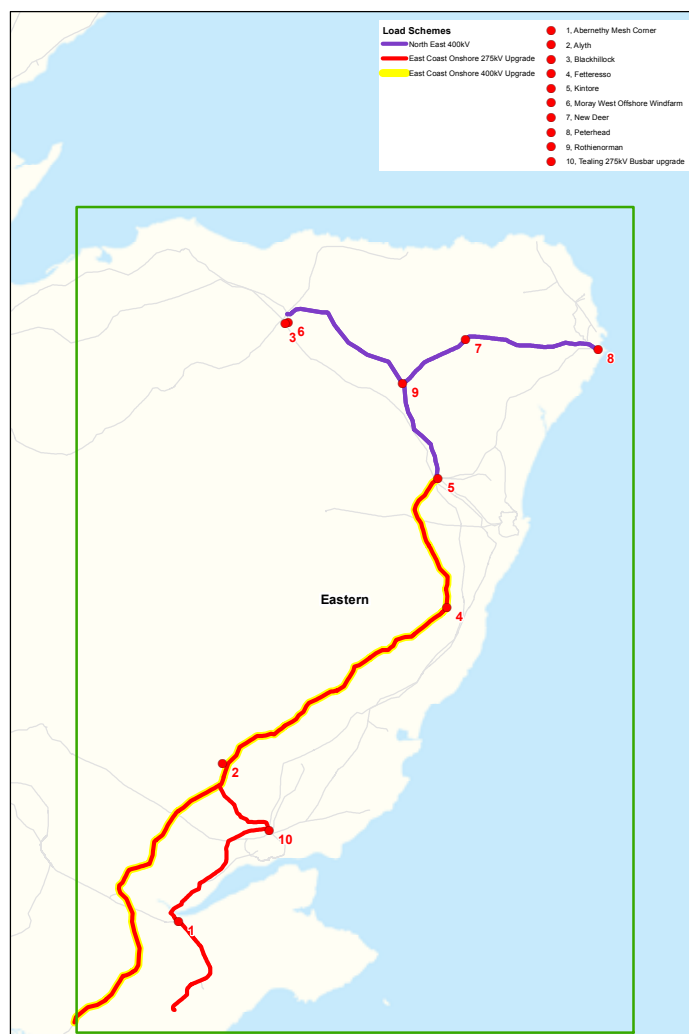


Figure 2.8 Certain View growth investments: Eastern

Certain View growth investment: Caithness, Orkney and Shetland

Overview

The Caithness, Orkney and Shetland region of the north of Scotland transmission system covers the mainland to the north of Inverness along with the island groups of Orkney and Shetland (Figure 2.9).

Despite the vast geographical expanse, this region has little electrical infrastructure. The main transmission circuits are parallel 275kV and 132kV overhead lines that follow the north west coast of the Moray Firth and a subsea HVDC link from Caithness to Moray. These circuits allow for the bulk transfer of power, largely for the transport of renewable energy generated in the north of Scotland to energy consumers further south.

There is no transmission infrastructure connecting the Orkney Islands to the mainland. The islands are served by two 33kV distribution subsea cables that ultimately connect to the GB transmission system through Thurso Grid Supply Point. The Shetland Islands are not currently connected to the GB transmission system.

Strategic network development

Over the past decade the transmission system in Caithness has been significantly upgraded to accommodate the growth in renewable generation.

Initially the existing 275kV overhead line from Beauly to Dounreay was strengthened and reconducted to increase power transfer capability. Subsequently, transfer capability was increased further by the major Caithness Moray strategic investment. This comprised both onshore overhead line and substation works with new HVDC infrastructure.

Following these investments, there is currently no need for strategic investment in the Caithness region (Table 2.3).

During the RIIO-T2 period we will continue to work with the ESO, including through the NOA process, to ensure strategic network development options are assessed and developed in a timely manner. In particular, we note the pending ScotWind leasing round that envisages multiple-GW of offshore wind in the north of Scotland.

Name	Type	Description	Output	RIIO-T2 cost (Total cost ¹)	Delivery	
(1) Strategic wider investments that have been given a consistent sustained 'proceed' signal by the NOA						
	None					
(2) Sole-Use and Shared-Use infrastructure investments that commenced during RIIO-T1 and will be completed in RIIO-T2						
1	Creag Riabhach	Sole Use	22km new overhead line to connect onshore windfarm, and connection substation works	79 MW	14.2 (16.1)	End 2023
2	Limekilns	Sole Use	5km new overhead line to connect onshore windfarm, and connection substation works	90 MW	6.8 (12.4)	End 2022
	Lairg – Loch Buidhe	Shared Use	- 16km new overhead line - New Dalchork 132kV substation - Dismantling of existing 132kV overhead line	607 MVA	31.6 (62.6)	End 2022/23
(3) Other investments with strong evidence of certainty now						
	None					
(4) Activities required to ensure timely investment						
4	Other	Shared Use	- Other onshore pre-construction	Development	34.2	n/a

¹Some investments might incur costs during RIIO-T1 or RIIO-T3

Table 2.3 Certain View growth investments: Caithness, Orkney and Shetland

Orkney Islands

The Orkney Islands have a significant renewable energy resource, from both wind and water. However the electricity network for the islands is 'full' meaning that no further generation can connect. We have worked with stakeholders to develop an economic transmission investment to connect the islands to the mainland via 220kV subsea cable from Dounreay to Finstown.

On 16 September 2019, Ofgem published its decision to approve our proposed Orkney link investment¹. However this decision is conditional on Ofgem being satisfied at or before December 2021 that at least 135 MW of generation is ready to proceed.

Shetland Islands

The Shetland Islands also have a significant renewable energy resource that cannot be developed due to lack of electrical grid infrastructure. Our proposal for a 600 MW HVDC link between Shetland and Caithness was given minded-to approval by Ofgem in March 2019, conditional upon Viking Energy Wind Farm being awarded a Contract for Difference (CfD) in the 2019 auction¹. On 23 October 2019, Ofgem advised that, in light of the CfD auction outcome, the condition had not been met¹. We are now working with stakeholders to make a revised Needs Case submission before end 2019/20.



Respondents to the consultation on our draft RIIO-T2 Business Plan asked us to include the Scottish Islands' Links in the Certain View. While we understand stakeholders' strength of views on this, the Islands' Links do not yet meet our definition of "certain" given the conditions for investment directed by Ofgem. We remain committed to work with stakeholders to satisfy these conditions so that the Links can proceed into construction during the RIIO-T2 period.

Generation

Existing generation in the Caithness, Orkney and Shetland region is predominately large-scale onshore wind, and local distributed generation. Future generation interests include offshore wind, marine and tidal, and via interconnection with Norway.

We expect further generation to connect in this region during the RIIO-T2 period. The connection of two onshore wind farms is included in the Certain View (Table 2.3). Expenditure on other connections would be funded through uncertainty mechanisms (section 6).

Demand

The far north of Scotland is characterised by an excess of generation relative to demand. However, as local generation is intermittent renewable energy, it cannot be relied upon to provide security of supply.

Transmission investment to accommodate renewable generation is also an opportunity for cost-effective improvements to security of supply for remote communities. Our Scottish Islands' Links have been developed to increase security of supply on the islands.

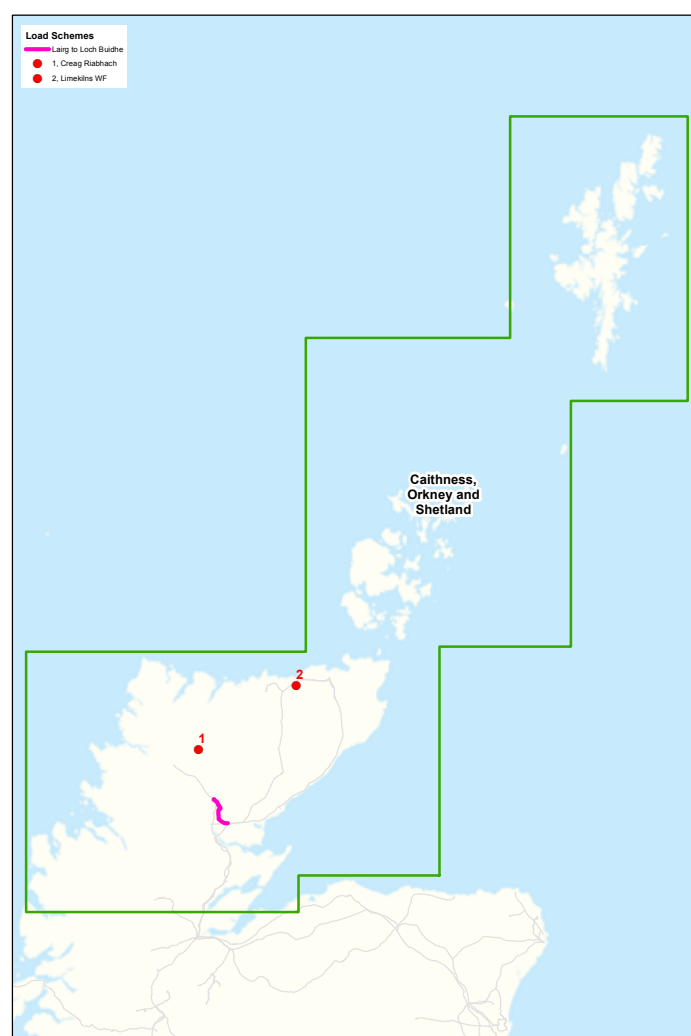


Figure 2.9 Certain View growth investments: Caithness, Orkney and Shetland

¹Available at: www.ofgem.gov.uk/publications-and-updates/orkney-transmission-project-conditional-decision-final-needs-case

¹Available at: www.ofgem.gov.uk/publications-and-updates/shetland-transmission-project-consultation-final-needs-case-and-delivery-model

¹Available at: www.ofgem.gov.uk/publications-and-updates/update-shetland-isles-transmission-project-and-potential-next-steps

Certain View growth investment: Argyll, Central and Western Isles

Overview

The Argyll, Central and Western Isles region of the north of Scotland transmission system covers the mainland to the west of Perth and Inverness along with the Inner and Outer Hebrides island groups (**Figure 2.10**).

The electrical spine of this region is the 400kV/275kV Beaully to Denny overhead line. At Beaully, there is interconnection with the Moray Firth circuits to the east and the Caithness circuits to the north. Together, this configuration allows for the bulk transfer of renewable energy generated in the north of Scotland to energy consumers further south.

At Fort Augustus, a single 132kV radial overhead line spurs off to serve the islands of Skye and, via a 33kV subsea cable, the Western Isles.

In the Central region around Tummel and Errochty, 132kV circuits provide connection with the Eastern region and completes an electrical 'ring'.

To the west, a single 132kV overhead line connects Errochty with Killin and onwards to Sloy and Argyll. The network in Argyll and Kintyre comprises long 132kV circuits running down the Kintyre peninsula to Crossaig and 132kV circuits to Taynuilt.

Strategic network development

Over the past decade there have been two major reinforcements to the transmission system in the Argyll, Central and Western Isles region:

1. The Beaully to Denny overhead line, energised in 2015; and
2. The Kintyre to Hunterston subsea cable, completed in 2016.

These investments increased the capacity for renewable generation connections in, respectively, the north and west.

Kinardochy Reactive Compensation

The Kinardochy Reactive Compensation investment will allow for the management of voltage on the Beaully to Denny line, and so increase the system capacity for renewable generation (**Table 2.4**).

While this investment was recommended to 'Hold' in the 2018/19 NOA, our detailed analysis demonstrates the need for completion by 2024. This follows on our analysis of system operability benefits outwith the scope of the NOA, along with incorporating the generation that has contracted for connection over-and-above 2018/19 NOA assumptions.

Name	Type	Description	Output	RIIO-T2 cost (Total cost†)	Delivery	
(1) Strategic wider investments that have been given a consistent sustained 'proceed' signal by the NOA						
	None					
(2) Sole-Use and Shared-Use infrastructure investments that commenced during RIIO-T1 and will be completed in RIIO-T2						
2	Glen Kyllachy	Sole Use	3km new overhead line and cable to connect onshore windfarm, and connection substation works	48 MW	0.7 (7.3)	End 2022
1	Carradale Grid Supply Point	Sole Use	Upgrade to existing substation to accommodate distributed generation	39 MW	4.6 (8.4)	End 2022/23
(3) Other investments with strong evidence of certainty now						
4	Kinardochy Reactive Compensation	Strategic Wider / Shared Use	- New Kinardochy 275kV (400kV capable) substation with reactive compensation - Overhead line diversion works	+325/-225 MVar	92.6 (106.0)	End 2024/25
3	Glenshero	Sole Use	0.2km new cable to connect onshore windfarm, and connection substation works	168 MW	4.1 (4.4)	End 2023/24
5	Millennium South	Sole Use	Overhead line and substation works to connection onshore windfarm	25 MW	3.0 (4.4)	End 2022
(4) Activities required to ensure timely investment						
5	Other	Shared Use	Other onshore pre-construction	Development	24.9	n/a

†Some investments might incur costs during RIIO-T1 or RIIO-T3

Table 2.4 Certain View growth investments: Argyll, Central and Western Isles

Skye

The existing 160km overhead line from Fort Augustus to Ardmore was constructed between 1956 and 1989, and is now reaching the end of its life. The circuit is 'full', with connected generation beyond that permitted by the national transmission system planning standard[†].

The efficient development of this part of the transmission system is complex to assess as it must take into account: maintaining security of supply for local communities, the existing asset, future system need (both demand and generation) and other network developments (including the Western Isles). This assessment must consider viable network development pathways that will realise net zero emissions targets.

In this Business Plan, we argue that there is an evidence-based need to invest in this part of the system during the RIIO-T2 period (page 61). However the detail of the investment remains subject to stakeholder consultation and the granting of planning consents. We propose an uncertainty mechanism to release funding for the investment upon the granting of necessary consents.

Western Isles

The Western Isles have a significant renewable energy resource that cannot be developed due to lack of electrical grid infrastructure.

In March 2019, Ofgem consulted on its minded-to reject position on our proposal for a 600 MW HVDC link between Lewis and Beaulieu[†]. Ofgem expressed concern that, for the known generation interest, 600 MW of capacity might be underutilised, and instead indicated it would be minded-to approve a 450 MW option (or equivalent protections for consumers). However, Ofgem also noted that a condition of two onshore windfarms being awarded CfDs in the 2019 auction would need to be met.

On 23 October 2019, Ofgem advised that, in light of the CfD auction outcome, the condition had not been met^{††}. Accordingly it has asked us to fully review the investment. We are now working with stakeholders on a revised Needs Case submission before end 2019/20.

Generation

Existing generation in the Argyll, Central and Western Isles region is predominately large-scale onshore wind, hydro and local distributed generation.

We expect further generation to connect in this region during the RIIO-T2 period. Four investments that facilitate renewable generation connections are included in the Certain View (Table 2.4). Expenditure on other connections would be funded through uncertainty mechanisms (section 6).

Demand

The west of Scotland is characterised by an excess of generation relative to demand. However, as local generation is intermittent renewable energy, it cannot be relied upon to provide security of supply.

Transmission investment to accommodate renewable generation is also an opportunity for cost-effective improvements to security of supply for remote communities. Our Western Isles Link and Skye Reinforcement have been developed to increase security of supply on the islands.

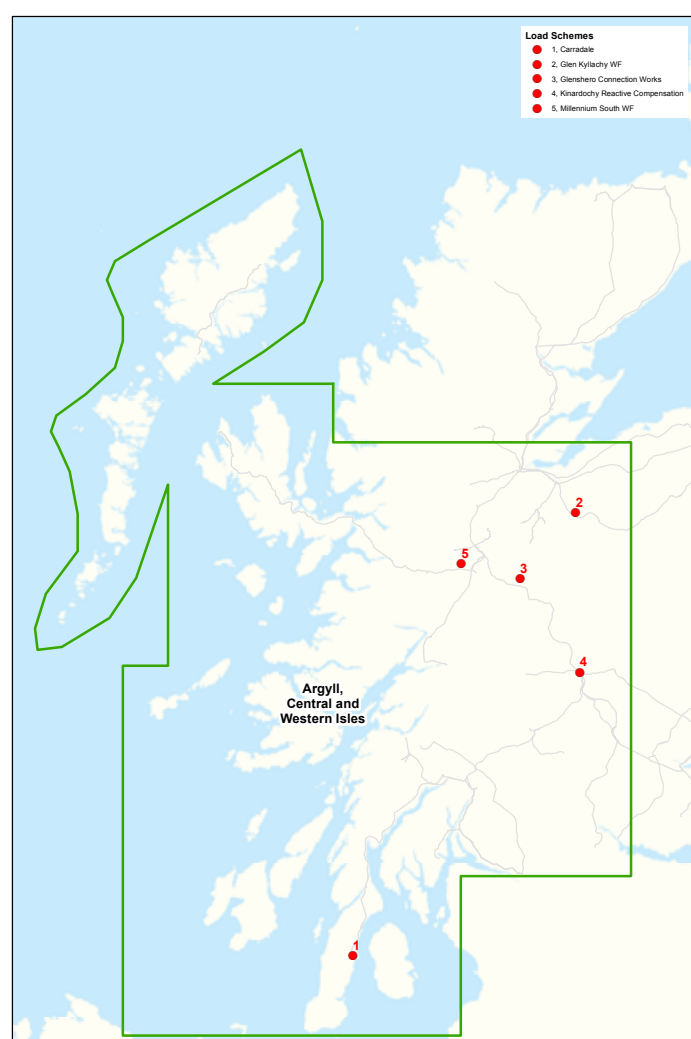


Figure 2.10 Certain View growth investments: Argyll, Central and Western Isles

[†]A derogation from the standard was granted by Ofgem in 2010. Available at: www.ofgem.gov.uk/ofgem-publications/52816/100709shettl-western-isles-decisionpdf

^{††}Available at: www.ofgem.gov.uk/publications-and-updates/western-isles-transmission-project-consultation-final-needs-case-and-delivery-model

^{†††}Available at: www.ofgem.gov.uk/publications-and-updates/update-western-isles-transmission-project-and-potential-next-steps

Ready to Deliver Net Zero



Acting quickly and efficiently to maintain net zero emission pathways during the RIIO-T2 period

During the development of this Business Plan and our summer 2019 consultation, stakeholders expressed strong support for the Certain View and our approach to protecting end consumers from the cost of uncertainty about future energy generation and demand. However, some stakeholders also expressed concern that this approach might result in delay to investments required beyond the Certain View.

This final RIIO-T2 Business Plan includes specific actions to mitigate that risk. These actions build upon our learning from the RIIO-T1 period, where we have demonstrated a strong track for on time and on budget capital delivery.

Long term network planning

We take a long term approach to network planning using future energy scenarios (including net zero emissions pathways) combined with detailed regional assessment. This closely involves stakeholders in both the assessment of the energy system need and the strategic optioneering assessment of investment options.

Our RIIO-T2 Business Plan builds upon our well established and effective approach to network planning. Our new [Stakeholder Engagement Strategy](#) embeds this way of working and sets out our intention to go further, including to advocate for our customers' and stakeholders' needs. We will extend our working with the ESO on the NOA, with local authorities on Local Area Energy Plans (page 97) and wider stakeholders to develop whole system thinking (pages 134-137).

Pre-construction development works

The greatest risk to timely system investment is the potential lead time between the confirmation of need to invest and the initiation of construction activities. This risk can be reduced by undertaking pre-construction development works in parallel with the assessment of need. This includes environmental impact assessments, routing studies, technology reviews and consenting.

This RIIO-T2 Business Plan includes £129 million of pre-construction expenditure to ensure timely growth investment. If this expenditure is not required, then we are committed to return any unused allowances to customers.

Regulatory framework

A second significant risk to timely system investment is the potential time associated with regulatory assessment and release of funding. Our RIIO-T2 Business Plan proposals are not designed to remove Ofgem's discretion in relation to the efficiency of capital investment. However, as was demonstrated through the RIIO-T1 price control period, well designed regulatory mechanisms can be put in place to provide transparency around when capital investment will be allowed and aligned with the confirmation of need, so reducing risk to the end consumer.

We propose five uncertainty mechanisms that are designed to specifically mitigate timely delivery risk and build upon the learning from RIIO-T1: the volume driver, the Strategic Wider Works reopener, the High Value Transmission Projects reopener, the pre-construction reopener, and a reopener for operability and system management. These are described in section 5.

Organisational readiness

While this RIIO-T2 Business Plan is based on the Certain View, our scenario analysis, including the Likely Outturn Assessment, allows us to identify the people, skills and capabilities to deliver more than the Certain View. This includes collaborating with our supply chain on future construction requirements to optimise the efficiency in delivery.

We have a strong track record of organisational responsiveness to uncertainty. During the RIIO-T1 period, our annual average growth capital investment has been nearly £300 million, of which over two-thirds was uncertain at the start of the period ([Figure 2.11](#)). Despite this uncertainty, we have delivered all required system investments on time.

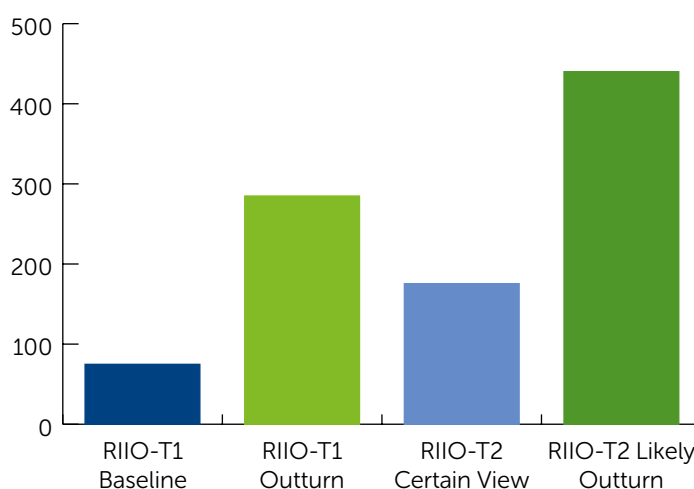


Figure 2.11 Annual average growth capital investment (£m)



Maintaining and Investing in the Existing Network

Contents: Section 3

Summary of Targets and Expenditure	50
Aspiring for 100% Reliability for Homes and Businesses	51
A Risk-Based Approach to Asset Management	52
Identifying the Need for Asset Intervention	55
Certain View Asset Investment: Eastern	58
Certain View Asset Investment: Caithness, Orkney and Shetland	60
Skye	60
Certain View Asset Investment: Argyll, Central and Western Isles	61
Certain View: Direct and Indirect Operations	64
Measuring Reliability and Target Outcomes	66

Maintaining and Investing in the Existing Network

STRATEGIC THEME



Safe and Secure Network Operation

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

CLEAR GOALS



Aim for 100%
transmission network
reliability for homes and
businesses

Main targets

Our ambition is to continue to improve the performance of the transmission network to achieve our goal of no interruptions for homes and businesses. We believe that through effective asset management and targeted investment, including in new technology, this goal can be achieved cost effectively. The targets below directly measure our progress towards achieving this goal under the Certain View.

Target	RIIO-T2 type [†]	Metric	RIIO-T1	RIIO-T2 Target
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	ODI (P/R)	MWh per annum	Annual average to date: 39 [‡]	90
Faults Total number of unplanned interruptions, of all durations and with no exclusions, on the transmission network	PCD	Number per annum	Annual average to date: 131 [‡]	72 pa. by 2025/26
Network Monetised Risk Value of asset-driven interventions as assessed by the Network Asset Risk Methodology (delta target)	PCD	Risk £ billion	RIIO-T1 forecast outturn: £210 million	£533 million (delta target)
International Benchmarking Outturn position in the composite service-cost metric in (i) International Transmission Operations and Maintenance Study (ITOMS), and (ii) International Transmission Asset Management Study (ITAMS)	ODI (Rp)	Relative position	(i) Quartile 3: lower right (ii) Quartile 1: lower left	(i) Quartile 4: upper right (ii) Quartile 4: upper right

[†]Type is a regulatory categorisation: LO = Licence Obligation; PCD = Price Control Deliverable; ODI (P/R) = Output Delivery Incentive with financial Penalty and/or Reward; Rp = Reputational; CVP = Consumer Value Proposition; UM = Uncertainty Mechanism

Cost of delivering our Certain View outputs (£m)

Our Certain View forecast expenditure during the RIIO-T2 period to deliver the capital investments described in this section is £810 million, with associated direct and indirect network operating costs of £117 million. A comparison with equivalent expenditure during the RIIO-T1 period is made on page 106.

Target	Cost category	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Replacement and refurbishment of existing assets - Lead Assets - Non-Lead Assets - Pre-construction	Capital Non-Load	91.8	160.5	188.2	248.5	121.2	810.2 636 161 13
Network Operations Inspection, maintenance and repair	Capital Load	16.5	18.7	16.8	18.7	16.6	87.3
Indirect Network Operations Asset management, network control centre and training	Closely Associated Indirect Operating	5.4	5.8	6.1	6.1	6.1	29.5

Aspiring for 100% Reliability for Homes and Businesses

Everyone needs energy to conduct their daily life and everyone expects reliable access to energy when and where it is needed.

There is a high economic and social cost for households and businesses if their supply of electricity is interrupted. A recent report commissioned by the Scottish Government forecast that a total shutdown of the Scottish electricity networks would cost the Scottish economy around £930 million per day¹.

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 cut².

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 (page 25). 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.

The importance of a reliable supply of electricity was reinforced at our stakeholder workshop in March 2019³, when we asked attendees to decide what was the most important factor in the running of the north of Scotland transmission system. Security of supply was ranked the highest, with a score of 9.46 out of 10.



"If the reliance on electricity increases, and it inevitably will do, security becomes even more important."

- Infrastructure/engineering representative

In the north of Scotland 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). Electricity consumption is higher than the GB average: the weather is can be harsher and, in the winter, it is colder and darker. The limited extent of the gas network means many buildings rely on electricity for heating.

Maintaining a reliable supply of electricity can be more challenging in the north of Scotland than elsewhere in GB. This is because many electricity consumers depend on the operation of a single overhead line for their energy. Such overhead lines can be located in remote and hostile terrain.

Despite these challenges, the reliability of the north of Scotland transmission system is very good (**Figure 3.1**). Homes and businesses rarely experience a power cut due to an event on the transmission system.

As we have developed our Business Plan for the RIIO-T2 period, we have given significant thought to our ambition for network reliability. On one hand, reliability is very good so continuation of current performance is an option. On the other, stakeholders emphasise that, although a power cut is low probability, there is potentially a very high social and economic impact.

Our conclusion, based on the views we have heard, is that to continue to strive for no power cuts due to an event on our network should be central to what we do.

But we don't want to spend unnecessary money to achieve this goal. Thus our approach is:

- As we replace or refurbish equipment as part of the normal asset lifecycle, or when we install new equipment to grow the network, we will seek optimal reliability. This remains subject to rigorous options assessment and cost benefit analysis.
- Under our risk-based approach to asset management, we can identify assets that are starting to show signs of material deterioration and target intervention where it is cost effective to do so. This might be asset replacement or refurbishment, preventative maintenance or emergency response planning.
- We will roll out remote monitoring equipment as standard on equipment during new installation, replacement or refurbishment to enable our transition to risk-based operations.



Respondents to the consultation on our draft RIIO-T2 Business Plan expressed concern about the potential cost of our reliability goal. We are clear that any investment we make must be needed and economically justified. Thus we aim to achieve this goal through working smarter, not by spending more. We have revised the wording of the goal in response to stakeholders' views.

¹Black Start Event – Assessment of the Socio-Economic Costs and Recovery Standards for Scotland, EY Report to the Scottish Government, April 2018

²Study 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>

³A full report of the stakeholder event is available at: www.ssen-transmission.co.uk/media/2730/ssen-transmission-stakeholder-workshop-report.pdf

A Risk-Based Approach to Asset Management

About asset management

Asset management is how we look after and get the best from the equipment that makes up the north of Scotland transmission system. Our approach to asset management seeks to achieve the best possible network performance (measured by the reliability of electricity supply, [Figure 3.1](#)) for an efficient whole asset lifecycle cost. We aim to consistently improve our asset management capabilities to ensure we deliver efficient outcomes and do not over or under invest in our asset base.

The north of Scotland transmission asset base

The transmission system in the north of Scotland has undergone significant growth over the past decade to accommodate new renewable generation.

Figure 3.2 shows the Regulated Asset Value (RAV) – a proxy for the value of the network – has increased ten-fold (solid line). This is due to substantial capital investment (bars) of up to £575 million per annum. The majority of this capital investment has been to grow the capacity of the network, with less than 20% on the management of existing assets. The growth of the network has also brought new technology and equipment types such as:

- High Voltage Direct Current (HVDC) convertors and cables
- Assets operating at 220kV AC voltage
- Reactive compensation equipment

The geographical extent of the network has also grown. New subsea cables cross the Moray Firth and Firth of Clyde. Numerous new overhead lines, cables and substations connect renewable generators across the north of Scotland.

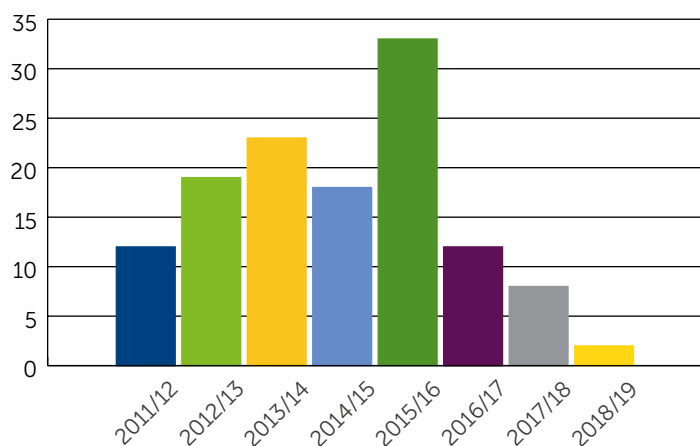


Figure 3.1 Loss of supply events

Source Loss of supply events of >3 minutes duration resulting in a power cut to end consumers. Data available at: www.nationalgrideso.com/insights/transmission-performance-reports

About asset management

Our approach to asset management must be seen in the context of our growing network and the needs of our network users in the north of Scotland. This is important as this context means that our asset management requirements are unique and unusual. Typically, the operators of long life network infrastructure will have a 'steady state' asset management requirement, with the overall size of the asset base staying near constant. For these operators in most years, new additions to the asset base will equal assets being removed in that year.

In contrast, our network has both that legacy steady state element plus a substantial element of nearly new assets and continued growth. [Figure 3.3](#) shows the age profile for our overhead line spans. This clearly shows the scale of new build over the past decade, with previous peak of construction in the 1950s.

As our network has grown, so we have had to grow our asset management approach and capability. We have sought to do this in a measured way, in tandem with the network growth and not too fast or slow. Specifically this has required:

- Developing and implementing new asset management practices for the new types of equipment. Of note has been the successful operational deployment of HVDC, where we entered into a long term service agreement with the manufacturer to support operations and train our employees.
- Investing in new IT systems to store and analyse asset data. This includes our new work and asset management system, condition based replacement management modelling tool and geographic information system.
- Increasing the number of people we employ and widening our skills base. This includes technology specialists and asset engineers, as well as field-based colleagues.

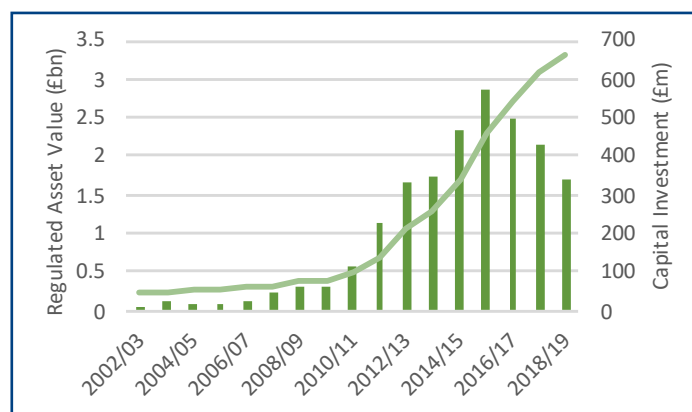


Figure 3.2 Growth of north of Scotland transmission network

Source Data from Annual Accounts. Available at: www.ssen.co.uk/Library/FinancialInformation/

This RIIO-T2 Business Plan describes the continued growth of the north of Scotland transmission network. Under the Certain View, we forecast the RAV will be around £5 billion by 2026. Thus we view the RIIO-T2 period as ongoing transition and development of our asset management approach.

Our long term asset management ambition

Our long term goal beyond 2026 is to be world class in asset management. This means the best possible service for our customers at an efficient cost for end consumers.

Given the context of our growing network, we are not currently world class. International benchmarking has given us insight into our strengths and weaknesses, and how we can efficiently increase our capabilities.

Our planning for the RIIO-T2 period is focused on continued steady and measured development of our asset management capability. We will successfully deploy new assets to grow the network and, at the same time, improve overall system reliability.

We are using two international approaches to measure our performance:

1. To assess and measure our asset management capabilities, we use the Asset Management Excellence Model developed by international consultancy AMCL[†] (Figure 3.4). This provides a comprehensive framework of 39 business activities that are essential to asset management excellence.

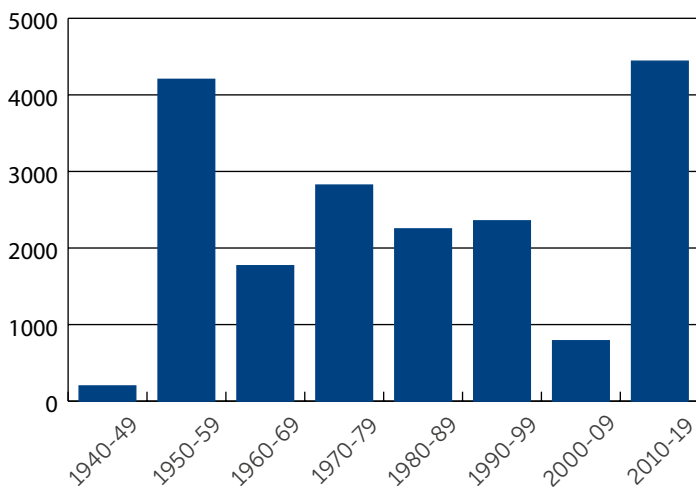


Figure 3.3 Age profile for overhead line spans

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 and development of NOMs 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 covering all aspects of AC and HVDC operations on the north of Scotland network

April 2019

New governance model implemented.

Our plans for continued capability development include a new Network Control Centre, new warehousing facilities and improvements to essential communications and digital infrastructure

[†]For more information see: www.amcl.com

2. We participate in benchmarking studies with international transmission operators. This allows us not only to measure and compare our performance, but also to share best practice and learn from global leaders. We have set a goal of being an upper quartile (i.e. top 25%) operators in the International Transmission Asset Management Study (ITAMS) by 2026.

Embracing the AMCL model gives us a framework for excellence in asset management. Through this we can identify areas of key capability development – including strategy, policy, people and skills, risk management and asset lifecycle management.

We submitted data to ITAMS for the first time in 2017. We are currently undertaking our second cycle of benchmarking with results expected in spring 2020. Initial indications are that we will have improved markedly from the 2017 outcome, as we have applied the learning from international comparators.

Risk-based approach

We are currently making the transition to a risk-based approach to asset management and network operations. This transition will continue during the RIIO-T2 and early RIIO-T3 periods.

Asset management

Historically, the need for intervention on network assets has been determined using age, condition and performance data combined with manufacturers' recommendations.

All of the GB TOs have developed at the direction of Ofgem, and are in the process of implementing, a risk-based model for asset management. This approach calculates the probability of failure of an individual asset and the consequences of failure for safety, environmental and network outcomes. The intention of this model is to provide a common measure against which the relative riskiness of individual asset failures – and the benefits of intervention – can be compared.



Figure 3.4 AMCL Asset Management Excellence Model

We will continue with the development of this model during the RIIO-T2 period. At this time, the model is still relatively immature, untested, and limited in scope (Table 3.1). We have applied the risk-based model in the development of this Business Plan. The output has been used to inform our capital investment programme, along with traditional condition and performance information in the prevailing statutory and industry framework.



We are certified under ISO 55001, which specifies the requirements for the establishment, implementation, maintenance and improvement of a management system for asset management

Network operations

Likewise, 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. 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.

However 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.

In scope	Not in scope
Drivers <ul style="list-style-type: none"> Asset Growth (in part) 	Drivers <ul style="list-style-type: none"> Growth (in part) System
Lead Assets <ul style="list-style-type: none"> Transformers and reactors Circuit breakers Underground cables Overhead lines (conductors, fittings and towers) 	Non-Lead Assets <ul style="list-style-type: none"> Circuit switchers Disconnectors Earth switches Busbars, post insulators and fittings Instrument transformers Ancillary systems, e.g. batteries Protection, control, telecommunications and smart monitoring systems Civils and buildings

Table 3.1 Scope of risk-based model

Identifying the Need for Asset Intervention

READ more...

SUPPORTING DOCUMENT 8. [A risk-based approach to asset management](#)

SUPPORTING DOCUMENT 8A. [Network Asset Risk Methodology](#)



There are four steps to our comprehensive, evidence-based approach to identifying the need for asset intervention (Figure 3.5).

STEP 1. Data Gathering

Accurate, up-to-date asset data is critical to asset management.

Visual on-site data gathering and assessment is undertaken on a time-based inspection schedule. The data collected varies by asset type and observed condition. In addition, physical tests are used to assess the internal condition of assets. For example, oil sampling and dissolved gas analysis for transformers and reactors, and CORMON analysis and/or sampling of overhead line conductors and earth wires. All our asset condition information, current and historical, is held within our secure asset databases.

STEP 2. Risk-based Analysis

The risk-based modelling for assessing the relative risk associated with failure of lead assets is undertaken.

The output of this modelling is a monetised risk value for each lead asset item. A high monetised risk value is not necessarily an indication of the need to intervene. For example, a new asset in good condition could have a high value if the impact of failure is significant (e.g. many customers experience loss of supply or risk to the public). Thus, relative monetised risk values are an important tool in our methodology, but not sufficient justification in itself to intervene.

The Electricity Safety, Quality and Continuity (ESQC) Regulations

The ESQC Regulations are a statutory instrument with two main elements:

1. To specify safety standards which are aimed at protecting the general public, our employees and contractors from danger; and
2. To specify power quality and supply continuity requirements to ensure an efficient and economic electricity supply service for consumers.

The Regulations cover overhead lines, underground cables and substations, as well as requirements for protection and earthing of electrical equipment. We are required by law to comply with the ESQC Regulations and, hence, the Regulations set a minimum standard for the asset management of our network.

STEP 3. Options Assessment

This is the critical stage in our methodology as it brings together asset data and risk assessments with the economics and practical delivery of different intervention options. At this stage, wider network requirements (including for growth and operability needs) are considered to explore options for integrated, whole system solutions. Accordingly we will take into account outage costs, system constraints and customer impacts associated with intervention options, and how the proposed work efficiently fits into the long term network development plans.

STEP 4. Intervention Plan

The final step is the collation of all of the evidence and analysis into summary justification papers, and integration of the preferred options into our whole system intervention plan. This is a 'live' document revised for new information and analysis.

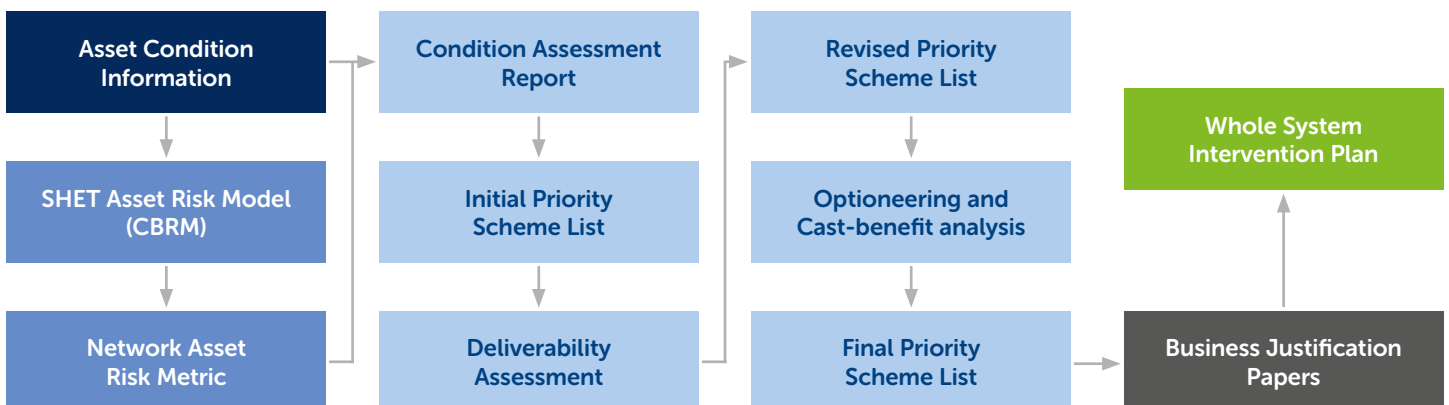


Figure 3.5 Methodology for identifying the need for asset intervention

Through the application of this rigorous methodology we can have confidence that we have identified and considered all of the evidence necessary to choose the right intervention option and timing.

CASE STUDY. Hydro connections

Substation works at Aigas and Kilmorack, Culligran, Deanie, Foyers, Glenmoriston, Quioch, Sloy, St Fillans, Tummel Bridge

During the RIIO-T2 period we intend to replace equipment in the connection substations for ten hydro electric power stations. In each case this is equipment that has reached end-of-life based on condition data. We have engaged with the customer for each of these sites to discuss the need for the intervention, confirm the customers' future needs and assess whether our works could be co-ordinated with planned customer works.

Detailed site specific consideration of intervention options has been undertaken. In each case, the primary driver for the preferred option has been to minimise the impact of the intervention. Other impact factors have been compliance with safety standards (including ESQC Regulations) and environmental constraints. In some sites, associated equipment is being replaced in advance of end-of-life. Our assessment demonstrates that this approach is of lower overall cost than undertaking two separate interventions.



Fire wall degradation, St Fillans PS

CASE STUDY. Port Ann to Crossaig 132kV overhead line works

The highest cost asset intervention in our RIIO-T2 Business Plan is the rebuild of 49km of overhead line in Argyll.

The primary reason for the intervention is asset condition. The overhead line was constructed in 1960, and is now evidencing significant deterioration of towers, fittings and foundations. The line does not meet modern standards and does not have an earthwire. Consequently, there are significant issues with the performance of the circuits with the number of faults occurring being very significantly above average and placing the circuit as one of the worst performing on the whole network.

In assessing intervention options, consideration was given to future growth requirements to accommodate local contracted and known generation. While none of this is sufficiently certain to justify growth investment now, our cost benefit analysis (using least worst regret) demonstrates the economic benefits of constructing the replacement overhead line with an option for a future upgrade to 275kV capability.



Tower foundation, Port Ann to Crossaig

CASE STUDY. East Coast

As we describe in section 2, the main transmission circuits on the East Coast are a significant bottleneck for further renewable generation growth and so need to be upgraded during the RIIO-T2 period. As these investments will largely be in existing infrastructure, there are also benefits to network condition and performance – this has been explicitly considered as part of the options assessment.

The scope and design of the East Coast investments – North East 400kV, East Coast Onshore 275kV Upgrade and East Coast Onshore 400kV Upgrade – have been optimised to address current and near term asset drivers; for example on the overhead lines between Kintore, Fetteresso and Alyth.

The scale of investment on the East Coast also impacts upon access to the network. For example, remedial works at Persley substation have been efficiently deferred as outages are not available to undertake works during the RIIO-T2 period.



Fetteresso to Alyth overhead line

Following our four step methodology, 28 asset-driven investments are to be undertaken during the RIIO-T2 period. These are described in the following pages.

Each of these 28 schemes makes multiple asset interventions. Our options assessment, and cost benefit analysis, demonstrates that in many instances it is more cost-effective to combine asset interventions in a single scheme than have multiple single-asset schemes. The total number of assets that will be replaced or refurbished is shown in [Table 3.2](#).

For lead assets that can be assessed using the common network risk methodology, we have assessed the lifetime risk benefit arising from our 28 investments to be £55 billion. Over the RIIO-T2 period alone, the monetised risk benefit is forecast to be £533 million. These values are in comparison to a counterfactual of undertaking no investment.

Following these 28 investments, the overall monetised risk of lead assets will be £790 million higher than at 1 April 2021.

We have carefully considered whether further investment on lead assets is required during the RIIO-T2 period given this forecast increase in monetised risk. However our detailed consideration of the network investment options has concluded that there is no economic case for further investment. Hence, this increase in monetised risk is justified.

We keep this assessment under constant review, given the inputs to the monetised risk calculation are dynamic. Should the case for any investment be revised materially during the RIIO-T2 period then we would deploy the regulatory substitution mechanism to ensure only justified investments are undertaken.

The monetised risk methodology currently only covers lead assets. We have plans to develop new risk-based models during the RIIO-T2 period to expand the range of assets covered by the metric. Our objective is to have modelling developed and tested by 2026 that cover all electrical assets.

Innovation and whole system

During RIIO-T1 we jointly developed with Cyberhawk, a visual asset management company, a platform that combined drone captured images of towers, fixtures, fittings and overhead conductors with a framework for assessing condition. This allowed us to capture images of our network without having to take circuit outages, a great example of innovation for us and one that had clear benefits around safety and increased network resilience.

We want to continue that development of our ways of working in RIIO-T2. We will look at how to get more up to date information on the condition of our assets. As part of our Integrated Condition and Performance Monitoring programme, where we identify that an asset warrants increased monitoring, either through the age of the asset or a decreasing reliability, we will look to install online monitoring. This could take the form of online condition assessment of transformer oil condition through Dissolved Gas Analysis. Having this information would allow us to identify the optimal time for intervention and co-ordinate with other surrounding network developments. Additionally we will look to improve the way we work at a process level. By expanding the monetised risk methodology to cover nonlead assets, we enable more innovative and whole system thinking as we better understand the potential impact of asset failure.

"If you grade things on risk, you know the monetised impact to failure, you can do something forward looking and innovative"

- Infrastructure engineering representative

	Lead Assets		Non-Lead Assets
Estimated investment (£m)**	636		161
Assets replaced or refurbished	18 nr.	132kV transformers	There are currently no common reporting categories for non-lead assets. The Certain View includes intervention on a wide range of asset types, including 412 items of non-lead switchgear (circuit switchers, disconnectors, earth switches etc)
	11 nr.	275kV transformers	
	1 nr.	reactors	
	74 nr.	132kV circuit breakers	
	13 nr.	275kV circuit breakers	
	28 km	132kV underground cables	
	294 km	132kV overhead lines	
Monetised risk value (£bn)	1.22	At 1 April 2021	<i>There is currently no monetised risk methodology for non-lead assets. We are committed to support the development of a common methodology during the RIIO-T2 period</i>
	2.54	At 31 March 2026 (no intervention)	
	2.01	At 31 March 2026 (with intervention)	
	-0.53	Target output (delta)	

*Will not add to 28 total schemes, as the majority of schemes include both lead and non-lead assets

**Estimate based on allocation of lead and non-lead assets, and pro-rata split of other costs

Table 3.2 Asset-driven interventions during RIIO-T2

Certain View Asset Investment: Eastern

Overview

The Eastern region of the north of Scotland transmission system covers the east coast from Perth to Peterhead, and the Moray Firth coast from Peterhead to Elgin (**Figure 3.6**). Total asset investment of £253 million will be undertaken in the Eastern region during the RIIO-T2 period (**Table 3.3 and Figure 3.7**).

This region is the most electrically dense of the north of Scotland transmission network. 267km of 275kV overhead line runs parallel with the Moray Firth coast from Beaulieu to Peterhead. The line splits into two at Kintore, and two 185km overhead lines run south to Kincardine and Glenrothes. These circuits in the north east and on the east coast, which are used for the bulk transfer of renewable energy, are to be upgraded in the RIIO-T2 period (pages 42-43).

Also along the Moray Firth coastline is 103km of 132kV overhead line that serves the communities of Nairn, Elgin, Keith and Macduff. Some refurbishment and replacement of these assets was undertaken during the RIIO-T1 period. Further minor work is required to replace the 132kV busbar at Keith substation in 2025.

From Peterhead, a local 132kV overhead line connects communities in the far northeast, along with the St Fergus gas terminal. Being in a saline, marine environment these assets can degrade more quickly than assets away from the coast. Refurbishment and replacement works on the overhead line and at two substations are largely due to degraded asset condition.

The city of Aberdeen is served by a 132kV 'ring' network connected to the main Kintore and Persley supergrid substations. Likewise, the city of Dundee has a 132kV network connected to Tealing supergrid substation. Both cities have a number of 132/33kV substations that export electricity onto the local distribution networks.

Our North of Scotland Future Energy Scenarios work (pages 31-32) has indicated that Aberdeen and Dundee will see growth in electrical load over the coming decade, largely due to the electrification of transport. Our system modelling shows that forecast load growth will exceed the capacity of local grid substations potentially triggering upgrades to the transmission system.

Name		Intervention	Description	Monetised Risk Output*	RIIO-T2 cost	Delivery
	Peterhead Inverugie 132kV OHL Works	Overhead line refurbishment	7km of overhead line to have new phase and earth conductors, with tower remediation and local ground works	6.66 (1,389)	10.3	2024
	Redmoss Clayhills Cable Works	Underground cable replacement	5km of underground cable replacement	7.05 (2,156)	13.1	2023
	Elmwood Glenagnes Cable Works	Underground cable replacement	2km of underground cable replacement, with minor refurbishment of 1km existing overhead line	3.58 (917)	11.4	2025
1	Keith Substation Works	Substation asset replacement	Replacement of 132kV busbar	7.27 (22)	39.0	2025
2	Kintore Substation Works	Substation asset replacement	Replacement of busbar, transformers and cables	9.70 (450)	74.2	2026
3	Peterhead Substation Works	Substation asset replacement	Replacement of busbar, transformers and cables	5.88 (3)	36.7	2026
4	Redmoss Substation Works	Substation refurbishment	Refurbishment of substation assets and civil works	3.34 (-20)	0.5	2023
5	St Fergus Mobil	Substation asset replacement	Replacement of substation assets and additional circuit breakers	31.80 (-110)	12.7	2025
6	Tealing Substation Works	Substation asset replacement	Replacement of transformers, circuit breakers and associated equipment and structures	3.64 (56)	9.3	2024
7	Willowdale Substation Works	Substation asset replacement	Replacement of transformers and circuit breakers	7.69 (-80)	45.4	2026

*£Rm. Lifetime benefits shown in brackets

Table 3.3 Certain View asset investments: Eastern

Our analysis concludes that the current transmission system can accommodate load growth, under the Certain View, during the RIIO-T2 period. However, we are committed to work with local stakeholders over the coming five years to develop whole system city strategies for Aberdeen and Dundee. We expect this work to be part of the Local Authorities' Local Area Energy Plans (page 97). We are also looking at the growth of EVs and other Low Carbon Technology through partnerships with Scottish Government as well as innovation funded projects.

Thus our approach to the city transmission assets for the RIIO-T2 period is to maintain and only intervene where there is no other option. This reduces the risk of potential stranded investment. In total we will invest £70 million to replace two sections of underground cable and replace substation assets that have been in operation for over 50 years.

The local 132kV east coast overhead line that connects Aberdeen to Dundee via Fiddes and Brechin does not demonstrate need for intervention over the coming decade. However this circuit is now at full capacity due to the volume of local renewable generation, so we will consider its future as part of our regional network development assessment.

Kintore and Tealing supergrid substations, both critical to security of supply to end consumers, require intervention during the RIIO-T2 period. In Tealing, these are minor works to replace 50 year old assets that are now performing poorly. In Kintore, where there are limited options to undertake work within the substation while maintaining security of supply, a full re-build of the substation is justified.

Changes from draft Business Plan consultation

- **Dudhope:** proposed asset replacement at Dudhope substation in Dundee has been substituted with enhanced maintenance. The cost of these maintenance activities is outweighed by the benefits of deferring works at Dudhope to allow development of the whole system Dundee City strategy.
- **St Fergus Mobil:** further asset investigations during summer 2019 have identified condition concerns with key substation assets. When combined with operational limitations, our analysis concludes in favour of intervention.

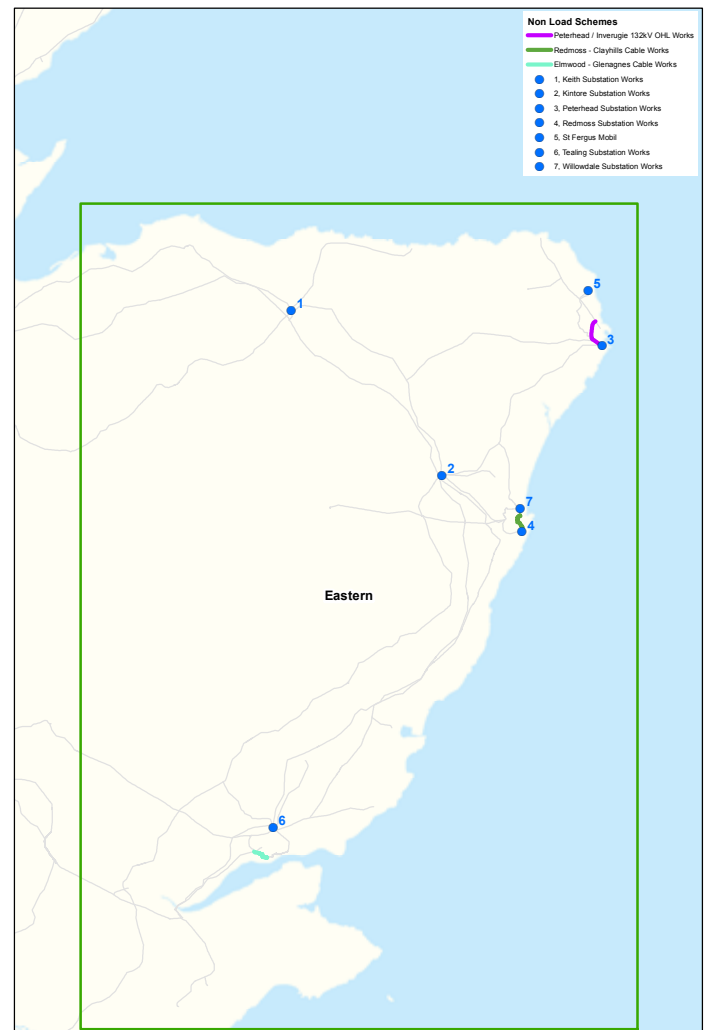


Figure 3.6 Certain View asset investments: Eastern

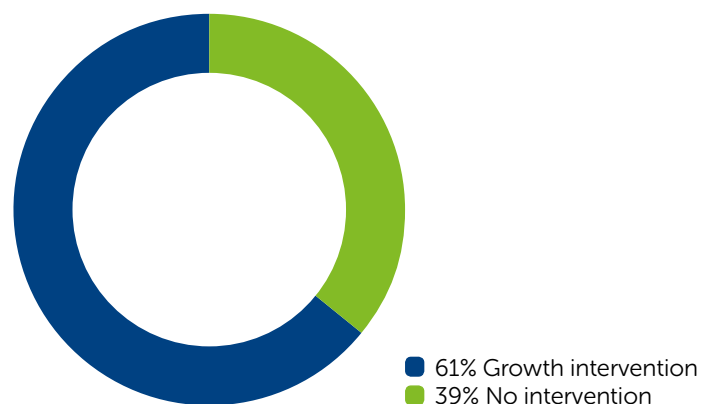


Figure 3.7 Asset intervention: 275kV overhead line, Eastern region

Certain View Asset Investment: Caithness, Orkney and Shetland

Overview

The Caithness, Orkney and Shetland region of the north of Scotland transmission system covers the mainland to the north of Inverness along with the island groups of Orkney and Shetland.

Our detailed assessment has not identified any necessary asset interventions in the Caithness, Orkney and Shetland region during the RIIO-T2 period ([Table 3.4](#)).

Name	Intervention	Description	Monetised Risk Output	RIIO-T2 cost	Delivery
-	None	-	-	-	-

Table 3.4 Certain View asset investments: Caithness, Orkney and Shetland

Skye

The Skye transmission network consists of a single 132kV overhead line that extends over 160km of challenging terrain from Fort Augustus 400kV substation to Ardmore on Skye (Figure 3.8). From Ardmore, there are two SHEPD owned 33kV subsea cables; one to Loch Carnan on South Uist and the other to the Isle of Harris. The 132kV transmission circuit continues from Harris to Stornoway. The security of supply on Skye and the Western Isles is dependent on the Skye circuit as the only connection to the main GB electricity grid.

The 9km line section from Fort Augustus to the Skye Tee point is of trident wood pole construction, completed in June 2017. From Skye Tee to Quoich, we are currently installing 19km of trident wood pole to replace single circuit steel lattice towers dating from 1956. The 64km line section from Quoich to Broadford is supported by double circuit steel lattice tower structures, strung on one side only, completed in 1980. The last 68km section from Broadford to Ardmore, the construction is trident wood pole built in 1989. Our rigorous asset assessment methodology demonstrates that there is a strong need for intervention on the 132km between Quoich and Ardmore before 2030.

In addition to asset risk, there are both demand and generation needs to be met on the Skye transmission network:

- To restore supplies during prolonged outages of the Skye transmission circuit, SHEPD relies on mobile and fixed diesel generators on Skye and the Western Isles. Given the light construction of the transmission line, over the most challenging terrain, its reliability is poorer than other lines. This line has an environmental impact due to the high carbon intensity of the backup diesel generators. Working with SHEPD, there is an opportunity to improve security of supply.
- The amount of generation connected on the Skye circuit (137 MW) exceeds the rating of the existing line¹, with an additional 177 MW either contracted or offered to connect and a significant further volume having expressed interest.

In developing potential solutions to meet the identified need, we considered technical, environmental and geographic constraints on the design and safe operation of the assets along with views expressed by stakeholders. We have used a scenario-based pathway approach, where we look into the medium to long term network requirements and identify potential development pathways for the network. This allows us to compare incremental developments of the network to balance investment and operational costs, the risk of asset stranding, the economic and environmental impacts of frequent interventions, and impacts on end consumers. A cost benefit analysis (CBA) was undertaken on the shortlisted pathways to refine the list further. Based on the outcome of this analysis, further detailed analysis was undertaken considering line section capacity requirements, more localised environmental constraints and stakeholder feedback to date.

The outcome of this work is certainty over the need to intervene and economic appraisal confirms the net benefits of replacing the overhead line between Quoich and Ardmore as soon as possible. As part of this RIIO-T2 Business Plan we are proposing a two-stage regulatory framework for the approval of this capital investment:

1. With this Plan we set out the evidence of a certain need for investment, along with the comprehensive approach we have taken to assessing the investment options. We include within the Certain View the cost of pre-construction development work.
2. A reopener mechanism (High Value Transmission Projects, page 81) that allows us to make a within-period application for the efficient cost of construction following the outcome of the statutory planning process.

We understand the concerns of some stakeholders about the construction of new transmission infrastructure between Fort Augustus and Ardmore. We remain committed to working with all stakeholders to find the solution that meets local community, generator, environmental and GB society needs.

Certain View Asset Investment: Argyll, Central and Western Isles

Overview

The Argyll, Central and Western Isles region of the north of Scotland transmission system covers the mainland to the west of Perth and Inverness along with the Inner and Outer Hebrides island groups (**Figure 3.8**). Total asset investment of £545 million will be undertaken in the Argyll, Central and Western Isles region during the RIIO-T2 period (**Table 3.5**).

Hydro connections

The configuration of the transmission network in the north of Scotland was designed to connect hydro electric power stations and serve remote rural communities. The era of 'power from the glens' was the 1950s and 1960s, and many of the assets installed at that time are reaching the end of their economic life.

We intend to undertake work to replace or refurbish substation assets that connect ten hydro electric power stations at: Aigas, Culligran, Deanie, Foyers, Glen Moriston, Kilmorack, Quoich, St Fillans, Sloy and Tummel Bridge. As each site is different, the scope of work required and the most economic option varies. In each site, we have collaborated with the customer in developing the intervention option.

Work at four of these substations – Aigas, Culligran, Deanie and Kilmorack – has been optimised as part of a wider programme that includes refurbishment of the 23km Beaulay to Deanie 132kV overhead line constructed in 1960, and replacement of the 132kV substation at Beaulay:

- The Beaulay Deanie overhead line passes through several protected landscapes, including the Glen Affric to Strathconon Special Protection Area (SPA). Refurbishment of the 60 year towers with replacement of phase and earth conductors will extend the asset life by around 15 years.
- Beaulay substation was constructed in 1970 as a 132/33kV site. The site does not meet modern safety and environmental standards, and installed assets are evidencing both internal and external deterioration. Given the system criticality and local stakeholder impacts, detailed options assessment has been undertaken including consideration of visual and environmental factors.

Skye transmission network and Western Isles

In addition to the overall replacement of the Fort Augustus to Ardmor overhead line (previous page) and Quoich connection works (above), there are three interventions to be undertaken in the Skye / Western Isles area:

1. Refurbishment of the 2km Invergarry Tee overhead line.
2. To replace poor condition assets at Broadford substation and make changes that will improve operational performance.
3. Rebuild of the 58km Harris to Stornoway wood pole overhead line as a lower cost option than ongoing maintenance and case-by-case pole replacement.

Argyll

The Argyll region is characterised by long 132kV overhead line circuits that connect remote communities and collect distributed hydro and wind generation. Much of this network was constructed in the 1950s and 1960s. Our assessment demonstrates the need to intervene on three overhead lines during the RIIO-T2 period:

- The 132kV overhead line between Sloy power station and ScottishPower Transmission's Windyhill substation, of which 15km is in our operating area. Substantial refurbishment, including replacement of the earth and phase conductors, will extend the life of the asset.
- The 132kV overhead line between Dunoon and ScottishPower Transmission's Whistlefield substation, of which 17km is in our operating area. A variety of drivers and local factors justify the rebuild of this 48 year old asset.
- During the RIIO-T1 period the northern section, from Inveraray to Port Ann, of the 132kV overhead line down the Kintyre peninsula is being rebuilt. Following this, the 48km southern section from Port Ann to Crossaig will be similarly rebuilt. This line dates from 1960, with conductors replaced in 1991. Based on our cost benefit analysis (using least worst regret) this investment has been scoped to realise the economic benefits of constructing the replacement overhead line with an option for a future upgrade to 275kV capability.

Changes from draft Business Plan consultation

- **Aigas and Kilmorack:** detailed consideration of the cost effective delivery of these hydro connection works has identified cost savings from combining the two investments



We have provided to Ofgem detailed options assessment with CBA and cost breakdown for each capital investment in our Certain View. These are confidential, but please get in touch if you would like further information

Name	Intervention	Description	Monetised Risk Output*	RIIO-T2 cost	Delivery
Beaully / Aigas Deanie 132kV OHL Works	Overhead line refurbishment	23km of overhead line to have new phase and earth conductors, with tower remediation	0.13 (26)	19.0	2023
Harris Stornoway 132kV OHL Works	Overhead line replacement	Replacement of 58km of overhead line	143.10 (47,681)	35.8	2026
Invergarry T 132kV OHL Works	Overhead line refurbishment	2km of overhead line to have new phase and earth conductors, with tower remediation	0.01 (1)	2.4	2025
Sloy Windyhill East 132kV OHL Works	Overhead line refurbishment	15km of overhead line to have new insulator sets and earthwire, with tower remediation	1.60 (344)	16.5	2023
Sloy Windyhill West 132kV OHL Works	Overhead line refurbishment	15km of overhead line to have new insulator sets and phase and earth conductors, with tower remediation	1.97 (365)	16.8	2024
Whistlefield Dunoon 132kV OHL Works	Overhead line replacement	Replacement of 17km of overhead line	14.03 (464)	40.8	2023
Port Ann Crossaig 132kV OHL Works	Overhead line replacement	Replacement of 49km of overhead line	14.89 (1,089)	138.2	2025
1 Beaully Substation Works	Substation asset replacement	Replacement of transformers, circuit breakers, switchgear and associated equipment	81.69 (364)	89.8	2026
2 Broadford Substation Works	Substation asset replacement	Replacement of circuit breakers, switchgear and associated equipment	153.53 (-401)	1.0	2023
3 Culligran Substation Works	Substation asset replacement	Replacement of single transformer substation	2.24 (25)	14.3	2026
4 Deanie Substation Works	Substation asset replacement	Replacement of single transformer substation	2.25 (15)	14.6	2026
5 Foyers Substation Works	Substation asset replacement	Replacement of transformer and cable	4.27 (83)	41.6	2026
6 Glenmoriston Substation Works	Substation asset replacement	Replacement of single transformer substation	1.55 (28)	5.7	2026
7 Kilmorack Aigas Substation Works	Substation asset replacement	Replacement of two single transformer substations	3.10 (36)	27.6	2026
8 Quoich Tee Substation Works	Substation asset replacement	Replacement of switching station, and local overhead line diversion works	-0.34 (-43)	13.6	2025
9 Sloy Substation Works	Substation asset replacement	Replacement of transformers, circuit breakers, switchgear and associated equipment	0.83 (44)	45.3	2025
10 St Fillans Substation Works	Substation asset replacement	Replacement of single transformer substation	1.20 (37)	6.8	2025
11 Tummel Bridge Substation Works	Substation asset replacement	Replacement of transformers and new cable works	2.47 (16)	14.8	2025

*£Rm. Lifetime benefits shown in brackets

Table 3.5 Certain View asset investments: Argyll, Central and Western Isles

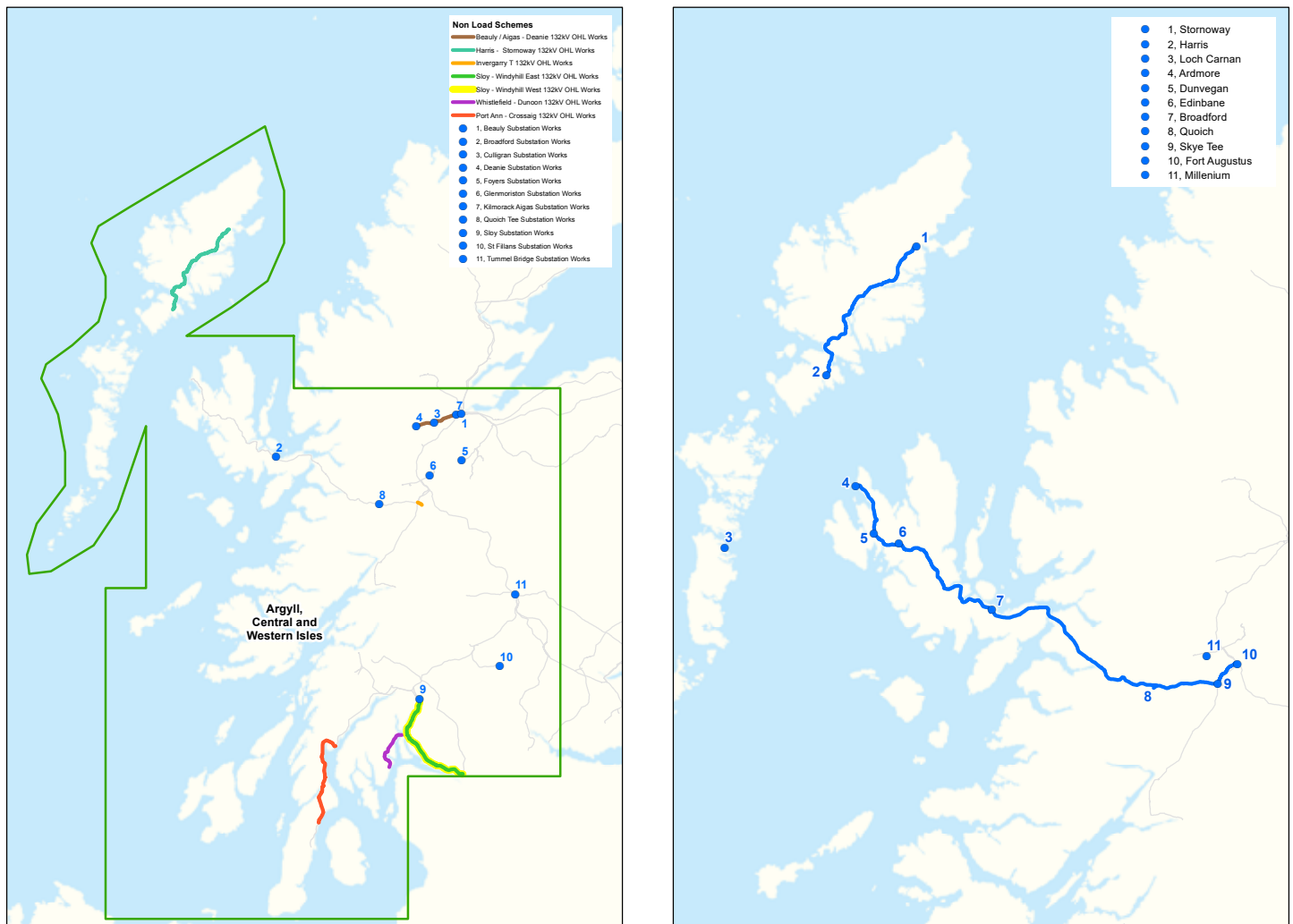


Figure 3.8 Certain View asset investments: Argyll, Central and Western Isles

The map on the left shows all of the investments to replace or refurbish existing assets in the Certain View.

The map on the right shows the scope of the Skye investment described on page 60. Our analysis demonstrates the need to progress this investment during the RIIO-T2 period. However, the specifics of the intervention remain subject to further stakeholder engagement and the outcome of the planning process. We intend to use the High Value Transmission Projects uncertainty mechanism to make a within period application for construction funding.

Certain View Direct and Indirect Network Operations

Direct operations

Direct operations are the activities we undertake for the day-to-day operation and maintenance of the north of Scotland electricity transmission system.

These activities include:

Inspection and maintenance of all of the component parts of the transmission system, incorporating the electrical equipment, communications networks, and buildings and civil engineering structures. We use both direct inspection techniques and remote monitoring tools. During the RIIO-T2 period we will undertake this activity on a time-based schedule, but begin to trial some risk-based approaches.

Management of spares, being the equipment we hold for use to restore the network. We have plans during the RIIO-T2 period to significantly improve our capabilities for warehousing and spares (page 72), to meet the requirements of our larger network. The activity described here is separate from that investment.

Fault repairs as required due to unplanned interruptions on the network. Faults are typically due to external factors (such as weather or landslides) and, rarely, equipment failure. We currently experience around 131 faults per annum, and have a target to reduce this to 72 by 2025/26.

Vegetation management around our equipment, such as tree cutting in the vicinity of overhead lines or keeping down vegetation within substation sites.

The scale, and hence cost, of our direct operations is closely related to the extent and complexity of the network. That is, how many substations are there, what is the total length of overhead line and cable, how many different types of technology are deployed, and how many users of the network there are.

As the network has grown over the past decade, so our direct operations activities have grown commensurately:

RIIO-T1 We are forecasting overall growth in the costs of direct operations during the RIIO-T1 period by 350% (Table 3.6). Over that same time, the value of the asset base will increase by around 300% (Figure 3.2). Increased costs are primarily due to the introduction of HVDC and subsea technology onto the network, with secondary impacts from a larger workforce and stock required for a larger activity base (page 53).

RIIO-T2 Certain View Over the five years of the RIIO-T2 period, we expect a further 7% increase in our direct operations costs, while the value of the asset base will increase by 61%. Our assessment concludes that the efficiency benefits from new technologies (including IT investment) and ways of working will result in productivity improvements that largely offset growth and economic pressure on our cost base.

Given the potential for the network to grow beyond that envisaged in the Certain View, we have proposed an Operating Cost Escalator mechanism (page 82). This would result in an automatic increase to allowed expenditure on the completion of capital investments over-and-above the Certain View.

(£m)	RIIO-T1		RIIO-T2				
	2013/14	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Direct Operations	3.2	17.6	16.5	18.7	16.8	18.7	16.6
Inspection and Maintenance	2.9	11.2	9.6	11.7	9.7	11.4	9.1
Fault repairs	3.2	17.6	16.5	18.7	16.8	18.7	16.6
Vegetation management	0.1	1.2	1.8	1.9	1.9	2.0	2.1
Other costs, e.g. building repair	0.1	4.1	3.9	3.9	4.0	4.0	4.1
Indirect Operations	1.4	5.0	5.4	5.8	6.1	6.1	6.1
Asset management	0.3	1.7	2.2	2.2	2.2	2.2	2.2
Control room	n/a	2.2	2.4	2.4	2.4	2.4	2.4
Operational training	1.1	1.1	0.8	1.2	1.5	1.5	1.5

Table 3.6 Certain View direct and indirect operations

Indirect network operations†

There are three key activities that we undertake that are essential to support our direct network operations:

Asset management which is the back office function that gathers and analyses our asset information, develops our practices and policies, and makes decisions on the need for asset intervention. We have a long term ambition to be world class in asset management. We will continue to grow and develop our capabilities towards that goal over the coming decade.

Network control room is the activities that undertakes both the real time operation of the transmission network with the ESO, and develops forward plans for network operations (including outage planning, page 66). We have plans during the RIIO-T2 period to establish new network control room facilities (page 76), to meet the modern security and operation standards for our larger network. The activity described here is separate from that investment.

Operational training is the necessary safety training to allow our employees and contractors to work on the high voltage transmission network. We do not allow anyone access to our equipment or sites without the designated certifications.

As with direct operations, the scale and cost of our indirect network operations is closely related to the extent and complexity of the network. While we continue to continue to see increases in the early years of the RIIO-T2 period, again primarily due to the integration of HVDC operations, costs are flat thereafter.

Real Price Effects (RPEs)

RPEs is a regulatory term that refers to input price increases above the prevailing inflation metric. Typically this will consider national and regional labour costs, and global plant and material prices. Where forecasts indicate that these items are likely to increase during the price control period in excess of prevailing inflation, then an RPE escalator would be applied.

Our analysis of the RIIO-T2 period demonstrates that there is likely to be real wage increase of 1.1-1.3% per annum above inflation. This translates to an overall RPE escalator of 0.46% of total expenditure, which we have applied in our Certain View.

This has been applied after a total factor productivity assumption for operating expenditure of 0.3% to 0.6% per annum.

We do not identify any RPE for plant and materials.

Operating cost efficiency

Our direct and indirect network operations costs represent a relatively small proportion of our overall total expenditure: around 4% of our Certain View. However we remain vigilant to ensuring that these costs are efficiently incurred.

Two analytical studies give us confidence in the relative efficiency of our costs:

International Transmission Operations and Maintenance Study (ITOMS)

We are currently engaged in our fourth cycle of benchmarking in this international study of the relative efficiency of transmission operators. Our performance in previous cycles has shown that for our service outcomes, we benchmark as low cost / average service (quartile 3) (Figure 3.9). We have set a target to achieve low cost / high service (quartile 4) outcome by the end of the RIIO-T2 period.



Figure 3.9 Results from 2017 ITOMS benchmarking

Transmission Cost Benchmarking project

We participated in the Transmission Cost Benchmarking project undertaken by Sumicsid and the Council of European Energy Regulators (CEER). We subsequently engaged consultants to undertake independent analysis of these data for our UK peers and European TSOs.

This analysis demonstrates, using the project's totex models, our historic and forecast operating expenditure† is 100% efficient when compared with the 27 participating transmission owners (using Sumicsid's definitions). For a range of sensitivities, such as length of network and scale of total expenditure, this conclusion is unchanged.

Overall, this study concludes that our operating costs would need to increase by 25% to be below the 100% efficiency assessment.

A Network for Net Zero

†These activities are part of a broader regulatory cost classification called Closely Associated Indirect (CAI) Operating Costs. Other activities in the CAI category include system planning, commercial management and customer connections, and stakeholder engagement (page 106).

†This analysis is of our total operating costs, including all CAI and other business support costs.

Measuring Reliability and Target Outcomes

READ more...

SUPPORTING DOCUMENT 10. [Network Access Policy](#)

SUPPORTING DOCUMENT 12A. [Regulatory framework: Outputs, Incentives, Consumer Value Proposition and Innovation](#)



For homes and businesses

Our clear goal is to aim for 100% transmission network reliability for homes and businesses



We have set three main targets to measure our performance towards achieving this goal:

- Energy Not Supplied (ENS)
- Number of unplanned interruptions (or faults)
- Network Monetised Risk reduction during the RIIO-T2 period

ENS is the volume of energy to customers that is lost (not supplied) as a result of faults or failures on our network (**Figure 3.10**). This measure uses a nationally agreed methodology and has a number of exclusions.

ENS is subject to a regulatory incentive, under which we receive a financial reward if the actual volume of unsupplied energy is below the annual target and a financial penalty if the volume is above target. We support continuation of this incentive with a 25% tightening of the target to 90 MWh per annum.

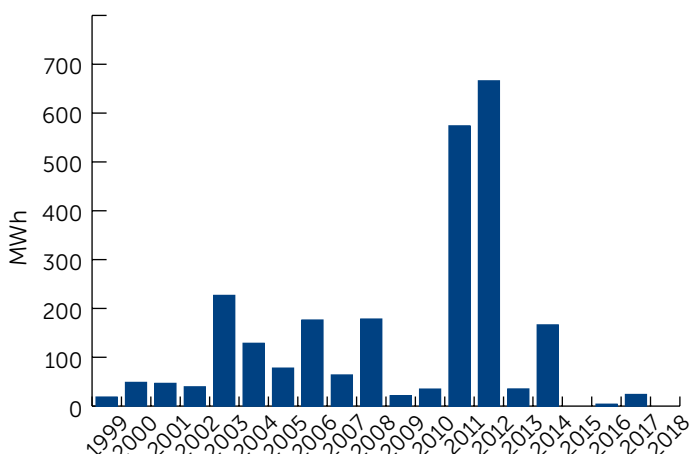


Figure 3.10 ENS performance

For generators

When completing these necessary infrastructure investment or maintenance, parts of our network can be temporarily taken out of service.

In general, this does not impact continuity of electricity supply to homes and businesses. However, the impact on generation customers can be material:

- In some circumstances, generators will be paid for loss of access. These 'constraint costs' are ultimately recovered from the end consumer.
- In other circumstances, generators will lose access without financial recompense. This is common in the north of Scotland (in particular for distributed generation) where generators terms of connection can include specific provisions for network unavailability.

The Network Access Policy (NAP) is a key tool in ensuring these outages are well planned. The NAP seeks to ensure outage planning is efficiently coordinated between network owners to benefit customers and consumers by minimising whole system costs while meeting climate change obligations. Through the NAP we can work together to identify high impact outages and take early action to assess the options for minimising that impact.

The NAP works optimally when it is reviewed regularly, and the benefits are measured and monitored. We are committed to demonstrating continuous improvement of NAP implementation, as we have taken the lead on to date. We will hold ourselves to account publicly through our Enhanced Reporting Framework (page 103), as well as being accountable to connections customers impacted by outages through the Quality of Connections survey (page 96).

Our whole system network planning approach, embodied in the NAP, goes beyond the minimum requirements for a transmission owner. This encompasses our commitment to go further than year ahead outage planning. Working with the ESO we have assessed an incremental consumer benefit (termed Consumer Value Proposition) of £5 million during the RIIO-T2 period.

In addition to these outcomes, we are committed to protect consumers by returning allowed expenditure for outputs that are not delivered during the RIIO-T2 period.



Security of Supply

Contents: Section 4

Summary of Targets and Expenditure	68
Resilience and Security of Supply	69
Operating a Growing Network of Increasing Complexity	71
Certain View Asset Resilience	72
Certain View Network Control	76
Certain View Data and IT	77

Security of Supply

STRATEGIC THEME



Safe and Secure Network Operation

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

CLEAR GOALS



**Aim for 100%
transmission network
reliability for homes and
businesses**

Main targets

Our ambition is to continue to improve the performance of the transmission network to achieve our goal of no interruptions for homes and businesses. Central to achieving that goal is continual vigilance as to the threats to security of supply and taking timely, cost effective steps to address those threats. The targets below directly measure our progress towards achieving this goal under the Certain View.

Target	RIIO-T2 type ¹	Metric	RIIO-T1 Equivalent Output	RIIO-T2 Output by 31 March 2026
Reliability: Digitising the network Installation of smart monitoring and establishing real time asset analytics at a dedicated control room facility	PCD	Smart monitoring installed on critical assets	None	62
Redundancy: Back up assets Inventory management systems to be of industry best practice commensurate with larger network size and range of technologies	PCD	Specialist warehousing facilities	0	2
Resistance: Protection and control Maintain modern protection systems	PCD	Number of protection and control systems upgraded	None	64 protection 33 RTUs replaced
Resistance: Physical security Security upgrades at critical sites	PCD	Number of substation security improvements	None	23 deter 55 detect
Response and Recovery: Substation resilience All substations to meet minimum duration of operation without a mains supply of electricity	PCD	Number of substations of increased 120 hours standalone operational capability	None	116

¹Type is a regulatory categorisation: LO = Licence Obligation; PCD = Price Control Deliverable; ODI (P/R) = Output Delivery Incentive with financial Penalty and/or Reward; Rp = Reputational; CVP = Consumer Value Proposition; UM = Uncertainty Mechanism

Cost of delivering our Certain View outputs (£m)

Our Certain View forecast expenditure to deliver the network outcomes described in this section is £330 million.

Target	Cost category	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Back-up assets: Warehousing and spares <i>Including purchase of critical assets</i>	Capital Non-Load	11.7	20	18.3	1.9	1.7	53.6
Protection and control	Capital Non-Load	8.4	16.3	16.2	16.3	7.8	65
Physical site security <i>Including to climate change threats</i>	Capital Non-Load	6.2	9.6	7.8	6.9	3.4	33.9
Substation resilience	Capital Non-Load	6.4	12.3	12.3	12.3	5.9	49.2
Reliable communications	Capital Non-Load	0.3	0.4	0.5	0.5	0.2	1.9
Other (POPM)	Capital Non-Load	1	1.8	1.8	1.8	0.9	7.3
Control centre and smart monitoring	Capital Non-Load	8.0	15.5	15.5	15.4	7.3	61.7
Digitisation, data and IT <i>Including business IT</i>	Capital Non-Load and Non-Operational	9.9	14	15.9	12.3	5.7	57.8

Resilience and Security of Supply

Being resilient

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[†]:

“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 4.1**). 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.

Reliability

The reliability component of resilience is concerned with the design and operation of the network under a range of conditions. It includes making interventions to maintain, replace or refurbish assets before their performance deteriorates below expected standards (see section 3).

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 3.1**). 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.

Some connected customers requested, and we provided, network configurations that do not provide 100% network availability. 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 (page 66).

The majority of our actions during the RIIO-T2 period to ensure network reliability are described in section 3: maintaining and investing in the existing network. In this section we describe the long term steps we are taking in the transition to risk-based network management through digitising the network. During the RIIO-T2 period we will install smart monitoring on critical assets and establish asset analytics (including in real time) at a dedicated network control facility.

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[‡].

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.

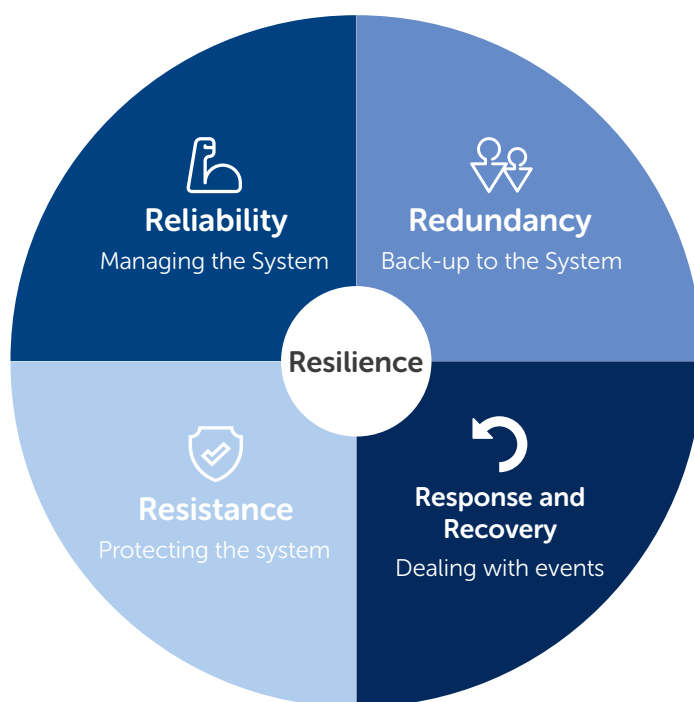


Figure 4.1 Components of network resilience

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 either in-house or through third party agreements, to deal quickly with asset failure.

Resistance

The resistance component of resilience is concerned with preemptive 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.

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

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.

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. 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.

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.

In light of changes to the GB energy system, the Government and Ofgem are currently reviewing the GB restoration standard for a Black Start. The recommendation from the joint industry working group is to increase the substation resilience standard to 120 hours. Government is expected to make a decision on this recommendation within the coming months and, as a prudent planning assumption, we have adopted this recommendation for new and refurbished substation interventions during the RIIO-T2 period.

Operating a Growing Network of Increasing Complexity

There are substantial differences in our planning for infrastructure resilience during RIIO-T2 when compared to the RIIO-T1 period (**Table 4.1**).

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 (**Figure 3.2**). It has a different age profile, topology and technology mix. It now incorporates 220kV AC and HVDC assets on land and subsea. As the network has grown, along with connected renewable generation, so we have had to change our organisation, ways of working and capabilities.

2. External threats

There is ever greater awareness of the threats in the landscape in which we operate, be these physical threats from third party actors, natural hazards including a changing climate, or cyber threats. Experience from international network operators demonstrates that these threats are real, and the impact on society, the environment and economy can be substantial.

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 energy network operators 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.

Our expectation in planning for the RIIO-T2 period is that these known pressures on infrastructure resilience will continue to grow, along with an expectation from stakeholders that we will take all possible steps to maintain the integrity of electricity supplies.



"Have a plan and stage a prioritised recovery. SHE Transmission needs to know that each critical part is secure before it opens up new parts of the network."

- Academic[†]

We are also forward looking.

This RIIO-T2 Business Plan describes the strong drivers for the further growth of the north of Scotland transmission system and the new approaches and technologies that we intend to deploy. For example the transition to a risk-based approach to asset management and operations will bring cost savings. However, if the transition is not thorough and rigorous, could increase the risk of asset failure and vulnerability to cyber threats.

In addition we recognise that new and currently unknown threats to resilience might emerge during the RIIO-T2 period. This emphasises the critical importance of business continuity planning, both by ourselves and as part of national forums such as the Centre for the Protection of National Infrastructure. We must maintain best practice, share learning and undertake regular simulation exercises.

Accordingly, as with the RIIO-T1 period, we must continue to strengthen our organisational and system capabilities in tandem with the growth of our network and the development of best practice in resilience planning.

Component	Key change from RIIO-T1 period	Material impact on...
Reliability	<ul style="list-style-type: none"> Generator type and location Consumer behaviour and energy use Implementation of NARM New technology, including digitisation and dynamic data 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Network growth New technology Risk-based approaches to planning and operations 	<ul style="list-style-type: none"> Risk associated with critical single points of failure Need for asset spares and warehousing
Resistance	<ul style="list-style-type: none"> Network growth New technology Growing physical and cyber threats 	<ul style="list-style-type: none"> Need for physical site security Many protection systems now obsolete Consequences of a changing climate
Response and Recovery	<ul style="list-style-type: none"> Generator type and location New Government standards (tbc) 	<ul style="list-style-type: none"> Business Continuity Planning Expectations for emergency response System tools available for Black Start

Table 4.1 Drivers for change

[†]A full report of the stakeholder event is available at: www.ssen-transmission.co.uk/media/2730/ssen-transmission-stakeholder-workshop-report.pdf

Certain View Asset Resilience

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.

We have used the four strategic components of infrastructure resilience to develop a comprehensive programme of outputs that are necessary for safe and secure network operation (Table 4.2). These are described in the following pages.

Back up assets: Warehousing and spares

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.

Whilst we will continue to work with other network owners where appropriate, the new technologies that we have energised and the increased expectation to restore network security as quickly as possible 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.

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.

This detailed review has identified significant benefits from moving to a centralised approach. This approach would also enable improved physical and cyber security measures to be adopted. In addition to our own facilities, we would continue to use equipment sharing and service level agreements with manufacturers.

Investment Type		Description of Output	RIIO-T2 cost	Delivery
Redundancy	Back up assets: Warehousing and spares	<ul style="list-style-type: none"> Two new staffed warehouse facilities Secure inventory management IT system Purchase of critical spares 	53.6	2024
Resistance	Protection and control	<ul style="list-style-type: none"> Refurbishment of bay protection at 23 sites Enhance 41 bay protection schemes with post event and real time monitoring Replacement of 33 remote terminal units, and upgrade to communication systems 	65	2026
Resistance	Physical security	<ul style="list-style-type: none"> Install CCTV and alarms at 56 sites Upgrade fences at 27 sites Install anti-climbing devices on around 1000 towers 	33.9	2026
Resistance / Response and Recovery	Substation resilience	<ul style="list-style-type: none"> Energy efficiency and solar PV installed at 85 substations Install around 130 EV charging points Works at 92 substations to ensure all sites are capable of 120 hours of standalone operation 	49.2	2026
Resistance / Response and Recovery	Reliable communications	<ul style="list-style-type: none"> Install 410km of OPGW, and multiplexers at 66 sites Install secure DCNs in all substations Full network coverage of PMRs and VOTN 	1.9	2026
Other	Persistent Organic Pollutants Management (POPM)	<ul style="list-style-type: none"> Replacement of voltage and current transformers at 21 sites 	7.3	2026

Table 4.2 Expenditure forecast for Certain View asset resilience investment

Protection and control

System protection acts as a fuse box that immediately isolates and automatically 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.

Like any asset with both hardware and software components, system protection requires both maintenance and risk-based replacement.

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.

During RIIO-T2, we propose to refurbish protection at 23 sites and enhance protection at a further 41 sites. These interventions will address equipment at end of life, asset obsolescence and implement the new requirements of STCP 27-01.

Control systems are used 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.

Substation SCADA systems generally consist of on-site Remote Terminal Units (RTUs), local communications systems and Human Machine Interfaces (HMI) for local control and monitoring of equipment. RTUs take alarms (e.g. protection operated, CB open) and other information and pass back to the central SCADA system (PowerOn) and to local HMIs. RTUs also process controls from the control system to individual assets.

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.

During RIIO-T2, we will replace RTUs that are at end of life or due to asset obsolescence. We will also replace HMIs and associated network equipment with modern equivalents, allowing communication with digital substation systems and all existing protocols.

Stakeholders' views

In March 2019 we held an event¹ for stakeholders to explore the options for warehousing and spares, protection and control, and black start and network resilience. The structure of the event was a presentation on the topic and options, round table discussion and voting exercise. 46 stakeholders attended, representing 31 organisations.

During voting exercises, stakeholders were asked to review the options and vote on a preferred approach. In exercise 1, stakeholders were provided with the un-costed options in order to understand their general views on the principle. In exercise 2, the costs of each option were revealed to ascertain what stakeholders felt was value for money. A summary of the results of the voting exercises can be found in **Table 4.3** below.

For all of the topics explored, stakeholders concluded that we should go beyond the minimum standard (equivalent to legal compliance only) and the average outcome did not change when costs were revealed. We agree with these stakeholders' views and intend to implement the preferred option for each topic.



"It was a great opportunity to discuss issues at the table and speak to the SSE experts."

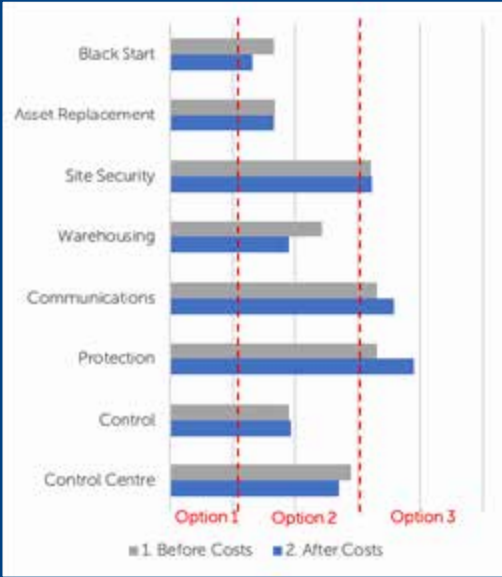


Table 4.3 Summary of stakeholder voting

¹A full report of the event is available at: www.ssen-transmission.co.uk/media/2730/ssen-transmission-stakeholder-workshop-report.pdf

Physical security†

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) by:

- Maximising the time taken for an intruder to breach the perimeter once detection has taken place; and
- Prevent an intruder from breaching the perimeter.

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 have identified necessary security deterrent measures at 23 substations and detection measures at 55 sites.

Emergency response and contingency 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.

We will continue with our thorough approach to Business Continuity Planning taking steps to improve as required, this includes the purchase of 12 new temporary masts for use in emergency situations.

We continue to roll out the industry technical specification‡ for anti-climbing devices on overhead lines, and during RIIO-T2 intend to install upgraded measures on 69 existing circuits.

Substation resilience

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.

Taking steps to increase the resilience of the electricity transmission system to these threats is beneficial to both security of supply and the environment.

We intend to undertake a range of measures to increase substation resilience during the RIIO-T2 period. First, to reduce and decarbonise energy use at substations. Second, to install EV charging points that enable the electrification of our operational fleet. Finally to maintain our flood risk models, and take actions where required.

Loss of mains electricity supply is a threat to the continued safe operation of substations. 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.

During the RIIO-T2 period, we will undertake a programme of works to upgrade substations for 120 hours operation without a mains supply of electricity, in line with recent industry working group recommendations. This work will provide both back up supply and diversity of supply. There will also be upgrades to existing provisions to accommodate the increased power requirements of technologically complex substation usage and operational technology networks (OTN).

Reliable communications

The north of Scotland transmission network is undergoing significant changes in both the quantity of system data available and the way that information is collated, with increasing levels of data capture and transfer for both existing and new power system monitoring, and Internet Protocol based networks equipment to support the various dependent functions.

†Excludes physical site security upgrades for critical national infrastructure (see pages 83-84)

‡Technical Specification 43-90 Anti-climbing measures and safety signs for overhead lines, Energy Networks Association, 2013.

New procedures agreed with the ESO and the modernisation of our protection systems are both placing a significant and increasing demand on information transfer capacity. To fully support this digitisation, we rely on a communications network which must be high speed, high bandwidth, secure and resilient to ensure the integrity of protection, control and monitoring of the transmission system.

During the RIIO-T2 period, we will continue our programme of completing a full, dual, diverse fibre network to all our substations, with interconnections to the adjoining ScottishPower Transmission network. To further support the increasing levels of data capture and transfer for both existing and new power system monitoring equipment and the resultant higher demand on information transfer capacity, we will also install secure data network connections (DCNs) and cyber security devices into all substations.

In addition to secure and reliable network communication, we also rely on communication between our employees whether on site, travelling or at our Network Control Centre.

Currently we use traditional public switched telephone network (PSTN) telephony, provided by BT over copper circuits, supported in some areas by Voice-over-IP (VoIP) and Personal Mobile Radios (PMRs). However, as BT have committed to withdrawing the PSTN by 2025, going forward we will increase our deployment of PMRs and deploy VoIP Over Operational Technology Network (VOTN) capabilities across the whole of our network.

Persistent Organic Pollutants Management

Polychlorinated Biphenyl (PCBs) have long been recognised as posing a threat to the environment because of their toxicity, persistence and tendency to bioaccumulate (i.e. to build up in the bodies of animals, particularly at the top of the food chain). As a result, their use is controlled by legislation.

The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (Scotland) Regulations 2000 requires compliance with EC Directive 96/59/EC on the disposal of PCBs and Polychlorinated Terphenyls (PCTs). This Directive required the preparation of inventories, labelling and disposal / treatment of all significant PCB holdings. Specifically it is required to identify and remove from use equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks) containing more than 0.005 % PCBs and volumes greater than 0.05 dm³, as soon as possible but no later than 31 December 2025.

To comply with this legal requirement, we will remove all PCB containing equipment. This means the replacement of 105 voltage transformers and 60 current transformers at 21 locations.

Innovation and resilience

When switchgear suffers an SF6 gas leak, it is removed from service whilst it is investigated, thus temporarily degrading system resilience. We have worked with one of our longstanding equipment suppliers FLIR to test an SF6 leakage detection camera. As the camera was being developed we used it in situations when loss of gas pressure was detected. We are now expanding its use to improve our SF6 management.

The benefits of this innovation include: quicker identification and location of leaks against previous standard process; ability to repair leaks earlier; and this leads to less leakage of a potent GHG and improved network availability and resilience.



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 (above).

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.

Certain View Network Control

Network 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 an emergency back-up facility of highly limited scope 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. This review also considered our ambitions for digitisation of our network, enhancing management of assets in real time through remote monitoring.

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.

During the RIIO-T2 period we are proposing to construct and move to a new Control Centre building that meets modern security and operational standards. Upon completion, we will vacate the existing space and put in place arrangements for this to be our back-up facility.



We have applied for funding from the Centre for the Protection of the National Infrastructure (CPNI) for the construction of our new Control Centre. Should our application be successful, we will return an equivalent amount to consumers.

Integrated condition and performance 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 intend to install remote monitoring equipment at 62 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 inspection and maintenance on a routine, time based frequency, instead allowing us to take action when required. This should realise operational efficiencies, in addition to enhanced data for investment decision-making and improved network performance.

A digital twin is a virtual replica of a physical object. Digital twins can be used for real time analytics of performance and also for modelling simulation of different operating conditions

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.

Description of Output	RIIO-T2 cost	Delivery
<ul style="list-style-type: none"> • New Control Centre • Conversion of back-up facility 	16.3	2026
<ul style="list-style-type: none"> • Remote real time monitoring of 62 critical assets • 'Digital twin' capability • Associated data storage and analytics 	45.4	2026

Table 4.4 Certain View Control Centre expenditure

Certain View Data and IT

READ and give us feedback on our draft Digital Strategy

SUPPORTING DOCUMENT 11. [Digital Strategy](#)



Business IT

Over the past five years we have made significant investment into our Information Technology (IT), including core asset and HR systems, and Operation Technology (OT), including SCADA, telemetry and network control systems. This investment has provided a foundation for the digitisation of our business, to improve our asset management performance and to enable us to operate in a smart, flexible world of greater stakeholder expectations.

IT spending as a percentage of revenue during the RIIO T1 period has been low in comparison to current peer levels (**Figure 4.3**). The expenditure set out in our RIIO-T2 Business Plan would maintain levels at lower than peer average.

During the RIIO-T2 period, we will continue that move towards digitisation. Our stakeholders have told us they want to see a “whole system design approach”, with “data driven network development”. Our investments will further improve data maturity for accuracy, completeness and timeliness, as set out in ISO 55000 and ISO 17020.

Our IT investment projects can be classified either as enablers or providers:

Providers are the platforms that deliver tangible benefits

Enablers are the necessary tools and functions to support those providers

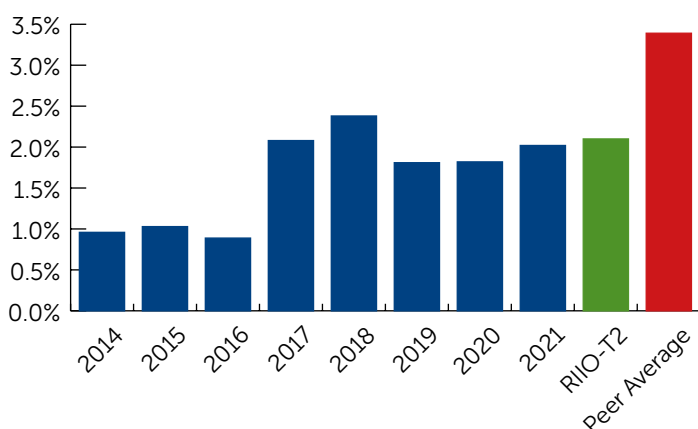


Figure 4.3 Business IT spend as % of revenue

IT expenditure is in four broad categories:

1. Asset: £22.9 million

Such as the supporting IT systems for integrated performance and condition monitoring and data analytics, along with:

- Establishment of central data lake to enable analytics
- Investment optimisation tools, covering both existing and new assets, using analytics and Artificial Intelligence
- Maturing Building Information Modelling (BIM) to Level 2 across the majority of the asset base
- Enabling technologies, including 3D metal printing and augmented reality

2. Work Management £12.8 million

To improve operational efficiency and outcomes. Encompassing asset inspection and monitoring, environmental monitoring, marine asset tools and mobility solutions

3. Customers and Connections £10.2 million

To deliver the initiatives set out in our stakeholder-led Commercial and Connections Policy including:

- Pre-connection application improvements
- Management of the end-to-end connection process,
- Harmonisation of our complaints management systems
- Improvements to our website, as requested by stakeholders

4. Operational technology £8.2 million

Being primarily the replacement of legacy obsolete systems, with improvements in:

- Integration of the new control centre, including a new disaster recovery centre
- Inter control room coordination with ESO and other TOs
- Improved situational awareness with new alarm prioritisation and replacement of obsolete equipment
- Future cyberthreat detection
- Upgrades to HVDC equipment

In addition, we intend to invest £3.7 million in enhanced cyber security for existing business IT applications. We have proposed two windows to apply for additional expenditure allowances at the mid-point and end of the RIIO-T2 period (page 83).



Following discussion with Ofgem, given changing legislative requirements and the evolving threat, we will make a full submission for investment in cyber security for operational IT in spring 2021

Digital

Digital is integral to SHE Transmission's stakeholder-led strategy, supports delivery of our RIIO-T2 clear goals, and will create a contemporary user experience for customers, stakeholders and employees. Digital will drive continuous improvement in:

- Efficiency and, therefore, value for consumers and stakeholders; and
- The reliability, resilience and sustainability of our network.

Simply put, this means providing, within a secure and controlled environment, the Right Data to the Right People at the Right Time to enable the Right Decisions.

In more practical terms, digital means having a single source of network data, supplemented by data from relevant external parties, which stakeholders can access, in a contemporary and secure manner. In the background, this includes having the data quality processes, security, and information processing and presentation to ensure information is presented in standard and usable ways, can be readily understood and provides value to stakeholders.

Digital Strategy Process Model

Our digital strategy process model (Figure 4.2) has two segmented circles, the inner circle captures the key users and business functions which the digital strategy must support, and the outer circle defines the high level activities, to be elaborated in the digital roadmap, which form the main digital workstreams.

The red borders on all segments highlights the constant thread of cyber security, to ensure that SHE Transmission's systems and data are secure, and that information is shared in a secure manner with both internal and external users.

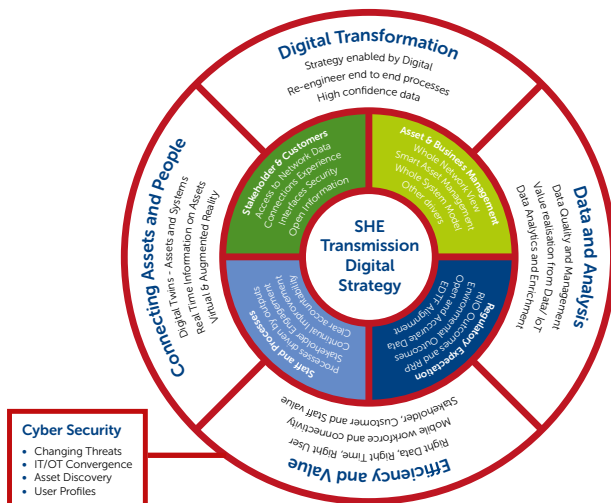


Figure 4.2 Digital strategy process model

1 Data

A single source of truth, which is validated and updated appropriately for each data type. Data is owned by the relevant business function

2 Information Technology (IT)

The applications (including design and development or procurement), tools, processing and presentation of data to enable effective collaboration with stakeholders, and efficient internal business processes

3 Cyber Security

Controlled access to information and systems, for both external and internal users, so that systems, data and users are protected

4 Operational Technology (OT)

The operational systems which monitor and control the network and ensure operational integrity is maintained, and the acquisition and processing of data, both of which provide network information to inform operations and asset management. (These systems are generally internal only and must be secure)

5 Business Process Improvement

Development of existing and new processes, to ensure reliable information is available in a timely manner to inform decisions

6 People

Equipping and training our staff and contractors (present and future) to embrace digital working, and providing access to information for all stakeholders in a contemporary manner

A green thistle flower is positioned on the left side of the page, its spiky petals and stem extending upwards. The background is a solid green color. A white rounded rectangle is located in the upper right quadrant, containing the title text.

Protecting Consumers from an Uncertain Future

Contents: Section 5

About Uncertainty Mechanisms	80
Volume and Need Uncertainty: Certain View, Likely Outturn and Net Zero	81
Unknown External Costs	83

About Uncertainty Mechanisms

READ about how we have used scenarios to quantify uncertainty in the future use of the transmission network

SUPPORTING DOCUMENT 11. [Planning for Net Zero: Scenarios, Certain View and Likely Outturn](#)

READ more on the design of our uncertainty mechanisms

SUPPORTING DOCUMENT 12A. [Uncertainty mechanisms](#)



As we look forward to the RIIO-T2 period, we know that there are many factors that could impact how we invest in and operate the north of Scotland transmission system.

While we can identify the factors, we cannot always predict the timing or the precise details. For example, we can be confident that new generation developments will connect to the electricity network – but we cannot be confident where, when or their size. In general, we only have that confidence around two years before the generator is energised.

Uncertainty mechanisms are a means to manage the risk associated with events outside our control. These mechanisms protect us: from being forced to make decisions at the wrong time and so over or under forecasting our investment needs. Importantly, these mechanisms protect consumers by only allowing us to invest when the need is certain.

Stakeholders have consistently told us that efficiently managing uncertainty is a key priority for them. This view was strongly reinforced when we consulted on our draft RIIO-T2 Business Plan. Eighty per cent of attendees at our consultation events supported our proposed uncertainty mechanisms (**Figure 1.7**).

As we have developed this RIIO-T2 Business Plan, we have been rigorous in our assessment of the certainty of need in our expenditure forecast. Because of this, we can confidently assert our Plan to be a Certain View.



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

Our approach does not allow funding without an evidence-based need. Hence there is a low risk of allowed funding being unspent.

As we have identified activities and expenditure that are of uncertain need, we have excluded these from the Certain View. These fall into two broad categories (**Figure 5.1**):

Volume and need uncertainty Where volume is primarily timing, location and scale uncertainty about future energy flows on the transmission system, in particular of renewable generators. Need relates to uncertainty about the timing and scale of making a known investment (for example the Eastern HVDC link).

Unknown external costs These are where we are required to do something required by a third party, for example by the ESO or Government, or because of a high impact event, such as a subsea cable fault.

Within these two categories there is a broad range of uncertainty. In some instances, there is certainty that it will happen, the uncertainty is about timing. For others, it may never happen.

Overall, we have identified 16 uncertainty mechanisms which are described in the following pages.

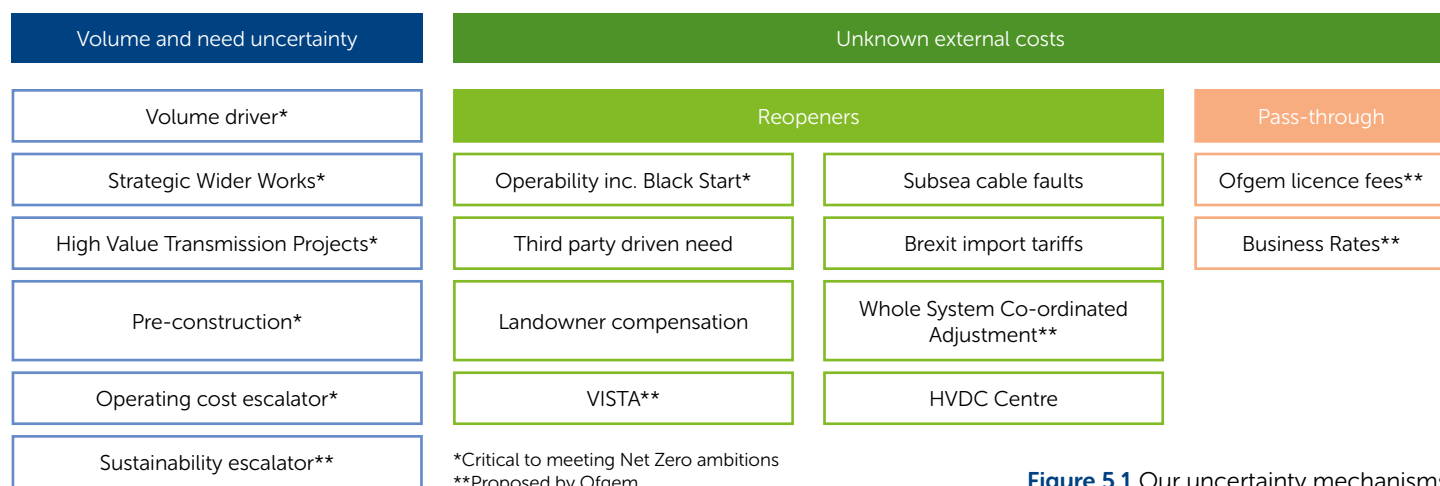


Figure 5.1 Our uncertainty mechanisms

Volume and Need Uncertainty: Certain View, Likely Outturn and Net Zero

The uncertainty

In section 2 we describe the future energy scenarios that we have used in the development of this Business Plan. Overall we have considered nine different potential pathways for the future use of energy in GB and the north of Scotland (pages 31-32).

Each of the nine scenarios presents a different requirement for the north of Scotland transmission system. For example, for existing and new connected generation in the north of Scotland, the range of potential outcomes in 2025/26 varies between 8.6 GW and 15.7 GW. The uncertainty that arises is significant:

- What generation connections will be required, where and when?
- What about the transmission impacts of changes in distributed generation and energy consumption on the local distribution networks?
- When is the right time to invest to grow strategic network capability?
- How to ensure that network development work is flexible and responsive to changing needs, so as not to result in future delays?
- What about the impact of all of this on operational activities, including due to new technologies (both network and user)?

We view this as a programme uncertainty. That is, we can be certain that activities are required, yet there is significant uncertainty about the timing, location and scale.

The challenge we face is that regulatory price control settlements, by their nature, define fixed outputs and associated expenditure for the forward looking period. To do this with confidence is impossible with such uncertainty about future network requirements. Hence, the importance of well designed uncertainty mechanisms.

Building on the insights from future energy scenarios and our learning from the RIIO-T1 period, we have developed six uncertainty mechanisms to mitigate volume and need uncertainty (**Figures 5.1 and 5.2**).

Volume driver

The connections volume driver mechanism addresses uncertainty in the timing, location and scale of:

- Infrastructure investment to connect new, predominately renewable, generation
- Changes at Grid Supply Points (GSPs) to accommodate changes in local energy generation and consumption
- Infrastructure investment to connect new offshore windfarms¹

This is an automatic mechanism that would be agreed as part of the price control settlement. In essence, fixed investment allowances would be released when predefined events occur, for example, associated with the connection of a new renewable generator.

Separate fixed allowances would be released for the construction of linear assets (e.g. overhead line) and substation elements. The fixed investment allowances for both the linear and substation allowances have been derived from detailed analysis of actual and forecast cost drivers and unit costs.

Under our Likely Outturn Assessment (page 37), we estimate that up to £400 million of investment could be released using the volume driver mechanism.

Strategic Wider Works (SWW)

The SWW mechanism addresses uncertainty in the timing of strategic investments of greater than £100 million capital cost. The scope of this mechanism is investments to increase boundary capability that are given a 'proceed' signal by the Network Options Assessment (NOA) process.

This is a reopener mechanism, that would require us to make submissions to seek in period regulatory approval for the proposed SWW investment.

In addition to the Scottish Islands' links that are in-flight under the RIIO-T1 SWW mechanism, we anticipate the Eastern HVDC link to go through the assessment process during the RIIO-T2 period.

High Value Transmission Projects (HVTs)

The HVTs mechanism addresses uncertainty in the timing, location and scale of capital investments of greater than £25 million capital cost. This includes investments that would be within scope for the volume driver, but are of high value (greater than £100 million capital cost) or exceed the volume driver unit cost allowances by 33%. Excluded from this mechanism are investments that are within scope of the SWW mechanism.

This is a reopener mechanism, with an annual submission window for investments of £25-100 million capital cost. For investments of greater than £100 million capital cost, submissions would be made as required.

Examples of this are the Skye project (page 60), system operability driven investment, or potentially whole system solutions.

¹Via an Offshore Transmission Owner (OFTO)

Pre-construction

The Certain View includes capital investment of £142 million for developing transmission infrastructure to be ready for construction during RIIO-T2 or beyond¹. As we describe in section 2, this activity can be up to 7.5% of the total capital investment and it is critical to ensuring that the right investment is made at the right time (pages 38-41).

Given the interdependency between pre-construction and the volume driver, SWW and HVTPs mechanisms, we intend that part of the Certain View pre-construction allowance is subject to an uncertainty mechanism:

- £114 million for strategic (SWW and HVTPs) investments is 'use it or lose it'. Unused funding will be handed back to consumers at the end of the RIIO-T2 period.
- £24 million for existing investments that are scheduled to enter construction after 31 March 2026 is subject to a symmetric

'true up' mechanism at the end of the RIIO-T2 period.

Automatic	Volume Driver Operating Cost Escalator Sustainability Escalator
Annual Reopener (September)	HVTPs of £25-100 million capital cost
Reopener (as required)	Strategic Wider Works HVTPs >£100 million capital cost

Figure 5.2 Mechanisms to manage the volume and need uncertainty in future network use

Importantly, we do not propose that the pre-construction in the Certain View is investment specific. As highlighted by our stakeholders, flexibility and responsiveness to our customers' needs is critical if we are to deliver the right investment at the right time.

Operating cost escalator

There is evidently an impact on the day-to-day cost of system operation as the network grows. This includes the expansion of inspection and maintenance activities, developing new processes and procedures for new technology on the network, and back office costs like buildings and fleet.

Associated with the volume driver, SWW and HVTPs uncertainty mechanisms, we have designed an operating cost escalator of 1% of the allowed capital funding. This escalator would be applied automatically in the year following completion.

Sustainability escalator

Our clear goal is one third reduction in our scope 1 and 2 GHG emissions by 2026. This is an absolute target, and so should our network (and, hence, GHG emissions) grow then additional interventions over-and-above those included in the Certain View would be required. Similarly net zero and sustainability policy aspirations might require us to go further than our current investment assumptions.

Associated with the volume driver uncertainty mechanism, we have designed a sustainability escalator of 0.5% of the allowed capital funding. This escalator would be applied automatically in the year following completion.

Learning from the RIIO-T1 period

Four of the six volume and need uncertainty mechanisms that we set out in this Business Plan were also applied in the RIIO-T1 period. As we have developed this Plan we have assessed and applied the learning from RIIO-T1:

Volume driver The RIIO-T1 uncertainty mechanism, while successful in protecting customers, was very simple and loosely defined. In particular the unit cost allowances per MW and MVA resulted in high variability in outcomes across the portfolio of connections. For the RIIO-T2 period, we have sought to provide more detail on the application of the volume driver and disaggregated the unit cost allowances to provide a stronger correlation between expenditure and funding.

SWW During the RIIO-T1 period, we successfully applied for and delivered three SWW investments – Beaulieu Mossford, Kintyre Hunterston and Caithness Moray – when the mechanism worked well. However the mechanism has been more challenging for the three Scottish Islands' links, with the in period assessment process being lengthy and the evidence requirements less clear. We propose strengthened guidance under the HVTPs mechanism to address this.

The RIIO-T1 **Pre-construction Mechanism** and **Operating Cost Escalator** have worked well and are largely unchanged.

Unknown External Costs

The uncertainty

We recognise two types of unknown external factors that might result in us undertaking additional activities and expense during the RIIO-T2 period:

Third party requirements where we are required to do something at the request of others

High impact, low probability events where an incident occurs that is of high cost to resolve

We consider these to be external uncertainties, some of which might be ‘unknown unknowns’ that we cannot identify in advance.

Based on our current knowledge of the policy landscape and our learning from the RIIO-T1 period, we have developed six uncertainty mechanisms to mitigate the uncertainty of unknown external costs (**Figure 5.1**). These are in addition to the four mechanisms proposed by Ofgem. External uncertainty mechanisms are of two types:

- **Reopener mechanisms** that allow for in period determination of additional costs in predefined categories (**Figure 5.3**); and
- **Pass-through mechanisms** that automatically adjust allowed expenditure and, hence, revenues for incurred costs.

The nature of the uncertainty means it is difficult for us to forecast a value for the outturn of these uncertainty mechanisms. During the RIIO-T1 period, we did not use re-opener mechanisms. However, given the increasing network operability challenges and changing policy landscape, there is the potential for significant (>£100 million) expenditure using these mechanisms during the RIIO-T2 period.

Reopener mechanisms

For reopener mechanisms, we define the category of costs to be considered, the timing of the in period determination and a materiality threshold to avoid trivial assessments.

Operability, including Black Start

This mechanism would meet third party requirements from the ESO.

Under the provisions of the System Operator - Transmission Owner Code (STC), the ESO can require us to undertake work for reasons of system operability. Given the ongoing evolution of network operations and the widening scope of the ESO (including Pathfinder initiatives), we expect such requests are likely to continue, if not increase.

We have not included any forecast expenditure for such STC requirements in the Certain View. Instead we set out a two part reopener mechanism:

1. With predefined unit cost allowances for shunt reactors and capacitors, and intertrips (excluding active network management schemes).
2. An application window reopener for other ESO requests, including Black Start requirements and for system harmonics.

Third party driven need

This mechanism would meet third party requirements from parties other than the ESO. This includes new legislative and regulatory requirements.

Categories within the scope of this application window reopener are:

- Investments for cyber resilience
- Work directed by Government under the Physical Security Upgrade Programme for critical national infrastructure
- The impact of changes to legislation, including environmental, regulations or engineering standards
- Investments for flood resilience, based on threats identified by statutory agencies

The Certain View includes forecast expenditure of £8 million for cyber resilience and ten flood resilience investments. This mechanism is over-and-above those certain requirements.

Landowner compensation

This mechanism would meet third party requirements from landowners. It is a continuation of an existing RIIO-T1 mechanism.

We require permission to install our electric lines and associated equipment on, over or under private land. We also require access to that land for the purposes of inspecting, maintaining or replacing the line or equipment. We pay for this access.

Under law, affected landowners can lodge injurious affection claims, wayleave terminations and challenges to our land rights. The number of claims and quantum of claims are very difficult to forecast.

The Certain View includes does not include forecast expenditure for landowner compensation, but we expect it could be material during the RIIO-T2 period of around £30 million.

Materiality	Individual >1% annual net base revenue Collective >3% annual net base revenue
Annual Window	Brexit Import Tariffs
Two Windows (mid-point and end)	Operability, including Black Start Third Party Driven Need* Landowner Compensation Subsea Cable Faults HVDC Centre Whole System Co-ordinated Adjustment
As Required	VISTA
Automatic	Operability, including Black Start

*Includes spring 2021 cyber resilience reopener

Figure 5.3 Reopener mechanisms to manage unknown external costs uncertainty

Close Out

At the end of the price control period there is a regulatory process termed 'Close Out' that adjusts our revenue for the output of investments delivered within that period (where identified upfront) and the transition of activities and investments that straddle the price control boundary.

Close Out adjustments will impact on allowed costs and revenues in the following price control period. However, this only happens after Ofgem has considered and directed a change. In presenting this Business Plan, including our financial modelling, we have not made any assumptions about the outcome of the Close Out assessment. However, based on the RIIO-T1 settlement, we expect adjustments to 'true up' transmission connection assets and SWW pre-construction.

There are seven growth capital investments that start during RIIO-T1 and energise during RIIO-T2. We have assumed that the RIIO-T1 uncertainty mechanisms apply to these investments. We further assume that the RIIO-T1 sharing factor applies to all investments made under RIIO-T1 uncertainty mechanisms that commence construction prior to 1 April 2021.

Looking forward to the end of the RIIO-T2 period, we expect the following factors will be within the scope of Close Out: (i) Use it or lose it SWW pre-construction; (ii) True-up of pre-construction for post 31 March 2026 investments; (iii) Defined reopener mechanisms with an end of price control window; and (iv) Undelivered Certain View outputs (subject to an equivalence-based substitution mechanism).

Subsea cable faults

This mechanism is for high impact, low probability events.

We have two subsea cables on our network, Caithness Moray HVDC and Kintyre Hunterston 220kV AC, with the potential for further assets to be installed during the RIIO-T2 period. In the near term, faults and/or damage to these assets are unlikely to be due to age or wear and tear. More likely is third-party interference or unforeseen environmental damage. We have not included any forecast expenditure for subsea cable faults in the Certain View. Instead we set out that efficiently incurred fault restoration costs be assessed through a reopener.

Brexit import tariffs

The UK is due to leave the European Union on 31 January 2020. There remains significant uncertainty about the impact of this departure and the future terms of trade.

The impact of Brexit could be significant changes to import charges and other cost drivers. We are proposing that this impact be subject to an independent assessment and the findings incorporated into RIIO-T2 Final Determinations with the option for further adjustments during the RIIO-T2 period as required.

HVDC Centre

Under the RIIO-T1 Network Innovation Competition (NIC), we developed and constructed the HVDC Centre to enable the planning, development and testing of high voltage direct current transmission solutions in GB. This is now an established centre of technical expertise open to all, and our Certain View includes the ongoing running costs of the facility.

However, considering net zero targets, there is the potential for the HVDC Centre to grow during the RIIO-T2 period. We have designed a reopener for consideration of appropriate funding in this circumstance.

VISTA

Ofgem has proposed the continuation of the current uncertainty mechanism for enhancing the visual amenity of pre-existing assets. We support this mechanism, and describe our proposals for the RIIO-T2 period on page 101.

Whole System Co-ordinated Adjustment

Ofgem has proposed this uncertainty mechanism to ensure the regulatory framework is not a barrier to the efficient development and implementation of whole system solutions. We support this mechanism, and describe our proposals for implementation on page 139.

Pass-through mechanisms

The current regulatory arrangements allow for pass-through of non-controllable costs for business rates and licence fees. We support continuation of these uncertainty mechanisms.



A Sustainable Network for Current and Future Energy Consumers

Contents: Section 6

Summary of Targets and Expenditure	86
Our Social Responsibility	88
A New Approach to Stakeholder Engagement	90
Meeting Stakeholders' Ambitions for Connections	94
Local Area Energy Plans and Community Energy	97
Leadership in Sustainability	98
Enhanced Reporting Framework	103

A Sustainable Network for Current and Future Energy Consumers



Cost of delivering our Certain View outputs (£m)

Our forecast expenditure during the RIIO-T2 period to implement the proposals described in this section is £27 million.

The majority of the cost of our sustainability ambitions is embedded within the Certain View capital expenditure; for example, policies and actions to reduce SF6, improve substation energy efficiency, implement biodiversity net gain and reduce waste.

Expenditure on...	Cost category	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Stakeholder and customer teams Customer experience; Communities; Stakeholder policy and reporting	Capital Load* and Closely Associated Indirect Operations	1.7	1.7	1.7	1.7	1.7	8.5
Events and communications Including performance reporting	Capital Load* and Closely Associated Indirect Operations	1.0	1.0	1.0	1.0	1.1	5.1
Employee training Communications; Vulnerable communities; Inclusion and diversity	Closely Associated Indirect Operations	0.3	0.3	0.3	0.4	0.4	1.7
Development of commercial products Engagement, consultation, industry liaison and process implementation	Capital Load* and Closely Associated Indirect Operations	0.4	0.4	0.4	0.4	0.4	2.0
Policy development and reporting	Closely Associated Indirect Operations	1.6	1.6	1.6	1.6	1.6	8.0
Assurance and accreditation Including SBTi	Closely Associated Indirect Operations	0.3	0.3	0.3	0.3	0.3	1.5
Workforce planning and development Pipeline intake; skills planning	Closely Associated Indirect Operations	0.1	-	0.1	-	0.1	0.3
							27.1

*Some of our expenditure is associated with growth capital investment; for example local community consultation during project development

Main targets

We aspire to provide the service and outcomes that GB energy consumers, customers and stakeholders expect, while delivering on our social responsibilities. This means operating sustainably now and for the long term.

We have two clear goals: to deliver every network connection on time, and to reduce our GHG emissions by one third over the RIIO-T2 period. Our overall ambition is to be sector leading and so we have defined a broad set of measures to track our progress.

Target	RIIO-T2 type [†]	Metric	RIIO-T1 Equivalent Output	RIIO-T2 Target
Stakeholder Engagement Commitment Stakeholder engagement survey KPI performance on KPIs AccountAbility AA1000 Health Check	PCD PCD PCD	Score out of 10 Weighted percentage Maturity score	7.9* 81%* n/a	>9.0 pa. >90% pa. >75% by 31 March 2026
Stakeholder Satisfaction Survey Quality of Connections survey New infrastructure survey	ODI (P/R) ODI (Rp)	Weighted percentage Score out of 10	n/a n/a	tbc [‡] tbc [‡]
Connecting for Society Offers for connections to the transmission network made to customers within the time periods set out in the industry code, currently 60 days Application of new CBA framework to relevant investments	LO / ODI (P) PCD	Percentage made on time Percentage of investments proceeding to construction after 1 April 2021	100% pa* n/a	100% pa. 100% pa.
Tackling Climate Change Reduction in scope 1 and 2 GHG emissions from 2018/19 baseline SF ₆ leakage	PCD ODI (P/R)	Percentage GHG volume Percentage installed SF ₆	n/a 0.39%*	-33% by 31 March 2026 0.39% pa.
Promoting the Natural Environment Projects gaining consent after 1 April 2020 with biodiversity 'no net loss' outcomes Investments to improve visual amenity	CVP (R) UM / CVP (R)	Percentage of investments Number submitted for approval	n/a 3 (to date)	100% pa. 5 total
Optimising Resources Waste sent to landfill across all waste streams Recycling, recovery and reuse of construction and demolition waste	PCD PCD	Percentage of non-compliance waste Percentage	23% n/a	By end RIIO-T2 0% 70%
Supporting Communities Employees trained in community vulnerability Approved supplier located in the north of Scotland	CVP CVP(R)	Percentage Percentage	n/a 27% in 2018/19	>95% by 31 March 2016 >25% pa.
Growing Careers Employees trained in inclusion and diversity Pipeline intake is local diversity representative	PCD PCD	Percentage tbc	n/a n/a	>95% by 31 March 2026 tbc ^{††}
Enhanced Reporting Framework Annual reporting of service performance, financial performance and performance for society	PCD	Percentage of reports published to schedule	n/a	100% pa.

[†]Type is a regulatory categorisation: LO = Licence Obligation; PCD = Price Control Deliverable; ODI (P/R) = Output Delivery Incentive with financial Penalty and/or Reward; Rp = Reputational; CVP = Consumer Value Proposition; UM = Uncertainty Mechanism

* Annual average to date

[‡]We are working with Ofgem, the ESO and other networks on the design of this survey and expect to set a target for RIIO-T2 after trials during 2020

^{††}We will establish the methodology and measurement of our diversity profile during 2020, and expect to set a target in early 2021

Our Social Responsibility

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 survey¹ 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 the SSE Group – a publicly-listed, responsibly-financed organisation – we fully recognise our enhanced public interest social obligation and are leading the industry in improving levels of trust and transparency.

SSE's commitment to sustainable business practices is strong. In early 2019 the SSE plc Board agreed to align SSE's business strategy to the UN Sustainable Development Goals (SDGs) and adopted four fundamental business goals representing the most material contribution SSE can make to the SDGs. The Remuneration Committee agreed to link an element of executive incentives to the achievement of these goals (page 111).

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



There is growing demand from the investor community for increased disclosure from companies on environmental, social and governance (ESG) performance. SSE takes a comprehensive approach to disclosure of ESG performance through its two main reports – the Annual Report and annual Sustainability Report – as well as secondary topic-specific reporting. SSE fully supports the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) and has committed to meet them in full by March 2021.

SSE responds annually to questionnaires including: CDP Climate Change, Water and Forest Programmes on how it manages these environmental issues; the Workforce Disclosure Initiative, on its management of workforce related issues; and the Bloomberg Gender-Equality Index which benchmarks the top companies globally which are committed to advancing women in the workplace.

Through a wide ranging programme of activities and collaborations, SSE aspires to international best practice in its sustainable business practices:

- SSE has been a **Living Wage** accredited employer since 2013. Since April 2014, SSE has been rolling out the Living Wage across its supply chain. By 2020, before the start of the RIIO-T2 period, all SSE's contracts are expected to contain the Living Wage Clause.
- **Living Hours** is a new accreditation which sets the standard on responsible working hour practices. SSE was part of the Steering Group that developed the accreditation and is committed to becoming one of the first five organisations to gain Living Hours accreditation in the UK.
- SSE is a **Social Mobility Employer** through its signing of the Social Mobility Pledge, a cross-party campaign to improve social mobility in the UK.
- Since 2014, SSE has remained the only FTSE 100 company with the **Fair Tax Mark** independent accreditation. It publishes an annual Talking Tax booklet which aims to make tax affairs more clear and transparent, and is designed to be accessible to non-tax specialists.
- SSE engages PwC to undertake an **annual economic impact** to assess its contribution to the UK, Scotland and Republic of Ireland. It undertakes socio-economic impact assessments for its large investments; for example the Caithness Moray HVDC transmission project.
- SSE is the largest issuer of **Green Bonds** in the UK corporate sector and one of the first UK corporates to convert to an ESG-linked Revolving Credit Facility.
- SSE is a signatory to the **UN Global Compact** (UNGC), the world's largest corporate sustainability initiative and is committed to applying the UNGC's ten principles focused on the environment, human rights, labour and anti-corruption.

- The **Be the Difference** initiative allows each SSE employee to take a day away from their usual job and give a helping hand to a community project of their choice.
- SSE supports the British Academy's international research and public engagement programme **The Future of the Corporation**. The aim of the programme is to develop an evidence base that will serve as a foundation to redefine business for the 21st century and build trust between business and society.

SSE transparently publishes its ethical business policies – including on Human Rights, Modern Slavery and Responsible Procurement – on its website:

www.sse.com/sustainability/reporting-and-policy/policies/

These are supported by a comprehensive employee training and awareness programme.

Citizens Advice principles

In May 2018, Citizens Advice published five principles¹ that it considered needed to be met in order for the RIIO-T2 price control to really deliver for consumers.

We welcome this overarching guidance from Citizens Advice, and have adopted the five principles in the preparation of this Business Plan (**Table 6.1**). In particular we have worked with Citizens Advice in the development of our Enhanced Reporting Framework (page 103).

Citizens Advice and Citizens Advice Scotland have met three times with our User Group to share their views on our proposals.



"We are supportive of all 5 of the goals set out at the start of the plan. We think they are sufficiently ambitious and set a positive precedent."

"We strongly appreciate SSENs decision to make the draft business plan publicly available [and] welcome the opportunity to respond to a formal consultation"

- Citizens Advice Scotland



 Citizens Advice principles	 In our Business Plan
1. Profits are lower than the previous price control, to more accurately reflect the relative low risk for investors in this sector	Based on the current market evidence, we have proposed a lower cost of equity (and hence potential profits) than in RIIO-T1
2. The value of any unspent funding for infrastructure projects is returned to consumers promptly and in full	Our Certain View removes upfront funding for infrastructure without a strong investment case, so reducing the cost and risk to consumers
3. Industry business plans and regulatory decisions are directly informed by consumer (including future consumer) feedback and research	We have co-created our Business Plan with consumers, customers and stakeholders, and developed a new Stakeholder Engagement Strategy
4. Companies are required to publish complete information on their performance, financial structures, gearing and ownership	Our reporting framework for RIIO-T2 is open and encompasses performance, financial and benefits to society
5. Innovation funding and incentives support consumers in the transition to a low-carbon future, particularly those consumers in vulnerable circumstances	Our approach to innovation and incentives is to deliver cost-effective, whole system outcomes for GB society. We have proposed targeted measures to support vulnerable communities

Table 6.1 Citizens Advice principles for RIIO-2

¹Available at: www.citizensadvice.org.uk/about-us/policy/policy-research-topics/energy-policy-research-and-consultation-responses/energy-consultation-responses/citizens-advice-riio-2-framework-consultation-response/

A New Approach to Stakeholder Engagement

READ our new Stakeholder Engagement Strategy

SUPPORTING DOCUMENT 13. [Stakeholder Engagement Strategy](#)

GET INVOLVED! We have published our first Stakeholder Engagement Action Plan that sets out the actions we intend to take to implement our strategy. This is a live document and will be developed in response to stakeholders' needs and as we learn

SUPPORTING DOCUMENT 13A. [Stakeholder Engagement Action Plan](#)



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 late 2017 we undertook a perceptions study¹ with our existing stakeholders to explore their views of us and our service. We found that the perception of us is largely positive, with stakeholders valuing our strong personal working relationships viewing us as helpful, friendly and keen to engage. They believe we have significantly improved in recent years but acknowledge that we are on a journey and that we have more improvements to make.

In light of this stakeholder feedback, we spent 18 months during 2018 and 2019 working with external specialists to fundamentally re-design our approach to stakeholder engagement and the role of stakeholders in our organisation. This review was led by our stakeholders' input, with contributions from 156 stakeholders, alongside extensive research into best practice.

We consulted on our new Stakeholder Engagement Strategy in summer 2019, and the final Strategy with an accompanying Action Plan are essential to the delivery of this RIIO-T2 Business Plan.

Our new strategy has been structured around four connected areas: why we engage with people, what we want to achieve, our objectives, and the principles which define how we engage (**Figure 6.1**). Together these areas provide clarity of purpose that will enable us to go beyond best practice and involve stakeholders in all our decision-making and ways of working.

The costs and benefits of stakeholder engagement

Our Stakeholder Engagement Strategy is designed to enable us to be stakeholder-led, now and in the future. We recognise that there is also a cost associated with realising the benefits of stakeholder engagement.

Our seven objectives for stakeholder engagement reflect the desired needs of our stakeholders. The actions we take to achieve those objectives must be at a cost that is proportionate to the benefits and acceptable to our stakeholders.

In developing our Action Plan, we have taken a qualitative approach to cost benefit assessment. We have used our experience in stakeholder engagement and researched the costs of the organisations who are leading in stakeholder engagement. For example, we discounted the option of a new Customer Relationship Management IT platform due to the high cost per stakeholder.

We currently don't have a quantified cost benefit analysis (CBA) methodology for stakeholder engagement options. Our best practice review did not identify a methodology used by others that could be easily adapted for use in this Business Plan.

We are committed, under objective 4 of our Action Plan, to work with stakeholders on the development of a quantified CBA for stakeholder engagement. Consistent with our wider business strategy, we will seek to consider the full range of social, environmental and economic costs and benefits.

Stakeholder input



"You need to move away from communicating to engaging. Engagement is more: 'we have this issue or opportunity and we think we'll do this, but we'd like your input on how? Is there something we've not thought of?' It's where the audience actually has chance to influence and have a say, and it would be done at an earlier stage."

"I'd like to see an ambitious company who's trying to do things differently. It's not just about ticking boxes and speaking to tons of people. It's actually being clever about the right kind of people."

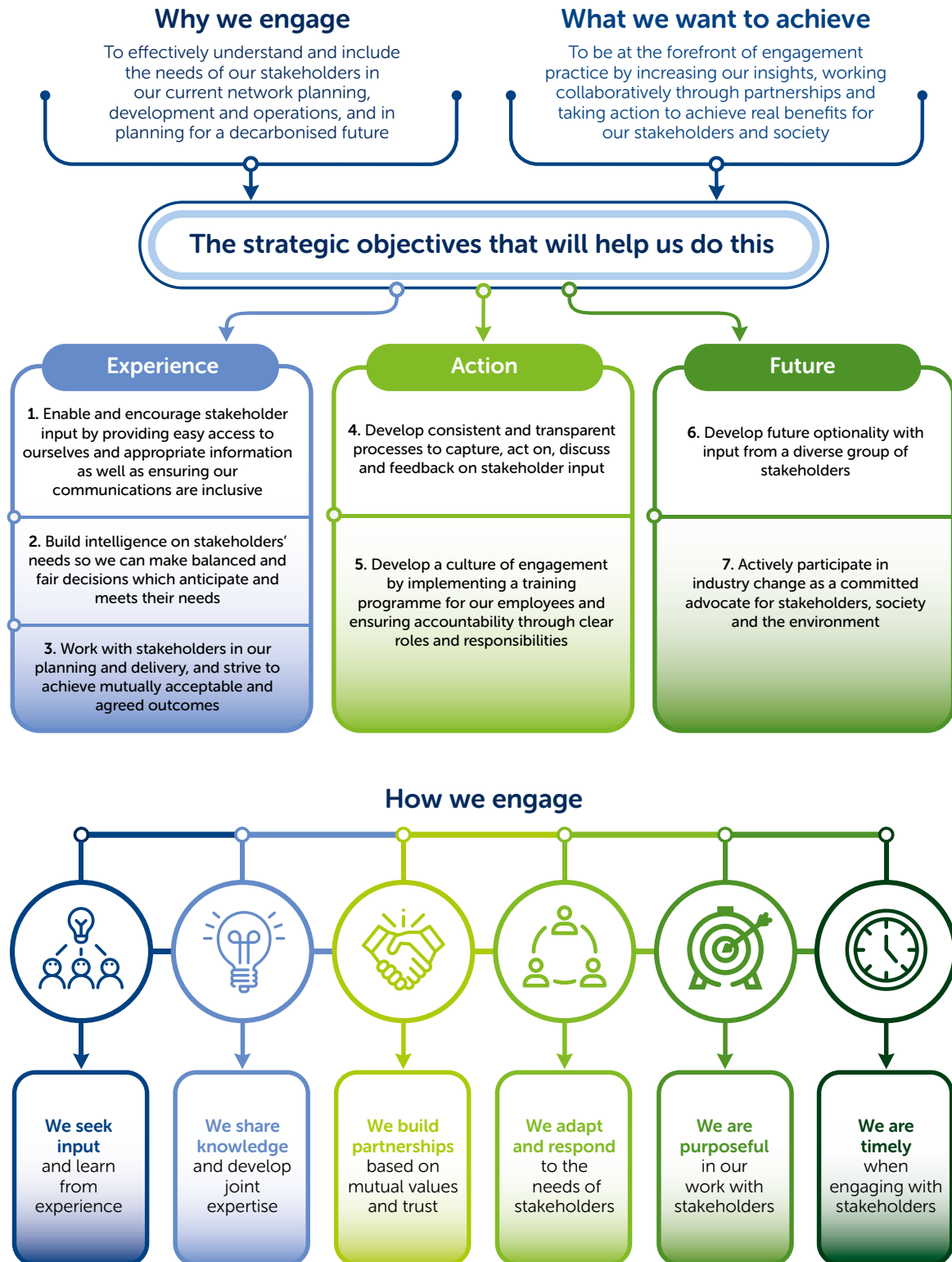


Figure 6.1 Our Stakeholder Engagement Strategy

Our stakeholders

By having a full picture of our stakeholders and understanding exactly who they are, we are able to tailor our engagement with each audience on every activity by level of influence, interest, impact, knowledge and value. This will ensure purposeful, meaningful and accessible dialogue at all stages, and enable us to deliver value for money services that exceed stakeholder expectations.

Definition of a stakeholder, customer and end consumer

We use AccountAbility's definition¹ of **stakeholder** which is:



"Any individual, group of individuals, or organisations that affect and/ or could be affected by [our] activities, products or services, and/or associated performance"

This includes, amongst others, our direct customers, end consumers and members of the public, and new stakeholders who we are currently unaware of:

- As a transmission system owner, our **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 connected to the distribution network, we also consider distributed generators to be our customers.
- GB households and businesses are the final electricity **end consumer** and we are rightly under significant scrutiny to ensure we invest consumers money in the right way. As the energy market changes, our stakeholders are telling us that we need to increase our engagement with end consumers
- The transition to our new flexible, democratised, decentralised energy future will require us to reach out to **new stakeholders** in new ways. We will identify those new stakeholders by actively improving how people can contact us and developing mechanisms to encourage involvement. Through our existing stakeholder networks and expanding our use of digital channels, we will drive awareness of opportunities to work with us in a way that is inclusive and accessible to all.

A GB-wide approach

Throughout the review of our stakeholder engagement, there were strong views expressed about our role as an advocate for north of Scotland stakeholders in the GB energy debate. Stakeholders argued that we should take the lead in uncovering and representing the many 'hard to reach' parties in the north of Scotland such as community energy groups, end consumers with high electricity dependence and the impact of energy policy on local socio-environmental conditions.

Stakeholders highlighted our approach to the Scottish islands as an example of where we had brought together local and national stakeholders to seek a common understanding of the issues, and then acted as an advocate for action.

This stakeholder input led to objective 7 – actively participate in industry change as a committed advocate for stakeholders, society and the environment – of our new Stakeholder Engagement Strategy.



In the near term, our focus is on achieving industry best practice. However, we want to make meaningful in-depth stakeholder engagement central to our ways of working. We have set ourselves the longer term ambition to be at the forefront of engagement practice for our industry and beyond.

A re-structured organisation

Our review, including the learning from best practice, concluded that our organisation was not well structure to achieve the objectives of our Stakeholder Engagement Strategy. At the start of 2019, we implemented a new operating model with the aim to create a fully collaborative business with clear lines of accountability and decision making:

- Formation of a new Executive Committee, including a new Director of Customers and Stakeholders, and Shadow Board of employee representatives
- Establishment of a new Customer and Stakeholder Directorate, with the specialist skills and expertise to deliver our Stakeholder Engagement Strategy

This change has already led to considered use of our stakeholder input in our senior discussions and decision-making.

"Your new structure is positive, it will ensure you keep an eye on the overall big picture, as it can be easy to get trapped in the detail when running individual events"

- National Charity

What does success look like?

We intend to develop our long running direct measurements of stakeholder satisfaction (**Figures 6.2 and 6.3**):

During the RIIO-T1 period, we have undertaken an **annual survey** of stakeholders' experiences and assessment of our performance. Our annual average satisfaction score from stakeholders during the RIIO-T1 period is 7.9 out of 10.

For RIIO-T2, we intend to split this into three targeted surveys:

- For stakeholders impacted by our capital investment programme,
- On the quality of our connections service (page 96), and
- The overall quality of our engagement.

Over the past six years, we have also measured the weighted average score of a suite of **Key Performance Indicators (KPIs)** that reflect the full range of our stakeholders' expectations of our performance. Our annual average score during RIIO-T1 is 81%. We intend to keep these KPIs under review to ensure they remain relevant to stakeholders' performance expectations.

In addition to these two measurements, to ensure we are maintaining best practice and continuous improvement in our engagement, we will undertake the AccountAbility AA1000 Health Check each year.

Under our Enhanced Reporting Framework (page 103), we are committed to report on our performance annually.

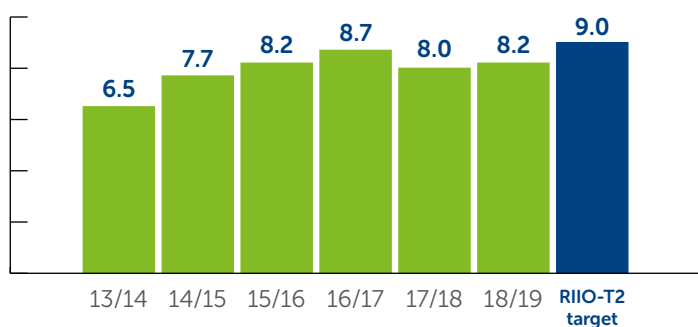


Figure 6.2 Stakeholder satisfaction scores†

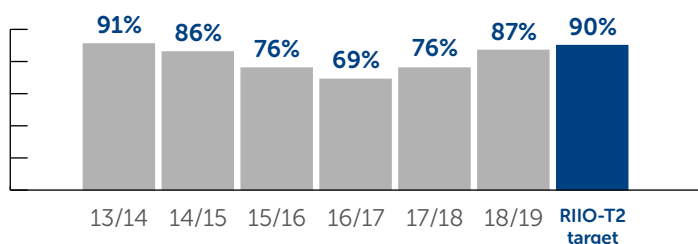


Figure 6.3 Key performance indicators†

Future role for an independent stakeholder voice

In summer 2018 we openly recruited our RIIO-T2 User Group to challenge the development of this RIIO-T2 Business Plan (page 28).

The independent insights and advice that have come from the User Group have strongly influenced the content and presentation of this Plan. Together with our existing Stakeholder Advisory Panel, the members of the User Group have scrutinised our proposals and engaged directly throughout our organisation including our Board.

We are committed to continue an enhanced engagement approach during the implementation of our RIIO-T2 Business Plan, and as we look beyond that to future business planning. Part of this approach will be the establishment of an independent stakeholder group that builds upon the extensive engagement in developing this Plan. The role of this new group will be to:

- Monitor delivery of this RIIO-T2 Business Plan and hold us to account on key commitments
- Review and advise on material decisions relating to delivery of the Plan
- Where we are triggering growth investments not in the Certain View, to make an independent assessment of the case for investment.

We intend to implement these proposals during summer 2020, ahead of the start of the RIIO-T2 period.

"As an independent Non-Executive Director, I am acutely aware that customers and stakeholders are a primary consideration in any decision that the SHE Transmission takes and that their interests are paramount. Stakeholders views have played a vital role in guiding and influencing each stage of the process throughout the development of this ambitious Business Plan. The stakeholder challenge and input has resulted in a plan with Five Goals which are both clear and affordable."

- David Rutherford, Director SSEPD Board

Meeting Stakeholders' Ambitions for Connections

READ our new Commercial and Connections Policy

SUPPORTING DOCUMENT 14. [Commercial and Connections Policy](#)



We play a key role in enabling the GB transition to the low carbon economy by providing connections services and a route to market for renewable generators in the north of Scotland, and the onwards transmission of renewable energy to homes and businesses throughout GB.

While the vast majority of our connections customers are generation, they are diverse: from small community renewable developments to large offshore wind farms. Given the nature of renewable generation, most connection applications are for remote locations.

During RIIO-T1 our customers' expectations have largely focused on securing quicker connections, of which the timely making of connection offers was a key part. We have worked increasingly closely with our customers on this objective, taking care to understand each individual customer's subsidy dates and connection requirements.

The steps we have taken to change our ways of working have been stakeholder-led. We have become the GB industry leader in developing and delivering flexible connections to speed up connection timescales. With our customers and stakeholders, we have sought to understand barriers to connection and propose innovative solutions to address these barriers particularly for renewable and community customers. The industry direction of travel points towards a potential subsidy free (or low subsidy) market during the RIIO-T2 period. This means we are likely to see a change in customer behaviour. We expect customers focus on affordability, flexibility and the overall quality of their connection will increase as we move towards a low carbon economy.

Our day-to-day engagement tells us that customers' expectations of us to provide a quality service and solution are high. From late 2018, we undertook an active listening exercise to hear customers' future needs and co-create our new Commercial and Connections Policy. We engaged directly with over 100 connections stakeholders over a nine-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.



Connections customers have reported a satisfaction score of 9.6 out of 10 on average in our RIIO-T1 annual customer survey[†]

The customer's experience

There are five stages to a customer's experience of being connected to the transmission network (**Figure 6.4**):

- i. **Scoping:** early discussions about the possibility of connection during the development stage
- ii. **Application:** applying for a connection via the ESO (and possibly the local distribution system operator)
- iii. **Connecting:** undertaking the construction works (if required) and commissioning the physical connection to the network
- iv. **Energised:** ongoing operation after the customer's connection is energised
- v. **Review:** when a customer reviews their project prior to disconnection or repowering

Regardless of the type or size of the customer connection, or what stage of the customer experience the customer is in, we want to ensure that the connection service and solution we provide is right for that customer's needs whilst ensuring this is optimal for the wider GB consumer.

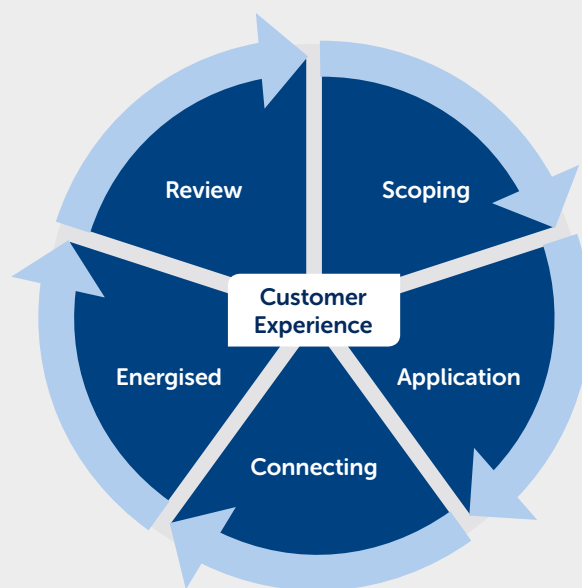


Figure 6.4 Connections customer's experience

Our Commercial and Connections Policy ambition for the RIIO-T2 period 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

To achieve this ambition we have proposed nine initiatives that are grouped under three areas:

<p>1. Optimal connection solutions We will work with our customers to ensure that their individual project economics and timescales, whilst ensuring that it is also the optimal solution for the wider network and GB consumer</p>	<p>2. Tailored customer services and products for our existing and future customers From project scoping to review, we aim to provide the services and products that matter to our customers today and in the future throughout the customer experience</p>	<p>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</p>
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Each of our initiatives is aligned with the seven objectives of our overarching Stakeholder Engagement Strategy (Figure 6.1 and Table 6.2).

Stakeholder engagement objectives	Initiatives for connections customers
Experience How we can improve our stakeholders' experience when engaging with us during day-to-day activities and strategic decisions	
<p>i. Enable and encourage stakeholder input by providing easy access to ourselves and appropriate information as well as ensuring our communications are inclusive</p> <p>ii. Build intelligence on stakeholders' needs so we can make balanced and fair decisions which anticipate and meets their needs</p> <p>iii. Work with stakeholders in our planning and delivery, and strive to achieve mutually acceptable and agreed outcomes</p>	<ul style="list-style-type: none"> Optimal connection solutions: <ul style="list-style-type: none"> Equipping customers with digitised information via a live 'capacity availability map' accessed through our website A new online portal that would allow customers to access their connection information, including making an application, payments and providing feedback Tailored customer services and products: <ul style="list-style-type: none"> Providing an 'offer in principle' product with options for flexible connection A new energised engagement service that would provide customers with five-year ahead indicative outage plans
Action What signification action we can take to create a step change in our approach to stakeholder engagement	
<p>i. Develop consistent and transparent processes to capture, act on, discuss and feedback on stakeholder input</p> <p>ii. Actively participate in industry change as a committed advocate for stakeholders, society and the environment</p>	<ul style="list-style-type: none"> Accessible connections process: Through a customer advocacy approach, we will represent and keep our customers up-to-date with industry policy changes and market opportunities
Future How we can work with stakeholders to strategically shape a resilient energy future	
<p>i. Develop future optionality with input from a diverse group of stakeholders</p> <p>ii. Develop a culture of engagement by implementing a training programme for our employees and ensuring accountability through clear roles and responsibilities</p>	<ul style="list-style-type: none"> Tailored customer services and products: <ul style="list-style-type: none"> Learning from our Orkney 'ready to connect' trial, develop and implement a queue management approach To proactively review every connection to ensure it remains optimal for the customer's needs Accessible connections process: Implement tools for collaboration between customers and ourselves, and between customers

Table 6.2 Delivering on our stakeholder engagement objectives for connection customers

Performance Indicator	RIIO-T1 (1 April 2013 to 31 March 2021)		RIIO-T2 (1 April 2021 to 31 March 2026)	
Number of timely connection offers	448*		Report annually	
Offers made within industry standard timescales	Target	100%	Target	100%
	Achieved	100%*	Achieved	Report annually
Total MW of connected generation	3,894*		Report annually	
Quality of service survey	n/a		Target	TBC
			Achieved	Report annually

*To 30 September 2019

Table 6.3 Measuring connections performance

Implementing our Policy

During the engagement to develop our new Commercial and Connections Policy our customers and stakeholders told us that there were steps we could take now to improve our service. We agreed, and are already making improvements for example:

- To address customers' concerns with the Connections and Infrastructure Options Note (CION) process for making connection offers to offshore generators.
- To introduce the option of cost-reflective application fees (including for our new products) and post-project reconciliation processes.
- To provide an accessible, plain English connection process guide.

We assessed our organisational 'readiness' to deliver the Policy, and have implemented the following changes:

- Appointed a new Head of Customer Experience to lead our team of Customer Account Managers
- Strengthened our Commercial Policy and Whole System teams that lead on advocacy and policy development in collaboration with our customers
- Initiated scoping studies for the new IT systems for customer information
- Worked with the ESO and other transmission system owners in the design of the quality of service survey



When asked to rate how satisfied they were with our Policy proposals on a scale of 1 to 5, 67% of respondents were either satisfied or very satisfied with 28% neutral¹

What does success look like?

Our clear goal is to provide every network connection, tailored to meet our customers' needs, on time, on budget and to our customers' satisfaction. By taking the actions we describe in this section, we believe that this goal can be achieved by 2025.

We have proposed an Enhanced Reporting Framework (page 103) under which we will report annually on the performance indicators shown in **Table 6.3**.

The new Quality of Connections survey will directly measure our progress towards achieving our goal of every connection on time. In April 2019 we put forward initial proposals for this survey and welcome its adoption by Ofgem as an Output Delivery Incentive for RIIO-T2.

We are currently working with Ofgem, the ESO and other stakeholders on the design of the Quality of Connections survey. Our aspiration is that the survey measures our performance at each stage of the connection's customer experience (**Figure 6.4**). We expect this design work to conclude in early 2020, allowing us to run trials prior to the start of the RIIO-T2 period.

Our target for the Quality of Connections survey remains subject to the outcome of trials. Ofgem has also yet to conclude on the value of the associated financial incentive. Our analysis of the customer value of good service indicates that the incentive should be at least +/-1% of base revenue.



"I think both 'Supporting thriving communities' and 'Connecting for society' are important. Removing barriers in communities opens and enables other things to happen. Scottish Government commitments for social equality and access are important here."

Local Area Energy Plans and Community Energy

READ our full policy statement on local and community energy

SUPPORTING DOCUMENT 15. [Local Area Energy Plans and Community Energy](#)



Track record

We have long recognised the importance of local communities' views and energy aspirations in our network planning and operations. We pioneered the establishment of Community Liaison Groups to represent local stakeholders during the development, design and construction of our capital projects. More recently we have sought to assist our communities in their understanding of the energy industry, for example by holding workshops on access and charging arrangements.

The development of this RIIO-T2 Business Plan has been strongly influenced by the needs of our local communities. Our north of Scotland Future Energy Scenarios (pages 31-32) were in part motivated by a 'gap' in existing transmission network planning on energy demand and community energy. Likewise our new [Stakeholder Engagement Strategy](#) emphasises our role as an advocate for all energy stakeholders in the north of Scotland – particularly the smaller parties that might not have the time or resources to participate fully in industry reforms.

Drivers for local and community energy

We identify three key drivers for the RIIO-T2 period:

1. The Scottish Energy Strategy has set a target of delivering 1 GW of locally owned energy by 2020 and 2 GW by 2030[†], from 697 MW today[‡].
2. Scotland's energy networks vision* states "Consumers and their representatives need to be central in deciding how our networks develop". This approach is endorsed by consumer groups such as Citizens Advice Scotland.
3. The central importance of the decarbonisation of heat, given that less than 5% of Scotland's non-electrical heat demand is met from renewable sources[‡].

The enabling policy framework has two parts:

1. Local Heat and Energy Efficiency Strategies (LHEES) to be a statutory minimum requirement for local authorities in Scotland to further heat decarbonisation; and
2. Local Area Energy Plans (LAEP) are intended to help local government, energy networks and other key local stakeholders take the lead in preparing for a low carbon future.

Our approach

Our RIIO T2 Business Plan recognises that more can be achieved with our local stakeholders and greater collaboration is necessary.

Our Stakeholder Engagement Strategy, Commercial and Connections Policy, Whole System Policy and Strategic Optioneering Methodology all have local communities at their heart. Together, these approaches provide the foundation to realise the benefits of supporting local authorities in the preparation of LAEP and LHEES.

We will be a trusted partner to local authorities as they develop LAEP and LHEES:

- Build on and expand the relationships that we have with our local authority stakeholders, understanding their needs and how we can best assist
- Recognise the diversity of local energy ambition across the north of Scotland and apply this in our stakeholder-led whole system strategy
- Ensure that LAEPs are developed in way that is complementary to the development of the national transmission network
- Work the ESO and with SHEPD to maximise the value of our engagements and quality of information exchanged with LAEP partners

We will support local and community energy taking steps to identify and address the barriers that local communities can face when taking a project from concept to delivery:

- Enable our stakeholders to more easily identify connection opportunities across our network
- Provide access to expertise
- Ensure that our communications are accessible and inclusive

Our approach applies to all 14 local authorities in the north of Scotland, with a specific commitment to collaborate on whole energy system city strategies for Aberdeen and Dundee.

In May 2019, we held a roundtable event with key stakeholders to explore the options for local and community energy.

"Vulnerable / low awareness communities will struggle to recognise and realise opportunities"
- Local Energy Scotland

"Culture of engagement needs to be proactive, more facilitated and not just about what fits or doesn't fit our model"
- Community energy developer

[†]Scottish Energy Strategy, Scottish Government, December 2017. Available at: www.gov.scot/policies/renewable-and-low-carbon-energy/

[‡]From: www.localenergy.scot/projects-and-case-studies/searchable-map-of-local-energy-projects/ Accessed 31 October 2019.

*Scotland's electricity and gas networks: vision to 2030, Scottish Government, March 2019. Available at: www.gov.scot/policies/renewable-and-low-carbon-energy/

Leadership in Sustainability

FIND OUT MORE

SUPPORTING DOCUMENT 16. [Sustainability Strategy](#)

Our Sustainability Strategy is supported by an Action Plan and specific documents on SF6, losses, visual amenity, biodiversity and our sustainable workforce

READ a summary of our [Sustainability Action Plan](#) (incorporating our Environmental Action Plan) in Appendix 3 (pages 144-148)



Our journey to leadership in 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.

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.

In late 2017 we started a conversation with our stakeholders about what a sustainable business would look like for us.

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 development¹:

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

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 6.5**). These ambitions are broad and bold.

As part of our Sustainability Strategy we committed to publish a Sustainability Plan of the actions we proposed to take to achieve our ambitions. We published our first [Sustainability Plan](#) in February 2019, and this will be updated every two years.

Partnerships are an invaluable tool to drive change towards more responsible, inclusive and sustainable growth. Over the past three years we have engaged in several partnerships to support our sustainability 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.



Figure 6.5 Our Sustainability Ambitions

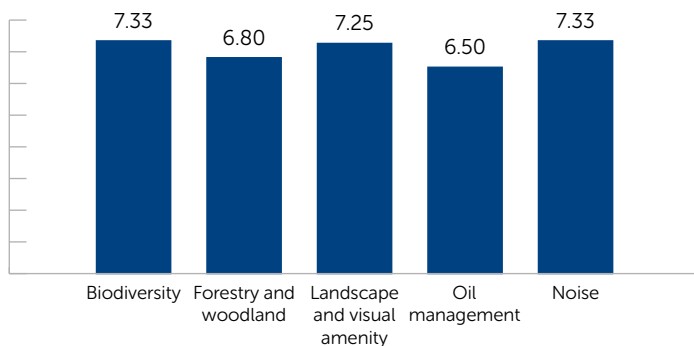
Meeting stakeholders' expectations

Following on from wide ranging consultations on our Sustainability Strategy and Sustainability Plan, we undertook specific engagement on what our stakeholders wanted us to do during the RIIO-T2 period. This included three round table events, written consultation and bilateral meetings on specific topics.

While there was strong support for our approach and proposals (Figure 6.6), there was also a consistent call for us to do more and display greater ambition. This view was shared by our User Group and Government. In response to this, we have strengthened our proposals for SF6 emissions, visual amenity and supporting vulnerable communities.

Stakeholders were generally supportive of the cost of our sustainability ambitions. A similar finding emerged from the Willingness to Pay study¹ (page 25).

Stakeholders recognised that many of our actions are consistent with national policy targets (for example, recycling, reuse and recovery of waste). Where we propose to go beyond this, for example in improving visual amenity, stakeholders view the cost as acceptable – so long as we are not duplicating or replacing outcomes best achieved by others.



Stakeholder average score 1 - 10 (extremely unsatisfied - extremely satisfied)

Figure 6.6 Views of attendees at roundtable², March 2019



Awarded **Leadership** scores in Ofgem's Environmental Discretionary Reward in 2017/18 and 2018/19

Contributing to the UN Sustainable Development Goals

The UN SDGs provide a common framework for targeting improvements in wider sustainability.

In order of materiality, the SDGs we actively support are:



Contributing to a sustainable future

We have a clear vision of a sustainable business, encompassing the full range of social, environmental and economic considerations. This vision is strongly supported by our stakeholders.

Our RIIO-T2 Sustainability Action Plan, published alongside this Business Plan, describes the next stage of our sustainability journey and commits us to fully deliver our Sustainability Strategy during the RIIO-T2 period. The Action Plan sets out specific activities for each of our six sustainability ambitions with clearly defined outcomes by 31 March 2026.

The Action Plan, by its nature, will not identify every activity that we might undertake to implement our Sustainability Strategy. This is a policy area that continues to develop and establish new best practice. Hence, supported by the Sustainability Sub-Committee of our Board, we will transparently revise and update our approach through our biennial sustainability planning framework and annual strategy reviews.

A summary of our plans for each of our six sustainability ambitions is set out below. For each we describe our ambition and the main targets that we have set for the RIIO-T2 period. A more comprehensive summary of the Action Plan is set out in Appendix 3 (pages 144-148).

¹Our joint study with the other GB transmission licensees used a Stated Preference methodology to assess domestic and commercial energy consumers' willingness to pay for nine service attributes including: undergrounding of overhead lines (OHLs); improving visual amenity of OHLs; improving environment around transmission sites; supporting local communities; and investing to make sure the network is ready to connect renewable generation. All attributes resulted in significant positive willingness to pay.

²The full report from this event is available at: www.ssen-transmission.co.uk/riio-t2-plan/riio-t2-our-stakeholder-engagement-journey/



Connecting for Society

Working collaboratively to deliver a whole system solution that promotes affordability, considers societal benefits and supports community renewable connections

Our strategic objective to enable the transition to the low carbon economy through the timely, cost effective connection of renewable generation to our network is at the heart of our sustainability ambition. Achieving this ambition is central to our [Commercial and Connections Policy](#) and [Network Access Policy](#).

Main targets:

- All connection offers made within the timescales set out in industry codes
- To apply our new social, environmental and economic CBA framework to all capital investment decisions made during the RIIO-T2 period and report on the outcomes



Clear goal

Every connection delivered on time



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

Climate change is no longer a distant threat, but a visible reality. To tackle climate change, our RIIO-T2 Business Plan sets out targeted actions to reduce our main GHG emissions (SF6, substation and operational transport), along with a commitment to invest in business resilience to climate change (pages 74-76).

Main targets:

- By summer 2020, set a science-based target, approved by the Science Based Target Initiative, that reduces our scope 1 and 2 GHG emissions by 33% by the end of the RIIO-T2 period
- Target annual SF6 emissions of 0.39% of installed volumes with a financial reward / penalty based on the prevailing carbon price



Clear goal

One third reduction in our GHG emissions



Promoting Natural Environment

Delivering biodiversity net gain and driving environmental stewardship best practice

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 working towards certification.

There are strong views in the north of Scotland and across GB that our actions must be environmentally sensitive. These stakeholders' views are reflected in the scale of our ambition.

In July 2019 we became the first UK network licensee to consult on an approach to implementing biodiversity net gain

Main targets:

- All capital investment projects gaining consent after 1 April 2020 to have biodiversity no net loss outcomes, including no net loss of all woodland cover
- Make regulatory submissions for at least five visual amenity projects during the RIIO-T2 period (see box to the right)

Let's take a more positive approach to biodiversity

"There are fantastic examples of corporates leading the way. One developer, SSE's Scottish Hydro Electric Transmission, is at the forefront. It published its sustainability strategy last year and incorporated [biodiversity net gain] into its core. Initiatives such as the award-winning SSE project that resulted in the creation of habitat for a rare type of bumblebee at its Thurso South substation show the benefits of the approach."

The Herald
23 October 2019



Optimising Resources

Managing resources for a circular economy; achieving zero waste to landfill, increasing resource efficiency and using sustainable materials

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.

Main targets:

- Achieve zero waste to landfill (excluding compliance waste) by the end of the RIIO-T2 period
- Achieve recycling, recovery and reuse of construction and demolition waste of 70% by the end of the RIIO-T2 period



Supporting Communities

Meeting the needs of vulnerable customers and maximising the local benefit of our investments

While our regulator does not prescribe support for vulnerable communities as a minimum requirement for transmission owners¹, our stakeholders take a different view. Our conversations, particularly with consumer groups, reveal an expectation that we carefully consider how we support vulnerable communities and take steps to act in collaboration and support of others.

Main targets:

- Maintain >25% of our approved suppliers to be located in the north of Scotland
- Achieve >95% of our employees trained in supporting vulnerable communities by end 2022



"We are supportive of SSENs approach to supporting communities and vulnerable customers. While this is not an area that Transmission companies have traditionally focussed on, we welcome the ambition being shown by SSEN."

- Citizens Advice Scotland

Improving visual amenity

As part of the RIIO-T1 settlement, Ofgem established a £500 million fund for GB electricity transmission owners to mitigate the impact of existing electricity infrastructure on the visual amenity of nationally designated landscapes.

Visual Impact of Scottish Transmission Assets (VISTA)² is our policy initiative to assess the visual impact of our infrastructure on National Parks and National Scenic Areas (NSAs) in the north of Scotland. Through collaboration with stakeholders, the aim of VISTA is to identify the most effective mitigation proposals for which funding can be sought from the Ofgem administered fund. To date, Ofgem has approved two VISTA schemes:

- £32 million to replace 12.3km of 132kV overhead line with 14.1km of underground cable in the Cairngorms National Park near Boat of Garten; and
- £0.5 million to reduce the visual impact of the existing transmission line in the Loch Tummel National Scenic Area through a combination of tower painting, tree planting and landscaping

Stakeholders strongly support our VISTA policy and its continuation into RIIO-T2. Working with Ofgem and the other transmission owners, we have developed modifications to the fund to make it more transparent and introduce an element of materiality in access to the fund.

Following stakeholder feedback to the draft Business Plan, we are also committing to work with stakeholders to co-create an evidence-based approach to assessing visual amenity improvement proposals outwith designated landscapes. Our goal is to implement this methodology for the RIIO-T3 period.



Queens View, part of the Loch Tummel VISTA scheme

A Network for Net Zero

¹RIIO-2 Sector Specific Methodology Decision, Ofgem, May 2019. Available at: www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-decision

²More information on our VISTA initiative is available at: www.ssen-transmission.co.uk/sustainability-and-environment/vista



Growing Careers

Ensuring a safe and inclusive culture for our employees; adding value through good jobs, training and development

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 the north of Scotland transmission network, significant 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 (**Figure 6.7**).

As a growing organisation with an evolving skills requirement, we are cautious and thorough in our approach to workforce planning. For this RIIO-T2 Business Plan, our planning for a [sustainable workforce](#) is based on the Certain View outcomes, but will adapt in response to need.

79% of our employees ranked us as a Great Place to Work[†]

Main targets:

- Expand our inclusion and diversity programme, including >95% of employees having received targeted training
- Develop a methodology for our pipeline intake to be representative of our local demographics and implement a target by 1 April 2021

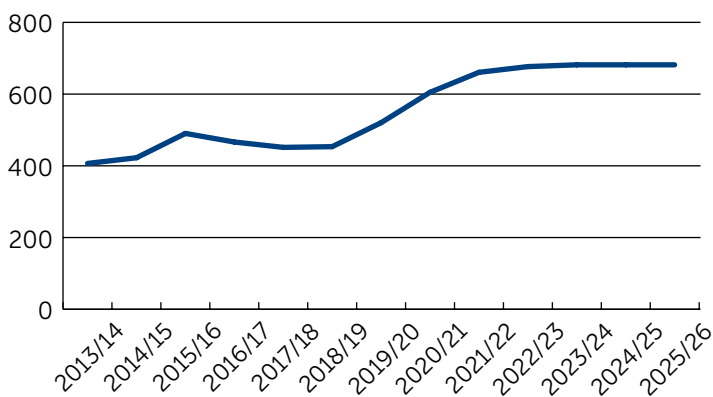


Figure 6.7 Our workforce during the RIIO-T1 and RIIO-T2 periods

(directly employed; actual to 2018/19, forecast thereafter)

Collaborating with our value chain

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 wider stakeholders.

The UNGC[‡] recognises procurement as 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. We have worked closely with our supply chain during the development of this RIIO-T2 Business Plan and together we have committed to:

- 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
- Incorporate sustainability credentials in our tender evaluation criteria and processes to ensure sustainability is factored into investment decisions

Responsible procurement charter

SSE's Responsible Procurement Charter and Procurement Policy both highlight the importance of sustainable supply chains with the former outlining the standards SSE holds itself to and expects of its suppliers on issues including: health and safety, human rights, ethics, fairness at work, local supply chains, payment practices, information security and environmental impacts. All potential new suppliers for SSE must register on SSE's Supplier Registration System which includes sign-on to SSE's Responsible Procurement Charter.

Enhanced Reporting Framework



Citizens Advice principle 4: Companies are required to publish complete information on their performance, financial structures, gearing and ownership

"We welcome SSEN's willingness to engage with this issue. We believe their involvement will enrich the debate and ultimately lead to better outcomes for consumers."

"We strongly encourage other energy networks to do the same and show they're serious about delivering an efficient and fair service for their consumers."

- Citizens Advice, March 2019¹

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 workshop² 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.

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 (**Table 6.4**), 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.

Implementing our Policy

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.

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.

Table 6.4 Enhanced Reporting Framework

¹Reform in RIIO: Transparency, SHE Transmission consultation, March 2019. Available at: www.ssen-transmission.co.uk/media/3224/reform-in-riio_transparency.pdf

²A full report on this workshop is available at: www.ssen-transmission.co.uk/riio-t2-plan/riio-t2-our-stakeholder-engagement-journey/



Financing our Plan

Contents: Section 7

Overview of this Section	105
Summary of Total Expenditure: Certain View	106
Allowed Revenue and Customers’ Bills	108
Shareholder Returns and Pay	110
Overview of Financial Parameters	112
Financeability Assessment and Managing Financial Risk	114

Overview of this Section

This RIIO-T2 Business Plan sets out the case for continued significant investment in the north of Scotland transmission system to maintain a pathway to net zero emissions and ensure continued security of supply.

The efficient financing of this investment is a further critical aspect of delivering good outcomes for GB energy consumers. Efficient financing assumptions are an important part of determining our allowed revenue and, thus, the cost that is incorporated into household energy bills.

There are five parts to this section of our Business Plan:

1. A summary of the total expenditure under the Certain View set out in the previous sections. We make a comparison with equivalent expenditure during the RIIO-T1 period, and explain the main reason for changes.
2. An overview of the impact of total expenditure under the Certain View and Likely Outturn Assessment for the average GB household bill. This is presented using Ofgem's assumptions for financing our Plan.
3. An explanation of the approach we take to making dividend payments to our shareholder, and the approach we take to remunerating our employees.
4. The financial parameters that are relevant to the efficient financing of our Business Plan. We highlight the differences between Ofgem's assumptions and our evidence-based proposals.
5. A summary of the financeability assessment we have undertaken to ensure our network remains financeable during the RIIO-T2 period. In presenting this assessment, we have closely followed the Guidance set out by Ofgem.

This section of our Business Plan should be read in parallel with [Supporting Document 18 Finance Annex](#), and the associated independent consultants' reports.

Throughout this section, we refer to:

The Guidance being RIIO-2 Business Plan Guidance, Ofgem, 31 October 2019. Available at: www.ofgem.gov.uk/publications-and-updates/riio-2-business-plans-guidance-document

The SSMD being the RIIO-2 Sector Specific Methodology Decision, Ofgem, 24 May 2019. Available at: www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-decision

The SSMD-F being the Finance part of the SSMD

The Financeability Guidance being Financeability Assessment for RIIO-2: Further Information, Ofgem, 26 March 2019. Available at: www.ofgem.gov.uk/publications-and-updates/financeability-assessment-riio-2-further-information



Stakeholders' views

We have engaged with a wide-range of stakeholders on the issues associated with financing our RIIO-T2 Business Plan, and the cost of the north of Scotland transmission network to the average GB household.

In response to stakeholders' input we have expanded our modelling and included additional information in our Plan:

Be clear about what consumers are paying for

We have described how much of the average household bill is attributable to historical investment (or current network assets in operation) and how much is for new assets and investment (**Figure 7**, page 15).

Assess the Business Plan against Ofgem's assumptions clearly, but it is important to also set out other scenarios including the net zero scenarios

We have included sensitivities for potential investment requirements for our Likely Outturn Assessment and the Proactive Decarbonisation scenario (net zero proxy).

Set out plausible mitigating actions you would or could undertake during the RIIO-T2 period if financeability was a concern, and consider financeability over the long term (not just this price control)

We have set out mitigating factors to ensure financeability does not become an issue in the short term, i.e. within the RIIO-T2 price control up to 31 March 2026 only, as required by Ofgem's Business Plan Guidance. We have assessed financeability in the long term in our Finance Annex.

Clearly set out why our proposed target credit rating is appropriate for both consumers and investors

We have included additional information on target credit rating including how longer term financeability and interacts with our credit rating.

In considering the above feedback, we have set out what the cost to consumers is under our Proposed Financial Parameters compared to Ofgem's Working Assumptions in our Finance Annex.

Summary of Total Expenditure: Certain View

The total expenditure forecast for the Certain View in this RIIO-T2 Business Plan is £2.36 billion (Table 7.1 and Figure 7.1).

In line with the Guidance, all expenditure in this Plan is presented in 2018/19 prices. An adjustment for inflation (CPIH) will be made automatically each year during the price control. When we present financial data including inflation, we have assumed 2% inflation each year from 2018/19.

In the preceding sections of this Business Plan, we have described expenditure to grow the network, to maintain and invest in existing assets, for security of supply and to operate a sustainable network. In each case, we have set out the reason for expenditure, the amount and the outputs that will be delivered.

The total expenditure in these preceding sections is £2.18 billion. We have not described two further expenditure types:

Closely Associated Indirect Operating Costs (CAI) are for our employees and related expenditure for regulatory reporting; stakeholder engagement; sustainability and environmental management; capital delivery; customer connections; and operational training. The total cost for CAI during the RIIO-T2 period is £147.7 million[†]. While CAI costs increased during the RIIO-T1 period as the network grew significantly, looking out to 2026 there will not be further substantial increase.

Business Support Cost (BSC) activities covering the following functions: Finance; Risk, Audit and Assurance; Legal; Regulation; HR; IT; Corporate Affairs; Property Management; Telecoms; and IT. As we are part of the SSE plc Group, our structure has central Group BSC functions which allows us to benefit from economies of scale and gain access to expertise as and when required at a reduced cost.

The total cost for BSC during the RIIO-T2 period is £89.5 million[†]. BSC increased during the RIIO-T1 period by 117%; significantly less than the asset value growth of around 300%. While we expect continued growth in the network over the coming years, we are not forecasting any growth in BSC.

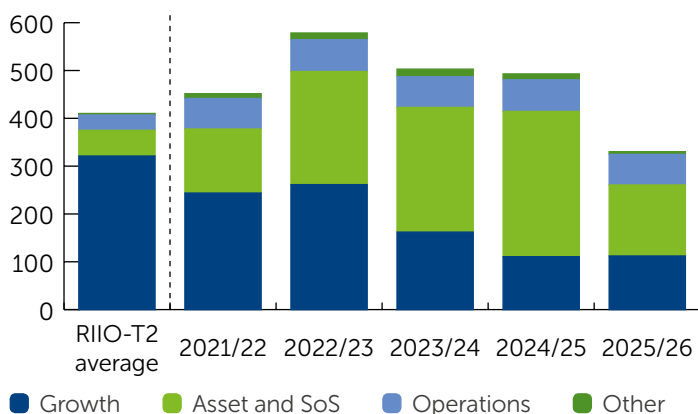


Figure 7.1 Total expenditure: Certain View (£m pa)

Comparison of forecast total expenditure with historic actuals

It is difficult to make a meaningful comparison of our RIIO-T2 Business Plan with our expenditure over the past price control given the significant growth in the north of Scotland transmission network. However, we note the following:

Growth capital expenditure (section 2)

Investment to grow the network, for example for generation connections or strategic boundary uplift, is highly variable in scope, scale and timing. The north of Scotland transmission network began to grow around 2010 and will continue to grow under the Certain View during the RIIO-T2 period. On an annual average basis, growth capital expenditure during the RIIO-T1 period was £321 million, but this masks significant year-on-year variability. During the RIIO-T2 period, annual average growth capital investment under the Certain View is £178 million. This rises to over £400 million under the Likely Outturn Assessment.

Capital expenditure for replacement or refurbishment of existing assets (section 3)

Investment in existing network assets is also highly variable, being a function of the need, the economic scope of works and achieving whole system outcomes. Annual average expenditure during the RIIO-T1 period was £54 million, but this does not capture the asset improvement works undertaken as part of the growth programme. Annual expenditure is higher at £162 million on average during the RIIO-T2 period, with each activity strongly justified as described in section 3.

Direct operating costs (section 3)

The scale, and hence cost, of our direct operations is closely related to the extent and complexity of the network. We are forecasting overall growth in the costs of direct operations during the RIIO-T1 period by 350%. Over the five years of the RIIO-T2 period, we expect a further 7% increase in our direct operations costs, while the value of the asset base will increase by 61%. The efficiency benefits from new technologies (including IT investment) and ways of working will result in productivity improvements that keep our costs down.

	Expenditure (£m)	Main Outputs [†] by 31 March 2026 (or annual, where stated)
Building a Network for Net Zero		Pages 29-48
New Sole-Use Infrastructure for onshore and offshore generation [†]	77.2	2,043 MW [†]
New or Upgraded Shared-Use Infrastructure	124.3	2,047 MVA
New or Upgraded Strategic Infrastructure	560.4	1,090 MW on B4*
Pre-construction	129.1	Undertaking all necessary development activities (e.g. options assessment, environmental studies, consents) to enable timely construction. Includes five early stakeholder engagement events per annum
Maintaining and Investing in the Existing Network		Pages 49-66
Replacing or Refurbishing Existing Network Assets	810.2	533 £Rm monetised risk reduction (relative to no intervention)
Direct Operations	87.3	Annual average Energy Not Supplied <90 MWh
Indirect Operations**	29.5	72 faults of all durations with no exclusions Upper quartile in international benchmarking for (i) operations and maintenance, and (ii) asset management
Security of Supply		Pages 67-78
Refurbished or Upgraded Protection and Control	65.0	64 protection schemes 33 real time control units
Improved Physical Site Security	33.9	23 deterrence schemes (e.g. fencing) 55 defence schemes (e.g. CCTV, alarms)
New and Upgraded Warehousing and Spares	53.6	2 specialist warehouse facilities
New and Upgraded Network Control Centre	16.3	1 new network control centre and back-up facility
New Smart Monitoring of Critical Assets	45.4	62 critical assets
Other	58.4	116 substations capable of 120 hour stand alone operation Compliance with Persistent Organic Pollutants regulations
Data, IT and Analytics	57.8	Business IT and Operational Technology, and enhanced cyber security
A Sustainable Network for Current and Future Energy Consumers		Pages 85-103
Customer and Stakeholder Engagement, including Connections	17.3	100% of connection offers made on time >9.0 out of 10 in stakeholder engagement annual survey Annual reporting under Enhanced Reporting Framework
Sustainability Policy and Reporting	9.7	33% reduction in scope 1 and 2 GHG emissions Annual average SF6 gas leakage <0.39% Five projects to improve visual amenity submitted
Other Expenditure		Pages 106-108
Indirect Operations	93.6	Activities that support network operations such as System Planning and Regulatory Reporting
Business Support	87.1	Back office activities such as Finance; Risk, Audit and Assurance; Legal; Regulation; HR; Corporate Affairs; and Property Management
	2,356.1	

Table 7.1 Total expenditure forecast for the Certain View

[†]For full outputs schedule see Appendix 4 Snapshot Tables: Outputs (pages 152-154)[†]Includes expenditure (but no outputs) for Transmission Connection Assets and Sole Use Infrastructure subject to RIIO-T1 arrangements

*Boundary capabilities are based on a given generation and demand background. For the purposes of reporting cumulative deliverables, the boundary capability uplifts from the individual projects have been arithmetically added. However, the aggregate boundary uplift over time will not necessarily equal the arithmetic sum due to the sensitivity of the boundary capability to generation and demand backgrounds

**Asset management, network control centre and operational training

Allowed Revenue and Customers' Bills

Determining allowed revenue

Our allowed revenue is calculated using a regulated financial framework which is common to all transmission licensees 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 believes to be efficient.

The inputs to the framework are our expenditure requirements (**Table 7.1**) and the financial assumptions explained later in this section. 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:

- Our allowed revenue is made up of the following key components:
- Return on Regulated Asset Value (RAV), being the proportion of our expenditure that is capitalised ("slow money") that is added to the RAV each year. The return is determined using the allowed Cost of Capital
- Depreciation of the RAV, spread over the lifetime of the assets
- In year expenditure ("fast money"), on which there is no return element
- Efficient expenditure on things outwith our control, such as business rates, and an allowance for tax and pensions
- Payments (positive or negative) due under regulatory performance incentive or uncertainty mechanisms

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 internal financial model to forecast our allowed revenue for the RIIO-T2 period while also reconciling to Ofgem's current RIIO-T2 PCFM to ensure we remain compliant with the Guidance.

Forecast allowed revenue

Figure 7.2 shows our forecast of allowed revenue for the RIIO-T2 period for the Certain View of allowed expenditure based on Ofgem's assumptions for financial parameters. This shows our allowed annual revenue increasing from around £470 million to £570 million (including inflation) as we invest to grow the network.

In our Finance Annex we set out the evidence for our proposed financial parameters. Using these parameters, the average annual allowed revenue is approximately £47 million higher than under Ofgem's assumptions. This largely relates to the difference in the Cost of Equity assumption.

As explained in our Annex, our Cost of Equity proposal is necessary to maintain the long term financeability of our business. Once Ofgem's assumptions are adjusted to support financeability, as illustrated later in this section, the differential in revenue between our proposed financial parameters and Ofgem's assumptions reduces significantly.

Allowed revenue is forecast to increase by up to £100 million in the first year of RIIO-T2 under both Ofgem's assumptions and our proposed financial 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.

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. Ofgem¹ estimates that the average GB household electricity bill is £577, 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.

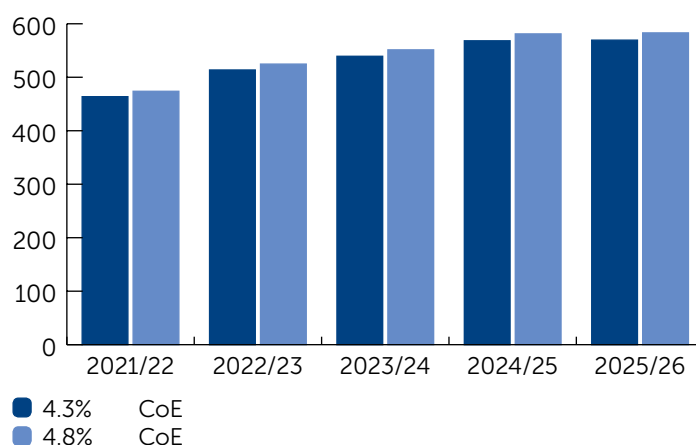


Figure 7.2 Allowed revenue for Ofgem's assumptions (£m, including inflation)

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 our Business Plan, we have used a simple top-down approach that is intended to follow the methodology described by Ofgem¹ with five steps:

1. Start with our calculated allowed revenue for each year of RIIO-T2
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 customers²); 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*)
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.

Figure 7.3 shows our best estimate of the cost to the average GB household of the north of Scotland transmission network during the RIIO-T2 period. This has been calculated for the Certain View of expenditure and outcomes, and uses Ofgem's assumptions for financial parameters. For our proposed financial parameters, the annual average cost would be slightly higher than Ofgem's assumptions (less than £0.50). However, our analysis demonstrates that Ofgem's approach is not a financeable proposition and would cost customers more in the long term.

Figure 7.4 shows our best estimate for the Likely Outturn Assessment. This would increase the annual average household bill by around £1 in 2025/26 compared to the Certain View. 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, 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. 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 consume 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.

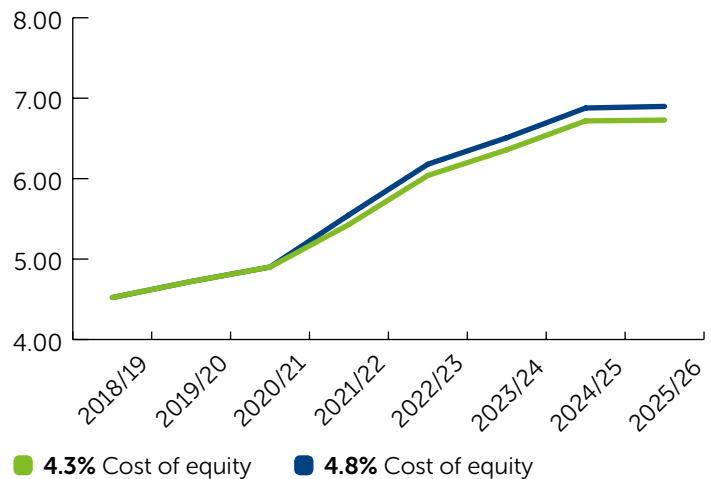


Figure 7.3 Estimated cost of the north of Scotland transmission network to the average GB household for Ofgem's assumptions: Certain View

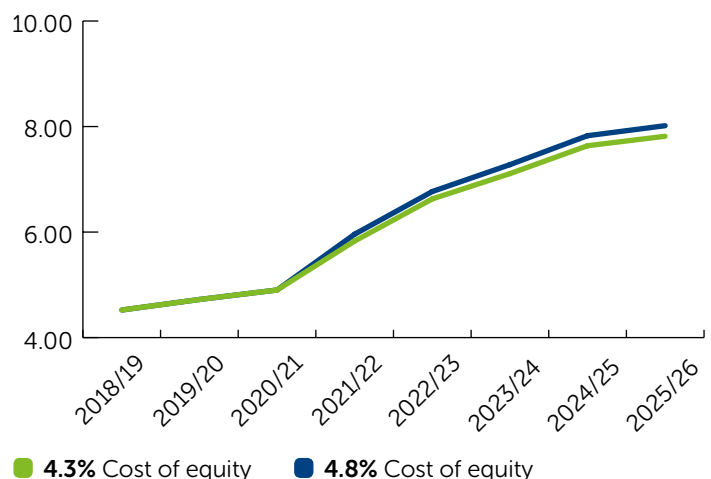


Figure 7.4 Estimated cost of the north of Scotland transmission network to the average GB household for Ofgem's assumptions: Likely Outturn Assessment

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

¹Understand 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

²Digest of UK Energy Statistics, BEIS, 2018. Available at: www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2018-main-report

*Transmission Network Use of System (TNUoS) charges, National Grid ESO, 2019. Available at: www.nationalgrideso.com/charging/transmission-network-use-system-tnuos-charges

Shareholder Returns and Pay

Our sole shareholder is the SSE plc Group, a UK-listed company based in Perth, Scotland. SSE is committed to the highest standards of corporate governance, which the best way to ensure SSE is a consistently successful, well-run and responsible business. SSE's approach to making dividends and remunerating its employees is described below.

RIIO-T2 dividend policy

Our dividend policy is based on a range of factors considered by the Board of Directors including delivering our Business Plan, maintaining our investment grade credit rating and providing an appropriate rate of return to shareholders.

Given the significant capital investment over the past decade and planned in this RIIO-T2 Business Plan, our dividend policy has to have the capability to flex with these requirements such that shareholders will see cash dividends over the period in line with their required rate of return. This will result, in particular years, to be a relatively low or no dividend and in other years a significantly higher dividend. Each year will consider our commitments to deliver our Business Plan while ensuring we comply with our licence requirements to maintain an investment grade credit rating and for Availability of Resources.

Under our dividend policy, we consider the following factors on an annual basis prior to declaring a dividend:

- Availability of Resources for operating in the coming 12 months
- Company Viability over the forthcoming three years in line with the UK Corporate Governance Code
- Maintaining investment grade credit rating including raising external borrowings at an appropriate credit rating
- Planned and committed capital investment
- Financial performance and the required return by shareholders
- The impact on customers of a dividend being paid including attracting and retaining investment to deliver our Business Plan

The dividend policy for the RIIO-T2 period does not deviate significantly from our historic approach.

Historical dividends and returns

Our Return on Regulatory Equity (RoRE) including tax and debt performance for the RIIO-T1 period is 9.1%¹. This includes forecast performance in 2019/20 and 2020/21, and regulatory mechanisms subject to adjustment at the end of the price control period.

The Return on Capital Employed (ROCE) is 4.3%¹. This is the equivalent to the amount charged for use of the electricity transmission network as it is based on the value of the RAV.

To date, over the RIIO-T1 period, we have paid total dividends of £505 million. This is equivalent to 7.8% return on the equity portion of the RAV which is owned by shareholders. These dividends have been made on a similar flexible dividend policy to that described above, including using a weighted average methodology. We believe this represents a fair distribution to shareholders: it is closely linked to the level of business performance, while ensuring we retain an investment grade credit rating.

Full details of our dividend payments are reported in our Annual Accounts and Regulatory Financial Performance Reporting*.

RIIO-T2 equity issuance policy

Our equity issuance policy is to only consider equity investment under certain circumstances where alternative means of funding are considered inappropriate. This includes options to manage annual cash flows, adjust actual borrowings (including short and long term debt) and restricting dividends where appropriate.

Our licence requires us to annually inform our Ultimate Controller (SSE plc) of its obligations to the company. Under this obligation, if equity investment is required then we would request this from our Ultimate Controller including the cost of raising equity for investment.

The regulatory cost allowance for issuing equity in RIIO-T1 is 5% and Ofgem propose to retain that value in RIIO-T2. We do not propose any alternative values but will continue to review market evidence up to RIIO-T2 Final Determinations in late 2020.

Pay and Performance

The SSE plc Group's Remuneration Committee is responsible for setting pay for members of the Group Executive Committee (GEC) and reviewing the remuneration arrangements for all employees across the Group. The GEC includes the Managing Director of Networks and the Managing Director of Transmission.

The details of how the Remuneration Committee operates is disclosed in the Directors' Remuneration Report in the SSE plc Group Accounts**.

¹This is based on an RPI-real estimate and compares to a cost of equity of 7.0% for the RIIO-T1 period

¹ROCE is a more appropriate measure of financial returns as it incorporates the amount paid for borrowing costs which constitutes 55% of the charge for use of the transmission network

*Regulatory Financial Performance Reporting (RFPR), SHE Transmission, 31 July 2019. Available at: www.ssen.co.uk/Library/FinancialInformation/

**SSE plc annual reports are available at: <https://sse.com/investors/reportsandresults/>

The Remuneration Committee has responsibility for overseeing pay in SSE Transmission. Pay and remuneration is based on the following elements:

- The senior management population participate in annual and long-term incentive arrangements. In line with Executive Directors' arrangements, incentives for senior management have an emphasis on share awards.
- All employees have the opportunity to be share owners through the Share Incentive Plan and the Sharesave Plan and those participating are able to express their views in the same way as other shareholders.
- Pension planning is an important part of SSE's reward strategy for all employees because it is consistent with the long-term goals and horizons of the business, an approach it has been practising for a number of years. The terms of the funded final salary pension schemes apply equally to all members.
- As part of its Employee Engagement Survey ("Great Place to Work") SSE invites all employees to provide a view on the benefits and pay that it provides.

The Remuneration Committee keeps these arrangements under constant review. In 2019/20 SSE plc has made changes to the non-financial measures of its annual incentive plan by adopting four long term business goals directly linked to the UN's SDGs.

For SSE Transmission, there is close alignment with the long-term goals of SSE: supporting renewable output, accommodating electric vehicles and championing fair tax and the real Living Wage. Individual performance in SSE Transmission is measured against these goals along with other factors such as health and safety, licence compliance, Business Plan outputs and stakeholder engagement.

The Remuneration Committee appreciates the importance of an appropriate relationship between the remuneration levels of the Executive Directors, senior executives, managers and other employees within SSE, although comparison metrics are not used to determine pay policy. Remuneration at all levels is designed to be consistent with the Group's core remuneration principles, long-term business strategy and, for SSE Transmission, the goals set out in our Business Plan. The structure of reward necessarily differs based on scope and responsibility of role, level of seniority and location (**Table 7.2**).

	Base Salary	Benefits	Pension	Short Term Incentive	Long Term Incentive
Executive Directors	Base salary is typically set with reference to the market and wider workforce considerations Annual increases are typically in line with or less than the wider employee population	A range of voluntary benefits in line with the wider workforce, plus contractual car and private medical benefits	All employees are a member of the SHEPS or SEPS defined benefit (DB) scheme, or the Pension+ defined contribution (DC) scheme unless they have opted or cashed out. The arrangements are diverse and the employer cost typically ranges from 3% to 38% of salary when DC and DB are taken into account	Annual Incentive Plan linked directly to business performance – 50% financial, 50% non-financial, 33% of the total award is deferred as career shares <u>and/or</u> Annual Incentive Plan considering performance of the Group (directly linked to the above), the business and the individual. 25% of the total award is deferred as SSE plc shares for three years	The Performance Share plan is a share award with performance linked to strategic performance measure and those with direct impact on strategic output are eligible
Group Executive Committee					
Senior Management					
Wider Workforce	Base salary levels are subject to negotiation with recognised trade unions and/or are set in line with market requirements	A range of voluntary benefits are available to all employees, such as a cycle to work scheme, a holiday purchase scheme, health benefits and enhanced maternity, paternity and adoption leave		Depending on role, a proportion of employees will participate in the Annual Incentive Plan (as above)	All employees may participate in the Share Incentive Plan (SSE matches three shares for every three bought) and the Sharesave (SAYE) plan

Table 7.2 Remuneration arrangements, SSE Group

Overview of Financial Parameters

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 of equity) and financial parameters (representative asset lives, proportion of capital investment and inflation). We also need to plan to pay our taxes.

Ofgem's assumptions on the financial parameters from the Guidance and our proposed parameters are shown in **Table 7.3**.

Cost of Capital

The Cost of Equity (CoE) is a component part of our price control and comprises 40%[†] of the Weighted Average Cost of Capital (WACC or Cost of Capital) which is the rate of return charged to consumers for the use of the transmission network.

The value of the electricity transmission network is termed the Regulatory Asset Value (RAV) and is part of the price control formula for charging consumers.

The remaining 60% of the Cost of Capital is comprised of the Cost of Debt (CoD) and is based on the appropriate market rate for borrowing capital to invest into the electricity network.

The summary presented in this section uses the CoD, CoE and WACC assumptions directed by the Guidance. Our proposed financial parameters are set out in our Finance Annex.

	Ofgem's assumptions	Our proposed parameters
Cost of Equity	4.3% or 4.8%	6.5%
Cost of Debt	11-15 year trombone	At least 11-15 year trombone, but keep under review
Gearing	60%	60%
Inflation	CPIH	CPIH
Capitalisation	90% (Based on Business Plan)	90%
Asset lives	Transition to 45 years by 2026 (Based on Business Plan)	Transition to 45 years by 2026
Tax treatment	Pass-through	Pass-through

Table 7.3 Main financial parameters

Note that Ofgem propose three options for tax treatment: Notional allowance, pass-through or "double-lock"

Cost of Equity

Ofgem's assumption for CoE is 4.3% (CPI-real).

However, Ofgem intend to assess a notional company's financeability on CoE of 4.8%. Ofgem expects outperformance of the price control settlement which would improve cash flows and returns to investors by the equivalent of 0.5% CoE uplift.

We do not agree with this "outperformance wedge" and have presented evidence in our Finance Annex and in previous submissions to Ofgem. However, in order to comply with the Guidance, we have evaluated our Business Plan using a CoE of 4.3% and 4.8% assuming an incentive bias of 0.5% is secured in cash terms in each financial year[†].

Based on current market evidence and our financeability assessment, we propose that the CoE is set at 6.5%. This is explained in detail in our Finance Annex with supporting evidence and analysis.

Cost of Debt

Ofgem's assumption for the CoD is an 11-15 year 'trombone' of the average of A/BBB iBoxx non-financial corporate bond indices.

We have previously advocated for the use of a simple 15-year trailing average of A/BBB iBoxx non-financial corporate bond indices. We presented evidence for this in our draft June Business Plan supported by independent analysis from Oxera*. This showed that to fund the 'all-in' CoD during the RIIO-T2 period it would be more appropriate to have this trailing average of 15 years subject to changes in debt markets.

We set out our full analysis of an appropriate CoD index in the Finance Annex including evidence for Additional Costs of Borrowing supported by independent analysis from NERA**.

At this stage, we consider Ofgem's assumption of an 11-15 year trombone to be the minimum length of index that would be required, dependent on market circumstances, to ensure sufficient funding of 'all-in' costs of debt under a range of scenarios. However, we intend to keep the CoD mechanism under review until Final Determinations to ensure additional evidence, analysis and changing market conditions can be considered prior to setting allowances for the RIIO-T2 period^{††}.

It is critical that we are fairly compensated for 'all-in' borrowing costs under a proposed mechanism, while also maintaining the incentive to finance efficiently in line with Ofgem's CoD and efficient financing principles set out in the SSMD.

[†]Notional gearing of 60% is based on Ofgem's assumptions and is consistent with our current actual gearing in the latter years of the RIIO-T1 period

^{††}The 0.5% incentive bias included in cash terms is not realistic due to the timing of cash from the totex incentive mechanism. Thus this assumption overstates the positive cash flow impact on credit ratios

*Cost of debt and Financeability analysis for SHE-Transmission, Oxera, June 2019.

**Halo Effect and Additional Costs of Borrowing at RIIO-2, NERA report for the ENA, September 2019.

^{††}In the RIIO-ED1 price control process, 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

Asset lives

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 customers that use that line during the next 45 years.

As part of the RIIO-T1 price control settlement, Ofgem determined that asset lives should transition to 45 years from 20 years. This was in order that regulatory asset lives better reflected the estimated useful economic lives of network assets.

For us, the period for this transition was to be across “two price control periods”. The transition period reflected the intensity of the capital investment programme and, hence, to support financeability. As the RIIO-T1 period was eight years, it was assumed that the transition would be over 16 years.

However, RIIO-T2 will be a five year period. We have tested, with reference to managing financial risk and our financeability assessment, a range of assumptions about the transition period including moving to 45 years immediately in the first year of RIIO-T2 and reducing asset lives (Figure 7.5¹). In doing so we have considered the impact on cashflow in the short and long term and considered the inter-generational impact of changing asset lives. Our analysis demonstrates that consumers between generations will be adversely impacted by significant changes in asset lives; this was a finding of the CMA appeal on RIIO-ED1 Slow Track DNOs in 2015.

On balance, reflecting the policy decision of “two price control periods”, we have assumed the transition shortens to 13 years and asset lives will be 45 years by 1 April 2026.

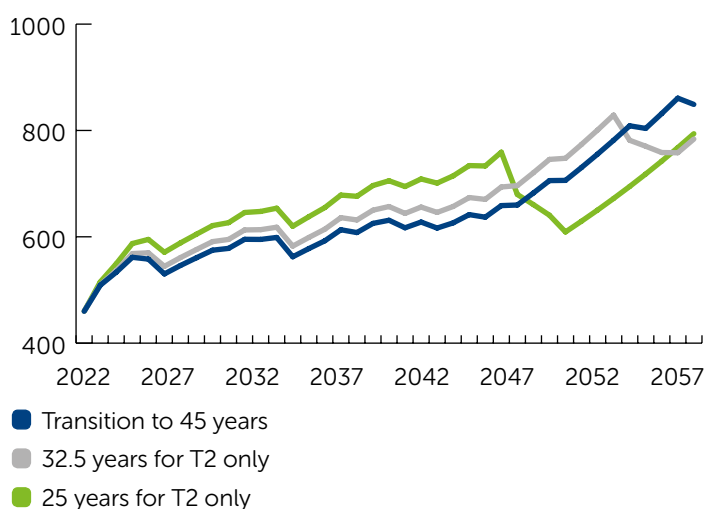


Figure 7.5 Revenue profiles for different asset life assumptions

Capitalisation rates

Capitalisation rates are the proportion of the total expenditure that is for capital investment.

Currently our regulatory capitalisation rate is 90% (Table 7.4). This reflected the large capital investment programme forecast in our RIIO-T1 Business Plan. The Certain View in this RIIO-T2 Business Plan has an implied capitalisation rate of 86%. However, this understates our likely capitalisation rate given further investment to be funded under uncertainty mechanisms. Under our Likely Outturn Assessment, the implied capitalisation rate would be over 90%².

Therefore, our Business Plan proposal incorporates a 90% capitalisation rate which we believe appropriately spreads costs of the assets over their useful economic lives and consumers. If set lower, it would increase the short term cost to current consumers unduly*.

Treatment of tax

We strongly believe that licensees should be 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 if licensees can demonstrate compliance (or a demonstrable equivalent level of compliance) with a tax accreditation standard. We are accredited under the Fair Tax Mark.

We do not support the alternative mechanisms proposed by Ofgem in the SSMD, which do not appropriately ensure licensees pay their actual tax due. This is not in the best interest of consumers.

(£m)	RIIO-T1 allowance	RIIO-T1 actual/forecast	RIIO-T2 Certain View
Capex	3,246	3,597	2,032
Opex	253	254	324
Totex	3,499	3,851	2,356
Implied capitalisation	93%	93%	86%

Table 7.4 Analysis of capitalisation rates

¹Using steady state capital investment being a sufficient amount to ensure the RAV does not deteriorate. This allows a like-for-like comparison of changing asset lives

²Including an additional £1.3bn capital expenditure under the Likely Outturn Assessment would increase implied the capitalisation rate to over 90%

*We also believe the Credit Rating Agencies would look through any short term adjustments in capitalisation rates to address financeability concerns, albeit we have reflected a potential reduction in our financeability assessment in line with the Guidance

Financeability Assessment and Managing Financial Risk

The following pages are a summary of our financeability assessment of this RIIO-T2 Business Plan based on Ofgem's assumptions and the Guidance. We set out the analysis required by the SSMD-F and also the criteria set out in the Financeability Guidance. In doing so, we are confident that we have adhered, in full, to the regulatory requirements for this Business Plan. The contents of this section are:

- Price Control Financial Model
- Target credit rating
- Notional and actual company financeability
- Financeability assessment of totex expenditure scenarios
- Managing financial risk and mitigating actions
- Board and independent assurance

These pages should be read with our Finance Annex.

Price Control Financial Model

Ofgem issued a Price Control Financial Model (PCFM)¹ on 31 October 2019, subsequently revised on the 8 November 2019.

The Guidance requires us to obtain Board assurance on financeability matters, and there is a requirement to comply with established regulatory best practice in doing so. Appendix 1 sets out the governance and assurance that has been applied to this Business Plan.

Despite our comprehensive and thorough approach, the timing of issue of the PCFM meant it was not possible to utilise and rely upon the PCFM as we undertook independent and Board assurance on our Business Plan. We have therefore relied upon our internal financial model to undertake our financeability assessment, obtain independent and Board assurance. From this, we are confident that we are in compliance with the Guidance and our licence obligations.

However, we have completed the PCFM (as issued on 8 November) and submitted this to Ofgem. In doing so we have identified any reconciling items where our internal financial model and financeability assessment differs from the results of the PCFM. We have also noted errors in the PCFM. In our Finance Annex, we have included a summary of the financial differences between the PCFM and our internal financial model and a review of these items undertaken by Oxera.

We remain committed to working alongside Ofgem and industry to develop the PCFM and ensure it is fully audited, reliable and useable as soon as possible.

Target credit rating

Network operators are required under licence to maintain an investment grade credit rating as part of demonstrating they are financeable. Ofgem's target investment grade credit rating (as set out in the SSMD-F) is Baa1 or BBB+. This rating is consistent with our current and target investment grade credit rating for both the RIIO-T1 and RIIO-T2 periods².

Ofgem has proposed short term measures to address financeability problems during the RIIO-T2 period, as its concern is only financeability within the price control period (see paragraph 4.27 of SSMD-F). The measures proposed by Ofgem in the SSMD-F are to make changes to actual or notional gearing, regulatory asset lives, and capitalisation rates³.

To ensure our Business Plan is financeable, we have undertaken an assessment of our credit rating ratios in line with the expectations of the Credit Rating Agencies. We have commissioned Oxera⁴ to independently evaluate our Business Plan for financeability, as well as consider Ofgem's approach to financeability.

This evaluation allows us to test both our proposed financial parameters (as set out in our Finance Annex), but primarily Ofgem's assumptions. This analysis has supported our Board assurance process. It has also allowed us to evaluate what adjustments would be required to ensure we maintain the target credit rating between 1 April 2021 and 31 March 2026 as stipulated by Ofgem. Our Finance Annex sets out why we disagree with this approach and why we believe our proposed financial parameters are more appropriate than these short-term measures.

Notional and actual company 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 followed this historic regulatory approach for our Business Plan financeability assessment, albeit we do not have sufficient information to determine the potential outperformance available from the incentive mechanisms proposed in the SSMD. We have assessed our Business Plan assuming no outperformance during the RIIO-T2 period and also under a range of sensitivities outlined by Ofgem in the SSMD-F.

¹Sometimes referred to as a Business Plan Financial Model (BPFM) or Licence Model (LiMo)

²Ofgem use an average of A and BBB rated non-financial corporate bond indices in setting the CoD allowance which is between Baa1 and Aaa3 (BBB+ and A-) rating. We have included in our financeability assessment why this is appropriate alongside our sensitivity analysis in our Business Plan and in our Finance Annex

³Other measures to manage financial risk in the Financeability Guidance include restricted dividends or injecting equity, which is consistent with changing the notional or actual gearing (and re-financing expensive debt where applicable)

⁴RIIO-T2 cost of debt and financeability assessment, Oxera, December 2019. Hereafter referred to as "the Oxera report"

For RIIO-T2 Ofgem has assessed financeability on a notional company basis in the SSMD-F. It has assumed that there is 50 basis points (bps, equivalent to 0.5%) of outperformance, hence, the use of CoE of 4.8% rather than the base CoE of 4.3%. The Financeability Guidance stipulates that the assessment must include both 4.3% and 4.8% with the incentive bias included in the assessment.

While we have followed Ofgem's Guidance, we highlight that the assumed additional 0.5% in cash flows in-year would not in practice be earned that way depending on the source of the outperformance (if any)[†]. This would mean the actual ratios would be worse than shown in our financeability assessment using 4.8% as the CoE.

Table 7.5 summarises the credit metrics we have used from each of the Credit Rating Agencies in assessing our Business Plan, consistent with BBB+ or Baa1. **Table 7.6** sets out the assumptions used when assessing the notional company. The actual company is defined as the actual capital structure and the actual costs of debt with the remaining parameters kept the same for consistency. We have undertaken the following analysis on the notional and actual company financeability:

- Financeability assessment using Ofgem's CoE assumptions of 4.3% and 4.8% and the sensitivities requested in the SSMD-F
- Assessment of the notional and actual company on 4.3% and 4.8% CoE (including a sensitivity for 0% indexed linked debt)
- Assessment of the notional and actual company on 4.3% and 4.8% CoE using higher totex scenario referred to as the Likely Outturn Assessment (including 0% indexed linked debt)

Ratio	Fitch		Moody's		Standard and Poor's	
	A	BBB	A	Baa	A	BBB
Debt metrics						
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		
FFO (cash interest) /net debt (%)			18–26	11–18	>12	8–12
RCF/net debt (%)			14–21	7–14		

Table 7.5 Indicative ranges for investment grade credit ratings from the Credit Rating Agencies

Note A comprehensive derivation of these ranges is set out in the Oxera report. * denotes Ofgem's key credit metrics in the SSMD-F

We have also undertaken an assessment of the mitigating actions stipulated in the Financeability Guidance for the scenarios above. In our Finance Annex, we have undertaken the same financeability assessment for our proposed CoE at 6.5%.

Parameter	Assumption
Allowed CoE	Baseline estimate of 4.3% / 4.8% (real, CPIH)
Allowed CoD	11–15-year trombone
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	3.0% based on Ofgem's assumption on cash dividend set out in their SSMD-F. A sensitivity of zero dividend yield is also assessed, as well as estimating the implied dividend yield
Capitalisation rate	90.0%
Depreciation	Transition to asset life of 45 years by the end of the RIIO-T2 period

Table 7.6 Main assumptions for a notional company

Note Oxera assume the allowed CoD 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 CoD mechanism

[†]For example, cash flows may extend over the asset life of the capital investment (between 32.5 years and 45 years) meaning the cash flow benefit would be materially less than 0.5% in any one year

Our analysis concurs with the findings of the Oxera report. The assessment which we and Oxera have conducted shows that there is little headroom in key financeability metrics above the minimum Credit Rating Agencies' thresholds for Baa and significantly below the thresholds required to retain our target investment grade credit rating of Baa1.

The findings described here focus on the key credit ratios of concern to Credit Rating Agencies including the Adjusted Interest Cover Ratio (AICR) or Post Maintenance Interest Cover Ratio (PMICR), and the Funds from Operations (FFO) to Net Debt. We also have considered the equity ratios to compare against each scenario and Ofgem's assumptions for dividend yield. We present the ratio analysis considering the financeability and equity ratios outlined in the Financeability Guidance for the scenarios noted above including those set out by Ofgem in the SSMD-F.

Notional company financeability

Our analysis, shown in **Tables 7.7a and 7.7b** (page 118), with supporting evidence in the Oxera report, indicates that the key ratios (i.e. AICR and FFO to Net Debt) are not in line with the target thresholds to underpin a rating of BBB+ or Baa1. These ratios under a range of sensitivities exhibit a downward bias towards BBB- or Baa3, two notches below the target credit rating.

In our view, when considering a CoE of 4.3% or 4.8%, the ratios are not sufficiently high to be deliver a Baa1 credit rating even considering qualitative factors normally considered by the Credit Rating Agencies.

An additional factor is that to maintain the ratios, the dividend yield is materially below Ofgem's assumption of 3%. Additional debt over-and-above the notional gearing ratio would need to be drawn down in order to pay a dividend yield of 3%. This would materially affect the credit metrics during the RIIO-T2 period and thereby worsening the credit rating if no action was taken. Oxera shows that an equity injection of more than 20% of our current equity value would be required to satisfy the Ofgem assumption of 3% dividend yield.

We see no rationale for why action should be required for a notional company to achieve Baa1 and pay a dividend yield if Ofgem's assumptions were accurate.

Treatment of index linked debt

We have considered the appropriateness of CPIH index linked debt (ILD), and in particular the impact of holding no ILD as a notional company. In doing so the credit metrics worsen even further than described above for the notional company analysis. In particular, we would have to raise more than 70% of new borrowings during the RIIO-T2 period as CPIH ILDs which appears extremely ambitious given the lack of CPIH ILDs in capital markets.

Actual company financeability

When assessing actual company financeability, we reflect the impact on credit metrics based on our actual gearing and actual embedded debt (**Tables 7.7c and 7.7d**, page 119).

Our actual gearing is in line with the notional gearing of 60%, hence the only difference is the cost of embedded debt. When considering the cost of embedded debt, this excludes transaction costs and Additional Costs of Borrowing, therefore the analysis does not fully reflect the actual credit metrics. This is consistent with Ofgem's PCFM for RIIO-T2, although Oxera has considered these factors in their independent report.

The outcome of the actual company analysis shows a worsening credit metric due to there being no indexed linked debt being held as part of our current debt book. The cash interest is in line with the interest charge, therefore worsening the cash interest paid under the AICR ratio. Again, the dividend yield is materially below Ofgem's assumptions to sustain actual gearing of 60%. On an actual company basis, we are unable to retain the target credit rating of Baa1 and deliver a dividend payment of 3% in line with Ofgem's assumptions.

Financeability assessment of totex expenditure scenarios

We have undertaken a financeability assessment considering the higher capital investment in our Likely Outturn Assessment (page 37). This requires an additional £1.3 billion in expenditure during the RIIO-T2 period, released through predefined uncertainty mechanisms (section 6). This outturn is consistent with our Business Plan being focused on delivering the infrastructure to achieve the net zero emissions targets set by the UK and Scottish Governments.

It is critical that our Business Plan remains financeable on the target gearing should this expenditure be incurred. **Tables 7.8a-d** (pages 120-21) summarise the credit metrics and equity ratios based on a cost of equity of 4.3% and 4.8% for the notional and actual company.

Treatment of AICR and maintenance capex

The definition of the AICR (or PMICR) is that cash flows after maintenance capital investment is the available cash flow to pay cash interest. This definition assumes that a company would be required to maintain its assets to sustain cash flows and ensure debt can be service in the future. This implies that a company could elect not to undertake growth driven capital investment if cash flows were under pressure and would therefore improve credit ratios, namely the AICR. For the AICR ratio, this uses the RAV depreciation as a proxy for maintenance capex as it is assumed that this would be required to sustain the cash flow for servicing future cash interest.

However, for a regulated network the obligations for operating and investing in an electricity network do not constitute just the maintenance element of capital investment. The cash flows are derived from all capital investment which is mandatory to fulfil licence obligations and therefore not discretionary in nature as implied by the AICR ratio.

Non-discretionary capital investment encompasses both growth and asset driven investment and other necessary investments, for example, system safety, security and resilience. When comparing the obligatory capital investment to the RAV depreciation in the AICR ratio, this is materially higher meaning the cash flows are significantly lower for interest coverage. This weakens the ratio compared to that presented in [Tables 7.7 and 7.8](#) for our Certain View and Likely Outturn Assessment. Osera has demonstrated the overstatement of the AICR ratio when there is significant capital investment over-and-above the RAV depreciation.

Financeability Assessment: Likely Outturn Assessment

When discounting the treatment of AICR and continuing to use the regulatory definition for maintenance capex, the ratios improve under the Likely Outturn Assessment despite the significant additional capital investment ([Tables 7.8](#)).

This improvement is due to the increase in RAV depreciation, which is used as the proxy for maintenance capital investment, being offset by the fast money related cash flows from a 90% capitalisation rate. The AICR ratio further improves due to an increase in debt being raised during the RIIO-2 period thereby improving the credit ratios depending on the forecast interest rates.

This analysis therefore indicates that under an extremely capital intensive phase, the credit ratios improve compared to lower capital investment. This is not consistent with the expectations of the analysis and, thus, demonstrates the potential inaccuracies when interpreting the AICR ratio for capital intensive phases. RAV depreciation is a more appropriate proxy in a steady state capital phase where the capital expenditure or RAV additions closely resemble the RAV depreciation.

Adjusting for Growth Capex

When we adjust our analysis by substituting RAV depreciation with capital expenditure, the credit metrics do not support Baa1 or a dividend yield of 3% as set out in Ofgem's assumptions. Our credit metrics are more in line with Baa3, two notches below the target credit rating when adjusted the AICR for actual capex. We do not believe this is in the best interest of consumers and stakeholders given net zero targets are legislative objectives.

Our proposed financial parameters are more appropriate and our mitigating actions outlined in this Business Plan are the minimum required to sustain investment grade credit rating in the event of this additional capital investment.

Managing Financial Risk and Mitigating Actions

The Guidance requires us to set out our assessment of financial risk and risk management measures. This includes undertaking appropriate scenario analysis and how these would be managed during the RIIO-T2 period. Additionally the Guidance requires that an overall risk assessment is required with a well-justified proposal for notional gearing.

The Guidance also requires Board assurance that the licensee is financeable on both a notional and actual capital structure basis using Ofgem's assumptions and expected incentive outperformance. In doing so, if there are financeability challenges identified, then we are required to set out what efforts will be made to address them and what applicable measures are required to aid financeability.

[Tables 7.9a-d](#) (pages 122-123) demonstrate that in order to maintain credit ratios at a Baa1 level and a dividend yield of 3%, both the capitalisation rate and notional gearing would need to be adjusted to 86% and 55% respectively. These, we believe, are the only viable adjustments under Ofgem's approach to achieve the target credit rating.

We do not believe changing the asset lives is appropriate (as described above) or in the best interests of consumers. Other measures, such as restricting dividends and injecting equity, are in essence the same as reducing the gearing level. Additionally, as set out in our here, we note that we are unable to pay dividends at the rate assumed by Ofgem of 3% and thus have already reached the constraint on dividends to improve financeability metrics.

These changes would support a target credit rating of Baa1 during the RIIO-T2 price control period only. Our long term analysis as set out in our Finance Annex deteriorates meaning there would be a financeability concern in future price controls. We believe Ofgem's obligations are to ensure financeability is maintained in the short and long term in line with their obligation to protect the interest of current and future consumers.

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.0	3.4	3.7 - 4.3	4.3 - 3.7	4 - 4	4.1 - 3.9	4.6 - 3.4	4.1 - 3.8
FFO interest cover, excl. accretions (x)*	3.4	3.4	3.3 - 3.6	3.4 - 3.4	3.4 - 3.4	3.5 - 3.3	4 - 2.9	3.4 - 3.4
AICR (or PMICR) (x)*	1.15	0.99	1.13 - 1.17	1.17 - 1.24	1.24 - 1.07	1.07 - 1.15	1.15 - 1.15	1.15 - 1.21
Notional PMICR (x)	1.77	1.77	1.72 - 1.85	1.85 - 2.15	2.15 - 1.39	1.39 - 1.77	1.77 - 1.77	1.77 - 1.84
FFO (cash interest) /net debt (%)*	9.2%	9.2%	9.1% - 9.2%	9.2% - 9.2%	9.2% - 9.2%	9.5% - 8.9%	11.1% - 7.2%	9.2% - 9.2%
FFO (interest expense)/net debt (%)*	9.7%	9.2%	9.7% - 9.7%	9.9% - 9.4%	9.7% - 9.7%	10% - 9.4%	11.6% - 7.7%	9.8% - 9.6%
RCF/net debt (%)	7.8%	7.3%	7.8% - 7.8%	8% - 7.5%	7.8% - 7.8%	8.1% - 7.5%	9.8% - 5.8%	7.9% - 7.7%
EBITDA/RAV	9.3%	9.3%	9.4% - 9.1%	9.3% - 9.2%	9.3% - 9.3%	9.5% - 9%	10.9% - 7.6%	9.3% - 9.3%
RoRE	11.2%	11.2%	11.2% - 11.2%	11.4% - 11.1%	11.2% - 11.2%	11.8% - 10.7%	14.3% - 8.1%	11.2% - 11.2%
Dividend Cover	2.7	2.7	2.7 - 2.7	2.7 - 2.6	2.7 - 2.7	2.9 - 2.5	3.7 - 1.6	2.7 - 2.7
Dividend/RegEquity	3.0%	3.0%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%
Implied Dividend yield	(0.8%)	(0.9%)	-0.8% to -0.8%	0.7% to -2.3%	-0.8% to -0.8%	1.3% to -2.8%	2.3% to -3.9%	-0.8% to -0.8%
Required equity buyback/ (issuance) (£m)	(340)	-345.5	-342 to -337	-214 to -460	-340 to -340	-147 to -532	-61 to -619	-338 to -341

Table 7.7a Financeability metrics for the notional company (4.3% CoE): Certain View

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.1	3.5	3.8 - 4.4	4.4 - 3.8	4.1 - 4.1	4.2 - 4	4.7 - 3.5	4.2 - 3.9
FFO interest cover, excl. accretions (x)*	3.5	3.5	3.3 - 3.7	3.5 - 3.5	3.5 - 3.5	3.6 - 3.4	4 - 3	3.5 - 3.5
AICR (or PMICR) (x)*	1.25	1.08	1.22 - 1.27	1.27 - 1.35	1.35 - 1.16	1.16 - 1.25	1.25 - 1.25	1.25 - 1.31
Notional PMICR (x)	1.86	1.86	1.79 - 1.94	1.94 - 2.24	2.24 - 1.47	1.47 - 1.86	1.86 - 1.86	1.86 - 1.92
FFO (cash interest) /net debt (%)*	9.5%	9.5%	9.5% - 9.5%	9.5% - 9.5%	9.5% - 9.5%	9.8% - 9.2%	11.5% - 7.5%	9.5% - 9.5%
FFO (interest expense)/net debt (%)*	10.0%	9.5%	10% - 10%	10.2% - 9.7%	10% - 10%	10.3% - 9.7%	12% - 8%	10.1% - 9.9%
RCF/net debt (%)	8.1%	7.6%	8.1% - 8.1%	8.3% - 7.8%	8.1% - 8.1%	8.4% - 7.8%	10.1% - 6.1%	8.2% - 8%
EBITDA/RAV	9.5%	9.5%	9.7% - 9.4%	9.5% - 9.5%	9.5% - 9.5%	9.8% - 9.3%	11.2% - 7.9%	9.5% - 9.5%
RoRE	11.7%	11.7%	11.7% - 11.7%	11.9% - 11.6%	11.7% - 11.7%	12.3% - 11.2%	14.9% - 8.6%	11.7% - 11.7%
Dividend Cover	2.8	2.8	2.8 - 2.8	2.9 - 2.8	2.8 - 2.8	3 - 2.6	3.9 - 1.8	2.8 - 2.8
Dividend/RegEquity	3.0%	3.0%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%
Implied Dividend yield	(0.3%)	(0.4%)	-0.3% to -0.3%	1.2% to -1.8%	-0.3% to -0.3%	1.8% to -2.3%	2.8% to -3.4%	-0.3% to -0.3%
Required equity buyback/ (issuance) (£m)	(295)	-300.7	-297 to -292	-168 to -416	-295 to -295	-103 to -487	-16 to -574	-294 to -296

Table 7.7b Financeability metrics for the notional company (4.8% CoE): Certain View

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.4	4.4	3.7 - 4.9	4.4 - 4.4	4.4 - 4.4	4.5 - 4.3	5.1 - 3.7	4.3 - 4.4
FFO interest cover, excl. accretions (x)*	4.4	4.4	3.7 - 4.9	4.4 - 4.4	4.4 - 4.4	4.5 - 4.3	5.1 - 3.7	4.2 - 4.4
AICR (or PMICR) (x)*	1.27	1.27	1.12 - 1.33	1.33 - 1.27	1.27 - 1.28	1.28 - 1.27	1.27 - 1.27	1.27 - 1.34
Notional PMICR (x)	2.27	2.27	1.93 - 2.47	2.47 - 2.76	2.76 - 1.78	1.78 - 2.27	2.27 - 2.27	2.27 - 2.35
FFO (cash interest) /net debt (%)*	10.0%	10.0%	9.6% - 10.1%	10% - 10%	10% - 10%	10.3% - 9.7%	12% - 8%	9.8% - 10%
FFO (interest expense)/net debt (%)*	10.0%	10.0%	9.6% - 10.1%	10% - 10%	10% - 10%	10.3% - 9.7%	12% - 8%	9.9% - 10%
RCF/net debt (%)	10.0%	10.0%	9.6% - 10.1%	10% - 10%	10% - 10%	10.3% - 9.7%	12% - 8%	9.9% - 10%
EBITDA/RAV	9.4%	9.4%	9.5% - 9.3%	9.4% - 9.4%	9.4% - 9.4%	9.7% - 9.2%	11.1% - 7.8%	9.4% - 9.4%
RoRE	12.5%	12.5%	11.9% - 12.6%	12.6% - 12.4%	12.5% - 12.5%	13.1% - 12%	15.6% - 9.4%	12.3% - 12.5%
Dividend Cover	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dividend/RegEquity	0.0%	0.0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%
Implied Dividend yield	0.4 %	0.4 %	-0.2% to 0.5%	1.9% to -1%	0.4% to 0.4%	2.5% to -1.6%	3.5% to -2.7%	0.4% to 0.4%
Required equity buyback/ (issuance) (£m)	38	37.7	-21 to 48	171 to -91	38 to 38	224 to -148	317 to -241	32 to 38

Table 7.7c Financeability metrics for the actual company (4.3% CoE): Certain View

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.5	4.5	3.8 - 5	4.5 - 4.5	4.5 - 4.5	4.6 - 4.4	5.2 - 3.8	4.4 - 4.5
FFO interest cover, excl. accretions (x)*	4.5	4.5	3.8 - 5	4.5 - 4.5	4.5 - 4.5	4.6 - 4.4	5.2 - 3.8	4.3 - 4.5
AICR (or PMICR) (x)*	1.38	1.38	1.2 - 1.46	1.46 - 1.38	1.38 - 1.38	1.38 - 1.38	1.38 - 1.38	1.38 - 1.45
Notional PMICR (x)	2.38	2.38	2.02 - 2.59	2.59 - 2.86	2.86 - 1.89	1.89 - 2.38	2.38 - 2.38	2.38 - 2.46
FFO (cash interest) /net debt (%)*	10.3%	10.3%	9.9% - 10.4%	10.3% - 10.3%	10.3% - 10.3%	10.6% - 10%	12.3% - 8.3%	10.2% - 10.3%
FFO (interest expense)/net debt (%)*	10.3%	10.3%	9.9% - 10.4%	10.3% - 10.3%	10.3% - 10.3%	10.6% - 10%	12.3% - 8.3%	10.3% - 10.3%
RCF/net debt (%)	10.3%	10.3%	9.9% - 10.4%	10.3% - 10.3%	10.3% - 10.3%	10.6% - 10%	12.3% - 8.3%	10.3% - 10.3%
EBITDA/RAV	9.7%	9.7%	9.8% - 9.5%	9.7% - 9.7%	9.7% - 9.7%	10% - 9.5%	11.4% - 8%	9.7% - 9.7%
RoRE	13.0%	13.0%	12.4% - 13.1%	13.2% - 12.9%	13% - 13%	13.6% - 12.5%	16.1% - 9.9%	12.8% - 13%
Dividend Cover	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dividend/RegEquity	0.0%	0.0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%
Implied Dividend yield	0.9 %	0.9 %	0.3% to 1%	2.4% to -0.5%	0.9% to 0.9%	3.1% to -1.1%	4% to -2.2%	0.9% to 0.9%
Required equity buyback/ (issuance) (£m)	82	82.3	24 to 93	217 to -47	82 to 82	268 to -103	361 to -197	76 to 82

Table 7.7d Financeability metrics for the actual company (4.8% CoE): Certain View

Note to Tables 7.7 *Also reflects metrics for the actual company, as actual and notional gearing ratios are in line with each other **Ofgem key credit metric in the SSMD-F
 ***RPI-CPI wedge 0.5% or 1.5%

Likely Outturn Assessment

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.0	3.5	3.7 - 4.3	4.3 - 3.7	4 - 4	4.1 - 3.9	4.6 - 3.4	4.1 - 3.9
FFO interest cover, excl. accretions (x)*	3.5	3.5	3.3 - 3.7	3.5 - 3.5	3.5 - 3.5	3.5 - 3.4	4 - 2.9	3.5 - 3.5
AICR (or PMICR) (x)*	1.40	1.21	1.36 - 1.44	1.44 - 1.51	1.51 - 1.3	1.3 - 1.4	1.4 - 1.4	1.4 - 1.45
Notional PMICR (x)	1.95	1.95	1.88 - 2.03	2.03 - 2.31	2.31 - 1.58	1.58 - 1.95	1.95 - 1.95	1.95 - 2
FFO (cash interest) /net debt (%)*	9.2%	9.2%	9.2% - 9.3%	9.2% - 9.2%	9.2% - 9.2%	9.6% - 9%	11.2% - 7.3%	9.2% - 9.2%
FFO (interest expense)/net debt (%)*	9.8%	9.2%	9.7% - 9.8%	10% - 9.5%	9.8% - 9.8%	10.1% - 9.5%	11.7% - 7.8%	9.9% - 9.7%
RCF/net debt (%)	7.9%	7.4%	7.9% - 7.9%	8.1% - 7.6%	7.9% - 7.9%	8.2% - 7.6%	9.9% - 5.9%	8% - 7.8%
EBITDA/RAV	9.5%	9.5%	9.7% - 9.3%	9.5% - 9.5%	9.5% - 9.5%	9.7% - 9.3%	11.2% - 7.8%	9.5% - 9.5%
RoRE	11.5%	11.5%	11.4% - 11.5%	11.6% - 11.3%	11.5% - 11.5%	12% - 10.9%	14.6% - 8.3%	11.5% - 11.5%
Dividend Cover	2.7	2.7	2.7 - 2.7	2.8 - 2.7	2.7 - 2.7	2.9 - 2.5	3.8 - 1.7	2.7 - 2.7
Dividend/RegEquity	3.0%	3.0%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%
Implied Dividend yield	(4.6%)	(4.7%)	-4.7% to -4.6%	-3.2% to -6.1%	-4.6% to -4.6%	-2.1% to -7.1%	-1.5% to -7.8%	-4.6% to -4.7%
Required equity buyback/ (issuance) (£m)	(768)	-777.6	-772 to -765	-640 to -890	-768 to -768	-500 to -1036	-449 to -1087	-766 to -770

Table 7.8a Financeability metrics for the notional company (4.3% CoE): Likely Outturn Assessment

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.1	3.5	3.8 - 4.4	4.4 - 3.8	4.1 - 4.1	4.2 - 4	4.7 - 3.5	4.2 - 4
FFO interest cover, excl. accretions (x)*	3.5	3.5	3.4 - 3.8	3.5 - 3.5	3.5 - 3.5	3.6 - 3.5	4.1 - 3	3.5 - 3.5
AICR (or PMICR) (x)*	1.49	1.29	1.45 - 1.55	1.55 - 1.61	1.61 - 1.38	1.38 - 1.49	1.49 - 1.49	1.49 - 1.54
Notional PMICR (x)	2.03	2.03	1.95 - 2.12	2.12 - 2.39	2.39 - 1.66	1.66 - 2.03	2.03 - 2.03	2.03 - 2.08
FFO (cash interest) /net debt (%)*	9.6%	9.6%	9.5% - 9.6%	9.6% - 9.6%	9.6% - 9.6%	9.9% - 9.3%	11.5% - 7.6%	9.6% - 9.6%
FFO (interest expense)/net debt (%)*	10.1%	9.6%	10% - 10.1%	10.3% - 9.8%	10.1% - 10.1%	10.4% - 9.8%	12% - 8.1%	10.2% - 10%
RCF/net debt (%)	8.2%	7.7%	8.2% - 8.2%	8.5% - 8%	8.2% - 8.2%	8.5% - 7.9%	10.2% - 6.2%	8.3% - 8.1%
EBITDA/RAV	9.8%	9.8%	9.9% - 9.6%	9.8% - 9.7%	9.8% - 9.8%	10% - 9.5%	11.5% - 8.1%	9.8% - 9.8%
RoRE	12.0%	12.0%	12% - 12%	12.1% - 11.8%	12% - 12%	12.6% - 11.4%	15.2% - 8.8%	12% - 12%
Dividend Cover	2.9	2.9	2.9 - 2.9	2.9 - 2.8	2.9 - 2.9	3.1 - 2.7	4 - 1.8	2.9 - 2.9
Dividend/RegEquity	3.0%	3.0%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%
Implied Dividend yield	(4.1%)	(4.2%)	-4.2% to -4.1%	-2.7% to -5.7%	-4.1% to -4.1%	-1.6% to -6.6%	-1% to -7.3%	-4.1% to -4.2%
Required equity buyback/ (issuance) (£m)	(718)	-727.3	-721 to -714	-588 to -842	-718 to -718	-451 to -985	-399 to -1037	-716 to -720

Table 7.8b Financeability metrics for the notional company (4.8% CoE): Likely Outturn Assessment

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.4	4.4	3.6 - 5	4.4 - 4.4	4.4 - 4.4	4.5 - 4.3	5.1 - 3.7	4.4 - 4.4
FFO interest cover, excl. accretions (x)*	4.4	4.4	3.6 - 5	4.4 - 4.4	4.4 - 4.4	4.5 - 4.3	5.1 - 3.7	4.2 - 4.4
AICR (or PMICR) (x)*	1.55	1.55	1.31 - 1.67	1.67 - 1.55	1.55 - 1.55	1.55 - 1.55	1.55 - 1.55	1.55 - 1.61
Notional PMICR (x)	2.49	2.49	2.07 - 2.75	2.75 - 2.95	2.95 - 2.02	2.02 - 2.49	2.49 - 2.49	2.49 - 2.56
FFO (cash interest) /net debt (%)*	10.1%	10.1%	9.6% - 10.2%	10.1% - 10.1%	10.1% - 10.1%	10.4% - 9.8%	12% - 8.1%	9.9% - 10.1%
FFO (interest expense)/net debt (%)*	10.1%	10.1%	9.6% - 10.2%	10.1% - 10.1%	10.1% - 10.1%	10.4% - 9.8%	12% - 8.1%	10% - 10.1%
RCF/net debt (%)	10.1%	10.1%	9.6% - 10.2%	10.1% - 10.1%	10.1% - 10.1%	10.4% - 9.8%	12% - 8.1%	10% - 10.1%
EBITDA/RAV	9.7%	9.7%	9.7% - 9.5%	9.8% - 9.7%	9.8% - 9.8%	10% - 9.5%	11.5% - 8.1%	9.8% - 9.8%
RoRE	12.8%	12.8%	12% - 12.9%	12.1% - 11.8%	12% - 12%	12.6% - 11.4%	15.2% - 8.8%	12% - 12%
Dividend Cover	n/a	n/a	n/a	2.9 - 2.8	2.9 - 2.9	3.1 - 2.7	4 - 1.8	2.9 - 2.9
Dividend/RegEquity	0.0%	0.0%	0% - 0%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%
Implied Dividend yield	(3.4%)	(3.4%)	-4.2% to -3.3%	-2.7% to -5.7%	-4.1% to -4.1%	-1.6% to -6.6%	-1% to -7.3%	-4.1% to -4.2%
Required equity buyback/ (issuance) (£m)	(346)	-346.4	-426 to -327	-588 to -842	-718 to -718	-451 to -985	-399 to -1037	-716 to -720

Table 7.8c Financeability metrics for the actual company (4.3% CoE): Likely Outturn Assessment

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	60.0%	60.0%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%	60% - 60%
FFO interest cover, incl. accretions (x)*	4.5	4.5	3.7 - 5.1	4.5 - 4.5	4.5 - 4.5	4.6 - 4.4	5.2 - 3.9	4.5 - 4.5
FFO interest cover, excl. accretions (x)*	4.5	4.5	3.7 - 5.1	4.5 - 4.5	4.5 - 4.5	4.6 - 4.4	5.2 - 3.9	4.3 - 4.5
AICR (or PMICR) (x)*	1.65	1.65	1.4 - 1.79	1.79 - 1.65	1.65 - 1.65	1.65 - 1.65	1.65 - 1.65	1.65 - 1.71
Notional PMICR (x)	2.60	2.60	2.15 - 2.87	2.87 - 3.05	3.05 - 2.13	2.13 - 2.6	2.6 - 2.6	2.6 - 2.67
FFO (cash interest) /net debt (%)*	10.4%	10.4%	9.9% - 10.5%	10.4% - 10.4%	10.4% - 10.4%	10.7% - 10.1%	12.4% - 8.4%	10.2% - 10.4%
FFO (interest expense)/net debt (%)*	10.4%	10.4%	9.9% - 10.5%	10.4% - 10.4%	10.4% - 10.4%	10.7% - 10.1%	12.4% - 8.4%	10.3% - 10.4%
RCF/net debt (%)	10.4%	10.4%	9.9% - 10.5%	10.4% - 10.4%	10.4% - 10.4%	10.7% - 10.1%	12.4% - 8.4%	10.3% - 10.4%
EBITDA/RAV	9.9%	9.9%	10% - 9.8%	10% - 9.9%	9.9% - 9.9%	10.2% - 9.7%	11.6% - 8.2%	9.9% - 9.9%
RoRE	13.3%	13.3%	12.5% - 13.4%	13.4% - 13.1%	13.3% - 13.3%	13.8% - 12.7%	16.5% - 10.1%	13% - 13.3%
Dividend Cover	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dividend/RegEquity	0.0%	0.0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%
Implied Dividend yield	(3.0%)	(3.0%)	-3.7% to -2.8%	-1.5% to -4.4%	-3% to -3%	-0.4% to -5.4%	0.2% to -6.1%	-3% to -3%
Required equity buyback/ (issuance) (£m)	(296)	-296.4	-376 to -277	-158 to -428	-296 to -296	-39 to -554	23 to -616	-303 to -296

Table 7.8d Financeability metrics for the actual company (4.8% CoE): Likely Outturn Assessment

Note to Tables 7.8 *Also reflects metrics for the actual company, as actual and notional gearing ratios are in line with each other **Ofgem key credit metric in the SSMD-F ***RPI-CPI wedge 0.5% or 1.5%

Financeability Adjustments

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	55.0%	55.0%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%
FFO interest cover, incl. accretions (x)*	4.7	4.1	4.4 - 5.1	5.1 - 4.4	4.7 - 4.7	4.8 - 4.6	5.4 - 4	4.8 - 4.6
FFO interest cover, excl. accretions (x)*	4.1	4.1	3.8 - 4.3	4.1 - 4.1	4.1 - 4.1	4.2 - 4	4.7 - 3.4	4.1 - 4.1
AICR (or PMICR) (x)*	1.59	1.38	1.54 - 1.65	1.65 - 1.72	1.72 - 1.48	1.48 - 1.59	1.59 - 1.59	1.59 - 1.66
Notional PMICR (x)	2.23	2.23	2.14 - 2.34	2.34 - 2.65	2.65 - 1.81	1.81 - 2.23	2.23 - 2.23	2.23 - 2.3
FFO (cash interest) /net debt (%)*	11.5%	11.5%	11.5% - 11.6%	11.5% - 11.5%	11.5% - 11.5%	11.9% - 11.2%	14% - 9.1%	11.5% - 11.5%
FFO (interest expense)/net debt (%)*	12.0%	11.5%	12% - 12.1%	12.3% - 11.8%	12% - 12%	12.4% - 11.7%	14.5% - 9.6%	12.2% - 11.9%
RCF/net debt (%)	9.7%	9.2%	9.7% - 9.7%	10% - 9.5%	9.7% - 9.7%	10.1% - 9.4%	12.1% - 7.3%	9.8% - 9.6%
EBITDA/RAV	10.2%	10.2%	10.4% - 10.1%	10.2% - 10.2%	10.2% - 10.2%	9.8% - 9.2%	11.4% - 7.6%	9.5% - 9.5%
RoRE	11.6%	11.6%	11.6% - 11.6%	11.8% - 11.5%	11.6% - 11.6%	11% - 10%	13.6% - 7.3%	10.5% - 10.5%
Dividend Cover	3.0	3.0	3 - 3	3 - 3	3 - 3	2.8 - 2.4	3.7 - 1.6	2.6 - 2.6
Dividend/RegEquity	3.0%	3.0%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%
Implied Dividend yield	(2.2%)	(2.2%)	-2.2% to -2.2%	-0.9% to -3.5%	-2.2% to -2.2%	-0.7% to -4.5%	0.5% to -5.7%	-2.6% to -2.6%
Required equity buyback/ (issuance) (£m)	(516)	(521)	-518 to -514	-404 to -624	-516 to -516	-364 to -763	-250 to -877	-562 to -564

Table 7.9a Financeability metrics for the notional company (4.3% CoE): Financeability Adjustments

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	55.0%	55.0%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%
FFO interest cover, incl. accretions (x)*	4.8	4.2	4.5 - 5.2	5.2 - 4.5	4.8 - 4.8	4.9 - 4.7	5.6 - 4.1	5 - 4.7
FFO interest cover, excl. accretions (x)*	4.2	4.2	3.9 - 4.4	4.2 - 4.2	4.2 - 4.2	4.3 - 4.1	4.8 - 3.5	4.2 - 4.2
AICR (or PMICR) (x)*	1.71	1.48	1.65 - 1.78	1.78 - 1.85	1.85 - 1.59	1.59 - 1.71	1.71 - 1.71	1.71 - 1.78
Notional PMICR (x)	2.34	2.34	2.24 - 2.45	2.45 - 2.75	2.75 - 1.91	1.91 - 2.34	2.34 - 2.34	2.34 - 2.4
FFO (cash interest) /net debt (%)*	11.9%	11.9%	11.9% - 11.9%	11.9% - 11.9%	11.9% - 11.9%	12.3% - 11.6%	14.4% - 9.5%	11.9% - 11.9%
FFO (interest expense)/net debt (%)*	12.4%	11.9%	12.4% - 12.5%	12.7% - 12.2%	12.4% - 12.4%	12.8% - 12.1%	14.9% - 10%	12.5% - 12.3%
RCF/net debt (%)	10.1%	9.6%	10.1% - 10.1%	10.4% - 9.9%	10.1% - 10.1%	10.4% - 9.8%	12.5% - 7.7%	10.2% - 10%
EBITDA/RAV	10.5%	10.5%	10.7% - 10.4%	10.6% - 10.5%	10.5% - 10.5%	10.8% - 10.3%	12.4% - 8.7%	10.5% - 10.5%
RoRE	12.1%	12.1%	12.1% - 12.1%	12.3% - 12%	12.1% - 12.1%	12.6% - 11.7%	15.3% - 9%	12.1% - 12.1%
Dividend Cover	3.2	3.2	3.2 - 3.2	3.2 - 3.1	3.2 - 3.2	3.3 - 3	4.2 - 2.1	3.2 - 3.2
Dividend/RegEquity	3.0%	3.0%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%	3% - 3%
Implied Dividend yield	(1.7%)	(1.7%)	-1.7% to -1.7%	-0.4% to -3%	-1.7% to -1.7%	0.3% to -3.6%	1.4% to -4.8%	-1.7% to -1.7%
Required equity buyback/ (issuance) (£m)	(467)	(471)	-469 to -465	-352 to -576	-467 to -467	-267 to -666	-157 to -776	-466 to -467

Table 7.9b Financeability metrics for the notional company (4.8% CoE): Financeability Adjustments

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	55.0%	55.0%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%
FFO interest cover, incl. accretions (x)*	5.2	5.2	4.4 - 5.7	5.2 - 5.2	5.2 - 5.2	5.3 - 5.1	6 - 4.4	5.1 - 5.2
FFO interest cover, excl. accretions (x)*	5.2	5.2	4.4 - 5.7	5.2 - 5.2	5.2 - 5.2	5.3 - 5.1	6 - 4.4	4.9 - 5.2
AICR (or PMICR) (x)*	1.76	1.76	1.55 - 1.86	1.86 - 1.76	1.76 - 1.76	1.76 - 1.76	1.76 - 1.76	1.76 - 1.83
Notional PMICR (x)	2.85	2.85	2.46 - 3.09	3.09 - 3.38	3.38 - 2.31	2.31 - 2.85	2.85 - 2.85	2.85 - 2.93
FFO (cash interest) /net debt (%)*	12.4%	12.4%	12% - 12.4%	12.4% - 12.4%	12.4% - 12.4%	12.7% - 12%	14.8% - 9.9%	12.2% - 12.4%
FFO (interest expense)/net debt (%)*	12.4%	12.4%	12% - 12.4%	12.4% - 12.4%	12.4% - 12.4%	12.7% - 12%	14.8% - 9.9%	12.3% - 12.4%
RCF/net debt (%)	12.4%	12.4%	12% - 12.4%	12.4% - 12.4%	12.4% - 12.4%	12.7% - 12%	14.8% - 9.9%	12.3% - 12.4%
EBITDA/RAV	10.4%	10.4%	10.5% - 10.2%	10.4% - 10.4%	10.4% - 10.4%	10.6% - 10.1%	12.2% - 8.5%	10.4% - 10.4%
RoRE	12.7%	12.7%	12.3% - 12.7%	12.8% - 12.5%	12.7% - 12.7%	13.2% - 12.2%	15.8% - 9.5%	12.5% - 12.7%
Dividend Cover	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dividend/RegEquity	0.0%	0.0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%
Implied Dividend yield	(1.2%)	(1.2%)	-1.6% to -1.1%	0% to -2.5%	-1.2% to -1.2%	0.8% to -3.1%	1.9% to -4.3%	-1.3% to -1.2%
Required equity buyback/ (issuance) (£m)	(120)	-120.1	-163 to -114	2 to -238	-120 to -120	74 to -314	189 to -429	-125 to -120

Table 7.9c Financeability metrics for the actual company (4.3% CoE): Financeability Adjustments

	CoE 4.3%	No inflation-linked debt	Interest Rate $\pm 1\%$	CPIH $\pm 1\%$	RPI-CPI wedge $\pm 0.5\%$ ***	Totex Perf $\pm 10\%$	RoRE $\pm 2\%$	Inflation linked debt $\pm 5\%$
Net debt/RAV (%)	55.0%	55.0%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%	55% - 55%
FFO interest cover, incl. accretions (x)*	5.3	5.3	4.5 - 5.8	5.3 - 5.3	5.3 - 5.3	5.4 - 5.2	6.1 - 4.5	5.2 - 5.3
FFO interest cover, excl. accretions (x)*	5.3	5.3	4.5 - 5.8	5.3 - 5.3	5.3 - 5.3	5.4 - 5.2	6.1 - 4.5	5.1 - 5.3
AICR (or PMICR) (x)*	1.89	1.89	1.66 - 2.01	2.01 - 1.89	1.89 - 1.89	1.89 - 1.89	1.89 - 1.89	1.89 - 1.97
Notional PMICR (x)	2.98	2.98	2.57 - 3.23	3.23 - 3.51	3.51 - 2.44	2.44 - 2.98	2.98 - 2.98	2.98 - 3.07
FFO (cash interest) /net debt (%)*	12.7%	12.7%	12.4% - 12.8%	12.7% - 12.7%	12.7% - 12.7%	13.1% - 12.4%	15.2% - 10.3%	12.6% - 12.7%
FFO (interest expense)/net debt (%)*	12.7%	12.7%	12.4% - 12.8%	12.7% - 12.7%	12.7% - 12.7%	13.1% - 12.4%	15.2% - 10.3%	12.7% - 12.7%
RCF/net debt (%)	12.7%	12.7%	12.4% - 12.8%	12.7% - 12.7%	12.7% - 12.7%	13.1% - 12.4%	15.2% - 10.3%	12.7% - 12.7%
EBITDA/RAV	10.7%	10.7%	10.8% - 10.5%	10.7% - 10.7%	10.7% - 10.7%	10.9% - 10.5%	12.6% - 8.8%	10.7% - 10.7%
RoRE	13.2%	13.2%	12.8% - 13.2%	13.3% - 13%	13.2% - 13.2%	13.7% - 12.7%	16.3% - 10.1%	13% - 13.2%
Dividend Cover	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dividend/RegEquity	0.0%	0.0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%	0% - 0%
Implied Dividend yield	(0.7%)	(0.7%)	-1.2% to -0.6%	0.5% to -2%	-0.7% to -0.7%	1.3% to -2.6%	2.4% to -3.8%	-0.8% to -0.7%
Required equity buyback/ (issuance) (£m)	(71)	-70.6	-114 to -64	53 to -190	-71 to -71	122 to -264	239 to -380	-76 to -71

Table 7.9d Financeability metrics for the actual company (4.8% CoE): Financeability Adjustments

Note to Tables 7.9 *Also reflects metrics for the actual company, as actual and notional gearing ratios are in line with each other **Ofgem key credit metric in the SSMD-F
 ***RPI-CPI wedge 0.5% or 1.5%

Next Steps

Next Steps

This final RIIO-T2 Business Plan is the end point of over two years of collaboration with our customers and stakeholders on the future requirements for the transmission system in the north of Scotland. We thank every person and organisation that has contributed to and supported the development process.

The next step is the regulatory assessment of, and determination on, our Plan. The indicative high-level milestones published by Ofgem are shown in [Table 8.1](#).

Enhanced Engagement Reports

Our RIIO-T2 User Group is required to make its final report on this RIIO-T2 Business Plan on 22 December 2019 (page 28). This will be published on the User Group [webpage](#).

Ofgem’s RIIO-2 Challenge Group is due to make its final report on all RIIO-2 Business Plans on 6 January 2020 (page 25). Ofgem has committed to make this report publicly available.

Open Hearings

In its July 2018 RIIO-2 Framework Decision¹, Ofgem confirmed its decision to introduce open public hearings to increase the transparency of the RIIO-2 price control process.

The intention of these hearings is to focus on areas of disagreement or contention raised by stakeholder groups and to invite any other evidence in support of, or against, Business Plans. Ofgem highlight that it retains ultimate responsibility to make price control determinations, but will consider evidence from the open hearings.

The open hearing for our RIIO-T2 Business Plan is planned for March-April 2020. We understand Ofgem will publish more details of the process and how to get involved in due course. We will support Ofgem in ensuring that the hearings are open and constructive.

Date	Milestone
22 December 2019	User Group report published
6 January 2020	RIIO-2 Challenge Group report published
March - April 2020	Ofgem hold Open Hearings
June 2020	Ofgem Draft Determination
November 2020	Ofgem Final Determination
1 April 2021	RIIO-T2 period starts

Table 8.1 Indicative high-level milestones

^{Source} Table 2, RIIO-2 Business Plan Guidance, Ofgem, 31 October 2019. Available at: www.ofgem.gov.uk/publications-and-updates/riio-2-business-plans-guidance-document

¹RIIO-2 Framework Decision, Ofgem, 30 July 2018. Available at: www.ofgem.gov.uk/publications-and-updates/riio-2-framework-decision
[†]Energy Licence Modification Appeals: Competition and Market Authority Rules, CMA, October 2017. Available at: www.gov.uk/government/publications/energy-licence-modification-appeals-rules-cma70

Draft and Final Determinations

Ofgem makes the final determination on the price control settlement. It can approve our Business Plan in full (as it did for the RIIO-T1 price control), make modifications to our Plan, or even substantially revise our Plan.

In June 2020, Ofgem will publish its Draft Determination for open consultation. After considering the responses to the consultation, it will make its Final Determination in November 2020.

Following Final Determination, Ofgem’s decision will be implemented through the modification of our electricity transmission licence conditions and we are legally obliged to comply with these conditions under the Electricity Act 1989. The new licence conditions will come into force from 1 April 2021, this being the start date for the RIIO-T2 price control period.

Reflecting the Final Determination

Given the discretion of Ofgem in making its Final Determination, there is the potential for changes to be made to this Business Plan. We will consider this carefully, taking into account the stakeholder views that have shaped this Plan.

If required, we will publish any modifications to our RIIO-T2 Business Plan arising from Ofgem’s Final Determination in early 2021.

What happens if we disagree with Ofgem’s Final Determination?

In the UK, whilst decisions by regulators can be judicially reviewed by the courts, the Electricity Act 1989 provides a specific appeal framework for challenging Ofgem’s price control decisions.

If we disagree with Ofgem’s Final Determination on our RIIO-T2 Business Plan, then we can appeal that decision to the Competition and Markets Authority (CMA) on the grounds of appeal that are provided in the Electricity Act 1989[†]. The legal appeal process can take up to a year to conclude.

While a transparent, evidence-based price control process should obviate the need for an appeal, we reserve our right to do so. Should we decide to appeal then we will notify our stakeholders in accordance with our obligations as a UK listed public company.

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Assurance and Governance of this Business Plan

"The Board acknowledges and supports the approach taken in developing the RIIO-T2 Business Plan.

I have also examined the rigour of the business planning process and have been impressed with the application of both internal and independent external assurance to the submission documentation. The approach taken has been exemplar and means I am confident in the ability of this ambitious Business Plan to deliver a Network for Net Zero."

David Rutherford
Sufficiently Independent Non-Executive Director, SSEPD limited Board

Assurance and Governance of this Business Plan

This RIIO-T2 Business Plan has been subject to rigorous and comprehensive governance and assurance throughout its development. This has ensured that the final Plan is accurate, based on high-quality information, reflects the ambitions and needs of our stakeholders, and is good value for money for our customers and GB energy consumers.

Governance

As part of the SSE plc Group, we comply with the UK Corporate Governance Code¹. This ensures we have a clear purpose, values and strategy, and the internal controls and practices to generate value for shareholders and contribute to wider society. Our governance structure is shown in **Figure A1.1**. The Boards of SSE plc and SSEPD Limited have overseen, directed and challenged the development of this Business Plan. Both the SSE plc and SSEPD Limited Boards have Independent Non-Executive Directors.

Both Boards have approved this final Plan. In doing so, specific consideration has been given to ensuring that our business remains financeable, on both a notional and actual capital structure basis, to allow our ongoing operation in accordance with our licence conditions. Our Business Plan is compliant with Ofgem's Guidance on financial matters, while also setting out an appropriate, well justified and preferred financial alternative.

Independent oversight and challenge to the Business Plan development has come from our RIIO-T2 User Group and established Stakeholder Advisory Panel (page 28). Both groups have met with the SSEPD Limited Board to share their observations and recommendations.

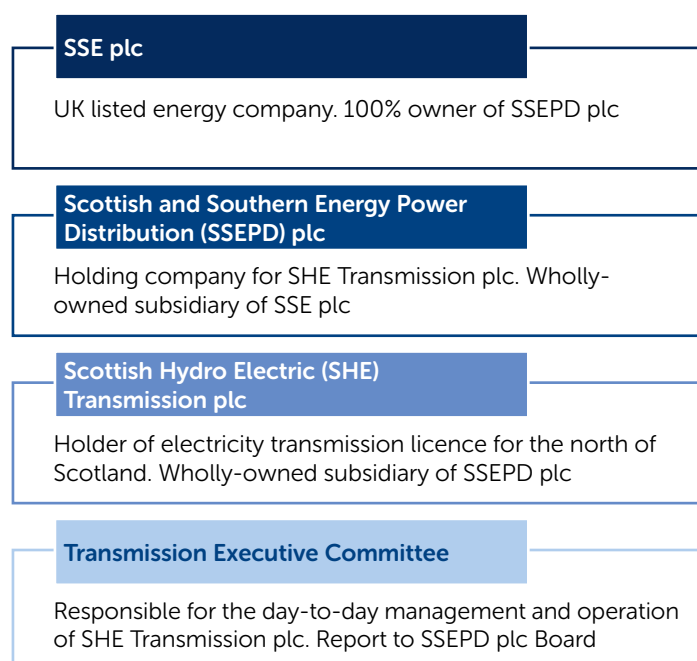


Figure A1.1 Our governance structure

Assurance

We use a 'three lines of defence' model to the management and control of risk:

1. First, within our operations we have management controls and assurance
2. Second, we have an independent compliance function that reports to the Transmission Executive Committee
3. Third, there is an independent audit team that reports to the Audit and Risk Management Committee of the SSE plc Board

All three lines of defence have been used to ensure that this Plan is accurate and high-quality, and all of the necessary checks and controls have been implemented.

Given the capital intensive nature of our activities, we have a fourth element to our defence model under our Large Capital Projects (LCP) framework. The independent LCP team undertake assurance reviews through the investment lifecycle and oversee our capital risk management procedures. The capital investments in this Plan have been subject to this assurance framework.

Our assurance model has been established in adherence to Ofgem's Data Assurance Guidance (DAG)². Following our well established DAG methodology, we categorised this overall RIIO-T2 Business Plan as a critical irregular submission. Accordingly, a specific process was developed to risk assess the elements of the Business Plan and undertake a level of assurance proportionate to the assessed risk:

- For low risk elements (for example, expenditure forecast for operational training), we require three levels of review up to an accountable senior manager
- For medium and high risk elements (for example, justification of climate change driven investments), an additional Director-level review is required
- For critical risk elements, SSEPD plc Board are required to review and sign-off

This internal assurance process was controlled by our dedicated Project Management Office, with oversight and audit from our independent Networks Assurance team.

To support this internal assurance, we engaged external experts to review and challenge some high and critical risk elements. This included for cost efficiency (Arcadis and Oxera), IT (Gartner), innovation (Baringa) and financial issues (Oxera and KPMG).

¹The UK Corporate Governance Code, published by the Financial Reporting Council, sets out the standards for successful and sustainable corporate governance. Available at: www.frc.org.uk/directors/corporate-governance-and-stewardship/uk-corporate-governance-code

²Data Assurance Guidance for Electricity and Gas Network Companies, Ofgem, January 2016. Available at: www.ofgem.gov.uk/publications-and-updates/data-assurance-guidance

List of Supporting Documents

List of Supporting Documents

Our full RIIO-T2 Business Plan comprises over 300 documents and data tables. While we are committed to openness and transparency with our stakeholders in our plans and performance, there are some parts of this Business Plan that are confidential. In this Appendix we set out the full list of published documents, along with an overview of the confidential material that we have submitted to Ofgem and the reason that we have not published it.

Published documents

A full list of the supporting documents referred to in this main Business Plan can be found in the table below.

No.	Title	Available at
	A Network for Net Zero: Summary	www.ssen-transmission.co.uk/riio-t2-plan/
	A Network for Net Zero: Our RIIO-T2 Business Plan	www.ssen-transmission.co.uk/riio-t2-plan/
	Business Plan Data Tables (partially confidential)	www.ssen-transmission.co.uk/riio-t2-plan/business-plan-data-tables/
	Draft Business Plan Consultation Report	www.ssen-transmission.co.uk/riio-t2-plan/draft-business-plan-consultation-report/
1	Engaging on our Strategic Objective	www.ssen-transmission.co.uk/media/3222/engaging-on-our-strategic-objective.pdf
2	Report on RIIO-T2 Business Plan stakeholder engagement	www.ssen-transmission.co.uk/riio-t2-plan/report-on-stakeholder-engagement/
3	Planning for Net Zero: Scenarios, Certain View and Likely Outturn	www.ssen-transmission.co.uk/riio-t2-plan/planning-for-net-zero-scenarios-certain-view-and-likely-outturn/
3A	North of Scotland Future Energy Scenarios	www.ssen-transmission.co.uk/media/3411/north-of-scotland-future-energy-scenarios-full-report.pdf
4	Strategic Optioneering Methodology	www.ssen-transmission.co.uk/media/3406/strategic-optioneering-methodology.pdf
5	Cost Benefit Analysis Methodology	www.ssen-transmission.co.uk/riio-t2-plan/cost-benefit-analysis-methodology/
6	Capital Development and Delivery	www.ssen-transmission.co.uk/riio-t2-plan/capital-development-and-delivery/
7B	Competition Strategy (includes Native Competition Plan)	www.ssen-transmission.co.uk/riio-t2-plan/competition-strategy/
8	A risk-based approach to asset management	www.ssen-transmission.co.uk/riio-t2-plan/a-risk-based-approach-to-asset-management/
8A	Network Asset Risk Methodology	www.ssen-transmission.co.uk/riio-t2-plan/network-asset-risk-methodology/
10	Network Access Policy	www.ssen-transmission.co.uk/riio-t2-plan/network-access-policy/
11	Digital Strategy	www.ssen-transmission.co.uk/riio-t2-plan/digital-strategy/
12	Regulatory Framework – Uncertainty Mechanisms	www.ssen-transmission.co.uk/riio-t2-plan/regulatory-framework-uncertainty-mechanisms/
12A	Regulatory Framework – Outputs, Incentives, Consumer Value Proposition and Innovation	www.ssen-transmission.co.uk/riio-t2-plan/regulatory-framework-outputs-incentives-and-innovation/
13	Stakeholder Engagement Strategy	www.ssen-transmission.co.uk/media/3560/shet-stakeholder-engagement-strategy-final-document.pdf
13A	Stakeholder Engagement Action Plan	www.ssen-transmission.co.uk/information-centre/our-stakeholder-engagement/implementing-the-strategy/
14	Commercial and Connections Policy	www.ssen-transmission.co.uk/riio-t2-plan/commercial-and-connections-policy/
15	Local Energy Area Plans and Community Energy	www.ssen-transmission.co.uk/riio-t2-plan/local-energy-area-plans-community-energy/
16	Sustainability Strategy	www.ssen-transmission.co.uk/sustainability-and-environment/sustainability-strategy/
16A	Sustainability Action Plan	www.ssen-transmission.co.uk/riio-t2-plan/sustainability-action-plan/
17	Sustainable Workforce Strategy	www.ssen-transmission.co.uk/riio-t2-plan/sustainable-workforce-strategy/
17A	Sustainable Workforce Action Plan	www.ssen-transmission.co.uk/riio-t2-plan/sustainable-workforce-action-plan/
18	Financeability Annex (includes supporting consultants' reports)	www.ssen-transmission.co.uk/riio-t2-plan/financeability-annex/
19	Innovation Strategy	www.ssen-transmission.co.uk/riio-t2-plan/innovation-strategy/
20	Enabling Whole Energy System Outcomes	www.ssen-transmission.co.uk/riio-t2-plan/enabling-whole-energy-system-outcomes-policy/
21	Losses Strategy	www.ssen-transmission.co.uk/riio-t2-plan/losses-strategy/
22	Our Strategy for the Management of Insulation and Interruption Gases	www.ssen-transmission.co.uk/riio-t2-plan/our-strategy-for-the-management-of-insulation-interruption-gases/
23	Our Approach to Implementing Biodiversity Net Gain	www.ssen-transmission.co.uk/riio-t2-plan/our-approach-to-implementing-biodiversity-net-gain/
24	Visual Impact of Scottish Transmission Assets (VISTA) – Our Approach for RIIO-T2	www.ssen-transmission.co.uk/riio-t2-plan/vista-our-approach-for-riio-t2/

Confidential documents

The confidential elements of our Business Plan are described in the table below, along with the reason for each not being published.

No.	Title	Overview
7	"Costing methodology (includes pre-construction costing methodology)"	We have not published this document as it contains information on how we develop our cost metrics and how we are planning during the RIIO-T2 period to drive efficiency through our procurement strategy. These are both commercially sensitive
7A	Efficient capital investment: benchmarking and cost metrics	We have not published this supporting document as it contains information on detailed asset level cost metrics and, like the cost methodology document, how we are planning during the RIIO-T2 period to drive efficiency through our procurement strategy. These are both commercially sensitive
9	Efficient operating costs: benchmarking and cost metrics	This report includes a range of commercially sensitive financial information on our relative cost position and efficiency. The key conclusions of this report are included in our published Business Plan with detailed analysis and information provided to Ofgem in the confidential report
11A	Business IT Security Plan	We have not published our detailed Plan as this contains information that concerns IT threat actors and counter measures that have the potential to impact the integrity of our line-of-business systems and applications. In addition, these contain commercially sensitive information that might distort effective competition in our procurement processes.
	Business Plan Data Tables (partially confidential) and Narrative	We have not published 20 data tables along with the supporting narrative as these contain commercially sensitive information that might distort effective competition in our procurement processes
	"Engineering Justification Packs (incorporating asset condition reports, business case and options assessment, cost benefit analysis, and costs and efficiency assessment)"	We have not published our detailed Engineering Justification Packs as these contain information that is confidential to system and/or cyber security. In addition, these contain commercially sensitive information that might distort effective competition in our procurement processes
	RIIO-T1 / T2 Cross Over Paper	We have not published our RIIO-T1/T2 Cross Over Paper as this paper contains commercially sensitive information that might distort effective competition in our procurement processes.
	IT Investment Plan	We have not published our detailed IT Investment Plan as this contains information that is confidential to system and/or cyber security. In addition, these contain commercially sensitive information that might distort effective competition in our procurement processes.
	Strategic Workforce Plan	This document has not been published as it contains sensitive and confidential details on our current and future employee and contingent worker population and requirements. In addition, this plan contains commercially sensitive information that might distort effective competition in our HR and procurement processes. This plan is intended for internal purposes only and has been submitted to Ofgem to provide further details on our Sustainable Workforce Strategy
	Price Control Financial Model (PCFM)	Ofgem issued the PCFM on 31 October 2019 with an update to the RIIO-2 Business Plan Guidance. The PCFM was re-issued on 8 November 2019 due to significant change required. In previous price controls the PCFM was finalised and independently audited in advance of Business Plan submission. At this stage the PCFM for RIIO-2 remains incomplete and, hence, has not yet been independently audited. Therefore we have not published the PCFM until it is in a similar position of previous price controls

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Summary of Core Policies

Contents: Appendix 3

Timely, Cost Effective Innovation	132
A Co-ordinated Whole Energy System	136
Our Stakeholder Engagement Action Plan	140
Our Sustainability Action Plan	144
Using Competition to get the Best Outcomes for Consumers	149

Timely, Cost Effective Innovation

READ more about our approach and how it has been applied in

SUPPORTING DOCUMENT 19. [Innovation Strategy](#)



What is innovation?

We define innovation as:

Identifying and proving new ways of working for the long-term benefit of our stakeholders and ourselves

We see innovation as doing something that we do not do now, regardless of whether another party is doing it already, that brings an improvement to the way we do things.

We will not just innovate for the sake of it. Rather, we will target improvements where it can add value to our stakeholders and ourselves, without negatively impacting the other. If any innovation does not work for our customers, then it does not work for us. In our day to day working, we undertake a wide range of different activities, from deep technical engineering through to customer facing engagement. Having a broad definition of innovation ensures that improvements can be achieved throughout our business and in all our joint working with other parties.

The foundation of our approach to innovation is a framework that centres on being a 'responsible innovator' (**Figure A3.1**). This is a core principle that aims to ensure we are focussed on delivering benefits for our customers and stakeholders by taking a proactive and forward looking approach to innovation.

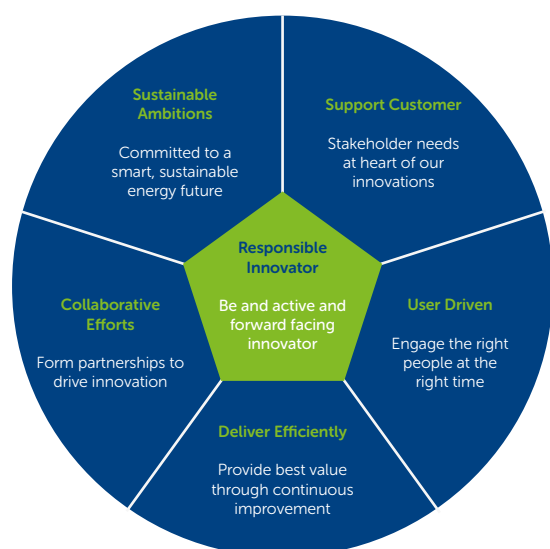


Figure A3.1 Our innovation framework

The core principle is underpinned by five outcome-driven values, each of which have been identified as a successful component of delivering successful innovation projects through our wide reaching internal and external review. By applying the framework and its values, we can take a systematic approach to identifying and prioritising the innovations to work on with the correct partners, that deliver the best value for and GB society.

Value 1: Support Customer

Our customers must be at the heart of our innovations. The network exists to service them, if it does not work for them, then it does not work for us

To achieve this, we must know what our customers want from our network. We can only do this if we work closely with them by building strong relationships to ensure we understand their priorities and needs.

We need to understand what's important to all our customers to allow us to act as advocates for them across the industry. This includes the development of stakeholder-led positions and policies upon which we can act as our stakeholders' advocate. For example, on topics such as Distribution System Operators (DSO) and the Whole System.

Success here will lead to well-formed trials that deliver the outputs and industry change that our stakeholders want. If those trials are proven successful, we will drive these new innovations into our Business as Usual (BaU) operations. If the trials are a success, or even if they're not, we will also share the learning with the wider industry to increase overall customer benefit.

Value 2: User Driven

Innovation will engage the right people at the right time, from the design of innovation trials through to BaU transfer

In delivering innovation, success is dependent on working with the right people all the way through the innovation lifecycle. That starts with identifying where any innovation opportunity could provide most benefit, as well as what is important to any user of that successfully proven innovation.

Understanding the end users' requirements from any innovation increases the chance of success. Taking their requirements, as the starting point for any innovation test, allows the full lifecycle of the proven concept to be considered. That ensures that safety, operation and maintenance, compliance and replacement are all considered from the outset.

Success under this value will increase the transfer rate of proven innovations to BaU, thus increasing innovation benefits.

Value 3: Deliver Efficiently

Delivery of successful innovation can only provide best value if a consistent methodology is applied

Delivering innovation efficiently relies on having a consistent implementation and assessment framework to identify opportunities, develop trials and scope any opportunities for deployment. Crucially, this also allows for benefits to be tracked consistently to assess the resultant value for stakeholders. Having a consistent framework also helps identify any external and internal stakeholders required to be involved in the project.

Furthermore, this provides a framework against which to manage change. This will allow projects to be amended or even ended if they are not going to produce the benefits anticipated. If a project changes too much, then an informed decision can be made about whether to continue, change course or stop. Once completed, this efficient delivery method allows the project to be more readily transferred to BaU. Thus ensuring that the maximum return is achieved against the original investment.

Value 4: Collaboration

Many different parties can benefit from innovation. Those stakeholders need to be involved in identifying, scoping, trialling and rolling out those solutions

Working in isolation can result in a failure to deliver maximum value from an innovation. By working collaboratively with stakeholders from across the energy supply chain we can increase the overall value of our innovation activities and, hence, improve the level of benefit for customers.

Large scale industry developments must be thought through as an industry and not in isolation. These developments and other drivers will be better understood when collaborating.

By working with a range of stakeholders, we can identify a wide range of innovation needs and develop projects to respond to these needs. This also gives an opportunity for us to learn from our wider stakeholder group and benefit from their experience to help improve our performance service.

Value 5: Sustainable Ambitions

Delivering innovation that isn't sustainable won't deliver the long-term benefit we target

Our Sustainability Strategy (page 98) describes our ambitions in enabling a low carbon future. That ambition is embodied within our approach to innovation.

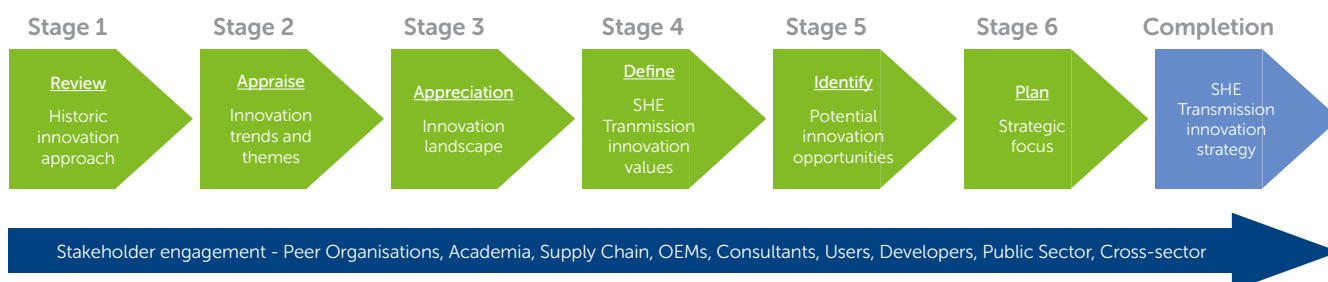
When assessing the benefit of any innovation, it is essential to include environmental benefits such as impact on GHG emissions, embodied carbon reduction and network losses.

We will not only consider sustainability when we are identifying projects that solely deliver a sustainable environmental improvement. We will also look at delivery of all projects to ensure they are developed and delivered sustainably.

Our sustainable ambitions will not just stop with us. We will look to stretch this into our supply chain to ensure that we are not just moving poor sustainability performance down the supply chain. Instead we will work with our suppliers to have an overall improvement across our innovation portfolio.

Development of our innovation framework

In developing our RIIO-T2 Business Plan, we have fundamentally reviewed our approach to innovation. Our review took a staged approach considered learning from the RIIO-T1 period (including from other networks), GB and European best practice, views of our stakeholders, current and emerging industry trends, government policy and our regulatory requirements. The outcome of this 12-month process is our new innovation framework that has been applied to our RIIO-T2 Business Plan.



Benefits from innovation during the RIIO-T1 period

We have worked with specialist consultants, Baringa Partners LLP, to undertake a rigorous assessment of the benefits of our innovation activities during the RIIO-1 period. The benefits calculation considered efficiency savings, carbon savings and avoided constraint costs.

The eight main projects and benefits realised are shown in **Table 3A.1** below. The benefits shown are for the eight year RIIO-T1 period only, but will continue to accrue during RIIO-T2 and beyond.

Innovation	RIIO-T1 benefits (£m NPV)
Caithness Moray HVDC transmission reinforcement	11.7
The HVDC submarine cable link unlocks 1,200MW of renewable electricity generation across the north of Scotland	
ACCC Investment	7.5
Use of Aluminium Core Composite Conductors to extend the life and capacity of existing circuits	
Dorenell WF Connection	0.3
The use of composite poles instead of steel lattice towers or traditional wooden poles to connect Dorenell Wind Farm to Blackhillock Substation	
Whole system planning	3.9
To develop transmission and distribution system development options	
OHL Design Approach	0.7
New overhead line guidance was developed using existing asset data and performance of lines which had been in operation for a number of years to support the reliability and loadings applied to the assets	
Non-firm Statement of Works	0.2
New flexible connection process that is less onerous and costly for customer connections less than 10 MW	
SF₆ Leakage FLIR Camera	0.1
Use of specialist cameras that are able to detect leaking SF ₆ and allow for early intervention	
Flexible Connections	4.7
The use of flexible connections such as Active Network Management (ANM) and inter-trips allows generators to connect quicker and faster and displace carbon technologies sooner	

Table A3.1 Innovation benefits during RIIO-T1 period

Innovation to achieve our strategic themes

Our innovation framework explains how we will deliver innovation, but not what we will focus our efforts on. To identify that we seek outcomes that will realise our strategic objective and four supporting themes (pages 22-23). Alignment with these themes will make sure that any innovation we progress, helps deliver what our stakeholders want from our network.

Case study: Stakeholder-led Strategy

There will be a lot of change in the industry over the coming years. Some of it is driven by stakeholder choice but all of it will impact, either positively or negatively, on stakeholders. It is important to identify those impacts and work to mitigate or improve on them.

This will drive a more holistic approach to innovation, across not only our network, but through to other energy networks. The development of 'whole system' is one example of this.

Innovation opportunities with this goal start with how to engage with customers and giving them access to the information they need. This will allow them to make better informed decisions on connection options, as well as a clearer idea on managing their connection once it is energised. This is a key area where innovation can add value. From there, innovation opportunities include how best to support the deployment of EVs and how to facilitate the decarbonisation of heating. Coupling that with service flexibility from network parties allows a whole system approach to be taken to deliver the network capacity requirements outside the normal reinforcement approach.

Finally, opportunities lie in facilitating connection flexibility to accelerate connections. Options here could include wide area Active Network Management (ANM), hybrid options between ANM and flexible connections, or improved interfaces between transmission and distribution networks.

For example, we are working with Scottish Government, local authorities, SHEPD, ESO and Transport for Scotland to understand how we can support national plans for decarbonising transport. This starts with gaining a common understanding of those plans and then working together to determine the most efficient way of meeting the desired outcome in the timescale required. This could include taking advantage of new flexible network arrangements.



"Whole system, energy system transition and using network flexibility all go hand in hand."

Case study: Safe and Secure Network Operation

Network reliability and integrity is fundamental to our day-to-day operations. However, maintaining and improving our existing standards at a time of unprecedented industry change is a significant challenge. We must develop new options to accommodate flexibility, new methods of working and facilitating new commercial arrangements whilst maintaining network resilience and safety.

With this transition will come new technologies that will challenge long established characteristics of stable network operation including fault level, system inertia and power quality. Well established techniques for network management need to be updated and revised to better reflect the changing use of the network. Similarly, new technology can provide improved visibility and transparency of the networks operating characteristics, which allows opportunities to maximise network utilisation.

Our target areas for innovation are: network planning, data and analytics, smart asset management, resilience to threats, network protection and control, and security of supply for generation connections.

Innovating in these areas will improve the way that we work. They start with understanding and developing the network using more detailed data. Combining that with probabilistic planning allows the likelihood of worst-case scenarios happening to be mapped and accounted for. In the long run this will see the deployment of Artificial Intelligence and machine learning.

With these new standards and development options comes impacts on how the network is operated. With the move away from traditional carbon dense generation, resilience and blackstart capability need to deliver the same standards through different means. At the same time, normal network operation needs to understand, and work with, the various new forms of network components and behaviours.

The changing network operation will not work if there is not enough information to feed into operational procedures. With this increased monitoring and data driven decision making, comes an increased threat from the cyber sphere that needs addressed.

Regulatory mechanism for funding innovation

We support the proposed regulatory funding mechanisms for innovation expenditure:

- For large transformational research and development through the Strategic Challenge Fund (SCF)
- For smaller scale process or technological innovations through the Network Innovation Allowance (NIA)
- For market ready innovation as a first time deployment through BaU funding

As evidenced during the RIIO-T1 period, the NIA can deliver significant benefits by progressing innovation concepts towards market ready status, at which point BaU allowances can take over and deliver monetised benefits. This Business Plan proposes upfront NIA of £8 million over the five year RIIO-T2 period. We propose a 90:10 shared commitment where we will contribute at least 10% of overall project expenditure.

The NIA would apply to projects where associated benefits will either accrue after the RIIO-T2 price control period (thus avoid duplication with other RIIO-T2 mechanisms), or accrue to parties other than ourselves, or are simply high risk or very uncertain. Projects will need to demonstrate benefits in the context of our strategic themes (Figure A3.2).

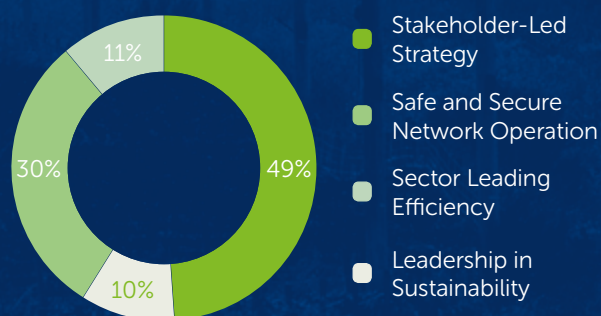


Figure A3.2 Proposed split of NIA by strategic theme

We have worked with the other energy networks and the ESO to develop a common approach to the tracking of innovation benefits during the RIIO-T2 period. You can read more in:

SUPPORTING DOCUMENT 12A. [Regulatory Framework – Outputs, Incentives, Consumer Value Proposition and Innovation](#)

A Co-ordinated Whole Energy System

READ more about our approach and how it has been applied in the development of this RIIO-T2 Business Plan

SUPPORTING DOCUMENT 20. [Enabling Whole Energy System Outcomes](#)



What is the whole energy system?

In order to develop whole system working it's important to start with a clear definition. To us:

"The whole energy system comprises electricity, gas, heat and transport networks and components that serve GB society"

This definition recognises that there are many parts to the energy system and through co-ordination it should be possible to achieve better outcomes for consumers.

The critical aspect of our definition of the whole energy system is the realisation of GB society benefit.

In this context, we look beyond the electricity bill payer to the overall costs and benefits to GB society, environment and the economy.

Currently, the GB energy system operates largely as standalone elements. Our interest is in identifying and working with those other elements that impact on the economic development of the north of Scotland transmission system. The north of Scotland is a unique environment for whole system working. When compared with the rest of the UK there are some key differences:

- There is a low population density
- Electricity consumption is higher than the GB average, in part due to the relatively limited extent of the gas network
- The penetration of renewable energy generation is high with both large and small scale developments dominated by wind and hydro

The Scottish Energy Strategy¹ lists whole system as one of three core principles that will guide the Scottish energy system as it develops. In this context, the whole energy system encompasses electricity, heat and transport. The Scottish Energy Strategy stresses that development of each of these vectors cannot be done in isolation from the others if full value is to be realised.

For transport, Scotland has a legislated target to have no new fossil fuelled cars by 2032. This is eight years earlier than the target of the Westminster Government. The Scottish Government has set a target for locally owner or community energy of 1 GW by 2020 and 2 GW by 2030.

Drivers for whole system working

Our GB electricity system is undergoing a period of sustained change driven by national targets for net zero GHG emissions by 2050 (2045 in Scotland). New technologies are driving new ways of producing and consuming energy. How we generate and distribute that energy is becoming increasingly important, ensuring we do so in a sustainable and economic manner. Energy consumers are seeking greater involvement in the development and decision-making of our energy system.

Drivers for change include decarbonisation, decentralisation and democratisation. Enablers include digitalisation, and commercial and policy reform.

It makes sense to work together to identify how best to meet these challenges and support the overall energy transition. A whole system approach allows network owners and stakeholders to develop solutions together in a way that accounts for impacts across traditional network boundaries, energy vectors and over time to realise benefits for GB society that would not otherwise be achieved.

A new way of working

Our approach to the development and operation of the north of Scotland transmission system has evolved over many years to ensure that we are efficient, sustainable and acting in the best interests of our customers and stakeholders. It is critical that we maintain that discipline as we expand our approach to encompass the whole energy system.

For us, the **objective** of whole energy system working is to:

"Optimise the development, delivery, construction, operation and maintenance of our network, by working across traditional energy vector boundaries to deliver benefit to GB society"

To implement this approach, it is essential to have a transparent and consistent methodology for measuring the benefits. This methodology should allow the relative costs and benefits of different options (both traditional and whole system) to achieve an outcome to be measured and, hence, the option of greatest benefit to GB society to be selected.



"The benefits (of whole system thinking) relate to customer costs and the support of decarbonisation."

We believe that cost benefit analysis (CBA) is critical to whole energy system working. CBA techniques allow both the costs and benefits of different intervention options to be measured (either quantitatively or qualitatively) over time, and compared on a level playing field.

We have recently developed our CBA methodology to include for social and environmental factors, in addition to traditional economic measures. For example, a whole system solution could include electricity transmission, distribution or network services, or solutions from other vectors. CBA allows for a meaningful comparison by analysing all the costs and benefits associated with each, thus enabling informed decision making.

However, our existing CBA methodology will need to expand beyond the electricity transmission system. Through CBA we may identify that one party must spend more than they would under a traditional approach to achieve the maximum GB society benefit. Robust, consistent CBA tools are essential to support this outcome.

There are three essential **building blocks** on which the establishment of whole system working depends (**Figure A3.3**):

- Engaging stakeholders to gain a common understanding of the desired outcomes;
- Working collaboratively to identify and assess possible solutions; and
- Supporting innovation to improve outcomes for GB society

Engage stakeholders

Whilst developing and implementing a whole energy system approach it is essential that we engage with north of Scotland and GB stakeholders.

Whole system approaches, by their very nature, have impacts across the energy sector. This includes both the current participants in the industry, potential new entrants and the end consumers that are impacted by whole system outcomes.

We will need to tailor our engagement approach, being wide reaching in who we engage with and open minded to understand what their requirement is of the energy networks.

Work collaboratively

Despite the multiple parties involved, the electricity network in GB operates as one coordinated system, which is connected to European markets through interconnectors. The secure and efficient operation of the electricity system is contingent upon effective coordination and collaboration between the different parties. As one part of that system, we play a significant role in facilitating this collaboration through the interfaces prescribed in industry frameworks and codes.

However, as set out in the definition of whole energy system, our future ways of working must look beyond the electricity sector. To achieve this, the existing codes and frameworks will need to be reviewed, revised and expanded.

Innovate to Improve

For whole system to become established it will require new ways of working to be established into Business as Usual (BaU).

We have completed and have in-progress innovation projects that can help deliver whole system. These include: Active Network Management (ANM) and flexible connections, probabilistic planning standards, and whole system modelling. We also look to learn from others across industry and participate in national forums.

Where we want to test new ways of working, and where there is no existing project that we can work with or learn from, we will look to establish a project to test the concept. We will look to deliver that project with project partners and so that the end outcome has application and/or learning across the industry.

Implementing whole system working

Our definition of the whole energy system incorporates gas, heat and transport. We believe that substantial progress towards whole energy system working can be achieved in the short to medium term.

In the longer term though we see that benefits can be accrued to GB society from whole system working with other industries. These include water authorities, sustainability agencies and telecoms companies. In meeting our ambitions, we understand that there will need to be consistency across industry. We seek to play a leadership role in this development.



Figure A3.3 Whole system working building blocks

We describe three stages to the implementation of whole energy system working (**Figure A3.4**).

The **framework** stage looks to prepare us for the start of the RIIO-T2 period. Building on existing interfaces, and keeping it restricted to electricity, we are working with stakeholders to understand where whole system can be best applied.

Although starting with existing interfaces, we recognise that the major barrier is a lack of industry frameworks for whole system analysis. Thus our primary objective prior to the start of the RIIO-T2 period is to establish the necessary frameworks that allow us to compare different network solutions be those network development or general operation and maintenance activities.

The **electricity** stage looks to take the learning from the framework stage and establish it as BaU. Building on those frameworks and new ways of working, we will look to expand whole system to other energy vectors where it makes sense to do so. As a minimum we expect this to cover transport, gas and heat networks.

During the electricity stage, we also expect that development work will progress on expanding whole system further: for example, to water, sustainability and telecoms. The critical aspect of this expansion will be identifying activities where whole system working might result in benefits to GB society, and then developing and implementing the necessary frameworks for collaboration across vectors.

These frameworks will need to facilitate a comparison between any proposed solution from each vector to allow whole system solutions to be identified and delivered. In addition to the framework, there will need to be a role created for an independent party to allow determinations to be made should there be any conflicts between the various solutions.

The whole energy stage will look to establish as BaU the other vectors developed from the electricity stage. Further work will focus on identifying further vectors that could deliver whole system benefits and developing the frameworks to encompass them if they do.

Good quality, accessible data is central to achieving whole system outcomes. We will apply the staged approach set out by the Energy Data Taskforce¹ to identify, collect and (where appropriate) share the necessary data for whole system working.

Application of whole system working the development of this RIIO-T2 Business Plan

We have applied our three whole system building blocks in the development of our RIIO-T2 Business Plan.

Engaging stakeholders has been central to the development of this Business Plan. For example, our north of Scotland Future Energy Scenarios (pages 31-32) took a whole system approach to consider the impacts of heat, transport and energy efficiency to quantify uncertainty about future energy use in the north of Scotland.

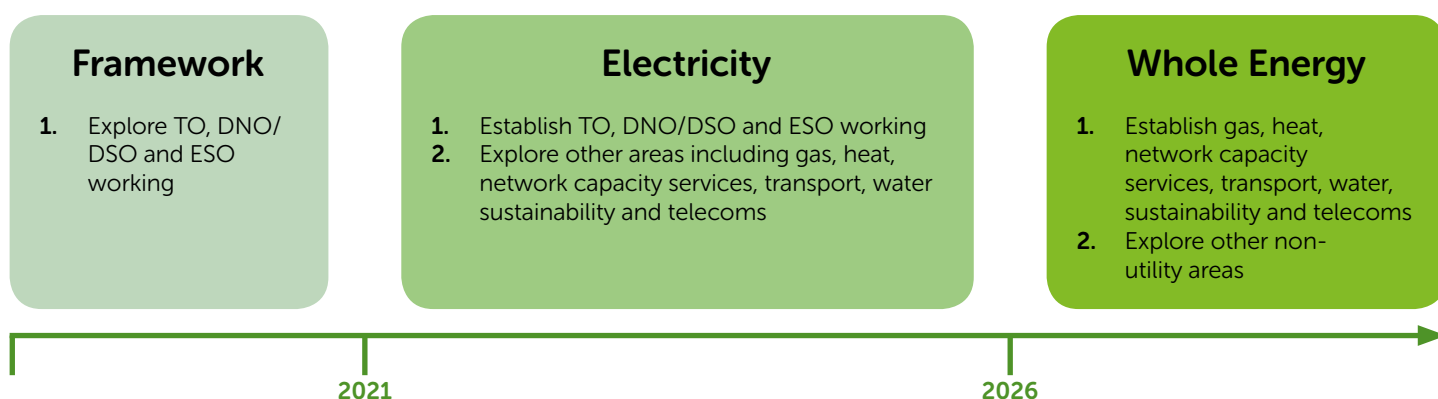


Figure A3.4 Timeline for whole energy system working implementation

Working collaboratively and co-creation has been the consequence of our wide-ranging stakeholder engagement. In particular it has strongly influenced our new Stakeholder Engagement Strategy, which has specific actions to collaborate to develop options for network development and for us to act as an advocate for our stakeholders in national policy forums.

Innovate to improve is the extension of our outcome-driven approach to innovation developed and applied over the past decade. Successful innovations, both technology and commercial, have been incorporated as BaU in this Plan, not least our sector-leading flexible connection arrangements.



"I think it feels about right, focusing first on distribution and transmission."

RIIO-T2: the electricity stage

Our two ambitions for the development of whole system working during the RIIO-T2 period are (Figure A3.4):

1. Establishing whole system working as BaU across electricity; and
2. Expanding the whole system framework to encompass other energy vectors.

We intend to pursue a 'learning through doing' approach, where whole system working can be developed through its application to current network requirements and, hence, realising immediate benefits for GB society. This approach will increase the breadth and depth of learning, as different network issues occur across GB.

A key outcome from the electricity stage in the north of Scotland will be achieved through Local Area Energy Plans (page 97). The development of these Plans by each local authority will bring together all local energy stakeholders to share future energy requirements. We expect this collaboration to result in local future energy scenarios that encompass the range of potential energy (electricity, gas, transport and heat) needs. From this, we can transparently develop energy network pathways that incorporate non-network and third party solutions.

We currently have underway three key projects to instigate the electricity stage:

- Engaging stakeholders: the development of the Dundee City energy plan
- Working collaboratively: applying the learning from our North East 400kV investment case
- Innovate to improve: to the design and use of the proposed 600 MW HVDC link to Shetland

Co-ordinated Adjustment Mechanism

Ofgem has recognised that the prospective benefits of whole system solutions "may not be fully realised, at the long-run expense of consumers" under its regulatory framework. To address this, Ofgem has proposed:

- The potential for additional expenditure to be approved for whole system approaches under its Business Plan Incentive mechanism;
- Inclusion of whole system within the innovation regulatory mechanisms (page 135); and
- The Coordinated Adjustment Mechanism (CAM).

The CAM is an uncertainty mechanism that is not intended to allow new expenditure, but rather reallocate existing allowances between parties. Ofgem has proposed a materiality threshold of £20 million to use this reopener.

From our experience during the RIIO-T1 period in developing and implementing whole system solutions, we believe that core elements of an effective whole system framework are missing from Ofgem's RIIO-2 proposals. Accordingly we argue propose an additional Whole System regulatory mechanism with three parts:

1. Development Funding Pot: that provides initial small-scale upfront funding to act as a catalyst to give networks the confidence to progress and develop solutions. This would be a 'use it or lose it' allowance
2. Regulatory "sandbox approach": where we can submit whole system solutions for approval. Such submissions would set out the need, the counterfactual of continuing with traditional approaches, the parties involved and necessary code modification
3. Whole System Incentive: a reward-only financial reward realised for solutions that provide a material benefit to consumers. We propose this includes a 50% sharing factor.

A key characteristic of this mechanism must be flexibility. While we do not anticipate significant volumes of projects coming forward during the RIIO-T2 period, those that do come forward may represent significant value to consumers, but are also likely to represent a wide range of network solutions. The RIIO-T2 whole system framework must therefore be able to accommodate the widest range of possible solutions.

Our Stakeholder Engagement Action Plan

READ on our Action Plan

SUPPORTING DOCUMENT 13A. [Stakeholder Engagement Action Plan](#)



To deliver our new Stakeholder Engagement Strategy (page 90-93) we have created a plan of action (**Figure A3.5**).

By setting out our proposed actions, we aim to demonstrate to our stakeholders that we are committed to achieving our ambition to be at the forefront of engagement practice and achieve real benefits for our stakeholders and society. We have included a high-level timeframe for completing the actions, as well as costs (where available) so that we can be held accountable. To support this and ensure we are being transparent, we will publish an annual Stakeholder Engagement Report to share our progress. Our approach is one of continuous development. To ensure we continue to seek and implement best practice, our action plan is a living document which our stakeholders can directly influence by challenging and amending areas to increase its effectiveness.

In this Appendix we summarise the actions that we are committing to in our Stakeholder Engagement Action Plan, noting that these will develop and grow in response to stakeholders' input during the RIIO-T2 period.

Actions to deliver Objective 1

Enable and encourage stakeholder input by providing easy access to ourselves and appropriate information as well as ensuring our communications are inclusive

- Provide open information on our organisation structure and teams responsibilities (Short term)
- Help stakeholders self-select areas of interest, knowledge and engagement approach (Short term)
- Work with SSEN Distribution to improve how we engage with shared stakeholders (Medium term)
- Create a live 'capacity availability map' on our website (Long term)
- Create a new online portal through our website for connecting customers (Long term)
- Include the use of social media into our engagement plan (Continuous improvement)
- Improve internal knowledge (Short term)
- Improve our website and access to it (Medium term)
- Provide communications in different languages as appropriate (Medium term)
- Ensure all engagement activities meet current and future stakeholders' needs (Continuous improvement)

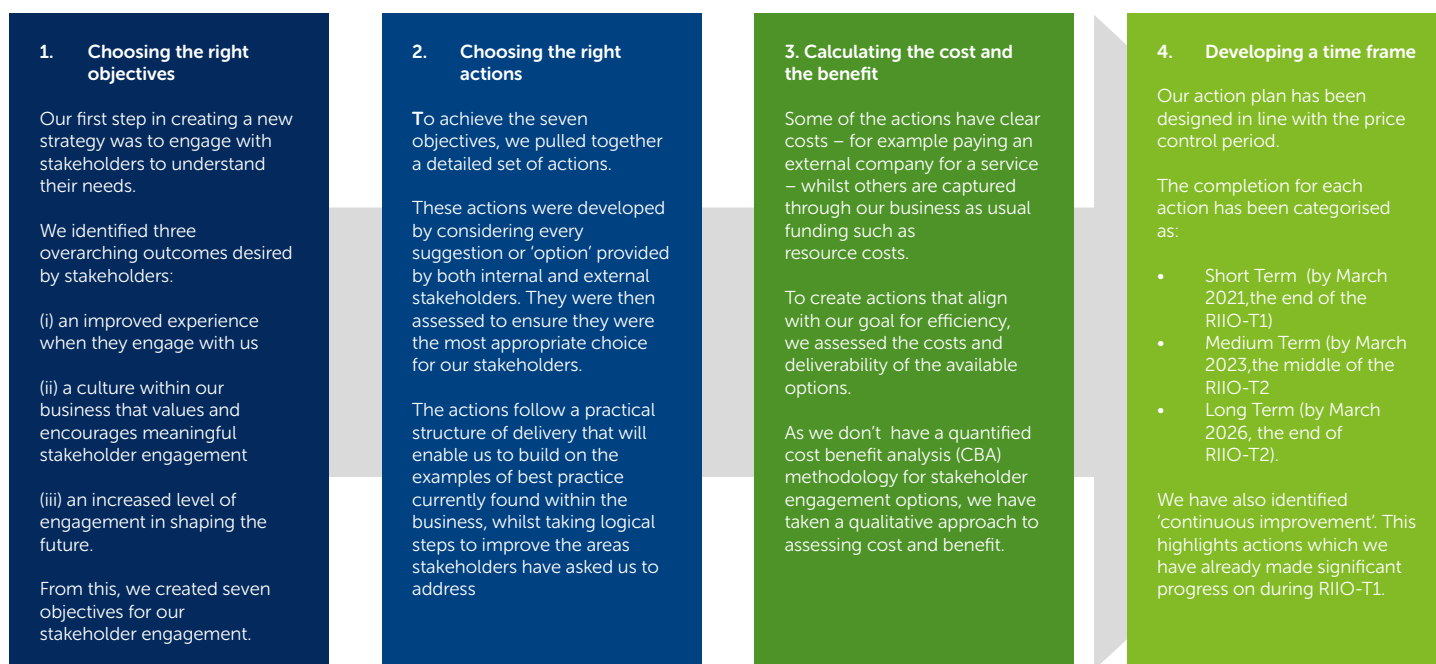


Figure A3.5 Approach to developing our Stakeholder Engagement Action Plan

Actions to deliver Objective 2

Build intelligence on stakeholder's needs so we can make balanced and fair decisions which anticipates and meets their needs

- Identify future and hard to reach stakeholders (Continuous improvement)
- Ensure our key stakeholders have a dedicated contact within our business (Short term)
- Carry out knowledge sharing sessions with targeted stakeholders (Continuous improvement)
- Establish a new external RIIO-T2 Implementation Group (Short term)
- Formalise partnerships (Short term)
- Develop and use one consistent process for assessing our impact on stakeholders (Medium term)
- Formally include our impact on stakeholders in decision-making processes (Long term)
- Develop one consistent complaints procedure for all our business (Medium term)
- Improve current, and develop new, research and feedback capabilities (Medium term)
- We will encourage innovative thinking to meet stakeholders' needs (Continuous improvement)

Actions to deliver Objective 3

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

- Share information on our full programme of work (Continuous improvement)
- Update our Project Planning templates to formally include engagement activities (Continuous improvement)
- Collaborate with key stakeholders on project and engagement plans (Continuous improvement)
- Create opportunities for impacted stakeholders to come together at the same time to openly discuss decisions (Short term)
- Create information sharing opportunities prior to consultation activities (Continuous improvement)
- Build the new Stakeholder Impact Assessment into a project's life cycle (Medium term)
- Implement a new Quality of Connections survey (Short term)
- Update our stakeholder satisfaction survey (Continuous improvement)
- Introduce new methods to assess stakeholder's satisfaction (Continuous improvement)

Actions to deliver Objective 4

Develop consistent and transparent processes to capture, act on, discuss and feedback on stakeholder input

- Update all processes, work instructions and governance to include new principles of engagement (Long term)
- Implement Tractivity, our new stakeholder engagement management system (Short term)
- Create one consistent process to map impacted stakeholders (Continuous Improvement)
- Develop a methodical decision process to act on conflicting stakeholder input (Medium term)
- Provide information requested by stakeholders which is currently unavailable (Short term)
- Develop guidance on when and how to provide feedback to stakeholders (Medium term)
- Develop Cost Benefits Analysis process for stakeholder engagement (Long term)
- Conduct our first health check and aim to improve each year (Long term)
- Develop KPIs for the actions (Short term)

Actions to deliver Objective 5

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

- Recruit for new roles within the new Customer and Stakeholder Directorate (Short term)
- Ensure clear responsibility for stakeholder engagement is assigned in our business (Long term)
- Ensure one objective related to stakeholder engagement is included in all employees yearly Performance Review process (Short term)
- Create an internal communications plan to raise awareness and buy-in on our new strategy (Short term)
- Create consistent and common habits in our business (Long term)
- Deliver required training across our business (Medium term)
- Enhance our senior managers understanding of engagement benefits and their ability to engage (Continuous improvement)
- Coach our employees before they engage with stakeholders (Continuous improvement)
- Update our induction process for new employees to include our new strategy (Short term)

An annual routine for stakeholder engagement

Each year it is important for us to plan, deliver and review our stakeholder engagement to ensure we maintain an up-to-date understanding of stakeholders' needs and ensure their views are captured and incorporated into the day-to-day operation of our business.

These activities are based on lessons learnt from RIIO-T1 such as our successful annual stakeholder event which provided significant input into our business plans; as well as our research into best practice which has prompted us to conduct the AccountAbility Health Check, a process highly recommended by other Transmission Owners.

These actions do not capture all the activity we will undertake each year. They have been selected to provide our stakeholders with an insight into how we carry out stakeholder engagement.

Action		Status
Plan	Complete annual review of our stakeholders	Improve
	Develop Engagement Plan for the year ahead with key stakeholders	Improve
	Create an Internal Communications Plan	Continue
Deliver	Conduct annual stakeholder event	Continue
	Conduct annual stakeholder roadshows to discuss our programme of works	Improve
	Proactively share learning from all innovation projects	Improve
	Gather Real-time information on stakeholders wants and needs	Improve
	Working with our 'new RIIO-T2 Implementation Group'	Improve
Review	Assess connecting customers satisfaction	New
	Assess stakeholder's satisfaction who have been impacted by new transmission infrastructure	Improve
	Annually assess wider stakeholder satisfaction	Improve
	Track accessibility of information we currently provide and identify any issues	New
	Conduct external assurance	Improve
	Continuous improvement	Continue

Actions to deliver Objective 6

Develop future optionality with input from a diverse group of stakeholders

- Develop engagement plan for North of Scotland Future Energy Scenarios (Continuous improvement)
- Engage with stakeholders to support the development of their future scenarios (Continuous improvement)
- Establish consistent analysis and exploration of what the future might look like (Continuous improvement)
- Review how we can build further stakeholder input into the options we present to National Grid for the annual Network Options Assessment (Continuous improvement)
- Increase stakeholder input into our Innovation Strategy (Continuous improvement)
- Increase the number of opportunities for innovation we openly shared (Continuous improvement)
- Recruit a Whole System Manager and Senior Whole System Planning Engineer (Short term)
- Support the development of Local Area Energy Plans and Local Heat and Energy Efficiency Strategies in the north of Scotland (Continuous improvement)
- Enable connecting customers co-location and collaboration (Medium term)

Actions to deliver Objective 7

Actively participate in industry change as a committed advocate for customers, society and the environment

- Recruit a Business Development Manager (Short term)
- Build upon our Policy Engagement Service (Continuous improvement)
- Ensure we have representation at industry forums and working groups (Continuous improvement)
- Develop a process to analysis what change means for our business and our stakeholders (Medium term)
- Encourage change in the industry through innovation (Medium term)
- Encourage change in the industry through proactively providing input (Continuous improvement)
- Encourage and enable change within our business (Short term)
- Update our strategies and policies with stakeholder input needs. (Continuous improvement)
- Create a queue management service for our connecting customers (Medium term)

What does success look like?

We want to co-create solutions with stakeholders in a structured, fair and balanced process (**Figure A3.6**).

We believe success is when our stakeholders trust us and advocate on our behalf. This will be achieved by:

- Understanding all our stakeholders and their needs;
- Being open to stakeholders raising challenge or questions;
- Coming together to determine the most important areas to focus on;
- Working together to develop meaningful outcomes; and
- Maintaining on-going discussions about what can and can't be achieved.

Stakeholders have told us that we can do this successfully, for example in the development of our RIIO-T2 Business Plan. It is right that stakeholders are the judge of whether we are delivering on their behalf.

Monitoring, governance and reporting

Part of our governance will be providing stakeholders accurate and current information on the efficiency and effectiveness of our stakeholder engagement, and the status of our actions in this document.

We hold ourselves accountable for each action and are committed to report annually on our progress. We will either report: that the action has been completed, for example we will inform stakeholders that we have successfully delivered a live 'capacity availability map' on our website; or report a measurement through monitoring our activity, for example we will report how many stakeholders inputted into the next revision of our Innovation strategy.

Consumer Value Proposition

The implementation of our Stakeholder Engagement Strategy goes above-and-beyond minimum expectations of a transmission owner in three aspects:

Commercial and Connections service

Through well justified initiatives in our Connections and Commercial Policy that deliver service quality and societal value over and above the value proposed in the existing framework of outputs.

Consumer value: carbon savings

Network Access Policy

Implementing whole system network planning by extending the requirements of the NAP, building on our track record in RIIO-T1.

Consumer value: cost savings and carbon displacement

Local and Community Energy

Facilitating local and community energy by being an expert and trusted partner for local authorities and other local stakeholders. As Local Area Energy Plans (LAEP) and Local Heat and Energy Efficiency Strategies (LHEES) are developed, we will identify policies across our Business Plan that will address barriers that local communities face when taking a project from concept to delivery.

Consumer value: combined consumer value based on cost savings from avoided investment, carbon displacement and socio-economic benefits

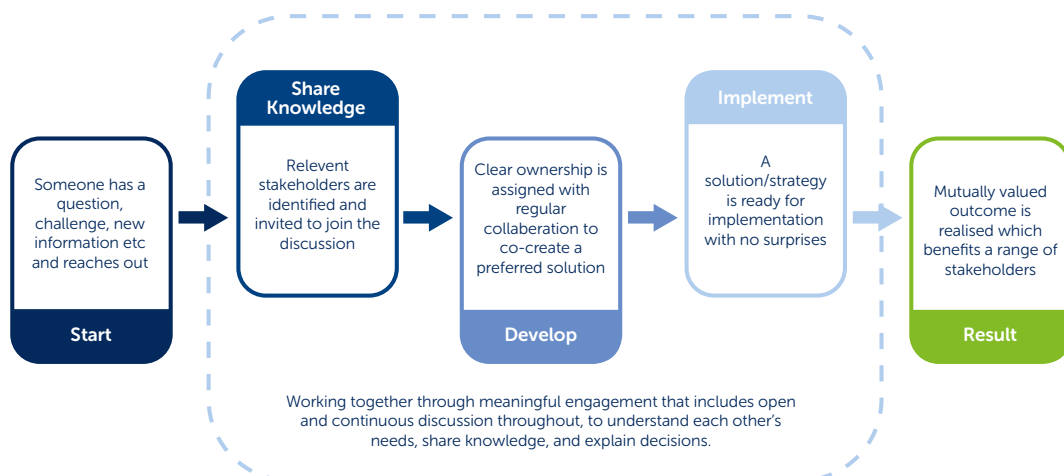


Figure A3.6 The engagement cycle

Our Sustainability Action Plan

READ our full Sustainability Action Plan, including our Environmental Action Plan

SUPPORTING DOCUMENT 16A. [Sustainability Action Plan](#)



We have published with this RIIO-T2 Business Plan a full and comprehensive action plan for the achievement of our six sustainability ambitions. This encompasses the Environmental Action Plan requirements of the Business Plan Guidance[†].

We summarise the main actions[‡] over the following pages.



Connecting for Society

Working collaboratively to deliver a whole system solution that promotes affordability, considers societal benefits and supports community renewable connections

Supporting the low carbon energy transition

Benchmarking Leading

Actions

- Develop Net Zero scenarios for our network area (Short term)
- Support flexible network solutions to enable the growth of low carbon technologies (e.g. electric vehicles) (Continuous)
- Transport enough renewable energy through our network to power 10 million homes (Long term)
- Contribute towards a GB network capable of supporting the accommodation of 10 million electric vehicles across by 2030 (Long term)

Measurement

- Connected renewable capacity (MW)
- Carbon emissions displaced by renewable generation and low carbon technologies facilitated by our network (tCO₂e)
- Number of electric vehicles supported in our network area
- Number of engagements on whole system planning & network flexibility

Making sustainable investment decisions

Benchmarking Leading

Actions

- Assurance review of CBA framework (Short term)
- Annual review of CBA framework (Continuous)
- Consultation on CBA framework (Medium term)

Measurement

- CBA will be presented as part of business justification papers for each applicable project. These will show the project carbon footprint and associated cost for each option
- Report on the development of the CBA framework and its underpinning models

Providing a quality connections service

Benchmarking In the pack

Actions

- Collaborate with TOs and the ESO to develop a common NAP approach (Short term)
- Develop a Quality of Connections service target (Short term)
- Deliver optimal connection solutions (Medium term)
- Provide a tailored customer service (Long term)
- Deliver an accessible connections process (Long term)
- Formulate and implement a process for network users to self-fund outage changes (Medium term)
- Act as a trusted partner and realise the benefits of collaboration through the development of LAEP and LHEES (Long term)

Measurement

- Performance against a quality of connections service (to be developed during 2020 for the start of RIIO-T2)
- Number of connections and outages on time
- Number of accelerated connections
- Customer satisfaction ratings throughout connection process
- Community energy supported in our network area (MW)
- With the ESO and other TOs, a NAP performance metric

[†]Paragraphs 2.33-35 and Appendix 2 of RIIO-2 Business Plans Guidance, Ofgem, 31 October 2019. Available at:

www.ofgem.gov.uk/publications-and-updates/riio-2-business-plans-guidance-document

[‡]Excludes actions for Supporting Communities and Growing Careers, which are not part of the Environmental Action Plan requirements. Actions for these ambitions can be found in our Sustainability Action Plan



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

Business carbon footprint (BCF)

Benchmarking Leading

Actions

Substation energy use

- Technical review of existing sites suitability for energy efficiency measures and the adoption of PV microgeneration (Short term)
- Technical specifications developed for energy efficiency measures, micro generation and metering on substations (Short term)
- Pilot the installation of PV microgeneration on substations sites (Medium term)
- Pilot energy efficiency measures on existing sites (e.g. heating control, LED lighting, insulation etc) (Medium term)
- Update methodology for calculating substation emissions based on metering and determine need to re-baseline emission projections (Medium term)
- Roll out energy efficiency and PV programme on existing and new substation sites (Long term)

SF6 emissions

- Insulation and Interruption Gases (IIG) Strategy published and plan to implement strategy in place (Short term)
- Update the SF6 specification to include not installing new 132kV SF6 assets and Install real time monitoring on new GIS SF6 installations (Short term)
- Monitor and report against our IIG leakage rate of achieving 0.39% by the end of RIIO-T2 (Continuous)
- Continue to collaborate with our suppliers and other network operators to improve the alternative supply chain and minimum leakage requirements (Continuous)

Operational transport emissions

- Complete technical scoping for the installation of EVs charging infrastructure across our network area (Short term)
- Pilot the introduction of EVs and/or alternative fuel use vehicles in our operational fleet (Medium term)
- Develop and implement a plan to reduce our operational vehicle mileage where possible without compromising the quality of service to our customers and stakeholder (Medium term)
- Roll out programme to install EV charging infrastructure and the use of Electric Vehicles and/or alternative fuel use vehicles in our fleet by the end of the price control (Long term)

Emission Area	Percentage of Scope 1 and 2 Emissions (%)
Substation Building Electricity Use	66.9
SF6 Emissions	22.8
SHE Transmission Operational Transport	6.7
Buildings Electricity Use	2.2
Diesel Fuel Combustion	0.12
Buildings Energy Use – Other Fuels	0.02

Table A3.2a Scope 1 and 2 Emissions (2018/19)

Emission Area	Percentage of Scope 1 and 2 Emissions (%)
Capital goods (estimated)	47.86
Road (Contractors)	35.27
SF6 (Contractors)	9.36
Waste generated in operations (estimated)	3.01
Road (SHE Transmission)	2.40
Buildings - Electricity (Contractors)	1.26
Air	0.71
Rail	0.08
Buildings - Other fuels (Contractors)	0.02
Gas Natural (Contractors)	0.01
Sea	0.01

Table A3.2b Scope 3 Emissions, excluding Losses (2018/19)

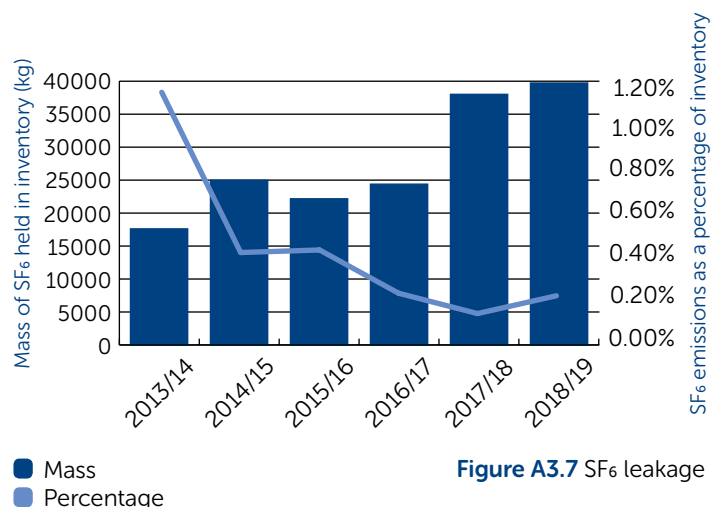


Figure A3.7 SF6 leakage

Scope 1

Direct greenhouse gas emissions occurring from sources owned or controlled by the company e.g. our vehicles and SF₆ 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

Scope 3 emissions

- Include our Sustainable Procurement Policy in key framework contracts for the start of the price control that will include a requirement for our key framework contractors to set a science-based carbon targeted within the next 5 years (Short term)
- Adopt the SBT best practice guidance and define our supplier engagement plan for supporting our key framework contractors to set a science-based target (Short term)
- Include carbon projections in contract tenders (Short term)
- Strengthen our supply chain carbon reporting by introducing a sustainable procurement reporting database for our suppliers (Short term)
- Based on the science-based target guidance, report on progress of achieving our scope 3 supplier engagement target (Long term)
- Strengthen scope 3 data quality and undertake review to determine future scope 3 targets (Long term)
- Hold regular contractor and supplier engagement forums to collaborate, share knowledge and support our supplier to set science-based carbon targets (Continuous)

Measurement

- Annual reporting on GHG emissions

*Transmission Losses***Benchmarking** In the pack**Actions**

- Embed the Grid/Super Grid transformers' representative loading profile into the whole life losses and associated carbon emission cost estimation to the procurement tendering system (Short term)

- Explore a better way to enhance the losses data collection on our network (Short term)
- Develop a reinforcement option losses assessment methodology (Short term)
- Develop the whole life cycle losses estimation methodology for other key components such as conductors and embed it into the procurement tendering system (Medium term)
- Establish a platform to automatically collect and calculate the detailed losses data on the key assets across our network (Medium term)
- Validate the effectiveness of the methodology through the learning by trying and explore embedding the methodology into the whole system CBA framework (Medium term)
- Review the losses and carbon costs projection methodology; continue to collaborate with our suppliers to design lower power losses products (Long term)
- Review the losses data collection effectiveness and work more closely with ESO and other two TOs on the losses data sharing and cooperation (Long term)
- Review the methodology and achieve an industry agreement on the methodology between 3 TOs and ESO (Long term)

Measurement

- Annual Network Losses (TWh)
- Annual Network Losses greenhouse gas emissions (tCO₂e)

*Climate resilience***Benchmarking** Lagging**Actions**

- Update our flood risk assessments in-line with best practice, using the latest Met Office forecasts and climate change projections (Medium term)
- Update wider climate risk assessments (such as wildfire risk) and integrate into business planning by the end of the price control (Medium term)
- Facilitate our Wildfires Subgroup (Transmission & Distribution) and participate in international collaborations on Wildfire Risk Management (Medium term)
- Undertake flood mitigation works at identified sites following the risk assessment (Long term)
- Actively undertake asset condition monitoring such as a monitoring and sampling programme of the concrete foundations on sites near floodplains and exploring the use lidar assessments to assess condition risk where appropriate (Continuous)

Measurement

- Number of flood risk assessments completed



Promoting Natural Environment

Delivering biodiversity net gain and driving environmental stewardship best practice

Biodiversity

Benchmarking Leading

Actions

- Embed Terrestrial BNG procedures into Business as usual and design no-net loss into future projects (Short term)
- Develop methodology and implement baseline biodiversity calculation of existing transmission estate (Short term)
- Engage with stakeholders to understand and contribute to development of marine biodiversity methodologies (Short term)
- Participate in Natural Capital external forums and contribute to development of consistent methodologies (Short term)
- Design Net Gain into development projects due to be consented from 2025 (Medium term)
- Review corridor / substation vegetation management practices to identify opportunities to enhance biodiversity (Medium term)
- Marine biodiversity environmental trial (Medium term)
- Trial Natural capital approach (Medium term)
- Design Biodiversity Net Gain into project applications (Long term)
- Update and implement operational vegetation management practices where appropriate (Long term)
- Adopt an industry standard approach to marine biodiversity reporting, where appropriate (Long term)
- Adopt an industry standard approach to Natural Capital reporting, where appropriate (Long term)

Measurement

- Percentage of Projects designed to achieve No Net Loss
- Percentage of Projects designed to achieve Net Gain target
- Overall BNG percentage designed into project portfolio

Woodland and forestry

Benchmarking Leading

Actions

- Develop woodland strategy and implementation plan for new projects (Short term)
- Incorporate woodland No Net Loss principles into business as usual (Short term)
- Design No Net Loss for woodland into project (Short term)
- Monitor and Review (Continuous)

Measurement

- Percentage of projects meeting No Net Loss of woodland
- Percentage of change in woodland cover (new projects)

Visual amenity

Benchmarking In the pack

Actions

- Develop technical options position statement and informative brochures/materials (Short term)
- Embed existing visualisation technology into Business as usual (Short term)
- Define opportunities to enhance interactive visualisations (Short term)
- Select new undergrounding projects under VISTA for delivery in RIIO-T2 (Short term)
- Agree an implement enhanced interactive visualisation opportunities where available (Medium term)
- Detailed VISTA project design and Ofgem application for selected projects (Medium term)
- Consultation with stakeholders on the desire to extend VISTA beyond NP/NSA (Medium term)
- Initiate construction of VISTA undergrounding projects (Long term)
- Develop and publish a methodology for assessing assets out with NP/NSA for potential consideration for VISTA in RIIO-T3 (Long term)
- Initiate construction of VISTA undergrounding projects (Long term)
- Develop and publish a methodology for assessing assets out with NP/NSA for potential consideration in RIIO-T3 (Long term)

Measurement

- Number of projects where visualisation technology is delivered
- Number of investment proposals to improve visual amenity
- VISTA Project delivery and associated benefits

Oil management

Benchmarking Lagging

Actions

- Participate in industry groups to determine national solutions for inaccessible PCB equipment (Short term)
- Establish and initiate programme for replacement of equipment containing PCB's (Short term)
- Undertake contaminated land risk assessment of existing sites (Short term)
- Develop Risk assessment methodology for implementation of synthetic based transformer fluid (Short term)

- Initiate contaminated land remediation of high-risk sites and monitor medium risk (Medium term)
- Embed RA methodology for synthetic based transformer fluid in business as usual (Medium term)
- Remove all equipment containing PCBs (Long term)
- Remediation of all high-risk contaminated land sites complete (Long term)
- Improve our reporting on Oil Use across the network (Continuous)

Measurement

- Number of sites that have undergone contaminated land remediation
- Number of PCB containing assets removed from the network
- Oil regulatory reporting requirements

Noise

Benchmarking Leading

Actions

- Undertake baseline noise monitoring and develop noise models for strategically important substations (Short term)
- Develop and implement noise management plans for strategically important substations (Medium term)
- Measurement
- Number of sites with noise assessment models
- Number of sites with long term noise management plans



Optimising Resources

Managing resources for a circular economy; achieving zero waste to landfill, increasing resource efficiency and using sustainable materials

Waste

Benchmarking Leading

Actions

- Develop a targeted waste management approach (Short term)
- Work with SSE and waste management framework contractors to reduce waste from shared offices (Medium term)
- Focus efforts to increase recycling of waste (as opposed to incineration or anaerobic digestion) (Medium term)
- Achieve zero waste to landfill (Long term)

Measurement

- Waste produced and disposal routes (landfill, recycled, re-used, incineration etc.) (tonnes and percentage)
- Most significant waste streams (by tonnage and carbon)
- Carbon saving from landfill diversion (tonnes of CO2 equivalent)

Resource use

Benchmarking In the pack

Actions

- Develop our understanding of disposal routes for our assets (Short term)
- Implement recycled content reporting across our supply chain (Continuous)
- Explore opportunities for re-use of assets (Medium term)
- Extend asset lifespan through preventative maintenance (Long term)
- Monitor and reduce water consumption in our offices through communications and awareness initiatives (Long term)

Measurement

- Number and type of assets refurbished
- Carbon saving from refurbishment (i.e. embedded carbon avoided)

Embedded carbon

Benchmarking In the pack

Actions

- Develop our approach to managing carbon across lifecycle of our projects (Short term)
- Implement embedded carbon reporting across our supply chain (Continuous)
- Develop means of measuring embedded carbon in materials and design (Medium term)
- Review baseline data and establish an appropriate embedded carbon reduction target (Medium term)
- Through innovation, identify and trial sustainable materials with reduced embedded carbon relative to their traditional counterparts (Long term)

Measurement

- Progress against an embedded carbon reduction target (to be developed)
- Embedded carbon in new projects
- Carbon saving from innovations (i.e. embedded carbon avoided)

Using Competition to get the Best Outcome for Consumers

READ about the role of competition in our business activities, including our Native Competition Plan

SUPPORTING DOCUMENT 7. [Competition Strategy](#)



As an established and responsible provider of critical national infrastructure, our role is to deliver an economic and efficient network to the benefit of consumers.

Co-ordinating the delivery of investments, in conjunction with the ESO and other stakeholders, ensures we deliver the most efficient solution. Risk-based operation of the network during the development and delivery of new infrastructure or reinforcement of existing assets is integral to safety and security for consumers, the public, and of course for those that operate and work on the network.

Competition plays a critical role in realising these outcomes. We are subject to national laws¹ that require competitive procurement of our capital investment and associated works, goods and services above specified minimum value thresholds. We apply a risk/value matrix to our procurement activities which fall under these minimum value thresholds, thus ensuring we use competitive processes, even at lower values, to keep our expenditure as efficient as it can be.

As our capital investment is around 90% of our total expenditure, the use of competition in procurement gives us confidence that we are rigorous in seeking the best value solutions.

In developing our procurement strategy for the RIIO-T2 period, we undertook stakeholder engagement across the supply chain and with potential providers of network and non-network solutions. This engagement revealed that, due to the geography and topography of the north of Scotland, we will continue to have challenges within our supply chain regarding security of resources and project location. Given this, we have designed a multi-element approach that applies best practice over a whole programme of works.

Competition in onshore transmission

Ofgem has stated its intention to expand the use of competition in the ownership and/or operation of onshore transmission infrastructure, where it is in consumers' interest.

We note that its proposals, termed early and late competition, are not yet fully developed for implementation. However, in accordance with the requirements of the RIIO-2 Business Plan Guidance², we have undertaken a provisional assessment of the eligibility of capital investments in the Certain View.

Ofgem's competition models



Late Competition

Under the late competition model a 'preliminary works party' (most likely a networks owner) would complete all necessary development works for a new, separable and high value project. Ofgem or another third party would then run a tender to determine who is responsible for the construction and operation of the project. Each party would bid a 'tender revenue stream' to construct, own and operate the asset for a long-term operational period (currently expected to be 25 years).

Ofgem's criteria for application of a late competition model include the following:

New – means a completely new transmission asset or a complete replacement of an existing transmission asset

Separable – means the boundaries of ownership between these assets and other (existing) assets can be clearly delineated

High-value – means at or above £100 million of expected capital expenditure at the point of Ofgem's initial assessment of the appropriate delivery model

Early Competition

The early competition model is a competition run prior to the project design process, aimed at revealing the best idea to meet a system need, including non-network solutions.

Ofgem's criteria for the identification of projects for early competition is still being developed, however Ofgem has specified that it might apply to any project valued at £50 million or over.

Ofgem has asked the ESO to develop an Early Competition Plan, detailing how it intends to develop an early model of network competition.

www.ofgem.gov.uk/electricity/transmission-networks/competition-onshore-transmission

¹The Utilities Contracts (Scotland) Regulations 2016

²Paragraphs 2.77- 83 of RIIO-2 Business Plans Guidance, Ofgem, 31 October 2019. Available at: www.ofgem.gov.uk/publications-and-updates/riio-2-business-plans-guidance-document

Competition assessment

For each of the capital investments in this RIIO-T2 Business Plan that meet either the £50 million or £100 million value threshold, we have carefully considered eligibility using the early and late competition criteria defined by Ofgem. **Table A3.3** provides a summary of this assessment.

We note the following material points in the context of this assessment:

Timescales

In considering eligibility for either early or late competition models, it is important to consider whether there is sufficient time to run a competitive tendering process (which we assume would take 18 to 24 months including pre-qualification) without impacting upon customers' connection dates.

A significant proportion of the growth investment that we will deliver during the RIIO-T2 period is required by new customers seeking to connect to our network by an identified connection date. The current connection date is based upon the most efficient programme for procurement and delivery, and we are obliged under licence to take all reasonable steps to meet these contracted dates.

We have undertaken desktop analysis applying the estimated timeframe for a competitive process commencing on 1 April 2021 to the identified projects. This analysis has concluded that an 18 to 24-month period in order to accommodate a competitive tendering process would result in potentially significant delays to customers' connection dates.

Alternative solutions

Our comprehensive and rigorous approach to project development (pages 38-39) includes an extensive 'optioneering' phase to identify all possible solutions with the potential to meet the required system need. This is done, where possible, with local stakeholders and other third parties.

Ofgem's Business Plan Guidance states that we can indicate from among the investments flagged as meeting the £50 million threshold value for early competition, any which we consider would have no reasonable probability of being addressed by an alternative solution (contestability test).

We therefore reviewed the possibility of alternative solutions (i.e. non-network) being able to address the system need. From this, and our extensive expertise, we are not aware of any alternative technology that can deliver the required output. We consider it is in consumers interests to progress with known technological solutions that are guaranteed to deliver the output within the required timescales.

Project splitting or bundling

Through a GB wide approach to the planning of the transmission system, supported by our portfolio procurement strategy and our risk-based approach to managing our assets, we have identified a clear and justified need for our planned capital investment in the Certain View. Each investment has undergone detailed options assessment, with economic analysis where appropriate, to ensure the most efficient solution has been identified. This has taken due account of splitting or bundling of work.

Investment	Early Competition Criteria			Late Competition Criteria			
	>£50m?	Contestable?*	Criteria met?	>£100m?	New or Replacement? **	Separable**	Criteria met?
Beaully Substation Works	✓	✗	No	✗	n/a	n/a	n/a
Kintore Substation Works	✓	✗	No	✗	n/a	n/a	n/a
Port Ann – Crossaig 132kV OHL Works	✓	✗	No	✓	✓	✗	No
North East 400kV Upgrade	✓	✗	No	✓	✓	✗	No
East Coast Onshore 275kV Upgrade	✓	✗	No	✓	✓	✗	No
East Coast Onshore 400kV Upgrade	✓	✗	No	✓	✓	✗	No
Kinardochy Reactive Compensation	✓	✗	No	✓	✓	✓	Yes

*i.e. Is there reasonable probability of the system need being addressed by an alternative solution?

**an assessment of new/seperable is only undertaken where the initial >£100m threshold is exceeded

Table A3.3 Competition assessment



Snapshot Tables

On 9 September 2019, Ofgem published “snapshot tables” as a standard format for licensees to set out summary information on outputs, uncertainty mechanisms and the Consumer Value Proposition (CVP). Ofgem requires these tables to be populated and published alongside Business Plans. In our presentation of these tables, we have aligned the contents with the sections of this Business Plan for ease of use.

In these tables, we describe an “output” where specific expenditure is aligned to delivery. We use “targets” for outcomes that do not have specific expenditure or are not within our control.

Further information can be found in Supporting Document 12. Regulatory Framework – Uncertainty Mechanisms, and Supporting Document 12A. Regulatory Framework – Outputs, Incentives, Consumer Value Proposition and Innovation

The snapshot tables in this Appendix are in the form specified by the RIIO-2 Business Plan Guidance published by Ofgem on 31 October 2019. Available at:
www.ofgem.gov.uk/publications-and-updates/riio-2-business-plans-guidance-document

Snapshot Table: Outputs

Output		Reference in this Plan			Costs associated with output delivery				Are there any associated outputs, uncertainty mechanisms or CVP proposals in your Business Plan?		
Name	Category	Common or bespoke?	Description	Type ¹	For ODI's What is the maximum upside/ downside of any reward/ penalty**	Funding in Business Plan?	Forecast cost / BPDT reference	Funding for enhanced performance in Business Plan?	Forecast cost / BPDT reference		
Section 2. Building a Network for Net Zero											
Shared Use Infrastructure	Maintaining a safe and resilient network	Bespoke	Increase in shared use infrastructure capacity (MVA)	PCD	Pages 42-47	n/a	Yes	222.2 Table B4.2a	No	-	Output: 2,047 MVA by 31 March 2026 Uncertainty Mechanism: Volume Driver
Reactive Power	Maintaining a safe and resilient network	Bespoke	Increase in reactive power capacity (MVA)	PCD	Pages 42-47	n/a	Yes	92.6 Table B4.2a	No	-	Output: +325/-225 MWAr by 31 March 2026 Uncertainty Mechanisms: High Value Transmission Projects; Operability, including Black Start
Strategic Network Capability	Maintaining a safe and resilient network	Bespoke	Increase in boundary transfer capability (MW)	PCD	Pages 42-47	n/a	Yes	370.0 Table B4.2a	No	-	Output: 1,090 MW on B4 by 31 March 2026† Uncertainty Mechanisms: Strategic Wider Works; High Value Transmission Projects; Operability, including Black Start
Early Engagement	Meeting the needs of consumers and network users	Bespoke	Number of regional and community engagement events on north of Scotland future energy scenarios and strategic network development	CVP	Pages 38-41, 90-93, 140-143	n/a	Yes Included in Events and Communications (section 6)	-	No	-	Output: 5 events per annum CVP (qualitative)
Section 3. Maintaining and Investing in the Existing Network											
Energy Not Supplied	Maintaining a safe and resilient network	Common	n/a	ODI (P/R)	Page 66	Upside 2.8 Downside 4.2	No	-	No	-	ODI Target: 90 MWh pa.** Uncertainty Mechanism: Subsea Cable Faults
Faults	Maintaining a safe and resilient network	Bespoke	Number of unplanned interruptions of all durations with no exclusions	PCD	Page 66	n/a	No	-	No	-	Target: 72 faults pa. by 2025/26
Network Monetised Risk	Maintaining a safe and resilient network	Common	n/a	PCD	Pages 52-63	n/a	No	-	No	-	Output: £533 million monetised risk reduction by 31 March 2026 (relative to no intervention) Within period substitution mechanism
International benchmarking: ITOMs	Maintaining a safe and resilient network	Bespoke	Outturn position in composite cost metric	ODI (Rp)	Pages 64-65	n/a	No	-	No	-	Output: Quartile 4 (upper right) by 31 March 2026
International benchmarking: ITAMs	Maintaining a safe and resilient network	Bespoke	Outturn position in composite cost metric	ODI (Rp)	Page 54	n/a	No	-	No	-	Output: Quartile 4 (upper right) by 31 March 2026
Network Access Policy	Maintaining a safe and resilient network	Common	Production of and compliance with NAP	LO CVP (R) ¹	Page 66	n/a	No	-	No	-	Output: To develop and implement a common NAP by 1 April 2021 CVP Connecting for Society

¹Type is a regulatory categorisation: LO = Licence Obligation; PCD = Price Control Deliverable; ODI (P/R) = Output Delivery Incentive with financial Penalty and/or Reward; Rp = Reputational; CVP = Consumer Value Proposition; UM = Uncertainty Mechanism

[†]Boundary capabilities are based on a given generation and demand background. For the purposes of reporting cumulative deliverables, the boundary capability uplifts from the individual projects have been arithmetically added. However, the aggregate boundary uplift over time will not necessarily equal the arithmetic sum due to the sensitivity of the boundary capability to generation and demand backgrounds

^{**}Estimate, subject to regulatory determination

Output		Category		Common or bespoke?	Description	Type¹	Reference in this Plan	For ODIs What is the maximum upside/downside of any reward/penalty**	Costs associated with output delivery				Are there any associated outputs, uncertainty mechanisms or CVP proposals in your Business Plan?
Name									Funding in Business Plan?	Forecast cost / BPDT reference	Funding for enhanced performance in Business Plan?	Forecast cost / BPDT reference	
Section 4. Security of Supply													
Reliability: Digitising the network	Maintaining a safe and resilient network	Bespoke	Number of critical assets with smart monitoring installed	PCD	Page 76	n/a	Yes	45.5 Table C2.25	No	-		-	Output: 62 by 31 March 2026
Redundancy: Back up assets	Maintaining a safe and resilient network	Bespoke	Number of specialist warehousing facilities	PCD	Page 72	n/a	Yes	40.3 Table D4.3a	No	-		-	Output: 2 by 31 March 2026
Resistance: Protection and control	Maintaining a safe and resilient network	Bespoke	Number of protection and control systems upgraded	PCD	Page 73	n/a	Yes	33.9 Table C2.25	No	-		-	Output: 64 protection schemes refurbished or enhanced by 31 March 2026 Output: 33 RTUs replaced by 31 March 2026
Resistance: Physical security	Maintaining a safe and resilient network	Bespoke	Number of substation security improvements	PCD	Page 74	n/a	Yes	9.6 Table C2.24	No	-		-	Output: 23 deterrence by 31 March 2026 Output: 55 defence by 31 March 2026 Uncertainty Mechanisms: Third Party Driven Need
Response and recovery: substation resilience	Maintaining a safe and resilient network	Bespoke	Number of substation investments to increase capability to 120 hours standalone operation and provide dual diverse LV supplies	PCD	Page 74	n/a	Yes	48.9 Table C2.12	No	-		-	Output: 116 by 31 March 2026 Uncertainty Mechanisms: Operability, including Black Start
Section 6. A Sustainable Network for Current and Future Energy Consumers													
Stakeholder Engagement Commitment	Meeting the needs of consumers and network users	Bespoke	<ul style="list-style-type: none">Stakeholder engagement survey (score out of 10)KPI performance (%)AccountAbility AA1000 Health Check (maturity score %)	PCD	Pages 90-93	n/a	Yes	Included in Stakeholder and Customer teams (section 6)	No	-		-	Target: >9.0 each year Target: >90% each year Target: >75% by 31 March 2026
Timely Connections	Meeting the needs of consumers and network users	Common	n/a	LO ODI (P)	Pages 94-96	Downside -12	No		No	-		-	ODI Target: 100% of offers made on time
Quality of Connections Survey	Meeting the needs of consumers and network users	Common	n/a	ODI (P/R) CVP (R)	Pages 94-96	"Upside +12 Downside -12"	Yes	Included in Stakeholder and Customer teams (section 6)	No	-		-	ODI Target tbc following trials during 2020 CVP Connecting for Society
New Infrastructure Survey	Meeting the needs of consumers and network users	Common	n/a	ODI (Rp)	Page 96	n/a			No	-		-	Target tbc following trials during 2020
Enhanced Reporting Framework	Meeting the needs of consumers and network users	Bespoke	Annual reporting of service performance, financial performance and performance for society (%).	PCD	Page 103	n/a	Yes	Included in Events and Communications (section 6)	No	-		-	Output: 100% of reports published to schedule each year

Output					Reference in this Plan	For ODI's What is the maximum upside/downside of any reward/penalty**	Costs associated with output delivery				Are there any associated outputs, uncertainty mechanisms or CVP proposals in your Business Plan?
Name	Category	Common or bespoke?	Description	Type ⁱ			Funding in Business Plan?	Forecast cost / BPDT reference	Funding for enhanced performance in Business Plan?	Forecast cost / BPDT reference	
Section 6. A Sustainable Network for Current and Future Energy Consumers (Continued)											
New CBA framework	Deliver an environmentally sustainable network	Bespoke	Investments that are subject to our new CBA framework (%)	PCD	Page 99	n/a	No	-	No	-	Output: 100% of applicable investments proceeding to construction after 1 April 2021
Scope 1 and 2 GHG emissions	Deliver an environmentally sustainable network	Bespoke	Reduction in emissions volume from 2018/19 baseline (%)	PCD CVP	Page 100	n/a	No	-	No	-	Target: 33% reduction by 31 March 2026 Uncertainty Mechanism: Sustainability Escalator CVP Tackling Climate Change
Sf6 leakage	Deliver an environmentally sustainable network	Common	n/a	ODI (P/R)	Page 100	Upside +0.9 Downside -1.4	No	-	No	-	ODI Target: 0.39% leakage pa.
Losses Strategy	Deliver an environmentally sustainable network	Common	n/a	LO	Page 100	n/a	No	-	No	-	Output: To have in place a Losses Strategy and review this annually
Biodiversity/ no net loss/ outcomes	Deliver an environmentally sustainable network	Bespoke	Biodiversity/ no net loss/ outcomes for new projects gaining consent after 1 April 2020 (%)	CVP (R)	Page 100	n/a	Yes	3.38 Tables C2.2a, B4.2a	No	-	Target: 100% of new projects Uncertainty Mechanism: Sustainability Escalator CVP Promoting the Natural Environment
Investments to improve visual amenity	Deliver an environmentally sustainable network	Bespoke	Number of projects to improve visual amenity in designated landscapes that are submitted for regulatory approval	UM / CVP (R)	Page 101	n/a	No	-	No	-	Target: at least 5 projects by 31 March 2026 Uncertainty Mechanism: VISTA CVP Promoting the Natural Environment
Waste sent to landfill	Deliver an environmentally sustainable network	Bespoke	Waste (excluding compliance waste) sent to landfill across all waste streams (%)	PCD	Pages 100-101	n/a	Yes	3.01 (embedded in capital investment)	No	-	Target: 0% of non-compliance waste by 31 March 2026
Construction waste	Deliver an environmentally sustainable network	Bespoke	Recycling, recovery and reuse of construction and demolition waste (%)	PCD	Pages 100-101	n/a	Yes		No	-	Target: 70% by 31 March 2026
Consumer vulnerability	Deliver an environmentally sustainable network	Bespoke	Employees trained to recognise and support community vulnerability (%)	CVP	Page 101	n/a	No	n/a	No	-	Target: >95% by 31 March 2026
Approved suppliers	Deliver an environmentally sustainable network	Bespoke	Suppliers located in the north of Scotland (%)	CVP (R)	Page 101	n/a	No	n/a	No	-	Target: >25% pa.
Diversity and inclusion	Deliver an environmentally sustainable network	Bespoke	Employees trained to promote diversity and inclusion in the workplace (%)	PCD	Page 102	n/a	Yes	0.155 Table A3.1	No	-	Target: >95% by 31 March 2026
			Employee pipeline is local population representative (tbc)								Target tbc after methodology development during 2020

Snapshot Table: Uncertainty Mechanisms

Uncertainty Mechanism				Reference in this Plan	Costs associated with the uncertainty mechanism		Are there any associated outputs, uncertainty mechanisms or CVP proposals in your Business Plan?
Name	Included in SSMD	Description	Type ¹		Funding in Business Plan?	Forecast cost / BPDT reference	
Section 2. Building a Network for Net Zero							
Volume Driver**	No	"Volume and need uncertainty An automatic mechanism that releases fixed allowances when trigger events occur"	Volume Driver	Page 81	No	-	Associated UMs: CVP: Operating cost escalator; Sustainability escalator
Strategic Wider Works (SWW)	No	"Volume and need uncertainty Within period determination mechanism to allow funding for predefined investment types"	Reopener	Page 81	No	-	Associated UMs: Operating cost escalator*
High Value Transmission Projects (HVTs)	No	"Volume and need uncertainty Within period determination mechanism to allow funding for predefined investment types"	Reopener	Page 81	No	-	*Associated UMs: Operating cost escalator
Pre-construction	No	"Volume and need uncertainty Close out mechanism for 'use it or lose it' allowance for SWW investments, with scope for in period substitution" "Volume and need uncertainty Close out mechanism to true-up allowance for investments due to enter construction after 31 March 2026"	Close Out	Page 82	Yes	118 Table B4.2a 11 Table B4.2a 13 Table C2.2a	No
Section 3. Maintaining and Investing in the Existing Network							
Operating Cost Escalator	No	"Volume and need uncertainty An automatic mechanism that releases fixed allowances associated with Volume Driver, SWW and HVTs UMs"	Volume Driver	Page 82	No	-	Associated UMs: Volume Driver; SWW; HVTs
Landowner Compensation	No	"Unknown external costs Within period determination mechanism to allow funding in prescribed circumstances"	Reopener	Page 83	No	-	No
Subsea Cable Faults	No	"Unknown external costs Within period determination mechanism to allow funding in prescribed circumstances"	Reopener	Page 84	No	-	To be an exceptional event for ENS ODI
Section 4. Security of Supply							
None							
Section 6. A Sustainable Network for Current and Future Energy Consumers							
Sustainability Escalator	No	"Volume and need uncertainty An automatic mechanism that releases fixed allowances associated with Volume Driver UM"	Volume Driver	Page 82	No	-	Associated UMs: Volume Driver
VISTA**	Yes	See SSMD	Reopener	Pages 85 and 101	No	-	CVP
Other Uncertainty Mechanisms							
Operability and System Management, including Black Start	No	"Unknown external costs An automatic mechanism that releases fixed allowances when trigger events occur" "Unknown external costs Within period determination mechanism to allow funding for ESO requested investment including for system management"	Volume Driver Reopener	Page 83	No	-	No
Third Party Driven Need	Yes (in part)	"Unknown external costs Within period determination mechanism to allow funding arising from predefined third party need (includes cyber resilience)"	Reopener	Page 83	No	Flooding 1.5 Table C2.24 Physical Site Security 6.2 Table D4.4a	No
Brexit Import Tariffs	No	"Unknown external costs Independent review to be conducted prior to RIIO-T2 Final Determinations"	Adjustment	Page 84	No	-	No
HVDC Centre	No	"Unknown external costs Within period determination mechanism to consider funding in specified circumstances"	Reopener	Page 84	Yes	4.3 Table D4.5 Table D4.6	No
Whole System Co-ordinated Adjustment	Yes	See SSMD	Reopener	Pages 84 and 139	No	-	No
Business Rates	Yes	See SSMD	Pass through with true-up	Page 84	Yes	326.0 Table A3.14	No

Snapshot Table: Consumer Value Proposition (CVP)

Consumer Value Proposition		Reference in this Plan	Costs associated with the uncertainty mechanism			Are there any associated outputs, uncertainty mechanisms or CVP proposals in your Business Plan?
Name	Description		Funding in Business Plan?	Forecast cost / BPDt reference	Value to consumer	
Section 2. Building a Network for Net Zero						
"Reducing Risk of Consumer Overpaying Certain View and output return commitment"	The Certain View and our commitment to return unspent allowances mean outperformance will only be due to actions to make efficiency savings and not due to other factors	Pages 33-37	No	-	75	No
"Reducing Risk of Consumer Overpaying Volume driver unit cost allowance"	Using actual historical costs in deriving unit cost allowances (UCAs), rather than forecasts, means outperformance will only be due to actions to make efficiency savings and not due to other factors	Page 81	No	-	8.5	Associated UM: Volume Driver
Section 6. A Sustainable Network for Current and Future Energy Consumers						
"Connecting for Society Commercial and Connections service"	Stakeholder-led, well justified initiatives in our Connections and Commercial Policy deliver service quality and societal value over-and-above framework expectations	Pages 94-96	No Internal cost only removed from analysis (Table D4.5)	-	59.5	ODI: Quality of Connections Service Maximum reward removed from analysis
"Connecting for Society Above BAU in whole system network: Network Access Policy"	Going above-and-beyond the requirements of the NAP building on our track record in RIO-T1, by implementing new tools and continuous delivery of innovative whole system solutions	Pages 66 and 132-139	No Internal cost only removed from analysis (Table D4.5)	-	5	No
"Connecting for Society Local and Community Energy"	Working with local authorities and others, in particular for LAEP and LHEES, in whole system planning and common policy development	Page 97	No Internal cost only	-	6.6	No
"Promoting the Natural Environment Biodiversity net gain"	Showing national leadership in the development and implementation of net gain methodologies for net gain for new transmission infrastructure investments	Pages 100 and 147	Yes	3.4 Tables C2.2a, B4.2a	158.6	No
"Promoting the Natural Environment Visual amenity"	Showing national leadership in the stakeholder-led development of visual amenity improvement investments and development of extended methodology	Pages 101 and 147	No Analysis assumes £70 million investment	-	30.7	Associated UM: VISTA
"Supporting Local Communities Local supply chains"	Building on our RIO-T1 approach, with stakeholder-led initiatives to support local supply chains and realise benefits to the local communities in which we operate	Page 101	No Internal cost only	-	6.4	No
Qualitative						
"Sector Leading Efficiency Early engagement"	Responding to stakeholders desire for early engagement on north of Scotland future energy scenarios and strategic network development to make more efficient and well informed decisions	Pages 38-41, 90-93 and 140-143	No Internal cost only	-	-	No
"Safe and Reliable Network Interruptions compensation scheme"	Inconvenience payment due to a loss of supply made to the directly affected consumer	Page 66	No Internal cost only	-	-	ODI: ENS
"Tackling Climate Change Science Based Target"	Demonstrating national leadership in committing to a science based target to reduce GHG Scope 1 and 2 by 33% through Sf6 alternative, EV fleet and PV and energy efficiency at substations	Pages 100 and 145-146	Yes	24.0 Included in the load and non-load Tables B4.2a, C2.2a	-	Associated UM: Sustainability Escalator
"Supporting Local Communities Supporting vulnerable customers"	Working with other agencies and parties to support vulnerable consumers and communities in the North of Scotland	Page 101	No Internal cost only	-	-	No



Ofgem's Business Plan Guidance

Ofgem's Business Plan Guidance

In its RIIO-2 Sector Specific Methodology Decision (SSMD) published on 24 May 2019, Ofgem decided that it would publish guidance setting out the minimum required information for RIIO-2 Business Plans.

Under its Business Plan Incentive (BPI) mechanism described in chapter 11 of the SSMD, Ofgem intends to carry out a qualitative assessment of Business Plans in order to ensure that they contain all of the minimum required information. If Ofgem finds that a Plan has failed to meet the minimum information requirements, then it intends to levy an upfront penalty of 0.5% of allowed baseline totex in its Final Determination.

The SSMD is available at: www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-decision

Our assurance activities (Appendix 1) have carefully assessed the content of our final RIIO-T2 Business Plan to ensure it meets all of Ofgem's minimum information requirements. A summary of this assurance outcome is shown in the tables in this Appendix. Note that for items highlighted (*) only the main references are listed, there are other references on a topic-specific basis throughout the Business Plan and supporting documents; for example, stakeholder engagement ("giving consumers a stronger voice") has influenced all parts of the Plan.

The tables below are from Appendix 1 of RIIO-2 Business Plan Guidance published by Ofgem on 31 October 2019. Available at: [/www.ofgem.gov.uk/publications-and-updates/riio-2-business-plans-guidance-document](http://www.ofgem.gov.uk/publications-and-updates/riio-2-business-plans-guidance-document)

Ofgem's Business Plan Guidance		Our RIIO-T2 Business Plan	
Minimum information requirements by assessment area	Reference in Guidance (paragraph number)	Reference in this Plan (page number)	Supporting document (if applicable)
Track record and business plan commitment	2.3-2.4	(*) 6-7, 106, 110-111, 127	-
Giving consumers a stronger voice	2.6-2.8	(*) 4, 22-28, 88-97, 129-130, 140-143	1, 2, 4, 13, 13A, 14, 15
What consumers want and value from networks: meeting the needs of consumers and network users	2.12-2.13	(*) 30, 50, 68, 86, 152-154	12A, 17, 17A
What consumers want and value from networks: maintaining a safe and resilient network	2.18-2.31	52-65, 72-75, 77-78, 102	8, 8A, 11, 11A, 17, 17A
What consumers want and value from networks: delivering an environmentally sustainable network	2.32-2.35	98-102, 144-148	15, 16, 16A, 17, 17A, 21, 22, 23, 24
Enabling whole system solutions	2.48-2.52	(*) 136-139	20
Real price effects (RPEs)	2.61	65	9, 18
Ongoing efficiency	2.63-2.64	41, 65	7A, 9
Innovation activities	2.68-2.71	(*) 132-135	19
Network innovation allowance	2.74-2.75	132-135	12A, 19
Competition	2.78-2.82, 2.84-2.86, 2.88-2.89	40, 149-150	7A, 7B
A consistent view of the future	3.1-3.2, 3.4-3.5	31-37	3, 3A
The net zero target	3.6-3.7, 3.9	31-37, 80-82	3, 3A, 12
Cost information	3.10-3.16	(*) 30, 50, 68	7
CBA	3.21	38-39, 55	5, 8
Financial information	3.23, 3.26-3.28	105-123, 127	18

Ofgem's Business Plan Guidance		Our RIIO-T2 Business Plan	
Minimum information requirements by assessment area	Reference in SSMD (paragraph number)	Reference in this Plan (page number)	Supporting document (if applicable)
Stakeholder engagement	2.36, 2.37	24-28, 90-93, 140-143	2, 13, 13A
Stakeholder satisfaction survey	2.139	90-96, 140-143	13A, 14
Energy not supplied	2.227, 2.235, 2.237, 2.246, 2.264	25, 66	8, 12A
Environmental considerations embedded in Business Plans	3.35, 3.36, 3.47, 3.50, 3.60	98-102, 144-148	12A, 16, 16A
Transmission losses	3.96, 3.101	100, 146	16A, 21
Additional contribution to low carbon transition	3.121, 3.124	(no bespoke LCT ODI)	12A, 16A
Sulphur hexafluoride (SF6) and other IIG leakage	3.161, 3.174, 3.178, 3.181	100, 145-146	16A, 19, 22
Mitigating visual amenity impacts in designated areas	3.246	101, 147	16A, 24
Network Access Policy	4.74, 4.80	66	10
Successful delivery of large capital investment projects	4.138, 4.152, 4.161	(no milestone proposal or change to 'high value' definition)	7B
Cost assessment	5.13	65	9, 18
Uncertainty mechanisms	6.7	80-84	12



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