Scottish & Southern Electricity Networks

TRANSMISSION

Network Asset Management Strategy

A Risk-Based Approach to Asset Management

December 2024

Executive Summary

Our Network Asset Management Strategy for RIIO-T3 builds on a proven track record of network reliability and active stakeholder engagement. This strategy is designed to maintain high service standards, bolster operational resilience, prepare the network for increased clean energy demand, and achieve long-term asset reliability.

During RIIO-T2, we delivered exceptional asset performance, achieving over 99% reliability of supply and more than 97% system availability. Over the past four years only one fault has affected end customers under the Energy Not Supplied incentive, highlighting our commitment to reliability.

Our focus on continual improvement has led to certification under the ISO55001 standard for asset management, top-quartile results in global transmission operations and maintenance benchmarking, and recognition at the 2023 Institute of Asset Management UK and Global Excellence Awards.

We are advancing asset management expertise across the organisation, innovating to improve climate resilience and reduce our carbon footprint, and deploying digital tools to enhance safety, efficiency, and resilience.

To achieve our T3 goal of zero interruptions to electricity supply, we have developed a data-driven, risk-based non-load investment portfolio. This portfolio focuses on reducing network risk and increasing resilience, using the Network Asset Risk Metric (NARM), cost-benefit analysis, and long-term risk assessments to ensure best value and risk reduction for stakeholders. Our T3 non-load investment plan will:

- **Invest** in existing network infrastructure to replace or refurbish equipment at the end of its economic life.
- **Strengthen** operational resilience through new depots, expanded spares, training resources, and enhanced system monitoring.
- **Modernise** field operations and maintenance with integrated data and digital tools.

The RIIO-T3 non-load investment portfolio will deliver a safe, reliable, and resilient network with a long-term monetised risk benefit of R£1420.9m and a reduction of network risk of R£484.5m. The delivery plan ensures that resources are allocated effectively to support our stakeholders and meet our strategic objectives.

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1. Introduction

1.1. Context

Our RIIO-T3 Network Asset Management Strategy outlines how our risk-based approach to asset management has defined our asset risk and resilience investment proposals for RIIO-T3. These investment proposals directly contribute to our overarching strategic corporate goals for the 2026 to 2031 period:

- **Resilient Supply** – Zero interruptions in electricity supply to homes and business due to our network
- **Clean Power** – Our network will have the capability to meet 20% of the GB demand for clean power
- **Our Legacy** – Drive investment in the energy transition that delivers transformative, lasting benefits for local communities, our economy and nature

Our asset risk and resilience investment proposals focus on ensuring our network is safe, reliable and resilient, with cognisance that the proposals directly contribute to accelerating the pathway to net zero by supporting an increasing generation background and connection requirements. This strategy reflects our organisational context, asset management objectives and the requirements of our key stakeholders.

Delivering this strategy will positively contribute to the communities and economy of the north of Scotland through job opportunities and skills development, reinforcing our commitment to delivering sustainable and inclusive growth and ensuring that the benefits of our investments extend beyond the energy sector.

1.2. Scope

This RIIO-T3 Network Asset Management Strategy sets out:

- Our primary asset management objective, to manage asset risk and promote long-term network resilience.
- Our approach to the management of our network assets, considering safety, compliance, and risk management.
- Our processes for identifying and prioritising investments.

- Our prioritised RIIO-T3 refurbishment or replacement capital investment proposals and the benefits to network risk reduction.
- Our approach to network resilience, recognising the changing size and scale of our network, and our RIIO-T3 network resilience investment proposals.
- Our approach to becoming world class asset stewards in the RIIO-T3 period.

There are two main types of capital investment undertaken by us on our network:

- Load related investments are initiated by a customer-driven need to connect to the electricity transmission network or are associated with reinforcement of the network to allow increased flows of electricity. The load related investment proposals for RIIO-T3 are covered in the Load Strategy.
- Non-Load investments are associated with ensuring our existing assets are reliable, resilient, and available to perform to the required standards. This is achieved by undertaking the appropriate repair, refurbishment, or replacement intervention at the right time, or investing in initiatives that increase the resilience of our assets, networks and systems to disruptive events. These non-load related investment proposals for RIIO-T3 are covered by this document.

This strategy should be read in conjunction with our Network Operating Cost (NOC) Investment Decision Pack (IDP), which sets out the operational activities we will undertake to maintain network reliability and availability.

1.3. Our Key Drivers

The key drivers for our non-load related interventions, as outlined in our Asset Management Policy[1], are centred around sustainability, regulatory compliance, operational efficiency, and stakeholder value. These key drivers are:

- **Managing network risk –** We will minimise transmission network risk by optimising asset lifecycle activities without compromising safety or performance. We do this by fully integrating risk-based decision-making processes into all asset life cycle management activities, considering factors like safety, environmental impact, cost, and performance. We will prioritise resources on high-risk assets to reduce risks associated with asset failure and safety.
- **Regulatory and statutory compliance –** We will operate within the bounds of our Transmission Licence and other regulatory requirements set by bodies such as Ofgem and the HSE. We have established clear governance and assurance processes to achieve this and allocate resources to address compliance gaps.
- **Sustainable and Responsible Operations –** We will operate in a sustainable and responsible way through environmental stewardship, extensive stakeholder engagement, and delivering value not just for our shareholders but also for society.
- **Total Cost of Ownership and Value Optimisation –** We strive to achieve the best value for all our stakeholders while ensuring the security and performance of our transmission network. This is achieved by integrating load and non-load driven decision-making, optimising asset life cycles activities, understanding whole asset lifecycle cost and stakeholder value, and investing in activities to improve operational efficiencies.
- **Innovation and Technology Adoption –** We are committed to promoting innovation and the use of emerging technologies such as advanced data analytics and predictive maintenance. These technologies help improve asset efficiency, reduce downtime, and enhance overall performance.
- **Workforce Development and Competence –** We recognise the importance of a skilled and competent workforce to achieve our objectives. As such, retaining and developing talent within Transmission is a key in meeting our asset management goals and aspirations.

2. Our Track Record

We are proud of our exceptional track record for strong service and outputs performance that we have delivered for our customers and stakeholders over the past one and half decades. Our approach to sustainability and social responsibility is sector leading.

We have achieved this through effective asset management and by building strong working relationships with our customers, regulators and other stakeholders.

This has enabled us to deliver our primary objective of providing a safe and reliable supply of electricity to our communities. At the same time, we play a strategic role in supporting the delivery of the UK and Scotland's Net Zero targets, adapting to global volatility, and increasing network resilience.

2.1. Our Asset Management Journey

Since 2018, we have transformed our approach to asset management within Transmission because of a clear understanding of the need for change being embraced and supported by our leadership team. In 2018/19, our commitment to embedding asset management at the highest levels of decision-making was galvanised in our T2 Business Plan, with clear links established between asset management activities and our T2 strategic goals.

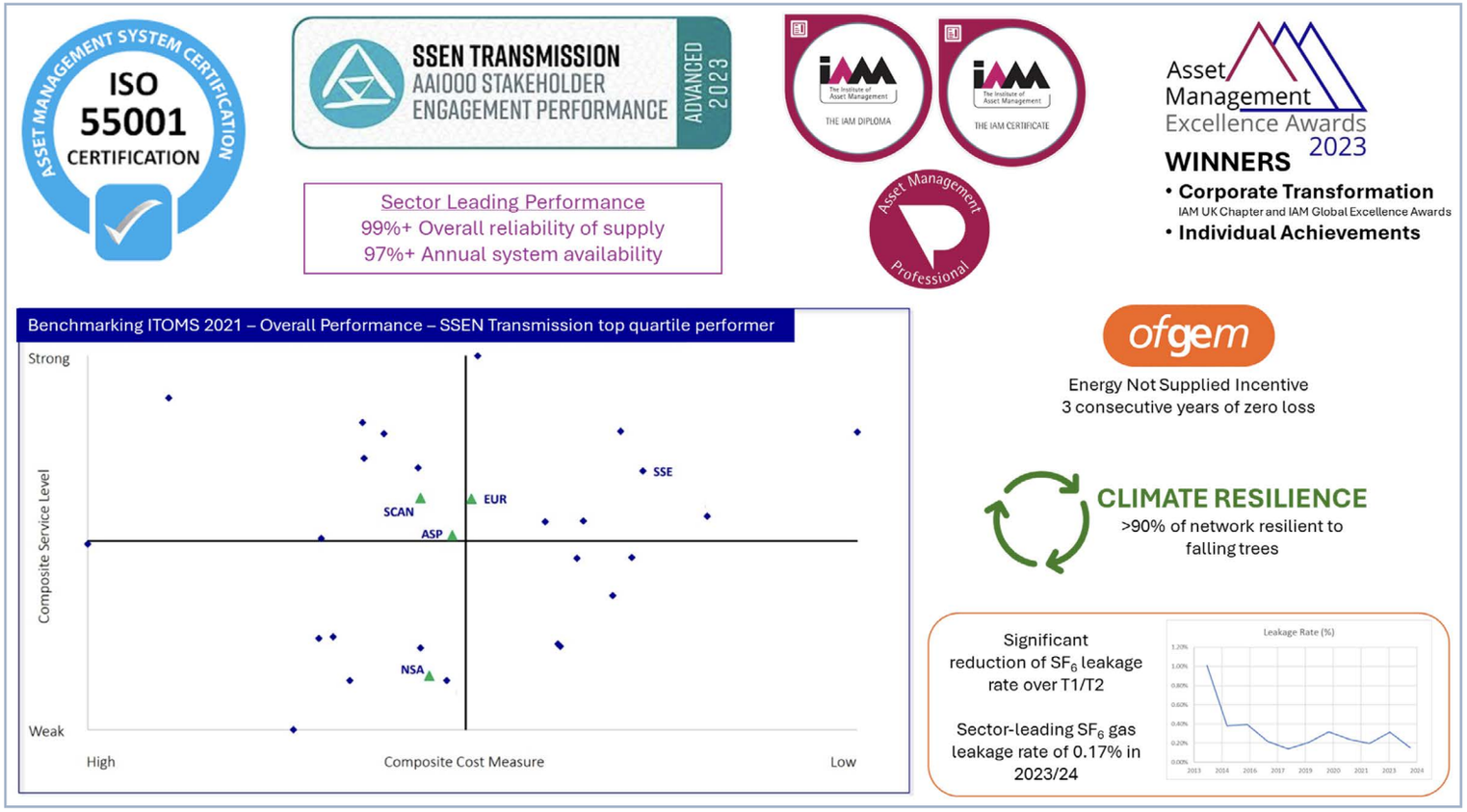
During 2018/19, improvement activities were identified through self-assessment and international benchmarking of asset management capabilities (International Transmission Asset Management Study (ITAMS) and the International Transmission Operations & Maintenance Study (ITOMS)). Delivery of improvement initiatives across the business enabled our certification to ISO55001, the international standard for infrastructure asset management, in 2021.

Following a succession of benchmarking studies and external assurance monitoring in T2, we have developed and are delivering a continual improvement roadmap that has undergone independent analysis by asset management industry experts. This prioritised roadmap aims to improve alignment of our activities across our organisation to achieve the best value from our assets.

Our success at delivering change to date is summarised in Figure 1.

[1] **PO-NET-ENG-501 Asset Management Policy**

Figure 1 Our Asset Management Successes to Date



SSEN Transmission is considered exemplary at developing and delivering asset management transformation. Many other Transmission Operators (TOs) and infrastructure asset owners have sought guidance from our leaders in asset management within Transmission, who both hold the esteemed title of Asset Management Professional, to design and implement their own asset management transformation.

We are committed to our journey of continuous improvement and deliver greater benefit for our stakeholders. To improve our asset management knowledge and capabilities we have sought advice and information from other companies outside of the Transmission sector, rolled out a companywide foundation course in Asset Management, and are delivering Institute of Asset Management (IAM) certificate and diploma training to colleagues across the business.

2.2. Delivering in RIIO-T2

Our ambitious RIIO-T2 plan was built on the strong foundation laid in T1 and our progress in RIIO-T2 is summarised in our State of the Nation Report[2].

Significant headwinds including Brexit, the COVID-19 pandemic, inflation, geopolitical instability, and the global and UK pursuit of net zero targets have resulted in supply chain disruptions and increased material costs[3]. In response we have adjusted our Price Control Deliverables (PCDs) in our T2 plan to manage emergent risks associated with changes to and competition for outage periods, expedited regulatory change and supply chain availability.

We have transformed our business significantly to enable us to deliver net-zero outputs alongside our T2 plan in an efficient, coordinated and timely manner, while remaining focussed on safety. Our plans are kept under review to ensure they remain aligned with customer and consumer interests.

Our modified T2 plan will deliver over 85% of our original T2 risk reduction target (R£8833.36k) alongside emergent investments including Large Onshore Transmission Investment (LOTI), Accelerated Strategic Transmission Investment (ASTI) and Holistic Network Design (HND).

Where projects are deferred from RIIO-T2 into T3 we have proposed to hand back T2 allowances to Ofgem through the Close Out process and make a new request in the T3 delivery plan. We perceive this to be the most transparent option for managing project deferral. The asset risks associated with project deferral are being managed through our operations and maintenance processes.

[2] SSENT RIIO-T2 State of the Nation Report - July 2024
[3] Electric power supply chain resilience | Deloitte Insights

2.3. T2 Non-Load Case Studies

We are making good progress with delivering our T2 non-load capital program with ambitious plans for the next two years. Two T2 projects that have been energised are summarised below as examples of the benefits our investment activities bring to all stakeholders.

2.3.1. Port Ann-Crossaig - Energised June 2023

The Port Ann to Crossaig 132kV overhead line (OHL) was originally built in the 1950s and had reached the end of its operational life. Due to the evolving energy landscape and the whole-life costs of an OHL the decision was made to 'future-proof' the line by replacing the existing 132kV circuits with an OHL, of 275kV capacity. This would enable the line to accommodate future contracted electricity generation. Following energisation, the existing 132kV line would be decommissioned.

This was a T1/T2 crossover scheme with costs and allowances spanning both price controls and is now completed[4]. This scheme is identified as a Top 3 scheme by cost/allowance variance.

During peak construction, around 150 people worked on the new overhead line between Port Ann to Crossaig, with over half-a-million working hours spent delivering the project across SSEN Transmission and its contractors.

Building a project of this size has brought significant benefits to the local economy. Teams across both Phase 1 and 2 of the Inveraray to Crossaig project have contributed significantly to the £7 million spent by SSEN Transmission and their contractors on food and accommodation in the Argyll and Bute Council area since April 2020, including spending around 50,000 nights in local accommodation.

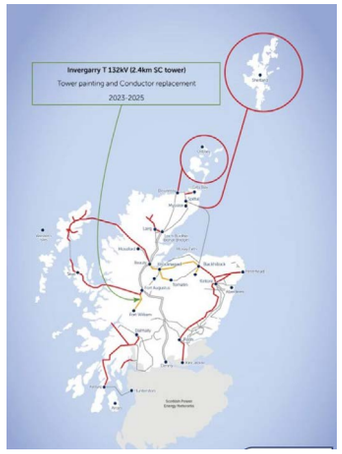
As a stakeholder-led business, the team has worked to keep the community informed throughout the project via monthly community liaison groups to keep stakeholders up to date on progress. The team also carried out various volunteering initiatives to give something back to the area, included projects such as:

- Installing a new sandpit for the outdoor nursery MAKI Pups, run by Argyll and the Isles Coast and Countryside Trust.
- Painting the interior living-space of Ardfenaig Residential Home in Ardrishaig; and,
- Donating high-vis clothing and torches to Tarbert High School to help keep pupils safe on their commute to school during the winter months.

SSEN Transmission committed to replanting over 270 hectares of trees, which were removed during construction. As part of our Biodiversity Net Gain (BNG) commitments we opted to replant with native tree species to support and enhance Scotland's rainforest in Argyll. This was completed in 2023 alongside the leading community and conservation organisation Argyll and the Isles Coast and Countryside Trust (ACT) and Argyll and Bute Council.

Figure 2 Port Ann-Crossaig OHL

Figure 3 Invergarry Tee



2.3.2. Invergarry Tee- Energised July 2023

The Invergarry Tee (FI) circuit was constructed in 1955 and comprised a 2.4km 132kV single circuit suspended on 11 SC PL16 type towers with 150m of 2000mm^2 aluminium underground cable which was installed in 2018. By the end of the RIIO T2 period, this circuit would have been 65 years old, having aged beyond its design life of 40 years and beyond the 54-year industry mean asset service life.

The primary driver for the scheme was asset performance and condition with a secondary driver of network resilience.

This project was to refurbish the line to ensure that the design complied fully with SSEN Design Guidance and British Standard requirements set out in BS EN 50341 part 1 and part 2. This approach ensured that the design was robust for the additional asset life of at least 40 years.

Upon completion, the project delivered the following outputs and benefits during the RIIO T2 period:

- A long-term monetised risk benefit of R£0.4m;
- A reduction of total network risk calculated as R£6.0k;
- Improved operational flexibility and resilience in line with our goal to aim for 100% transmission network reliability for homes and businesses.

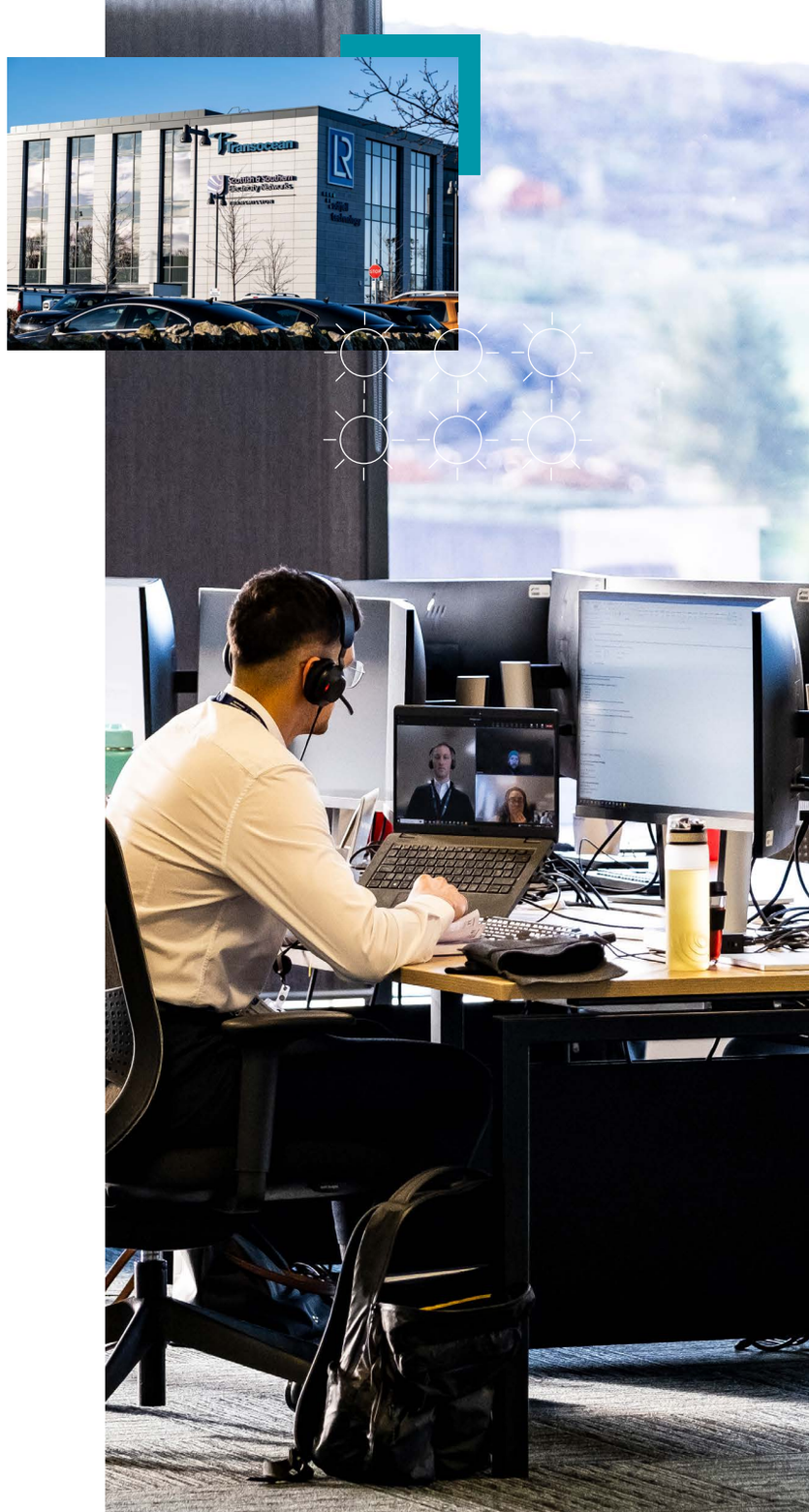
[4] **Inveraray to Crossaig Project**

2.4. Network Resilience Deliverables in RIIO-T2

In RIIO-T2 we proposed a series of investments to improve the resilience of our assets, networks and systems to disruptive events. These PCDs were focussed on the long-term management and security of network assets and improved operational and non-operational facilities (Table 1) to ensure the continued secure operation of the network.

Table 1: RIIO-T2 Operational and Non-Operational Facilities Schemes

Location	T2 Development
Perth Grampian House	Additional 2nd floor office and Transmission Control Centre (TCC) operational space from 2025.
Glasgow Bothwell Street	New office space for Transmission over 3 floors from 2025/26.
Aberdeen Kingswells Prime View	New office space for Transmission went live in 2023 and set to expand in 2025.
Inverness Henderson Road	Ground floor office space goes live September 2024 for ASTI offshore projects. Delivery of a Disaster Recovery site went live in July 2024. Fit-out of remaining first floor to commence in 2025.
Burghmuir Substation	Upgrade and security works to existing to ensure resilience of facility until permanent operational building is built.
Dundee	New purpose-built warehouse facility in 2025 (see Section 2.5.2).
Inverness (Dalcross)	New purpose-built warehouse facility in 2025 (see Section 2.5.2).
Temporary Warehousing	Storage facilities have been given over to projects to support the delivery of new operational infrastructure. Spaces are needed to support operations in the short term.
Dyce Depot	Existing depot with additional Unit leased adjacent to accommodate growth. Fit out of new space will take place in 2025.
Perth Cyber Test Facility	New purpose-built facility went live in 2023 (Grampian House).
Perth Training Centre for Digital Substations (TReNDS) Centre	The existing facility at Braco has been outgrown and a larger space within existing accommodation in Perth is being developed for completion 2025.



2.5. T2 Network Resilience Case Studies

2.5.1. Operations Centre

During the RIIO-T2 period the requirements for our control centre and the associated scope has materially changed in response to UK net zero initiatives and the introduction of LOTI, ASTI and HND regulatory mechanisms fundamentally changing the scale of our business.

Analysis carried out in conjunction with the Electric Power Research Institute (EPRI) assessed the potential number of substations that would be installed by 2032 based upon Future Energy Scenarios (FES), North of Scotland FES and Electricity Ten Year Statement (ETYS) 2023. Across the next 10 years we will need to build 115 new substations taking us to 266 substations in total by 2032. Design, delivery and operation of each new substation will be completed by a member of staff located within the new Operations Centre. As a result, additional workspace and facilities are required for the increase in staff numbers necessary to facilitate this growth.

Due to the changes to the scope of this PCD it was determined that progressing with the original scope would not provide good value for consumers. Therefore, to allow for a revised scope to be designed this project will be developed in T2 with any remaining funds passed back to Ofgem at close-out. Delivery of the project will now take place in T3 with construction funding applied for in the T3 Business Plan.

2.5.2. Dundee and Inverness Warehouses

To manage our Strategic Spares, two warehouses are in construction in RIIO-T2, one in Dundee, the other in Inverness. Each location requires a minimum capacity of 7500m² to achieve meaningful operational and functional requirements.

Both the Dundee and Inverness locations are on course for scheduled completion in August 2025. Significant construction milestones have been achieved including partial completion of the Dundee site transformer hall and commencing the internal fitout at the Inverness site.

Figure 4 Warehouse Development in Dundee

Figure 5 Warehouse Development Near Inverness

By supporting our spares strategy, the construction of these facilities aims to reduce outage periods and risk in the event of an asset failure. For example:

- The availability of a strategic spare circuit breaker and fast mobilisation of the Original Equipment Manufacturer (OEM) and our Operations Team resulted in a circuit at Blackhillock Substation being returned to full service within 6 weeks, rather than the typical 3-to-6-month minimum period. This enabled the Beatrice Windfarm to return to full output within a shorter time frame.

- The failure of a relatively young transformer (<10 years old) at Arbroath Substation was rectified within 8 weeks due to the decision to hold a strategic spare transformer. The Grid Supply Point could have been at risk for 2 to 3 years based on the order time for asset replacement, however the network was returned to full resilience within a much shorter duration.

3. Non-Load Investment Decision Making

To ensure we meet our T3 goal of providing a safe and reliable network we utilise a well-established toolbox approach to identify high risk assets that require intervention based on asset performance (probability of failure) and consequence of failure data. Combined with engineering judgement and embedded within our Investment Decision Making Framework (IDMF; developed during T2) we can justify and assess asset investment proposals based on consistent criteria and against our corporate goals.

Our non-load investment methodology covers the activities required for decision-making that define the non-load capital investment plans for asset risk and resilience interventions. Capital interventions based on asset risk, also

- Lead related assets- These are primary assets that directly influence the performance and operation of the energy network. They are critical to maintaining the core functions and reliability of the network. Examples include transformers, circuit breakers, underground cables and overhead lines including the conductors, fittings and towers. These assets are typically prioritised in maintenance and investment due to their significant impact on network stability and efficiency.

- Non-Lead assets- These are secondary or supporting assets that, while not directly influencing the main operational performance, are still important for the overall functionality and safety of the transmission network. Examples include switches and disconnectors, busbars, instrument transformers, ancillary systems such as batteries, protection and control, telecommunications and smart monitoring systems, civils which includes buildings, fences, bases, bunds, trenches, ducts, drainage. Proper management of non-lead assets is essential to ensure the safe and effective operation and maintenance of the lead assets.

Decision making for non-load core interventions considers the whole life value (costs, risks and benefits) of our assets and the proposed interventions. Recognising the required growth in capacity of the network both non-load and load requirements are considered during the decision-making process to ensure the best value is obtained for consumers and stakeholders.

Capital interventions focussed on asset and network resilience, also referred to as non-load non-core initiatives, are selected to strengthen network resilience and ensure a secure supply. These projects are strategically designed to gain a better understanding of our assets, fortify our infrastructure, minimise vulnerabilities and safeguard the continuity of supply.

3.1. Data Driven Decision Making

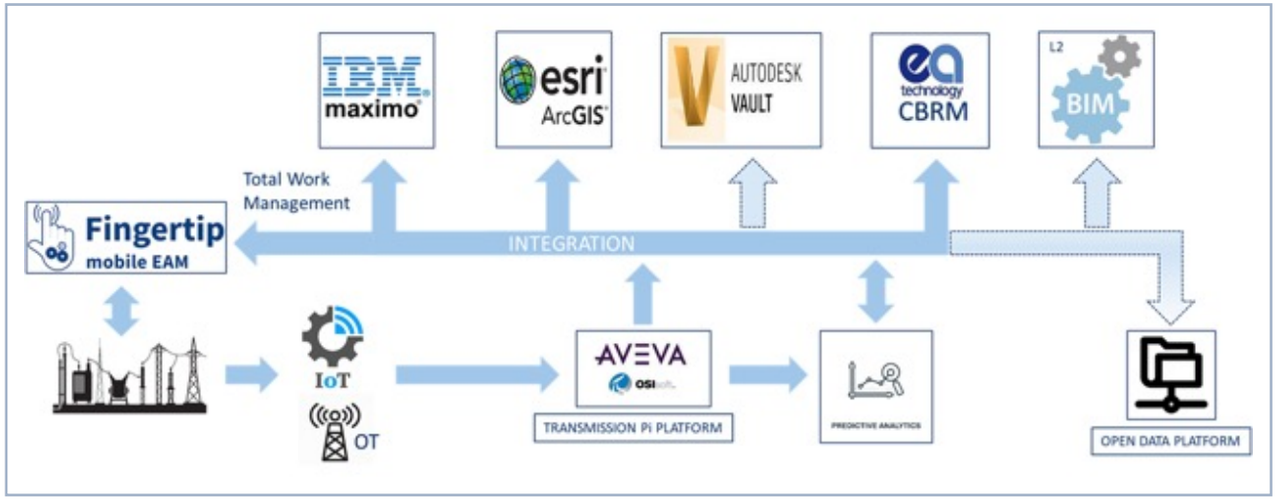
Asset data underpins our non-load investment decision making and over the course of RIIO-T1 and RIIO-T2 we have significantly expanded our asset data collection and management systems to improve data quality and accessibility.

We utilise multiple specialist software products to capture asset information and work is ongoing to migrate asset registration and condition data for all civil and electrical assets into Maximo under our 'Total Work Management' project.

We are also progressing the development of a data platform to enable integration of the software systems to improve data handling, interrogation, scenario modelling and ultimately asset investment optimisation (Figure 6).

This is driven by the need for a holistic view of future investments by creating optimal modelling scenarios that take information from multiple core systems (financial systems, Enterprise Asset Management etc.) and which is aligned with industry best practice.

Figure 6 Our Five-Year Digitalisation Plan to 2026



3.2. The Investment Decision Making Framework

In RIIO-T2 we have developed a common methodology that we apply to our investment proposals. The Investment Decision Making Framework (IDMF) sets out the stages of investment decision making in line with our principles and business goals.

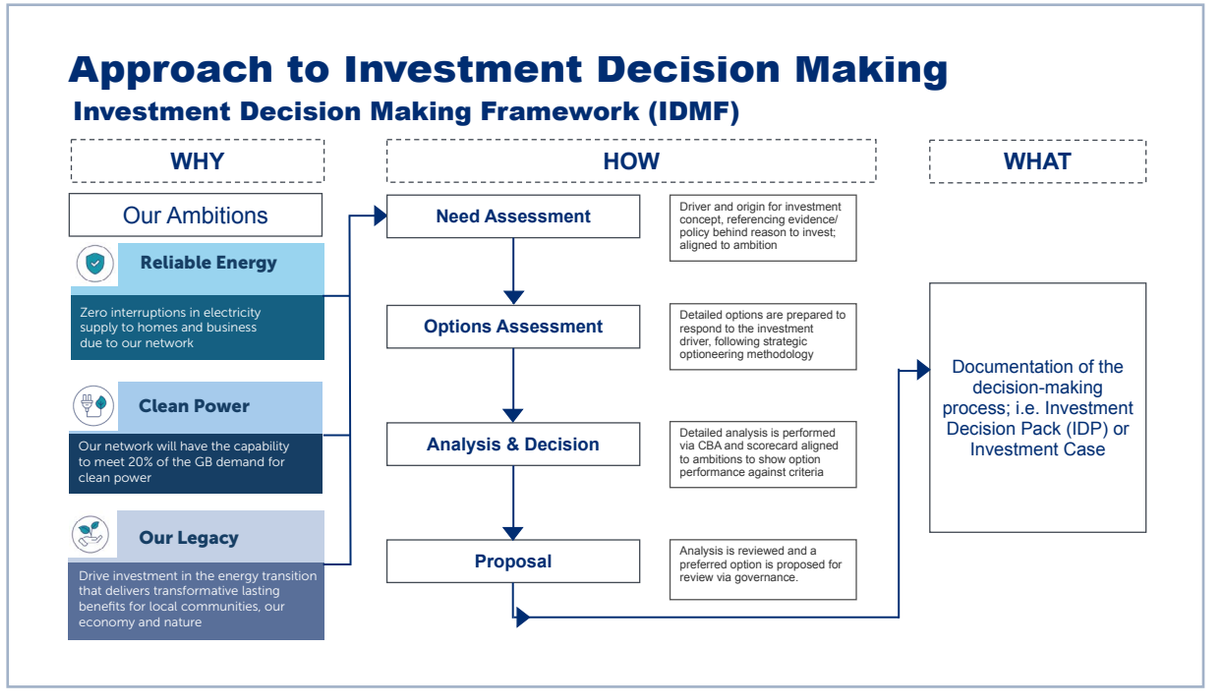
It provides an overarching process, which is followed for all types of investments to ensure that our investment decision-making is undertaken in a consistent manner and is informed by a full set of environmental, social and economic considerations.

It follows four project assessment stages:

- **NEED –** Identification and justification of the need to intervene.
- **OPTIONS –** All viable options are identified for implementing the project relative to a baseline (status quo).
- **ANALYSIS –** A detailed economic and strategic analysis is performed for all shortlisted options.
- **REVIEW / DECISION –** Evidence collected during the previous three stages is collated and provided to decision makers for review.

The IDMF (Figure 7) brings together multiple methodologies that exist within the business under the one process to ensure consistency and alignment of decision making. Whilst many of our investments may be driven by a single investment driver (e.g. Non-Load or Load), some of our investments have multiple drivers and consideration needs to be given to multiple aspects in determining the most efficient and coordinated investment solution. This means that our IDMF takes a whole-system approach to ensure that all drivers and factors are considered as part of the decision-making process. The outcome from the IDMF process is contained within the Investment Decision Packs (IDPs) associated with each of our investment proposals.

Figure 7 Investment Decision Making Framework



3.3. Non-Load Need Identification & Network Asset Risk Metric

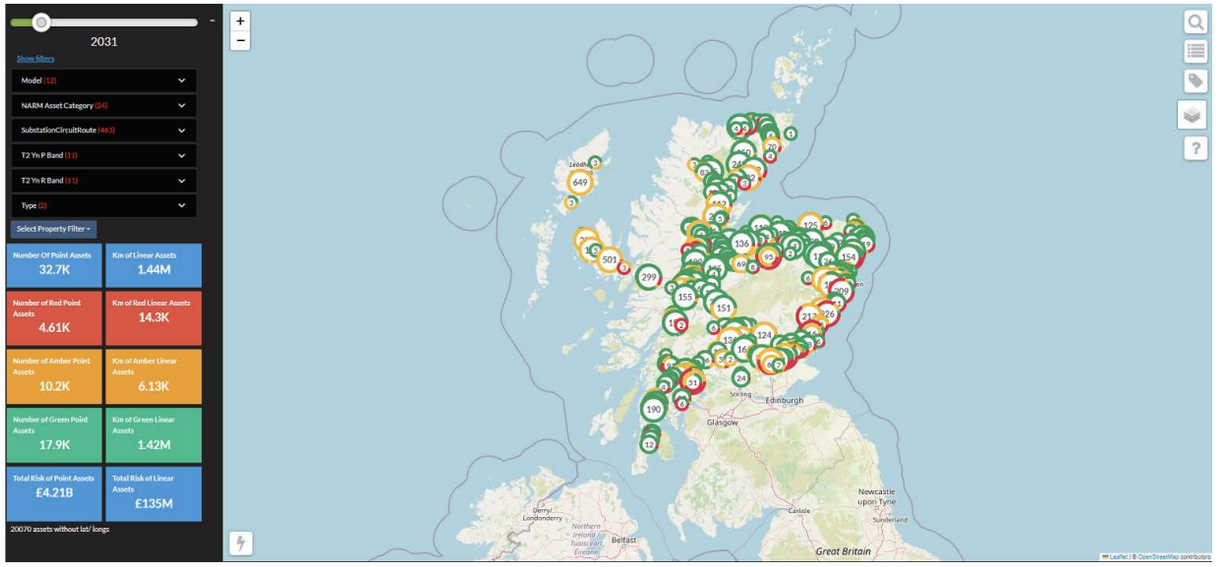
Our Invest tool (Figure 8) has been developed to identify high risk assets that require intervention. Invest incorporates the electrical transmission industry, Ofgem regulated methodology known as the Network Asset Risk Metric (NARM[5]) and takes asset performance information from multiple data sources to generate individual asset risk scores (NARM value).

NARM is defined as the relative reduction of long-term monetised network asset risk. It is used to justify the funding for, and to set the outputs and allowances of, asset management activities on our lead assets by considering the probability and impact of an asset failing. Consequently, NARM ensures that the risk to consumers of asset failure is maintained within reasonable bounds.

The output of this risk-based analysis process is a series of data tables that identify the highest risk lead assets in each asset class (transformers, circuit breakers, underground cables and overhead lines), prioritised by their monetised risk or NARM value. This enables projections to be made into the future to assess the status of the network, and where highest risks are likely to be located with the current interventions proposed.

Although NARM considers only lead assets, our planning process considers the condition of all associated non-lead assets at the same site as part of our rigorous approach to delivering cost-effective, risk-based interventions that deliver the best value to consumers.

Figure 8 Invest Dashboard, Reflecting Network Scores Without Interventions



As part of our T2 strategy we are extending the NARM principles to our non-lead assets by bringing non-lead asset data into the Invest platform. This work will be completed by the end of 2025.

For T3 planning however, we have utilised asset condition data from our Cyberhawk database to produce Asset Condition Reports (ACRs) for our non-lead assets in the poorest condition, as we do for our lead assets identified through Invest. This process is in line with our policies and industry best practice. In some instances, non-lead asset interventions are combined with those on lead assets to deliver a safe, efficient & cost-effective work packs.

[5] **NARM Handbook v3.1**

3.4. Options Appraisal

Both Long-Term Monetised Risk Benefit (LTRB) and Cost Benefit Analysis (CBA) are used to appraise viable options to address the need for intervention. These analysis methods help to assess the financial risks associated with various intervention options to facilitate informed decision making for non-load related investment plans.

3.4.1. Long-Term Monetised Risk Benefit (LTRB)

For each proposed non-load intervention, we calculate the LTRB. The LTRB is the relative measure of Monetised Risk reduction (R£) achieved through asset interventions and measured over a defined period, considering the anticipated deterioration of assets over time.

This integrated process helps to assess the financial risks associated with various assets, facilitating informed decision making for non-load related investment strategies.

However, due to our rapidly expanding network and the nuances between TO networks, the LTRB technique can create spurious outputs that skew appraisals and decision making. Therefore, judgement by our Asset Risk and Investment professionals is incorporated at this stage.

3.4.2. Cost Benefit Analysis (CBA)

Where multiple intervention options are viable, each undergo a CBA to help determine the most appropriate intervention. The CBA considers the cost of the intervention, LTRB, and other benefits such as carbon footprint.

3.5. Non-Load Capital Investment Plan

The needs assessment, options appraisal and analysis, preferred option scope and financial information are combined to form site or asset specific Investment Decision Packs (IDPs) to address asset risk. Network resilience projects are similarly detailed in Investment Decision Packs (IDPs).

3.6. Non-Operational Property Site Selection and Acquisition

The approach taken for our Non-Operational Properties is driven by the following key variables:

- Proximity to Resources - Ease of access to people, utilities, data connections, and transportation infrastructure will inform our decision making.
- Proximity to Infrastructure - Quick delivery of spares, staff response times and good transportation links to ensure resilience of infrastructure will be key factors.
- Availability - Fit for purpose available stock, cost of alteration, refurbishment or new build options shall be considered alongside delivery timescales to ensure end user needs are met.
- Consents - Requirements for regulatory consents e.g. Planning, Building Regulations and Environmental shall inform risk analysis and the critical path for delivery.
- Environmental Impact - We will consider environmental impact and sustainability factors when acquiring property.

We also ensure appropriate forecasting and analysis is conducted to ensure resilience across the network:

- Demand Forecasting - We analyse current usage, liaise with the Human Resources workforce planning team, track lease dates, and assess the impact of technological advancements and working practices on our property. We will work closely with the ASTI teams to manage the non-operational property portfolio making sure new properties are introduced seamlessly.

- Infrastructure Analysis - We work with stakeholders to identify future property needs, gaps or opportunities resulting from new operational infrastructure and technological advancements. Our aim is to plan at least one price control period ahead so that pre-construction funding can be identified in advance of the price control period in which the project is to be delivered.

- Continuous Improvement - We regularly review our approach with stakeholders and end users to improve our approach and obtain feedback on the quality and suitability of the properties that they use.

4. Our T3 Network Risk Investment Proposals

Using our rigorous internal and industry best-practice processes to identify intervention as outlined above the following section summarises our network risk and replacement priorities for the RIIO-T3 period. This includes our views on the overall risk at start of the price control period, and the end of the price control period with and without asset interventions. This section is supported by

- The NARM Workbook which sets out the asset risk across our portfolio of assets. The Workbook sets out the Baseline Network Risk Outputs (BNRO) that we are required to deliver by the end of the price-control period. This includes a breakdown of the Baseline Funding and Unit Cost of Risk Benefit (UCRBL) at each Risk Sub-Category level.

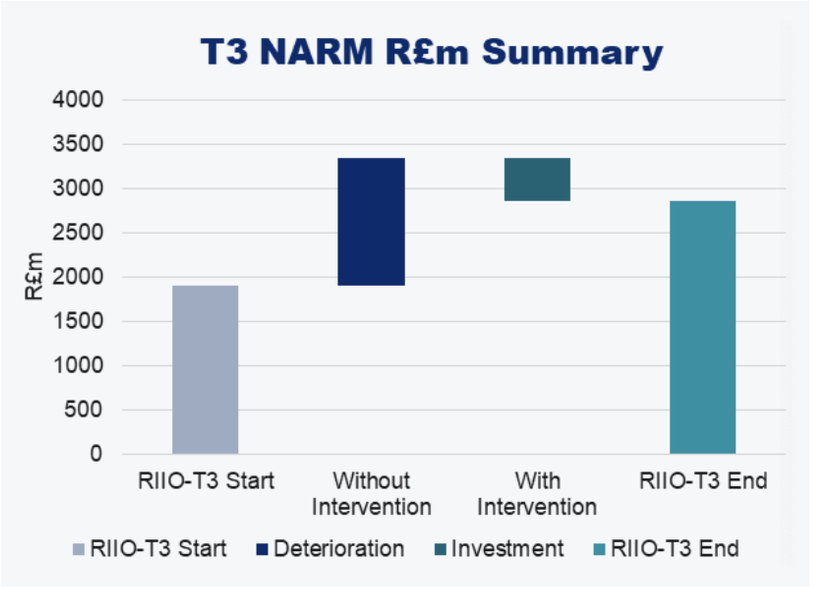
- Investment Decision Packs for each of the individual investment proposals, which give further details on asset condition and contain the outputs from asset condition report and IDMF methodologies detailed in Section 3.

4.1. RIIO-T3 NARM Performance

In the RIIO-T3 period we are proposing targets, as shown in Figure 9. We aim to deliver:

- A long-term monetized risk benefit of R£1420.9m,
- A reduction of network risk calculated as R£484.5m;

Figure 9 RIIO-T3 NARM Summary



In our view the 'without intervention' risk increasing across the T3 period is a function of the NARM methodology. This is not a real increase in risk as seen by consumers. The risk profile is a function of the network topology, customer numbers and calibration and weighting of network components. A broad doubling of real-world risk is not a credible proposition in 5 years.

The 'with intervention' risk reduction is notably limited by some non-load interventions, predominantly overhead line programmes, being incorporated into Load Related Expenditure (LRE) due to the significant interactions with generation and the future connection queues. The exclusivity between Load Related and the NARM funding mechanisms, a Section Specific Methodology Decision, means that shared driver projects (load and non-load drivers) are removed from the NARM framework. This is reflected in the Table 2 detailing asset risk movements. Table 2 has taken values from the T3 NARM BPDT N2.1_Network_Risk_Summary tab which includes A1, A2 and A3 interventions.

Table 2: RIIO-T3 Asset Risk Movements

Asset Category	RIIO-T3 Start (R£m)	RIIO-T3 End - Without Intervention	RIIO-T3 End - With Intervention
132kV Circuit Breaker	468.95	826.66	518.50
132kV Transformer	104.55	206.70	180.72
132kV Reactor	0.72	1.01	1.01
132kV Underground Cable	2.26	3.29	0.58
132kV OHL Conductor	337.63	583.07	580.07
132kV OHL Fittings	309.42	588.72	583.97
132kV OHL Tower	339.61	526.65	523.49
275kV Circuit Breaker	174.89	340.46	277.83
275kV Transformer	24.18	43.11	38.03
275kV Reactor	2.59	4.59	4.59
275kV Underground Cable	0.56	0.96	0.01
275kV OHL Conductor	10.90	15.27	12.34
275kV OHL Fittings	21.92	40.04	37.48
275kV OHL Tower	64.92	100.63	38.05
400kV Circuit Breaker	8.42	8.97	8.97
400kV Transformer	3.97	5.51	5.51
400kV Reactor	1.59	2.56	2.56
400kV Underground Cable	0.00	0.00	0.00
400kV OHL Conductor	1.12	1.15	1.15
400kV OHL Fittings	1.61	2.55	2.55
400kV OHL Tower	22.65	32.41	32.41
TOTAL R£	**R£1902.49m**	**R£3334.30m**	**R£2849.80m**

4.2. RIIO-T3 IDPs with NARM Outputs

Table 3 sets out the Investment Decision Packs which have been developed for each non-load investment proposal over £25m with a brief description, Long-Term Risk Benefit, and network risk reduction.

Table 3: RIIO-T3 Non-Load IDPs (>£25m) With NARM Outputs

Scheme Name	Ofgem / Internal Ref.	Description	LTRB (R£m)	Risk Red. (R£m)
Dunoon Substation	SHNLT2166 / T3BP-EJP-005	A full offline build comprising of two 132/33kV GSP bays on a new platform adjacent to the existing Dunoon Substation.	41.5	2.1
Elgin Substation	SHNLT2167 / T3BP-EJP-006	Offline replacement of the Elgin Substation including replacement of GT1 and GT2 (132kV 90MVA).	53.1	1.2
Willowdale - Clayhills Substation	SHNLT2169 / T3BP-EJP-003	An offline extension at Willowdale Substation due to significant space limitations at Clayhills site and expected increase of load growth.	197.4	21.3
Orrin Substation	SHNLT2168 / T3BP-EJP-015	Offline build near existing Orrin Substation including GT1 132/11kV and associated ancillary equipment and switchgear.	29.5	1.2
Sloy Power Station	SHNLT204 / T3BP-EJP-020	Full offline build of the 132/11kV Grid Supply and Entry Point including replacements for GT1-4 and associated switchgear and ancillary equipment.	81.8	2.8
Foyers Power station	SHNLT2017 / T3BP-EJP-009	In-situ replacement of the 2 275/18kV GTs and the replacement of the single oil filled 275kV cable circuit between the generation site and Foyers.	126.7	17.5
Kintore - Dyce OHL Reconductoring	SHNLT2154 / T3BP-EJP-012	Replacement of existing BEAR phase conductor with UPAS AAAC conductor on the XPN circuit only; strengthen steelwork and foundation upgrades to accommodate the increased conductor size.	603.0	3.7
Craigiebuckler - Woodhill Underground Cable Replacement	SHNLT2165 / T3BP-EJP-001	Replacement of oil-filled CW1/CW3 UGC with modern XLPE equivalent.	197.4	21.3
Peterhead Circuit Breaker Replacement	SHNLT2163 / T3BP-EJP-017	Replacement of circuit breakers, earth switchers, wall mounted through wall bushings and transformers (CT and CVT).	384.9	328.0
Kilmorack Substation	SHNLT2129 / T3BP-EJP-056	Offline build of a new 132kV indoor substation near existing site. To include 1 GT bay with associated switchgear and ancillary equipment.	18.3	0.7
Aigas Substation	SHNLT207 / T3BP-EJP-058	Offline build of a new 132kV substation near existing site. To include 1 no. GT bay with associated switchgear and ancillary equipment.	20.6	0.8
Whistlefield – Dunoon OHL Reconductoring	T3BP-EJP-059	Rebuild an existing 132kV OHL with L7 Steel lattice towers and Upas AAAC conductor to meet the minimum rating requirement.	235.3	2.1

5. Our T3 Network Resilience Investment Proposals

We have demonstrated a strong history of delivering sustained improvements in network resilience which will continue throughout the RIIO-T3 period. Our annual network availability for the past 5 years has consistently been above 97% with winter peak system availability over 98%[6].

To ensure network resilience, we will be making cost-effective investments to support our growing and complex asset base, as well as ensuring the right investments are made across our Non-Operational Property base. The Network Resilience projects, proposed within our RIIO-T3 Business Plan, are the output of a rigorous development process and network performance information as the driver to undertake activities. Our approach to risk-based interventions also delivers increased network resilience.

The following areas of focus have been identified as key drivers for our investments:

Figure 10 RIIO-T3 Key Network Resilience Investment Drivers

[6] System Performance Reports | ESO (nationalgrideso.com)

5.1. RIIO-T3 BJPs with Resilience Outputs

Table 4: RIIO-T3 Network Resilience Business Justification Papers

Scheme Name	Ofgem / Internal Reference	Description
RAAC Intervention	SHT20550 / T3BP-EJP-023SHT20573 / T3BP-EJP-037	Removal of all Reinforced autoclaved aerated concrete (RACC) from roofing across the network which is beyond end-of-life. This will remove RAAC from our network.
Refurb and replacement of Substation Earth Mats	SHT20551 / T3BP-EJP-024	Refurbishment and replacement of Substation Earth Mats to ensure they continue to be safe and functional and are compliant with updated industry standards. 30 priority sites in T3.
Operational Security	SHT20552 / T3BP-EJP-025	16 sites that have aging or near obsolescent Intruder Detection Systems with an additional 12 sites requiring upgrade to CCTV systems and 4 additional sites requiring both. This will increase our physical site security in line with our strategic goals and themes for energy security and our ongoing commitments to ESQR.
GIS Refurbishment	SHT20553/ T3BP-EJP-026	Due to higher than anticipated IIG leakage on 6 existing GIS installations protective coating, full refurbishment or partial replacement will be deployed to prevent future leakage, improve carbon emissions performance and enhance performance levels.
Overhead Line Circuits Painting	SHT20555 / T3BP-EJP-028	Following condition-based analysis approximately 30% of our 132kV OHL towers have a condition score of 3 and 4 (poor). Maintaining a suitable protection to our tower steelwork through a planned painting regime will prevent the need to replace steelwork before it degrades to an unrecoverable level. This is the optimal delivery plan for RIIO-T3 to manage the deteriorating condition of our 3 and 4 condition score tower steelwork.
HVDC Station Control and Monitoring (SCM) System Upgrade	SHT20556 / T3BP-EJP-029	Upgrade of 5 Station Control and Monitoring (SCM) Systems at HVDC sites to ensure security and reliability of Critical National Infrastructure.
HVDC User Interface (UI) Upgrade	SHT20557 / T3BP-EJP-030	This proposal seeks to upgrade the user interface of our control systems at the Caithness Moray Shetland (CMS) multi terminal HVDC system to enhance our HVDC operations and maintenance capability and efficiency and improve our response to faults.
HVDC Autonomous Robot and Thermal Camera	SHT20558 / T3BP-EJP-031	HVDC converter station valve and DC halls are inaccessible to personnel during operation due to the generation of strong electromagnetic fields (EMF). We propose to use innovative condition monitoring technologies to gain a detailed understanding of the health of these critical assets during operation to inform our inspection and maintenance strategies, increase availability and reduce the risk of forced outages.
HVDC Cable Monitoring System	SHT20559 / T3BP-EJP-032	To enable us to identify hotspots, anchor strikes or dredging in the vicinity of the Caithness Moray Shetland (CMS) High Voltage Direct Current (HVDC) Link and provide data on cable burial and surrounding environment we propose to install a Cable Monitoring System, a real-time monitoring solution based on distributed temperature and acoustic sensors.

Scheme Name	Ofgem / Internal Reference	Description
HVDC Centre Upgrade	SHT20560 / T3BP-EJP-033	With a burgeoning demand for its services, reflected in a growing HVDC project pipeline, The National HVDC Centre underwent expansion, completing an extension to its building in 2022/23. Further expansion is driven by the imperative to cater to approximately 40 upcoming HVDC projects in Great Britain within the next decade, as well as Ofgem's identification of 7 HVDC-related projects in its investment strategy.
Flood Mitigation	SHT20561 / T3BP-EJP-034	To ensure the resilience of our network to a changing climate flood mitigation works will be carried out at 9 substations and basement sealing works at 55 Substations.
Integrated Condition Performance Monitoring	SHT20564 / T3BP-EJP-035	This T2 follow on project will install additional condition monitoring equipment on our assets to improve the evidence we gather to support and underpin our decision-making processes during asset maintenance and life cycle interventions, maximise the value of Condition Monitoring for all assets though both fixed and portable monitoring equipment and solutions, and further develop our data storage and analytical capabilities along with a structured escalation approach to address any abnormal measurements or observations identified on our assets.
Protection Refurbishment/Replacement and Modernisation	SHT20570 / T3BP-EJP-036	Replace 53 protection assets on a like-for-like basis and 25 protection schemes where multiple assets within a given scheme have been identified for replacement. This will help manage asset obsolescence and reduce network risk
The Transmission Operations Campus (TOC)	SHT20573 / T3BP-EJP-037	A new operational campus to provide the capability for SSEN Transmission to deliver net zero and UK energy policy. This includes a new Transmission Control Centre (TCC), this is a vital component of SSEN Transmission operations and acts to plan, monitor and control the North of Scotland Electricity Transmission System.
Strategic Spares	SHT20565 / T3BP-EJP-038	Follow on from T2. Enhancing our strategic spares due to; Increased network growth, new technology types, environmental impact, industry lead times, and availability.
EV Chargers	SHT20566 / T3BP-EJP-039	Installation of 28 electric vehicle chargers across 14 sites to further enhance our EV charging network. This will support us in our ambition converting our operational fleet to electric vehicles, aligning with the global EV100 initiative's goal of making electric vehicles the new standard.
Transmission Substation SCADA Replacement	SHT20568 / T3BP-EJP-041	To maintain operational integrity 69 number Schneider RTUs identified as reaching end of life during the T3 period will be replaced along with the replacement of 14 legacy RTUs and HMIs at 9 sites.
Transmission Operational Depots	SHT20562 / T3BP-EJP-043	This project will successfully deliver six new operational depots facilities, in the RIIO-T3 period, within the North of Scotland including the islands which will significantly improve operational resilience and support our operational staff.
System Monitoring Modernisation Project	SHT20571 / T3BP-EJP-044	All System Monitoring assets approaching end-of-life, are obsolete, or where spares holding is low, will be replaced to maintain operational integrity beyond the T3 period.
Transmission Training School	SHT20563 / T3BP-EJP-046	A new purpose-built facility to deliver comprehensive training programmes producing skilled staff authorised to work on our network assets and trained in health and safety protocols. With future transmission network growth, increasing staff numbers and evolving technology, it will be a hub for all employees fostering a culture of continuous learning and development.

6. Stakeholder Engagement

We have established strong, long-term, collaborative relationships with advisory, expert, external and internal stakeholder groups to iteratively improve our asset management activities. These stakeholder led improvements are reflected in successive governance, policy, strategy, and process revisions, and ensure our activities continue to meet stakeholder requirements and deliver our corporate and asset management objectives.

Our T3 Plan reflects our increased asset management maturity, learnings from T2 activities and extensive stakeholder engagement, and enhanced operational efficiencies through technological and operating model improvements.

A summary of stakeholder engagement undertaken during the development of our T3 non-load investment plan can be found within the Stakeholder Decision Log.

7. Becoming World Class in Asset Management

We continually strive to improve our asset management activities in Transmission to deliver best value for our stakeholders. Our aim is to become 'world class' in asset management within T3. Based on benchmarked maturity assessments, we will be considered as 'world class' on achieving top-quartile performance in the International Transmission Asset Management Study (ITAMS).

Our continued participation in international benchmarking studies, internal gap-analysis and internal and external assurance activities enable us to identify areas for improvement. These improvement activities will be prioritised based on those that are most aligned with our core values and those which provide best stakeholder value.

We are embedding asset management principles across all business areas, ensuring that asset management excellence is a key driver of corporate culture and decision-making. We are defining key performance indicators (KPIs) for asset management that focus on risk reduction, innovation, efficiency, sustainability, whole-life cost, and stakeholder value.

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