

Operational Strategic Spares Justification Paper



Operational Strategic Spares Justification Paper**1. Executive Summary**

This Justification paper sets out the need for improved Strategic Spares over the RIIO-T2 period and beyond. SHE Transmission require to address the current network risks of the current spares holdings and drive the changes needed to enhance network resilience through the reliability, availability and maintainability of a strategic spares inventory.

SHE Transmission also has a license obligation to commit non-load related expenditure to invest in our existing assets to maintain network security. SHE Transmission also has a statutory duty under the Electricity Supply Quality and Continuity (2002) Regulations to maintain a fit for purpose electricity transmission network, which includes all legislation pertaining to the system.

To support these obligation's, SHE-Transmission has outlined the following deliverables for this approach;

- Procure Strategic Spares as listed below.
- Develop a two-warehouse solution at two independent locations complete with in-house logistics support. Related costs for this project are contained within the warehouse submission paper and not part of the costs herein
- Implementation of an Inventory Management System (IMS). Note that while the IMS is integral to this work and is discussed throughout this paper, related costs for this aspect of the project are contained within our IT submission and not part of the costs herein.

The cost to deliver the above option stands at £11.82M. This cost is based on a spares risk analysis and current cost rates for similar material that would be procured during the RIIO-T2 price control if required.

Upon project delivery there are several benefits relating to the RIIO-T2 business goals which have been listed below:

- Spare strategic spares will be available to support operational activities and if required assist load and non-load projects for any emergency need.
- Storing materials in the appropriate conditions at the correct sites increase operational life cycle and increase efficiency in accordance to SHE-T's goal of "£100 million in efficiency" as outlined in the "Network for Net Zero" Business plan.
- Implementation of the IMS will allow greater accuracy and tracking of spare assets in use which also contributes to operational efficiency outlined in the above goal.

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Name of Scheme/Programme	Strategic Spares
Primary Investment Driver	Resilience
Scheme reference/mechanism or category	SHNLT2046
Output references/type	Spares
Cost	£11.82 Million
Delivery Year	2021-26
Reporting Table	BPDT C2.11
Outputs included in RIIO T1 Business Plan	None

Section 2: Introduction

This Engineering Justification Paper sets out our plans to enhance the Operational Strategic Spares during the RIIO-T2 period (April 2021 to March 2026).

The Engineering Justification Paper is structured as follows:

Section 3: Need

This section provides an explanation of the need for the planned works. It provides evidence of the primary and, where applicable, secondary drivers for undertaking the planned works. Where appropriate it provides background information and/or process outputs that generate or support the “need”.

Section 4: Optioneering

This section presents all the options considered to address the “need” that is described in Section 3. Each option considered here is either discounted at this Optioneering stage with supporting reasoning provided or is taken forward for Detailed Analysis in Section 5.

Operational Spares Justification Paper**Section 5: Detailed Analysis**

This section considers in more detail each of the options taken forward from the Optioneering section. Where appropriate the results of Cost Benefit Analysis are discussed and together with supporting objective and engineering judgement contribute toward the identification of a selected option. The section continues by setting out the costs for the selected option.

Section 6: Conclusion

This section provides summary detail of the selected option. It sets out the scope and outputs, costs and timing of investment and where applicable other key supporting information.

Section 7: Price Control Deliverables and Ring Fencing

This section provides a view of whether the proposed scheme should be ring-fenced or subject to other funding mechanisms.

Section 8: Outputs included in RIIO-T1 Business Plan

This section identifies if some or all the outputs were included in the RIIO-T1 Business Plan and provides explanation and justification as to why such outputs are planned to be undertaken in the RIIO-T2 period.

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2. Introduction

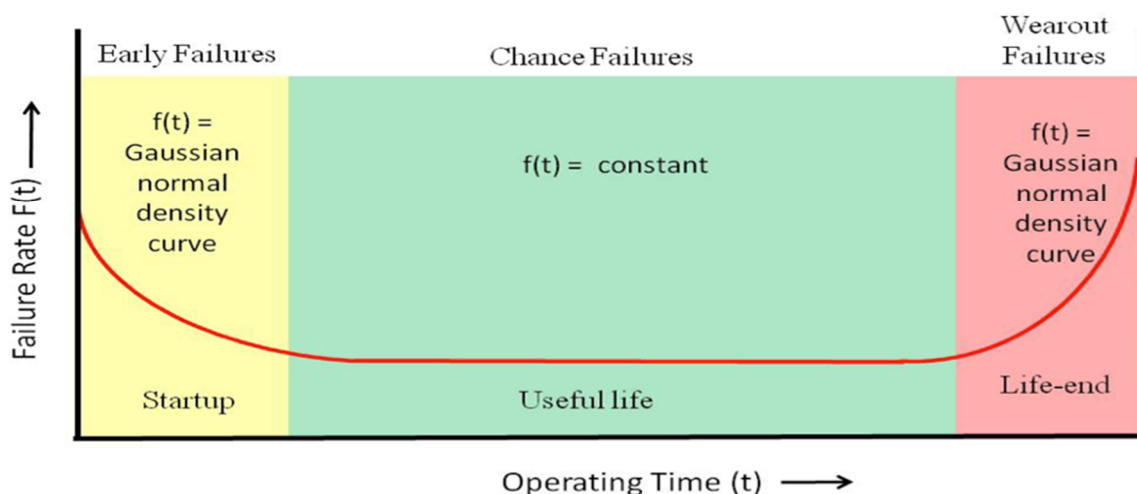
This Justification Paper sets out our plans for an enhanced operational strategic spares approach during the RIIO-T2 period and beyond. In addition, the paper describes the activities that will increase efficiency and enhance our spare material management.

Where appropriate, this paper lists spares which have a long lead time from the original equipment manufacturers and therefore increase risk to the network due to their previous unavailability. However, due to the challenge of forecasting spares consumption and the lack of data it is difficult to predict both spares consumption and equipment reliability. This paper requests that SHE Transmission is allocated sufficient additional budget to allow for flexibility to procure lower cost spares. In order to support operational activities, we will establish re-order quantities to ensure costs are minimised.

Along with the need for additional targeted spares, it is projected that several current assets will become available during the completion of load related projects in the RIIO-T2 period. To minimise wastage, SHE Transmission will review the age and condition of these assets and where appropriate will refurbish and recover to be held as strategic spares. This approach is in alignment with our sustainability plans within the SHE Transmission RIIO-T2 business plan.

This paper has also taken into consideration that the installation of new equipment and technologies introduce a risk similar to risks of aging assets. The established “bathtub” chart below supports this assumption that new plant and older equipment have similar risks.

The Normal Bathtub Curve
Expected Failure Rate



Operational Spares Justification Paper**3. Need**

SHE Transmission require to address the limitations of the current spares support and to drive the improvements needed to enhance network reliability by the ensuring that the correct inventory is held and controlled. This will not only allow the implementation of Statutory and Regulatory obligations but will support the SHE Transmission's RIIO-T2 goals.

This justification paper provides the basis for these improvements required for the Transmission business, along with the costs to support a safe and secure network and to support Transmission Asset Management & Operations in the future.

3.1 Network Growth

The UK Electricity Supply Industry has changed dramatically in recent years with the loss of conventional thermal power stations, and the growth of renewables as the country looks to decarbonise. This is apparent in the North of Scotland where natural resources for renewables are available which can be connected to the Scottish Hydro Electric Transmission (SHE Transmission) network. Transmission asset value have grown during the RIIO-T1 price control period from 3.3GW in 2013 to a projected 6.7GW by 2021. As a result, the SHE Transmission network has also undergone significant transformation in recent years. At the beginning of RIIO-T1, the high voltage network was primarily 132kV with a skeleton 275kV network. Our high voltage network now operates at 132kV, 275kV and 400kV as well as HVDC. This coincides with an increasing reliance on electricity, a trend which is likely to increase as we further electrify to decarbonise and meet increased customer expectations.

3.2 New Technology Types

As stated above the SHE Transmission network has been transformed significantly. At the commencement of the RIIO-T1 period the network was primarily of a 132/275kV Air Insulated Switchgear (AIS) design which has changed to a significantly more complex design of 132/275/400kV AIS and Gas Insulated Switchgear (GIS). With this growth the physical assets have increased significantly, which now include HVDC, 220kV subsea cables, 275 & 400kV Gas Insulated Switchgear and specialised equipment such as Static Var Compensators and Statcoms that help control the network. These significant changes to the network are not solely limited to substations and cable technology. Innovative overhead line designs have been adopted with the NeSTS project due for completion in 2021. This will introduce new steel pole designs and various new conductor types to the network.

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3.3 Industry Lead Times and Availability

A significant risk that SHE Transmission must currently manage is exposure to manufacturers' lead times. Due to the relative low volume from a manufacturing perspective, Original Equipment Manufacturers (OEMs) do not hold significant stocks of spares. If a failure occurs, lead times can vary from several days to years dependent on the spare type required and from where it is being manufactured. It should be noted that a significant amount of our strategic assets such as transformers, switchgear and cables are now manufactured outside of the UK and are manufactured to order.

Whilst SHE Transmission complies with the Security and Quality of Supply Standard (SQSS) and the network is designed to take asset failures into account, with lead times being significant, this can lead to additional risks on the remainder of the network. A risk-based approach has been taken to determine the type and quantity of transformers required.

4. Optioneering

This section presents all the options considered to address the "need" that is described in Section 3. Each option considered here is either discounted at this Optioneering stage with supporting reasoning provided or is taken forward for Detailed Analysis in Section 5.

When reviewing our options in this area, we produced a three-tier approach to our development in addition to a "Do Nothing" option:

- **Minimum Requirements**
 - The bare minimum required to "keep the lights on" & maintain legal/regulatory compliance
- **Responsible Operator**
 - A more resilient network for longer term customer benefit
- **Progressive Network Enabler**
 - An adaptable, sustainable and flexible network providing enhanced value to current and future customers

1. Do Nothing

The option to "Do Nothing" would require no intervention during RIIO-T2. However, the following concerns remain unaddressed:

- Without the strategic spares it increases the network risk significantly in the event of an asset failure.

On this basis, this option has not been progressed to detailed analysis.

NOT PROGRESSED

2. Minimum Requirements

The Minimum Requirements approach for Operational Spares involves the procurement of the listed Transformers and having the funding available

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On this basis, this option has been progressed to detailed analysis.

PROCESSED

5. Detailed Analysis

The table below lists the current units that are estimated to be required including the quantity and costs, where highlighted SHE Transmission requests the necessary investment for transformers so to help preserve the security of supply whilst reducing the network risk.

Asset Type	Cost	Units in Service	Order Qty	Comments
275-132kV 240MVA	£1,579,673	16	1	T2 Requirement – Cost listed based on most cost-effective supplier – To be purchased in 2022
275-33kV 120MVA	£993,543	9	1	T2 Requirement – Cost listed based on most cost-effective supplier – To be purchased in 2022
132-33kV 60MVA	£617,928	41	1	T2 Requirement – Cost listed based on most cost-effective supplier – To be purchased in 2022

It is envisaged that any strategic spare consumed in RIIO-T2 period will be replaced with a new spare ordered against the contingency project.

To help maintain our network the following table shows a mix of assets that will require spares support in the RIIO-T2 period, along with the associated costs. Exact quantities, and costs are dependent on the nature of the failure mode and when it occurs. The requirement is based on engineering judgement and experience. Should these outputs not be required the funding will be returned to consumers in line with the detail in Section 7.

	2022	2023	2024	2025	2026
132KV CB AIS	0.1				
275KV CB AIS	0.15				
400KV CB AIS	0.25				
132KV CB GIS	0.2	0.2	0.2	0.2	0.2
275KV CB GIS	0.3	0.3	0.3	0.3	0.3
400KV CB GIS	0.45	0.45	0.45	0.45	0.45
HV Cables including joints and terminations	0.25	0.25	0.25	0.25	0.25
OHL	0.1	0.1	0.1	0.1	0.1

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Protection and Control inc RTS	0.1	0.1	0.1	0.1	0.1
Battery Systems	0.3		0.3		
Auxiliary Equipment	0.1	0.1	0.1	0.1	0.1
Total	£2.3m	£1.5m	£1.8	£1.5m	£1.5m

6. Conclusion

This Justification paper sets out the need for operational strategic spares at a cost of £11.82 million due to SHE-Transmission's strategy to enhance network resilience over the RIIO-T2 period and beyond. This driver is part of a package of improvements for the management of materials that includes new warehousing, adoption of improved inventory systems and enhanced policies and procedures which will help maintain the quality controls and assurance required in the event of an asset failure. A secondary benefit of holding a wide range of Strategic and non-strategic assets will be in the support of capital projects during construction. If any project requires an emergent spare, then if spares are available these can be utilised to maintain the project delivery programme.

The paper investigated SHE Transmission's current spares options and determined that there was an opportunity to improve how spares are handled and stored. A new warehousing system independent from current facilities would reduce rental costs and ensure security of supply of spares for the Transmission network.

7. Price Control Deliverables and Ring Fencing

As set out in our Regulatory Framework paper (section 1.12 and Appendix 3) we support a key principle from Citizens Advice – one that guarantees delivery of outcomes equivalent to the funding received - to ensure that RIIO-T2 really deliver for consumers. At the project level this means that if we don't deliver the output, or a materially equivalent outputs, we commit to returning the ex-ante allowance for the output not delivered.

This means that if the funding for the Operational Strategic Spares should be ring-fenced and if it does not go ahead, we will return the allowances of £11.82 million in full (minus any justified preconstruction expenditure).

It also means that we commit to delivering the output specified above for the costs of £11.82 million. If we do not deliver the output, or a materially equivalent output, we commit to returning a proportion of the ex-ante allowance. The detailed methodology should be decided at when developing the Close Out methodologies but should apply the same principles of uncertainty mechanisms - that any under delivery should be material

8. Outputs included in RIIO-T1 plans

There are no outputs associated with this scheme included in our RIIO-T1 plans