Torness 400kV Circuit Breaker GIS Programme - OFGEM Justification Paper	
Name of Scheme/Programme	Torness 400kV Circuit Breaker GIS Programme
Primary Investment Driver	Asset Health
Scheme reference/ mechanism or category	SPNTL2091 Circuit Breaker
Output references/type	NLRT2SP2091 / Lead
Cost	£3.36m
Delivery Year	2024
Reporting Table	C0.7 / C2.2a_CI / C2.2a_AP / C2.3 / C2.4b / C2.5 / C2.5a
Outputs included in RIIO T1 Business Plan	No

Issue Date	Issue No	Amendment Details
July 2019	Issue 1	First issue of document
December 2019	Issue 2	Gross cost, NPV, Monetised Risk, Long Term Risk Benefit values, delivery year and future pathways – Net zero text updated.

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1 Introduction

It is essential that the network asset base is healthy and sustainable, reducing the likelihood of losses and network faults. This document is part of a proposal for lead asset refurbishment works for substation circuit breakers to ensure that performance to be maintained.

The 400kV GIS Substation at Torness has circuit breakers that are in requirement of intervention. The substation was designed and built in the early 1980s with what was at the time leading edge GIS technology. Since then, technology and standards have moved on.

The equipment has been identified as requiring mechanism upgrades to maintain operability.

SPT have worked with Siemens (OEM) to ensure that the proposed solutions will ensure adequate performance for the switchgear's design life.

The paper provides the supporting information.

- Circuit breaker addition / activities : 8 units
- Circuit breakers disposed: 0 units

2 Background Information

The 400kV GIS substation Torness was installed in 1985.The performance of this equipment has begun to deteriorate and intervention is required to maintain operability for its design life.

Working with the OEM it has been established that the CB mechanism needs to be replaced. Due to its age and its condition the works can only be undertaken by the OEM. As such, Siemens have developed and produced a retrofit process for the market.

SPD GIS
Torness 400kV – 8 units

Table 1 – SPD GIS

Please find below the details of the circuit breakers identified for intervention.

SPEN corporate asset ID	Asset Description	Manufacturer	Model	Year of manufacture	EoL	Risk £
14236943	TORN400GCBX120	REYROLLE	SPD2 400KV GCB TRANS	1985	11.70473	£ 404,649.45
14237871	TORN400GCBX220	REYROLLE	SPD2 400KV GCB TRANS	1985	9.24288	£ 213,031.46
14237952	TORN400GCBX320	REYROLLE	SPD2 400KV GCB TRANS	1985	11.70473	£ 53,537.08
14237992	TORN400GCBX420	REYROLLE	SPD2 400KV GCB TRANS	1985	9.33425	£ 28,938.68

14238121	TORN400GCBX520	REYROLLE	SPD2 400KV GCB TRANS	1985	11.70473	£ 404,649.45
14238135	TORN400GCBX620	REYROLLE	SPD2 400KV GCB TRANS	1985	11.70473	£ 404,649.45
14238163	TORN400GCBX720	REYROLLE	SPD2 400KV GCB TRANS	1985	9.24288	£ 28,185.09
14238767	TORN400GCBX820	REYROLLE	SPD2 400KV GCB TRANS	1985	11.70473	£ 53,537.08

Table 2 Identified 400kV GIS Circuit Breaker Refurbishments

The EOL and risk values are those at the end of the RIIO-T2 period without intervention.

3 Optioneering

A summary of the options considered for interventions were as follows:

	Option	Status	Reason for rejection
1	Refurbishment in RIIO-T3	Proposed	-
2	Refurbishment in RIIO-T2	Proposed	-
3	Replacement in RIIO-T2	Rejected	The costs to replace the substation are not justified to manage the mechanism issues. The site is likely to be rationalised during the decommissioning of the nuclear power station in the 2030s and replacement in the RIIO-T2 period is likely to result in stranded investment.

Table 3 Option summary

4 Detailed analysis

4.1 Option Details

The proposed options considered for intervention for Torness 400kV GIS site were reviewed as follows:

Option 1 – Refurbishment in RIIO-T3:
The baseline option for the do minimum investment for the CB programme considered was deferring all intervention until T3. The operability issues and lack of spares for the mechanisms mean that it will not be possible to maintain operability beyond the end of the RIIO-T2 period. The network risk at Torness nuclear power station (and the inflexible mesh configuration) is considered to be incompatible with deferral of investment.

Option 2 – Refurbishment in RIIO-T2:
This option will maintain operability of the circuit-breakers until the site is likely to be rationalised in the 2030s during the decommissioning of the power station.

4.2 Selected Option

Torness 400kV has been identified as having mechanism failures within the CBs, the option that has been selected is the refurbishment of the equipment by replacing the mechanisms.

The CBA supports the preferred option of refurbishment in RIIO-T2.

4.3 CBA Outputs

Torness 400kV GIS CBA

Options	**Proposal**	**NPV (£m)**
Baseline	Refurbishment in RIIO-T3	£ 18.27
1	Refurbishment in RIIO-T2	£ 41.01

4.4 Environment & Sustainability

The SPT sustainability approach is to prioritise reuse, then refurbish and finally replace if there is no other option. Where there are opportunities to reuse or refurbish equipment they will be taken, and this is clearly evidenced as the proposal is to refurbish the equipment at Torness 400kV GIS.

4.5 Innovation

Innovation is a key component to deliver developments in all aspects of work. While the technology used in the project will be standard with a proven track record and the topology adopted in line with industry standards, SPEN will look to use innovative ways of project delivery and installation to deliver the programme.

5 Conclusion

The circuit-breaker mechanisms at Torness 400kV have suffered mechanism failures and spares are being exhausted with no further options to replenish stocks. The option that has been determined to be feasible and included in the business plan is refurbishment of the equipment.

The project costs have been built up from individual costs for each element and included in a bill of quantities. The bill of quantities has been engineered from the design layouts developed for each option. The basis of individual unit costs has been the SP Energy Networks MoSC (Manual of Standard Costs) tool which makes reference to costs incurred during previous similar projects.

- Total cost: £3.36m
- Delivery year: 2024 .
- Declared outputs:
    - Addition/Activities: 8 units
    - Disposals/Removal: 0 units
- Lifetime risk benefit: Lr£24.35m

The works are coordinated with other planned outage works and in liaison with the operators of Torness nuclear power station.

6 Future Pathways – Net Zero

6.1 Primary Economic Driver

The primary driver for this investment is asset condition and risk. The investment does not have a strong reliance on environmental benefits.

6.2 Payback Periods

The CBA indicates that a positive NPV results in all assessment periods (10, 20, 30 & 45 years) which is consistent with the lifetime of the intervention. Consumers benefit from reduced network risk immediately on completion of the project.

6.3 Pathways and End Points

The network capacity and capability that result from the proposed option has been tested against and has been found to be consistent with the network requirements determined from the ETYS and NOA processes. Additionally, the proposed option is consistent with the site-specific capacity requirements from SPT's Energy Scenarios.

6.4 Asset Stranding Risks

Electricity generation, demand and system transfers are forecast to increase under all scenarios. The stranding risk is therefore considered to be very low.

6.5 Sensitivity to Carbon Prices

Carbon price sensitivities have been applied using the higher case CBA template. The CBA outcome is influenced by losses and is sensitive to carbon prices.

6.6 Future Asset Utilisation

It has been assessed that the preferred option is consistent with the future generation and demand scenarios and that the risk of stranding is very low.

6.7 Whole Systems Benefits

Whole system benefits have been considered as part of this proposal. The capacity and capability of the preferred option is consistent with the provision of whole system solutions.

7 Outputs included in RIIO T1 Plans

N/A