

| Engineering Justification Paper – Pre-Engineering Works | | | | |
|--|---|-----------|-----------|-----------|
| Name of Scheme/Programme | Pre-Engineering Works | | | |
| Primary Investment Driver | Pre-engineering work for load projects | | | |
| Scheme reference/mechanism or category | SPT200136 / SPT200114-7 Wider Works / Eastern Subsea HVDC Link | | | |
| Output references/type | LRT2SP2050 / LRT2SP2043-4 | | | |
| Cost | £21.07m | | | |
| Delivery Year | 2021 - 2026 | | | |
| Reporting Table | B0.7 Load Master Data B4.2a Scheme Summary B4.5 Scheme Asset Data B4.5a Scheme Asset Data B4.9 SWW Memo | | | |
| Outputs included in RIIO T1 Business Plan | No | | | |
| Spend apportionment | Scheme | T1 | T2 | T3 |
| | SPT200136 | - | £21.07m | - |

| Issue Date | Issue No | Amendment Details |
|-------------------|-----------------|--|
| December 2019 | Issue 1 | First issue of document |
| August 2020 | Issue 2 | Draft Determination update. In the December submission, Eastern Link pre-construction costs were incorrectly allocated to both SPT200136 and SPT200117. The costs for SPT200117 have now been set to zero in the BPDT. This paper justifies increased pre-construction funding for the Eastern Link, based on additional information. The total requested (£5.72m) is equal to the Eastern Link pre-construction funding requested in SPT100136 Issue 1 (£2.86m) and for SPT200117 in the BPDT (£2.86m). |

Table of Contents

| | | |
|-----|---|---|
| 1 | Introduction | 3 |
| 2 | Projects | 3 |
| 2.1 | Network Options Assessment (NOA) Projects | 3 |
| 2.2 | Eastern Link HVDC..... | 4 |
| 2.3 | Synchronous Compensators | 5 |
| 2.4 | Torness Closure..... | 6 |
| 2.5 | Other Projects | 6 |
| 3 | Future Pathways – Net Zero | 6 |
| 3.1 | Primary Economic Driver | 6 |
| 3.2 | Payback Periods | 6 |
| 3.3 | Pathways and End Points..... | 6 |
| 3.4 | Asset Stranding Risks | 6 |
| 3.5 | Sensitivity to Carbon Prices..... | 7 |
| 3.6 | Future Asset Utilisation..... | 7 |
| 3.7 | Whole Systems Benefits..... | 7 |
| 4 | Conclusion..... | 7 |
| 5 | Supporting Documentation | 7 |
| 6 | Outputs included in RIIO T1 Plans..... | 7 |
| 7 | Appendix – Eastern Link Pre-Construction Costs..... | 8 |

1 Introduction

This paper provides justification for pre-engineering funding for a number of load-related projects. This funding is intended to cover activities including:

- Detailed design
- Specialised design studies
- Environmental impact assessments
- Audible noise surveys and studies
- Stakeholder engagement
- Onshore and offshore surveys
- Manufacturer engagement
- Consenting

This will allow us to progress with the development of projects that have not yet been funded, e.g. existing or future NOA projects, or projects that are funded under an uncertainty mechanism prior to funding being granted, e.g. synchronous compensators.

A use-it-or-lose-it fund is proposed for pre-construction costs. This is a relatively low-risk approach to providing pre-construction funding: SPT has certainty that pre-construction costs are allowed while unused funds are returned, protecting the consumer.

The transmission network is facing significant uncertainties as the energy system develops towards Net Zero. It is vital that project development and pre-construction activities can proceed without delay to avoid delays in project delivery. Against a background of large power station closures and rapidly increasing volumes of renewable generation, any project delays are highly likely to lead to cost increases related to network constraints and wider operability challenges, e.g. low inertia or voltage control difficulties. A baseline use-it-or-lose-it fund would ensure that any risk of delay can be avoided.

The following sections outline the key projects for which pre-construction funding is sought. The table below outlines these projects and how the funding has been apportioned.

Table 1. Pre-construction funding

| Project | RIIO-T2 Cost (£m) |
|--------------------------|--------------------------|
| NOA Projects | 5.29 |
| Eastern Link HVDC (SWW) | 5.72 |
| Synchronous Compensators | 4.76 |
| Torness Closure | 2.65 |
| Other Projects | 2.65 |
| Total | 21.07 |

2 Projects

2.1 Network Options Assessment (NOA) Projects

Since the initial NOA process in 2015, the rapid growth in generation seeking connection in the north of GB and the continued decline in overall transmission demand has led to growth in required transfers north to south year on year. This has seen modest recommendations in the initial years of the process

grow into recommending a significant level of transmission network reinforcement across all of the GB transmission network areas. The NOA4 report¹ gave recommendations that would see investment of £5.4bn across the system. In addition to the known projects, further ‘notional’ reinforcements were seen as required that equalled the addition of a further 2GW over each boundary from B2 down to B8. This notional reinforcement has led the TOs to submit further projects into NOA5 which are at early stages and therefore have not been scoped enough to have specific project detail included within the RIIO-T2 plan. As the NOA is an annual process, the requirement for the TOs to submit additional boundary reinforcements each year will continue as the generation landscape changes, and as a function of this, new projects will require to be developed throughout the RIIO-T2 period that will not have been considered through this planning stage. Should any of the new options be considered as economic to the NOA process, pre-construction funding will be required in order to develop options to a stage that a business case can be made on a project-specific basis to provide funding.

Currently, an assessment has been made on the new projects considered within NOA5, the results of which were published by the ESO in January 2020 and factored into the requested preconstruction funding should a proportion of these projects, or similar, be recommended via NOA at any stage through the RIIO-T2 period. A summary of new projects submitted to NOA5 is shown in Table 2. It can be seen that these projects have earliest in-service dates in the RIIO-T3 period and would require development during RIIO-T2 if a “proceed” signal was given.

Due to the relative importance of these schemes to increase boundary capability and the high associated costs we would wish to see these schemes provided with baseline allowances, to be used if and when required, separate to the MISP reopener mechanism to avoid any project delays.

Table 2. New projects in NOA5.

| NOA Code | Project | Earliest In-Service Date | Cost |
|----------|---|--------------------------|-------|
| DLUP | Windyhill-Lambhill-Denny North 400kV reinforcement | 2028 | £99m |
| DWUP | Denny North - Clydesmill - Wishaw 400kV Reinforcement | 2027 | £63m |
| TKUP | East Coast Onshore 400kV Phase 2 Reinforcement | 2030 | £52m |
| LCUP | Eastern B5 400kV Reinforcement | 2029 | £162m |

2.2 Eastern Link HVDC

In the December 2019 submission of our business plan, we incorrectly included pre-construction funding for the Eastern Link in project SPT200117 and also in SPT200136. This error has been corrected by:

1. Withdrawing SPT200114-7 by setting all costs associated with the project to zero in the BPDT².
2. Updating the pre-construction costs for the Eastern Link as discussed below and updating the EJP (this paper) and costs associated with SPT200136.

¹ Network Options Assessment Report 2018/19
<https://www.nationalgrideso.com/publications/network-options-assessment-noa>

² As submitted with Draft Determination response, September 2020.

Each of the GB onshore transmission license holders were provided with preconstruction funding through the RIIO-T1 period to progress with the development of the Eastern HVDC link. At the beginning of the T1 period, works were undertaken by the TOs and the ESO to determine that the wider system need for a large reinforcement on the East of GB was not as strong as the requirement for a reinforcement on the West (Western HVDC Link) and therefore the development of this project in these early years was stopped. The needs case however, was continually assessed by all TOs and the ESO, and through the NOA process the requirement for significant East Coast reinforcement is now seen as critical to the development of the GB transmission network.

In order to progress with the development of an Eastern HVDC link to deliver in line with the recommendation from the NOA process in 2027, further to the funding within the RIIO-T1 period, additional pre-construction funding will be required. The funding requested will fund the detailed design of the link, further environmental activities, including engagement with both onshore and offshore stakeholders, onshore and offshore surveys, engagement with manufacturers and progression through the consenting process, all of which fall under the criteria for pre-construction funding.

Additional details and costs, alongside associated timings, of the Eastern Link pre-construction activities that are planned or already underway, are given in the appendix at the end of this EJP. The total expected pre-construction expenditure in the RIIO-T2 period is £5.716m.

2.3 Synchronous Compensators

The ESO is currently conducting its Stability Pathfinder project³, which aims to procure stability services across GB. Phase 1 of this project has been completed and was aimed at providers that can start before the beginning of RIIO-T2⁴. The submission of tenders for Phase 2, which is under development by the ESO, is currently expected in April 2021. The volume, timing and location of stability services that will be contracted as part of Phase 2 remains uncertain.

If suitable stability contracts are not placed, or if these only provide a part of the requirement, our RIIO-T2 business plan includes synchronous compensators that can be installed under an uncertainty mechanism (engineering justification paper reference EJP_SPT_SPT200137). We are working closely with the ESO on the Pathfinder project and will submit our synchronous compensator projects to future tender phases as a TO participant.

The timing of these installations is important to get the network ready for Net Zero and the closure of the last large synchronous plant on our network. In order to meet the proposed delivery timescales for these projects, we need to continue developing the designs and specifications for this plant. The announcement by EDF, on 27 August 2020, that Hunterston B Nuclear Power Station will be closing two years earlier than planned, further highlights the need to continue, or possibly accelerate, the development and delivery of our synchronous compensation plant.

The availability of pre-construction funding is key to ensure ongoing development of these projects. We recognise that uncertainty remains around the competitive and commercial aspects of the delivery of stability services. However, there is a risk that the stability pathfinder process delivers insufficient

³ See <https://www.nationalgrideso.com/publications/network-options-assessment-noa/network-development-roadmap>

⁴ Phase 1 contracts awarded 31 January 2020 for stability services starting between April 2020 and April 2021 (a contract was awarded to one existing pumped-storage unit in the SPT area). <https://www.nationalgrideso.com/balancing-services/system-security-services/transmission-constraint-management?market-information>

capacity in the SPT area. In such a case, SPT will be ready to provide the shortfall, provided that project development has continued.

Audible noise is of significant concern at all the proposed sites and it is important that accurate noise surveys are included in our tenders for this equipment. We also anticipate significant activity around supplier and stakeholder engagement, specialist design studies and establishing a detailed location and layout for each installation. These activities have been used to forecast our pre-construction allowance for these schemes.

2.4 Torness Closure

Our RIIO-T2 business plan includes a number of projects that will help to ensure that our network is ready for the closure of Hunterston and Torness nuclear power stations. The closure of Hunterston in 2021 has recently been announced by EDF. Torness is currently anticipated to close in 2030, [REDACTED]

[REDACTED]. The closure of Torness and the establishment of Branxton 400 kV substation also provides an opportunity to decommission the Torness 400 kV GIS substation and remove around 24,000 kg of SF₆ from the network. However, an alternative 132kV feed would need to be provided for the power station and the 132 kV network normally fed from Torness 400 kV. Pre-construction funding is required to consider this option in detail, including the impact on the power station and potential routes for a 132 kV circuit, e.g. from Crystal Rig.

2.5 Other Projects

It is likely that we will develop further new projects, e.g. Net Zero investment or anticipatory schemes developed in cooperation with a wider group of stakeholders, such as local, Scottish or UK government, renewables developers, etc. Such schemes may develop rapidly to the point where pre-engineering work such as route surveys or wider supporting analysis has to be commissioned. These “unknown” projects are likely not to fall under LOTI or MSIP and would have no access to funding through other mechanisms. Therefore, due to the nature of the use-it-or-lose-it pot we feel this additional funding for these “unknown” other projects is relatively low risk as it is simply handed back if they fail to materialise.

3 Future Pathways – Net Zero

3.1 Primary Economic Driver

The primary driver for this investment is to provide funding for pre-engineering work on future projects that have not yet received funding. This allows project development to proceed so that planned delivery dates are not compromised. It also provides funding for the development of e.g. new NOA projects or more anticipatory schemes.

3.2 Payback Periods

A payback period has not been considered.

3.3 Pathways and End Points

This funding is justified in all Future Energy Scenarios.

3.4 Asset Stranding Risks

There is no asset stranding risk associated with this funding. There is a risk that pre-construction funding is used to develop projects that do not proceed to delivery. However, this has to be weighed

against the cost of delaying projects (i.e. not starting development) until there is more certainty that they will be required. Project delays will almost certainly lead to increased costs associated with network constraints or network operability problems.

3.5 Sensitivity to Carbon Prices

This funding is not sensitive to carbon price changes.

3.6 Future Asset Utilisation

This paper justifies pre-construction funding and has no direct impact on future asset utilisation.

3.7 Whole Systems Benefits

By continuing to develop uncertain projects, we ensure that delivery timescales are not compromised and that assets are delivered and commissioned at the right time to provide benefit across the whole system.

4 Conclusion

This paper has outlined a requirement for pre-construction funding for a range of projects, which will allow us to progress with the development of projects that have not yet been funded, or projects that are funded under an uncertainty mechanism. This ensures that project timelines for less certain projects are not compromised and that they can be delivered in an economic, efficient and timely manner

5 Supporting Documentation

None

6 Outputs included in RIIO T1 Plans

No outputs are included in RIIO-T1 plans.

7 Appendix – Eastern Link Pre-Construction Costs

| Contract in Place Y/N/NA | Works | Anticipated Duration | T1 Expenditure £k | T2 Expenditure £k | Total |
|--|--|-------------------------|-------------------------|-------------------------|-------|
| Marine Related Works | | | | | |
| N | Seabed Survey Lot 1 | | | | |
| N | Seabed Survey Lot 2 | | | | |
| N | Employers Rep (Seabed Survey) | | | | |
| N | Environmental Consultant (Offshore) | | | | |
| NA | Fisheries Compensation | | | | |
| Y | Fisheries Liaison | | | | |
| Y | Marine Consultant (Initial) | | | | |
| Y | Marine Survey Permits | | | | |
| N | Marine Survey Consultant | | | | |
| Y | Marine Manager | | | | |
| Y | Survey Preparation | | | | |
| Y | Survey Preparation | | | | |
| | | | | | |
| On-Shore Environmental Planning | | | | | |
| Y | Environmental 2019 | | | | |
| Y | Environmental 2020 | | | | |
| N | Environmental 2021 | | | | |
| N | Title Searches | | | | |
| N | Title Searches | | | | |
| N | Land Rights | | | | |
| Y | Initial Env. Review | | | | |
| N | Stakeholder Engagement | | | | |
| | | | | | |
| On-Shore Survey Work | | | | | |
| N | Surveys (AC) | | | | |
| N | Survey Work (GEO Phys/Tech) | | | | |
| | | | | | |
| Engineering & Design Works | | | | | |
| N | FEED Study/Design Assessment | | | | |
| N | Sub-Synchronous Analysis (Interaction Analysis) | | | | |
| Y | Technical Report | | | | |
| N | Cable Routing Studies | | | | |
| N | Cable Design Expert Manuf/Tender (external) | | | | |
| N | Develop Converter Specification (internal/external) | | | | |
| | | | | | |

| Legal and Commercial Consultancy Work | | | | |
|---------------------------------------|---|--|--------------|--------------|
| Y | Legal | | | |
| Y | Legal (via NGET) | | | |
| N | Contract Development (Internal/External) | | | |
| N | Legal (Consents) | | | |
| N | Legal (Main Contract - Internal/External) | | | |
| | | | | |
| Other | | | | |
| | Wider OH Line Works | | | |
| | Staff cost | | | |
| | Other | | | |
| | | | | |
| Total (£k) | | | 2,731 | 5,716 |
| | | | | 8,448 |