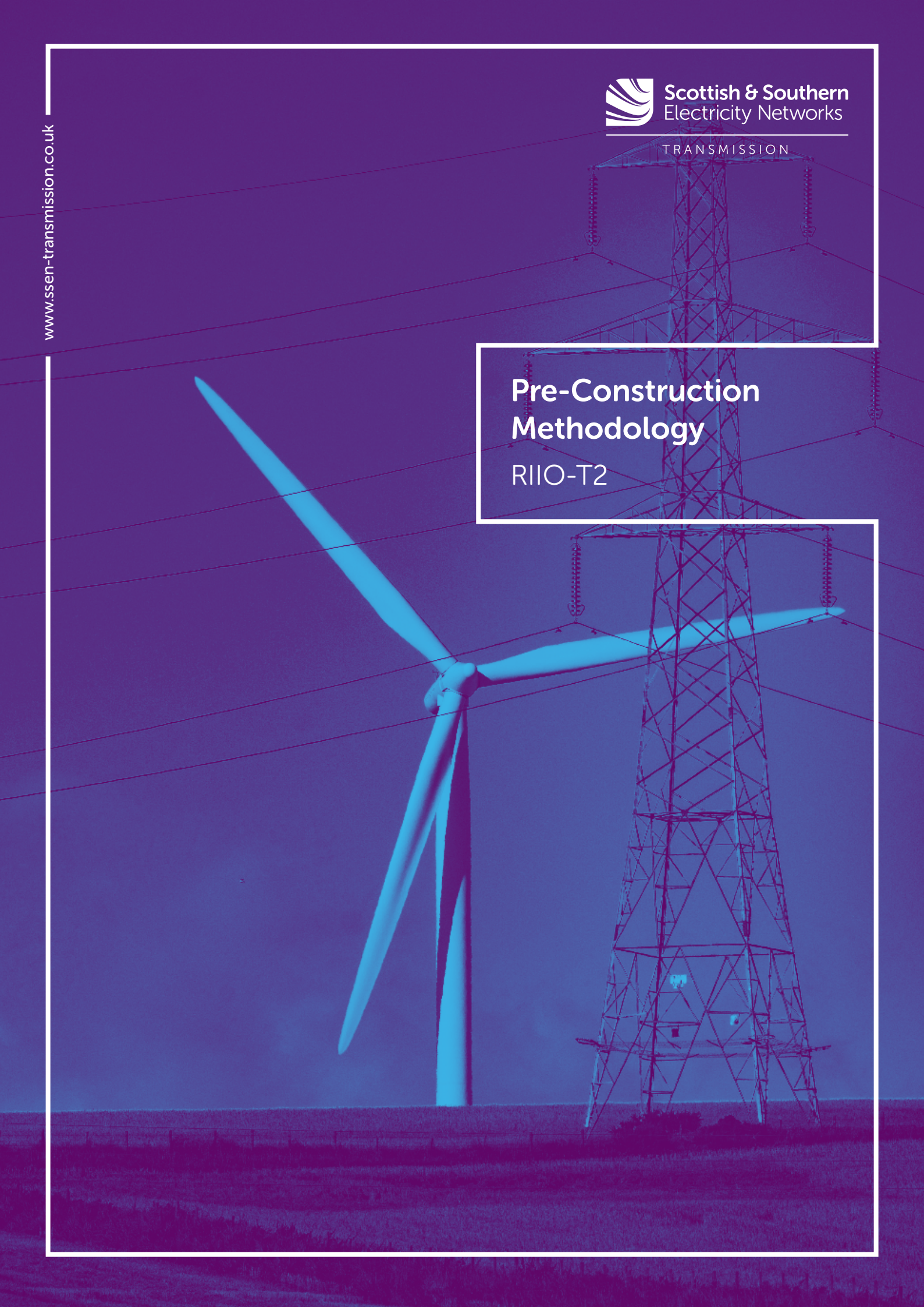




Pre-Construction Methodology

RIIO-T2





Introduction

This document outlines our proposals for the recovery of costs for Pre-Construction activities during the RIIO-T2 period covering:

- The key phases of our Large Capital Projects (LCP) Governance Framework including an overview of the importance of the Pre-Construction phase elements;
- The key activities and outputs during the delivery phase of our projects; and
- Details of our proposals for recovering Pre-Construction expenditure covering (i) our Certain View for RIIO-T2 and (ii) our proposals for recovering Pre-Construction expenditure for uncertain schemes during the RIIO-T2 period (Network Options Assessment (NOA) driven and future T3 schemes).

Pre-Construction & Governance

The Pre-Construction phase considers how we can be confident in the efficiency of our proposed capital investment programme due to the rigorous approach to identifying need, assessing the preferred option and efficiency in construction.

The most important thing we do, in the context of cost to customers, is decide there is a justified need for efficient expenditure. For this reason we invest significant time and analysis, including engagement with customers and stakeholders, in the pre-construction phase. We will spend up to 10% of the final investment cost in this phase.

This pre-construction assessment process can be complicated by the long life and high cost of transmission infrastructure. A decision to invest will impact our current customers and also future customers of whom we might not be aware. A balanced investment decision will take into account the needs of both.

In some cases, the preferred option can be to do nothing, or to delay. In others, the preferred option might be to build larger than current customers' needs. These decisions are a forecast and must be done thoroughly, transparently and with the best available information to ensure customers are not exposed to inefficient costs.

A clear commitment to undertaking pre-construction works to ensure that investments are ready for construction when the need is certain. This includes the design and consent of connections for new generation developments.

Gates

Gate 0-1, Opportunity Assessment

Relates to developing, assessing and selecting business opportunities. This phase screens opportunities for best strategic and regulatory fit, assesses the business case and viability of technical execution, and defines the appropriate level of governance to be applied. If necessary, Pre-Construction Expenditure is requested during, or at the end of this Phase.

Gate 1-2, Development

Is the phase where selected project opportunities are further assessed, defined, and a preferred option is selected. If necessary, Pre-Construction Expenditure is requested during, or at the end of this Phase.

Gate 2-3, Refinement

Is the phase where the selected option is further developed to a level that allows full assessment of the viability of technology and execution. Key requirements from this phase include gaining higher degrees of certainty on cost, programme and risks. Execution and commercial strategies are selected, and the business case is finalised. During this phase a gradual transition and transfer of responsibilities takes place between the development and execution project teams. At the end of this phase, a request for full capital investment is made in line with our internal governance process.

Gate 3-5, Execution

Is the phase where the approved option is designed in detail, procured, constructed and commissioned.

Gate 5, Operate and Evaluate

Is the phase where the asset is handed over to our operations team and its performance and financial returns are evaluated against the business case.

Pre-Construction expenditure is required to deliver the activities relating to Gate 0-3 activities. A detailed overview of the key activities and deliverables during each of the three Pre-Construction phases is included in Appendix A– Pre-Construction deliverables.

Analysis of our performance during RIIO-T1, and lessons learned, highlights the criticality of comprehensive and rigorous Pre-Construction works in the success of the execution phase. As a general approach, we would expect to incur around up to 10% of an investment’s total value prior to commencing the execution phase. Insufficient investment in pre-construction can result in incomplete or flawed scoping, or failure to identify and mitigate execution risks (such as ground condition). This increases project risk with a consequential impact on the efficiency of procurement and likelihood of failed execution.

Pre-Construction requirements for RIIO-T2

Our business plan outlines that we anticipate the requirement to develop and deliver a variety of large capital projects covering a broad range of categories:

- Growth driven (load) - covering large strategic (NOA) driven schemes, sole and shared use infrastructure to provide local connection for generators, demand infrastructure and local connection asset;
- Asset driven (non-load) - refurbishment or replacement of existing assets based on condition drivers;
- System driven - to meet system needs, e.g. voltage support.

Our Certain View set out in our business plan is based on the schemes (Growth and Asset) which have a high degree of certainty, strong justifications and sufficiently developed to be included for ex-ante funding. All Pre-Construction costs for these schemes have been included (where necessary) within the individual scheme costs in our business plan submission. However, we anticipate there will be a requirement for additional funding to allow Pre-Construction activities during the period as outlined below. As the system background develops throughout T2, and to ensure efficient expenditure, the ability to substitute within the NOA and T3 pots to continue development of key schemes to achieve our Net Zero ambition is required:

1. Generation Connections

In addition to the schemes outlined in our Certain View we expect there will be other generation connecting in the period. We therefore require Pre-Construction funding to develop the associated infrastructure schemes and our proposal is to recover these costs as part of the generation uncertainty mechanism for these schemes, i.e. the Pre-Construction costs will be included as part of the Unit Cost Allowances (UCA) for development of both the sole and shared use infrastructure required to connect this additional generation. This reflects that Pre-Construction costs are recoverable from the generation customer if the scheme terminates prior to connection. No separate Pre-Construction funding will therefore be requested for these schemes.

2. NOA

We have an ongoing requirement to provide input into the NOA process. This means an ongoing requirement to carry out early development works to assess technical options and provide associated costs for large scale strategic upgrades which provide wider system benefits. Based on ongoing discussions with the Electricity System Operator (ESO), we anticipate this scope will increase to cover wider system issues meaning the scope of this early development works is likely to increase. We have included an initial estimate of £400k/annum to cover the costs of supporting the annual NOA process along with other ESO driven requests.

We also recognise there will be a need to develop large strategic schemes with NOA driven ‘proceed’ signals, at this stage it’s very difficult to predict which NOA driven schemes will need to be developed further for delivery in the T2 period and beyond. Significant Pre-Construction activities are currently being undertaken in the T1 period developing a variety of schemes including the Scottish Island links, Eastern onshore upgrades and the Eastern HVDC link. We anticipate there will be an ongoing requirement to develop large strategic schemes of a similar nature in the T2 period. In addition to the Eastern HVDC link, which currently has a strong NOA proceed signal, we have identified several other schemes that may require development during the period. These are detailed in Appendix B – Potential future NOA driven schemes and are set out in Table 1 below, along with a provision for development of schemes driven by wider issues (identified by the ESO):

Table 1

Scheme	Boundary
1st Eastern HVDC Link from SHET to England	B2 / B4
East Coast Onshore 400kV Phase 2 Reinforcement	B2 / B4
2nd Eastern HVDC Link from SHET to England	B2 / B4
Dounreay to Spittal 400kV double circuit	B0
HVDC link Spittal to Peterhead	B0
Beaulieu to Denny 400kV (uprating the 275kV circuit for 400kV operation)	B1 / B1A / B2 / B4
Skye/Western Isles upgrade	

We’ve based our forecast Pre-Construction expenditure on historical spend on schemes of a similar nature. Using a forecast of 2.56% of total costs for Pre-Construction activities, we anticipate a potential Pre-Construction spend of up to £117.9M during the period as shown in Table 2 across:

Table 2

Mechanism	Number of Projects/Years	Cumulative Cost	Dev %	Pre Con
NOA	7	£4601.5M	2.56%	£113.4M
Annual NOA	5 years	£2M		£2.0M
Regional Plans	5 years	£.2.5M		£2.5M
Total		£4606M		£117.9M

Since the actual level of expenditure in this area is highly uncertain, our proposal is that a baseline allowance is set for these activities based on the above estimate with a mechanism in place to reconcile efficiently incurred costs at the end of the price control period with an adjusting mechanism to hand back unused allowances. This will be what is known as a “use it or lose it pot”.

- Our experience from RIIO-T1 highlighted the difficulty in assigning defined Pre-Construction expenditure on an individual scheme basis since it’s impossible to predict which schemes will progress. We propose setting the allowances based on Pre-Construction works across each of the transmission boundaries along with general pots covering the ongoing NOA interface with the ESO, and regional development plans
A boundary based approach is consistent with the NOA approach to optioneering;
- We are currently looking to define the outputs associated with Pre-Construction activities in line with the key milestones set out in our LCP gate process (see provisional deliverables set out in Appendix A)

3. T3 schemes

Our experience in RIIO-T1 has highlighted the importance of robust planning across price control periods, including the need to ensure there is adequate funding to develop key schemes that will be delivered early in the following price control periods. The five-year price control period makes this issue more relevant and our proposal is to include additional Pre-Construction allowances covering:

- Future Asset driven – the shorter price control period intensifies the need to manage our rolling asset replacement and refurbishment program into the next price control period. A key factor to consider is the requirement to deliver asset replacement and refurbishment schemes in the early years of the RIIO-T3 period. To deliver this in the most

efficient and co-ordinated manner will require spend in the T2 period to ensure adequate Pre-Construction activities are carried out for such schemes to ensure we are ready to commence delivery in line with our rolling program. Our preliminary assessment has highlighted 11 potential schemes that fall into this category and based on historical Pre-Construction spend (6.5%) we estimate a requirement for £13m allowance covering these activities. An overview of these schemes is shown in Appendix C – T3 Non load development.

- Future Growth driven – the Pre-Construction activities associated with large shared use infrastructure projects can span many years and depending on the background generation drivers, can span multiple price control periods. There is the possibility that the spend relating to Pre-Construction activities for some schemes may not be recovered in the T2 price control period and our proposal is to include additional funding to cover this potential shortfall. Our preliminary assessment has highlighted 6 potential schemes that fall into this category and based on historical Pre-Construction spend (7.5%) we estimate a requirement for £11m allowance covering these activities. An overview of these schemes is shown in Appendix D – T3 shared use development.

Given the level of uncertainty associated with these works, specifically shared use due to the increased volume of connection applications and the possible effect on the network infrastructure, our proposal is that all costs associated with T3 activities would be subject to a symmetric ‘true up’ at the end of the price control to adjust allowances based on efficiently incurred expenditure. Our forecast for T3 allowances are based on initial estimates of likely expenditure requirements in both areas and are summarised in Table 3 below.

Mechanism	Number of projects	Cumulative Cost	Dev %	Pre Con
Non-Load	11	£200M	6.5%	£13.0M
Shared	6	£146.5M	7.5%	£11.0M
Total		£346.5M		£24M

Appendix A - Pre-Construction deliverables

As the projects develop through the Pre-Construction Gate process (Gates 0-3) the following typical activities are carried out at each of the following, Opportunity Assessment (Gate 0-1); Development (Gate 1-2); and Refinement (Gate 2-3). Details of the works carried out at each phase along with the key outputs at each stage are detailed below.

Opportunity Assessment (Gate 0-1)

The Opportunity Assessment phase involves a high level of appraisal of the project needs case in determining potential project solutions with a view to developing a brief for further development. Typical activities within the phase include:

- High level appraisal of options, taking account of environmental, technical and cost factors,
- Development of Single Line Diagrams of proposals,
- Technical network system studies,
- Identification of key interface points/synergies with other projects proposed in the region,
- Preliminary engineering design evaluations,
- High level environmental appraisal (desk top) for potential siting options taking consideration of engineering design options; and,
- Stakeholder engagement.

Gate 0-1 The key deliverables from this phase of the project are:

- Optioneering Report,
- Business Case Document,
- Design Requirement Document,
- Design Management Plan,
- Stakeholder engagement/consultation plan and report
- Initial Cost Estimates.

Development (Gate 1-2)

The Development phase builds upon the works carried out within the Opportunity Assessment phase with the key objective being to identify a preferred technical solution and to obtain any necessary consent for the project.

Typically, at this stage of the project, the project team will have a number of specified technical parameters (e.g. identified system connection points) and geographical search areas to work within. The identification of the preferred project solution requires input from stakeholders covering environmental, technical and cost.

Environmental specialists are engaged to assess the identified search areas with a view to determining numerous potential sites (e.g. for a substation location) or route corridors (e.g. for an overhead line or cable route). Desktop surveys and available information will be utilised to inform this process which will then scope the requirement for further works and investigations.

Initial engineering studies are also required at this stage to determine basic engineering parameters for the assessment of the various sites and route corridors. This may potentially include initial geotechnical investigations, tower and line surveys and topographical surveying.

Continuous interaction and engagement with stakeholders is crucial to the successful development of projects. At this stage contact would be made with key stakeholders, representatives of the local community, statutory consultees, MPs, MSPs and, members of the public.

Once the preferred technical solution has been identified there is a further requirement to carry out detailed environmental survey works (Environmental Impact Assessment/appraisal surveys) and engineering design works in preparation for consent applications. For any projects involving subsea cabling this will include significant costs for marine survey works. There is also the possibility of costs incurred due to the consent applications being rejected and associated public inquiry costs.

At this stage of the process discussions with landowners/tenants are progressed with land purchase and wayleave option/Heads of Terms agreements in place (typically 10% of land cost).

Submission of an overhead line consent application to the Energy Consents Unit (Section 37) and Town and Country planning application to the relevant local council will also be carried out.

Gate 1-2 The Key deliverables from this phase of the project are:

- Business Case Document - updated,
- Design Requirement Document - updated,
- Design Management Plan - updated,
- Project Safety, Health and Environment Review (PSR1),
- Environmental Management Plan ,
- Project development Plan,
- Commercial and Contracting Strategy,
- Works information produced for instruction to Tender,
- Submission of a section 37 and/or Town and Country planning application,
- Heads of Terms agreed with landowners/tenants,
- Project Risk Management Plan,
- Continued Stakeholder engagement/consultation,
- Project Quality Plan,
- Cost Estimate - updated.

Gate 2-3 The key deliverables from this phase of the project are:

- Business Case - finalised for construction,
- Design requirement Document - finalised for construction,
- Design Management Plan - finalised for construction,
- Project Safety, Health and Environment Review (PSR2),
- Environmental Management Plan - finalised for construction,
- Project Development Plan - finalised for construction,
- Project Risk Management Plan - finalised for construction,
- Competitive tender exercise complete and preferred contractor selected,
- Approved Planning consent for all elements as required,
- All land options secured.

The pre-construction activity does not generally include:

- Significant challenges for planning applications or public inquiries assumed for any projects

Refinement (Gate 2-3)

The refinement phase involves detailed engineering site investigation, engineering design and tendering works to finalise the project design, programme and improve project costing accuracy in advance of the construction phase of the project.

Typical engineering site investigation works could include detailed soil investigations for substation platforms or overhead tower foundations. Further detailed engineering design works are usually required in advance of the tender preparation and contract negotiations. As well as the engineering aspects there is also a requirement to develop any environmental mitigations associated with the project consent conditions.

It is also prudent at this stage on receipt of planning consents to carry out works to discharge any conditions attached as part of the consent. These enabling works may be required to allow the contractor site access in line with the agreed programme. Such works may be public road improvement and/or drainage works.

The logic applied is that effort at these upfront stages provide more cost certainty and lowers the risk of change during the construction phase of the project. The key output from the refinement stage is that the project has been fully designed, costed and all relevant planning consent granted in advance of construction funding.

In conclusion, at the end of the pre-construction phase, Gates 0-3, each project will have:

- All necessary consents in place
- Undergone a robust design process with any outstanding design risks documented and understood
- project budget defined with high degree of cost certainty based on tendered prices for key contracts and detailed account of project risk
- Demonstrated project management compliance with the SSE LCP framework

Appendix B - Potential future NOA schemes

NOA RIIO-T2 Pre-Construction Spend – Driver

The projected growth in generation capacity within the SHE Transmission (SHET) area (north of the B4 boundary) gives rise to increased north to south power transfer requirements. At present there is approximately a total of 9.2GW of additional contracted capacity north of the B4 boundary shared by SHET and SP Transmission (SPT), and a current winter peak demand of approximately 1.4GW. Figure 1 details the projected growth in generation capacity within SHETs area (north of boundary B4). This is based on the 2018 Future Energy Scenarios (FES) and includes generation directly connected to the transmission system and large (>10MW) embedded generation. In addition, a contracted position has also been shown which reflects all generators contracted to connect in the SHET area. It is evident that all 2018 FES lag the contracted generation position.

In Figure 2 below (taken from the Electricity System Operator's, ESO, 2018 Electricity Ten Year Statement publication) the current B4 boundary capability (black line) is plotted alongside anticipated boundary power transfers for the next 20 years. The B4 boundary capability of the current network is thermally limited to 3,300MW (based on Future Electricity Scenarios 2018, FES) whereas the anticipated boundary transfers from 2023 onwards across all four 2018 FES scenarios significantly exceed this. The ESO through the NOA in 2018/19 (and in 2017/18) recommended to 'Proceed' with a two phased onshore reinforcement approach of the East Coast Onshore 275kV Upgrade (ECU2), to be completed by 2023, followed by the East Coast Onshore 400kV Upgrade (ECUP), to be completed by 2026, and the Eastern HVDC link (E4D3 – from Peterhead to Drax) to be completed by 2029. Following completion of E4D3, B4 boundary capability will rise to 6,600MW however, as can be seen in Figure 2, the anticipated boundary transfers may reach 9000MW around 2030 – a difference of 2,400MW.

The NOA 2018/19 process indicated that further reinforcement in the SHET area may be required. A long-term conceptual option (with a delivery date of 2032 – later than any of the options in NOA 2018/19) was submitted by the TOs to reinforce multiple boundaries (including the B4 boundary between SHET and SPT). This long-term conceptual option was allocated a cost equivalent to an offshore HVDC link (of significant length) and assigned as giving a 2GW capability uplift on each boundary (including B4). The NOA CBA determined that this long-term option was economic and therefore needed to support the long-term future network. This reinforcement is particularly required to improve system capability when NorthConnect, a 1400MW interconnector to Norway located in the north east of Scotland, is at high import.

System studies undertaken at the end of 2018 and the beginning of 2019 have also indicated that following the completion of ECU2, ECUP and E4D3 by 2029, further reinforcement on the east coast of the SHET network may be needed. As a result, an initial scope for two further east coast reinforcements has been developed, these are:

- The East Coast Onshore 400kV Phase 2 reinforcement – for delivery around 2029/2030, total cost £529m; and
- A 2nd Eastern HVDC link from SHET to England – for delivery around 2032 (equivalent date to the long-term conceptual option), total cost to SHET of £1200m

Total Transmission Entry Capacity in the SHE Transmission Area

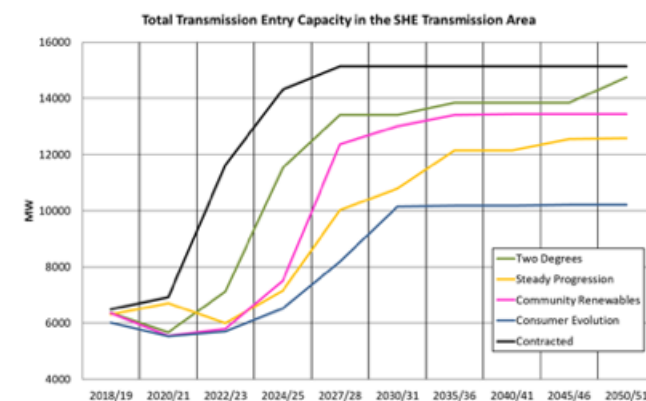


Figure 1: Total Generation in the SHE transmission Area

In addition, in November 2017, Crown Estate Scotland announced their intention to run a further leasing round for commercial scale offshore wind energy projects in Scottish Waters. This initiative is consistent with the Scottish Energy Strategy which envisages further offshore wind developments as playing a key role in Scotland's future energy mix. To inform the spatial development of this leasing round, Marine Scotland, as Planning Authority for Scotland's Seas, is required to undertake a planning exercise. Marine Scotland are at the early stages of developing the offshore wind plan¹. Initial 'Areas of Search' – potential areas for the sustainable development of offshore wind – have been identified and scoping reports of the environmental and socio-economic assessments have been produced. A number of these 'Areas of Search' are on the west coast and in the very north of the SHET area (in the Pentland firth and near Orkney). Further, SHET have recently received a connection application for a 2.25GW offshore wind farm located west of Orkney. This has necessitated the consideration in our long-term planning of two further potential reinforcements to strengthen the SHET network in the Caithness area (i.e. north of Beaulay) and on the west coast, to enable the connection of over 2GW of offshore wind. These are:

- HVDC link Spittal to Peterhead – for delivery around 2030/2031, total cost £1045m;
- Dounreay to Spittal 400kV double circuit OHL – for delivery around 2030/2031, total cost £115m; and
- Beaulay to Denny 400kV (uprating the 275kV circuit for 400kV operation) – for delivery around 2028/2029, total cost £112m

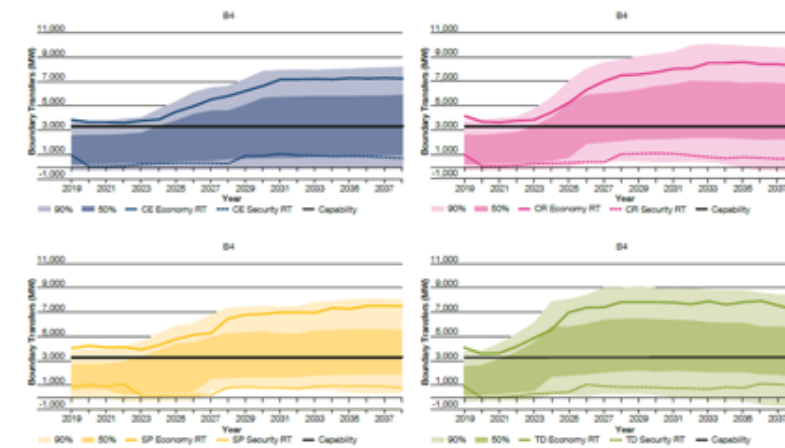


Figure 2: Base capability and anticipated boundary flows for boundary B4

¹More information on this can be found at: <https://www2.gov.scot/Topics/marine/marineenergy/Planning/smp-scoping-consultation>

Appendix C - T3 Non load development

Non-Load Pre-construction Spend for Early T3 Works

The following projects will require pre-construction spend in T2 for early T3 construction works as identified during asset condition survey works carried out during T1:

Clayhills Substation	Grid Transformer Replacements
Elgin Substation	Grid Transformer Replacements
Inverness Substation	Grid Transformer Replacements
Lyndhurst Substation	Grid Transformer Replacements
Milton of Craigie Substation	Grid Transformer Replacements
Orin Substation	Grid Transformer Replacement
Woodhill Substation	Grid Transformer Replacement
Craigie Buckler to Woodhill	Underground Cable Works
Beauly/Shin	Overhead Line Refurbishment
Strichen/Fraserburgh/St Fergus	Overhead Line Refurbishment
Nairn / Keith	Overhead Line Refurbishment

Appendix D – T3 Shared use development

Shared use Pre-construction Spend for Early T3 Works

The following projects will require pre-construction spend in T2 to allow development works to proceed to achieve early delivery in T3:

Ben Sca	Windfarm connection
Coire Glas	Pumped storage scheme
Energy Isles	Windfarm connection
Gleannn Eoghainn	Windfarm connection
Red John	Pumped storage scheme
Invergarry - Fort Augustus	(To connect Coire Glas to the network)