

Decision

Harker - Final Needs Case decision

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Contact: James Dunshea

Team: Price Control Operations – Heavy scrutiny projects

Telephone: 020 7901 7000

Email: RIIOElectricityTransmission@ofgem.gov.uk

Following our 21 July 2023 Final Needs Case consultation, this document confirms our decision to approve the Final Needs Case for the Harker Energy Enablement (Harker) project under the Large Onshore Transmission Investment mechanism. As per the Initial Needs Case, we expect that National Grid Electricity Transmission plc (NGET) will do everything reasonably practicable to deliver a sulphur hexafluoride (SF6) free solution.

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Executive summary

Harker Energy Enablement Project and what this document covers

In July 2023 we consulted¹ on our minded-to position to approve the Final Needs Case (FNC) submission from National Grid Electricity Transmission plc (NGET) regarding the proposed 'Harker Energy Enablement' (Harker) project. The project's Initial Needs Case (INC) was submitted for our assessment under the Large Onshore Transmission Investment (LOTI) mechanism in September 2021.

Harker is a load and non-load driven project, triggered by several interfacing drivers which include asset health, several new customer connections, proceed signals under the Network Options Assessment (NOA) and environmental concerns. NGET now estimates that the project will cost approximately £252.68m (18/19 price base) and is planned for delivery by 2026. NGET's preferred solution to addressing all project drivers on the site consists of an offline rebuild of 132kV and 400kV substations, along with the rationalisation of the 275kV substation.

In accordance with our RIIO-2 price control arrangements, we have assessed the need for the project under our LOTI re-opener mechanism² and on the suitability of applying a late competition model to the project. This document summarises the outcome of that assessment, our decision on the FNC assessment, and the next steps for the project.

Final Needs Case assessment

We are satisfied that there is sufficient evidence of a clear needs case for the Harker project; we recognise the need for urgent intervention to ensure safe operation of the site and that reinforcement is required to support forecast load growth.

In-line with the UK government's ambitions to achieve Net Zero by 2050³, there is an ongoing requirement to minimise Sulphur hexafluoride (SF6) losses as SF6 is considered a targeted greenhouse gas under section 24(1)(f) of the Climate Change Act 2008. SF6, historically used to insulate electrical equipment and switch the flow of current on and off, is a significantly potent greenhouse gas and efforts are underway to reduce and ultimately remove it from the network. Harker is currently the highest emitting site for

¹ [Harker – Consultation on the project's Final Needs Case | Ofgem](#)

² [Special condition 3.13 of the Electricity Transmission licence](#) and the [LOTI Guidance](#)

³ [Net Zero Strategy: Build Back Greener - GOV.UK \(www.gov.uk\)](#)

SF6 on NGET's network with holdings of SF6 within the 132kV and 275kV substations (509kgs), and a sizeable concentration at the 400kV substation (16,365kgs).

Further, our Principal Objective (as set out in the Electricity Act 1989) requires us to protect the interests of future and existing consumers, including through the reduction of electricity-supply emissions of targeted greenhouse gases. As such, we expect to see an SF6-free solution detailed as part of the final Project Assessment submission for Harker.

We consider that the cost benefit analysis (CBA) submission supports the need for the project. We are also satisfied that the CBA has considered the most relevant engineering solutions and that the results show that option 3 is the optimal option. Option 3 is also best placed to reduce risk and facilitate timely delivery required for the load-related drivers.

Delivery via a competition model

The Harker project is being considered under the LOTI mechanism as part of the RIIO-2 price control; accordingly, and in line with our Final Determinations for RIIO-2, we have assessed the suitability of the Harker project for 'late model' competition⁴. As per the FNC consultation, our position remains that the Harker project does not meet the criteria for delivery via a late model competition. The criteria require that a project be both separable and entirely new and Harker is neither. In addition, it is our view that applying any of the models outlined above would be detrimental to the interests of consumers. It is therefore our view that applying competition to Harker is not in the interests of consumers.

Large project delivery

In our RIIO-2 Final Determinations⁵ we set out our approach to late delivery of large projects (>£100m) with the aim to ensure companies do not benefit from delay and to protect consumers from the impact of such a delay.

⁴ 'Late model' competition refers to the late models of competition (i.e., run for delivery once a project is sufficiently developed) identified for consideration for LOTI projects within the RIIO-2 Period (the Competitively Appointed Transmission Owner (CATO) model, the Special Purpose Vehicle (SPV) model, and the Competition Proxy Model (CPM)). For further information, see page 117 of 'Final Determinations: Core Document' in [RIIO-2 Final Determinations](#)

⁵ [RIIO-2 Final Determinations](#), ET Annex (REVISED), pp. 32-36

We are not deciding at this stage which large project delay mechanism should apply to the project but we will consult on which mechanism to apply at the Project Assessment (PA) stage.

Decision and next steps

This document confirms our decision to approve NGET's FNC for the Harker project under the LOTI mechanism.

Once NGET have confirmed this if feasible, we will proceed to the next stage of the LOTI assessment which is the PA stage.

1. Introduction

Context

- 1.1 Great Britain's (GB) onshore electricity transmission network is currently planned, constructed, owned, and operated by three Transmission Owners (TOs): National Grid Electricity Transmission (NGET) in England and Wales, Scottish Power Transmission (SPT) in the south of Scotland, and Scottish Hydro Electric Transmission (SHET) in the north of Scotland. We regulate these TOs through the RIIO (Revenue = Incentives + Innovation + Outputs) price control framework. For offshore transmission, we appoint Offshore Transmission Owners (OFTOs) using competitive tenders.
- 1.2 The incumbent onshore TOs are currently regulated under the RIIO-2 price control which started on 1 April 2021 and will run for 5 years. Under this price control we developed a mechanism for assessing the need for, and efficient cost of, large electricity transmission reinforcement projects. This mechanism is called 'Large Onshore Transmission Investment' (LOTI). Once the need for and the costs of projects have become more certain, the TOs submit construction proposals and seek funding for them. As explained in chapter 9 of the RIIO-2 Final proposals – Core Document⁶ (REVISED), all projects that come forward for assessment via the LOTI re-opener mechanism during the RIIO-2 period will be considered for their suitability for delivery through one of the late competition models.
- 1.3 Network investment is informed by the Future Energy Scenarios (FES)⁷ and the Network Options Assessment (NOA)⁸ which are developed and published annually by the Electricity System Operator (ESO). A key focus of the FES and NOA is the Government's ambition⁹ to connect up to 50GW from offshore wind by 2030 and the legally binding¹⁰ UK Government Net Zero targets which are to be achieved by 2050. The transition to a Net Zero economy will see increased demand on transmission boundary capability which will need to be facilitated by critical network reinforcements.

⁶ [RIIO-2 Final Determinations](#), Core Document (REVISED), chapter 9

⁷ ESO [Future Energy Scenarios \(FES\)](#)

⁸ ESO [Network Option Assessment \(NOA\)](#)

⁹ Government's [British energy security strategy](#)

¹⁰ [The Climate Change Act 2008 \(2050 Target Amendment\) Order 2019](#)

Overview of LOTI re-opener mechanism

- 1.4 The LOTI re-opener mechanism provides TOs with a route to apply for funding for large investment projects that can be shown to deliver benefits to consumers, but that were uncertain or not sufficiently developed at the time we set costs and outputs for the RIIO-2 price control period. The LOTI mechanism provides a robust assessment process through which we can ensure that TO proposals represent value for money for existing and future consumers.
- 1.5 To qualify for the LOTI mechanism, TO proposals must meet the following criteria:
- a) be expected to cost £100m or more of capital expenditure; and
 - b) be, in whole or in part, load related¹¹.
- 1.6 We are satisfied that the Harker project meets the criteria and is eligible¹² as a LOTI project. We are therefore assessing the Harker project in accordance with the LOTI mechanism as detailed in the LOTI Guidance¹³.

Stages of our LOTI assessment

- 1.7 Following the approval of eligibility, our LOTI mechanism is made up of three main stages:
1. **Initial Needs Case (INC)** – The usual focus of our assessment at this stage is to review the technical and/or economic need for the project, the technical options under consideration, and the TO’s justification for taking forward its preferred option for further development.
 2. **Final Needs Case (FNC)** – Following all material planning consents being secured for the project, the TO is then required to submit a FNC¹⁴. The focus of

¹¹ Part (b) of this criterion used to be either “wholly or partly load related” or “shared-use or sole-use generator connection project related”. As a result of a licence modification, which came into effect on 24 July 2021, the “shared-use or sole-use generator connection project” criterion no longer applies. However, this does not impact the project as this is in part a load related project. For further information on the licence modification, see the [Decision on the proposed modifications to the RIIO-2 Transmission, Gas Distribution and Electricity System Operator licence conditions](#)

¹² [RIIO-2 Final Determinations](#), NGET Annex (REVISED), section 3.60

¹³ [Large Onshore Transmission Investments \(LOTI\) Re-opener Guidance](#)

¹⁴ In accordance with Special Condition 3.13.14, we may issue a direction relieving the TO from the requirement to obtain all material planning consents prior to submitting the FNC.

our assessment at this stage is to confirm the need for the project by checking that there have been no material changes in technical and/or economic drivers that were established in the INC.

3. Project Assessment (PA) – If the FNC is approved, the TO will then need to apply for a PA direction. The focus of our assessment at this stage is the assessment of the proposed costs and delivery plan that the TO has in place for the project, with a view to potentially specifying in the TO’s licence a new LOTI Output, a LOTI delivery date, and setting the efficient cost allowances that can be recovered from consumers for delivery of the project.

Related publications

- 1.8 RIIO-2 Final Determinations – Core Document and NGET Annex – both REVISED: [Ofgem.gov.uk/publications-and-updates/riio-2-final-determinations-transmission-and-gas-distribution-network-companies-and-electricity-system-operator](https://www.ofgem.gov.uk/publications-and-updates/riio-2-final-determinations-transmission-and-gas-distribution-network-companies-and-electricity-system-operator)
- 1.9 LOTI Re-opener Guidance document: [Ofgem.gov.uk/publications-and-updates/large-onshore-transmission-investments-loti-re-opener-guidance](https://www.ofgem.gov.uk/publications-and-updates/large-onshore-transmission-investments-loti-re-opener-guidance)
- 1.10 Harker – Final Needs Case consultation: [Harker – Consultation on the project’s Final Needs Case | Ofgem](#)

2. Harker Final Needs Case assessment

Section summary

This chapter summarises our July 2023 consultation position regarding the design choices NGET has made to date and the CBA underpinning the need and design of the project, as well as the consultation responses and our decision following consideration of those responses.

Overview of NGET's proposal

- 2.1 NGET's proposal seeks to apply significant investment across the Harker site to address a combination interfacing non-load and load drivers that have manifested over several years.
- 1.1 The proposed solution is a full site rebuild of Harker costing £252.68m (2018/19). The scope of works to address all the project drivers includes:
- Construction of new 132kV and 400kV substations, incorporating any extension and up ratings required for new circuits and additional supergrid transformers.
 - Tendering for SF6-free solutions across the site - while NGET are exploring the opportunity for SF6-free technology across the site, the viability of an SF6-free solution is expected to be determined during the PA stage. As set out in section 5, our expectation is that NGET will submit an SF6-free solution for the Project Assessment.
 - Addition of six 400/132kV 240MVA transformers to replace existing transformers, providing capacity required for present and future load drivers.
 - The removal of the 275kV substation as it is no longer needed, but maintaining existing connection to Stella West and Fourstones connected to the 400kV substation.¹⁵

¹⁵ Two 275kV transmission circuits are connected at the Harker 275kV substation. The primary functions of these circuits are to connect Harker 275kV to NGET's Fourstones and Stella West 275kV substations located in the North-East England.

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- Replacement of existing interbus transformers on the 275kV substation¹⁶

Figure 1: Map of the Harker site



Consultation position, responses, and decision

- 2.2 Two stakeholders responded to our FNC consultation, one from NGET and one from Electricity North West Limited (ENWL). Their responses were non-confidential, and we have published the full text of the consultation responses online¹⁷.
- 2.3 The remainder of this chapter sets out our consultation position, stakeholder response, and our decision on the project's drivers, optioneering and CBA.

Project drivers

Consultation position

- 2.4 We agreed that NGET has clearly demonstrated the urgent need for asset intervention based on the poor condition of existing assets, the strategic importance of Harker on the B6 boundary and the evidence that reinforcement is required to support forecast load growth.

¹⁶ The cost for the NOA works is not part of the £252.68m LOTI submission. This is now part of an Incremental Wider Works submission to expedite delivery

¹⁷ [Harker INC Consultation \(final\).pdf](#), 'Response documents'

Consultation responses and our views on them

- 2.5 Both responses agreed with our consultation position, noting that investment is required from both an asset condition perspective and to facilitate timely capacity enhancements necessary to connecting customers by 2026.

Decision following consultation

- 2.6 Having considered the consultation responses, our decision is that the project drivers evidence a clear need for the project.

Options considered

Consultation position

- 2.7 Our consultation position was that NGET had considered an appropriate range of options, having taken 4 options to a sufficiently mature stage of development as well as considering the baseline. We also stated that the most efficient and effective option for delivering the project, Option 3 utilising Gas Insulated Switchgear (GIS), had been selected as the preferred option. We also stated we expect NGET will submit an SF6-free solution for consideration at the final PA stage of the LOTI process.
- 2.8 We agreed with NGET that Options 1 and 2 involve lengthy, complex build programmes and are expensive relative to the output that is being delivered. Neither option will support new customer connections within the required timescales.
- 2.9 We noted that Option 4 has a similar build solution to Option 3, albeit with the installation of Air Insulated Switchgear (AIS) rather than GIS. This would necessitate greater land-take, with higher associated costs and a potentially longer programme. We note that with AIS our general view is that whole life costs appear to be more optimal, however given the critical timing and multiple delays from the original connection offer, we accepted that the GIS solution is time appropriate in this instance. We noted that in future this should not imply that all GIS solution are economic and efficient or quicker to consent than AIS options.

Consultation response and our views

2.10 The consultation responses agreed with our consultation position on the preferred option, however they also raised a number of points regarding the requirement for an SF6-free solution.

- NGET noted that a type-registered SF6-free solution does not yet exist for the 400kV equipment required for Harker, and the current expectation for completion of type testing is March 2024. The success of such type testing is outside of the control of both NGET and its delivery contractor.
- NGET note that there are certain instances where individual circuit breaker(s) may need to be of an SF6 variant as at present SF6 free technologies will not be adequate for the duties required, namely in limited reactive control instances. Ofgem accepts this principle where evidenced, however our expectation is that the replacement of this asset(s) is planned and accounted for in the design of the switchboard, building and associated non-lead plant.
- This innovation therefore carries a risk of delay to the delivery programme and the potential for higher costs due to delays and early adoption risk.
- ENWL saw no issue with the 132kV Switchgear but flagged that they did not believe the 400kV Switchgear has been assessed and passed conformity. They flagged that they would be disappointed if this issue had a significant impact and caused a potential delay to their customers 2026 connection dates.

Decision following consultation

2.11 Having considered the consultation response, our decision is that the optioneering phase considered a suitable range of technical options and that Option 3 is the optimal solution. We will continue to engage with NGET regarding managing any impact associated with the implementation of novel technology required for the 400kV switchgear or an SF6 free solution.

2.12 We note that Harker would not be the first GIS switchgear in the UK to attempt to minimise SF6; NGET are in the process of delivering 400kV gas insulated switchgear at Bengeworth Road Substation, where SF6 will only be present in the interruption components. SF6-free insulation mediums will be in use for the remaining switchgear. We expect NGET to lean on this experience in their solution for Harker and adopt a similar approach if reasonably practicable.

CBA results

Consultation position

- 2.13 We agreed with NGET that the CBA supports the need for investment on this part of the network and that it justifies their progression of Option 3 as the preferred option.
- 2.14 We were also satisfied that Option 3 remains the most appropriate option under a reasonable range of tested sensitivities.

Consultation responses and our views on them

- 2.15 The consultation responses agreed with our minded-to position; ENWL offered additional information on the level of connected, accepted to connect and offered applications across the area. In their view, the evidence suggests that the needs case for the project is growing stronger over time.

Decision following consultation

- 2.16 Having considered the consultation response, our decision is that an appropriate range of viable options and sensitivities were tested in the CBA and that the outcome remains a strong indicator of the need for investment at Harker.

3. Delivery via a competition model

Section summary

This chapter summarises our July 2023 consultation position, consultation responses regarding whether to apply a late competition model, and our decision following consideration of those responses.

Background

3.1 Competition in the design and delivery of energy networks is a central aspect of the RIIO-2 price control. Competition can have a key role to play in driving innovative solutions and efficient delivery that can help meet the decarbonisation targets at the lowest cost to consumers. We set out in our Final Determinations¹⁸ for RIIO-2 that during the RIIO-2 period, all projects that meet the criteria for competition and are brought forward under an uncertainty mechanism¹⁹ will be considered for potential delivery through a late competition model.

Consultation position, responses, and decision

Consultation position

- 1.2 Our consultation position was that we considered the Harker project does not meet the criterion for being entirely 'new' or 'separable'. Whilst the preferred option involves the construction of new assets, a number of existing assets will be retained and reused, hence the proposals cannot be deemed entirely new.
- 3.2 In addition, our minded-to position stated that applying any of the competition models would be detrimental to the interests of consumers.

Consultation responses and our views on them

- 3.3 The consultation responses agreed with our consultation position that Harker should remain within LOTI.

Decision following consultation

¹⁸ [RIIO-2 Final Determinations](#), Core Document (REVISED), chapter 9

¹⁹ [Large Onshore Transmission Investments \(LOTI\) Re-opener Guidance](#), pages 9-11

3.4 Having considered the consultation response, our decision is that the Harker project should be retained within the LOTI mechanism and be delivered by NGET as part of the RIIO-2 price control.

4. Large project delivery

Section summary

This chapter summarises our July 2023 consultation position, consultation responses regarding large project delivery options, and our decision following consideration of those responses.

Background

4.1 In the RIIO-2 Final Determinations²⁰, we set out our approach to late delivery of large projects (i.e. >£100m). The aim of the approach is to ensure that a network company does not benefit financially from a delay to project delivery and that consumers are protected from any delay in delivery. To this end, we have considered setting a Project Delivery Charge (PDC) which will apply for each day a project is delivered late.

Consultation position, responses, and decision

Consultation position

- 4.2 We stated that to address the possibility of NGET benefitting financially from any delay in delivery we will re-profile the allowances to reflect actual expenditure.
- 4.3 We stated that we would consider the appropriate project delivery mechanism and PDC level at the PA stage. We also stated that we would not propose the Milestone-Based approach as we do not consider there are any appropriate milestones in the delivery plan that could be used to set allowances in a manner that will protect consumers.

Consultation response and our views on them

- 4.4 NGET agreed with Ofgem's stated aim of ensuring network companies do not benefit financially from a delay to the delivery of LOTI projects and that, if a project is delivered late, reprofiling may be used to reflect actual expenditure.
- 4.5 NGET also agreed with our position on the Milestone-Based Approach however it disagreed with our position on the PDC. In their view it would be inappropriate to

²⁰ [RIIO-2 Final Determinations](#), ET Annex (REVISED), page 32 onwards

apply a PDC where Ofgem has mandated an SF6-free solution, given that the technology is not readily available within the market and has not yet undergone testing. They hold that it would be unreasonable for NGET to be exposed to either a PDC or any other form of financial penalty under the LPD given that outcomes from new technology testing are out with their control.

4.6 NGET further stated that an evaluative PCD would be an appropriate alternative to LPD.

4.7 ENWL did not provide a response on this question as they did not feel sufficient information was included in the consultation to offer a view.

Decision following consultation

4.8 Having considered the consultation responses, our decision is that it remains appropriate to consult and decide on the appropriate LPD mechanism and incentivisation at the PA stage.

4.9 We do not consider that an evaluative PCD is an appropriate alternative to LPD. In accordance with our RIIO-2 Final Determinations ET Annex revised,²¹ the LPD framework applies to all LOTI projects. As such, we expect that one of the re-profiling mechanism or milestone based approach will be applied to all projects, and the PDC may also apply.

²¹https://www.ofgem.gov.uk/sites/default/files/docs/2021/02/final_determinations_et_a_nnex_revised.pdf

5. Next steps

Section summary

This chapter sets out the next steps in our assessment of the Harker project.

- 5.1 The next stage of the LOTI assessment process is the PA stage at which point we will assess the project estimate, determine an efficient allowance, and set the appropriate delivery mechanism and incentivisation. As noted above, we expect NGET to submit an SF6-free solution for assessment.