NIA Project Registration and PEA Document

Date of Submission:

*Notes on Completion: Please refer to the NIA Governance Document to assist in the completion of this form. Please use the default font (Calibri font size 10) in your submission. Please ensure all content is contained within the boundaries of the text areas. The full-completed submission should not exceed 10/12 pages in total.*

1. Project Registration

|  |  |  |
| --- | --- | --- |
| Project Title (*This cannot be changed once registered*) |  | Project Reference |
| Centralised Strategic Network Plan Decision Making Tool -EconomicC |  | NIA2\_NESO096 |
| Funding Licensee(s) |  | Project Start Date |
| National Energy System Operator (NESO) |  | 19/11/2024 |
| Nominated Project Contact(s) |  | Project Duration |
| Sathsara Abeysinghe |  | 2 months |
| Contact Email Address |  | Project Budget |
| innovation@uk.nationalenergyso.com |  | £90,000 |

**Project Summary (125 words limit)**

NESO has historically used Least Worst Regret (LWR) analysis to identify the preferred long-term electricity transmission network reinforcement options based on potential futures provided by the Future Energy Scenarios (FES). LWR is regarded as “risk-averse” approach (avoiding risk or uncertainty). NESO is moving from using a range of scenarios to a Single Strategic Energy Pathway (SSEP) for nearer term followed by a range of Future Energy Pathways (FEP) for long-term.

In the absence of multiple scenarios in the nearer term and with the need for anticipatory investments, LWR may not be the best decision-making tool. This project will appraise an array of analytical framework options, narrow down to those most promising for the CSNP, and undertake worked examples to conclude with the recommended tool and an implementation roadmap highlighting a suitable deployment path.​

**Benefits Summary (125 words limit)**

The economic decision-making tools developed through this project will ensure that sufficient investment for electricity transmission network reinforcements is delivered on time to meet Net Zero targets. By addressing the complexities of a high uncertainty and high investment energy landscape, the tools will provide essential transparency, allowing stakeholders to make informed decisions with confidence**.​**

**Lead Sector**

|  |  |
| --- | --- |
| Electricity Distribution | Gas Distribution |
| Electricity Transmission  × | Gas Transmission |

**Other Sectors**

|  |  |
| --- | --- |
| Electricity Distribution | Gas Distribution |
| Electricity Transmission  × | Gas Transmission |

**Primary Research Area** *(Please select just one)*

|  |  |
| --- | --- |
| Net zero and the energy system transition  × | Optimised assets and practices |
| Flexibility and Commercial Evolution | Whole Energy System |
| Consumer Vulnerability | Data and Digitalisation |

**Secondary Research Area** *(Please select up to two)*

|  |  |
| --- | --- |
| Net zero and the energy system transition | Optimised assets and practices  × |
| Flexibility and Commercial Evolution | Whole Energy System |
| Consumer Vulnerability | Data and Digitalisation |

**Development steps**

|  |  |
| --- | --- |
| Technology Readiness Level (TRL) at Start  2 | TRL at Completion  4 |

1. Project Details
   1. Problem(s)

This should outline the Problem(s) which is/are being addressed by the Project. This cannot be changed once registered.

In the past, NESO has used Least Worst Regret (LWR) as its decision-making tool for economic assessment to identify the preferred electricity transmission network reinforcement options given a range of potential future generation and demand backgrounds provided by the Future Energy Scenarios (FES). This method is regarded as “risk-averse”: it chooses the option that is never very wrong.

CSNP will provide a blueprint out to 2050: this longer-term planning horizon will include significant uncertainty whilst at the same time require increased levels of network expansion and anticipatory network investment. Consequently, LWR will not be the best decision-making tool for the CSNP.

As NESO develops the SSEP and CSNP, it is important to adapt decision-making tools and stress-test for different scenarios to ensure robust and informed decisions are made. Therefore, the purpose of this project is to review existing economic decision-making tools and recommend the tool that will enable CSNP to deliver net zero by 2050.​

* 1. Method(s)

This section should set out the Method or Methods that will be used in order to provide a Solution to the Problem. The type of Method should be identified where possible, eg technical or commercial.

For RIIO-2 projects, apart from projects involving specific novel commercial arrangement(s), this section should also include a Measurement Quality Statement and Data Quality Statement. [You can find more information here](https://nationalgridplc.sharepoint.com/:w:/s/GRP-INT-UK-ESOInnovation/EUHa8ywhnJ9EmaRDlEXTOGcBR-ixyoa2Nd9onfMs66xdsw?e=fefb74).

Workstream 1: Review the available literature on the tools that are available for transmission network planning

* Review of tools available that are suitable for the CSNP, that is high-investment requirements for the Net-Zero environment but also provide consumer value.
* Review what tools are used elsewhere, in other industries facing high uncertainty and potentially high investment.
* Highlight the strengths and weaknesses of each tool.
* Explain why, in the current energy environment that requires timely or proactive network investment, that the recommended tool is the most appropriate.

Workstream 2: Recommend a clearly defined decision-making tool(s) for transmission network planning

* Whilst the NOA/TCSNP process has tended to be focused on constraint costs and CAPEX, the CSNP may include additional economic assessments. The tool should be able to incorporate other economic components such as socio-economic welfare.
* The tool must clearly show how the decision is made and what has driven the outcome.
* The tool must be able to function with a range of scenarios or possible different outcomes. What other decision-making tools are available that would be a better solution in the current energy environment that requires timely or proactive network investment.
* The tool should be suitable for the high uncertainty/high investment energy landscape, providing transparency and confidence in decisions made.
* Explain whether the tool is mechanistic, like LWR, or should it be more of an interactive analytical process with decision makers providing judgement.

Workstream 3: Assess the practicality of the new tool.

* Provide a detailed coverage of how the tool would work in practice.
* Provide worked examples relating to the current and future energy landscape of high uncertainty, high investment costs and the potential need for anticipatory investment.
* Provide worked examples of how the tool would be flexible enough to cope with major changes in the energy landscape, for example zonal pricing or pathways with multiple sensitivities.
* Explain how the tool will work when in the near-term scenarios are replaced by a central view with sensitivities and followed in the longer term by a range of pathways.

Phases, Work Packages, Deliverables, Data use

In line with the Electricity Network Association (ENA’s) ENIP document, the risk rating is scored Low

TRL Steps = 1 (2 TRL steps)

Cost = 1 (<£500k)

Suppliers = 2 (2 suppliers)

Data Assumptions = 2

Total = 6 (Low)

* 1. Scope

The scope and objectives of the Project should be clearly defined including the net benefits for consumers (eg financial, environmental, etc). This section should also detail the financial benefits which would directly accrue to the GB Gas Transportation System and/or electricity transmission or distribution.

**The scope of the work**

The project aims to recommend a decision-making tool for the CSNP that identifies the preferred electricity transmission network reinforcement options based on a range of potential future generation and demand backgrounds including SSEP pathway, FES scenarios, and sensitivities around those pathways and scenarios. The focus is on economic factors.

**The project will:**

* Review tools available that are suitable for the CSNP, that is high-investment requirements for the Net-Zero environment but also provide consumer value.​
* Identify what tools are used elsewhere, in other industries facing high uncertainty and potentially high investment.
* Highlight the strengths and weaknesses of each tool. The chosen tool must be robust, transparent, and easily understood by the industry. It must seamlessly integrate with the outputs of the SSEP, FES and other CSNP processes and be flexible enough to accommodate changes in the number of scenarios and other developments in subsequent iterations. The project will explain why the recommended tool is the most appropriate.

The recommendation will include examples of how the tool would work in practice, including:

* Examples relating to the current and future energy landscape of high uncertainty
* High investment costs and the potential need for anticipatory investment
* Examples of how the tool would be flexible enough to cope with major changes in the energy landscape, for example zonal pricing or pathways with multiple sensitivities.

**Out of scope**

Balancing other factors such as environmental and community considerations, as well as deliverability and operability of network design options, are outside the scope.

**In summary**

The project will explain why the recommended tool is the most appropriate in an environment that demands timely and proactive network investment. The proposed tool will focus on delivering robust and transparent recommendations to ensure anticipatory investments align with Net Zero 2050 goals, as opposed to tools with less proactive approaches that may fail to meet these targets.

* 1. Objectives

This cannot be changed once registered.

The objective of the project is to:

* Deliver a decision-making tool for the Centralised Strategic Network Plan which will allow NESO to identify the optimal electricity transmission network reinforcement options based on a range of potential future energy pathways and sensitivities.

The tool will:

* Ensure informed and effective decision-making for the benefit of consumers and the environment.
* Ensure transparency in the assessment methodology and decision-making process.
* Consider the sensitivities and risk profiles associated with the input pathways and scenarios.
* Facilitate timely investments.
* Strive to minimise costs for consumers while maintaining the reliability and efficiency of the network.
* Contribute to achieving Net Zero goals.
  1. Consumer Vulnerability Impact Assessment (RIIO-2 projects only)

Details of the expected effects of the Method(s) and Solution(s) upon consumers in vulnerable situations. This must include an assessment of distributional impacts (technical, financial and wellbeing-related). For RIIO-1 projects please add “Not Applicable”

NESO does not have a direct connection to consumers, and therefore is unable to differentiate the impact on consumers and those in vulnerable situations.

* 1. Success Criteria

Details of how the Funding Licensee will evaluate whether the Project has been successful. This cannot be changed once registered.

The project will be deemed successful if the following criteria are met:

* Decision making tools and approach are clearly identified for the economic assessment of network reinforcement options within the CSNP
* Implementation approach defined​ and clear worked examples are provided
* Internal and External Stakeholder buy-in and executive support​
  1. Project Partners and External Funding

Details of actual or potential Project Partners and external funding support as appropriate.

Frazer Nash Consultants and University of Edinburgh will carry out the work. No external funding is required.

* 1. Potential for New Learning

Details of what the parties expect to learn and how the learning will be disseminated.

The project will identify a range of economic decision-making tools suitable for long-term energy transmission network planning and will recommend the best decision tools to be used for the Centralised Strategic Network Plan (CSNP). The project will assess the tools not only from a theoretical perspective but will also consider their suitability for use in the current rapidly evolving GB strategic energy planning landscape. The project will review a broad spectrum of decision-making tools used across a range of industries, identify the strengths and weaknesses of each, select the most appropriate and provide worked examples of how the tool can be applied to making decisions where there is deep uncertainty.

The final project report will be publicly available, and the project outcome will be presented to the key external and internal stakeholders through the CSNP working groups**.** The project will increase knowledge regarding decision making under deep uncertainty for strategic energy planning.

* 1. Scale of Project

The Funding Licensee should justify the scale of the Project – including the scale of the investment relative to the potential benefits. In particular, it should explain why there would be less potential for new learning if the Project were of a smaller scale.

The project will be delivered in 3 work packages over 2 months.

* 1. Geographical Area

Details of where the Project will take place. If the Project is a collaboration, the Funding Licensee area(s) in which the Project will take place should be identified.

This project has a geographical scope of Great Britain.

* 1. Revenue allowed for in the current RIIO settlement

An indication of the funding provided to the network licensee within the current RIIO settlement that is likely to be surplus to requirements as a result of the Project.

None

* 1. Indicative Total NIA Project Expenditure

An indication of the total Allowable NIA Expenditure that the Funding Licensee expects to reclaim for the whole of the Project (RIIO1).

An indication of the Total NIA Expenditure that the Funding Licensee expects to reclaim for the whole of the Project (RIIO2).

£90,000

1. Project Eligibility Assessment

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

* 1. Requirement 1 - facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

* + 1. How the Project has the potential to facilitate the energy system transition:

The proposed economic decision-making tools will enable the right investment decisions at the right time on transmission network reinforcements to facilitate decarbonisation of the energy system**.**

* + 1. How the Project has potential to benefit consumer in vulnerable situations:

N/A

* 1. Requirement 2 / 2b - has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter’s and/or Electricity Transmission or Electricity Distribution licensee’s network, or wider benefits, such as social or environmental.

* + 1. Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

N/A

* + 1. Please provide a calculation of the expected benefits the Solution

This is for Development or Demonstration Projects, not required for Research Projects. It should be (Base Cost – Method Cost, Against Agreed Baseline) and include a description of the recipients of the benefits.

N/a as research project

* + 1. Please provide an estimate of how replicable the Method is across GB

This must be in terms of the number of sites, the sort of site the Method could be applied to, or the percentage of the Network Licensees system where it could be rolled-out.

The Method will be suitable to apply across GB

* + 1. Please provide an outline of the costs of rolling out the Method across GB.

N/A

* 1. Requirement 3 / 1 – involve Research, Development or Demonstration
     1. RIIO-1 Projects

A RIIO-1 NIA Project **must have the potential to have a Direct Impact on a Network Licensee’s network** or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

|  |  |
| --- | --- |
| A specific piece of new (i.e. unproven in GB, or where a Method has been trialled outside GB the Network Licensee must justify repeating it as part of a Project) equipment (including control and communications systems and software) |  |
| A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software) |  |
| A specific novel operational practice directly related to the operation of the GB electricity transmission or distribution systems |  |
| A specific novel commercial arrangement |  |

* + 1. RIIO-2 Projects

A RIIO-2 Project must involve the Research, Development or Demonstration of at least one of the following:

|  |  |
| --- | --- |
| A specific piece of new equipment (including monitoring, control and communications systems and software) |  |
| A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven |  |
| A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information) | × |
| A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology |  |
| A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution |  |
| A specific novel commercial arrangement |  |

* 1. Requirement 4 / 2a – develop new learning

A Project must develop new learning that can be applied by Gas Transporter and/or Electricity Transmission or Electricity Distribution licensees. For RIIO-1 Network Licensees may wish to address challenges specific to their network.

Please answer one of the following:

* + 1. Please explain how the learning that will be generated could be used by relevant Network Licenses

By reviewing a broad range of decision making tools and by recommending the solution that will identify anticipatory investments in a future with significant uncertainty, the project highlight a tool that may be applicable for other areas within the energy sector where a solution is required and future scenarios highlight deep uncertainty. The project will deliver a robust assessment of a wide range of tools, both from an academic perspective and from a pragmatic, practical solution viewpoint.

* + 1. Or, please describe what specific challenge identified in the Network Licensee’s innovation strategy is being addressed by the Project (RIIO-1 only)

N/A

* + 1. Is the default intellectual Property Rights (IPR) position being applied?

This cannot be changed once registered.

|  |  |
| --- | --- |
| Yes  × | No |

If “no”, the following questions must be answered:

* + - 1. Demonstrate how the learning from the Project can be successfully disseminated to Network Licensees and other interested parties:

* + - 1. Describe how any potential constraints or costs caused, or resulting from, the imposed IPR arrangements:

* + - 1. Justify why the proposed IPR arrangements provide value for money for customers:

* 1. Requirement 5 / 2c – be innovative

A Project must be innovative (ie not a business as usual activity) and have an unproven business case entailing a degree of risk warranting a limited Research, Development or Demonstration Project to demonstrate its effectiveness. This could include Projects which are untested at scale, or in relation to which there are risks, which might prevent the widespread deployment of the equipment, technology or methodology.

* + 1. Why is the project innovative?

RIIO-1 projects must include description of why they have not been tried before.

Whilst there has been some academic review of decision making under uncertainty, this project will provide more detail on which tool is best for the NESO going forward​ and what tool would be flexible enough to cope with major changes in the energy landscape, for example zonal pricing and pathways with multiple sensitivities​. A thorough review of the methods and techniques from academics and literature is required and an in depth assessment of how these can be applied to the specific use case of the CSNP is needed. Specific expertise is required to conduct this task as an understanding of both the technical methods and techniques to be assessed and the planning processes used within NESO is required. ​

* + 1. Why is the Network Licensee not funding the Project as part of its business as usual activities?

As this project will be assessing methods not previously demonstrated in an electricity system operation environment with high levels of uncertainty and risk, this would not fall into BAU activities.

* + 1. Why can the Project can only be undertaken with the support of NIA?

This must include a description of the specific risks (e.g. commercial, technical, operational or regulatory) associated with the Project.

The TRL of the proposed work is relatively low. Therefore, innovation funding is more suitable for exploring the project's potential before transferring into BAU activities.

Conducting this project with NIA funding will ensure that the project findings can be shared more widely with other interested parties.

* 1. Requirement 6 / 2d – not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

* + 1. Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

The proposed project aims to provide a novel approach to economic decision making under uncertainty to identify the right investment decisions on the electricity transmission network required across the GB network, under the new CSNP framework. The existing methodologies would not be suitable as the key inputs and the objectives of the CSNP are different from the traditional long-tern transmission network planning process.

* + 1. If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

N/A

**Relevant Foreground IPR**   
*Please provide a list of the relevant foreground IPR that will be generated in the course of the project e.g. reports, models, tools etc.*

* A technical report detailing the methodologies/approach of the decision-making tool.
* Worked examples demonstrating the application of the tool.

**Data Access Details** *(standard NESO response - please do not edit)*

Data for this project and all other projects funded under the Network Innovation Allowance (NIA), Network Innovation Competition (NIC) or the new Strategic Innovation Fund (SIF) can be found or requested in a number of ways:

1. A request for information via the Smarter Networks Portal at <https://smarter.energynetworks.org>, to contact select a project and click ‘Contact Lead Network’. NESO already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
2. Via our Innovation website at [Innovation | National Energy System Operator](https://www.neso.energy/about/innovation)
3. Via our managed mailbox [innovation@nationalenergyso.com](mailto:innovation@nationalenergyso.com)

Details on the terms on which such data will be made available by National Energy System Operator can be found in our publicly available “Data sharing policy relating to NIC/NIA projects” at <https://www.neso.energy/document/168191/download>

1. PEA approval

The senior person (RIIO-1) or senior network manager (RIIO-2) responsible for implementing RIIO-2 NIA Projects must approve the PEA. It must then be published on the Project Registration page of the Smarter Networks Portal.

|  |  |
| --- | --- |
| **Please confirm this project has been approved by a senior member of staff** | × |