Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Dec 2024

Project Reference Number

NIA2_NESO096

Project Registration

Project Title

Centralised Strategic Network Plan Decision Making Tool (CSNP)

Project Reference Number

NIA2_NESO096

Project Licensee(s)

National Energy System Operator

Project Start

November 2024

Project Duration

0 years and 3 months

Nominated Project Contact(s)

innovation@uk.nationalenergyso.com

Project Budget

£90,000.00

Summary

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.

Nominated Contact Email Address(es)

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Problem Being Solved

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.

Method(s)

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)

Scope

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.

Objective(s)

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.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

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

Success Criteria

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

Project Partners and External Funding

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

Potential for New Learning

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.

Scale of Project

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

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

This project has a geographical scope of Great Britain.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£90,000

Project Eligibility Assessment Part 1

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).

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:

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.

How the Project has potential to benefit consumer in vulnerable situations:

n/a

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.

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

n/a

Please provide a calculation of the expected benefits the Solution

N/a as research project

Please provide an estimate of how replicable the Method is across GB

The Method will be suitable to apply across GB

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

N/A

Requirement 3 / 1

Involve Research, Development or Demonstration

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 system 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 Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ 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

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

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.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

n/a

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

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.

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.

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

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has 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.

Relevant Foreground IPR

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

Data Access Details

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
3. Via our managed mailbox 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

Please identify why the Network Licensees will not fund the project as apart of it's business and 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.

Please identify why the project can only be undertaken with the support of the NIA, including reference to 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.

This project has been approved by a senior member of staff

☑ Yes