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

Feb 2025

### Project Reference Number

NIA2_NESO073

## Project Registration

### Project Title

Future Operator Console: Optimised Visualisations

### Project Reference Number

NIA2_NESO073

### Project Licensee(s)

National Energy System Operator

### Project Start

September 2024

### Project Duration

2 years and 1 month

### Nominated Project Contact(s)

innovation@nationalenergyso.com

### Project Budget

£400,000.00

### Summary

Monitoring, assessment, decision support and action takes place continuously in the control room and good situational awareness is essential for these activities. The way information is presented tends to encourage reactive behaviour from control room operations as opposed to proactive system management.

This project will involve a review of the NESO's current control room methods to evaluate for visualisation alternatives. From this there will be a recommendation of guidelines and designs which will have the potential to optimise both visual comprehension and decision-making in the control room.

Control room engineers will evaluate the visualisations to test against current practices and determine whether the alternatives would increase situational awareness and decision-making.

### Nominated Contact Email Address(es)

Innovation@neso.energy

### Problem Being Solved

In NESO's Control Room, monitoring, assessment, decision support and action takes place continuously. Situational awareness is provided using many different display formats, and some of these are provided as an overview of system condition on a large videowall. The system condition is presented via a schematic of circuit status, surrounded by a selection of "useful" tabular formats.

## Method(s)

This project will predominantly be desk-based research looking at the science of visual perception and the control room design for enhanced operational awareness in future energy scenarios.

This project will consist of the following Work Packages (WPs) as listed below:

WP1: Control Room (CR) methods and case study development

This will involve reviewing the current CR methods in turn leading to identification of case studies, along with plans for simulation work.

WP2: Visual Acuity

This stage will involve the analysis of visual acuity (size, brightness and contrast). Recommendations will be documented, providing example visualisations and test results.

WP3: Saliency

This stage will involve the analysis of what stands out, including saliency and crowding measures. Recommendations will be documented, providing example visualisations and test results.

WP4: Colour

This stage will involve looking at the use of colour and the analysis of different colour vision. Recommendations will be documented, providing example visualisations and test results.

WP5: Annotations and Contextual Information

This will involve looking at the representation of faults, missing data and uncertainty measures. Recommendations will be documented, providing example visualisations and test results.

WP6: Decision-making

This involves cognition on visual data, where there will be experimental rank of visual alternatives on speed and accuracy.

WP7: Screen size effect

There will be evaluation of use-cases at two screen sizes (desktop and video wall).

WP8: Final recommendations

This will be the final stage, where advanced factors e.g., dual-target cost, peripheral vision testing, based on outcomes from WP2 to WP7 will be considered. Based on this, final recommendations will be outlined.

In line with the ENA's ENIP document, the risk rating is scored Low.

TRL Steps = 2 (3 TRL steps)

Cost = 1 (£400k)

Suppliers = 1 (1 supplier)

Data Assumptions = 2

Total = 6 (Low)

## Scope

NESO is working to develop the Operator Console Project to deliver an innovative way to streamline data and information to aid operator decision support. This project will provide an analysis of overview visualisations and associated 'design principles' that can

be applied to the control room. It will consider academic concept and test against current and future data sets, while also potentially providing opportunities to validate ongoing work. It is a desktop study looking at the science of visual perception and the control room design for enhanced operational awareness in future energy scenarios.

## Objective(s)

- To assess current control room (CR) methods and the influence of known visual factors and the limits on the CR visuals.
- Evaluate visualisation alternatives for the CR and provide recommended guidelines and designs that can improve visual comprehension and decision-making for CR tools.
- Generate and document synthetic zero carbon simulation data for case studies to consider for operational conditions.

## Consumer Vulnerability Impact Assessment

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

## Success Criteria

The project's success will be measured by its ability to achieve the objectives, through:

- Understanding around current visualisations on where they are not contributing to situational awareness and proactive behaviour and recommendations on how they can be improved
- Recommendations on how visualisations can be used to enhance operational awareness (visual comprehension and decision-making) in future energy scenarios in the control room.

## Project Partners and External Funding

King’s College London will be carrying out the work, and no external funding is required.

## Potential for New Learning

The specific learnings of this project will depend on the analysis of the work. It is envisaged that the findings will be used to create an optimised visualisation feel across the whole control room, to ensure consistency and improve situational awareness.

All future learnings will feed into ongoing innovation work, and they will be used in the development of future visualisations across all applications e.g. Advanced Dispatch Optimiser.

Results will be disseminated across networks through the NIA reports on the ENA smarter network portal and the wider industry through knowledge sharing forums where possible to enable other network operators to consider the use of optimised visualisation design principles, as appropriate.

## Scale of Project

The project spans 24 months with one project partner. The project consists of desktop-based research and workshops with the relevant teams across NESO.

## Technology Readiness at Start

TRL2 Invention and Research

## Technology Readiness at End

TRL5 Pilot Scale

## Geographical Area

The project will be based upon the GB NESO area of operation.

## Revenue Allowed for the RIIO Settlement

None

## Indicative Total NIA Project Expenditure

£400,000

# Project Eligibility Assessment Part 1

## Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

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

## How the Project has the potential to facilitate the energy system transition:

This project is expected to generate and document synthetic zero carbon simulation data for case studies to consider for operational conditions. It is anticipated that the project will outline methods to improve situational awareness tools, which will improve speed, accuracy and reliability of decision making with more complex information in net zero operating conditions. The results are also anticipated to be disseminated across the industry to enable other network operators to consider the use of optimised visualisation design principles; this approach has the capacity to mirror the similar, expected outcomes as set out in this project.

## 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

N/A

## Please provide a calculation and/or description of the expected benefits of the solution

This is an early stage design project that will inform future work, so no cost can be attributed at this stage.

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

This project will consider factors affecting the Electricity National Control Centre (ENCC) control room for GB's electricity system operation. The methodology therefore can not be used in the electricity sphere but can be used by other network operators in a similar manner to consider their respective usages of optimised visualisation design principles, as appropriate.

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

This project will consider factors impacting the monitoring, assessment, and decision-making measures in the ENCC, as part of a desktop research study. Incorporating the findings of this research will not require any significant time or cost to roll out.

## Requirement 3 / 1

Involve Research, Development or Demonstration

Projects 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

Involve Research, Development or Demonstration - Please select all that apply

☐ 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

Other Network Operators may benefit from the methodology used in this project to consider their respective usages of optimised visualisation design principles, as appropriate.

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. Networks must explicitly mention similar projects that they have considered and how these differ.

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

NIA_SSEN_0053- Future Control Room | ENA Innovation Portal (energynetworks.org)

### 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

This project involves adapting scientifical aspects of visual perception to control room design for enhanced operational awareness in future energy scenarios.

### Relevant Foreground IPR

The following foreground IPR is expected to be generated in the course of the project:

- A report on the review of current control room visual tasks, with examples. This will include final recommendations based of the findings from the work packages 2 – 7, covering different visual aspects used in the control room.

### 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 a part 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 overall framework is relatively low. Therefore, innovation funding is more suitable for exploring the project's potential and increasing the TRL before transferring into BAU activities.
- The use of NIA will also ensure that project outcomes and learnings can be shared with the industry.

## This project has been approved by a senior member of staff

☑ Yes