

NIA Project Registration and PEA Document

Date of Submission

Dec 2024

Project Reference Number

NIA_WWU_2_71

Project Registration

Project Title

Situational Awareness

Project Reference Number

NIA_WWU_2_71

Project Licensee(s)

Wales & West Utilities

Project Start

December 2024

Project Duration

0 years and 10 months

Nominated Project Contact(s)

Bethan Winter

Project Budget

£212,634.00

Summary

This project will research the latest developments in Human Machine Interface (HMI) theory and human factors (HF) to ensure any new process and systems design, relating to the use of control room systems through the net zero transition, is done in a way that best supports the users of the system.

Preceding Projects

NIA_WWU_02_27 - Gas Control System – Impact Assessment (Future requirements)

Third Party Collaborators

Frazer-Nash Consultancy

Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

Problem Being Solved

The existing suite of control centre systems used in the GB Gas Networks is not designed to support the transition to net zero. The Gas Networks anticipate the introduction of hydrogen as a blend from in the late 2020's, potential transition to full hydrogen from the 2030's and possible decommissioning of parts of the network from the late 2040's. As this transition happens it may not be possible to undertake our system operation activities on the basis of whole LDZ as we do now, and the configuration of our network topology is likely to change on a frequent basis. There will also be new industry arrangements to incorporate, in particular around gas quality and to support settlement arrangements and billing.

During 2023 WWU, in collaboration with NGN and NG, undertook an initial NIA project - Gas Control System – Impact Assessment

(Future requirements) NIA_WWU_02_27 - to fully understand the impact of a range of future scenarios on each of our processes, systems and roles, regarding the gas control room. A key finding of the project was the implications of transition on human factors with potential impacts on situational awareness, fatigue and supervision requirements, particularly for our 24/7 control centre teams

Method(s)

The NIA project - Gas Control System – Impact Assessment (Future requirements) NIA_WWU_02_27 identified risks including:

- Our systems don't adequately enable visualisation of the current state of the network and its configuration in a rapidly changing environment.
- The pace and magnitude of change may lead to an increase in errors in operation because the relevance and value of local knowledge and experience diminishes.
- There is likely to be an impact on the fatigue of control room engineers because of additional complexities in managing and keeping up to date with changes attributed to the transition.

This project will research the latest developments in Human Machine Interface (HMI) theory and human factors (HF) to ensure any new process and systems design, relating to the use of control room systems through the net zero transition, is done in a way that best supports the users of the system.

Whilst we do have clear positions on human factors and have done for some years, we now need to account for this new dynamic of rapid change to the physical system, potential commercial distractions and changing relationships between volume and energy content of green gasses. All of this could lead to distraction and a loss of connectedness to what's happening in real time. This is a new dynamic for our control centre, and gas control centres in general and may not be considered in current industry control centre guidance documents.

This project will cover HMI and situational awareness guidance for systems including views on the impact new technology opportunities, e.g., automation, could bring.

The project will:

- Define the current and future operating contexts, aligned with the adoption scenarios outlined in the Gas Control System: H2 Impact Assessment project.
- Consolidate current theoretical and best practice human factors (including lessons learned in analogous contexts) in areas including Human Factors Engineering (HFE), control room design and operations, controller's cognition (e.g. situational awareness), HMI and Management of Operational Change (MoOC).
- Define overarching conceptual framework, recommend best practice approaches based on existing practices, and identify and prioritise any gaps in the existing knowledge base.
- Undertake interviews with external stakeholders who have experienced changes to operating contexts and systems, to understand their perspective
- Develop novel approaches to address the gaps and validate recommendations with networks to ensure that they are operationally practicable and appropriate.
- Report project outputs, including method, findings, recommendations and guidance, in both full report and executive summary formats.

Measurement & Data Quality Statement

Our Data Quality Plan will mirror best practice as outlined in Ofgem's Data Best Practice Guidance and Ofgem's Data Assurance Guidance, to ensure that the risks associated with data are identified and managed; that data assurance activities are in place, and that the reporting requirements are met for submissions.

Fully agreed project methodology will be reviewed and agreed at the Kick off Meeting, including methodology, systems, responsibilities, timings, and milestones in the project where data sources need to be created / obtained, associated, merged or consumed. Risks associated with data assets (including final reports) will be identified, discussed and mitigated.

Frazer-Nash will capture the steps that we will take to ensure that data (raw and processed) are of sufficient completeness, accuracy and integrity, not only for this current project, but for future projects and users that might benefit from data reuse. For example, they will:

- Draw solely on quality, reliable data sources (e.g. reputable sources), ideally collaborated or validated wherever possible.
- Record supporting information relating to the data (e.g. its provenance or point of contact), as accurately as possible while preserving any information that could be confidential or commercially sensitive.
- Prepare templates for data capture and project submissions that ensure data are easily accessible, consumable and usable (interoperable) for all stakeholders who might find data access useful.

- The deliverables will be recorded, and Frazer-Nash will also appoint a suitably qualified and experienced independent verifier and an independent approver for both the model and report. Each deliverable will be subject to a “Deliverable Verification and Approval Record” (DVAR), which will record the agreement

The project is rated low in the common assessment framework detailed in the ENIP document after assessing the total project value, the progression through the TRL levels, the number of project delivery partners and the high level of data assumptions. No additional peer review is required for this project.

Scope

WP1 - Familiarise

Objective: Define the current and the future operating scenarios to form the basis of the review.

T1.1 Project Commencement:)

T1.2 Familiarisation Activities

T1.3 Define Gas Distribution Network Current and Future practices and systems:

Outputs:

- Sociotechnical models (1 current, 6 future) (Milestone 1).
- Human Factors Issues Register (HFIR)

WP2 – Literature and Industry Review

Objective: Review a body of research and industry practice to identify key themes, issues/considerations, methodologies, and best practices relating to the areas of interest (AOI) identified in WP1.

T2.1 Review relevant peer-reviewed HF body of research

T2.2 Review relevant Industry practice

Outputs:

- Review Summary spreadsheet summarising key HF themes and their relevance to current and future operational contexts (Milestone 2).
- Updated HFIR.

WP3 – Review and Assess

Objectives:

- Develop a conceptual GDN HF transition management framework to illustrate the key HF AOI and associated recommendations relating to each operating context.
- Develop recommendations to address the issues in the HFIR.
- Identify, risk assess, and prioritise gaps (issues in the HFIR that have no recommendations against them).

T3.1 Develop a GDN HF Transition Framework:

T3.2: Develop recommendations

T3.3: Identify gaps

Outputs:

- GDN HF Transition Framework (Milestone 3).
- Updated HFIR.

WP4 – Develop and Validate

Objective: Develop novel approaches to manage outstanding risks, and validate recommendations with stakeholders.

T4.1 Develop novel approaches

T4.2 Validate recommendations

Outputs:

- Final HFIR including novel approaches for any outstanding gaps (Milestone 4).

WP5 - Report

Objective: Detail the project method, findings and recommendations in a Full report and Executive Summary.

T5.1 Full report

T5.2 Executive Summary

Outputs:

- Full report and Executive Summary.

This project builds on previous work (NIA_WWU_02_27) and we anticipate that further phases will be needed before we can understand the true benefits that the project can bring.

There is a lot of ongoing work to identify the most effective route to meet net zero in the UK and this project is one of many projects which will assist in this area. Repurposing the UK gas networks with hydrogen to support the challenge of the climate change act has the potential to save millions of pounds with minimal gas customer disruption verses alternative decarbonisation solutions.

Objective(s)

To review and assess existing human factors guidance and best practice and to develop recommendations on how this, and any new techniques developed through the project, would support our new gas control room requirements for managing a rapidly changing environment as we transition to a net zero network.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

An assessment of distributional impacts (technical, financial and wellbeing related) for this project has been carried out using a bespoke assessment tool, which assesses the project as having a positive, negative or neutral effect on consumers in vulnerable situations. To help inform the assessment, this tool considers the categories of consumers identified in the Priority Services Register.

This project has been assessed as having a neutral impact on customers in vulnerable situations.

Success Criteria

Success will mean any new process and systems design, relating to the control room systems, will now have a suite of recommendations that considers HMI and HF in a rapidly changing environment.

Project Partners and External Funding

The project partners are Frazer-Nash. The project will be fully funded via NIA.

Potential for New Learning

The project will enhance learnings in the latest developments in Human Machine Interface (HMI) theory and Human Factors (HF) with the potential to develop new techniques to ensure any new process and systems design, relating to gas control room systems, is done in a way that best supports the users of the system and helps to enable a smooth transition to net zero

There is also potential for learning in this area to be transferable to other parts of the business.

Scale of Project

This is a desktop study, which will also include visits to the networks control rooms. This is the appropriate scale for this project, as per recommendations from a previous project NIA_WWU_02_27. Learnings from this project will feed into future projects that investigate actual changes that will be made to the control centre. The learnings could also be applicable to other departments within the networks as well as the wider industry at operate high stress, controlled environments

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project will consider the control rooms of WWU, SGN and NGN.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

External Cost

SGN: £79,737.50

WWU: £39,868.75

NGN: £39,868.75

Internal Cost

SGN: £26,579.17

WWU: £13,290

NGN£13,290

Project Eligibility Assessment Part 1

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

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

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

The system operator function is an integral part of the gas network delivering energy to customers safely. As new forms of energy start to enter the market e.g., hydrogen, and networks move towards a whole system approach, we need to ensure that all systems and procedures are fit for purpose. Part of this assessment is also how people will interact with these systems in an ever-changing landscape which will highlight ways that the transition can be managed for gas licensees system operators to ensure success.

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 (RII-1 projects only)

N/A

Please provide a calculation of the expected benefits the Solution

This project builds on previous work (NIA_WWU_02_27) and further phases will be needed before we can understand the true benefits that the project can bring.

There is a lot of ongoing work to identify the most effective route to meet net zero in the UK and this project is one of many projects which will assist in this area. Repurposing the UK gas networks with hydrogen to support the challenge of the climate change act has the potential to save millions of pounds with minimal gas customer disruption versus alternative decarbonisation solutions.

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

Any learnings would be fully replicable across network licensees.

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

This project would not have any specific roll out costs.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RII-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

RIO-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

All networks can take the learnings from this project given the consistent fundamentals of current system operation functions and consistent arrangements between GDNs and NGT.

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

All networks have been made aware of this project and no concerns of duplication have been raised.

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

Currently the control systems used are not designed to manage significant change in asset configuration or multi fuel systems, this project is one of many steps in ensuring that systems are future proofed and ready to be upgraded as and when future energy sources are bought into the network.

Relevant Foreground IPR

The reports produced as part of the project will form part of the foreground IP.

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:

- A request for information via the Smarter Networks Portal at <https://smarter.energynetworks.org>, to contact select a project and click 'Contact Lead Network'. WWU already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
- Via our Innovation website [here](#)
- Via our managed mailbox innovation@wwutilities.co.uk
- Details on the terms on which such data will be made available by Wales & West Utilities can be found in our publicly available "Data sharing policy relating to NIC/NIA projects" [here](#)

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

Ofgem published its final determinations which included a variety of provisions to enable necessary development work on Net Zero project. This project has the potential to facilitate the energy system transition, and is therefore eligible to use the NIA funding mechanism.

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 project would only be undertaken with support from NIA funding, it is in the interests of gas customers, the regulator and the UK government and the realisation of any benefits are outside the control of the gas networks. There is no allowance in BAU business plans for this type of work and there is a risk that if hydrogen is not accepted as a means to heat homes in 2050 that this work is no longer valid, hence the project can only be undertaken with the support of NIA

This project has been approved by a senior member of staff

☒ Yes