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 2022

Project Reference Number

NIA2_NGESO026

Project Registration

Project Title

Consumer Building Blocks

Project Reference Number

NIA2_NGESO026

Project Licensee(s)

National Energy System Operator

Project Start

November 2022

Project Duration

0 years and 9 months

Nominated Project Contact(s)

James Whiteford, James Kerr

Project Budget

£300,000.00

Summary

Consumers are critical to meeting net zero and are a fundamental part of the transition,not only as part of the energy picture but as part of their everyday lives and the running of their businesses. However, much of the consumer insight we have is from projects with early adopters. We can use these to base some of our assumptions, but we can make this more accurate and informed if we can capture a wider consumer base.

This project will look to develop a set of archetypes covering gas, electricity and hydrogen to benefit the further development of future energy scenarios across the whole system; gas, electricity and hydrogen, transmission and distribution. They will be developed in consultation with stakeholders across the industry to support their adoption.

Third Party Collaborators

SSE Energy Solutions

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

Consumers are critical to meeting net zero and are a fundamental part of the transition, not only as part of the energy picture but as

part of their everyday lives and the running of their businesses. However, much of the consumer insight we have is from projects with early adopters. We can use these to base some of our assumptions, but we can make this more accurate and informed if we can capture a wider consumer base.

Learning from our experience through the Open Networks programme where common building blocks for electricity were created as a standard and language, we can use this as template for cocreating consumer building blocks. This will allow us to use a common language and apply the learning at both a national and regional level. Adopting a collaborative approach will ensure we can reflect all areas of the network and understand localised changes and create joint industry strategies.

We need to understand the types of consumers, the characteristics that drive their behaviour and what this means for their consumption, propensity for change, adoption rates of technology and ability and propensity to engage with time of use tariffs. Understanding whether their engagement will be proactive or passive and the boundaries within which they would find flexing their demand acceptable. Understanding their needs, what drives their decision making, whether it be financial reward or engagement in climate change, will enable the market to best engage with them and tap into the resource that they hold.

Understanding the level of trust consumers have with different organisations in energy and broader technology will help us understand how they may engage and with whom. We can use this information to inform engagement but also the development of propositions to the consumer to increase adoption.

Method(s)

This project brings together an experienced team of subject matter experts from the Centre for Sustainable Energy (CSE) and Element Energy, with significant experience in consumer analysis. They will work in close collaboration to develop a set of archetypes covering gas, electricity and hydrogen to benefit the further development of future energy scenarios across the whole system, including transmission and distribution. They will be developed in consultation with stakeholders across the industry to support their adoption. A breakdown of the work packages is listed below:

WP0: Project coordination & stakeholder liaison (lead CSE)

Aim: work in partnership with NG ESO to ensure a coordinated approach to stakeholder engagement and delivery of outputs.

The stakeholder engagement is key to ensuring the successful delivery of the project allowing the scope to be managed and the engagement aligned with other NG ESO programmes. The stakeholders will be grouped in relation to their use of the Future Energy Scenarios (FES) (e.g., architects, primary users, secondary users) and will include transmission owners and Networks across gas and electricity as well as suppliers. Each engagement activity will have clearly defined objectives and will be targeted for the appropriate groups. The engagement will be led by the ESO to ensure integration with existing FES stakeholder engagement activities and other stakeholder engagement processes being run simultaneously by the ESO for different programmes. This requires close co-ordination between the ESO project lead, CSE and Element Energy teams.

WP0 Outputs

- Monthly consortium meetings
- Quarterly external project updates for stakeholders

WP1: Scoping (lead CSE)

Aim: to scope relevant existing work, identify key users, use-cases and modelling into which the archetypes will need to integrate – and use this to identify relevant dimensions on which to define archetypes. The scoping work helps to futureproof the archetypes by engaging future users in determining current and planned uses of the archetypes, as well as feeding their insights into the characterisation of how the energy system is expected to change. The social and system change characterisation produced in WP1.3 will provide a clear summary of the current assumptions and how these have been integrated into the archetypes' trajectories. This provides a way to update the archetypes' trajectories in the future when opinions and behaviours change.

WP1 Outputs

- Review of existing archetypes research and segmentation methods to inform stakeholder engagement strategy and WP2 data curation & WP3 archetype development
- Documented user needs
- System and social change characterisation (with stakeholder support)
- Technical specification for archetypes format

- Outline of potential changes to FES (reflecting discussions with ESO)

WP2: Data analysis & curation

Aim: Review suitability of existing datasets, identify and, where possible, address gaps to create robust datasets as inputs to segmentation. Obtain stakeholder input to dataset curation/creation.

WP2 Outputs

- Domestic consumer archetype input datasets
- I&C archetype input datasets

WP3: Segmentation & Archetype development

Aim: Develop robust segmentation methods, archetypes and archetype change trajectories that integrate into current FES modelling. Develop the archetypes in dialogue with stakeholders. Test the archetypes rigorously with ESO teams and relevant stakeholders that cover both domestic and I&C sectors. Liaise with teams running relevant projects (e.g., CrowdFlex).

WP3 Outputs

- I&C archetype technical specification & descriptions (review version)
- Domestic archetype technical specification & descriptions (review version)
- Stakeholder workshops
- ESO workshops

WP4: Outputs, User Guidance & training

Aim: Sign off final versions of all outputs, produce a guidance manual to accompany the release of the archetypes dataset and provide training and support to the ESO, network company teams and other potential users (including how the archetypes should – and shouldn't – be used) and enable them to explain the archetypes to their own wider stakeholders.

WP4 Outputs

- I&C Archetype descriptions (final version)
- I&C Archetype datasets
- Project report & presentation (I&C focus)
- User Guidance manual & training
- Scoping document on future FES directions reflecting on project outputs and stakeholder engagement outcomes
- Domestic Archetype descriptions (final version)
- Domestic consumer archetype dataset
- Project report & presentation (Domestic focus)
- User Guidance manual & training for ESO, networks & other potential users

In line with the ENA's ENIP document, the risk rating is scored Low.
TRL Steps = 1 (2 TRL steps)
Cost = 1 (£300k)
Suppliers = 1 (2 supplier)
Data Assumptions = 2
Total = 5 (Low)

Scope

The project will last approximately nine months with two project partners. CSE will develop archetypes for the domestic sector, while Element Energy will develop archetypes for the I&C sector. This division of labour fits well with the expertise and experience of both organisations.

Objective(s)

This project is split across multiple working packages, with an initial scoping phase followed by data analysis and archetype development. The objectives are as follows:

- Create two distinct sets of consumer archetypes for the domestic and non-domestic sectors to be used in modelling future energy scenarios on the GB energy system. This will include the raw data as well as archetypes descriptions.

- Create a written report which documents the methodologies, how the archetypes can be applied and how they can be updated for the future.
- Provide a user guidance manual and training for the ESO, networks and other potential users.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

The ESO 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 following will be considered when assessing whether the project is successful:

- The archetypes developed can be applied directly to the FES modelling process
- Relevant stakeholders and project partners from external organisations have received training on how to interpret the archetypes, how to apply them and how to keep them up to date.
- The archetypes will be developed in such a way that they can be easily and quickly adopted within multiple organisations (e.g., via accessible datasets, training and user guidance.
- The project will improve the ESO's and partner organisations' understanding of the types of consumers and the characteristics that drive their behaviour and what this means for their consumption, propensity for change, adoption rates of technology and ability and propensity to engage with time of use tariffs.

Project Partners and External Funding

CSE and Element Energy will be carrying out the work, no external funding required. The following organisations will also be active stakeholders in the project:

- Northern Ireland Electricity Networks
- SP Energy Networks
- National Grid Electricity Transmission
- Wales and West Utilities
- Scottish and Southern Electricity Networks
- SGN

Potential for New Learning

This project will help further understanding of:

- The types of consumers and the characteristics that drive their behaviour;
- What this means for their consumption, appetite for change, adoption rates of technology and ability and propensity to engage with time of use tariffs;
- Whether their engagement will be proactive or passive;
- The boundaries within which they would find flexing their demand acceptable;
- Their needs and what drives their decision making (whether it be financial reward or engagement in climate change).
- The level of trust consumers have with different organisations in energy as well as more broadly around technology;
- The proportions that make up each consumer archetype and how this varies geographically;
- How they may engage and with whom; and
- What would cause a consumer to move between archetypes.

Scale of Project

The project spans nine months with two project partners. The project consists of desk-based research, stakeholder engagement with partner organisations and with consumers, data analysis and dissemination.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project will be conducted in GB.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£300,000

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:

As a central player in the GB electricity system, it is the ESO's role to provide the leadership and guidance for the transition to Net Zero. We are seeking to facilitate a smooth transition through sharing insights and analysis to help industry stakeholders determine the direction of travel and make informed decisions.

The project's outcomes will be fed directly into the Future Energy Scenarios (FES), which outline various credible ways to decarbonise our energy system as we strive toward the 2050 target. The FES is a public document which plays a vital role in stimulating debate and helping to shape the energy system of the future.

To facilitate this, we would like to understand to a greater degree consumer behaviour change and how this can vary through time as well as geographically.

- The project will lead to enhanced assumptions on consumer behaviour change which will have direct implications for modelling done by NGESO and potentially by other interested parties.
- As the future energy scenarios feed directly into electricity and gas network development, an enhanced understanding of consumer behaviour will support decision making on how the networks need to develop to in response to this
- This project will support standardising consumer behaviour modelling across industry
- Allow the ESO to use these archetypes in other important projects that are part of the energy transition e.g., Crowdflex, Demand Flexibility Service.

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

Not required as research project.

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

- The project will help shape assumptions on consumer behaviour in the FES which, in turn, will improve the modelling for the Network Options Assessment (NOA), the ESO recommendations for which reinforcement projects should receive investment during the coming year.
- The project will engage other network companies from the start, to ensure they can help shape the outcomes and make use of the outputs.
- The project outputs will be shared more broadly across industry as there is an opportunity to apply consumer archetypes such as

these, in numerous ways.

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

We do not expect any direct costs of rolling out the method across GB. However, we aim to engage the various network licensees in workshops that will be held over the duration of the project to ensure that, on completion, the archetypes are used as a common language. The project outputs will also be shared more broadly across industry as there is an opportunity to apply consumer archetypes, such as these, in numerous ways.

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

The project's outcomes will be fed directly into the FES, which outline various credible ways to decarbonise our energy system as we strive toward the 2050 target. The FES is a public document which is analysed by a range of other network licensees and plays a vital role in stimulating debate and helping to shape the energy system of the future.

The intention of the project is to develop the archetypes in agreement with the network licensees to enable use in scenario development at the regional level. This will lead to strong collaboration if a common language is adopted across the transmission and distribution interface and across vectors.

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.

- Ofgem energy consumer archetypes – In 2019, CSE were commissioned by Ofgem to segment the population of Great Britain into a set of distinct groups of energy consumers, or archetypes, which together represent all households across the country. The archetypes were designed to assist with identification and understanding of different types of energy consumers. This includes those in vulnerable situations to better understand the impacts that changes in the energy system may have on these groups. The archetypes can also suggest which types of consumers are most likely to engage with and/or benefit from the energy system transition. The new archetypes will build on what was developed for Ofgem by developing a set of archetypes that could be used consistently across electricity and gas networks and input into the Future Energy Scenarios.
- CrowdFlex - CrowdFlex explores how domestic flexibility can be used in grid operations to help align demand to generation, improve coordination across the network, reduce stress on the system, while empowering consumers to be active players in reducing their energy bills via new tariffs and incentives. Consumer Archetypes will help to understand consumers propensity for change and how likely they might be to engage with ToU tariffs.

The proposed project will start with a literature review to understand the latest research and advancements in archetype development and will ensure the work is built upon rather than duplicated.

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

- Flexibility is reasonably new topic area that we need to explore further, and there isn't a coherent set of archetypes across the industry
- The project intends on developing archetypes that will be common across organisations
- The archetypes can be used for multiple purposes and across multiple projects that are at the cutting edge of development for the energy transition
- This project will introduce new skills and techniques into the energy forecasting process and potentially introduce requirements to transform modelling approaches

Relevant Foreground IPR

The following Foreground IPR will be generated from the project:

- Archetype descriptions
- Archetype datasets
- Project report & presentation
- User Guidance manual & training
- Scoping document on future FES directions reflecting on project outputs and stakeholder engagement outcomes

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’. National Grid ESO 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 https://www.nationalgrideso.com/future-energy/innovation
3. Via our managed mailbox innovation@nationalgrideso.com

Details on the terms on which such data will be made available by National Grid ESO can be found in our publicly available “Data sharing policy relating to NIC/NIA projects” at https://www.nationalgrideso.com/document/168191/download.

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

Due to the nature of the project and that it is researching potential future impacts to the grid based largely on assumptions, this does

not fall into current BAU.

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

- There are increased risks associated with the availability of required data and a high level of assumptions, which makes this project better suited to NIA.
- 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.
- Conducting this project with NIA funding will ensure that the project findings can be shared more widely with other interested network licensees.

This project has been approved by a senior member of staff

☑ Yes