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

May 2024

Project Reference Number

NIA_NGESO072

Project Registration

Project Title

Regional Whole Systems Strategic Planning (RWSSP) Methodology: Problem Statement Development

Project Reference Number

NIA_NGESO072

Project Licensee(s)

National Energy System Operator

Project Start

March 2024

Project Duration

0 years and 5 months

Nominated Project Contact(s)

box.so.innovation@nationalgrid.com

Project Budget

£220,000.00

Summary

This project will support the development of a first of its kind end-to-end system planning methodology (Regional Whole System Strategic Planning (RWSSP)) which accounts for deep and long-term uncertainty whilst driving whole system outcomes.

The new RWSSP methodology could support future Regional Energy Strategic Planning (RESP), ensuring transparent, consistent and robust planning approaches across the proposed 10-13 RESP regions.

This initial project aims to understand the landscape within which the RWSSP and RESP is being developed and define: the problem(s) being addressed by the RWSSP methodology; what is a “minimum viable product” (MVP) and enduring solution for the RWSSP methodology. It will also establish an outline structure for the future RWSSP methodology, to be built out in future phases.

Preceding Projects

10060474 - Powering Wales Renewably

NGED - SIF - 10060736 - Planning Regional Infrastructure in a Digital Environment (PRIDE)

10104062 (1) - Probabilistic Pathways for Energy System Planning

Third Party Collaborators

Energy Systems Catapult

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

There is currently no clear approach to deliver whole system strategic planning under conditions of deep uncertainty and high complexity, with urgency in the UK & abroad.

Today strategic investment planning:

- Is carried out separately by networks for single vectors.
- Lacks coordination of local and national plans as well as cross-regional interaction

Treats demand and supply separately.

- Engages stakeholders at single network level.
- Optimises for single network costs.
- Defines value at single network level.
- Lacks consistent and transparent frameworks for wider GB adoption

However, the need to transition to Net Zero and the significant development of, and investment into the energy networks that this requires, means a new approach is required and has led to whole system strategic planning taking a more prominent role, with an acknowledgement that both local needs and National goals must be taken into account when developing local plans

This led to OFGEM announcing the Regional Energy System Planner (RESP) function. The RESP is a new function designed to support improved infrastructure planning and investment by developing strategic energy plans at the regional level. OFGEM also announced that the Future System Operator (FSO) will be responsible for implementing the RESP.

These Regional Energy System Plans are themselves innovative and will be the first in the GB to, on a regional basis, aggregate top-down national targets and scenarios with local and regional insights. Aligning these local and regional insights with National goals to achieve regional energy system plans that are coherent, both within a single plan and between plans will require further innovation. The RWSSP methodology could support future Regional Energy Strategic Planning (RESP), ensuring transparent, consistent and robust planning approaches across the proposed 10-13 RESP regions. This methodology is the subject of a 3 Phase proposal (with this project representing phase 1).

This project aims to understand the landscape within which the RWSSP and RESP is being developed and define: the problem(s) being addressed by RWSSP; what is a “minimum viable product” (MVP) and enduring solution for the RWSSP methodology. It will also establish an outline structure for the future RWSSP methodology, to be built out in future phases.

This will support the development of an RWSSP-based planning methodology to facilitate the delivery of the RESP function and will support regional energy system plans and infrastructure investment which is transparent, fair and defensible and accounts for future energy system uncertainty.

Method(s)

A consortium led by Energy Systems Catapult with Siemens, Delft University of Technology, Credera and ICS Consulting, will explore the landscape within which the RWSSP and RESP is being developed, the problem(s) RWSSP is addressing; and what is a “minimum viable product” (MVP) and enduring RWSSP solution should look like. It will do this using the following approach:

WP1 – Confirm the outcomes RESP is trying to achieve with Ofgem and NESO: Building on the internal thinking undertaken in ESO and the relationship established with Ofgem, the consortium will carry out further engagement to confirm the value and expected outcomes of the RESP process based on Ofgem’s latest stated position as defined by Ofgem and ESO. This process will help unpack the question “what is the benefit of RESP?” and how the RESP creates additional value both by undertaking new and additional activities and reallocating existing activities.

This will need to draw on existing work from Ofgem and find ways to elicit and articulate a “strawman” of the value add of the RESP, from Ofgem and ESO colleagues, through a workshop.

WP2 – RESP and RWSSP landscape assessment: The landscape assessment will identify the key policies, regulations, markets, processes, stakeholders, tools, and methodologies likely to directly and indirectly interact with the RESP and RWSSP. It will establish how network planning (including DNOs and GDNOs) is currently undertaken and the models and tools available to assist it. It will assess other relevant infrastructure plans (e.g. SSEP, CSNP, FES) and key policy, regulations, and market developments (e.g., local flexibility markets) which will impact the RESP (e.g., Future System Network Regulation (FSNR)). WP2 will also identify other projects being undertaken, internally and externally, and directly relevant to the RESP.

WP3 – RWSSP project interfaces: This work package will identify and review key dependencies of the RWSSP methodology, including other infrastructure plans (e.g., SSEP), stakeholders (e.g., DNOs, GDNs), and regulatory processes (e.g., the Ofgem RESP programme). Building on the landscape review (WP2) and accounting for the value RESP is expected to realise according to Ofgem (WP1), it will establish how the RWSSP methodology should interface with these dependencies. This include taking a RACI approach, adopting working assumptions and proposing ways of working for key aspects of the future full development of the RWSSP approach (e.g., stakeholder management processes/structures). It will also identify key risks of these interdependencies to the RWSSP approach.

WP4 – RWSSP Roadmaps: Using systems engineering approaches WP4 will compare the value and outcomes RESP is trying to achieve (WP1), against the tools and methods available to meet it (WP2), to develop an outline vision for the RWSSP framework. This will include both a minimum viable product (MVP) and a more enduring RWSSP framework. It will also include high-level roadmaps showing: a) the credible pathway for development of the RWSSP over future phases of this project; and b) the transition from this MVP to a more enduring solution for the RWSSP framework. In both instances indicative timeframes will be included.
This will allow the key methodological building blocks required for the full RWSSP methodology in to be defined and sequenced in WP5 and WP6. The building blocks will include areas such as a service value framework wireframe and the high-level key requirements of a multi-model simulation methodology. More generally, these building blocks will begin to outline the solution and provide a first high-level indication of the key components a RWSSP methodology will require to deliver the value and outcomes confirmed in WP1. A more detailed review and prioritisation of these building blocks would be carried out at the beginning of the suggested Phase 2 project.

WP5 – Develop the outline structure for RWSSP framework: Based on the information derived from WP’s 1-4, WP5 will develop an outline structure for the RWSSP methodology framework describing, at a high-level, the end-to-end process, including novel methodological areas, such as how the uncertainty of market led developments (e.g., extent of local flexibility markets) will be factored in to RWSSP. This structure will focus on how the building blocks identified in WP4 should function and interact with each other. This will be an outline with further work in this area to be carried out in the future Phase 2 project.

WP6 – Phase 2 project structure: Collectively, WP1-WP5 will have confirmed the outcomes RESP is trying to achieve, the key dependencies it must interact with, and the vision and outline structure for a RWSSP framework. This will allow the project structure for a Phase 2, which will build out the detail of the outline RWSSP methodology, to be developed.
A key area to outline will be how other key stakeholders will be included in Phase 2 (e.g., DNO’s and GDN’s), either as partners or stakeholders – this will be informed by WP2 and WP4 in particular.

Whilst Ofgem’s system design plan will focus on the detailed policy framework design for RESP rather than the RWSSP methodology, we would nevertheless expect it to contain relevant information to the outline structure for RWSSP framework (WP5) and the structure of Phase 2 (WP6). Assuming it is published as expected then the relevant aspects of this detailed design phase will be built into the outline RWSSP structure and into the Phase 2 project structure.

In line with the ENA’s ENIP document, the risk rating is scored Low.
TRL Steps = 1 (1 TRL steps)
Cost = 1 (£220k)
Suppliers = 1 (1 supplier)
Data Assumptions = 2
Total = 5 (Low)

Scope

This project will last approximately 10 weeks and is seen as the first Phase of a 3 Phase approach:

Phase 1: Problem definition (this project).

This Phase 1 project is a problem definition phase and will build on engagement between ESO and the Catapult consortium to define: the problem(s) being addressed; what a "minimum viable product" (MVP) and enduring RWSSP framework looks like including the different timeframes they operate under; understand the landscape within which the RWSSP is being developed; and establish a delivery approach to Phase 2.

It will drive out key RWSSP uncertainties (both regulatory and technical) and interactions with other industry processes (e.g., SSEP, LAEP, existing system planning approaches (e.g., those used by DNOs and GDNOs)); and specify the Phase 2 project scope, schedule and cost. Whilst Phase 1 will focus on the problem definition it will also begin to explore further the RWSSP methodology, to the extent that it informs Phase 2.

- Phase 1 will also define later potential phases (2 and 3) of this project. These phases are not funded as part of this initial phase which is seeking to define the problem. Below is a short overview of the future phases:
- Phase 2: RWSSP Methodology Prototype - build out the detail of the outline RWSSP methodology. (Expect to work with a wider set of stakeholders) and

Phase 3: RWSSP Methodology Trials: apply various aspects of the methodology in the "real-world".

Note the scope of all three phases of this project is to develop the RWSSP approach; a planning methodology which can support the development of RESPs – it is not within the scope of the project to design the RESP function which is being designed by Ofgem.

Objective(s)

This project aims to:

- Confirm the outcomes RESP is trying to achieve with Ofgem and NESO
- Determine what "minimum viable product" (MVP) and enduring RWSSP methodology looks like including the different timeframes they operate under.
- Understand the landscape within which the RWSSP is being developed.
- De-risk and structure the delivery of the detailed RWSSP methodology.

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 of this project are summarised in Section 1.

Success Criteria

The project will be considered successful if the following deliverables are produced and meet the project objectives:

1. Problem Definition Report (WP's1-6)

A document outlining briefly the methodology used in Phase 1 and in detail the key outcomes or sub-deliverables. This will include a description and analysis of:

- **The expected outcomes of the RESP process:** Confirmation of the outcomes the RESP is expected to provide, based on engagement with ESO and Ofgem.
- **Landscaping:** A review of how network (including DNO's and GDNO's) planning is currently undertaken and the models and tools available to assist. An assessment of other relevant infrastructure plans (e.g. SSEP, CSNP, FES), policy, regulations and market developments (e.g., flexibility markets) and how they will impact the RESP and RWSSP.
  A review of other projects being undertaken which are relevant to RESP either in how they interact with it or how they may impact the scoping of Phase 2.
- **Dependencies:** An assessment of the key dependencies of the RWSSP methodology, and the application of a RACI approach to establish how to interface with these dependencies.
- **Roadmap for an RWSSP methodology framework:** Identification and description of the key components or building blocks of an RWSSP methodology. High-level roadmaps for a) a credible pathway for the development of the RWSSP framework over Phases 2 & 3 and b) the transition from this MVP to a more enduring solution

Outline RWSSP framework method: An outline of how the core building blocks of an RWSSP methodology will interact with each other, with further work in this area to be carried out in phase 2.

2. Detailed scope of work for phase 2: A detailed scope of how to build out the detail of the outline RWSSP methodology. This will build on the project outcomes described in the problem definition report.
3. Risk Register: A register detailing the key project risks and how they were mitigated. To be maintained throughout the project.

Project Partners and External Funding

A consortium led by Energy Systems Catapult and also comprising of Siemens, TU Delft, ICS Consulting and Credera will deliver this work. No external funding is required.

Potential for New Learning

As part of the proposed plan this project will help with further understanding of:

- How to develop and trial the RWSSP approach on this scale for energy networks in the GBand fit for the RESP.
- Developing end-to-end regional adaptive planning methodology (RWSSP) that facilitates cross-vector energy trade-offs and can inform anticipatory investment decisions.
- Developing an innovative approach to data collection and modelling components of the RWSSP which, due to the scale of RESP (~13 regions covering all of GB) will be significantly larger and more complex than previous projects.

Scale of Project

This first Phase 1 project will span 10 weeks with 5 project partners. It will be a desk-based assessment with stakeholder engagement with a small number of key stakeholders.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

This project will be conducted in GB.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

£220,000

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:

To meet Net Zero the UK's energy infrastructure including its energy networks will need substantial investment – with OFGEM and the UK Government suggesting that £170-210bn investment will be required in the electricity network alone. (Building a GB electricity network ready to Net Zero. Regen. 2023. https://www.regen.co.uk/wp-content/uploads/Building-a-GB-electricity-network-ready-for-net-zero.pdf). However, the evolution of the energy system over the coming years is deeply uncertain and this will have to be accounted for when planning future energy system investment.

Developing a RWSSP methodology for the RESP function will:

1. Enable whole system regional infrastructure requirements (aligned with local needs and National targets) to be accounted for in the context of future uncertainty.
2. Demonstrates a robust methodology which will also ensure the outcomes of the RESP function are themselves robust and transparent.
3. Ensure future energy infrastructure is efficiently designed, fit for purpose and aligned to Net Zero.
4. Enable efficient infrastructure investment which is transparent, fair and defensible and- shares risk and value and reduces cost to consumers.
5. Facilitate alignment with other strategic plans such as the SSEP, CSNP and local energy plans to ensure infrastructure needs across all scales are accounted for.

This Phase 1 project will focus on defining the detailed problem statement the RWSSP methodology is trying to solve, and investigating how should a methodology be developed to deliver that outcome.

This will enable and de-risk a detailed scope for developing the RWSSP methodology (Phase 2) to unlock the benefits listed above.

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)

Please provide a calculation of the expected benefits the Solution

Not required as this is a research project.

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

This project is the first of 3 proposed phases as listed below.

1. **Phase 1: Problem definition (this project).**
2. **Phase 2: RWSSP Methodology Prototype**

3. **Phase 3: RWSSP Methodology Trials**

Given that ultimately for the RESP function, any RWSSP methodology will have to be deployed across GB for all RESP regions, a key part of these 3 phases will be defining a methodology which can be replicated across GB.

In terms of more detailed estimates on the replicability of the method including risks, findings from potential future Phase 2 and especially Phase 3 will inform this.

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

As a problem definition research project, this Phase 1 project will not consider costs of rolling out the method in detail across GB.

However a key component of the proposed Phase 3 trials will be to rapidly learn and iterate the development of the RWSSP methodology for RESP, including information of costs of rolling it out across GB for all the RESP regions.

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 RESP is a new function designed to support improved infrastructure planning and investment by developing strategic energy plans at the regional level. OFGEM also announced that ESO will be responsible for implementing the RESP.

Using a RWSSP-based planning methodology to support the delivery of the RESP function will enable regional energy system plans and infrastructure investment which is transparent, fair and defensible and accounts for future energy system uncertainty (for further benefits see "Benefits Summary" section 1).

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.

Work Package 2 will review policies, regulations, markets, processes, stakeholders, tools, methodologies and innovation projects which are relevant to RWSSP. This will help to ensure there is no unnecessary duplication.

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 is innovative for the following reasons:

- First to employ a Regional Whole System Strategic Planning (RWSSP) approach to the development of a planning methodology for energy networks to account for future uncertainties.
- Regional Energy System Plans will be the first in Great Britain (GB) to, on a regional basis to aggregate bottom-up local plans to align with top-down national plans and targets.
- For the first time developing and trialling the RWSSP approach on this scale for energy networks in GB and fit for the RESP.
- First time developing end-to-end regional adaptive planning methodology that facilitates cross-vector energy trade-offs and can inform anticipatory investment decisions.
- Develop an innovative approach to data collection and modelling components of the RWSSP which, due to the scale of RESP (~13 regions covering all of GB) will be significantly larger and more complex than example projects such as the GridMaster project (https://gridmaster.nl/gridmaster/).

Relevant Foreground IPR

The following Foreground IPR will be developed as part of this project:

- Problem Definition Report (WP's1-6)
- Detailed scope of work for phase 2
- Risk Register

See section 2.6 for more detail regarding the deliverables.

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

Given the level of innovation associated with this project there are a number of risks that mean we should use NIA funding including:

- First time developing end-to-end regional adaptive planning methodology that facilitates cross-vector energy trade-offs and can inform anticipatory investment decisions.
- The concept is at a low level of maturity (TRL 2) and therefore has high risks, making it inappropriate for ESO to pursue it as part of business as usual.
- From an operational perspective if feeding into RIIO ED3 then timelines are very short for a project of this complexity and an expedited funding process such as NIA will be required.

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

Given the level of innovation associated with this project there are a number of risks that mean we should use NIA funding including:

- A risk around implementing the RWSSP approach on the scale required for RESP, particularly around the level of data which may be required.
- OFGEM may change the role of the RESP function – ESO and the Catapult have been engaging closely with OFGEM to mitigate this.
- From an operational perspective if feeding into RIIO ED3 then timelines are very short for a project of this complexity and an expedited funding process such as NIA will be required.

This project has been approved by a senior member of staff

☑ Yes