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_NGESO031

Project Registration

Project Title

Service Provider Capability Mapping

Project Reference Number

NIA2_NGESO031

Project Licensee(s)

National Energy System Operator

Project Start

October 2022

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Thomas Pownall

Project Budget

£250,000.00

Summary

National Grid ESO's knowledge of the technical and commercial preferences of existing and emerging service providers is limited. We need to develop effective markets in a rapidly changing electricity system. This project aims to address this knowledge gap and generate guidance on how to design future markets to better account for changing asset types. This is especially pertinent given Government targets to deploy and scale up new technologies that don't participate in existing markets. The outcomes of this project will be used to improve our markets to increase liquidity and facilitate a better customer experience, ultimately reducing costs to consumers.

Third Party Collaborators

SSE Energy Solutions

LCP Delta

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

The service provider landscape is rapidly evolving. Historically dominated by large, transmission-connected thermal generators, we are seeing a proliferation of new low-carbon and decentralised technologies that can offer us new forms of flexibility and operability

services. This will continue to change as we reach our net zero target in 2035.

Each of these technologies have different technical characteristics, e.g. provision of active and reactive power, speed and duration of response etc and importantly the organisations that own, operate or aggregate these technologies have very different business models. Their levels of sophistication in trading and general understanding of energy markets are different from traditional market participants.

Based on ESO market engagement we are aware that our markets sometimes are not optimally structured for these new assets and their owners, both in terms of technical requirements and commercial terms. On occasion, this has resulted in lower participation from new technologies, and therefore reduced level of competition and ultimately higher cost to consumers. There is a need to develop more in-depth knowledge of these new providers and by bridging this knowledge gap, improve the way we reform and design our markets.

Method(s)

This project consists of 5 work packages, delivered through a combination of desk-top research, intensive external engagement, including 1-1s and workshops, as well as supply side modelling to project the capacity and volumes of supply side capacity between now and 2035, going into greater depth than Future Energy Scenarios (FES) 2022 projections.

Work Package 1: Supply side modelling to project the capacity and volumes of supply side capacity between now and 2035. This will serve to provide a third-party view on the flexibility available from all relevant technologies, going to a level deeper than FES 2022 projections. It will include the capacity of technologies able to provide balancing services such as front of meter batteries, residential assets (e.g. HPs, EVs de-rated capacity), alongside transmission connected assets such as interconnectors, CCGTs etc. This will also provide estimates for technologies outside of FES that provide specialist system services (such as synchronous condensers).

Work package 2: Stakeholder interviews and a meta-analysis of current innovation projects to identify the commercial factors that influence investment decisions, operational/trading decisions, locationality and environmental considerations. To be complemented by various ESO existing work programs, and internal discussions to ensure a holistic view is obtained. (The project will not collect commercially sensitive information during this phase, such as detailed trading strategies. The aim is to understand the generic business models of these different providers and their market preferences to allow the ESO to take these into account and design markets in a way that is suitable to them.)

Work package 3: Stakeholder interviews and desk-based research to identify features along the 'provider journey' to understand specific 'pain points' from both an ESO and non-ESO market perspective.

Work package 4: Applying the lessons learnt from the previous phases and providing and analysis of ESO markets to identify the pain points for our markets. Validation via stakeholder engagement in the form of a mini consultation. A workshop with the ESO Subject Matter Experts (SMEs) to be held to identify the potential reforms based on these findings.

Work package 5: Generation of a summary report providing the conflicts and opportunities for market reforms. This information will be disseminated internally, followed by dissemination to the public.

In line with the ENA's ENIP document, the risk rating is scored Low.
TRL Steps = 1
Cost = 1(£250k)
Suppliers = 1 (1 Supplier)
Data Assumptions = 1
Total = 4 (Low)

Scope

The scope consists of 5-phases.

Work package 1: Generate a comprehensive list of current, emerging and future service providers across voltages and fuel types and detail their technical service provisions. Such provisions would include reactive/active power, stability services (such as inertia), speed of response and the duration of output that can be sustained, reliability, limitations etc.

Develop our understanding of the hardware required for these assets to 'flex': metering, smart control, grid forming capability etc. What is the cost of such equipment, and who provides the capability (the unit themselves, an aggregator, third party, part of asset investment, etc)?

Benefits: a comprehensive list of providers will ensure all technologies are considered when designing markets, thereby improving

liquidity and reducing costs.

Work Package 2: Understand how these providers make their commercial decisions. This will include factors that influence investment and operational / market entry decisions, as well as locationality and environmental considerations. Carry out comprehensive segmentation of providers/investors based on their risk appetite and routes to market, e.g., via an aggregator, a supplier etc.

This work package will also include a deep dive into the role of aggregators and the broader stakeholder landscape including the role of policymakers and local authorities to understand their respective roles in the flexibility value chain.

Benefits: support decision-making for the commercial terms of products, to ensure they maximise participation and reduce system costs.

Work Package 3: Building on the mapping of the overall stakeholder landscape to translate these into the practical and commercial issues experienced along the provider journey. These will be the key steps within the value chain, from asset development through to the provision of services and settlement. This will include registration, auctions/trades, scheduling, dispatch, performance monitoring, settlement etc, to identify any key 'pain points'.

Building upon this, another output from this task will be to compare and contrast this service provider journey across different markets (CM, WM, DSO etc) in order to provide a holistic understanding of the issues that service providers incur.

Benefits: an understanding of the customer journey will help identify barriers and inefficiencies within ESO markets which, by removing, could improve market efficiency and lower consumer bills.

Work Package 4: Overlay the findings from work packages 1-3 onto the suite of ESO balancing service markets to access their efficacy against providers' capabilities and business models. This is to identify the preferred market design parameters of each service provider. In doing so, understand how the ESO can become an 'enabler' by asking what customers need from the ESO, and by when, to allow them to provide the services that they want to.

Benefits: concrete recommendations for reforms to improve competition and lower consumer bills.

Work Package 5: Pulling together all the work of phases 1-4 to create a summary report.

Benefits: all the analysis in a report format will enable ESO, DSOs and policymakers to enhance their understandings of emerging technologies and improve the ESO, DSO products and wider market design, thereby reducing consumer cost.

Objective(s)

The key objectives for this project are to:

1. Gain understandings of all service providers, both existing and emerging, their technical capabilities and their commercial models.
2. Identify the pain points for ESO customers, both existing and emerging, across markets to provide a holistic view on the barriers to entry and how these may be avoided through future reforms.
3. Create high-level guidance for the ESO on reforming markets to reduce barriers to entry, increasing competition and liquidity.

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.

This project has been assessed as having a neutral impact on customers in vulnerable situations because it is a transmission project

Success Criteria

The project will be considered a success if:

- Insights generated feed into reforms of ESO services, via the following workstreams Markets Roadmap, the Distributed Flexibility Strategy and the Stability Market Design Phase II project.
- Positive feedback is obtained from customers on ESO stakeholder engagement and recognition that the ESO is proactively working to enable the participation of their assets.

Project Partners and External Funding

Project partner: LCP, no external funding contribution.

Potential for New Learning

The following learnings will be generated:

- A holistic overview of the technological characteristic of emerging service providers, building upon the ESO's existing knowledge of current providers.
- Understanding the ESO customer journey and identifying common barriers to entry for these service providers.
- Future proofing ESO markets design that considers provider commercial models and ensures they are accessible to emerging technology, such as hydrogen as a cross vector solution to contribute to the mitigation of constraints.
- Provision of guidance on how the ESO can reform the suite of markets to reduce barriers to entry, increasing competition into these markets and ultimately reduce costs for consumers.

These learnings will be disseminated via a range of mediums including internal webinars, teach ins, information shared during internal challenge and review sessions and a key report delivered at the end of this project.

Scale of Project

This project will span four months with LCP delivering the work (as well as additional stakeholder engagement). This is a research project to provide the ESO with current and future service provider capabilities which will underpin future market reforms and is therefore small in scale.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

This project will cover the whole of the GB network

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£250,000

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:

Each of the FES forecasts identifies a range of new service providers that underpin the energy system transition. ESO markets can help facilitate their maturity on the network by designing markets to account for their technical and commercial requirements. By building confidence into the role of these emerging service providers, we can reduce our reliance on conventional assets. Employing the guidance created in this project will allow the ESO to be an 'enabler' of the energy system transition by reducing barriers to markets and unlocking new routes to market that will provide investment signals to help facilitate the energy system transition.

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

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.

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 this is a research project.

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

This will be the output of the project. The scope of the project will cover the whole GB system.

We do not anticipate the need for this methodology to be replicated to achieve similar outcomes. The holistic nature of this project will encompass the range of service providers of interest. That said, the project will consist of several challenge and review sessions with SMEs. These bilateral meetings will disseminate the methodology employed, whilst providing useful validation of the techniques.

There are several marketplaces which facilitate the trade of flexibility as a service, not all of which are operated by the ESO. The guidance provided on how to reduce barriers to market entry for distributed service providers may also be of interest to the various DNO/DSOs and third-party platforms operating within the GB networks. We anticipate that this information would be disseminated via our final report uploaded on the ENA's portal.

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

This is an early TRL research project and as such the cost of rolling out these methods across GB is not known at this stage. The output of this project will help inform future market reform decisions and cost calculations.

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 holistic nature of this project encompasses service providers located on the distribution network. This in turn will result in findings of the capabilities and 'pain points' for these providers accessing into various marketplaces, such as those operated by the DNOs (Work Package 3).

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 breadth of this project has meant that there are other projects which have undertaken complimentary research. We have engaged internally to ensure that no duplication is present and instead synergies can be made. Below we explain how this project differs from, and will benefit other related projects:

The Future of Interconnectors NIA project:
This project explores the roles of interconnectors and how they can best be utilised to facilitate a GB net zero system. Interconnectors are one of the service providers that both projects will include. We have therefore engaged with the project lead to understand where their project will be able to feed into ours and vice versa.

Stability Market Design NIA project:
Stability NIA considering future market design options for stability procurement. Stability NIA has a focus on only stability, whereas this NIA proposal takes a much broader perspective. Understanding capabilities of providers can aid to inform market design

characteristics.

The Enhanced Frequency Control capability NIA project:
This project reviewed specific providers ability to provide stability services. This was a technical focus, rather than commercial. This NIA is also looking into a wide range of service providers, many of whom are at present not engaged e.g., residential. The technical characteristics provided by this project will inform work package 1.

The Distributed Flexibility (DFlex):
DFlex is a new strategy project to develop our market strategy to facilitate distributed flexibility. This NIA project will contribute to the development of DFlex.

SSE's Incentive project and Innovate UK's PFER have also been engaged.

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

- To date, the ESO has designed markets based on our system requirements. This project will provide an innovative approach to compliment this with a detailed understanding of a service provider's requirements.
- The project will use a systematic and proactive approach to gather feedback to ensure representation from all participants (traditional engagement channels run the risk of only hearing the voices of those than have the resource dedicated to ESO engagement)
- A proactive approach will be used, investigating new technologies that are emerging or will only come online in the future. This will ensure they will have appropriate markets to participate in from the beginning, rather legacy markets.

Relevant Foreground IPR

The following Foreground IPR will be generated from the project:

- Details of all service providers, both existing and emerging, their technical capabilities and their commercial models.
- Details of pain points for ESO customers, both existing and emerging, across markets to provide a holistic view on the barriers to entry and how these may be avoided through future reforms.
- Guidance document on reforming markets to reduce barriers to entry, increasing competition and liquidity.

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

There is a risk that the outcome of market reform guidance may not be feasible to implement. For example, services providers may indicate a certain commercial preference which the ESO is not able to incorporate into future reforms. In this instance, the project will not provide the ESO with valuable guidance and is therefore too risky to fund through business as usual.

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 ESO does not have the internal capabilities to generate this understanding as part of BAU practices. LCP have direct experience

working for, and closely with, service providers to understand their points of view. They will be able to draw from their ongoing research and a wide range of project experience on this topic.

This project has been approved by a senior member of staff

- [x] Yes