

## NIA Project Registration and PEA Document

### Date of Submission

Feb 2019

### Project Reference Number

NIA\_NGSO0018

## Project Registration

### Project Title

RecorDER

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NIA\_NGSO0018

### Project Licensee(s)

National Grid Electricity System Operator

### Project Start

February 2019

### Project Duration

1 year and 5 months

### Nominated Project Contact(s)

Adrian Sellar

### Project Budget

£753,000.00

## Summary

'RecorDER' is a collaboration between National Grid, UK Power Networks, SP Energy Networks and Electron to develop and demonstrate an asset register for Energy Resources. The project seeks to define, assess and pilot a blockchain-based asset register, enabling parties to use and reference a shared data set of generation and flexibility resources. The project aims to pilot a Minimum Viable Product (MVP) and, where possible, determine requirements for a full-scale deployment in future iterations of the project.

### Nominated Contact Email Address(es)

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## Problem Being Solved

In the current marketplaces for flexibility, across transmission and distribution, there is no 'one version of the truth' when it comes to the identification, characterisation and registration of flexibility and generation assets across the whole electricity system. There are multiple asset registers, owned by different parties, which contain overlapping, sometimes out of date or contradictory data. There is generally poor 'whole electricity system' visibility when it comes to assets that are used across T&D boundaries – for example, the ESO's understanding of the attributes of a distributed battery that can provide frequency response may be quite different to the attributes that the DNO where it is connected has on file.

There is also a lack of standardisation across different market players, from DNOs, to ESO, TO, aggregators and asset owners. This makes it difficult and labour-intensive to transfer and cleanse data from party to party, as parties need to translate between different formats, nomenclature and identifiers. Maintaining a growing number of uncoordinated systems across the industry is expensive and inefficient.

This lack of consistency and coordination becomes especially problematic when the same asset is to be traded among different counterparties. When there is no one correct view of the truth, trades become inherently more risky and difficult to enact.

Asset registration and prequalification systems are also not standardised across different procurers of flexibility, which makes life much more difficult for flexibility providers. These legacy processes and systems can be slow and inefficient.

## Method(s)

The project will test the initial hypotheses that:

- We can unlock more flexibility capacity and better utilise assets by building a shared asset register.
- Using blockchain technology to underpin the single system will avoid having to create a monopoly to run the system, will be readily extensible, and will be efficient compared to current systems.

'RecorDER' is a collaboration between National Grid, UK Power Networks, SP Energy Networks and Electron to develop and demonstrate an asset register for Energy Resources building upon the ongoing Open Networks (ON) work on building a single DER register; in particular Product 8, within ON's 2018 WS1 and Product 1 within ON's 2019 WS2 have been evaluating the feasibility of creating a single central resource register for all of GB's generation/storage/demand. The RecorDER project seeks to create a more broadly flexible and integrated 'data permissioning' mechanism for asset registration data, this enables parties to use and reference a shared data set of generation and flexibility resources. This will be done by building a blockchain-based system that enables the creation of a shared asset register between parties. The project aims to pilot a Minimum Viable Product (MVP) and, where possible, determine requirements for a full-scale deployment in future iterations of the project.

**WP1: Requirements & Project Scope.** Utilising ON 2018 WS1 Product 8 and 2019 WS2 Product 1 register data, we will define high-level system architecture, platform governance and undergo a blockchain technology review.

**WP2: Data Compliance & Regulatory Assessment.** We will establish a data compliance working group and liaise with ON Workstream 2 Product 1. The group will leverage ON's work in order to assess legal data compliance and regulatory issues, where a project decision gate will be placed in order to proceed based upon legislative grounds. We will furthermore conduct widespread industry and stakeholder engagement.

**WP3: Data Model & Processing.** Agree, define and publish data storage, organisation, validation, cleansing and processing rules. Map existing data sets and requirements to project defined data structures. Collect agreed asset data. Data permissions structures and systems will also be defined to allow access to relevant data within the asset register.

**WP4: Platform Development.** Document system architecture and security protocol. Develop blockchain software and data storage mechanism. Develop data deployment tool and platform API. Deploy asset data and test integration with various use cases. Review platform against objectives.

## Scope

The platform will host data on generation and flexibility assets down to 1MW in capacity, on regions (yet to be chosen) of UK Power Networks' and SPEN's networks, as well as transmission generation assets.

The asset characteristics to be stored on the register will be defined in WP1. During this project, only the ESO, UK Power Networks and SPEN will have access to the platform. The use of compiled data post completion will be considered and agreed towards the end of the project.

## Objective(s)

At the end of the project, we will understand:

- Whether a shared asset register for flexibility assets will
  - o Enhance whole-electricity-system visibility
  - o Facilitate easier trading of assets across transmission and distribution
  - o Enhance efficiency of data transfer
  - o Improve data quality and accuracy
  - o Enable more efficient and dynamic registration of assets
- Whether a blockchain solution can
  - o provide a flexible, innovative architecture for a shared asset register
  - o provide a secured validated permissions architecture to manage asset data
- What investment and effort will be required to roll out the register across GB

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

- Agreement on system architecture across ESO, DNOs and Open Networks
- Functioning asset register operating on blockchain platform
- Reduced time and effort to populate compared to current processes

- More accurate and up-to-date data than current processes

## Project Partners and External Funding

National Grid ESO  
UK Power Networks  
SPEN  
Electron

There is no external funding.

## Potential for New Learning

This is the first blockchain-based asset register to be developed in GB across network operators. If successful, the learnings will be disseminated to all Network Operators and the project partners will look to engage all other DNOs as soon as possible.

## Scale of Project

This register will capture data for assets above 1MW.

## Technology Readiness at Start

TRL3 Proof of Concept

## Technology Readiness at End

TRL6 Large Scale

## Geographical Area

The geographical regions to be covered will be determined in WP1 of the project.

## Revenue Allowed for the RIIO Settlement

None

## Indicative Total NIA Project Expenditure

£753,000

## 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:

n/a

#### 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)

This project is the first phase of a much larger ambition of creating a whole electricity system trading platform. The real financial benefit begins to materialise in later phases. However, the one area where this Asset Register could see immediate benefits is from being able to acquire more accurate data from significant assets thus resulting in:

1. A reduction in the time and effort spent gathering, cleansing and processing data. e.g. the ESO currently has ~1 Full-Time Equivalent (FTE) dedicated to managing the Week 24 data transfer process, and ~20FTE days p.a. managing the current register of DG data.
2. More accurate energy resource data would result in more accurate modelling and forecasting.
  - a. Long-term modelling of DER for planning and Future Energy Scenario (FES)
  - b. Short-term forecasting of wind, solar and demand

Additional financial benefits will potentially be gained from building on this first phase of the Asset Register:

- Creating one version of the truth about flexibility assets between trading counterparties should lower the risk of overlaps and missed trades, lowering the cost of transactions and increasing market liquidity.
- The platform could also enable more dynamic portfolio management by flexibility providers and aggregators, which would also contribute towards market liquidity by reducing the overall headroom a provider would need to bid to ensure it will be able to meet its commitments
- The development of an open and innovative platform across the industry will stimulate further innovation

#### Please provide a calculation of the expected benefits the Solution

The ultimate aim of the GB-wide asset register is to unlock more liquidity in the marketplace for balancing and ancillary services, thus lowering the overall market costs on the consumer. At this stage, It is difficult to quantify how much more liquidity could be unlocked from enhanced visibility of assets on the network and how that in turn will impact overall prices.

The reduction of the minimum capacity threshold in the Firm Frequency Response (FFR) market from 5MW to 1MW reduced costs of FFR by ~50% by increasing the number of providers by 800%. While this is a unique and specific example, there can be parallels drawn to other ancillary services markets, as well as the Balancing Mechanism.

The ESO spends roughly £400m in the Balancing Mechanism per annum. Currently, the ESO can find it difficult to utilise aggregated DERs, as it is unclear whether individual assets sit in an area where there is a constraint. Therefore, a transmission asset is often utilised instead, even if more expensive. Giving the ESO visibility over where each DER is will enable it to dispatch aggregated BM units with more confidence.

Conservatively, the added competition this would unlock in the BM would save >£4m (1% of BM costs) (so £400m - £396m) per annum. This is also applicable to a DSO driven market where transmission connected generation will be visible to DSOs to procure services at competitive costs should this be practical.

However, these benefits would only be realised once the proof of concept of this project was expanded across all of GB.

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

This concept could be replicated across all DNO regions, indeed that is the ultimate aim.

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

A full national rollout would cost an estimated £2.5M, based on a large team (~20 people) working for a year to deliver. This high-level estimate will be refined during the course of the project.

### **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 problems outlined at the start of this document are relevant across all network operators. If the hypotheses being tested in this project prove to be true, then not only will the learnings be relevant for all network operators to adopt, but we will actively be looking to roll out the solution across all license areas in GB.

#### **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

- ☒ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

#### **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 ENA Open Networks project (2018 Workstream 1, Product 8 and 2019 Workstream 2 Product 1) is also assessing the development of a system-wide asset register, but is not considering blockchain. To ensure that the projects remain complementary and that no overlap occurs at any stage throughout the development, we are working together with ON Product 8 to ensure all learnings from their work will be fed into the design of RecorDER, as such we see this project developing the solution to trial phase

**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**

There currently is no single unique national GB asset register for flexibility and generation assets across transmission and distribution. Blockchain has not been used for this particular application. Furthermore, this project seeks to create an asset register by building a secure permissions structure between existing datasets rather than obliging participants to export and maintain a new register of asset data.

**Relevant Foreground IPR**

n/a

**Data Access Details**

n/a

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

Whether blockchain is the most appropriate means of hosting a flexibility asset register is not at all certain. There are a range of technical, regulatory and organisational issues that will need to be explored and addressed as part of this project before any enduring solution is rolled out. The project may find that blockchain is not the right solution, and that another approach must be explored. Simply rolling out the proposed approach as BAU would be too risky.

**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 is significant technical risk around blockchain – it has never been implemented in this type of project before. We will need to work through all of the possible risks before deeming it the correct solution for this use case. There is also significant legal and regulatory risk associated with the sharing of asset data. WP2 of this project will build upon work done by Open Networks to ensure that only the appropriate data is shared with the right parties, and that data owners are protected.

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

☒ Yes