

Energy Networks Innovation Process NIA Project Registration and PEA Document



Date of Submission:

NIA Project Registration and PEA Document

Notes on Completion: Please refer to the NIA Governance Document to assist in the completion of this form. Please use the default font (Calibri font size 10) in your submission. Please ensure all content is contained within the boundaries of the text areas. The full-completed submission should not exceed 12 pages in total.

1. Project Registration

Project Title (This cannot be changed once registered) Flexible Operation of Water Networks Enabling Response Services (FLOWERS)	Project Reference WPD_NIA_062
Funding Licensee(s) Western Power Distribution	Project Start Date 04/01/22
Nominated Project Contact(s) Nick Devine	Project Duration 13 months
Contact Email Address wpdinnovation@westernpower.co.uk	Project Budget £287,729

Project Summary (125 words limit)

The FLOWERS project will analyse the potential capacity on South West Water’s network to embed flexibility capacity within the time difference (latency) between when Drinking Water and Waste Water is pumped and stored, and when it used by the system. It will explore methods of delivering latency flexibility and analyse the feasibility of implementing it on SWW’s system. It will define the regulatory compliance and commercial viability requirements for creation of a latency flexibility product which can be embedded within electricity network control rooms. If appropriate, a recommendations document will be produced identifying next steps for the development of latency flexibility capacity in ED2. The project will be delivered in partnership with South West Water and Smart Grid Consultancy.

Lead Sector

Electricity Distribution <input checked="" type="checkbox"/>	Gas Distribution <input type="checkbox"/>
Electricity Transmission <input type="checkbox"/>	Gas Transmission <input type="checkbox"/>

Other Sectors

Electricity Distribution <input type="checkbox"/>	Gas Distribution <input type="checkbox"/>
Electricity Transmission <input type="checkbox"/>	Gas Transmission <input type="checkbox"/>

Research Area

Net zero and the energy system transition <input type="checkbox"/>	Optimised assets and practices <input type="checkbox"/>
Flexibility and Commercial Evolution <input checked="" type="checkbox"/>	Whole Energy System <input type="checkbox"/>
Consumer Vulnerability <input type="checkbox"/>	Energy System Transition <input type="checkbox"/>

Development steps

Technology Readiness Level (TRL) at Start <input type="text" value="4"/>	TRL at Completion <input type="text" value="6"/>
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2. Project Details

2.1. Problem(s)

Water networks are one of the largest demands for electrical power supplied on distribution networks, estimated at 1TWh across WPD's four licence areas. However, Water and Sewerage Supply licence holders only deliver limited flexibility capacity to distribution networks to manage their electrical demand.

Water network operational processes are dictated by water supply and demand needs and do not align with electricity network requirements. As such, there is unexplored potential to embed capacity within these processes to flexibly shift the electricity demand of water pumps to relieve constraints on distribution network for both demand and generation connections. However, neither the technical and operational requirements to deliver this kind of flexibility, nor the forecasting or commercial arrangements necessary for procuring it are well understood.

2.2. Method(s)

This project will analyse the potential for water networks to deliver flexibility to distribution networks by embedding capacity within the operational processes which manage the inherent time difference (latency) between when water is pumped and stored for Drinking Water and Waste Water functions. It will assess the technical, operational and commercial requirements for extracting latency flexibility from water networks. This work will take place in partnership with South Wester Water (SWW), and consist of 6 work packages:

LFA1. Feasibility of latency flexibility

This work package will explore methods of delivering latency flexibility and analyse the feasibility of implementing it on SWW's system. A series of workshops will be held with SWW data and process engineers to identify SWW flexible assets and processes to map against WPD constraint requirements.

LFA2. Regulatory feasibility and development of commercial and regulatory relationships

This work package will define the regulatory compliance and commercial viability requirements for creation of a latency flexibility product which can be embedded within the 1st tier of flexibility to be accessed by electricity network control rooms. WPD and SWW legal teams will be engaged to assess the legal feasibility of creating the latency flexibility product.

LFA3. Mapping and case study selection

This work package will create and implement a methodology to quantify and map the capacity for latency flexibility from LFA1 onto SWW's networks and WPD's constraint map to identify areas of greatest potential benefit. From this a shortlist of potential case study areas will be produced, from which one will be selected.

LFA4. Technical and operational system specification

This work package will document the technical and/or operational solutions necessary to implement latency flexibility. It will assess the cost of implementing these solutions across SWW's network. It will aim to specify the required revised standard operating procedures, process solutions, software solutions and (if necessary) hardware.

LFA5. Case study modelling, simulation and cost-benefit analysis

This work package will take the outputs of work packages 2-4 and model the implementation and procurement of latency flexibility in the case study area. It will analyse the capacity procured over a set time period and perform a cost-benefit analysis to identify the potential benefits of the system.

LFA6. Recommendation for follow-on project and final report

This work package will produce a report analyse the outcomes of the preceding five work packages and, if deemed appropriate, produce recommendations for the follow-on project to FLOWERS.

2.3. Scope

FLOWERS aims to increase the capacity embedded within water networks to deliver flexibility for distribution networks. Water utilities are one of the largest consumers of electrical power, about 1TWh of demand across WPD's four licence areas. South West Water contributes 300GWh of this demand. Developing new operational processes and removing commercial and regulatory barriers for water networks to deliver flexibility therefore presents a significant opportunity for unlocking of flexibility capacity which is value for money to customers.

The project builds on an NIA project delivered by National Grid ESO to investigate the potential flexibility capacity in storm drains and wastewater catchments, which quantified capacity but did not create a commercial model for

accessing it. It will expand the search for capacity on water networks, quantifying the available capacity across both wastewater and drinking water systems within the inherent latency of their pumping operations. As such, it is expected to uncover a greater level of capacity and also develop a cost-saving commercial model for its delivery.

It is conservatively estimated that this project can deliver 0.25% of water network demand as flexibility. This amounts to 750MWh of capacity extracted from South West Water’s Network yearly. Replicated across the breadth of the four licence areas, this could unlock upwards of 2.5GWh of flexibility capacity on water networks. These capacities could, respectively, deliver £2.5m and £8.5m of value to customers.

2.4. Objectives

This cannot be changed once registered.

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Assess the technical and legal feasibility of embedding flexibility on water networks within the latency of their internal pumping operational processes

Quantify and map water latency flexibility capacity to understand the alignment between availability and network constraint zones

Determine the commercial arrangements necessary to procure flexibility capacity within water network processes

Understand the technical and operational requirements of the system that would trigger latency flexibility

2.5. Consumer Vulnerability Impact Assessment (RIIO-2 projects only)

Not Applicable

2.6. Success Criteria

Details of how the Funding Licensee will evaluate whether the Project has been successful. This cannot be changed once registered.

A business case and cost-benefit analysis for using water network latency as a flexibility source will be created

The high-level specification of a latency flexibility system will be documented for implementation in an appropriate follow-on project

The capacity for latency flexibility on SWW’s network will be quantified, with a methodology that can be replicated by WPD or other DNOs for other water networks

A commercial proposal will be submitted to Ofgem and Ofwat for the implementation of the latency flexibility product

2.7. Project Partners and External Funding

Details of actual or potential Project Partners and external funding support as appropriate.

South West Water - £84,700 contribution (23% of total project costs)

Smart Grid Consultancy

2.8. Potential for New Learning

Details of what the parties expect to learn and how the learning will be disseminated.

The assessment of the feasibility of latency flexibility will provide learning of the additional capacity for flexibility that exists within water networks beyond conventional flexibility procurement. This will be of financial value to customers. Furthermore, it will develop understanding of the commercial and regulatory barriers and solutions for collaboration between regulated industries on innovation projects. It will increase knowledge sharing between

electricity and water networks and facilitate understanding of further opportunities to solve Whole System challenges in RIIO-2.

2.9. Scale of Project

The Funding Licensee should justify the scale of the Project – including the scale of the investment relative to the potential benefits. In particular, it should explain why there would be less potential for new learning if the Project were of a smaller scale.

This is a desktop based project based in the South West licence area.

2.10. Geographical Area

Details of where the Project will take place. If the Project is a collaboration, the Funding Licensee area(s) in which the Project will take place should be identified.

The geographical area covered by this project will be the area of overlap between WPD's and South West Water's respective networks. This is entirely located in the South West licence area. A map of SWW's coverage is shown below:



2.11. Relevant Foreground IPR

Details of expected Relevant Foreground IPR which will be generated in the Project. If applicable, this must also explain if Background IPR will be required to use the Relevant Foreground IPR.

The Relevant Foreground IPR is:

- All report deliverables as described in section 2.2.
- A combined flexibility capacity and constraint map.

The Relevant Background IPR required to produce this is:

- WPD network assets and constraint maps
- South West Water network maps
- South West Water MPAN demand data
- South West Water pumping process policy and techniques
- South West Water pumping asset information

2.12. Data Access Details

A description of how any data (de-sensitised where necessary) that are expected to be gathered in the course of the project can be requested by interested parties, and, if applicable, reasons why such data cannot be released to interested parties. This requirement may be met by including a link to the publicly available data sharing policy, which is required by virtue of paragraphs 2.13-2.16 of the RIIO-2 NIA Governance Document.

South West Water asset and demand data will be obtained to facilitate LFA3 and LFA4. This data is confidential to South West Water and can only be released to interested parties with South West Water consent.

2.13. Revenue allowed for in the current RIIO settlement

An indication of the funding provided to the network licensee within the current RIIO settlement that is likely to be surplus to requirements as a result of the Project.

n/a

2.14. Indicative Total NIA Project Expenditure

An indication of the total Allowable NIA Expenditure that the Funding Licensee expects to reclaim for the whole of the Project (RIIO1).

An indication of the Total NIA Expenditure that the Funding Licensee expects to reclaim for the whole of the Project (RIIO2).

The project costs are summarised in the table below:

Total Project Cost	£372,429
Agreed Partner Contributions (South West Water)	£84,700 (23%)
Sub Total	£287,729
WPD DNO Contribution	£37,243
Funding from NIA	£250,486

3. Project Eligibility Assessment

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).

3.1. 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:

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

n/a

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

n/a

3.2. 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.

3.2.1. Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

It is anticipated that this project will develop a capacity for embedded flexibility with water networks. As noted above, it is conservatively estimated that this project can deliver 0.25% of water network demand as flexibility. This amounts to 750MWh of capacity extracted from South West Water's Network yearly. Replicated across the breadth of the four licence areas, this could unlock upwards of 2.5GWh of flexibility capacity on water networks.

WPD's procurement of flexibility in RIIO-1 has so far deferred more than £40m of reinforcement for more than 509MWh of flexibility. Using this ratio, an alignment of only 5% of the unlocked flexibility capacity with constrained zones would deliver an estimated £2.5m of value to customers from South West Water's network, and £8.5m from all water networks in WPD's licence areas.

3.2.2. Please provide a calculation of the expected benefits the Solution

This is for Development or Demonstration Projects, not required for Research Projects. It should be (Base Cost – Method Cost, Against Agreed Baseline) and include a description of the recipients of the benefits.

n/a

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

This must be in terms of the number of sites, the sort of site the Method could be applied to, or the percentage of the Network Licensees system where it could be rolled-out.

The Method is replicable across DNOs, with the value of savings relative to the total demand of water networks per licence area. As water networks supply the same set of customers as distribution networks, it is reasonable to assume that the demand will be a similar significantly high proportion in other licence areas.

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

The project will include a cost-benefit analysis of the full BAU rollout of latency flexibility and will ensure the cost-effectiveness of the product is calculated before recommendations for implementation in BAU or further NIA projects.

3.3. Requirement 3 / 1 – involve Research, Development or Demonstration

3.3.1. RIIO-1 Projects

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 systems and software)	<input type="checkbox"/>
A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)	<input type="checkbox"/>
A specific novel operational practice directly related to the operation of the GB electricity transmission or distribution systems	<input checked="" type="checkbox"/>
A specific novel commercial arrangement	<input checked="" type="checkbox"/>

3.3.2. RIIO-2 Projects

A RIIO-2 Project must involve the Research, Development or Demonstration of at least one of the following:

A specific piece of new equipment (including monitoring, control and communications systems and software)	<input type="checkbox"/>
A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven	<input type="checkbox"/>
A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)	<input type="checkbox"/>
A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology	<input type="checkbox"/>
A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution	<input type="checkbox"/>
A specific novel commercial arrangement	<input type="checkbox"/>

3.4. Requirement 4 / 2a – develop new learning

A Project must develop new learning that can be applied by Gas Transporter and/or Electricity Transmission or Electricity Distribution licensees. For RIIO-1 Network Licensees may wish to address challenges specific to their network.

Please answer one of the following:

3.4.1. Please explain how the learning that will be generated could be used by relevant Network Licenses

The outcomes of this project will generate learning on latency flexibility that can be used by any Network Licensee. The capacities investigated in this project are attributable to all Water Supply and Sewerage Supply areas, as the processes involved are carried out by all water utilities. Learning on the operational, process and technical requirements will be adaptable by Network Licensees to implement within their own processes and that of the water utilities within their licence areas.

As such, the cost benefit of the outcomes of this project will be applicable across the UK. Any policy or standard techniques will be shared with other LNOs/LSOs.

3.4.2. Or, please describe what specific challenge identified in the Network Licensee's innovation strategy is being addressed by the Project (RIIO-1 only)

3.4.3. Is the default intellectual Property Rights (IPR) position being applied?

This cannot be changed once registered.

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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If “no”, the following questions must be answered:

3.4.4. Demonstrate how the learning from the Project can be successfully disseminated to Network Licensees and other interested parties:

n/a

3.4.5. Describe how any potential constraints or costs caused, or resulting from, the imposed IPR arrangements:

n/a

3.4.6. Justify why the proposed IPR arrangements provide value for money for customers:

n/a

3.5. Requirement 5 / 2c – be innovative

A Project must be innovative (ie not a business as usual activity) and have an unproven business case entailing a degree of risk warranting a limited Research, Development or Demonstration Project to demonstrate its effectiveness. This could include Projects which are untested at scale, or in relation to which there are risks, which might prevent the widespread deployment of the equipment, technology or methodology.

3.5.1. Why is the project innovative?

RIIO-1 projects must include description of why they have not been tried before.

This project will investigate creating an innovative flexibility product embedded in water network processes. This has only been attempted previously with rare weather event water catchments by NGESO, and did not investigate the wider variety of potential opportunities described above. It will develop an innovative commercial relationship between two utilities to deliver value for money on flexibility.

3.5.2. Why is the Network Licensee not funding the Project as part of its business as usual activities?

We would not normally fund the investigation of new methods of flexibility procurement in BAU. The methodology described aims to unlock a new kind of flexibility capacity, as opposed to adding new sources of conventional flexibility.

3.5.3. Why can the Project can only be undertaken with the support of NIA?

This must include a description of the specific risks (e.g. commercial, technical, operational or regulatory) associated with the Project.

Water network latency is an unproven method for delivering flexibility to electricity networks. There is an inherent risk that the method will prove unfeasible for technical or regulatory reasons. The development of latency flexibility requires external knowledge of water networks not inherent to WPD, and an innovation trial with key specialist skills is the most sensible approach.

3.6. Requirement 6 / 2d – 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.

3.6.1. Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

This is the first time a project with this methodology has been undertaken between a DNO and water network.

3.6.2. If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

NGESO “Enhancing Energy Flexibility from Wastewater Catchments Through a Whole System Approach” examined flexibility in water networks. Focus was constrained to headroom in rare weather event water catchments. Conversely, FLOWERS will look at opportunities for flexibility across DW and WW pumping activities and take a system interoperability approach with an array of potential triggers and processes.

4. PEA approval

The senior person (RIIO-1) or senior network manager (RIIO-2) responsible for implementing RIIO-2 NIA Projects must approve the PEA. It must then be published on the Project Registration page of the Smarter Networks Portal.

Please confirm this project has been approved by a senior member of staff	<input type="checkbox"/>
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