NIA Project Registration and PEA Document

Date of Submission

Jun 2022

Project Reference Number

NIA_WPD_071

Project Registration

Project Title

ANM - Balancing Coordination Demonstration (ABCD)

Project Reference Number

NIA_WPD_071

Project Licensee(s)

National Grid Electricity Distribution

Project Start

June 2022

Project Duration

1 year and 0 months

Nominated Project Contact(s)

Jenny Woodruff

Project Budget

£291,653.00

Summary

This project builds on the NIA project NIA_NGSO0035 which looked at options for coordination between Balancing Services and ANM systems. Without coordination balancing services may be counteracted by ANM increasing balancing costs and reducing security of supply. It will specify, build and test upgrades to an ANM system to enable this coordination under a range of operational scenarios. The project includes specification of new communications between NG ESO and DNOs and will also investigate the potential financial impact under different potential regulatory regimes.

Preceding Projects

NIA_NGSO0035 - Optimal Coordination of Active Network Management Schemes and Balancing Services Market

Third Party Collaborators

Smarter Grid Solutions

WSP UK Limited

Problem Being Solved

ANM systems operating on the distribution network can counteract the impact of distribution connected customers providing Balancing Services. This will push up Balancing Service costs but also reduces the available services needed for security of supply and could limit the connection of renewable generation to the network.   The potential system interactions also makes non-delivery of services a risk that forms a barrier to entry for market participants. Removing this would increase market liquidity and reduce costs.

Method(s)

The project will specify, develop and test enhancements to a demonstration ANM system, specify new communications requirements and determine the financial impacts of this type of coordination under different regulatory regimes. This is delivered by a series of

Work Packages (WP) as follows.

WP1 System specification and design

This work package, involving all partners, will specify the processes and technologies by which

- The notifications from NG ESO will be shared with DNOS;
- The DNO will process the request (including checking for co-ordination with any other DNO planned actions e.g. flexibility services-DSO Primacy rules) and relay the information to the relevant ANM system, and
- The ANM system operation will be modified.

The specification of the system requirements therefore covers both the modifications to the ANM system (and any other related system such as PowerOn) as well as the new communications and supporting technology. It is expected to involve cross party workshops and the design will be closely linked.   The specification of communications requirements should also look ahead to the implementation of the forecasting based solutions and ensure that the solution for information transfer could support sharing forecasting data / results in the future as well.

WP2 Commercial Evaluation

This work package, delivered by WSP, will assess the potential impact of extending the degree to which ANM customers are constrained including potential costs if customers are to be compensated. This will consider different regulatory models reflecting extended customer choice in terms of firm/non-firm connection options.

WP3 System Development

This work package, delivered by SGS, will involve the development of the modified test ANM system.

WP4 System Factory Acceptance Testing

This is a set of tests to confirm the operation of the system meets the specification, carried out by SGS and witnessed by the other partners using the FAT workbook developed in WP1 to record the results of the tests. This work package includes any rework required to ensure all the tests in the workbook are successfully signed off.

WP5 System Trial

This will test the operation of the coordination solution with simulated balancing system requests under different conditions. This will be carried out by SGS and WSP according to the agreed System Trial plan developed in WP1.

WP6 Evaluation and Dissemination

This work package, delivered primarily by WSP with input from the other partners, includes an assessment of the performance of the system during the trial, distilling and disseminating the project learning.

Scope

The project will amend one ANM system but the algorithms developed and the specification of the additional communications will be shared so that they can be adopted by other ANM systems. The modified ANM system is trialled using a test system, rather than a real ANM system to minimise the costs and risks of the project, but a wide range of operational scenarios are used to ensure that the modified system operates effectively.

If balancing services and ANM systems are not coordinated then there is a financial impact in terms of NG ESO needing to despatch further services. There is also an impact on the liquidity of the balancing services market if players are wary of signing up to provide services when the operation of ANM schemes may affect their ability to deliver services putting them at risk of contractual penalties. NIA_NGSO0035 analysed the potential benefits of different coordination options. The modification of ANM systems to hold headroom being deployed in this project was estimated to have an annual benefit of £44m across the UK.

Developing and testing this upgrade is expected to speed up the adoption of this solution by approximately 18 months and therefore the UK wide benefits from the project are in the order of £70m.

Objective(s)

The project objectives are to;

- Develop the detailed coordination process required to avoid counteraction of Balancing Services by maintaining the headroom on ANM systems and document this is sufficient detail so that it can be used by any ANM system provider to enhance their system.

- Understand and capture the data exchanges required to support the coordination process.

- Modify an ANM system and test it using realistic scenarios to show how it would operate in a real-world implementation.

- Capture and share the project learning.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

N/A

Success Criteria

Success criteria for the project are that;

- The detail behind the coordination methodology has been explored and expanded into a specification and a design solution which has been captured in the System Specification and Design document.

- The requirements of communications to support coordination have been evaluated and the data items, frequencies and underlying technologies have been specified.

- A demonstration system has been built that can mimic the coordination process that would take place with live systems and this has been used to test the process under a variety of realistic test scenarios.

- The learning from the project has been captured and disseminated.

Project Partners and External Funding

The project partners are WSP and Smarter Grid Solutions (SGS)

WSP are responsible for the regulatory economic assessment Work Package 2 and will also be involved in the other work packages to specify the system, oversee the Factory Acceptance Testing, work with SGS to execute the trial and then the evaluation and dissemination work. They are selected due to their familiarity with the subject matter having been a key player in the previous NIA project assessing coordination options. WSP are contributing £9,200 to the project funding.

SGS have been selected as they are a provider of ANM systems to multiple DNOs. SGS are contributing £27,455 to the project funding.

Potential for New Learning

The project is expected to generate learning as follows;

- What algorithms are required to co-ordinate between balancing services and ANM systems.

- What data items are required by those algorithms, what communications processes are needed to provide this data and what technologies could be used to support these processes.

- How are these algorithms incorporated into an existing ANM system.

- What are the trial scenarios required to demonstrate the operation of the modified ANM system.

- How well did the coordination perform when tested and were any of the scenarios particularly problematic.

- How will the potential additional constraining of customers from coordination be likely to sit within potential future regulatory frameworks and what could be the potential associated costs.

Dissemination will take place via a webinar at the end of the project.

Scale of Project

While ANM schemes supported by different suppliers will vary, the proposal is to amend only one ANM scheme to keep costs to a minimum while still generating the learning that can be shared among other DNOs. SGS have a number of ANM systems deployed across a large range of areas.

The use of a test system, rather than implementation on a live system, reduces risk and project duration to keep costs low.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL6 Large Scale

Geographical Area

The project will use a demonstration ANM system and is therefore not tied to a particular physical network. The demonstration ANM system will be selected to be as reflective of networks as possible but may be altered to support the required testing e.g. by adding additional ANM controlled generators.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Contributions from WPD and NG ESO = £29,165 (£14,583 each)

NIA funding = £262,487. These costs will be equally split between WPD and NG ESO.

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:

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 (RIIO-1 projects only)

The benefits of the project are estimated to be in the order of £70m.

Please provide a calculation of the expected benefits the Solution

The benefits of coordination of the Balancing Services and ANM were investigated as part of NIA_NGSO0035, Optimal Coordination of Active Network Management Schemes and Balancing Services Market. The final report estimated that the benefits of the coordination approach being trialled in this project for 2020 were £44.4m across the UK.

Benefits are expected to increase over time due to the increase in requirements for balancing services as renewable power takes on an increasing share of generation. This is likely to be accelerated further by political pressures to cease energy trading with Russia and so it is reasonable to expect based on the increase from 2019 to 2020 that the benefit in 2022 would be in the region of £47m. By developing and testing the algorithms for this type of co-ordination we expect to bring forward the UK wide deployment of such systems by approximately 18 months. The difference between the base cost and method cost are therefore 1.5*£47m = £70m.

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

One of the project aims is that the algorithms developed can be applied to other ANM systems provided by different suppliers. This can therefore benefit all distribution network licence areas.

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

The costs of rolling out the improved ANM system would have two elements. Firstly the modification of the standard system and secondly implementing upgrades to each system in operation.

It is estimated that there the one-off upgrade to standard systems would be in the order of £70k and would be carried out by up to 4 ANM suppliers at a total cost of £280k.

Assuming there are 50 ANM systems in operation that would then need to be migrated to the later version and that the average cost per upgrade was £30k then this would cost £1.5m bringing the total GB roll out cost to £1.78m.

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

Any DNO that operates ANM systems will need to consider how to adapt them to co-ordinate with Balancing Services. This project provides a template for how that can be achieved using SGS ANM systems but will be certain to provide details of algorithms so that the same approach can be adopted by other systems.

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.

This project is developing new functionality and therefore is not expected to duplicate previous work. The project will liaise with the Open Networks project which is also interested in related areas of work such as the primacy rules.

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

The project follows on from the assessment of different options to co-ordinate between Balancing Services and ANM systems. Therefore this approach has only recently been identified as one of the best three options for coordination.

Relevant Foreground IPR

The default NIA IPR arrangements are applied for this project.

There is existing background enabling IPR in the SGS ANM software which is being extended to include the new functionality associated with coordination.

New IPR is expected to be generated in terms of the algorithms applied in the future modified systems and the specification of the communications link. This IPR is expected to be owned jointly by all four partners each having a 25% share. The IPR associated with the modified code and software developed by SGS will be owned entirely by SGS.

Data Access Details

No new data will be collected as part of this project.

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

This involves developing algorithms for ANM systems. The modifications apply to systems that are developed by third parties so this is not part of DNO BAU activities.

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 project involves commercial risks and from a DNO perspective the benefits accrue to the ESO. Thus while the project brings benefits on a Whole System basis it would be difficult to justify without a collaborative mechanism such as NIA.

This project has been approved by a senior member of staff

☑ Yes