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

Jan 2025

Project Reference Number

NPG_NIA_54

Project Registration

Project Title

Dynamic Pricing

Project Reference Number

NPG_NIA_54

Project Licensee(s)

Northern Powergrid

Project Start

February 2025

Project Duration

1 year and 2 months

Nominated Project Contact(s)

Alex Munnery

Project Budget

£268,000.00

Summary

The current, static nature of DUoS charges fails to address the increasing variability of when periods of peak demand occur e.g. instances of “price herding” around periods of negative wholesale prices that can fall outside of the ‘traditional’ peak demand periods. While explicitly contracted flexibility services can seek to address this through demand turn down/generation turn up services, procuring such services adds cost &complexity to mitigating network constraints. Additionally the totality of the network is not usually considered, with a focus often on either an HV or LV solution. Dynamic network pricing will take the form of a multi-voltage level network price as well as differentiation within the same voltage level, enabling specific assets, such as individual low voltage feeder cables to be priced uniquely based on prevailing conditions. This network level approach will co-ordinate price signals to efficiently mitigate system wide constraints&avoid possible conflicting actions

Preceding Projects

NIA_UKPN0086 - Shift 2.0

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

The current, static nature of Distribution Use of System (DUoS) charges is failing to address the increasing variability of when periods of peak demand occur, such as instances of “price herding” around periods of negative wholesale prices that can fall outside of the ‘traditional’ peak demand periods.

Method(s)

Building on the work in Shift 2.0, we will develop a dynamic pricing signal that takes account of both LV and HV network conditions on

a day ahead basis. The price signal will be delivered to Octopus, who will use their EV connected customers to test the effect of using the signal to run the network in an effective and efficient manner as possible. The project will investigate two separate price signal models to compare and contrast the methodologies.

Scope

The initial overview of the project has identified the five key work packages listed below.
Work Package 1, Project technical design and set-up
Work Package 2, Trial Delivery
Work Package 3, Analysis
Work Package 4, Dissemination and legacy
Work Package 5, Project management and quality assurance.

After work package 1, the project plan will be reviewed. Confirmation of the key design decisions are made in this phase. This includes identification of network characteristics of interest, the identification and assessment of suitable network locations, the assessment of the availability of Octopus controlled assets, the identification of both control and response variables of interest, ensuring the required data flows are available etc.
Depending on the outcomes we will look at potential extension of the project.

Objective(s)

- A fully successful project would deliver the following outcomes:
- Development of full project design, delivery of and acceptance of that design.
- Development and testing of an appropriate dynamic DUoS signal
- Development and testing of Operational design for Dynamic Pricing
- Development and testing of a commercial design for Dynamic pricing – from the individual perspectives of NPg, Octopus and retail customers. Assessment of the trade-offs between these actors. This includes identification of issues for particular groups, such as vulnerable customers.
- Development of commercial arrangements and a contractual exemplar for the provision of dynamic pricing based flexibility services.
- Assessment of the usefulness and impact of dynamic pricing flexibility approaches in network design and longer-term development.
- Assessment of interactions across the both the NPg network and with the broader electricity system and the identification of possible conflicts – current and future.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

A social impact assessment has been carried out using the Sirio Impact Assessment Tool. The project scored positively overall (8.1/10) and no mitigation is required.

Success Criteria

Success of the project will be the delivery of the objectives stated above. This assumes that the dynamic pricing approach is technically, economically and socially acceptable. Any outcome where the conclusion is that this is not achievable, appropriately justified, written up and published, would also be considered a successful project.

Project Partners and External Funding

Total project value is £268k, with an indicative NIA value of £134k. Octopus/Kraken contributing the balance as their own costs.

Potential for New Learning

There is large potential for learning from a DSO, flexibility service provider and regulatory perspective, including:

- Multi-Voltage & Specific Asset, Dynamic Network Price
- Primacy Framework for Distribution Networks
- Dynamic Price Design
- Response Rate Vs. Explicit Flex Procurement & Management of Interactions

- Impact on a Range of Stakeholders
- Impact on Allowed DUoS Revenue Recovery
- Impact of Mandatory Vs. Opt-In Participation
- Impact on Dynamic Pricing for Short Vs. Long Term Constraints

Scale of Project

The project will conduct field trials on two sections of the LV network below a secondary substation. We anticipate the outputs will be scalable to the whole of the GB network.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Field trial on Two sections of the Northern Powergrid LV network below a secondary substation.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£134,000

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:

It supports the net-zero journey in that it seeks to reduce curtailment of HV connected low carbon generation assets and to encourage the safe adoption of low carbon assets, particularly EVs, connected at LV.

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)

N/A

Please provide a calculation of the expected benefits the Solution

In the recent NESO Clean Power 2030 report, they forecast 11.7GW of demand side flexibility by 2030. With annual despatched volumes of between 10.5 – 31TWh. Based on an assumed average cost of £100/MWh, this could result in annual expenditure of £1 – 3 billion. While the report doesn't provide a breakdown of this expenditure split between NESO and DSOs, assuming 30% of expenditure is based on DSO expenditure, of which NPg is 15%, this suggests the annual expenditure on flexibility services by NPg in 2030 could be between £47 - £140 million. If dynamic network pricing could be used to totally avoid the requirement for the procurement of explicit flexibility services, this represents the potential annual benefit of this project to NPg. In reality this is unlikely to be achieved but demonstrates the likely ceiling on the monetary value of the benefits.

While this is a large potential benefit it needs to be appreciated that this assumes full take up of the dynamic pricing methodology

For the Shift 2.0 project UKPN produced a cost benefit analysis using standard copper reinforcement at low voltage as their baseline method. At project initiation, they estimated the benefit of the application of the Shift methodology to have an NPV of around £17m over the period to the end of ED3 on the UKPN network area alone.

A second CBA based around the ambition Consumer Transformation scenario from the DFES estimated the UKPN benefit to be £19m.

While the value of the two approaches to benefits are somewhat different they do demonstrate the potential to drive down network costs and therefore network prices to customers.

A more refined assessment of costs and benefits will be one of the project outcomes.

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

We anticipate the outputs will be replicable across the whole of the GB network where suitable customers' assets are available.

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

It is difficult to provide a figure at this stage. Marginal costs considered to be low, as the project is predicated on using assets that have already been rolled out such as LV monitoring.

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 Dynamic Pricing project has the potential to support the fast development of a whole new market, supporting our target of stimulating the broader economic take-up of flexibility.

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 project builds on work previously carried out by UKPN in their Shift 2.0 project. This work seeks to more fully test the learning set out in that previous work where very low volumes of data, under limited seasonal conditions was gathered.

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

Previous projects' learnings have informed the prokject design. These include:

Shift 2.0
UKPN's SIF funded Shift 2.0 project assessed dynamic network pricing as an alternative to explicit flexibility services procurement based on a primary substation headroom as a means of mitigating the impact of EVs "price herding" around negative wholesale price periods.

DUoS Significant Code Review (DUoS SCR)
Under DUoS SCR, Ofgem review the mechanisms by which DUoS could be collected, with the potential for the adoption of a more dynamic, Time-of-Use based price signal. Although this was deemed too challenging to implement in the short term due to limited LV monitoring on distribution networks, several working papers were produced by the DUoS SCR working groups that identified key factors that this project has taken into consideration in the formation of the project.

1:1 Ofgem Engagement
On 25th November 2024, we held a bi-lateral call with Andrew Malley, the Head of Electricity Network Charging at Ofgem who is responsible for the administration and development of DUoS. We sought his feedback on key learnings he felt would be valuable in assessing the potential for dynamic network pricing. We have used this feedback to help shape this project.
Demand Diversification Service for LMAs
On 13th December, we held a bi-lateral call with Kevin Stuart, the project manager for SSEN's Demand Diversification Service for LMAs project. Through this project, they are exploring different price signals that could be used to ensure ongoing diversification of demand as RTS for storage heating is retired in 2025.

The new learning that will generated by this project has been outlined above in 'Potential New Learning'.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The project is innovative. While building on work previously carried out by UKPN in their Shift 2.0 project this work seeks to more fully test the learning set out in that previous work where very low volumes of data, under limited seasonal conditions was gathered.

Further this project aims to take a more holistic view of the HV and LV network and examines the various trade-offs between the various actors - customers, DSO/DNOs and flexibility providers – involved. How optimisation for one of these actors impact the others is not yet understood and the development of an overall minimal loss/maximum benefit will be developed.

Searches of the ENA's Smarter Networks Portal indicate extremely limited other work on dynamic pricing for electricity system optimisation. SSEN's Load Managed Areas project and Shift 2.0 are the notable exceptions. We have spoken with both of these DNOs and the Dynamic Pricing project is complementary to both.

Relevant Foreground IPR

All IP will be shared. THe output will be a functional specification which will be put into the public domain to help develop a market place for this type of flexibilty service.

Data Access Details

Data will be made available via the Northern Powergrid Open Data Portal

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

There is technical, economic and social cceptability risk as to whether it will work. We are exploring the regulatory barriers to rolling out and/or further encouraging the roll out of this type of flexibility service.

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 technical, economic and social acceptability risk as to whether the project will deliver a successful outcome. It is not a suitable

activity to be undertaken with BAU funding as the outcomes remain uncertain

This project has been approved by a senior member of staff

- [x] Yes