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 2021

Project Reference Number

WPD_NIA_064

Project Registration

Project Title

Assessment of Climate Change Event Likelihood Embedded in Risk Assessment Targeting Electricity Distribution (ACCELERATED)

Project Reference Number

WPD_NIA_064

Project Licensee(s)

National Grid Electricity Distribution

Project Start

January 2022

Project Duration

1 year and 3 months

Nominated Project Contact(s)

Liza Troshka

Project Budget

£244,511.00

Summary

This project is looking to develop a climate change impact assessment procedure which will be supplemented by a visualisation tool and technical information of the observed at-risk climate change hot-spots/assets and most up-to-date climate science (UKCP18 projections) so that adaptation measures are considered at the appropriate time and to an acceptable level.

Third Party Collaborators

Newcastle University

GHD

Problem Being Solved

The latest 'Progress in Adapting to Climate Change' report (2021) clearly states that national overall progress in planning and delivering adaptation in not keeping up with increasing risk from climate change. Essentially, UK is less prepared for the changing climate now than it was when the previous risk assessment was published five years ago. As a result Committee on Climate Change (CCC) strongly recommend energy industry to make monitoring and data analysis of climate risks more accessible, alongside better digitisation of past records. Specifically, the report states that 'a major gap is lack of projections of impacts in 2℃ and 4℃ [temperature increase] scenarios; this needs addressing as an urgent priority'. Moreover, recent experience in dealing with extreme weather events revealed the need to improve information sharing on climate risks to infrastructure interdependencies at a local level, especially for electricity network.

DNOs are not currently required to have a dedicated climate change management procedures to govern risks associated with projected increase in frequency and severity of extreme weather events and therefore, operational functionality of certain types of assets may be compromised if appropriate level of resilience is not considered at the planning stage prior to installation or replacement of old infrastructure.

Method(s)

The project will be delivered through four interlinked work packages as follows:

Work Package 1: Identification of historic severe weather impacts and at-risk asset groups.

WP1 will establish the impact severe weather events have had on WPD network to date across all four licence areas; this will allow us to establish common fault causes associated with the observed trends. The faults will be analysed with the maximum weather intensities that occurred in the storm that caused them. Trend analysis will be performed to understand how severe weather impacts change over time and will map out at-risk locations and asset groups for each of the weather impacts.

Work Package 2: Projecting future impacts of severe weather and climate change.

UKCP18 projections and other relevant sources of information will be acquired to indicate how the impact of observed weather trends will change short-, medium- and long-term under various carbon emissions scenarios. The data will be correlated with the asset failure records discovered as part of WP1 with additional failure modelling performed as appropriate.

Work Package 3: Projecting climate change impacts on embedded generation and consumption patterns.

WP3 will be looking to develop a suitable methodology to factor in climate projections and specific weather variables into forecasting modelling to generate future demand and generation profiles for a range of timeframes.

Work Package 4: Climate Change Impact Assessment Procedure

Based on the findings of the analysis completed in work packages 1-3, climate change impact assessment procedure will be prepared for consideration to be adopted as part of WPD business procedures. The document will identify business units that require adoption of the document and will be supported by visualisation tool and other technical assessments prepared as part of work package 1-3.

Scope

We recognise that current and future climate change can directly affects WPD business objective of providing a safe, reliable and efficient electricity supply to our customers. To be prepared for the projected change in chronic and acute weather conditions in short-, medium- and long-term we as a business need to be equipped with novel reliable climate change data so that our distribution network is equipped with innovative toolset for effective operation and management. Climate change data provision will allow for informed investments decisions and identification of at-risk hotspots so that design, reinforcement and maintenance activities are performed with climate change future proofing in mind. Customers across all four licence areas will be ultimate beneficiaries through reduced interruption to the service and reduced maintenance/recovery cost. Furthermore, by providing climate change data at a glance we will ensure streamlined information sharing with all relevant stakeholders.

Objective(s)

- To provide a visual representation of WPD historic weather impacts and climate change projections within different timeframes and spatial resolutions;
- To establish an up-to-date understanding of the potential impacts of projected climate change on the WPD's assets performance and functionality;
- To establish an understanding of climate change impacts on embedded generation and consumption patterns;
- To develop a climate change impact assessment procedure and to trial it across the business.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

N/A

Success Criteria

- Climate impacts on asset groups established and documented;
- Impacts on embedded generation and future demand modelled and documented;
- Climate change impact assessment procedure developed and verified within the business.

Project Partners and External Funding

- Newcastle University
- GHD

Potential for New Learning

The output of this work will provide a methodology and structured approach to climate change impact assessment which will be applicable in a DNO context. Technical assessment of the performance and functionality of distribution assets in the lights of climate change (for relevant weather variables) will be undertaken and referenced during an impact assessment process. Visualisation of past extreme weather events impact on WPD network and climate change projections (UKCP18) will be developed and will act as a reference during the impact assessment process.

Feasibility of integration of climate change projections into existing distribution future energy scenario modelling will be tested and verified.

Scale of Project

This is a desktop study which will utilise data from all four WPD licence areas.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

Storm data from all four WPD licence areas will be utilised in the analysis.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Total Project cost: £244,511.30

Agreed Partner Contribution (Newcastle University): £0

Agreed Partner Contribution (GHD): £0

Sub Total: £244,511.30

WPD DNO Contribution: £24,451.13

Funding from NIA: £220,060.17

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 project's main benefit will be creation of a bespoke climate change impact assessment process, visualisation tool and supporting technical documents that will allow easy communication and computation of climate change risks across the business. A Climate Change Impact Assessment Procedure will ensure resilience to any future intense extreme weather events and climate conditions is considered in assets design and maintenance activities.

Several recent studies identify the benefits of making infrastructure climate resilient. The Global Commission on Adaptation (2019) and the World Bank Lifelines report (Hallegatte et al. 2019) both show that making existing and new infrastructure more resilient to the shocks and stresses of the changing climate, makes sound economic sense; on average, the benefits outweigh costs by a ratio of 4:1.

An estimated average annual impact of weather related faults across all four WPD licence areas is £14.8 million based on 2018-2020 data. Under moderate assumption that 10% of faults occurred due to changing climate having proactive climate change adaptation measures in place could have potentially saved WPD £1.1m annually on remedial cost. During the cause of this project we will aim to establish a baseline of impact.

Please provide a calculation of the expected benefits the Solution

N/A

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

Climate change impact assessment methodology and asset performance assessment will be applicable across all DNOs.

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

The project deliverables will provide a structured approach to climate change impact assessment to ensure adaptation measures are considered at the planning stage prior to installation or replacement of old infrastructure. The adoption of climate change impact assessment procedure can potentially involve amendment of relevant policies across the business and recommendations for standard amendments.

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 outcomes of this project will generate learning on vulnerability of distribution assets to climate change and extreme weather within different timeframes and spatial resolutions and will provide a structured approach for integration of appropriate climate change adaptation measures to ensure network resilience in the future. Climate change projections will be factored in to distribution future energy scenario modelling to get a better understanding of potential impacts future climate will have on embedded generation and demand.

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.

National Grid ESO's Mapping the Impacts and Visualisation of Risks of extreme weather on system operation (MIVOR) project has undertaken the evaluation analysis of the impacts extreme weather will have on system operation up to 2050 and produced a map demonstrating the risks, probabilities, and consequences of such events. Even though the project utilised UKCP18 projections (as proposed in this project) the methodology and scale of the analysis is not replicable/suitable in a DNO context.

This is the first time the impacts of climate change specifically on distribution assets, distribution future embedded generation and demand profiles are considered in such a granular detail.

In additional, there is no evidence that the analysis and visualisation of past extreme weather events was made available in an easy to understand/use format.

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

As stated above, the Committee on Climate Change called for the energy industry, BEIS and all associated parties to make monitoring and data analysis of climate risks more accessible, alongside better digitisation of past records. This project will fill the gap of this urgent priority and will also aim to embed climate change future proofing into Business as Usual (BaU) to build in resilience into our systems and ultimately save customers money in the long run.

Previous attempts to climate change adaptation tended to be reactive or was a risk or asset specific whilst this project provides a holistic strategic approach to ensure appropriate level of adaptation is consistently considered across all relevant activities.

Relevant Foreground IPR

Foreground IPR:

- Climate change impact assessment methodology/procedure developed during WP4
- All reports produced during the course of the project
- Results of the past severe weather and climate change impact analyses on WPD network
- Methodology for integrating climate change considerations into energy distribution forecasting activities

Background IPR:

- Consequence forecasting methodology developed by Newcastle University
WPD network assets data
- Distribution Future Energy Scenarios methodology, model and outputs (growth of demand and embedded generation).

Data Access Details

Anonymised data will be available to share in accordance with WPD's data sharing policy
www.westernpower.co.uk/Innovation/Contact-us-and-more/Project-Data.aspx

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

WPD would not typically fund the investigation of a new method of assessing the risks associated with climate change in such a detail as intended to do in this project. Analysis of climate change projections and their impacts on asset performance requires specialist knowledge which is outside of WPD remit.

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 proposed method is unproven at this scale and level of technical detail required.
- To establish whether the approach is compliant and achievable, a trial and testing within the business needs to be undertaken outside of BaU activities.

This project has been approved by a senior member of staff

☑ Yes