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## NIA Project Registration and PEA Document

### Date of Submission

Mar 2023

### Project Reference Number

NPG\_NIA\_044

## Project Registration

### Project Title

Readi

### Project Reference Number

NPG\_NIA\_044

### Project Licensee(s)

Northern Powergrid

### Project Start

March 2023

### Project Duration

1 year and 1 month

### Nominated Project Contact(s)

Peter Colinson,

### Project Budget

£90,000.00

## Summary

The project aims to gain an initial understanding of the interaction between new assets required for the net zero transition, legacy assets and network operation and how these might develop as the climate changes.

### Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

## Problem Being Solved

The combination of changing climate conditions, including the potential for more frequent and/or intense extreme weather, and a growing dependence on electricity through the clean energy transition make ensuring power sector climate resilience and adaptation a societal imperative. Utilities, regulators, and policymakers require scientifically informed insights about the future power system and the environment in which it will operate to identify critical adaptation and resilience investments.

There is currently a gap around a consensus on a common framework to:

- (1) establish a foundation for physical climate risk assessment and data needs,
- (2) conduct a risk-informed approach to assess the vulnerability of grid assets to those potential future climate scenarios and to harden the existing and future energy system, and
- (3) prioritise and select system investments that consider a range of threats, including those not driven by climate and other grid objectives such as decarbonisation, affordability, safety, and equity/vulnerable community exposure.

## Method(s)

Climate READi Coordination

In support of the three technical work streams this is intended to support coordination across technical workstream efforts and support engagement with various stakeholders by:

- convening a global collaborative of scientists, companies, and industry stakeholders to ensure that the project is comprehensively informed.
- undertaking two to three case studies, allowing for an “end-to-end” application of the framework testing its use and applying lessons learned to ultimate framework development.
- development and publication of easy-to-use guidebooks to enable application of the Framework to support widespread acceptance and application for years to come.

#### 1. Workstream 1 (WS1) – Physical Climate Data and Guidance

- to convene a group of experts to advise on the availability of different types of climate data, the use of climate data in electric sector modelling and analysis, and the suitability of different types of data for different analysis needs.
- collaboratively define climate data requirements by electric sector applications to understand specific impacts of weather and climate on electric power system assets, infrastructure, and cross-cutting resources (“climate impact pathways”) and to obtain specific climate data requirements for these impacts
- to define climate data requirements for incorporation into electricity system analysis models or to characterise weather and climate variability and extreme events across different time horizons for other system-level assessments using network models
- assess climate and secondary data relative to data requirements including:
  - the current state of scientific understanding with respect to historical trends for these variables (e.g., how they may be changing over time) and how they are projected to evolve in the future.
  - the current state of scientific understanding with respect to the influence of global warming and other drivers of variability (e.g., natural climate variability, other anthropogenic activity such as land management) on historical and future trends (both near- and long-term) and how this may impact the use of climate data in different analysis contexts.
  - recommendations on which types of climate data (e.g., historical vs. near-term projections vs. long-term projections; coarse vs. high resolution) are most appropriate for the different data requirements and applications defined
- determine data gaps and development opportunities
- develop guidance for selecting and applying data in different analysis contexts including the identification of tailored metrics and data sources for each application that characterises relevant physical climate changes and probabilities
- to seek to characterise the representations of uncertainty, including uncertainty in future emissions trajectories, the robustness of different types of climate information, and the influence of climate and non-climate drivers on changes in physical climate hazards.

- address data gaps and facilitate access to climate data or support opportunities for new data development as needed

#### 2. Workstream 2 (WS2) – Energy System and Asset Vulnerability Assessments

- stakeholder affinity groups to provide expertise and thought leadership into the climate vulnerability assessment.
- assemble available knowledge on the application of climate data to power system assets and operations.
- identification of Impacted Power System Assets and Associated Cross Cutting Operations
- development and documentation of Climate Data Requirements
- development of approaches to perform climate risk assessments and adaptation options
- characterisation of Asset Climate Risk or Vulnerability in support of seeking ways to present these with a standard metric to facilitate communication of relative risk

#### 3. Workstream 3 (WS3) – Resilience and Adaptation Planning and Prioritisation

- to convene a team of global thought leaders and experts to provide input to the development and review of the deliverables and identify gaps in the present knowledge.
- to assess the state-of-the-art and identify the gaps.
- development of Macro-Level Scenarios and Network Models for Analyses for performing analyses across distribution and customer utilisation as well as for assessing societal impacts.
- extreme event definition and impact quantification of extreme events focussing on developing metrics, methods, and tools to quantify impacts of extreme events and to the extent possible on society to assess resilience.
- To develop a full understanding of how the costs compare to the benefits, both from a system and socioeconomic perspectives.

## Scope

There are many risk management tools, processes, standards, and guidelines used by power sector organisations today. However, to meet societal electricity decarbonisation and climate resilience needs, the power sector must coalesce around a standardised and consensus-based framework to inform infrastructure investment and deployment. This scope of work is planned to cover:

- Physical Climate Data and Guidance
- Energy System and Asset Vulnerability Assessments
- Resiliency and Adaptation Planning and Prioritisation

## Objective(s)

The Climate READi: Power Common Framework is intended to facilitate analysis and application of appropriate climate data among all stakeholders to enhance the planning, design, and operation of the power sector. The Framework is intended to provide:

- guidance on the specific climate and secondary physical data availability, quality, suitability, gaps, specification, and interpretation to facilitate assessment of the full range of power system related applications including characterisation of how to treat the inherent uncertainty in climate and ecosystem modelling for applications.
- a consistent approach for power system stakeholders to apply climate-related information, including extreme weather and localised climate data trends and projections at the asset level, with guidance for specific asset/system vulnerability analyses, thus, enabling the most effective future design and operation of a reliable, resilient, and low-cost power system to meet societal needs.
- develop a common risk-based approach for prioritising hardening and adaptation options and applying a cost-benefit analysis to identify the specific adaptation investments that should be made considering climate resiliency along with other grid objectives.
- provide stakeholders with confidence that the methods and approaches utilised are well vetted and consistently applied across the industry, but flexible enough to account for regional differences in future climate trends and system configuration. In addition, provide an understanding of the inherent uncertainty and limitations so that network operators and other stakeholders can be well informed when making investment and prioritisation decisions ensuring these are made in the most economically efficient and social acceptable manner..

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

N/A

## Success Criteria

Delivery of the identified objectives in line with the section above is the key criteria for success. where the specific deliverables are not achieved an assessment and identification and dissemination of why that was not possible would also represent a successful project outcome.

## Project Partners and External Funding

This project is being run collaboratively across the Berkshire Hathaway Energy (BHE) group in partnership with the Electric Power Research Institute (EPRI).

The total project cost is \$975,000, of which the contribution from Northern Powergrid is 10% (£90,000). The remainder of the funding will be provided by our BHE partners

### Potential for New Learning

The development of climate resilience metrics for implementation in 2028 is a requirement for electricity distribution companies. This work could provide useful assistance in the development and implementation of these metrics informing asset investment decisions, and future innovation gaps particularly for the net zero transition under changing climatic conditions.

### Scale of Project

Project itself is small scale although does contribute to a larger piece of work being undertaken by Berkshire Hathaway Energy.

### Technology Readiness at Start

TRL2 Invention and Research

### Technology Readiness at End

TRL3 Proof of Concept

### Geographical Area

The project is desk based research. Findings will be applicable to a wide geographic area. No field trials or other geographically based activities are planned.

### Revenue Allowed for the RIIO Settlement

None

### Indicative Total NIA Project Expenditure

100000

## 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 is low TRL and the expected benefit to the GB customer is not yet clear.

The economic benefit of understanding long term impacts of changing climate on network assets is clear. Further there are likely to be significant social benefits from ensuring that long term investment and operational decisions lead to an improvement in network resilience. This is especially important with regard to an increasing number of customers made vulnerable by an increased reliance on a single energy vector due to the net zero transition.

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

Benefits cannot be calculated at this time. The project outcomes should allow an initial assessment of the order of magnitude of the benefits available.

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

The method and applicability of the outcome is relevant across all GB licence areas.

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

Application of the method is likely to have a trivial cost for other licensed entities.

### 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 learning and methods are applicable to all electricity distribution companies. It could also be applicable to both gas transmission and distribution networks and electricity transmission networks to some extent. Applicability is likely to be across a variety of functions - investment planning, operations, storm response, DSO transition, customer vulnerability response, resilience and reliability.

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

Our innovation strategy identified six transformational capabilities, one of which is to increase the dependability of the electricity network as seen by the customer. Our strategic outcomes include achieving next-level energy system dependability by increasing the reliability, resilience and security of the power grid.

This work contributes to achieving this outcome by enhancing our understanding of the risks posed to our network by the climate, how we can mitigate these risks and our performance towards achieving these aims.

### 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 led working group acts as a focus for all climate related work. Dissemination of the work and findings of this project through this group will prevent unnecessary duplication. There is no current indication that this work has been previously undertaken.

### 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

Whilst some work has been carried out in the climate adaptation arena, this is very much an emerging area.

This project will help us better understand the impact of the climate on our assets and network and therefore tailor datasets to our requirements.

The project intends to consider adaptation as an integrated approach to holistic objectives across decarbonisation as well as climate

adaptation in addition to potential impacts on transmission and generation which will help us to better understand interdependencies across infrastructure organisations. This is a key emerging area.

The project is intended to develop resilience metrics that will quantify resilience of the grid and its impact on society. This will then form a crucial input into a CBA style tool to help us better evaluate adaptations from the customers perspective.

### **Relevant Foreground IPR**

Project outcomes will be made available via reports and where necessary feed into ENA policy for general use across the industry.

### **Data Access Details**

No datasets will be developed by this project.

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

The project is a development activity with significant technical and economic risks. Significant financial return on the project outcomes is unlikely within the ED2 (or perhaps ED3) period assuming that the project is entirely successful. Returns are likely to be seen from about 2034.

### **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 remains significant technical and economic risk in this project. The low technical maturity indicate tthat there is a high likelihood of failure to reach BAU. The direct benefits of the project are unclear although the general benefits seem to be self evident.

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

Yes