

## NIA Project Registration and PEA Document

### Date of Submission

Apr 2019

### Project Reference Number

NIA\_WWU\_055

## Project Registration

### Project Title

Pathfinder Plus

### Project Reference Number

NIA\_WWU\_055

### Project Licensee(s)

Wales & West Utilities

### Project Start

March 2019

### Project Duration

0 years and 9 months

### Nominated Project Contact(s)

Bethan Winter

### Project Budget

£133,333.00

## Summary

This project is a complimentary to further the learning gained in Green City Vision (NIA\_WWU\_051). The current financial functionality within WWU's Pathfinder model is less sophisticated than the engineering functionality. Therefore, Pathfinder Plus has been developed to refine the ability within Pathfinder to understand the financial implications of an engineering solution and to allow scenarios to be optimised based on financial metrics

### Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

## Problem Being Solved

Network companies must enable the transition towards a smart, flexible, low cost, low carbon energy system for all consumers and network users.

In a previous project (Flexible Energy Model, NIA\_WWU\_041) an early model was produced, from this the Pathfinder model was developed to understand an annual hour-by-hour energy balance across both the electricity and gas networks, given a set demographic and energy supply profile. The model in its current form provides invaluable system insights to understand the operational implications of a decarbonisation strategy and allows the user to understand engineering trade-offs. The first scenario-based project developed with the Pathfinder model was the Green City Vision project (NIA\_WWU\_051), which was formulated to understand the engineering implications of a range of decarbonisation strategies to achieve a 2050 compliant scenario for a selected geographical area - Swindon.

This is a complimentary project to further the learning gained in Green City Vision. The current financial functionality within Pathfinder is less sophisticated than the engineering functionality. Therefore, this project – the Pathfinder Plus project – has been developed to refine the ability within Pathfinder to understand the financial implications of an engineering solution and to allow scenarios to be optimised based on financial metrics

## Method(s)

The project will achieve the outlined objectives as an extension to the existing Pathfinder model developed by Wales & West Utilities:

The methodology will involve:

1. Collation of an economic dataset.
2. Economic models for each generation source.
3. Economic models for network implications.
4. Economic models for non-billed costs.
5. Production of scenario inputs
6. Scenario modelling
7. Report writing
8. Dissemination and presentation

## Scope

The scope of the proposed extensions to Pathfinder are:

1. Quantification of the levelised cost of generation sources that results from the level of utilisation of the sources, as per the Pathfinder output.
2. Quantification of the levelised cost of gas generation sources that results from the level of utilisation of the sources, as per the pathfinder output.
3. Quantification of the additional network costs associated with reinforcement and utilisation, based on input from the network operators.
4. Creation of a financial optimisation tool.
5. Assess indicative implications for consumer energy bills.
6. Quantification of additional costs that are not realised through energy bills, such as the installation costs of domestic decarbonisation infrastructure.

The financial functionality will be developed using referenced data sources to build cost models, initially based on the original sources used by Delta-EE, refined where required.

Alongside the financial functionality, the engineering functionality within pathfinder is proposed to be extended to more accurately profile road transport and incorporate the model adjustments developed through the Green City Vision project.

## Objective(s)

The objective of the Pathfinder Extension project is to build upon the engineering outputs of the current Pathfinder model to increase the economic sophistication of the analysis.

The main outcome of the work will assist stakeholders as follows:

Wales & West Utilities – Increase the output value of Pathfinder as a whole system analysis tool to allow both engineering and economic implications of any given decarbonisation strategy to be assessed.

Gas & Electricity Distribution Network Operators – Understand how different energy scenarios will impact generation economics and resulting cost of electricity, as well as indicative economic implications for network upgrades.

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

n/a

### Success Criteria

A new version of Pathfinder will be produced that contains updated economic datasets for scenario modelling. The additional functionality will be designed and trained to WWU personnel familiar with pathfinder.

### Project Partners and External Funding

Progressive Energy. Funding will be entirely through Network Innovation Allowance

### Potential for New Learning

The enhanced model will enable the UK's energy sector to assess all or part of the energy trilemma. Allowing an assessment of a range of alternative supply scenarios to calculate the costs and benefits of alternative supply scenarios and understand the value of the gas network as an energy storage mechanism.

The model is critical in deciding future investment policy for network operators, suppliers & policy makers.

### Scale of Project

This project is done at the relevant scale which is a desk top study. However all modelling conducted will be on a UK scale

### Technology Readiness at Start

TRL3 Proof of Concept

### Technology Readiness at End

TRL4 Bench Scale Research

### Geographical Area

All modelling conducted will be on a UK scale

### Revenue Allowed for the RIIO Settlement

None

### Indicative Total NIA Project Expenditure

External Project Cost: £100,000

Internal Project Cost: £33,333

Total Cost: £133,333

## 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 outputs of the project may inform policy which could help avoid the estimated £300 billion it would cost to upgrade the infrastructure to generate, distribute and use electricity to meet heating needs.

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

This is a research project

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

The existing pathfinder model has been applied to Swindon as part of the Green City Vision Project, which is a typical town and the model has the capability to analyse any geographical area. This project will enable optimised approaches to be designed across the UK

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

The project outcomes could illustrate or demonstrate the need for further research and could influence future energy policy.

### 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

Can be used to develop optimised whole systems approaches. For example between gas and electricity networks.

### 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

- ☒ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

### 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.

No work of this kind has been completed in the UK to date.

### 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 pathfinder model has been developed by Wales & West Utilities internally, However this project is a follow on from another NIA project Green City Vision, which identified that improvements could be made to the model.

### Relevant Foreground IPR

n/a

### Data Access Details

n/a

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

This project did not form part of the RIIO GD1. It requires funding outside of this.

**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**

Whole systems approach to the energy market is emerging which carries a risk. By using NIA funding this risk is mitigated, while also ensuring that any learning is shared with the wider energy industry.

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

☒ Yes