

SIF Project Registration

Date of Submission

Jul 2023

Project Reference Number

NGED - SIF - 10060736

Project Registration

Project Title

Planning Regional Infrastructure in a Digital Environment (PRIDE)

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Project Licensee(s)

National Grid Electricity Distribution

Project Start

April 2023

Project Duration

3 Months

Nominated Project Contact(s)

Jenny Woodruff

Project Budget

£145,157.00

Project Summary

SIF AIMS

PRIDE creates a digital twin of regional infrastructure including energy systems, data for properties, etc., to support decision-making. It provides advanced visualisation capabilities and supports embedded scenario-based modelling. Decarbonising major energy demands is therefore accelerated as the digital twin supports the selection of options that are faster and/or better overall value for money to deploy.

THE INNOVATION

PRIDE will assess use cases to support decision-making and rank their potential impact under different governance structures. We will determine where:

- use case requirements are already met
- minor enhancements are required
- entirely new datasets/models are needed

We will develop a plan for an enhanced prototype to be developed in the Alpha phase. The potential for integration with the National Grid Virtual Energy System (VES) will be assessed.

EXPERIENCE AND CAPABILITY

Advanced Infrastructure is an enterprise SaaS partner for DNOs and local governments. The company leads the digitalisation of the Energy System Catapult methodology for Local Area Energy Planning in the form of the LAEP+ tool. The partner has delivered multiple projects under the Government Design Principles and developed tools for data management, visualisation and zoning and API integrations with network capacity assessment. The partner has worked on past NIA RESOP and InnovateUK PFER LEO projects.

The WMCA's Energy Capital provides specialist knowledge of place-based energy innovation and stakeholder involvement in whole energy systems, where giving cities and localities a stronger role within the UK's current energy regulation offers significant potential for added value, while supporting net zero transition. The WMCA has completed the prior work needed to inform the development of PRIDE within the context of whole system planning and delivery and has a detailed understanding of local needs.

NGED brings experience of automated network modelling and forecasting future load profiles from EPIC, the energy efficiency modelling within DEFENDER and the understanding of local flexibility from Equinox and FutureFlex.

NG ESO's VES development provides background experience for creating and managing digital twins.

USERS

The project's outputs are designed to support decarbonisation investment decision-makers. PRIDE addresses their needs by developing tools for the use cases of greatest value under different organisational structures. PRIDE paves the way for a Beta phase trial using the tool to assess local engagement and governance process, bringing together decision-makers and utilising the WMCA's Net Zero Infrastructure Delivery Panel governance structure. This would provide valuable evidence for the ESOs future system operator work and Ofgem's local governance programme.

Third Party Collaborators

West Midlands Combined Authority

Advanced Infrastructure

Problem Being Solved

PRIDE tackles the problem of regional infrastructure investment decisions failing to take local impacts and opportunities into account. For example, if transport infrastructure is planned without reference to the electricity network capacity then costs will be increased. A platform that enables sophisticated scenario-based modelling can help identify potential synergies and quantify business cases.

Project Approaches And Desired Outcomes

The Big Idea

Planning Regional Infrastructure in a Digital Environment (PRIDE) aims to investigate how a digital twin, incorporating regional infrastructure for electricity, gas, heat, transport, water, telecoms, together with a detailed view of buildings and demographics of their occupants, can enable stakeholders to make better decisions when planning the investment required to decarbonise major elements of demand.

PRIDE examines how different governance structures that put more emphasis on local decision making could be enabled by a digital twin, and what new supporting models and datasets would be required. For example, the digital twin may provide tools to identify the best locations for;

- installing heat pumps
- creating heat networks
- upgrading building insulation
- deploying electric vehicle chargers
- deploying rooftop PV

The digital twin will also support scenario-based modelling, to aid optimal whole system decision making and local area energy plan iterations. This will require models that can calculate network impacts and potential network upgrade costs, local carbon reductions etc. Where network upgrade costs are prohibitively high, the possibility of using non-network solutions needs to be assessed. The digital twin will link to new or existing models to assess flexibility potential or impacts of energy efficiency interventions. This will build on the outputs from projects such as Equinox (NIC) and DEFENDER (NIA).

The PfER funded Regional Energy System Operator (RESO) project found that taking a local, whole-system approach to energy infrastructure decision making could deliver a net present value of £721m over 30 years. Crucially, RESO uncovered the need to develop an engagement tool, so decision-makers are able to realise these benefits. For example, RESO highlighted the scale of opportunity from local flexibility markets and this tool will support the business case for new services like this and will be a key enabler in providing a means to share local infrastructure, building, demographic and other relevant data between stakeholders.

The discovery phase will identify stakeholders and collate use cases for the digital twin to support. We will identify the models needed to enable the use cases, and what datasets would be required by the models, as well as planning the later project phases in more detail.

The Alpha phase would then develop prototype tools, acquire and integrate new datasets into a test region. Finally, the Beta phase would trial the combination of a RESO organisational structure together with the enhanced digital platform to support decision making.

Innovation Justification

THE PROBLEM

PRIDE tackles the problem of regional infrastructure investment decisions failing to take local impacts and opportunities into account. For example, if transport infrastructure is planned without reference to the electricity network capacity then costs will be increased. A platform that enables sophisticated scenario-based modelling can help identify potential synergies and quantify business cases.

THE INNOVATION

PRIDE extends an existing infrastructure visualisation platform to include new datasets and analytical models in order to support a wider set of use cases. These support new governance structures to facilitate whole systems decision making. It also integrates the digital twin with National Grid's Virtual Energy System (VES) sharing information for loading, capacity and flexibility potential.

WORK DONE TO DATE

PRIDE builds on the RESO project which found data visibility was needed for cost-effective stakeholder engagement and suggested governance mechanisms for whole system planning and operation. PRIDE will integrate learning from related projects i.e. Equinox, Defender, Venice and EPIC. These provide relevant information on flexibility, energy efficiency impacts, vulnerable customers

and future load profiles. RESO brings this together to support selected use cases where gaps have been identified in the existing visualisation and modelling capabilities.

ECONOMIC AND SUSTAINABILITY VALUE

The RESO project identified potential benefits of £721m across the West Midlands over 30 years and a range of benefits including:

- Smart local energy systems create more local opportunities to help balance the grid, ensuring value is captured and distributed at a local level. This would help to lower bills, create jobs, and generate local economic benefits and ensure vulnerable consumers are not left behind during the energy transition.
- Savings through targeted technology deployment, identifying what technology is needed and where
- Data led local planning: development of co-ordinated energy and local planning
- Infrastructure investment: targeting investment to where it is needed most
- Economic development: creating and capturing local value from a smarter energy system
- Designing the market: to create local opportunities in demand-side response and flexibility services

JUSTIFICATION OF FUNDING

This project involved a large number of partners with the majority of the benefits accruing to local authorities rather than the Distribution Network Operator, therefore it is not appropriate to fund this as BAU.

Project Plans And Milestones

Project Plan And Milestones

PROJECT MANAGEMENT METHODS

This project has been planned in accordance with Agile Methodology and the Government Design Principles. This award will provide the consortium with access to all the necessary resources to carry out the project successfully. All data, software and computing resources are available. All data/software team members are in Cambridge/Sheffield for this project with COVID-19-compliant working practices set up.

REPORTING LINES

Project lead (Woodruff, NGED), with Advisors, will oversee governance lead (Hiles, WMCA) and Product Owner (Cairns-Haylor, ATIL). The Product Owner will oversee software engineering, academic support, and modelling. The Governance Leads oversee stakeholder management and engagement including but not limited to Major Energy Users, Housing Associations, Gas Networks and community groups.

Task-Method-Deliverable statements are authorised by the project Core Team named above. The Core has the ultimate responsibility for the delivery, meeting weekly and led by senior directors responsible for the growth of the company. The Core Team will have the responsibility of agreeing the Detailed Project Plan (DPP). Each work package is divided into sub-tasks, with defined deliverables.

GOVERNANCE

The project will be governed under standard SIF Governance Document including attribution of IPR, conflict resolution and change management.

RISK MANAGEMENT METHODS

Risks have been categorised by likelihood, impact and criticality (see appendix). A dynamic risk register utilising risk screening will be used to monitor the project, adhering to ISO31000 principles. Risks and critical path analyses have been conducted and will be reviewed at fortnightly meetings, led by the project lead's risk manager to ensure active risk monitoring, contemporaneous mitigation measures, root cause analysis as necessary and proactively minimise knock-on delays. A dynamic risk register is attached to the annex.

CONSTRAINTS

Access to data, expertise and commercial barriers are constraints upon this project. Recent work by NGED has placed a significant amount of data in the public domain. This will enable project success within the short 3-month duration. WMCA & Advanced Infrastructure will bring additional knowledge to support the removal of commercial barriers and knowledge gaps.

Project plan - see uploaded as an appendix

Risk Register - see uploaded as an appendix

PRIDE_Project plan.pdf (opens in a new window)

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PRIDE_Risk register.pdf (opens in a new window)

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Route To Market

CURRENT MARKET POSITION

There are a number of enterprise software vendors who are delivering data and web mapping products to DNOs and local governments. Customers purchase structured data and software for energy planning applications. Project partner Advanced

Infrastructure is a market leader in this area and is currently delivering the Energy Systems Catapult's digital LAEP tool. Advanced Infrastructure and other vendors will commercialise new services based on this innovation.

DEVELOPMENT OF COMPETITIVE MARKETS

The project outputs will not undermine developing competitive markets as they include features to assess demand-side flexibility potential and the use of flexibility markets as an alternative to traditional reinforcement.

ROUTE TO MARKET

The output of project PRIDE will be a software prototype and a detailed software specification that would form the basis of any future procurement activity. Route-to-market for the innovation will be through existing direct sales activity of software vendors such as Advanced Infrastructure. It would be expected that Advanced Infrastructure and other software vendors would compete in a procurement process to deliver the software service for a contracted period. The procurement exercise will be replicable across all 6 DNOs.

CUSTOMER SEGMENT

The innovation will be used by a consortium of stakeholders including the DNO, NG ESO, statutory transport planning authorities and local authorities. The primary customer is the Local and Combined Authority, as they would lead on the creation of a local area energy plan and RESO. The outputs of the project will have significant value, whatever the preferred governance structures around them are.

CUSTOMER VALUE

The RESO project estimated benefits of £450m over 10 years. PRIDE will help unlock these benefits by removing the barriers to better-informed, localised decision-making and network management. Project RESO evidenced the lack of a software tool to communicate and engage with local decision makers has resulted in poor understanding and lack of action. By developing this platform to communicate and engage, the benefits outlined in question 5 should be more readily realised.

FUNDING STRATEGY

Future funding will be shared between several parties. NGED is committed to making its data more available to third parties and much of the ongoing costs would be associated with ongoing data provision that would be funded via our Data and Digitalisation budget. WMCA has an ongoing commitment to a process of Local Area Energy planning which this platform would support by making data visible between stakeholders.

Costs

Total Project Costs

145157

SIF Funding

130641

This project has been approved by a senior member of staff

Yes