

The Subsidy Control Act 2022 will provide a new legal framework for subsidies in the UK from the 4 January 2023. Some funding rules for future grant opportunities may change. Specific competition guidance for new competitions will be updated from January.

Project details

Application team

WESTERN POWER DISTRIBUTION PLC (Lead)

Organisation details

Type	Business
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Team members

Full name	Email	EDI survey
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NATIONAL GRID ELECTRICITY SYSTEM OPERATOR LIMITED

Organisation details

Type	Business
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Team members

Full name	Email	EDI survey
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ADVANCED INFRASTRUCTURE TECHNOLOGY LTD

Organisation details

Organisation details

Type	Business
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Team members

Full name	Email	EDI survey
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West Midlands Combined Authority

Organisation details

Type	Public sector, charity or non Je-S registered research organisation
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Team members

Full name	Email	EDI survey
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Application details

Competition name

Ofgem Round 2: Discovery – Accelerating decarbonisation of major energy demands

Application name

Planning Regional Infrastructure in a Digital Environment (PRIDE)

When do you wish to start your project?

1 April 2023

Project duration in months

3 months

Has this application been previously submitted to Innovate UK?

No

Project description**Project description**

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.

Application questions

1. Applicant location (not scored)

Applicant location

National Grid Electricity Distribution (East Midlands) plc. Avonbank, Feeder Road, Bristol BS2 0TB

ADVANCED INFRASTRUCTURE TECHNOLOGY LTD. Company number 12552695. Registered office address: 21 King Street, Cambridge, England, CB1 1AH

NATIONAL GRID ELECTRICITY SYSTEM OPERATOR LIMITED. 1-3 Strand, London, WC2N 5EH

Energy Capital is a department of West Midlands Combined Authority, 16 Summer Lane, Birmingham, B19 3SD

2. Project short description (not scored)

Project short description

PRIDE examines how using a digital twin to visualise and model changes to electricity, heat, gas, transport, digital and water infrastructure, can make interdependencies, market opportunities and business cases more visible, therefore ensuring the investment decisions enabling decarbonisation of major loads are efficient and optimised.

Video link - <https://youtu.be/mofadzFOsAU> (<https://youtu.be/mofadzFOsAU>)
(password is not required)

(<https://youtu.be/MKMUSda-04s>)

3. Project summary

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 regulations 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 have 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.

4. Innovation justification

What value will your project deliver? Why is it suitable to be funded by the Strategic Innovation Fund rather than other sources?

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.

[Question 4 - Appendix.pdf \(opens in a new window\)](#)
 (/application/10060736/form/question/28896/forminput/76274/file/473216/download).

5. Benefits Part 1

Benefits Part 1

Network operating cost reductions result from more efficient, cost-effective engagement with local actors, better informed business planning, and better "flexibility first" assessment tools.

Providing tools for third parties to optimise their connection locations would also reduce connection costs i.e. cost savings for users of network services.

The RESO project identified benefits for Coventry to be a Present Value (PV) of £450m over 10 years and £1,245m over 30 years. This project aims to deliver those benefits and create a replicable platform for nationwide deployment. Within this the following savings were estimated;

- Carbon (£32m 10 yr PV, £90m 30 yr PV)
- Energy consumption (£47m 10 yr PV, £156m 30 yr PV)
- Transport fuel costs (£113m 10 yr PV, £443m 30 yr PV)

Other benefits covered NHS costs, social services, waste costs, local environment benefits and the value of local job creation which had a total present value of £221m over 10 years and £376m over 30 years.

Optimising investment decisions brings related carbon benefits, such as where reinforcement is avoided or reduced there will be less embodied carbon in the network assets. Similarly, if energy efficiency improvements can avert network investment the carbon benefits are considerable.

By embedding an energy simulator decision support tool in the digital twin, we will be able to interrogate it with "what-if" scenarios with the aim of determining the following. Identify scenarios that are best at supporting local decision-making, giving earlier notification of demand side investment plans and greater ability to mitigate the potential impact on the network, and providing a foundation for more effective network management through demand side flexibility, resulting in fewer network constraint issues.

By enabling the local use of flexibility services this project is improving access to revenues for users of network services and the digital twin may also enable the creation of new revenue streams.

Project RESO's markets work package suggested a Coventry flexibility market would have a value of £10 to £15 million per year with the highest costs being driven from high demand electrification.

It is likely that providing additional visibility of demand and generation profiles, existing and future network constraints etc. could trigger the creation of new markets and new services. However, this may require an even more enriched digital twin and a mature regional management structure before it is delivered in the Beta phase of the project.

6. Benefits Part 2

How will your project deliver net benefits to consumers? At Discovery Phase these can be high level; if the project progresses we would expect more granularity and evidence.

Previous projects EPIC and RESO identified a problem for all target user groups of Local Authorities, Energy Networks and Practitioners. Current tools can't serve all three user groups due to commercial barriers, poor data interoperability and proprietary methodologies. This impacts analysis for Local Area Energy Planning (LAEP) making it slow, expensive and potentially error prone. From Phase I research, LAEP+ is expected to cut energy plan production costs by 50% and reduce the time to complete feasibility assessments by 80% - reducing a nationwide overspend by £17 million annually. Therefore, benefits metrics are likely to include speed of LAEP production activities and quality of supporting datasets. Specifying Alpha and Beta phase benefit metrics and how they will be measured is an activity in Work Package 4.

The outputs and benefits of the Discovery Phase reflect the work packages and include;

1. An understanding of the requirements for the digital twin and associated models, including a better understanding of the types of scenario modelling that are useful to a RESO and the business processes that the modelling needs to support.

2. An evaluation of the organisational options for how a RESO could operate and whether this is affected by the use cases supported by the digital twin. i.e. can the digital twin facilitate RESOs with lower resource requirements, asynchronous data provision, etc.
3. A greater understanding of the abilities of a digital twin to visualise local infrastructure and relevant datasets to support investment decisions, including the datasets that can be included, the issues surrounding data management etc. This includes an assessment of the data required to support the existing and potential visualisations and models that would be used in the latter phases of the project. Where new model requirements are identified a high-level review of existing tools will be carried out for comparison to in-house development.
4. A clear view of the later stages of the project including a confirmation of the business case, detailed project plan, how benefits will be measured and agreed governance arrangements.

These bring greater understanding of the viability of the Alpha and Beta phases of the project and therefore benefit consumers either by avoiding the latter stages of an unviable project or, if the project continues, by removing some of the significant barriers (data visibility, cost-effective stakeholder engagement and resource requirements) to releasing the benefits of a RESO.

7. Project plan and milestones

What is your project plan? What are your 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, AITL). 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 \(opens in a new window\)](#)
(/application/10060736/form/question/28900/forminput/76298/file/473223/download).

[PRIDE_Risk register.pdf \(opens in a new window\)](#)
(/application/10060736/form/question/28900/forminput/76298/file/473226/download).

8. Regulatory barriers (not scored)

What would you consider to be the regulatory barriers for fully embedding your expected project outcomes into business as usual?

DATA PRIVACY

GDPR and the requirements for smart meter data aggregation may be potential barriers to the development of fully optimised digital twins supporting the widest range of modelling functions in the Alpha and Beta phases. This risk will be investigated as part of the project planning activities within the Discovery phase.

DATA LICENCING

We rely on commercial datasets for building information. Providers charge significant fees for derived usage of data in machine learning systems. Using lower-costs or open-source data providers risks reducing the accuracy of the machine learning model. To overcome this challenge, we are developing our own proprietary building information datasets that we can substitute for commercial datasets if a commercial agreement is not reached.

GOVERNANCE

The RESO project identified significant cultural, political, practical and regulatory barriers that need to be overcome to enable the identified value to be realised. This project is the first step in removing some of the non-technical barriers and considers the impact of different organisational structures. This is expected to help the process to remove other barriers.

REGULATORY

While there are no regulatory barriers expected during the Discovery phase of the project, how the digital twin will support effective decision making will also be impacted by future governance structures for decision making (Future System Operator/Distribution System Operator) being considered by Ofgem. This project will seek to inform these decisions by testing the RESO model and providing evidence of how decision making can be facilitated and enhanced.

ORGANISATIONAL

Adoption of new workflows by Distribution Network Operators is slow. The embedded costs of software tools and training creates a high barrier to entry. To overcome this, we will work with the Distribution Network Operator to trial our tool. We will use microservices software architecture that can connect to incumbent tools (such as Electric Office and PowerFactory) to allow a staged transition. There is now a regulatory requirement under RIIO-ED2 for Distribution Network Operators to support customers with connection requests and planning creating a critical need for our innovation.

9. Route to market

How will your idea become business as usual within your network and across the other networks? What considerations have your Project Partners made for the commercialisation strategy for this innovation?

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.

10. Intellectual Property Rights (not scored)

What are the Intellectual Property Rights (IPR) arrangements for your project?

The project partners will contribute background IPR to this project under the default arrangements for IPR required under the SIF Governance Document. The partners will also follow guidance for the calculation of royalties for any foreground IPR. The Licensee will make available Background IPR created by innovation projects NIC EQUINOX and NIA DEFENDER under their respective governance terms.

Foreground IPR is expected to be developed through this project in the form of software and datasets. Advanced Infrastructure owns background IPR associated with the LAEP+ software tool including algorithms and datasets that will be made available to project partners.

The partners will enter into a Data Sharing Agreement that will allow the sharing of datasets between the parties. Partners supplying third-party datasets for the project will ensure that all licensing conditions are satisfied including that of derived usage. Foreground IPR in the form of datasets rights will be made available to the Licensee according to the default arrangements for IPR required under the SIF Governance Document.

Foreground IPR is expected to be generated by the development of new models within PRIDE which will be shared by project partners in proportion to their involvement in the generation of the models. The definitions of the algorithms of these models will be available to third parties.

Foreground IPR from the output of the models, (e.g. costs of connections for different loads at different locations, geographic overlays, investment plans etc.) will be shared by the project partners in proportion to their involvement with the generation of those items.

Where there are no issues with confidentiality, and where this can be shared without the inclusion of datasets where the IPR is not owned by the project, this information will be shared with third parties.

11. Costs and value for money

How much will the project cost for this Discovery Phase and how does it represent value for money for the consumer?

PROJECT COSTS

The total project cost is £145,157.

The consortium targets the Energy Systems Integration sector, which is prohibitively expensive for a start-up without financial backing, as substantial R&D expenditure is necessary. The distribution of costs between partners is as follows:

- £30,176 NGED
- £57,600 AITL
- £49,282 WMCA
- £8,099 NGESO

Labour: Labour costs are below market-rate and are UK-based, representing a benefit to the UK taxpayer in terms of VAT and payroll PAYE/NI payments. This extends project value and ensures knowledge is retained and commercialised by the commercial partners.

Subcontractors: WMCA will subcontract 51% of their total costs which will specifically support WP1 and WP4 delivery.

PROJECT FUNDING: Costs have been calculated by determining the number of days effort expected for each work package and the appropriate discounted day rate for each partner. The 10% project cost contribution has been achieved by discounting normal day rates by 10%.

PROJECT IMPACT

Public funding will provide the necessary acceleration to be first-to-market and will allow partners to procure the additional resources and talents needed to increase the likelihood of project success. Alternative approaches such as grants for local energy systems would not engage market forces to drive decarbonisation to the same extent without this product.

Partners plan to commence sales within 18 months upon project completion. However, without this grant, this would likely be pushed back at least two years, with a detrimental impact on the environment and allowing EU companies to establish their position. Delaying sales forecasts by one year could result in 15 fewer UK jobs and £20M less in revenue by the year 2025.

VALUE FOR MONEY

The project brings together a mixture of industry leaders from various sectors who would otherwise work in a weaker, silo-oriented business ecosystem unlikely to have the required set of resources to deliver the proposed outcomes.

Project costs are small compared to the potential benefits that would be unlocked from more efficient investment decision making, supported by automated modelling and data exchanges. The Present Value of benefits from a Coventry RESO are expected to be in the region of £450m over 10 years. Thus, if this project enables only a small proportion of those benefits to be realised it would still provide good value for money.

12. Project Management Template (not scored)

Project Management Template

Uploaded

[PRIDE_Project Management Book.xlsx \(opens in a new window\)](#)
(/application/10060736/form/question/28906/forminput/76334/file/473237/download).

The finances of all project partners are included in this summary.

	Total costs (£)	Funding sought (£)	Contribution to project (%)	Contribution to project (£)	Contributions in kind (£)
WESTERN POWER DISTRIBUTION PLC Lead organisation	30,176	27,158	10.00%	3,018	0
NATIONAL GRID ELECTRICITY SYSTEM OPERATOR LIMITED Partner	8,097	7,289	9.98%	808	0
ADVANCED INFRASTRUCTURE TECHNOLOGY LTD Partner	57,600	51,840	10.00%	5,760	0
West Midlands Combined Authority Partner	49,286	44,354	10.01%	4,932	0
Total	£145,159	130,641		14,518	0

Funding breakdown

	Total	Labour (£)	Materials (£)	Subcontracting (£)	Travel and subsistence (£)	Other costs (£)
WESTERN POWER DISTRIBUTION PLC Lead organisation View finances (/application/10060736/form/FINANCE)	£30,176	30,176	0	0	0	0
NATIONAL GRID ELECTRICITY SYSTEM OPERATOR LIMITED Partner	£8,097	8,097	0	0	0	0
ADVANCED INFRASTRUCTURE TECHNOLOGY LTD Partner	£57,600	57,600	0	0	0	0
West Midlands Combined Authority Partner	£49,286	24,286	0	25,000	0	0
Total	£145,159	120,159	0	25,000	0	0

SIF Governance Document

SIF Governance Document

Partner	SIF Governance Document
WESTERN POWER DISTRIBUTION PLC (Lead)	Third Party (/application/10060736/form/terms-and-conditions/organisation/4760/question/28817)
NATIONAL GRID ELECTRICITY SYSTEM OPERATOR LIMITED	Third Party (/application/10060736/form/terms-and-conditions/organisation/34764/question/28817)
ADVANCED INFRASTRUCTURE TECHNOLOGY LTD	Third Party (/application/10060736/form/terms-and-conditions/organisation/40890/question/28817)
West Midlands Combined Authority	Third Party (/application/10060736/form/terms-and-conditions/organisation/75913/question/28817)