SIF Round 3 Project Registration

Date of Submission

Mar 2024

Project Reference Number

Rural Energy and Community Heat (REACH) (1)

Initial Project Details

Project Title

Rural Energy and Community Heat (REACH)

Project Contact

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Challenge Area

Whole system network planning and utilisation to facilitate faster and cheaper network transformation and asset rollout

Strategy Theme

Whole energy systems

Lead Sector

Electricity Distribution

Project Start Date

01/03/2024

Project Duration (Months)

3

Lead Funding Licensee

NGED - National Grid Electricity Distribution

Funding Licensee(s)

NGED - National Grid Electricity Distribution

Funding Mechanism

SIF Discovery - Round 3

Collaborating Networks

National Grid Electricity Distribution

Technology Areas

Commercial

Low Carbon Generation

Community Schemes

Stakeholder Engagement

Project Summary

Rural Energy and Community Heat (REACH) will work closely with rural community energy groups to learn what their decarbonisation priorities are, and develop a modular rural energy centre that can accelerate their decarbonisation. The solution can offer communities shared low carbon heating, rapid EV charging, and renewable generation in an areas where commercial markets may not serve customers and where the electricity network has limited capacity. Working closely with community energy groups, NGED connections, and innovative suppliers, the project will evaluate the feasibility of a novel way to help customers make cost effective decarbonisation plans coordinated with wider development plans.

Add Third Party Collaborator(s)

Smarter Grid Consultancy

Regen

Kensa Utilities

VEPod Limited

Project Budget

£159,880.00

SIF Funding

£116,995.00

Project Approaches and Desired Outcomes

Problem statement

Government policy to reduce carbon emissions directs domestic properties to shift towards electrification of heating, transportation and installation of local and small- scale renewable energy and storage. This has a significant impact on the usage of electrical networks, necessitating infrastructure upgrades to lift capacity. This will be most challenging in rural areas that make up just over 21% of UK population. To promote best value for consumers, we need transitional solutions to ensure many rural customers can choose to adopt low carbon technologies when it suits them, even if it is ahead of network upgrades. NGED's SILVERSMITH project, funded through the Network Innovation Allowance, found that rural Low Voltage networks require a higher-than-average percentage of intervention to facilitate the uptake of Low Carbon Technologies (LCTs) when compared to urban environments. By addressing this challenge, this project meets the needs of Whole System Network Planning and Utilisation Challenge statement, particularly focusing on the aims of accelerating connection times for renewables and demand sites with the focus theme of supporting customers in making cost-effective decarbonisation choices.

We will work closely with rural community energy groups to identify their decarbonisation aspirations, and assess whether limited network capacity inhibits the connection of these LCTs. After better understanding the size of the market, we will trial at least one novel modular EV Charging, generation, storage, and innovative shared heat solution to facilitate community energy aspirations. The scope will adopt a strategic approach that identifies barriers to LCT adoption with primary objectives focussing on heat and transport. Additionally it will help deliver wider positive outcomes for the wider rural communities by tackling their unique issues such as dependence on heating oil for heating and reduced resilience from conventional electricity supplies.

The modular technology being tested aligns with 3 of the 4 SIF challenges set for this round of applications. In addition to whole system planning, the solution is developing novel technical approaches to deliver an equitable and secure net zero power system as well as unlocking energy system flexibility that accelerates the electrification of rural heating. This solution leverages the benefits of an adaptable and scalable deployment model allowing it to be tailored to a community's specific needs. Following a successful beta trial, community groups will benefit from using the project's learning to make more informed decisions around accelerating decarbonisation and following a successful route to market, benefit from the standardisation of products.

Video Description

https://www.youtube.com/watch?v=Y-rlr4Vr_AI

Innovation justification

Previous research has demonstrated that the adoption of LCTs is incompatible with existing infrastructure due to the potential increase in peak demand in excess of 20 kW per household. To support these higher loads, a whole system approach to network planning is required. In many cases the most cost effective long-term means to deliver secure capacity to customers is to upgrade electrical networks. In addition to the high costs associated with this reinforcement, current solutions take significant amounts of time to deliver the required capacity which may delay the connection of rapid EV chargers, the transition from high carbon heating (oil/gas), and disenfranchise rural communities. We seek to develop a solution that allows rural communities adopt low carbon technologies before the grid infrastructure is upgraded.

We will work with key stakeholders including DNOs, DSOs and most importantly: community energy groups to assess the financial and technical benefits a modular solution can offer communities. This will include offering quicker access to shared centralised heat and EV rapid charging hubs. The complexity of this approach is necessary to enable a single, configurable solution to address multiple barriers already encountered in cities such as limited off-street parking, or capacity for many homes to access low carbon heat. These and other obstacles to widespread adoption of LCTs are unlikely to be resolved in a similar way to more urban populations as the economics for private investment are very different, as well as the existing infrastructure restrictions.

The initial scope of the project will clarify the true extent of the challenges and demonstrate how a rapidly deployable solution can ensure that rural communities will not be left behind and prevented from participating in achieving Net Zero. The main components of the modular solution will be rapid EV charging capability, community scale heat provision coupled with containerised independent 'power station' unit, incorporating a generator, energy store and a proprietary management system. Thereafter there

will be a range of modular options that can be tailored community needs. The proposed solution is versatile and can be specified to a variety of community needs through the range of module options. These include:

- proprietary management system to manage demand and generation connections while maintaining community objectives,
- EV charging module (7 150kw) charging options,
- Innovative shared heat solutions,
- Supplementary energy storage,
- Mains synchronisation I switchgear,
- Flexible capacity fuel storage.

Impacts and benefits selection (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum for users of network services

Environmental - carbon reduction – indirect CO2 savings per annum

Revenues - improved access to revenues for users of network services

New to market – products

New to market – processes

New to market - services

Others that are not SIF specific

Impacts and benefits description

1. Resources available to reinforce the network are finite and the solution being proposed will allow existing infrastructure to be upgraded in a more pragmatic and cost-effective manner.
2. Network upgrade costs are socialised and major projects may have an impact on customers. Cost deferment has a positive impact on cost exposure by.
3. By providing rural communities with an accelerated route to low carbon heatin and rapid EV charging, we provide carbon savings in two critical categories. In addition, the renewable fuel generator provides local low carbon generation.
4. The versatility of the technical solution will facilitate new and existing communi energy initiatives including rural EV charging, new renewable schemes and energy storage.
5. There are currently no modular solutions providing rural communities with co- located EV charging and heat, which incorporates local electricity generation and grid support through flexibility that the project team are aware of. Having such a system that is standardised would enable reduction in project development costs faced by the community.
6. Several new processes will be necessary to determine the technical and commercial viability of the solution within rural communities. It is also possible that a new variant of 'alternative connections' will be required to facilitate the combined community module in constrained rural networks.
7. It's expected that the solution will offer DSO local flexibility in addition to resolving issues with LCT adoption. Co-locating controllable synchronous generation, inverter controlled demand devices, and storage can provide benefit to the whole system through novel connection agreements.

Other benefits:

1. The LAEP approach from Energy Systems Catapult for macro-scale design can be used as a template for micro-scale planning and coordinated action at a local level to achieve faster transition and economies of scale.
2. The scale of reinforcement required to decarbonise rural communities may mean some areas have to wait several years for adequate capacity. Facilitating community solutions that integrate with DNO reinforcement timescales is a unique proposition.
3. Rural networks typically rely upon radial configuration, which have less resilience in the event of a fault. Embedding generation, storage, and heat storage will help provide critical services in outage conditions.
4. Homes in rural areas are typically 22% more expensive yet tend to be older and retrofitting insulation can be difficult and costly. Meanwhile, poorer households are more likely to live in privately rented houses than those in urban areas, where social housing is more plentiful. It's therefore important to ensure they are treated equitably.

Teams and resources

National Grid Electricity Distribution

Are the DNO for the East and West Midlands, South West and South Wales. They have been instrumental in delivering customer focussed innovation including the first vulnerability focused project, VENICE, and the largest heat pump flexibility project, EQUINOX. Outside of Innovation, NGED were the first UK network company to champion a Community Energy Engineer who works closely wit community groups across their licence areas to develop renewable energy schemes.

Smart Grid Consultancy (SGC)

Are a well-established organisation with over a decade of experience in successful delivery of Ofgem innovation projects on-time and under-budget. Their past record not only includes some strategically important outcomes including the creation of Flexible Power but they have also championed the ongoing evolution of learning into Bal-J adoption. The knowledge and experience they bring to the project is expected to significantly reduce the risk of delivering the overall project objectives. SGC will be the lead delivery partner leading project management and a range of subject matter expertise.

Regen

A not-for-profit centre of energy expertise and market insight whose mssion is to transform the energy system for a zero-carbon future. As well as having a specific interest in 'Accelerating Net Zero Power' and addressing the associated infrastructure challenges that brings, Regen has demonstrable experience in engagement with local authorities and community energy groups. All these core skills will be employed in identifying suitable communities and managing these critical stakeholders through the collaborative design and technology development processes necessary to fulfil the proposed outcomes.

VE Pod Ltd

Are a start-up that evolved out of an established group of companies processing and selling renewable fuels. VE Pod have designed and constructed a fully operational, self-contained 'grid free' charging solution which is capable of rapid deployment. This is in the process of being further developed into a modular system extending its capabilities to include all the additional functionality necessary to deliver the objectives of the rural energy project.

Kensa Utilities (Subcontractor)

Kensa Utilities is an asset infrastructure company that funds, owns and maintains shared ground loop arrays that serve the heat pump installations, many of which are installed and overseen by their sister company Kensa Contracting. Their award-winning project Heat the Streets, demonstrated the world's first in road- retrofit of a shared ground array, mimicking the networked design of the current gas network.

Project Plans and Milestones

Project management and delivery

SGC have the PM responsibility having successfully fulfilled this role on several previous NIC, NIA & SIF projects, with acknowledgements from the external governance bodies that the methodology and efforts are consistently at or above expectation. The approach used recognises the need for balance between the granularity of actions along with a hands-on approach to ensuring on-time delivery, which is crucial during the limited duration available for Discovery and Alpha phases. The Project Manager does require all project participants to be available for a weekly progress meeting that ensures everyone is up to date with their own deliverables as well as the wider project, ensuring the impact of dependencies and their potential risks are regularly reviewed.

Key outputs and dissemination

Discovery helps us understand the aspirations of rural communities looking to decarbonise.

Product line 1 allows us to concentrate in Alpha on how to install and operate the hardware and control systems. This will comprise of output from:

- WP2: Engineering aspects from shared heat
- WP5 & WP6: Engineering aspects from chargers and generation
- WP5: Connection opportunities

Product line 2 allows us to help communities to select and attract finance to be able to commission Product line 1. This will comprise of output from:

- WP1: Outreach
- WP3: Carbon
- WP4: Finance
- WP5: Connection opportunities

WP1: Community Group Outreach and Engagement

- Identify community groups and create an assessment process to find the most suitable to participate in trials.
- Stakeholder engagement to understand objectives and what support communities need to develop a plan to decarbonise that outpaces network reinforcement.

WP2: Shared Heat Solution Flexibility and Subject Matter Expertise

- Identify providers of shared heat solutions to enable retrofit of rural properties. These will include providers of shared heat loops and shared heat pumps.
- Collaborate with shared heat solution providers to evaluate the electrical network flexibility and load balancing that is possible via a centrally controlled shared heat solution.

WP3: Carbon Impact Scoping

- This work package will define our approach to how the modular solution will be fully costed and fully carbon accounted to help communities attract investment and help us compare the offering to alternatives in the market.
- Identify and engage a partner for carbon impact assessment for each operational scenario. EV Charging / Shared Heating / Constraint Management / Renewable Energy Storage.

WP4: Funding Model Scoping

- Identify potential funding models and external funding sources to enable community investment model.

WP5: Network Connection Opportunities

- Engage NGED connections to consider novel connection agreements and explore the feasibility of accelerating rural connections through demand and supply side flexibility coordinated by the modular system.

WP6: Develop Modular Energy Centre Specifications

- Create method statements and scope of works for rapid deployment of rural energy, with functional requirements mapped to customer insights from WP1.
- Identify and engage partners where needed for operational trials - EV Charging / Shared Heat Solutions / Constraint Management / Renewable Energy Storage .

WP7: Project Management and Development of Alpha & Beta Phases

- Perform Project Management tasks.
- Author a detailed project plan and outputs for Alpha and Beta.

WP8: Network SME

- Project sponsorship and SME.

Commercials

Intellectual Property Rights (IPR) (not scored)

The project will use the default arrangement for Intellectual Property Rights.

The IPR register will continue to be maintained throughout Discovery, as per National Grid Innovation's Project Management Governance.

Foreground Intellectual Property

The IP created in the discovery phase will be the deliverable reports produced, as detailed in the PMT. Intellectual Property rights will be shared between the creators of the documents, but they will be published externally.

Background Intellectual Property

Each partner will be the sole IP owner of the data provided on their commercial arrangements, including any work completed outside of the Discovery and Alpha phases.

The project partners acknowledge and accept the default arrangements for Intellectual Property Rights (IPRs) within Projects as documented within the SIF guidance document.

Value for money

Total Project Costs:

In total the project cost is £154,207. After total partner contributions of £41,891.30 representing an average of 27%, the total amount of SIF funding sought is £112,315.70.

Contributions:

In all cases, financial contributions made to the project are made through a discount applied to the total project cost. Across the project, these range from 10% to 38%. This shows that all partners have demonstrated a sizable commitment to the project.

Value for money:

National Grid has benchmarked partner costs against its wider pool of suppliers and partners, ensuring delivery costs offer value for money.

Supporting documents

File Upload

240603 REACH Show and Tell Slide Deck (Clean).pdf - 649.4 KB
240523 REACH EoP Slide Deck (Clean for Submission).pdf - 1.8 MB
SIF Round 3 Project Registration 2024-03-27 11_23 - 61.5 KB

Documents uploaded where applicable?

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