SIF Round 4 Project Registration

Date of Submission

Jun 2025

Project Reference Number

NPG/PV/FND/Rd4_Discovery

Initial Project Details

Project Title

Project VOLT

Project Contact

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Challenge Area

Accelerating towards net zero energy networks

Strategy Theme

Net zero and the energy system transition

Lead Sector

Electricity Distribution

Other Related Sectors

Electricity Distribution

Project Start Date

01/05/2025

Project Duration (Months)

3

Lead Funding Licensee

NPg - Northern Powergrid (Northeast) Limited

NPg - Northern Powergrid (Yorkshire) Plc

Funding Licensee(s)

NPg - Northern Powergrid (Northeast) Limited

NPg - Northern Powergrid (Yorkshire) Plc

Funding Mechanism

SIF Discovery - Round 4

Collaborating Networks

Northern Gas Networks

Technology Areas

Asset Management

Low Carbon Generation

Resilience

Project Summary

This project investigates the potential of multi-vector microgrids to support decarbonisation and resilience in industrial and commercial sites, working with stakeholders including Nissan (TBC), Newcastle Airport, Port of Tyne, Northern Gas Networks and Neptune Brownfield Power Plant.

It focuses on integrating renewable generation, energy storage, and smart technologies while exploring hydrogen and gas as supporting vectors. The project will assess energy demand, infrastructure synergies, and regulatory challenges through stakeholder engagement and customer audits. The intended outcome of this project are optimised microgrid designs which will be evaluated for cost-effectiveness and scalability, aligned with the Regional Energy Strategic Plan (RESP) to ensure coordinated energy system development. Findings will inform future adoption of microgrids and contribute to the energy transition.

Partners: Newcastle University, Port-of-Tyne, Newcastle Airport, Northern Gas Networks, Nissan and Siemens.

Project Budget

£171,499.00

SIF Funding

£147,200.00

Project Approaches and Desired Outcomes

Animal testing

- ○ Yes
- ◉ No

Problem statement

Project VOLT addresses the challenge of decarbonising industrial and commercial sites with complex energy needs by developing integrated multi-vector microgrids that combine electricity, gas, and hydrogen to enhance flexibility, reduce emissions, and improve energy resilience. It aligns with the Strategic Innovation Fund's goal of creating replicable regional energy models by enabling decentralised, flexible systems that support low-carbon technology deployment and whole-system coordination. Beyond its primary focus, VOLT also supports market innovation and scalability for broader industrial use. The project serves industrial users, network operators, and policymakers by offering tailored, cost-effective, and resilient energy solutions. Although this is its first funded phase, VOLT builds on insights from previous projects like ReFLEX Orkney, Distributed ReStart, HyDeploy, and HyNTS FutureGrid.

Video Description

www.youtube.com/watch?v=vqTq-eC4mEQnolinkdontclick

Innovation justification

Project VOLT introduces a novel approach by developing multi-vector microgrids that integrate electricity, gas, and hydrogen to decarbonise industrial and commercial sites. Unlike traditional microgrids that focus on single energy sources, VOLT dynamically balances energy flows across multiple vectors, improving system flexibility, resilience, and efficiency. This whole-system integration is a step change from current single-vector solutions and addresses key barriers like regulatory constraints and infrastructure readiness. The project is well-suited for SIF funding because its complexity and cross-network innovation go beyond the scope of standard investment mechanisms, requiring dedicated support to explore and validate these advanced energy system interactions.

Impacts and benefits selection (not scored)

Financial - cost savings per annum on energy bills for consumers

Financial - cost savings per annum for users of network services

Environmental - carbon reduction – direct CO2 savings per annum

Revenues - creation of new revenue streams

New to market – processes

New to market - services

Impacts and benefits description

1. Pre-Innovation Baseline and Reporting Metrics
Industrial and commercial (I&C) sites currently rely on centralised energy supply models, leading to high energy costs, carbon emissions, and limited flexibility. Most energy demand is met through direct grid imports, with peak electricity demand causing grid congestion and increased reinforcement costs. Multi-vector integration and industrial flexibility services are largely untapped.

Metrics to be used:

Financial savings: £ per MW of avoided network upgrade, £ per site per annum in energy bill savings, £ per MW of flexibility provided.
Carbon reduction: Tonnes of CO₂ saved annually (direct and indirect).
Revenue generation: £ per MW of flexibility provided, peer-to-peer trading, and hydrogen market participation.
Operational efficiency: Peak demand reduction (MW), fewer congestion events, improved system resilience (e.g., avoided outages).

2. Forecast of Cumulative Net Benefits
If implemented into business as usual, Project VOLT is expected to deliver:

£50–100 million in avoided network reinforcement costs over 10 years.
10–15% annual energy bill savings for participating I&C consumers.
5,000–10,000 tonnes of direct CO₂ savings per year from reduced fossil fuel use.
10,000–15,000 tonnes of indirect CO₂ savings per year from reduced reliance on carbon-intensive peaking plants.
£5–10 million in new revenue streams for industrial users through flexibility services and hydrogen markets.

3. Benefits Already Realised
As a discovery-phase project, VOLT has not yet delivered quantifiable benefits. However, early engagement with industrial partners has shown strong demand for multi-vector microgrids. Initial assessments suggest that even partial implementation could significantly reduce energy costs and emissions at key industrial sites.

4. Additional Impacts and Benefits
Beyond the SIF-specific benefits, VOLT will:

Enhance energy security by reducing reliance on volatile fossil fuel markets.
Support local economic growth through investment in low-carbon infrastructure.
Create skilled jobs in microgrid deployment and energy management.
Strengthen regional energy resilience by enabling decentralised, flexible energy systems.

Teams and resources

The Project VOLT team is a consortium of experienced organisations, each with defined roles to ensure successful delivery:

Northern Powergrid is the lead partner, responsible for overall project governance, regulatory engagement, and ensuring alignment with electricity distribution system needs.
Northern Gas Networks supports the integration of gas and hydrogen into the microgrid design, offering insights into gas network flexibility and infrastructure synergies.
LCP Delta leads the market analysis, techno-economic modelling, and regulatory assessment, ensuring commercial viability and stakeholder engagement.
Newcastle University conducts the technical feasibility studies, including modelling of multi-vector microgrid configurations and evaluating infrastructure readiness.
NESO (North East & Yorkshire Energy System Operator), an unpaid partner, ensures alignment with regional energy strategies and net-zero targets.
Industrial customers—Port of Tyne, Newcastle Airport, and Nissan—contribute real-world data, infrastructure insights, and use cases to ensure the solutions are practical and scalable.
Together, the team brings expertise in energy systems, regulation, modelling, and industrial decarbonisation, supported by access to data, modelling tools, and stakeholder engagement frameworks.

Project Plans and Milestones

Project management and delivery

Project VOLT will be managed using a structured, agile methodology with clearly defined work packages, milestones, and stakeholder engagement. Weekly coordination meetings among partners will ensure progress tracking and risk mitigation. A live risk register will manage technical, regulatory, and operational risks. The project plan includes six work packages covering project management, stakeholder engagement, technical feasibility, techno-economic analysis, regulatory assessment, and final reporting.

Key milestones include:

Completion of stakeholder engagement and site audits
Feasibility assessment of microgrid designs
Techno-economic analysis and business model evaluation
Final reporting and regulatory recommendations
Risks include data availability, regulatory uncertainty, and hydrogen readiness, all of which will be addressed through early engagement and scenario analysis.

Key outputs and dissemination

Expected outputs include:

A technical feasibility study of multi-vector microgrids
A techno-economic analysis and business case
Stakeholder engagement insights
A regulatory and policy assessment
A final report and roadmap for future phases
A replicable microgrid design framework
Dissemination plan:

Industry workshops and webinars
Public reports and white papers
Conference presentations
Regulatory engagement with Ofgem and DESNZ
These activities will ensure open access to findings and support national-scale replication.

Commercials

Intellectual Property Rights (IPR), procurement and contracting (not scored)

Project VOLT will follow the default IPR arrangements set out in the SIF Governance Document. Each partner will sign a collaboration agreement with Northern Powergrid, outlining terms for background and foreground IPR. Foreground IPR will be owned by the generating partner or shared if developed jointly, with licensing terms to support dissemination. A structured IPR management process will be in place, with regular reviews and updates.

Investment Needs

Project VOLT has not received prior UK Government or private funding. However, it builds on insights from related projects:

Distributed ReStart (NIC-funded): Explored distributed energy resources for system restoration.
ReFLEX Orkney (UKRI-funded): Developed an integrated local energy system.
HyDeploy (NIA/NIC-funded): Trialled hydrogen blending in gas networks.
HyNTS FutureGrid (NIA-funded): Investigated hydrogen transport in gas networks.
These projects inform VOLT's approach to multi-vector integration and system resilience.

Value for money

The total cost for the Discovery Phase is £171,499, with £147,200 requested from SIF and £24,299 contributed by private partners. The project delivers value by:

Leveraging existing expertise and tools
Avoiding unnecessary infrastructure costs
Focusing on scalable, replicable solutions
There are no subcontractor costs, and all work is conducted by project partners. The Discovery Phase will establish a strong business case for future demonstrator projects, supporting long-term cost savings and emissions reductions for energy consumers.

Supporting documents

File Upload

VOLT D5.1 Final Report (Summary) - 629.1 KB
SIF Round 4 Project Registration 2025-06-17 2_02 - 51.3 KB
VOLT Application.pdf - 345.7 KB

Documents uploaded where applicable?

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