

SHARED: Smart Hydrogen and Resilient Energy Decarbonisation

Alpha Phase Mid-Point Meeting

15/05/2026

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Agenda

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Project Overview



Problem



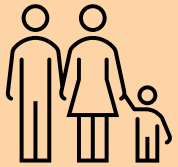
Network Topology

Due to network topology, **rural communities see a greater impact from network faults**, particularly those caused by extreme weather events



High Resilience Costs

Traditional network reinforcement and **resilience projects can be cost prohibitive and take years to deliver, delaying customers seeing the benefits of improved reliability**



Customer Experience

Rural communities tend to be amongst the most poorly served customers. This includes customers who are vulnerable/medically dependant and part of the priority services register (PSR)



Barrier to energy transition

Communities may be **less likely to decarbonise** because of their service interruptions. **Decarbonisation** of these communities would likely **exacerbate these issues**

Smart Hydrogen And Energy Resilient Decarbonisation (SHARED) **explores the use of low-cost hydrogen production and storage to reduce interruptions and their impacts for Worst Served Customers (WSCs) in rural communities.**

The Ofgem definition for Worst Served Customers are those that see 12 or more sustained (>3 minute) outages in a 3-year period, with a minimum of 2 in any one year

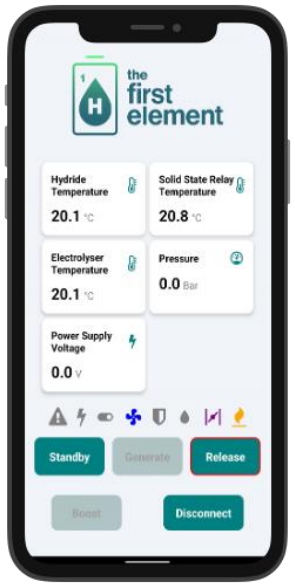
Solution

Low cost, modular hydrogen generation and **safe, long term storage** devices installed to power **rural communities**

Smart, remotely controlled device to restore power during a supply interruption, coming **online in a matter of seconds**

Installed **ahead of an interruption**, at pre-determined sites rather than in the event of an interruption

Automated solution **replaces the need for manual restoration via diesel generators** which must be driven to site – proactive over reactive





Detect
by the first element



Work Packages Progress



WP1 – Project Management / Progress

D1.1.1 Project Kick-off	• Contract signed • Timelines and work packages agreed • Kick-off meeting held	COMPLETE
D1.2.1 Mid-point Review	• Review project progress & documentation	COMPLETE
D1.3.1 End of Phase & Closure	• Delivery and approval of all work packages • Governance reporting complete • Project Specific Conditions addressed and evidenced	

Success will be deliverables delivered on time and to budget while meeting reporting requirements and Project Conditions

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WP2 – Stakeholder Engagement / Approach

Objective

To engage key internal and external stakeholder to aid development of the solution and its rollout

Approach:



Success will be stakeholder engagement outputs are successfully captured within the solution concept design and cost-benefit analysis

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WP2 – Stakeholder Engagement / Progress

2.1.1 Stakeholder Engagement Report	**Update Discovery stakeholder mapping and identify key stakeholders**	• Refined and broadened Discovery stakeholder mapping to include key individuals within UK Power Networks, as well as specific projects undertaken by wider industry

	Hold workshops to inform design and business case	• Held workshops with identified stakeholders including those from: Regs, Network Planning, Safety, Control on:
		  ○ Design Requirements
		  ○ Use case development
		  ○ Network control and implementation

	Develop consumer engagement plan	• Engagement with other relevant trials, such as SGN's Fife100 & Northern PowerGrid's MicroResilience, underway to understand consumer engagement, key performance indicators (KPIs) and metrics for success • Review of ED3 consumer engagement materials on interruptions

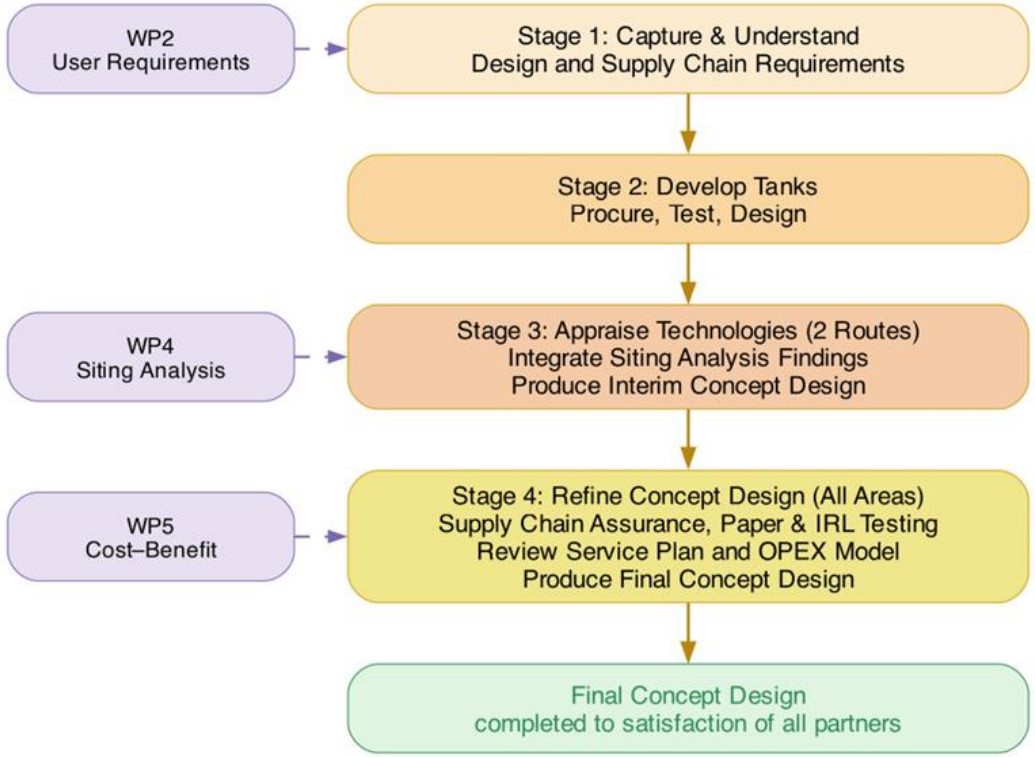
The final two key steps will commence from June onwards

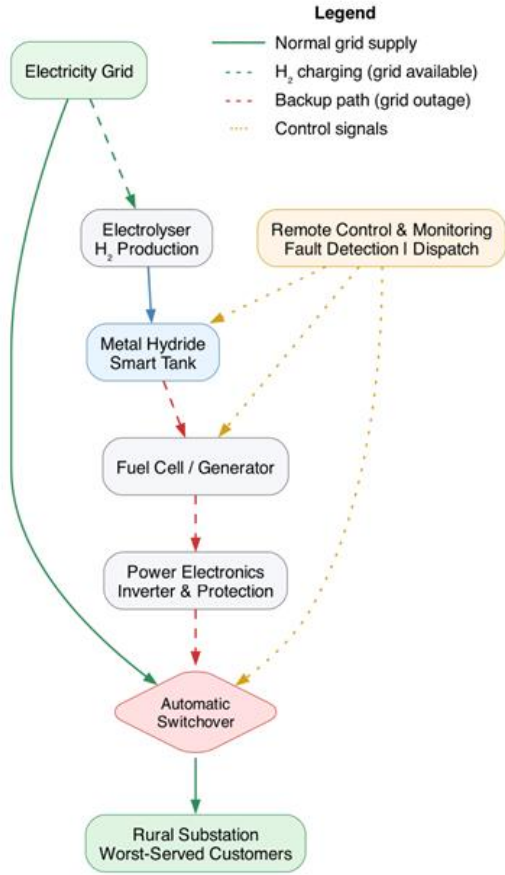
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WP3 – Solution Design / Approach

Objective

To develop the conceptual design of solution which is cost-effective for improving resilience in rural communities as determined by siting analysis in WP4, that meets user requirements captured in WP2





Success will be the concept design completed to the satisfaction of all project partners and capable of fulfilling the specified requirements

the first element

WP3 – Solution Design / Progress - example listed requirements

The workshops have led to the identification of 49 design requirements, examples of which are provided below:

Type	Requirement	Value
Supply Power	The system shall be capable of supplying the specified peak electrical power for the specified time.	10-100kVA
	The system shall be capable of providing up to the peak electrical power supply within the specified time of the onset of a power outage.	3 minutes
Store Energy	The system shall be capable of providing the average required electrical power (UR2) for up to the specified maximum time.	Up to 12 hours
Recharge	The system shall be capable of generating hydrogen to fully refuel itself within the specified time using power from the electrical grid.	21 days
Control	The system shall enable the operator to transition between SHARED system power and network power supply without interruption to customer power when 'handing back' power supply to the grid.	-
Site	The site footprint required for the system will be minimised.	Max: 3m x 3xm x2.7m

Type	Requirement	Value
Operational	The system shall provide electrical power to the grid's specification.	400V, three phase
Legislation	The system shall comply with all applicable regulations, legislation and standards .	-
Safety	The volumes of hydrogen held by the system shall not be high enough that Control of Major Accidents Hazards (COMAH) regulations apply.	5 tonnes
Environment	The system shall demonstrate a clear reduction in carbon emissions throughout the product lifecycle compared to other available options to improve resilience.	-
Scalability	The system shall be modular by design and configurable in discrete increments to provide energy storage capacities adapted to each individual site.	-
Economic	The system shall have an operational life.	20 years

In addition to solution requirements, the workshops also revealed some **key barriers for solution roll out** including:

- Site restrictions (planning permission, substation sizing) of both ground and pole-mounted
- Customer consenting to land-access

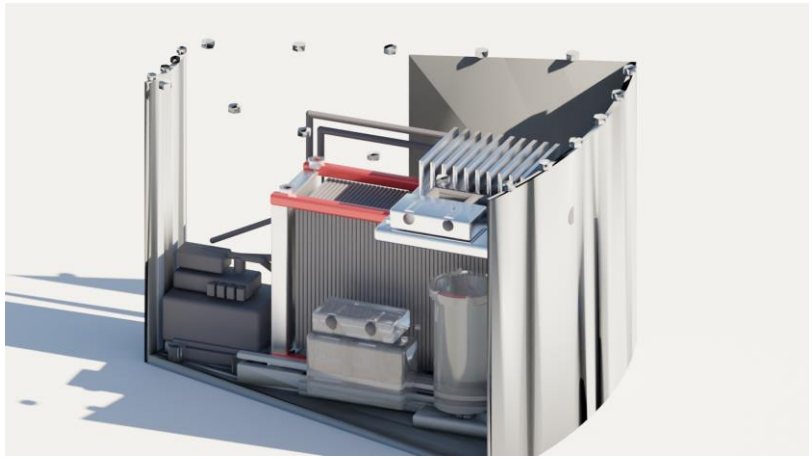
WP3 – Solution Design / Progress – design mock-ups

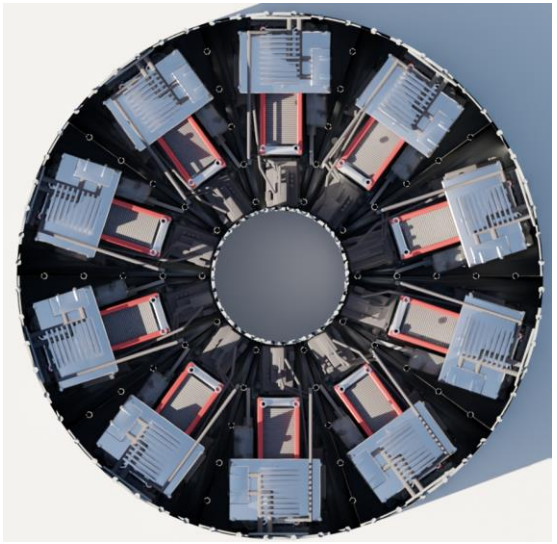
Requirement workshops also identified siting challenges and desirability of pole mounted system matching pole mounted transformer infrastructure

Innovation aspects: rainwater to hydrogen, modular toroidal cluster

Computer aided design feasibility study completed

Deeper supply chain engagement supporting specific solution underway







WP4 – Network Implementation / Approach

Objective

To understand how the solution designed in WP3 will integrate with UK Power Networks' existing control systems and finalise network locations where the final concept design is cost effective, and therefore understand how the SHARED system could be implemented on the network



Siting Analysis

Mapping the sites where SHARED is the best resilience intervention

Network Simulation

Demonstrating the control & interface of the system with the network

Network Integration Design

Identifying the connection & metering requirements for the network-side systems

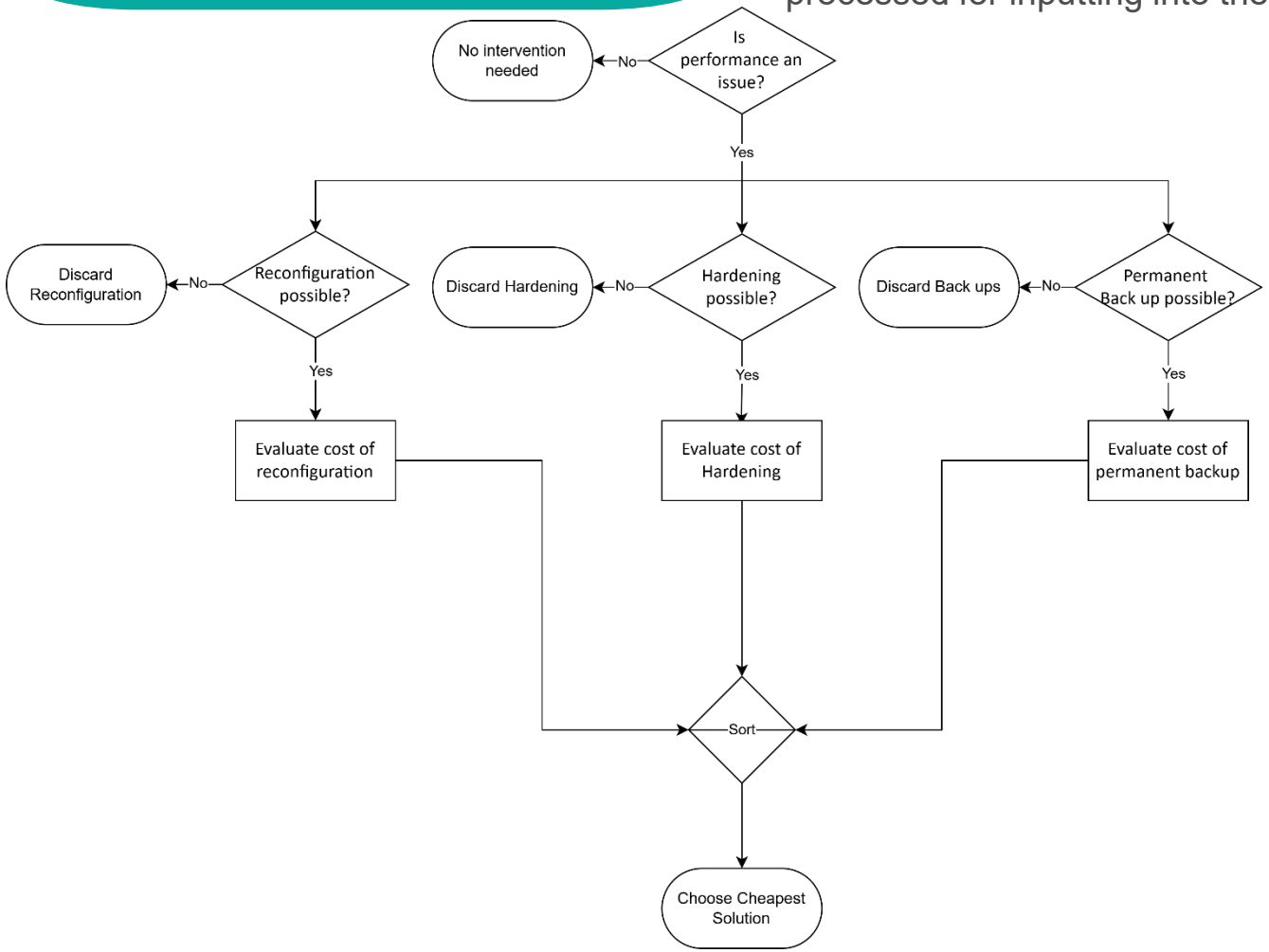
Success will be having the requirements for integration and implementation on the network captured

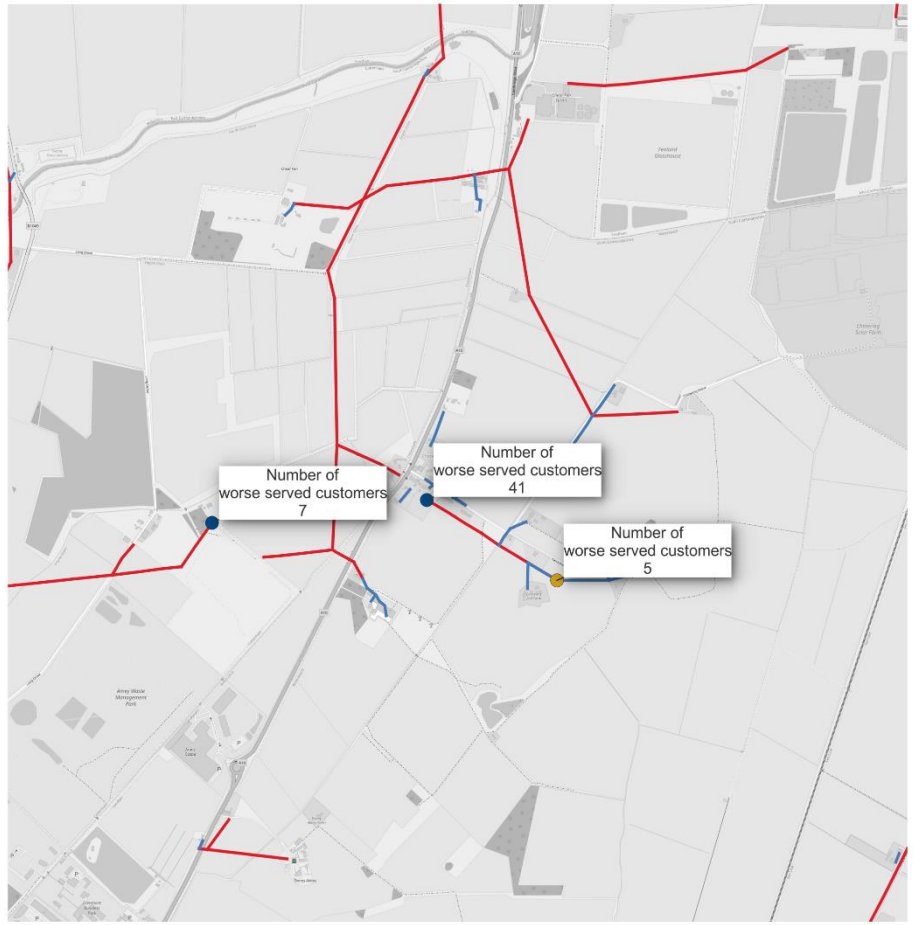
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WP4 – Network Implementation / Progress

Siting Analysis

- ✓ Model architecture has been defined
- ✓ Network data is being sourced and processed for inputting into the model





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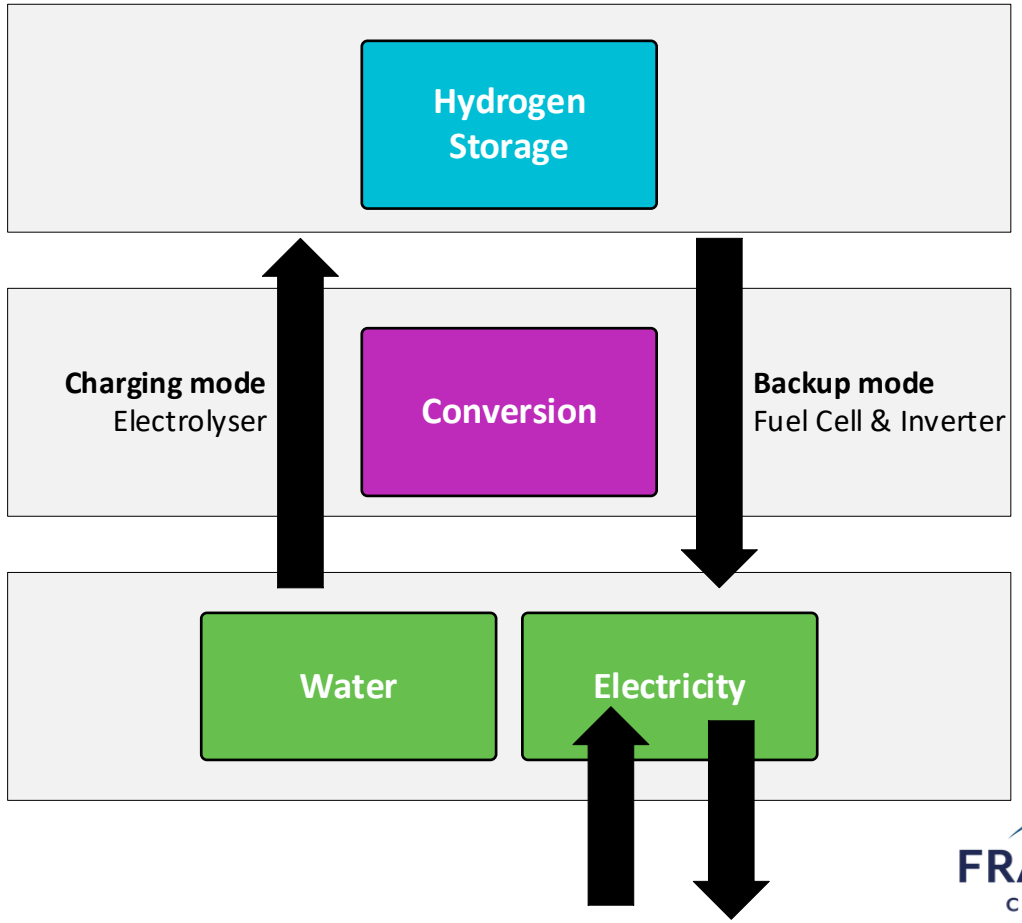
WP4 – Network Implementation / Progress

Network Simulation

- ✓ Workshop to define simulation scenarios
  - Scenario 1: Charging mode
  - Scenario 2: Backup mode
  - Scenario 3: Switching between modes

Network Integration Design

- ✓ Identifying the connection & metering requirements for the network-side systems



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WP5 – Business Case Development / Approach

Objective

To develop a thorough cost benefit analysis, based on final concept design and siting analysis, considering a variation of operating models to establish the business case



Success will be an established business case for the SHARED system as a solution for improving resilience for worst-served customers.

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WP5 – Business Case Development / Progress

Commercial & operating model review

	Value Streams	Operating Profile	Commercial Route
Option A: DNO-owned	• Resilience (primary)	• Standby most of the time • Rare discharge events	• Distribution Network Operator (DNO) Capital Expenditure (CAPEX) via WSC funding
Option B: Third-party owned	• Resilience service fee • Third party captures flexibility revenues	• Contractual resilience guarantee • Potentially higher utilisation	• Private CAPEX • Service payments from DNO
Option C: Community owned	• Resilience service contract • Full flexibility participation	• Resilience-first operation • Flexibility/trading only when capacity is available • Low-to-moderate utilisation	• Community energy group (including grants) • Service payments from DNO

Planned Outputs / Progress

At the end of Alpha Phase, the project will have achieved the main objectives of:

1. Developing the requirements and initial design for the solution
2. Quantifying the economic, financial and commercial business case for the solution
3. Shortlisting network location options for a future demonstrator trial

This will take format in the following deliverables table

Deliverable		Success Criteria
D1.1.1	Project Plan	Project governance set up to support project management meetings and enable successful delivery to cost, time and quality. Timelines agreed between partners and successful project kick-off.
D1.2.1	Mid-Point Report	Report progress against plan, key findings and lessons learnt and plans for remainder of project. Successful meeting with assigned Innovate UK Innovation Lead and Monitoring Officer sharing project progress to date.
D1.3.1	End-Point Report	Final project report summarising progress again plan and scope, inputted by all project partners. Project delivered to plan, budget and expert assessors' and project partners' satisfaction.
D2.1.1	Stakeholder Engagement Report	Report captures all relevant insight from stakeholder engagement undertaken throughout Alpha to the satisfaction of all project partners. Stakeholder engagement successfully captured within solution concept design and cost-benefit analysis.
D3.1.1	Interim Concept Design	Interim concept design completed and reviewed by all project partners, including key network operation stakeholders in dedicated workshop.
D3.1.2	Final Concept Design	Final concept design completed based on siting analysis output and ongoing feedback, reviewed by all project partners, including key network operation stakeholders in a dedicated workshop.
D4.1.1	Siting Analysis	Siting analysis consider rural substation characteristics and historic outage data to successfully evaluate SHARED system's economic effectiveness, allowing identification of suitable substations.
D4.1.2	Network Simulation Outputs	Successful test of network faults in simulation to understand performance of SHARED system and benefits to grid, captured in output report.
D4.1.3	Connection and metering requirements technical summary note	Successfully captured connection and metering requirements, with concept design, to project partners' satisfaction.
D5.1.1	Business Case	Business case is established and includes overall cost-benefit analysis on finalised solution design concept and siting analysis.

SIF Governance & Reporting



Project Specific Conditions (1 / 2)

Condition 1	The Funding Party must not spend any SIF Funding until contracts are signed with the Project Partners for the purpose of completing the Project	Complete
Condition 2	The Funding Party must report on the financial contributions made to the Project as set out in its Application. Any financial contributions made over and above that stated in its Application should also be reported and included on the Innovation Funding Service (IFS).	Underway
Condition 3	The Funding Party must make reasonable endeavours to participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and Department for Energy Security and Net Zero during the Alpha Phase.	Underway
Condition 4	The Project will be allowed a flexible start date and duration within the 8-month period from the date the Project Direction is issued. The Project must tell the monitoring officer the start date and end date of the Project.	Complete

Project Specific Conditions (2 / 2)

Condition 5	Prior to the end of Phase meeting, the Funding Party must provide to the Monitoring Officer a consumer engagement plan. This must include a clear approach to capturing and incorporating consumer experience and behavioural insights. The plan must also set out how learning from relevant hydrogen trials, including H100 Fife, has been considered.	Underway, to be presented within **D2.1.1**
Condition 6	Prior to the end of Phase meeting, the Funding Party must provide to the Monitoring Officer a summary of the proposed safety assurance, monitoring arrangements, and emergency response protocols for future trial activities.	Underway, to be presented within D4.1.3
Condition 7	Prior to the end of Phase meeting, the Funding Party must provide to the Monitoring Officer: • a summary of the key outputs, findings, and lessons learned from the Project, together with a plan outlining how these will be disseminated openly to support replication and learning across GB electricity networks, as is required in the end of phase report; • a statement setting out how learning from the Alpha Phase informs future scalability and application of the solution, including applicability to different rural network conditions and integration into business-as-usual resilience planning; • a summary demonstrating where the SHARED solution is cost competitive when compared to alternative options, including diesel generators, battery storage, and network reinforcement.	Underway, to be presented within D1.1.1 Work will commence on WP5 within May, and be presented within D5.1.1

Project Risks (1/2)

Ref	Risk Description	Likelihood	Impact	Mitigation	Related Work Package	Risk Owner	Status
R1	**Stakeholder unavailability** Key internal stakeholders might be unavailable or unidentifiable for user research sessions, delaying the understanding of user needs and requirements	Low	High	Stakeholder engagement will be conducted in the early phases of Alpha Phase to ensure input from engagement. Contacts and resourcing was acquired as part of this bid preparation and has been allocated for within costing, and dates agreed with key internal stakeholders. We will reengage as soon as project award notification to ensure engagement implemented throughout the project.	WP2	UK Power Networks	Open
R2	**Contract sign off delayed**	Medium	Medium	When approval for Alpha Phase is reached, project partners to start working on the project contract. Project partners legal teams to meet to discuss comments and finalise contract. UK Power Networks will use learnings from the previous projects to help accelerate the legal approval.	WP1	UK Power Networks	Closed
R3	**Delays in acquiring necessary data sources** Cause delays in geospatial analyses putting the project behind schedule.	Medium	High	Data request for UK Power Networks are being prepared ahead of project start to allow more time to prepare and data acquisition will begin at the outset of the project.	WP1	UK Power Networks	Closed
R4	**Insufficient data for Alpha Phase** Although data is provided on time and in line with Alpha requirements it is insufficient for siting analysis and other key pieces	Low	Medium	Data request for siting analysis has been prepared ahead of Alpha Phase bid submission and agreed with data owners. Scope has been built on agreed data.	WP1	UK Power Networks	Open
R5	**Scope creep** Uncontrolled changes or continuous expansion of the project scope may affect timelines, resources, and project quality	Low	Medium	The project scope has been designed in collaboration with the project partners. The partners carrying out the work are aware of the requirements. Scope for Alpha Phase is locked and any new opportunities to extend scope will be considered for subsequent phases of project.	WP1	UK Power Networks	Open
R6	**Resource constraints** Insufficient resources (personnel, time, budget) may lead to delays or reduced quality of deliverables	Low	High	Project partners have made commitments to ensure the project is properly resourced.	WP1	UK Power Networks	Open

Project Risks (2/2)

Ref	Risk Description	Likelihood	Impact	Mitigation	Related Work Package	Risk Owner	Status
R7	**Budget overruns** Project costs may exceed the allocated budget due to unforeseen expenses or underestimation, impacting financial resources	Low	Medium	Cost assessments for each partner have been undertaken based upon a thorough consideration of requirements. Through the project management plan and regular monitoring, cost analysis will also be undertaken to ensure any increases are dealt with early enough.	WP1	UK Power Networks	Open
R8	**Project overruns** Underestimating the time required for tasks could lead to schedule overruns and resource strain.	Low	Low	We will use good project management practices - with a weekly meeting, clear ownership of tasks and deliverables, and risk/dependency management. We will mobilise the team in the week ahead of the project kick-off to ensure all parties are resourced, clear on their roles, and clear on timescales for their delivery commitments.	WP1	UK Power Networks	Open
R9	**The barriers (policy, and regulatory) are too great to overcome.** The project is not feasible and project stops.	Low	Low	We will complete a regulatory review and look for any considerable blockers to this project. The project will take learnings from other innovation projects.	WP5	Frazer Nash	Open
R10	**Solution is found to be cost-prohibitive** The solution is not economically feasible to be deployed under BAU circumstances.	Medium	High	We have structured Alpha Phase to ensure that we capture key requirements, including network investment decision processes, and the results of the siting analysis in the design and size of the solution. This, paired with the modular approach, will ensure we avoid any oversizing.	WP5	Frazer Nash	Open
R11	**Delays in testing of metal hydride solution** Performance characteristics of metal hydride are not considered within design	Low	Low	Upon contract award, The First Element will book and reserve lab space at Coventry University and place the order for the necessary materials for testing, well-ahead of required usage.	WP3	The First Element	Open
R12	**Solution does not meet network requirements** Solution is not usable as a resilience product under BAU circumstances.	Low	High	We have structured Alpha Phase to ensure that we capture key requirements from UK Power Networks, with dedicated stakeholders resourced to the project and dedicated workshops to cover design, safety and network integration requirements. Informal engagement with SSEN will validate these requirements are scalable to DNOs wider than UK Power Networks.	WP3	The First Element	Open

Questions & AOB

