SIF Alpha Round 2 Project Registration

Date of Submission

Project Reference Number

10061342

Initial Project Details

Project Title

CREDO+

Project Contact

James Daniel

Challenge Area

Improving energy system resilience and robustness

Strategy Theme

Whole energy systems

Lead Sector

Electricity Distribution

Other Related Sectors

Electricity Transmission

Project Start Date

01/10/2023

Project Duration (Months)

6

Lead Funding Licensee

UKPN - South Eastern Power Networks Plc

Funding Mechanism

SIF Alpha - Round 2

Collaborating Networks

National Grid Electricity Transmission

Technology Areas

Active Network Management

Asset Management

Comms and IT

Community Schemes

Measurement

Control Systems

Modelling

Network Monitoring

Digital Network

Overhead Lines

Environmental

Fault Management

Project Summary

CReDo+ is a novel enhancement of the original Climate Resilience Demonstrator (CReDo) climate change adaptation decision support tool, with a primary focus of extending to the emerging risk of extreme heat. CReDo+ will scale up across the energy sector and develop a user-friendly platform for asset experts to quantify their combined tacit knowledge of risk under extreme weather conditions into new statistical models. By connecting

these asset impact models across the network, CReDo+ will capture a system level view of cascading risk, enhancing the ability of network operators and wider connected asset owners to build systemic climate resilience and robustness

Add Preceding Project(s)

10061340 - CReDo+ Climate Resilience Demonstrator (extension to new climate risks)

Add Third Party Collaborator(s)

Connected Places Catapult

Science and Technology Facilities Council (STFC) - UKRI

Computational Modelling Cambridge Ltd (CMCL)

Project Budget

£555,297.00

SIF Funding

£497,856.00

Project Approaches and Desired Outcomes

Problem statement

Problem

Climate change is expected to increase the frequency of severe weather events. The Committee on Climate Change reported that “Connectedness of infrastructure systems means that climate and weather-related impacts in one system can cause large and cascading failures in connected systems” and that “many organisations are struggling to fully assess risks from infrastructure interdependencies”, which is echoed by the National Infrastructure Commission. Energy networks are at the heart of critical infrastructure, interdependencies and cascading risks.

Reliable asset models that capture the impact and risk of different weather events are critical. However, typical data-driven (machine learning) approaches are limited by sparse historic failure data of rare weather events and a lack of digitisation across industries. Innovation is required to scale across different weather scenarios, use cases and networks.

Other work contributing to this project

CReDo (Climate Resilience Demonstrator) is a climate change adaptation digital twin project funded by Connected Places Catapult’s Innovate UK core grant. Over Phases 1 and 2 (2021-2023) of the project, the cascading impacts of flooding were modelled over the combined UK Power Networks – Anglian Water – BT Group network. The opportunities for cross-organisation data sharing were showcased using a scalable, extensible and interoperable distributed data sharing architecture and knowledge graph technology. CReDo demonstrated that economic models and cost-benefit analysis algorithms could optimise decision-making to benefit operators, customers and society at the lowest cost. Frontier Economics reported simulated potential benefits across the UK of £81m-£186m by 2050 for flooding alone.

CReDo+ seeks to scale up the CReDo technology across the energy sector and extend to new climate risks. CreDo+ will develop a scalable platform to enable asset experts to create asset impact models that quantify the risk of extreme weather conditions from their combined tacit knowledge.

The CReDo project is receiving complementary funding from Ofwat’s Water Breakthrough Challenge 3 Catalyst Stream to assess the impact of extreme heat on water assets. Dual funding will enable understanding of interdependencies and shared learnings across sectors.

Evolution

Learning from Discovery Phase shaped the focus for CReDo+. Heat was identified as an emerging risk that is poorly understood and CReDo+ was agreed to be the appropriate innovation due to the lack of historic data and complex network effects, such as derated capacity and increased demand from air conditioning.

CReDo+ seeks to scale an approach employed by the industrial mathematics research community known as “expert elicitation”, which overcomes the data gap. Previously, CReDo trialled elicitation interviews and workshops with asset specialists to translate their tacit knowledge into mathematical models. However, the need for extensive and costly workshops conducted by academic specialists was not scalable. To overcome this, CReDo+ will develop a user-friendly digital elicitation tool.

User research during Discovery Phase determined that a graphical interface for model building and distributing online questionnaires were needed, and a wireframe was co-developed. This self-serve tool will directly empower asset managers and engineers, identified as the primary users, to create a database of asset impact models from their collective expert inferences. The captured risks and failure modes needed to assess network robustness were found to be applicable to strategy, planning and data team

Innovation justification

Alignment with Innovation Challenge

By connecting asset models across energy networks, CReDo+ will capture a system level view of cascading risk. This connected decision support tool will enhance the ability of network operators and wider connected asset owners to build systemic climate resilience and robustness, addressing Challenge 3 Scope 2. CReDo+ will develop connected decision intelligence capability to ensure secure, robust, and affordable future energy networks resilient to climate change impacts, supporting the UK transition towards Net Zero and beyond.

CReDo+ is a novel solution and will:

1. Address data gaps in understanding asset behaviour by creating new probabilistic failure models for extreme heat.

2. Increase the granularity of data available to DNOs for their assets and identify interdependencies with other utilities' assets to inform cross-sector resilience approaches.

3. Incorporate economic and societal cost data to quantify the implications of failure, such as costs of recovery, repair, impact on supply, to support the investment case for building whole system resilience.

4. Prototype a user-friendly digital elicitation tool to create asset impact risk models extensible to other assets and risks. These models do not currently exist, as discussed in Question 2.

5. Implement the risk models in the CReDo technology to provide a new understanding of predictability, robustness, and quantificati

During Alpha we will improve the technology from TRL 2-3 to TRL 4-6.

Learnings from Discovery Phase, which shaped Alpha Phase

· We learnt the strategic focus of UKPN and other DNOs in relation to climate adaptation focusing on operational impacts.

· Lack of data to inform asset behaviour models without expert intervention, meaning that the BAU approach to forecasting faults on the network cannot anticipate impacts of extreme heat leading to gaps in investment planning.

· Applicability of available extreme heat climate data for Alpha prototyping, and UK capability to generate new data for Beta deployment.

· Approach to integrate the CReDo+ tool with CReDo technology, and as a digital resource in the DNO landscape.

· Modelling principles for extreme heat and differences versus prior work on flooding.

· Digital elicitation tool wireframe and requirements for a graphical interface for model building and distributing online questionnaires, informing the project roadmap.

Working with stakeholders: To refine our thinking so far, we have engaged with stakeholders from UKPN, Met Office, DEFRA, EA, DfT and Cabinet Office to inform future Phases. We also shared learning with SIF projects WARN, Planning4Resilience, Scenarios for Extreme Events and CommsConnect, identifying complementary or unique points in Alpha and potential collaboration opportunities during Beta. These discussions confirmed CReDo+ uniquely proposes scalable methods to model system-wide impacts of weather events across different sectors. The technology will be interoperable and complementary with asset models proposed by other projects.

Alignment to SIF

CReDo+ seeks SIF funding for CReDo+ because:

· Many digital twin projects related to asset health monitoring such as CReDo require asset failure models. They are heavily reliant on prior asset performance data. For extreme heat use cases, data is limited, hence the approach to develop models

drawing on the views and knowledge of experts. The risk of availability and accuracy of data is limiting the ability of infrastructure owners to rely on asset resilience models and SIF funding is essential in overcoming this risk.

· Complementary funding secured from Ofwat Innovation Fund (Catalyst) will develop modes of failure under extreme heat with a focus on the water sector. Together CReDo+ and Catalyst will consider whole system cascading impacts across water and energy sectors advancing CReDo adoption across GB and providing better value for GB customers.

· Current price control mechanisms lack provisions for investing in whole system resilience across utility organisations and infrastructure networks. Innovations are needed to assess and guide the necessary level of system resilience.

Challenge 3, focusing on strengthening the UK's energy system robustness to support efficient roll out of new infrastructure. CReDo+ will develop asset impact models that will provide owners/operators of critical

infrastructure with a system level view of cascading risk. A benefit of this is decision support for intervention for building climate resilience and robustness.

Impact and benefits (not scored)

Financial - future reductions in the cost of operating the network

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

New to market – products

New to market – processes

New to market - services

Impacts and benefits description

Maintaining whole system resilience will be more challenging in the future as the current infrastructure was not designed to cope with extreme weather events. The costs of robustness will increase and CReDo+ seeks to minimise those costs.

Frontier Economics (FE) undertook an illustrative CBA during CReDo Phase 1 (2021-22), finding benefits of £81m-£186m for the flooding use case alone. The analysis assumed that the CReDo technology had been scaled up across the entire energy, water and telecoms sectors, which is not yet the case. CReDo+ seeks to scale CReDo technology with the self-service modelling across the energy sector and to new climate risks. This is needed to realise the estimated FE benefits. CReDo+ also increases beyond FE benefits as extreme heat, flooding and other weather events are additive. The benefits realisation will increase with the increased number of network operators. Therefore, we estimate that CReDo+ (Extreme Heat scenario) will increase the FE benefits by 50%, in the range of £121.5m-£279m. This is because, outage costs and mitigation strategies of extreme heat and flooding are distinct, but equivalent in impact, and 50% is a conservative estimate.

The full details of the CReDo+ CBA will be understood in Alpha Phase as part of Work Package 7.

Frontier Economics CReDo CBA

CReDo modelled the cascading impacts of surface water flooding on a combined electricity-water-telecoms network in a region of East Anglia. CReDo outputs costs at the asset and system level including:

· Private costs through flood repair and guaranteed standard payments

· Direct societal costs of power outages through CIs and CMLs

· Indirect costs of power outages through knock on effects into water and telecoms outages

· Direct costs of water and telecoms outages from flooding

The expected benefits of coordinated investment in asset flood defences were simulated up to 2050 and scaled to UK level (Option 1). Relative to the "no investment" baseline, benefits are estimated at £221m (see CBA Option summary). The benefits of DNOs investing in silos were simulated at £77m (Option 2). Further analysis from Frontier Economics, described in PMT Business Case B7, concluded CReDo benefits of £81-186m. The benefits are not solely attributed UKPN, as the project is focused on whole system thinking.

CReDo+ benefit qualification

Financial benefits include reducing the cost of operating the network as asset owners can put preventative measures in place to reduce the likelihood of failures and subsequent repair costs. Therefore, energy networks and other infrastructure asset owners:

· Can reduce the overall investment cost to deliver a required level of resilience across the whole infrastructure system.

· Better preparedness and understanding of asset vulnerability will reduce emergency response costs.

· Cost savings for energy customers due to a lower level of investment and repair cost. The increased risk means a higher level of investment maintaining the current level of resilience.

CReDo+'s guides decision-makers in selecting the investments that will maximise stability at the lowest cost to consumer and with the lowest carbon impact.

· Reduced CI and CML during extreme weather events, by predicting failures and informing resilience upgrades. Other infrastructure asset owners, as users of network services using power as an input to their service, can minimise their resilience costs by benefiting from energy sector resilience instead of operating backup generators.

New to market – products, processes, and services: UKPN has pioneered confidential asset data sharing with Anglian Water and BT using a data exploration licence. Demonstrating that setting up these agreements with an agreed-upon common objective is possible. Establishing trust across networks is an essential part of this process, and its value needs to be better measured by traditional CBA

Teams and resources

The consortium for the project brings together the skills and knowledge needed to develop the CReDo+ tool (CPC, STFC, CMCL) with the network management and maintenance expertise of UK Power Networks and National Grid ESO (who has joined since the Discovery Phase). The partners have all demonstrated they are at the cutting edge of development in their fields through previous or other ongoing work, such as CReDo, in the area of whole system resilience.

UK Power Networks (UKPN)

· Suitability: A DNO with 8.5m customers . UKPN will input into the elicitation of asset failure that will feed into the CReDo+ failure models while helping to ground the business and benefits case.

· Capability: The quality of supply analysis, benefits measurement, project management, risk management, stakeholder engagement, data access

· Core role: Provision of expert advice and knowledge around assets and asset failure. Solution feedback and validation.

Connected Places Catapult (CPC)

· Suitability: The UK's accelerator for cities, transport, and place leadership. The lead organisation for the current phase of CReDo development. Brings deep experience in identifying market failures and convening stakeholders to solve them.

· Capability: Demonstrable capability in stakeholder engagement, business case & impact assessment, project management, and data science.

· Core role: Strategic project direction, project management, asset & system modelling, business case development & cost benefit analysis, engagement & dissemination.

The Science and Technology Facilities Council (STFC)

· Suitability: a multidisciplinary science organisation responsible for operating the UK's strategic scientific research assets, including data centres

· Capability: Data Analytics Facility for National Infrastructure (DAFNI) is a digital research platform curating data sets and modelling national infrastructure and hosts the CReDo Climate Resilience Demonstrator. STFC Hartree Centre research centre focuses on industrial innovation and provides probabilistic failure modelling and software development expertise.

· Core role: Data scientists and research software engineers to develop the digital elicitation tool small scale prototype

CMCL

· Suitability: SME tackling cross-domain interoperability challenges spanning energy, infrastructure, chemicals and materials. CMCL's know-how and expertise will be directly applicable to this project.

· Capability: Includes semantic knowledge and graph-based solutions to enable data interoperability and distributed digital twins.

· Core role: Ensuring interoperability, consistency and integrity of CReDo+ solution with CReDo. Data handling and integration, visualisation and demonstration.

National Grid ESO (NGESO)

· Suitability: Electricity System Operator for the UK. Responsible for second-by-second balancing of electricity supply and demand, to developing markets and advising on network investments. Play pivotal role within the UK Energy System Management, Control and Strategy

· Capability: Data integration and sharing perspectives. Insight into system level resilience and the impact of a cascade of failure. Extensive reach into other relevant network organisations.

· Core role: Input to tool validation through interviews and workshops involving subject matter experts.

Subcontractors (SCs)

1. Professor Chris Dent (University of Edinburgh) – Climate and Decision Support advisor, Technical lead of CReDo phase 1 (2021-22).

2. Professor Jim Smith (Warwick University) - Structural Bayesian Elicitation advisor

3. Dr Kevin Wilson (Newcastle University) - Probability Bayesian Elicitation, advisor

4. Sarah Hayes – Stakeholder Engagement and Dissemination support, Engagement lead (2022-24) of CReDo phase 2, project

lead of CReDo phase 1 (2021-22)

· Suitability: SC1,2,3 developed foundations of the CReDo modelling approach. SC4 Led CReDo Phase 1, and engagement for Phase 2.

· Capability: SC1,2,3 are distinguished academics in industrial mathematics. SC4 experienced in Stakeholder engagement, dissemination of findings and lessons learnt across energy and other sectors.

· Core role: SC1,2,3 will support modelling and elicitation workshops. SC4 will support stakeholder engagement to help network operators understand CReDo methodology and technology better and prepare for beta application.

Project Plans and Milestones

Project management and delivery

Tools and Governance:

The project will continue to use the hybrid agile-waterfall approach used successfully in Discovery Phase. Tasks and deliverables from each work package have been defined in a Product Backlog. Microsoft Planner Kanban board will be used to coordinate teams' activity and development work will be managed on Gitlab. We will use (30 min) stand-up meetings twice per week to support incremental sprints of two weeks with sprint goal, review, and retrospectives. We will track issues and risks in a RAID Log and ad-hoc decision meetings will be held to efficiently alleviate impediments.

Project Approach

The structure of the project is across four stages that group the Work Packages into logical components. There is dependency between each stage, and the key project dependency is the outputs from stage 2 feeding into stage 3 (prototype).

1. Project Enablement: Overarching work packages to provide governance, initiation, and closure.

2. Minimum Viable Data and Modelling (MVDM): Preliminary work packages to conduct initial design definition and validation.

3. Prototype Delivery: Work Packages to elaborate on MVDM and deliver the prototype

4. Business Case and Engagement: Work packages to conduct stakeholder engagement and define the value.

Structure

1. Project Enablement

· WP1 Project Management led by Connected Places Catapult (CPC)

· WP2 UKPN data, asset and testing support (UKPN)

· WP3 NGESO data, asset and testing support (NGESO)

2. Minimum Viable Data and Modelling :

· WP4 CReDo asset and system modelling led by CPC Data Team (CPC)

o M1. Preliminary phase

§ D1. Preliminary asset, system, and climate data and models

3. Prototype Delivery

· WP4 CReDo asset and system modelling led by CPC Data Team (CPC)

o M2. Full phase

§ D2. Asset, system, and climate data and models

· WP5 CReDo extreme heat prototype led by CMCL (CMCL)

· WP6 Digital elicitation tool small scale prototype led by Science and Technology Facilities Council (STFC)

4. Business Case and Engagement

· WP7 Business Case and Cost Benefit Analysis led by CPC Impact Team (CPC)

· WP8 Engagement and Dissemination led by CPC Engagement Team and supported by Sarah Hayes (subcontracted to

CMCL)

o M2. Support on engagement and dissemination across sectors from Sarah Hayes (CMCL subcontract)

Risks & Risk Management:

The project will exercise best practice project management governance to continuously assess strategic, regulatory, financial and operational risks.

The approach to project risk will follow:

· An If… Then… statement.

· Include a likelihood measure of High, Medium, Low

· Include an impact measure of High, Medium, Low

· Mitigation Category (Accept, Avoid, Transfer, Reduce)

Key Risks

1. Late delivery of sample asset and hazard data (describing extreme heat) mitigated by delivery approach

2. Availability of UKPN stakeholders mitigated by strong level of support from senior management achieved during Discovery Phase.

3. Divergent approaches developing to understanding asset vulnerability, limiting shared learnings and collaboration mitigated by engagement with other network operators throughout Alpha Phase to share information about CReDo in an open manner for consideration of joining up with CReDo+ at a later stage or using CReDo outputs (the modular, open approach) to develop their own methods of understanding for addressing asset vulnerability and system resilience.

4. Delay in contract signing may result in delayed project start (unless partners agree to Work at Risk) mitigated by UKPN issuing draft agreement in advance of funding decision to identify any red flags early which will lead to a rapid project mobilisation.

Impact on customers

· There is no planned or potential unplanned supply interruptions throughout the course of this project.

· There is no engagement planned with energy consumers over asset vulnerabilities

Key outputs and dissemination

The project will deliver a working prototype of the CReDo+ elicitation tool and asset models for extreme heat and integrate these with the existing CReDo technology. The prototype will incorporate high-priority user requirements identified during the Discovery Phase.

Summary of outputs:

· A working prototype of the elicitation tool (STFC). This will develop our approach to integrating the tool into the overall CReDo technology stack.

· Create initial probabilistic failure models for critical assets. (CPC). Our Bayesian modelling approach represents asset failure logic and key drivers through a flow diagram/decision tree. This enables users to understand the key factors that affect asset behaviour without the need to understand the underlying mathematics.

· Obtained climate data, processed it to create climate scenarios (CPC) and integrated the data into the CReDo technology stack connecting extreme heat data to the library of all-weather models (CMCL).

· Developed a first iteration of a system model to understand the cascading impact of asset failure will be created (CPC) and integrated into credo (CMCL).

· Prototyped visualisations with extreme heat insights into core CReDo (CMCL).

· Demonstrated a working prototype of the CReDo extreme heat tool and integrated the models and climate data into the CReDo stack (CMCL).

· Set up a working group for whole system resilience across SIF Alpha projects using data sharing to address the resilience and robustness challenge (CMCL). Stakeholder engagement will also identify who else to include outside of SIF projects. This can become a core stakeholder group where it is possible to build relationships laying the foundations for detailed discussions during beta phase where networks can share technical approaches and insight on deployment.

· Delivered stakeholder workshop with representatives of the energy sector, government and beyond to showcase the extreme heat CReDo+ demonstration (CPC)

The working group of engineers across UKPN and NGESO will review, test, and validate outputs while building support for the approach within their teams and broader organisations. This ongoing and collaborative engagement will create interest, familiarity and demand for the tool, which will assist in providing a soft landing for the Product through the Beta Phase. Dissemination activities such as this and the following will be coordinated by CPC and Sarah Hayes (sub-contractor to CMCL), drawing in all project stakeholders:

- Engagement with other energy networks to increase awareness of CReDo+ laying the foundations for the data sharing for whole system resilience working group.

- Continuing successful dissemination through the Digital Twin Hub to a cross-sector network of over 4,000 members.

- Knowledge sharing and engagement with other SIF projects (such as WARN and P4R) to exchange lessons learned and align outputs to resolve the problem.

- Ongoing direct engagement with Ofwat through the linked CReDo water sector project). A vital part of this engagement will be identifying the requirements to set up adequate data-sharing licenses for all cross-sector partners for the Beta phase.

All Alpha Phase projects will be uploaded to the Smarter Networks Portal and feature on the UK Power Networks innovation website with specific project learnings being disseminated at the IUK Show & Tell events. In addition, UK Power Networks will host an in-person event in London to disseminate the learnings and key outputs of all our successfully awarded Alpha Phase projects to a wider audience.

UK Power Networks will look to share project successes and discoveries via its social media channels with the possibility of publishing external press media where appropriate

Commercials

Intellectual property rights, procurement and contracting (not scored)

The parties agree to adopt the default IPR arrangements for this project as set out in Section 9 of the SIF Governance Framework, namely that each Project Partner shall retain all rights in and to its Background IPR and that each Project Partner shall own all Foreground IPR that it independently creates as part of the Project. Where IPR is created jointly then it shall be owned in shares that are in proportion to the work done in its creation. The agreement between the partners around the CReDo solution is that code is open and published under a permissive licence and we would expect similar from this project to benefit the sector at large.

Commercialisation, route to market and business as usual

The project will work with relevant stakeholders in UKPN and NGESO to ensure solutions are informed by users and grounded in current working practices. Supporting documentation will be developed as part of a toolkit to facilitate the change management requirements for BAU adoption. As part of Discovery Phase, stakeholders across all levels in UKPN have been engaged. More specifically, there is strong support from senior management as CReDo+ is closely aligned with UKPN's Digitalisation Strategy. The support from our leadership team provides further confidence in UKPN's ability to successfully deliver the project.

Furthermore, the project outputs will be shared with utility companies in an accessible, open-source format, notwithstanding the bounds of commercially sensitive data policies. This will permit rapid adoption through increased commercial awareness via multiple routes including by asset owners directly, their appointed contractors and consultants, digital supply chains, and the CReDo digital twin. The initial phase of CReDo provides an example of how the methodology is shared whilst the asset data is kept confidential: Technical Overview - DT Hub Community (digitaltwinhub.co.uk).

Policy, standards and regulations (not scored)

While legal, commercial, and regulatory barriers to data sharing persist across the energy system, we are unaware of any regulatory barriers to sharing the low code tool we aim to develop across the industry to help other asset owners develop asset-specific failure models.

Note that by regulatory barriers, here we mean the barrier preventing coordinated cross-organisation and cross-sector investment that we are identifying through the CReDo whole system approach to infrastructure interdependencies.

Considering the more extended-term realisation of the benefits of CReDo+, from a policy perspective, it would be valuable for regulators such as Ofgem and Ofwat to coordinate more closely to enable whole system resilience. The National Infrastructure Commission report, Strategic Investment and Public Confidence, recommended that regulators adopt climate change and resilience duties and a duty to collaborate. It would be helpful to explore how future price controls could allow for investment designed to deliver system resilience benefits in adjacent sectors to the source of investment, and to account for benefits that could accrue to other sectors, including water, communications, and transport networks. For example, regulators may wish to encourage whole systems solutions by enabling the water industry paying to upgrade or defend a substation to give the water assets more resilience.

In promoting collaboration across utility companies, regulators such as Ofgem may need to consider how to fund innovation in cross-sector innovation projects such as CReDo+.

Value for money

The total project costs for the Alpha Phase of CReDo+ are £555,297 with a SIF funding request of £497,856. Collectively the project team are funding a contribution of 10.3% of the total project costs. The contribution from each partner in the consortium evidences the commitment from the project partners and provides value for money to customers. For CPC, STFC and CMCL, the contribution will be covered from the profits of commercially focussed activity. UKPN and NGESO will contribute in kind through labour as part of Alpha Phase. Costs of each partner are competitive and have been scrutinised by senior managers as part of innovation governance and approvals in each organisation.

Split as below:

UK Power Networks

Total costs: £73,750

SIF Funding Request: £65,750 (10.85%)

Connected Places Catapult

Total Costs are: £221,195

SIF Funding Request: £199,075 (10%)

UKRI / STFC

Total costs are: £102,480

SIF Funding Request: £92,232 (10%)

CMCL

Total Costs are: £145,000

SIF Funding Request: £130,500 (10%)

National Grid ESO

Total Costs are: £12,872

SIF Funding Request: £10,299 (16.6%)

Subcontractors (accounted for in CPC and CMCL/UKPN total costs):

· Professor Chris Dent (University of Edinburgh) – Critical as technical advisor to CPC

· Prof Jim Smith (Warwick University) - Critical as technical advisor to CPC

· Dr Kevin Wilson (Newcastle University) - Critical as technical advisor to CPC

· Sarah Hayes – project and engagement activities advisor (subcontracted to CMCL) following being the project lead of CReDo phase 1 (21-22) and the engagement lead of activities during 22-24.

The proportional split of partner costs have been validated and agreed across the consortium. These reflect the balance of effort that organisations will spend on various aspects of project delivery during Alpha Phase. i.e the bulk of delivery will fall to CPC and the least to NGESO, who play an advisory role in Alpha Phase.

This project aims to deliver a whole system tool scalable across the industry which should help build network resilience more cost-effectively – the value of this is something we would aim to quantify (to increasing levels of accuracy) through Alpha and Beta Phases.

The project will leverage and be demonstrated through implementation into the pre-existing CReDo prototype platform – a digital twin within the ecosystem of investors, contributing up to £3.6 million to date and through planned investments over the next 12 months. CReDo+ will build on these investments to develop outputs that unlock economic and social value from climate resilience. SIF investment is essential for progress within the power sector as the Ofwat funding is specific to the water sector. As the granularity of asset portfolios and potential vulnerabilities are credentialed, the value of engagement between different utility providers will be realised through joint cost-benefit analysis of capital allocation to interdependent assets that deliver enhanced benefits to all.

There are other projects delivering value that can be integrated with CReDo, for example, the concurrent Anglian Water CReDo Ofwat project (£1.014 million) investigating extreme heat for the water sector specifically. Following engagement and knowledge sharing between projects, there is no duplication of effort, developed products are interoperable, and respective benefits are enhanced.

The scope for CReDo+ is focused on whole system impact of extreme heat, which has kept the size of Alpha (and potentially Beta) Phase appropriate for SIF. This will ensure we maximise the learning at the most efficient cost for customers.

A recent study by Glasgow City Council supports the value for money case for CReDo+ concluding that ‘Investments in mitigation and adaptation have benefits far outweigh their costs. These are much higher than traditional investments – up to £9 of economic return for £1 spent'.

Associated Innovation Projects

- ○ Yes (Please remember to upload all required documentation)
- ◉ No

Supporting documents

File Upload

CReDo+ alpha phase end of project meeting (Final).pdf - 2.6 MB
CReDo+ Alpha Show and Tell (Final).pdf - 3.8 MB
CReDo+ alpha Mid-Point Review - 11 Dec 2023 v1.pdf - 1.5 MB
SIF Alpha Round 2 Project Registration 2024-01-23 11_25 - 80.6 KB

Documents uploaded where applicable?

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