GCF 139 Urbanlink

End of Grant Report

Project Funded by

Local Energy Challenge Fund Round 2 Phase 1

Grant Awarded: £24,950

Overview

The UrbanLink project aimed to develop and deliver control systems for domestic scale electrical storage devices that reduced household energy costs. The focus was on properties with installed PV arrays owned by Glasgow Housing Association and the Phase 2 proposal was submitted as a Type 1 project with primarily an R&D focus.

The Urbanlink consortium led by Changeworks was awarded £24,950 to develop a highly novel approach that would combine storage control systems designed to optimise revenue from different sources with business models that use the revenue to reduce household energy costs through the use of innovative tariffs. Revenues would be based on modelling potential income through aggregation of distributed storage at the household level. The global market for domestic scale storage systems is rapidly expanding (forecasted to experience 30-40% annual growth over the next 5 years) but underutilisation of installed storage in its existing form is inevitable. The project was not awarded Phase 2 funding.

Consortium

The final consortium of six organisations covered the full complement of skills and experience required to deliver from experts in their respective field.

Consortium member	**Descriptor and project role**
Changeworks	Environmental charity: Project management, stock analysis and tenant engagement
Heriot-Watt University	Leading research-led university: Battery storage actuation (charge/discharge): Forecasting algorithm and control research
Auraventi	Spin-out company from Heriot-Watt. Battery storage actuation (charge/discharge): Forecasting algorithm and control commercialisation
Our Power	Energy supply company constituted as a Community Benefit Society: Create progressive electricity trading and retail models/tariffs based on data from the participating dwellings and the techno-economic modelling
Glasgow Housing Association	Scotland's largest social landlord: Managing works in properties and liaison with tenants. Context for Phase 2 interventions
V-Charge	Company providing grid balancing services: Expertise in distributed electric resources with embedded storage that respond intelligently to changing grid conditions

Phase 1 Activity Tasks and Progress

Task 1: Detailed Project Plan **Output: Detailed project plan for Phase 2 that creates a strong 'business case' and template for delivery**
• Tasks 2-7 all fed in to the key output, namely the research, development and writing of the Phase 2 bid • This was coordinated via a number of regular whole/part consortium meetings • A SharePoint site was developed so that all consortium members had access to key documents and to help with version control during the draft and full bid writing.

Task 2: Consortia Building

Output: Strong consortia of key actors with the required skills, experience, technology, community access and levels of trust

- The original consortium comprised Changeworks, Heriot-Watt University, Our Power and Glasgow Housing Association.
- Consideration was given to involving battery manufacturer and the DNO (Scottish Power Energy Networks) but consultation with those parties did not identify clear gains at this stage.
- Two additional partners were added to the consortium to increase experience in the wholesale electricity market and in algorithm development, namely V-Charge and Auraventi.

Task 3: Selection and analysis of pilot site(s) and proposal for end user engagement and possible business models

Output: Participating housing association top level analysis of housing stock , end user engagement strategy and potential business models

- A top level assessment of GHA properties was undertaken with a focus on properties with installed PV to better understand location, spread and archetype. Some analysis of high rise was also undertaken.
- The project went through a considerable evolution as the potential for utilising aggregated storage to generate multiple income streams became more apparent. Options considered included, high rise (centralised storage) versus low rise (diffuse storage), properties with and without installed renewables, and the utilisation of Void properties being brought back into occupancy.
- Scale was also reviewed. Heriot-Watt identified scenarios for actual project scale to allow for entry into (and participation in) current and near future balance markets. There was also a review of statistical requirements for the project for any findings to be robust. Once it became clear that entry to the balancing market was at a threshold level that the project, in its original form, would not be able to achieve, a decision was made to scale back from 1000 properties (Type 2 project- ten year plus cash flow) to 60 properties (Type 1 project-two year horizon).
- A tenant engagement strategy was developed to better understand the barriers that might exist to participation and the means of over-coming them. However delays in identification of target properties meant it was deprioritised.

Task 4: Legal issues

Output: Clear guidance on economic/IP constraints

- State aid guidance was sought from a specialist lawyer in the field. This formed the basis of which state aid articles were adopted for the different work packages.
- No issues were identified during Phase 1 around Intellectual Property

Task 5: Feasibility study – application of ORIGIN

Output: Working solution of current HWU ORIGIN system

- Weather forecasting algorithms were developed to work in any location
- Electricity demand forecasting was refined and the system was shown to be able to be incorporated at a domestic level with minimal control equipment.

• Basic techno-economic modelling of smart infrastructure (PV and battery control) was undertaken
Task 6: Identify heat and electricity storage solutions and define procurement method **Output: Details of appropriate energy storage technologies with full costs and timeline/procurement process to install.**
• A technical specification for the storage element was undertaken focusing on electrical storage and circulated to 13 battery manufacturers. Consideration of using phase change or thermal storage was undertaken but ultimately considered beyond the scope of the project. • Responses were collated and three manufacturers were shortlisted for more in depth investigation and to illicit further costs. • Confidence was gained that Li-ion market is sufficiently mature to meet the project needs. It also highlighted rapid developments in the market with new products promised in months. • Conditional quotations were sought as opposed to conducting a procurement exercise as it was anticipated that greater capacity at lower cost might be achieved should Phase 2 be funded.
Task 7: Matched Funding evaluation **Target Output: Understanding of whether additional funding schemes can be accessed within the project timescales**
• External funding opportunities were considered but the evolving nature of the business model limited the opportunities to identify a funding stream that could be accessed in the timescales given. • Ultimately all partners within the consortium were able to identify additional or in kind contribution to the Phase 2 proposal

Challenges in delivery

- The structure of UrbanLink, as originally conceived, did not provide the solution to the key challenge that was finally developed following research into the range of income streams that could be generated from utilising storage in the national grid balancing market
- There were a number of delivery approaches that were plausible but quite different in their approach and identifying one that met the test of; meeting funder objectives, practicality (related to implementation) and addressing the project aim presented a challenge in the timescale provided
- Delays and consortium time in identifying the final delivery model did impact on some work tasks including tenant engagement
- The final project was conceptually more complex that originally envisaged with a greater emphasis on R&D and modelled savings versus a longer term business model/cash flow with ‘real savings’. Communicating this with clarity was therefore more challenging

Learning

- In a project of this nature, identification of the final business model as early as possible is critical, allowing time to develop evidence to reinforce and strengthen.
- Communicating conceptually challenging business models should be tested and refined to ensure they are clearly understood

Expenditure

The Phase 1 Award was for £24,950 and two claims were made in December 2015 and February 2016. Glasgow Housing Association and V-Charge provided unfunded inputs to Phase 1.

Claim 1	**Amount**	**Claim 2**	**Amount**
Changeworks	£6,048.00	Changeworks	£2,610.00
		Heriot-Watt	£10,237.50
		Our Power	£4,050.00
		Burness Paul (solicitor- State Aid guidance note)	£1,945.20

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