Blackwood Grey Fleet to Green Fleet – Final Report

Phase 2 application has been completed and presented to the LECF judging panel in early 2016.

The project did not receive the funding requested, with feedback suggesting several areas where the project could be optimised and resubmitted to a different fund.

Proposal

The project aimed to achieve lower running costs and better care at two privately owned care homes by optimising the use of a solar photovoltaic (PV) systems. The power from the scheme would be stored within a home battery arrangement, which would provide immediate and latent renewable electricity to the care home, charge a number of electric vehicles, and also provide an uninterruptible power supply (UPS) backup.

The power generated would be controlled through dynamic forecasting systems with charge management hardware to provide power to the care home overnight, ensure charging of an electric vehicle fleet, based on car use schedules and requirements.

The two sites have different solar generation characteristics though similar demand profiles. A smaller care home in Cardonald, Glasgow has a potential solar output of around 80kWp, with a larger Stirling care home capable of generating up to 189.5kWp. Battery storage and electric car pool sizing were modelled using a bespoke model, which became a key instrument in designing and optimising system characteristics.

Project Feasibility

Having contracted Edinburgh based, Scene Consulting, to conduct a full feasibility study, the project team used the information to inform the phase 2 application. Alongside Scene, Heriot Watt University provided support to the project in terms of scheme optimisation through ICT.

Scene conducted site visits to establish the nature of the two sites, and focused preliminarily on modelling the solar potential of the Stirling site. With ongoing discussion with the Blackwood group, it was decided that the Glasgow property offered good solar potential and acted as a means to upscale the project, as well as offering much improved possibilities for future translation of the project into new locations and contexts – thus improving its replicability.

Initial scoping was conducted to ensure planning permission was not needed at the sites, as well as initial grid scoping to ensure a generation connection could be obtained in future.

Demand modelling allowed the project to accurately map the care home(s) energy use and costs, with data obtained from the provider (SSE).

Battery storage assessments were carried out by Scene, with desk based research complimented by consultation with a variety of battery manufacturers and experts. Heriot Watt's ORIGIN software platform was then integrated into the project plan, as a means to improve the efficiency of the system in relation to local climate and system design.

Design of the electric vehicle pool required input from staff at both care home sites. Blackwood facilitated this by distributing questionnaires to the respective care home managers, and the information was then fed back to the consultants. With this information, the project team were able to scale the car pool size around the daily usage and distances covered by care home staff for home visits – greatly reducing reliance on personal vehicles as well as minimizing mileage costs.

Taking all the gather information into account, Scene and Heriot Watt developed a bespoke modelling tool, with the capability to model a variety of system designs. The model's outputs allowed for accurate system optimisation as well as providing data relating to car charging efficacy, amount of generated electricity used in-house & exported, and financial outlooks over the next 20 years with or without grant funding.

Outreach & Replicability

In line with the pillars of the LECF, the project produced a methodology for engagement and replication of the platform. Firstly, a 'Grey Fleet to Green Fleet' handbook would be produced, aimed at care home managers and administrators around the UK, and offering a 'rough guide' style method for improving sustainability and reducing costs within a care home setting. Secondly, a mobile application would be designed based on the Blackwood model, allowing users to input values relating to solar, battery sizing, and car use; providing suitability ratings for each technology and information on where to find out more.

Further outside engagement was considered, with the provision of the car pool to the local community through an online booking platform. This would allow staff, care home residents and members of the local community to book and use the car pool. Further discussion with Blackwood led to the suggested possibility of integrating this booking system with their current 'clever cogs' ICT system.

3D modelling of how the sites would look with the electric car pool and associated infrastructure, as well as preliminary mobile application designs were created to aid with ongoing and future engagement.

Through discussions with Blackwood, project partners, academic contacts, and the wider community, the phase 2 bid was altered and shaped to enable the widest and most scalable impacts on both the UK care sector and the wider public.

Phase II Recommendations

Without the funding requested, the project is looking at downscaling certain elements of the system, such as the ORIGIN software integration. This would allow the project(s) to continue with less reliance on grant funding, though at a reduced scale and benefit.

The Phase II panel offered several recommendations to the project team, which are currently being considered, including:

- Assessing the potential of generation export with the Feed-in Tariff subsidy as a means of cover the lack of grant funding;
- Limiting costs through electric vehicle rental, over purchase;
- Reduction of battery storage to reduce costs;
- Removal/reduced use of the ORIGIN management system.

Going Forward

Blackwood and the initial project team are currently considering the recommendations and pathways to move forward with the project.