

Glasgow's Infrared Heat Demonstration Project

Project Manager's report

31st March 2016

Background

Glasgow City Council's Infrared Heat Demonstration Project was awarded funding of £20,000 in July 2015 by Local Energy Scotland under the Community and Renewable Energy Scheme (CARES): Phase 1 Local Energy Challenge Fund Grant.

The purpose of the project was to demonstrate the savings that can be made (both in fuel costs and carbon emissions) from the installation of a graphene infrared (IR) system and to evaluate its potential as a solution to the high energy costs within a stone tenement building, hard to treat social rented property and off gas areas.

The grant was to be used to prepare an in depth project plan to investigate the feasibility of using graphene infrared heating technology combined with Solar PV in a domestic setting.

Project Delivery

GCC appointed Ecodyn Limited after a competitive tender process to carry out a desktop feasibility evaluation for a graphene infrared heating project. The study was commissioned to allow GCC to prepare a stage 2 submission to the Local Energy Challenge Fund for funding to carry out a pilot project. The scope of Ecodyn's appointment was to:

- prepare a project brief and work plan for the implementation of a pilot programme;
- identify suitable properties for the pilot;
- carry out a cost evaluation of the technology, providing a value for money assessment and evaluation of how this will help to reduce fuel poverty and reduce carbon emissions;
- carry out a risk assessment of the proposed project;
- produce evidence that the technology is safe in a domestic setting;
- complete technical specifications for the project;
- produce a cost plan for the project with a view to going to competitive tender;
- complete fuel displacement calculations, and
- calculate GHG emission savings.

Ecodyn's full findings can be found in their report (attached), however the main elements of their study are highlighted below.

Feasibility Study Findings

Graphene based Products

GCC's project partner Keepmoat Ltd initially demonstrated a graphene based IR heating panel to GCC that was new to the market and also provided sales literature on other products that were soon due to come on the market. Graphene based wallpaper in particular appealed to GCC as an ultrathin ultra-insulation option that might be used in difficult to insulate properties. The potential savings offered an opportunity to improve the energy efficiency of heating systems in social housing properties.

The science behind infrared heating promises potential savings through efficiency, as radiant heating heats objects rather than the air in the room. All radiant and convection heating systems have the benefit that for every kW of energy used, a kW of heat is produced – in contrast to gas or oil heating systems which are between 0.7 and 0.95. This also means that if the heaters are linked to renewable generation then the heating system is carbon neutral at source.

In addition there are other benefits claimed including a reduction in dust and draughts and that there is a positive impact on users' health, in particular on arthritis sufferers. However, there appears to be little evidence to support this claim.

Efforts were made by Ecodyn to obtain sample products for examination and evaluation but none were available. It is understood that the BRE are currently assessing the graphene based heating panels and without certification GCC would be ill advised for GCC to ahead with large scale testing.

The graphene based wallpaper is still not commercially available and a graphene based plaster skim proposed by one company turned out not to include graphene at all. Sales literature and marketing information appears to be misleading as to the availability of graphene based products and contradictory in terms of the specification of the products. As a result and in the absence of suitable graphene based products, GCC decided to re-focus the original proposed study to look at conventional infrared heating panels.

Conventional Infrared Panels

GCC considered that the savings offered by conventional IR panels combined with battery storage and solar PV still merited the implementation of a pilot project to assess their utility and efficiency in a real world setting. There are also potential benefits to the building fabric in eliminating damp and mould – with a consequent effect on health - which can be verified as part of this project. The study would also be used to assess the 'thermal comfort' of occupants.

The proposed study includes 60 properties with a variety of interventions, including IR panels, solar PV, battery storage and new windows. Properties were selected on the basis of a number of suitability criteria. A monitoring regime was established and appropriate equipment identified to measure temperature, humidity, power consumption and user comfort.

A strategy to analyse the data is detailed along with the project timeline over a two year period. Project costs have been calculated including the purchase and installation of the interventions and monitoring equipment and staff costs to monitor and evaluate as well as to liaise with residents.

Summary

The feasibility evaluation carried out by Ecodyn on behalf of GCC has shown that graphene IR heating technology is not yet ready for the commercial market. However it also demonstrates the viability of a pilot project to evaluate an innovative combination of IR heating panels combined with solar PV and battery storage.

This study was used to inform GCC's subsequent bid for funding under Phase 2 of the Scheme in February 2016. However, GCC were informed in March 2016 that their application was unsuccessful.

GCC does not at this time have alternative funding available, however GCC hope to be able to take this project forward should funding be identified in future. In addition, while graphene based products are not currently a viable alternative to traditional domestic heating solutions, it is expected that these products will become available in the near future.