Philp Hall 'Energy Challenge' project Final Report 2016

Introduction

The Philp Hall Energy Challenge project made energy efficiency improvements to the Philp Hall Community Centre in Linktown, Kirkcaldy - making the building easier to heat, reducing its carbon footprint and running costs. The project also encouraged local householders to save energy in their homes, through exhibitions, workshops, groups who use the Hall and home energy advice visits. This had a measureable impact on carbon emissions, and also led to significant financial savings.

The energy advice strand delivered

- Home energy advice visits for 50 households
- 'Light touch' energy advice for an additional 60 people
- Significant energy savings in those households, through the uptake of energy efficiency measures and behavioural changes
- 51 households helped out of fuel poverty

Our engagement approach

The project was governed by our Community Engagement Plan which sets out how we approach our work with the community. Our Community Engagement Plan states that:

> *Engaging with the community is the first step for us to raise awareness, or to support people to change behaviours. Our aim to build community spirit - to go greener together – requires us to approach our community engagement in an inclusive and empowering way. When engaging with the public we*
>
> - *Are friendly, helpful, positive and welcoming to all*
> - *Don't tell or lecture – we listen as well as give advice*
> - *Share learning and encourage our members and volunteers to do so too*
> - *Are open about the values we hold and why our work is important i.e. we focus on the environmental and social benefits of the work we do*
> - *Act in ways consistent with our values - 'walk the walk'*

Project activities

We delivered presentations and attended events within the Philp Hall, such as the Philp Hall community lunch event and the Cosy Kingdom energy evening. Greener Kirkcaldy held a weekly energy stall in the Philp Hall foyer giving both 'light touch' energy advice as well as organising home energy visits for more detailed advice. We displayed posters at the Philp Hall, as well as a mailshot to local houses. We also used websites, newsletters and social media to promote the project to the local community.

The home energy visits provided tailored advice and support for households to help them save energy, money and carbon. The visits were delivered by our team of Energy Advisors, who are all qualified in City & Guilds Energy Awareness. For each participant, the advisor made an initial assessment, asking a series of questions about the home and the household's needs, concerns and motivations, then gave advice such as

- Options for physical improvements to the home: insulation, draught-proofing, new heating systems or controls, renewable energy technologies
- Assisting with accessing statutory schemes such as the Warmer Homes Scotland Scheme
- Advocacy for tenants, to help them access home energy-efficiency improvements
- Making referrals to the Greener Kirkcaldy 'handy' service for simple energy-efficiency measures such as draught-proofing, installed free of charge
- Ensuring the household understood their heating and hot water systems and controls
- Encouraging them to make the best use of heating, lighting and appliances
- Giving simple, low-cost tips to save energy
- Helping the household to understand energy bills, meters and tariffs
- Sign-posting to our partner Citrus Energy for impartial switching advice
- Giving advice on fuel debt
- Informing people of entitlements such as the Warm Homes Discount
- Sign-posting to our partner Citizen's Advice & Rights Fife for a benefit and tax credit check, to maximise household income
- Giving free energy saving gadgets such as TV Powerdowns or Shower Timers
- Making loans of energy monitors to help understand electricity usage
- Giving out advice materials and leaflets relevant to the home and circumstances
- Advice on any other household energy issues as required

We completed 10 case studies showing examples of the work that has been completed during the project, and the carbon savings achieved.

Project targets

Project objective	*Target*	*Project total*
Number of households reducing their home energy use	100	110 people received energy advice including 50 home energy advice visits
Number of households helped out of fuel poverty	35	51 households helped out fuel poverty

Monitoring and evaluation

The Greener Kirkcaldy energy advice team recorded all home energy visits carried out, including:

- Householder contact details
- Baseline energy usage and/or costs, when available
- A record of what advice was given, and of what changes we expect the household to make

All participants were offered a follow-up phone call or visit, a few months after the initial visit, to embed the changes and offer any additional support needed. When this call was made, we updated our records to note what advice was taken – for example, whether the advice we gave to get loft insulation topped up was acted upon. We contacted the majority of participants in this way.

The project's impact was evaluated through the creation of detailed case studies showing measures implemented and carbon savings achieved, for a sample of 10 participants. A selection of these is included below. The average carbon saving was then calculated and used to extrapolate from the sample, to estimate the carbon savings likely to have been achieved by the full set of 50 households receiving an advice visit.

Carbon evaluation

Each case study set out the participant's situation and aims, the advice and support we gave, and the carbon evaluation. The carbon evaluation describes the 'baseline' carbon footprint of their household gas and electricity use before our energy visit, and the savings that the household made. We state the annual savings, and also the estimated 'lifetime savings' - the annual savings multiplied by the predicted lifetime of the measures or behaviours.

To find the baseline energy use for a household, we asked participants for details of their gas and electricity use. For some, this came from bills, supplier's annual statements, or records of historic meter readings. For others, we made an estimate of energy use based on their energy costs. Where we could not obtain primary data for the household, we accessed postcode-level energy use data for the area from the UK Government's sub-national consumption data.

To calculate carbon footprints, we used the conversion factors given in the Climate Challenge Fund's 'recommended conversion factors' spreadsheet. These factors allowed a simple conversion from energy use in the usual units such as kWh, to carbon footprints.

We then used our records of what physical and behavioural energy-saving changes were made by each household to calculate the carbon savings, using the approach set out in the Climate Challenge Fund's Energy Efficiency Low Carbon Route Map.

The final step in the calculation for each case study was to convert annual carbon savings to the total savings expected over the lifetime of the advice or measures installed ('lifetime savings'). To do that, we multiply the annual savings by the expected lifetime of the measure, using lifetimes recommended by the Climate Challenge Fund's guidance and by the UK Government's Carbon Emissions Reduction Target scheme.

CO2e outcome

We then extrapolated from the sample case studies to make an estimate of the total carbon savings that the project achieved.

We carried out full carbon calculations for 10 project participant households, and found that the average saving achieved was 8.9 tCO2e per household. This is the lifetime saving, i.e. the annual savings multiplied by the predicted lifetime of the measures or behaviours.

For participants who made savings, these ranged from 2.2 tCO2e to 33.7 tCO2e. The households with the highest savings tended to be those whom we had helped to install insulation, which has a long lifetime of 40 years. Those with the lower savings were households who could not, or did not need to, make improvements to their homes, but were able to make simple behaviour changes to save a little energy.

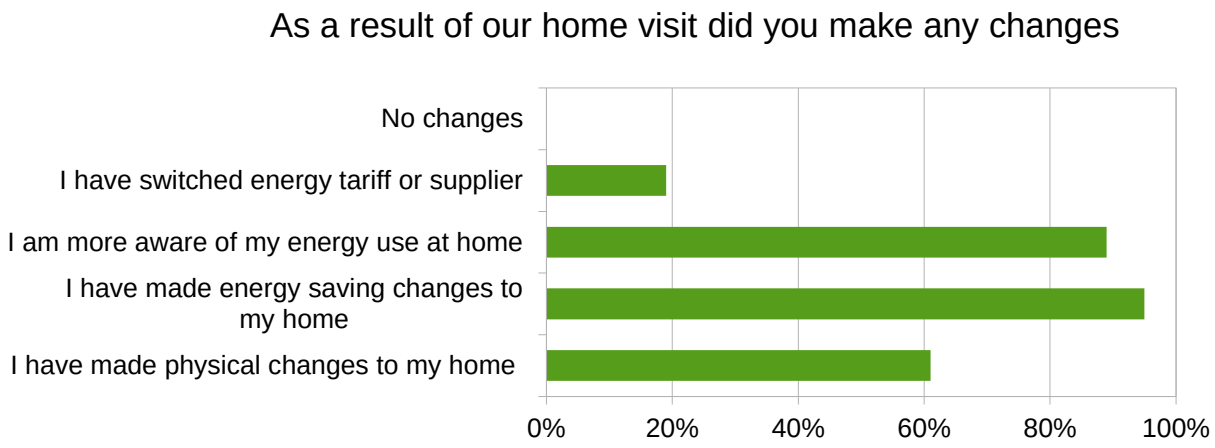
The estimated total savings for the 50 households we worked in-depth with, is therefore 50 x 8.9 i.e. 445 tCO2e.

This quantitative analysis of the project's carbon savings is backed up by the results of our participant survey.

Participant survey

We surveyed a sample of our energy advice participants in March and April 2016, using a telephone survey to ask a series of qualitative questions. The survey sample included households from all of Greener Kirkcaldy's 2015-16 energy advice projects, including the Philp Hall Energy Challenge project.

We asked people if they had made any changes as a result of our advice; the chart below shows their responses:

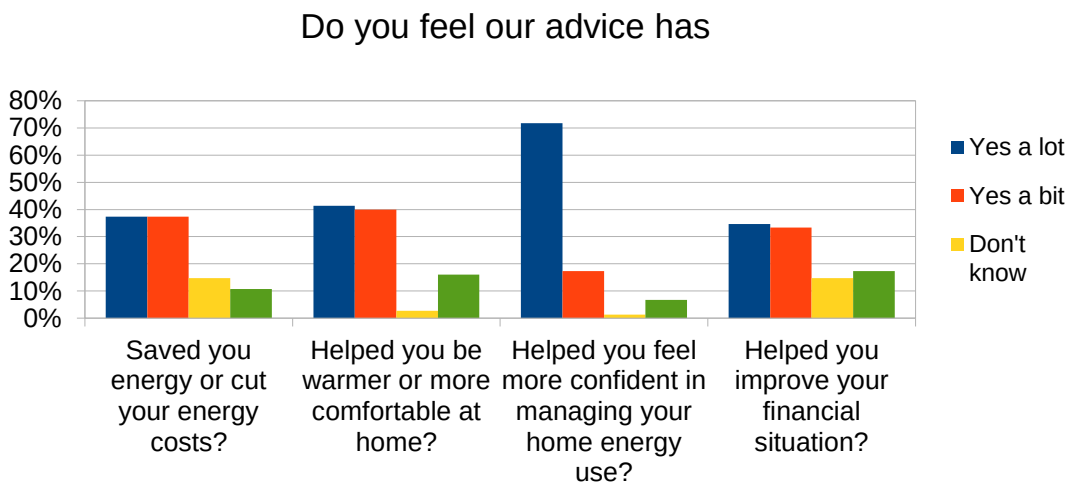


The key results are that 95% of respondents have made energy saving changes at home since our visit, 89% are more aware of their energy use at home, 61% have made physical changes to their homes e.g. insulation or a new boiler. A smaller number (19%) have switched energy tariff or supplier. These results confirm the findings shown in our case studies, that participants have taken up a wide range of physical and behavioural measures to reduce their energy use.

Community outcomes – fuel poverty and energy literacy

Our end-of-year survey gave us an insight into the impact of the project on fuel poverty and energy literacy. The survey asked about the impact of our advice on participants' energy use, thermal

comfort, confidence in managing their energy use, and financial situation. The graph below shows the results:



A key community outcome for the Philp Hall Energy Challenge project was our aim to help households out of fuel poverty. We did this by encouraging people to be more energy efficient, by helping them to access advice on income maximisation, and by giving advice on switching tariff or supplier.

To evaluate if our participant was in fuel poverty at the start of the project, we looked at their income against their fuel expenditure. If their fuel bills were over 10% of their total income they were regarded as being in fuel poverty. 68% of the people we worked with had been in fuel poverty. Out of 110 participants, that's a starting point of 75 households in fuel poverty.

Our survey showed that 75% of respondents felt that our advice had saved them energy or cut their energy costs, and that 68% felt that the project has helped them improve their financial situation. We therefore estimate that the project managed to help 51 people out of fuel poverty – that is, 68% of the 75 who were in fuel poverty to start with.

Another key outcome was to increase 'energy literacy'. We found that 89% of survey respondents now feel more confident in managing their home energy use; we think that is a good indication of energy literacy.

We also asked people for comments; these included

- *I found the energy advice visit very useful and can now work my storage heaters correctly making my home warmer.*
- *The people I had out were very helpful and happy to explain things that I wasn't sure of, thank you!*
- *Your Handy Service is great, changing to LED lights is a massive saving*
- *The energy monitors are great I look at them every night and switch things off.*
- *Telling me how to manage my heating better has saved me money*

- *Thanks to you we have a new boiler fitted*
- *Very happy with visit and has had a warm home for the first time in 4 years*

Example case studies

Case study A

Situation

Jane spoke with us to see what advice and support she could get to help her reduce her gas and electricity costs and be more efficient in the home. Jane lives by herself in a three bedroom terraced house in Kirkcaldy. She was finding the house difficult to heat and her heating bills were high.

Support we gave

We arranged to visit Jane in her home at a time that suited her to see what support and advice we could provide. We looked at how Jane was using her heating controls and found that she had the temperature of her boiler set a bit low. Having it low means that the boiler takes longer to heat the home and, therefore, burn more gas, making it more expensive. We adjusted the temperature to the appropriate level.

We also suggested that she should have heat reflective radiator panels fitted behind her radiators to reduce heat loss through her walls. With regards to her lighting, we advised Jane to replace her existing traditional incandescent lights with energy efficient LED lights. Upon assessing Jane's situation we concluded that she would qualify to get these measures done for free through our handy service. We also identified the main energy users in her home such as her electric shower and her tumble dryer and gave advice and tips on how to reduce her electricity bill through better behavioural use of her appliances.

Outcome

Jane was given high efficiency LED bulbs and radiator panels, fitted by our handy service, which has led to a brighter, more efficient and warmer home. She now feels more confident in understanding how she's using energy in the home and how to use her heating controls, which has led to a reduction in her gas and electricity costs.

Baseline

Annual Electricity Usage: 4,162 kWh (Taken from DECC postcode electricity estimates 2013)

Conversion factor for grid electricity = 0.46219 kg CO2e / kWh

Annual carbon emissions from electricity = 4,162 x 0.46219 = 1,923 kg CO2e

Annual gas usage: 12,192 kWh (Taken from DECC postcode gas estimates 2013)

Conversion factor for grid gas = 0.18445 kg CO2e

Annual carbon emissions from gas = 12,192 x 0.18445 = 2,248 kg CO2e

Total baseline carbon emissions for household energy use = 4.1 t C02e

Savings

Carbon savings from reduction in electricity usage:

Replacing a 50W halogen light bulb with a 6W LED leads to a 2.4% reduction in household electricity use (reference 2). We replaced 12 so 28.8% is saved.

LED lights x 12 = 28.8% reduction in energy use = 28.8% of 4,162 = 1198 kWh

Annual carbon savings from LED lights = 1198 x 0.46219 = 554 kg CO2e

The lifetime saving of this measure is assumed to be over 19.5 years (reference 1): therefore lifetime savings are 554 kg CO2e x 19.5 years = 10.8 t CO2e

Carbon savings from reduction in gas usage:

The data available for carbon savings of radiator reflector panels are per square meter (m_2) installed. We typically install 3.8m_2 (2 rolls of panels), which treats all of the radiators on the external walls. The reduction in carbon emissions attributable to DIY reflective radiator panels is 10 kg CO2 / m_2 / annum, and the lifetime of radiator panels is 10 years (reference 1). Therefore the annual savings are 3.8m_2 x 10kg CO_2/ m_2 = 38 kg CO_2 and the lifetime savings are 38 kg CO_2e x 10 years = 0.4 t CO_2e

The total lifetime savings for this household are

10.8 t CO2e + 0.4 t CO2e = **11.2 t CO2e**

Case study B

Situation

Ms Harvey is a single mother living in a terraced council house with her two children. She heard of our service through Philp Hall Community Centre and decided she would like a visit from us to see if we could help her with her situation. Ms Harvey has a very modest income and relies on the benefits that she receives; Employment Support Allowance, Child Tax Credit and Disability Living Allowance for her son. She explained how she struggles to get her home to a warm temperature and feels her energy bills are quite high. We arranged a visit to see if we could help her reduce her bills and get her home warmer.

Support we gave

We visited Ms Harvey's home, ran through some general questions about the property and noted the amount spent on energy bills. Her energy bill is approximately £1200 a year, which is more than 10% of her income and, therefore, puts her in fuel poverty. Her heating system is quite efficient with a combination boiler with thermostatic controlled radiators that was under 10 years old. We explained that with efficient use of the controls she might be able to reduce her gas bill. We noticed

that the radiators did not have reflector panels behind them so we explained to Ms Harvey that they can decrease the cost of heating the home through reduced heat loss through the walls. We noticed that there were no curtains in the living room and the bedrooms were lacking thick curtains. We explained the benefits of thermal curtains and also the benefits of simply having normal thick curtains to reduce draughts and retain more heat. Ms Harvey found this quite interesting as she explained she wanted to put curtains in to stop the draughts but had no money spare to put up poles and curtains. We took this opportunity to explain to Ms Harvey that we offer a free handy service that could install poles and curtains for her as well as the radiator panels. At this point we also explained how, through the handy service, we could also provide her with some LED bulbs as her current ones installed are the old inefficient halogen bulbs. Ms Harvey was very happy to learn of this service and asked to be referred for all of the above measures.

With the physical improvements to the home discussed, we moved on to discuss a way in which Ms Harvey could get an added financial benefit over the winter through applying for the Warm Homes Discount through her supplier. She informed us that she had never heard of this scheme so we explained that it is a £140 one off payment over the winter months to help people with their electricity costs. We called her supplier, got her assessed over the phone, found that she was eligible for the scheme and completed the referral for her.

Outcome

Ms Harvey confirmed that she received the handy service and was very happy with the changes. She informed us that she has noticed a difference in the warmth of her home and that she finds it much warmer and she informed us that she seems to be topping up her gas and electricity meters less often. Ms Harvey also received the Warm Homes Discount of £140 and that has taken a lot of pressure of her, she feels ready for winter now and will have some money spare this Christmas.

Carbon Savings

Baseline

Annual electricity use: 4672 kWh (Calculated from customers annual spending)

Conversion factor for grid electricity = 0.46219 kg CO2e / kWh

Annual carbon emissions from electricity = 4672 x 0.46219 = 2159 kg CO2e

Annual gas usage: 10,206 kWh (calculated from customers annual spending)

Conversion factor for grid gas = 0.18445 kg CO2e

Annual carbon emissions from gas = 10,206 x 0.18445 = 1883 kg CO2e

Total baseline carbon emissions for this household’s energy use = 4 t CO2e

Savings

Carbon saved from reduction in electricity use:

Replacing a 50W halogen light bulb with a 6W LED leads to a 2.4% reduction is household electricity use (reference 2).

LED lights x 7 = 16.8% reduction in annual energy use

Electricity saving = 16.8% of 4672 = 785 kWh

Annual carbon savings from LED lights = 785 kWh X 0.46219 = 363 KG CO2e

The lifetime of this saving is assumed to be 19.5 years (reference 1); therefore lifetime savings are 104 kg CO2e X 19.5 years = 7.1 t CO2e

Carbon saved from reduction in gas use:

Draught proofing the house through fitting thermal lined curtains can reduce heating costs by roughly 6% (reference 2).

The annual gas savings from draught proofing are 6% of 10,206 = 612 kWh

Annual carbon saved = 612 kWh x 0.18445 kg CO2e = 113 kg CO2e

The lifetime of this saving is assumed to be 15 years (reference 1); therefore lifetime savings are 113 kg CO2e x 15 years = 1.7 t CO2e

The data available for carbon savings of radiator reflector panels are per square meter (m2) installed. We typically install 3.8m2 (2 rolls of panels), which treats all of the radiators on the external walls. The reduction in carbon emissions attributable to DIY reflective radiator panels is 10 kg CO2 / m2 / annum, and the lifetime of radiator panels is 10 years (reference 1).

Therefore the annual savings are 3.8m2 x 10kg CO2 / m2 = 38 kg CO2 and the lifetime savings are 38 kg CO2e x 10 years = 0.4 t CO2e

The total annual carbon savings are 363 kg CO2e + 113 kg CO2e + 38 kg CO2e = 514 kg CO2. That's just less than 13% of the household's baseline carbon footprint.

The total lifetime carbon savings for this household are:

7.1 t CO2e + 1.7 t CO2e + 0.4 t CO2e = **9.2 t CO2e**

Case study C

Situation

We first met Mrs P when visiting a local contact point for people who have mental health issues. Mrs P informed us that she had never heard of the Warm Homes Discount (WHD) scheme. We arranged a visit to help her apply for this scheme as she is on income support, DLA and housing benefit. Her private-let home is an old stone built upper flat where she lives with her husband, who is also claiming DLA. Mrs P told us that she found her home hard to heat and worried about her fuel bills. The boiler in the property is at least twenty five years old and the hot water cylinder is not insulated.

Support

While completing the energy survey of her home it was noted that her loft insulation was way below standard, in fact it was so sparse that an average of around 25mm was all that could be recorded. We contacted Home Energy Scotland and enquired as to Mrs P's eligibility for accessing the Warmer Homes Scotland (WHS) scheme that is run by Warmworks. Mrs P was eligible and an engineer was arranged to visit the property to complete their own survey. We also contacted her energy supplier and requested her application for the Warm Homes Discount which supplies funds to her electric account in March 2016. A request for a handy service visit is completed pending the outcome of WHS scheme.

Outcome

The engineer for Warmworks came out to her property and did a thorough energy survey. The energy rating of the property came in an E 46 with a potential of C 72. It was estimated on the EPC that she could save over £1,704 in three years with reduced energy consumption. He has recommended that the property receives a full installation of new combi-boiler, with new radiators and pipes. He has also requested the loft insulation be fitted to the recommended 270mm. This work will all be carried out at no cost to the household.

She will also receive her grant of £140 from the warm homes discount, and new LEDs and radiator panels from our handy service.

Baseline

Annual electricity use: 2,698 kWh (calculated from customers fuel bill direct debit payments)

Conversion factor for grid electricity = 0.46219 kg CO2e / kWh

Annual emissions from electricity = 2,698 x 0.46219 = 1,247 Kg CO2e

Annual gas usage: 15,111 kWh (calculated from customers fuel bill direct debit payments)

Conversion factor for grid gas = 0.18445 kg CO2e

Annual carbon emissions from gas = 15,111 x 0.18445 = 2,787 kg CO2e

Total baseline carbon emissions for this household's energy use = 4 t CO2e

Savings

Carbon saved from reduction in electricity use:

Replacing a 50W halogen light bulb with a 6W LED leads to a 2.4% reduction is household electricity use (reference 2). We replaced 7 so 16.8% is saved.

LED lights x 7 = 16.8% reduction in annual energy use

Electricity saving = 16.8% of 2698 =453 KWh

Annual carbon savings from LED lights = 453 KWh X 0.46219 = 210 kg CO2e

The lifetime of this saving is assumed to be 19.5 years (reference 1); therefore lifetime savings are 210 kg CO2e x 19.5 years = 4.1 t CO2e

Carbon saved from reduction in gas use:

Virgin loft insulation install 270mm will save 24% reduction in energy use for heating. (reference 2).

Annual gas savings from installing full loft insulation 24% of 15,111 KWh = 3,627 KWh

Annual carbon savings from new loft insulation 3,627 x 0.18445 = 669 KgCO2e

Lifetime of savings for loft insulation is assumed to be 40 years. (reference 2).

40 x 668 = 26.8 tCO2e

Replacing an old boiler with hot water tank with a new combination boiler will typically save 8% on heating costs (reference 4).

The annual gas savings from a new combination boiler are 8% of 11,484 = 919 KWh

Annual carbon savings from a new boiler = 919 x 0.18445 = 170 Kg CO2e

The lifetime of this savings is assumed to be 15 years (reference 1); therefore lifetime savings are 170Kg CO2e x 15 years = 2.5 TCO2e

The data available for carbon savings of radiator reflector panels are per square meter (m2) installed. We typically install 3.8ms (2 rolls of panels), which treats all of the radiators on the external walls. The reduction in carbon emissions attributable to DIY reflective radiator panels is 10 kg CO2 / m2 / annum, and the lifetime of radiator panels is 10 years (reference 1).

Therefore the annual savings are 3.8m2 x 10kg CO2 / m2 = 38 Kg CO2 and the lifetime savings are 38 kg CO2e x 10 years = 0.4 t CO2e

The total annual carbon savings are

210 kg CO2e + 669 kg CO2e +170 kg CO2e + 38 kg CO2e = 1,087 kg CO2e.

That's more than 25% of the household's baseline carbon footprint.

The total lifetime carbon savings for this household are:

4.1 tCO2e + 26.8 tCO2e +2.5 tCO2e+ 0.4 tCO2e = **33.8 tCO2e**

References

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4 – DECC (2015). National Energy Efficiency Data-Framework, boiler reference is page 22. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/437093/National_Energy_Efficiency_Data-Framework__NEED__Main_Report.pdf