

# Climate Challenge Fund Final Report

Powerdown Project  
Energy Action Westray  
White Pow  
Westray  
Orkney  
KW17 2DR  
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Completed by: Meghan McEwen March, 2011

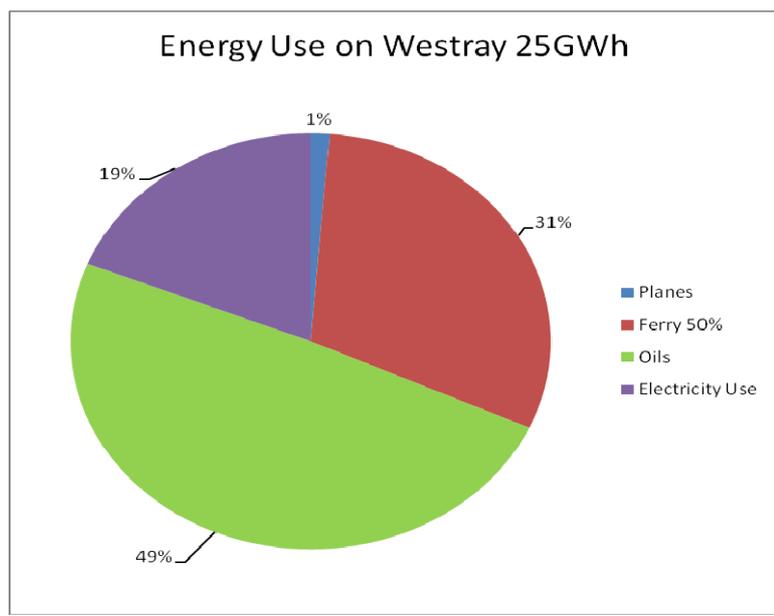
# Project Activities and Delivery

Energy Action Westray appointed a Powerdown Worker once we were notified of the award. Sam Marcus was appointed but only able to work 14 hours per week of a 22 hour per week post. Sam immediately began engaging with the community about ways to reduce emissions and increase efficiency. A document was produced detailing where produce in the shops come from i.e. our green beans come from Kenya and our tomatoes come Egypt. This document helped bring home the idea of food miles and seasonality. This has also encouraged a number of community members to try and eat more seasonally.

Sam has also been working in and around South Hammer since the beginning. There will be a full report on the genesis of the garden and the project as a whole as part of our CCF 2 reporting. On the back of Sam's work the local authority gave EAW some green cones to distribute and Sam has installed 10 to date.

In October 2009 Meghan McEwen was appointed to fill the remaining hours of the position. It was also agreed with KSB and CES that a rethink of our deliverables and carbon reduction targets was needed. In the beginning of 2010 our deliverables were agreed. The full detail of the five agreed deliverables is attached to this report as Appendix 1.

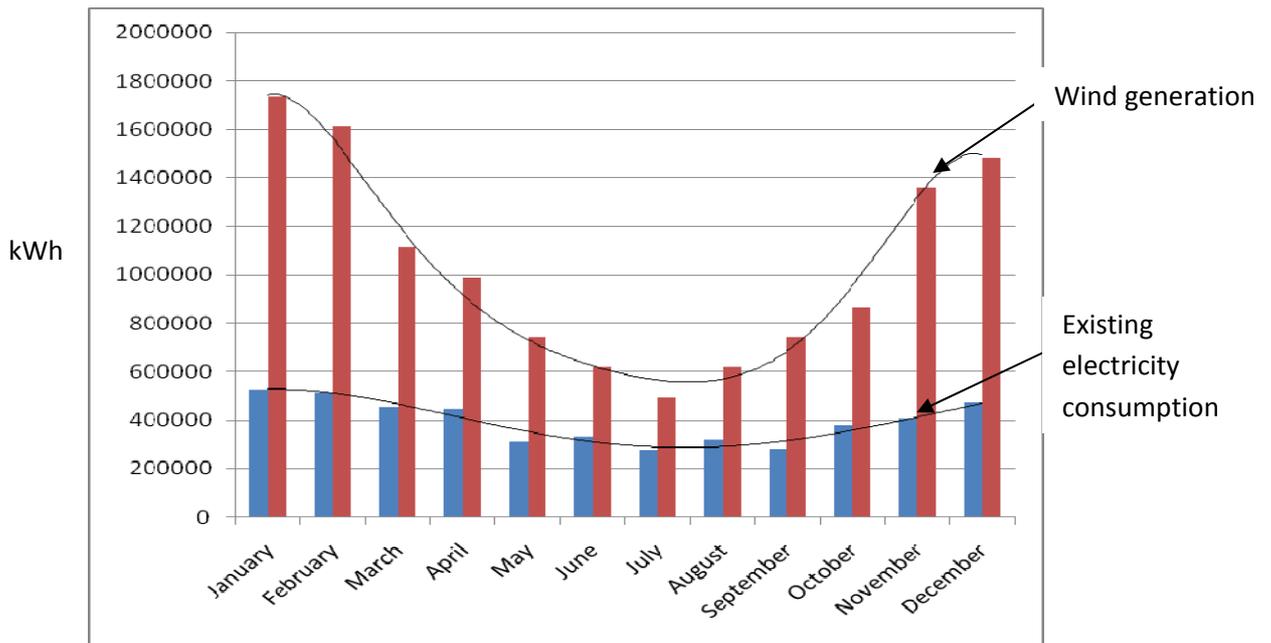
**Deliverable 1:** Build on the Action Plan and accurately audit the sources of greenhouse gas emissions on the island. Our focus has been primarily on household emissions and those baseline figures will be further detailed in Deliverable 3. We have also interrogated the district network operator and we have learned the following about energy usage of our community:



- Electricity worth circa £500k
- Liquid fuels worth £569k assuming 50p/litre average.

- Feed in Tariffs and Renewable Heating Incentives additional income.
- Grid constraints and lack of alternatives mean we are already fuel switching from liquid fuels to electricity.

We have also learned about the potential in our community for using our wind resource as a direct electricity supply. The graph below shows the predicted output from 3 x 900kW wind turbines which would cover our energy requirements. To maximise the local use of the electricity generated we need to increase the utilisation of wind energy in the winter periods. As part of this we have been encouraging renewable heat on the island.



By learning accurately about what we use, when we use it and how much it is costing us we as a community are empowered to make changes, and as an organisation Energy Action Westray is in a good position to gauge the savings we've made and help people change behaviour.

**Deliverable 2:** Development of renewable energy and energy efficiency systems at South Hammer. Whilst we were unable to secure a Climate Challenge Fund grant for the work EAW believes will influence our community in their behaviour at South Hammer, we were able to secure a LEADER grant for the interior work, alongside our Westray Wind Warmer project.

It is our intention to use the B listed site to demonstrate renewable energy technologies, insulation materials, and behaviour changes that can effect household emissions. We will also use the site to engage in a private way with community members about their individual energy usage, choices and the potential for reduction. We will also use the site as an educational resource in the community and invite the school, youth clubs, and visitors to the island in an effort to spread the word about climate change, peak oil, and community sustainability. We used our community consultation budget to purchase four large banners addressing the main areas of emissions in Westray: food, waste, transport, energy. These banners have been at consultation events on the island and up for

visiting groups to see. We will use these banners to further education and illustrate the situation in Westray, and our goal to reduce emissions by 80% by 2050.

Our ambitions for an electric car charging point remain unchanged. However recent experiences with private householders who have bought electric cars have shown us that our remote location places us at a massive disadvantage in the market for parts, servicing etc.

**Deliverable 3:** Reduction in energy use via energy auditing. This deliverable has really grown legs and branched out from our original intentions which was to assist the Westray Development Trust with technical advice and support to do the energy modelling.

The first important milestone to note is that 121 NHER home surveys have been completed from the 250 odd houses on the island. These surveys have been used to determine average emissions and fuel usages for households on the island. Once householders agree to a survey they unlock our ability to advise them about measures appropriate to their homes from simple ones like radiator panels and heating controls to the cost implications of a new, more efficient renewable energy system. As our knowledge and understanding of our housing stock has grown we have been able to identify measures that would reduce emissions on a large scale, with a single measure or technology implemented on a large scale.

Gairy, Westray, Orkney, KW17 2DR

**NHER**

New Open Close Save Reports EPC Regs Errors NES one

## RESULTS

**SAP 2005 Assessment**

SAP **71** (band C)

EI **62** (band D)

CO2 emissions **5151** kg/yr

[View SAP Worksheet](#)

**NHER Assessment**

NHER **6.4**

CO2 emissions rate **56.73** kg/m<sup>2</sup>/yr

CO2 emissions **7843** kg/yr

[View NHER Rating Worksheet](#)

**NHER Running Costs (standard occupancy)**

Type	kWh/yr	£/yr	CO2 (kg/yr)
Main heating	15090	953	3999
Water heating	5670	358	1502
Cooking	1185	124	358
Lights and appliances	5017	632	2117
Standing charges		61	
Generation savings	0	0	0
<b>Total</b>	<b>26960</b>	<b>2128</b>	<b>7975</b>

[View NHER Cost Worksheet](#)

Connected to c:\Users\Colin Risbridger\Documents\My Dropbox\Colin\Orkney.acldb  
 SAP 71 C, EI 62 D, HLP 1.84, NHER 6.4, Total costs £2128, Scotland

Typical NHER results screen shot

Our interest began by providing technical advice to the fuel poverty sub group of the Westray Development Trust but it became apparent that there was the potential for greenhouse gas reduction whilst reducing fuel poverty.

Energy Action Westray helped to design the original Energy Efficiency Design Award (EEDA) project secured by the Westray Development Trust. The project has proved that bore hole supplied ground source heat pumps coupled with insulation measures in traditional stone built properties can greatly reduce fuel poverty and GHG emissions. The average cost of £18k per home was expensive but it future proofed the house by making it affordable to heat even with low incomes.

Building on experience with the EEDA project and discussions with the Energy Saving Scotland advice centre (ESSac) we approached installers about bulk discounts for householders who were able to pay for the technology without grant assistance. Once we found an installer who embraced not only our geographical position but also our community interests we advertised to all householders on the island via a bulk mailing. We included heat pumps, solar panels and wind turbines in the available technologies showed their benefit and provided our contact details. We secured a discount of 15% on ten or more heat pumps, 22% on fifteen installs and 28% on 20 or more installs. For the first round of installs eleven heat pumps were installed with a number more paying deposits for future install at a 22% discount.



With our wind resource it was also essential to secure a bulk discount on wind turbines. We were able to secure a 10% discount on 15+ turbines, however we quickly realised that there were a lot of people in Westray who were interested in small scale wind generation. We held an event in Westray for householders who were interested in small scale wind and for installers who were interested in installing turbines in Westray.

The event was a massive success and participant householders expressed gratitude for EAW involvement and everyone agreed they would like EAW to continue with our involvement in the process. The contractor offering the original 10% discount has never followed up with the householders so we continue to look into alternatives.

We have also identified solid wall insulation as having a massive potential for emissions savings and improvements for quality of life in households in Westray. Using the NHER software we modelled various types of solid wall insulation and identified those with the biggest potential for emissions savings from households. We held an informational event for local builders and joiners who would be installing these measures for them to ask questions and get their hands on some of these materials. We also had a representative from Skye and Lochalsh housing association who had implemented some of these measures in houses there. We held a separate event for householders who were interested in having their solid walls insulated. Both events were successful and are happy to say that solid wall insulation is now being installed in stone-walled properties in Westray.

Insulation levels on the island were also hugely varied, and indeed we discovered 11 houses with no loft insulation. When one of Energy Action Westray's Board members was driving 'south' through Wick an offer at the Homebase there was available for loft insulation at 0.50p per square metre. It was decided that we would pursue Homebase and Eon who subsidised the in-store



deal for an equivalent deal in Westray. We began approaching both central Homebase contacts and CERT contacts at Eon. We used the data



about emissions gathered through our NHER surveys to provided indicative levels of carbon savings to both Homebase and Eon. We began identifying potential sources of assistance for help with payment for transport and haulage. In the end Homebase and Eon made the phenomenal decision to give everyone in Westray with less than 60mm of existing loft insulation free top-ups. They paid for transport to Westray and for gloves, goggles, and masks for all recipients of loft insulation.

The decision to cut off at 60mm was made because we knew the Home Insulation Scheme was coming to Orkney and that free top ups would be available above that level. In cases where the insulation was below 25mm householders received two layers of 170mm Carbon Zero loft insulation. The insulation was distributed via Westray's local haulage depot and picked up by recipient householders, their family, friends and neighbours. In the end 3 football fields' worth of insulation were delivered and distributed in less than a week. Local builders contacted client householders who they knew would benefit from a loft insulation top up, and family members made requests for older people who they knew would benefit. It was a perfect example of what makes Westray a brilliant place to live, people looking out for one another and everyone coming together to do something that can make a big difference.

We managed to secure a contract from Changeworks Resources for Life to deliver the Home Insulation Scheme door knocking service on Westray and employed a local resident for the summer before he left for University. He received training and a local face improved the response rate. Many islanders have since benefited from the Home Insulation Scheme cavity wall and free loft top up installations.

Our work in energy auditing will continue and we have begun creating a record of our work and methodology in the hope that many other communities can benefit from our experiences and we can continue to influence household emissions in our community. We use the audits to measure the energy required to create a satisfactory heating regime (21 deg C in the main room and 18 deg C elsewhere; 23 deg C throughout for vulnerable adults) and this information allows us to prioritise our assistance.

**Deliverable 4:** Development of a local grown food initiative. This deliverable was successful in securing CCF funding. A full report on this project will be submitted separate to this one.

**Deliverable 5:** Continue work with the ESSac and school. We have continued our partnership with the ESSac in identifying householders who qualify for grant funded efficiency measures and supporting householders through that process. We have helped five householders through the Energy Assistance Package process, we helped manage the Home Insulation Scheme in Westray and we are also working with the local authority to ensure delivery of the Universal Home Insulation Scheme in Westray.



Time and curriculum pressures have prevented us from getting into the school itself, so instead we have engaged with local youth clubs and have had tree-planting events seasonality discussions.

The upper primary also went to South Hammer as part of a unit of crofting and small-holding practices.

# Delivery Partners

Throughout the our project we have worked with a number of organisations in an effort to ensure the best outcomes for Westray. Most notably is Community Energy Scotland and Keep Scotland Beautiful who have not only funded the project but supported our project throughout.

We have also continued to work in partnership with the Energy saving Scotland advice centre by sharing information, communicating with one another and working together on a whole-community strategy to delivery of efficiency measures in Westray. The ESSac has generated a report into the Home Insulation Scheme and the work Energy Action Westray has done in the community. This report is interesting on a number of levels: the first being the huge amount of measure and households we have reached in our community. The next point to note is the difference in the emissions savings figures; this is notable because of the different methodologies employed by the organisations. The ESSac report is attached to this one as Appendix 3.

Energy Action Westray have made the conscious decision to use the most detailed system when modelling household emissions (National Home Energy Rating NHER) and the EST and ESSac use a less specific methodology (rdSAP). We have also been sharing information with the ESSac about delivery times grant assisted measures and communication problems. This has been hugely helpful as we have noticed immediate results from this process.

We have also worked with the Westray Development Trust in delivering technical advice and support to their 9 house efficiency project in EEDA round 1. EAW and WDT have also been working together to tackle fuel poverty in Westray and have sought unique and complimentary solutions to addressing the issue. This has led to the handover of money originally awarded to the Trust by the Scottish Power Energy People Trust to Energy Action Westray as we have built a reputation for delivery.

We have also actively engaged with the Orkney Islands Council to share the results of our work and to attempt to influence policy locally. We have also worked with OIC to identify households that were eligible for a trial of the Universal Home Insulation Scheme in Westray which would see grant funding available for solid wall insulation. To date we have successfully helped 9 houses in Westray to be awarded UHIS funding from a very limited pot of money.

We continue to work wherever we can to influence government policy including being members of Community Energy Scotland, the Climate Challenge Fund Communities Coalition, Development Trust Association Scotland and Energy Action Scotland. Our efforts were recognised earlier this year by winning an award from Energy Action Scotland.

# Community Outcomes

The most important outcome for our community is that climate change and carbon emissions are becoming commonplace discussions on Westray. Because the easiest way to engage with householders is to discuss financial savings and incentives, we made the decision to also use greenhouse gas emissions in partnership with the financial benefits when discussing options with householders.

We have also seen a massive increase in the number of householders approaching us for advice about heating technologies, insulation levels and sustainability. We have used the NHER software to prioritise help for householders and to understand their consumption and the potential for savings in their heating systems. Small wind turbines and ground source heat pumps are now essentially commonplace in Westray and acceptance of the technology is total.

In households that have installed new heating systems and increased insulation levels there have been anecdotal reports of improved overall health and well-being. There have been numerous studies done illustrating the effect of dampness and cold on health, so this claim is very likely. By reducing people's household fuel bills we have increased the amount of money within the local economy. Grandparents who have installed heat pumps have said they find their homes much safer for their grandchildren as the radiators never get too hot.

We have also begun work exploring the potential in our community of demand-side generation, using the electricity produced by renewable technology on the island and therefore reduce the amount of carbon associated with all electricity consumption on the island.



Energy Action Westray has begun to capitalise on the work done and attract visitors from other communities and institutions. We had a group of MSc Renewable Energy students from ICIT in Stromness to come and see the various projects in Westray and see how we've accomplished what we've have. Various other dignitaries and community members continue to visit Westray and see how we've inspired the community about climate change and household efficiency.

It is difficult to fully gauge the outcomes in Westray from the Powerdown project, as we haven't finished yet. It would be fair to say that future work will be easier because of the hard work that has taken place in this project.

## CO<sub>2</sub> Emissions Reductions

We originally decided to count 1 Tonne from every house surveyed and the associated advice given and actions taken by the householder as a result. Because EST adjusted their estimated savings from their surveys we adjusted ours in line with that. Also, we are pleased to say that the other outcomes of our project have been so successful we were in a position to adjust this down to 0.5 Tonnes per survey.

121 houses:	61tpa
Facilitating top insulation with local installer:	14.048tpa
Home base/ Eon loft insulation 70 houses:	157tpa
Bulk purchase of GSHPs:	89.353tpa
EEDA technical advice and support:	26.8tpa

We also have a number of projects on going with anticipated savings. These include our Westray Wind Warmer Project, North Eden and our involvement and hand-holding with householder through the Universal Home Insulation Scheme trial period in Westray. We are also continuing to engage with CERT suppliers and delivery partners in tackling the real issues facing household emission in Westray.

There is a full break down of our calculations attached to this report at Appendix 4.

## Legacy

The Powerdown project in Westray has continued to inspire our community to engage with issues around sustainability, climate change and household efficiency. These are becoming more and more prevalent in all discussions about community development and future project planning.

We have recorded that many members of our community are now considering installing renewable technologies as standard. These technologies include ground source heat pumps, wind turbines, and solar thermal. We are pleased that installers are now engaging with our community on a much improved level. Westray is quickly gaining a reputation as a community keen to explore renewable and sustainable technologies. From the householders that have already installed these technologies we can count the Fit in Tariff and Renewable heat Incentive, in whatever form it eventually takes, as a legacy of increased household income. A significant amount of this money will be circulated and recirculated in Westray's fragile economy see

[www.proveandimprove.org/new/tools/localmultiplier3.php](http://www.proveandimprove.org/new/tools/localmultiplier3.php) for evidence and formula.

Also contributing to our local economy as well as comfort levels to householders and improved health has been our continuing work to insulate our stock. This has reduced emissions from recipient householders and also reduced heating costs, and there has been anecdotal evidence of improved health.

Our employees have also received training in micro generation and the very useful city and guilds course; this means an increase in knowledge in the community. As our Powerdown project has continued to deliver in the community we have noticed and increase in our volunteer base. We have also set a standard for community co-operation in bulk buying and negotiating on a large scale. By harnessing the potential buying power in our community which has encouraged the take up of emissions reducing measures and has brought a better cost to our community.

## Appendix 2: Savings calculations

On our deliverables dated 25-01-10 and agreed that same month EAW committed to 100 NHER house visits with 1 Tonne claimed for every visit

This figure was based on EST claiming a similar amount to create a standard. EST has since reduced that figure and EAW will adjust our figures similarly

121 Surveys completed and input into NHER

.5 Tonne claimed per visit

61 Tonnes claimed for home visits, energy advice and awareness raising.

## Surveyed Properties

House Number	Original Co2	Improved	Saving kg per year
1	8497	8114	383
2	19036	16844	2192
3	15809	14811	998
4	14421	12508	1913
5	10517	9266	1251
6	15921	14000	1921
7	14456	12524	1932
8	19062	15138	3924
9	12826	11438	1388
10	10546	9963	583
11	11034	10235	799
12	10109	9487	622
13	15247	12517	2730
14	10316	9688	628
15	11631	11041	590
16	12647	11150	1497
17	8657	6454	2203
18	23863	15462	8401
19	13128	11130	1998
20	8632	7842	790
21	11363	10532	831
22	25844	16831	9013
23	16388	15651	737
24	21491	19293	2198
25	30296	29038	1258
26	20528	14474	6054
27	6775	6474	301
28	14968	13176	1792
29	31476	19729	11747
30	15527	14892	635
31	10078	9252	826
32	22183	21590	593
33	14328	12788	1540

74268 74.268 Tonnes per year  
x 40\* = 2970.72 lifetime Tonnes

Therefore 74.268 tonnes per year for 33 surveyed properties = 2.2 tonnes per house and 157 tonnes per year in total.

### Bulk Purchase of Ground Source Heat Pumps

House	Original Co2	Improved Co2	kg Co2 saving
1	16326	9727	6599
2	18497	9817	8680
3	22183	10504	11679
4	11461	7100	4361
5	5239	487	4752
6	13173	10091	3082
7	31476	17897	13579
8	18818	6566	12252
Total for houses with NHER surveys			64984

64.984 Tonnes per year

9	8123*
10	8123*
11	8123*

\* using the installed savings an average of 8123 kg Co2 has been assumed for the remaining properties

Total for all houses	89353	kg per year
	89.353	Tonnes per year

Westray Development Trust Energy Efficiency Design Award project- funded by the Scottish Government and administered through the EST

Energy Action Westray provided technical advice and support throughout the project and provided the carbon calculations

1	16.50	5.4	11.10
2	9.20	2.7	6.50
3	20.80	5.3	15.50
4	16.60	4	12.60
5	31.22	8.3	22.92
6	15.00	4.6	10.40
7	15.60	4.9	10.70
8	12.00	2.9	9.10
9	12.00	3.4	8.60
	Total	107.42	Tonnes

because this project was managed by the Westray Development Trust (who don't count emissions) but supported by EAW we have claimed 20% of the above savings

total claimed	26.855	Tonnes
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# Independent CO2 savings using the Energy Saving Trust methodology and the ESSac report;

## Energy Action Westray

Influenced carbon savings						
Area covered	KW17 2BD - 2DW		Period covered	01.10.2008 - 31.12.2010		
Number of unique households which have completed a HEC and/or have been given verbal advice	300					
<b>Energy Efficiency and renewables advice contacts</b>	<b>Number of advice contacts</b>		<b>Assumed annual CO2 saving per advice contact (tonnes)</b>	<b>Assumed annual CO2 saving (tonnes)</b>	<b>Assumed lifetime CO2 saving per advice contact (tonnes)</b>	<b>Assumed lifetime CO2 saving (tonnes)</b>
Home Energy Checks (max 1 per household)	270		0.03	8.10	0.18	48.60
Verbal advice - over the phone or face to face (max 3 per household)	484		0.04	19.36	0.25	121.00
<b>Total Advice Contacts</b>	<b>754</b>			<b>27.46</b>		<b>169.60</b>
	<b>Households Referred</b>		<b>Assumed annual CO2 saving per stage 4 referral (tonnes)</b>	<b>Assumed annual CO2 saving (tonnes)</b>	<b>Assumed lifetime CO2 saving per stage 4 referral (tonnes)</b>	<b>Assumed lifetime CO2 saving (tonnes)</b>
<b>Referrals to Stage 4 of the Energy Assistance Package</b>	<b>29</b>		<b>2.38</b>	<b>69.02</b>	<b>21.66</b>	<b>628.14</b>
<b>Referrals to Stage 2 of the Energy Assistance Package</b>						
Social Tariff Referrals	92					
Benefits and Tax Credit Checks referrals	84					
	<b>Number of measures referred</b>					
<b>CERT EAP</b>						
Virgin loft insulation	9					
Cavity Wall insulation	5					
<b>CERT</b>						
Virgin loft insulation	2					
Loft top-up	5					
Cavity Wall insulation	3					
<b>HIS or UHIS</b>						
Virgin loft insulation	7					
Loft top-up	88					
Cavity Wall insulation	17					
<b>CERT, HIS, UHIS and EAP referrals Totals</b>	<b>Number of measures referred</b>	<b>Actual number of installations</b>	<b>Annual CO2 saving per measure (tonnes)</b>	<b>Annual CO2 saved (tonnes)</b>	<b>Lifetime CO2 saving per measure (tonnes)</b>	<b>Lifetime CO2 saved (tonnes)</b>
Virgin loft insulation	18	14	1.068	14.952	42.710	597.940
Loft top-up	93	62	0.301	18.662	12.050	747.100
Cavity Wall insulation	25	9	0.532	0.000	21.270	0.000
<b>Sub-Total</b>	<b>136</b>	<b>76</b>		<b>33.614</b>		<b>1345.040</b>
<b>Other Energy Efficiency Installations</b>						
External Wall Insulation	0	0	1.814	0	54.41	0
Internal wall Insulation	0	0	1.715	0	51.46	0
Floor insulation	0	0	0.306	0	9.19	0
Draught proofing	0	0	0.123	0	1.2	0
Replacement of boilers (G-A)	0	0	0.95	0	5.7	0
Fuel switching (oil - gas) including boiler replacement (G-A)	0	0	2.206	0	18.9	0
<b>Sub-Total</b>	<b>0</b>	<b>0</b>				
<b>Renewables installations</b>						
Solar Water Heating	0	0	0.309	0.000	7.710	0.000
Ground Source Heat Pumps	18	1	3.952	71.136	198.080	2845.440
Air Source Heat Pumps	1	1	2.682	2.682	53.640	53.640
PV (2kWp)	0	0	0.802	0.000	20.050	0.000
Small scale Wind (<5kW)	1	1	1.793	1.793	35.900	35.900
Large scale Wind (6kW or above)	1	1	4.302	4.302	86.050	86.050
Wood Pellet Boilers	0	0	5.699	0.000	113.770	0.000
<b>Sub-Total</b>		<b>21</b>		<b>79.919</b>		<b>3021.030</b>
<b>Home Renewables Visits</b>	<b>40</b>					
<b>Number of Business Audits</b>	<b>19</b>					
<b>Potential Business Savings</b> (assumes business implements 37% of the potential carbon savings identified and expected lifetimes are for 6.34 years)				<b>45.461</b>		<b>288.22</b>
<b>Summary of expected carbon dioxide savings</b>				<b>Annual CO2 saved (tonnes)</b>		<b>Lifetime CO2 saved (tonnes)</b>
Assumed carbon savings from advice contacts				27.460		169.600
Assumed carbon savings from Stage 4 referrals				69.020		628.140
Carbon savings from CERT and HIS installations				33.614		1345.040
Carbon savings from other energy efficiency installations				0.000		0.000
Carbon savings from renewables installations				79.919		3021.030
<b>Total expected household savings</b>				<b>210.007</b>		<b>5163.810</b>
<b>Potential business savings</b>				<b>45.461</b>		<b>288.220</b>
<b>Total expected savings</b>				<b>255.468</b>		<b>5452.030</b>
Expected carbon dioxide saving per household				0.700		17.213