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An Evaluation of Energy Efficiency Advice Centres in Scotland

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ABSTRACT

The intention of this thesis has been to evaluate the merit of supporting the work of Energy Efficiency Advice Centres (EEACs). This has been done by means of a detailed evaluation study of two Scottish advice centres which belong to the UK network of 52 EEACs managed by the Energy Saving Trust. The two advice centres chosen for this project work in different environments where one is based in Ayr covering a dominantly rural area and the other one is located in Glasgow providing energy advice in an urban environment. As part of this thesis an evaluation methodology has been developed with which the benefits of the work of both advice centres in the form of energy, carbon and cost savings as well as other quantifiable outcomes have been assessed. This assessment has been undertaken for the previous financial year for both advice centres.

It has been found that the work of the advice centre in Ayr benefits in lifetime carbon savings of 17,103 tonnes and 23,865 tonnes cumulative carbon savings originate from the work of the advice centre in Glasgow. Furthermore, it can be said that £1 of government funding of the two energy advice centres that were studied leads to energy savings worth an average of £32.

Considering the continued increase of fuel prices and the growing demand in energy advice it is predicted that the effectiveness of Scottish Energy Efficiency Advice Centres will further rise over the coming years.

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LIST OF ABBREVIATIONS

CHP	Combined Heat and Power
DASU	Design Advice Support Unit
Defra	Department of the Environment, Food and Rural Affairs
DTI	Department of Trade and Industry
EAPG	Energy Advice Providers Group
EDAS	Energy Design Advice Scheme
EE	Energy Efficiency
EEAC	Energy Efficiency Advice Centre
EEC	Energy Efficiency Commitment
EELS	Energy Efficiency Loan Scheme
EST	Energy Saving Trust
HECA	Home Energy Conservation Act
LESP	Local Energy Support Programme
PV	Photovoltaic
RE	Renewable Energy
RURASU	Rural Advice Support Unit
SCHRI	Scottish Community and Householder Initiative
SERT	Strathclyde's Energy Rating Tool

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

Chapter 1 INTRODUCTION

There is a network of 52 Energy Efficiency Advice Centres throughout the UK which act as registered charities and provide free and impartial advice to domestic customers, communities, small businesses and local authorities. The overall objective of this thesis has been to construct a review of the work of such advice centres in Scotland, evaluate the outcomes of the advice work by means of two case studies, identify present barriers and problems and to recommend potential improvements.

The focus of the initial phase of the project was to gain a historical perspective and an understanding of the current energy advice network. Chapter 2 gives a brief overview of the establishment of this network and the role of Energy Efficiency Advice Centres for the country's energy policy. It also outlines the existence and work of other energy advice support groups and partnerships which presently complement the work of the UK's EEACs. Chapter 3 characterises the services energy advice centres provide while chapter 4 describes how this advice work is financed in Scotland and which financial sources Scottish customers can access in order to uptake advised recommendations.

Having gained an understanding of the purpose, work and funding of energy advice centres, the effectiveness and benefits of energy advice to domestic customers are quantified in chapter 5 which summarises and comments on some significant outcomes of recent studies that have explored the effects of energy advice to households.

Chapter 6 is concerned with the energy advice work in other countries. It provides a brief overview of the work of two successful European energy advice centres of which one is based in Germany and the other one in Greece. That chapter quite stands on its own but its purpose is to demonstrate the differences in the advice work of other countries to that of the UK's EEACs and to generate ideas for potential expansions of their advice service. Chapter 6 also serves as reference for some recommendations stated at the end of this report.

Aiming to create an evaluation method applicable to today's energy advice centres an evaluation technique has been studied in chapter 7, which was used for the Energy

Design Advice Scheme in the past. The purpose of this was to extract possible measures of effectiveness that can be applied in this project. Additionally the evaluation procedure currently used by the Energy Saving Trust is explored and the need for a new approach to the evaluation of Energy Efficiency Advice Centres is identified. This has been the focus of the next step of this project.

An evaluation methodology that could be easily adopted by energy advice centres themselves has been developed and is documented in chapter 8. This methodology classifies in benefits in terms of energy, carbon and cost savings, other quantifiable outcomes and non-quantifiable outcomes. The tools used to assess possible energy savings include a spreadsheet supplied by Ofgem, the University of Strathclyde's Energy Rating Tool and savings identified for behavioural changes which have been identified in chapter 5 of the thesis. The methodology is in the following two chapters applied to 2 different Scottish EEACs and their effectiveness has been evaluated for the previous financial year. The outcomes of both advice centres are compared in chapter 11 and some recommendations on potential improvements are made.

Information provided by both advice centres and the Energy Saving Trust as well as fuel price scenarios developed by the Association for Conservation of Energy, and the outcomes of the 2004 Scottish Housing Condition Survey have been used to investigate the future perspectives for the work and its effectiveness of Scottish energy advice centres. This is discussed in chapter 12.

Overall conclusions and recommendations for the future work of Scottish Energy Efficiency Advice Centres are presented in chapter 13.

Chapter 2 BACKGROUND

2.1 Establishment of UK's Energy Advice Network

In 1992 the government signed the Rio agreement on the environment which included a commitment to reduce the levels of carbon emissions. In the same year the first national Energy Design Advice Scheme (EDAS) was initiated as one of the actions taken by the UK to limit greenhouse gas emissions under the Climate Change Convention. EDAS was launched as a Department of Trade and Industry (DTI) discretionary initiative aimed at improving the energy and environmental performance of the UK's building stock by making low energy design expertise more widely available. The regional pilot for this national scheme was the Scottish energy advice centre which was operated between 1987 and 1992 receiving technical support from the ABACUS Unit at the University of Strathclyde [1]. Its success was the reason for expanding it to a national scheme (EDAS) that consisted of four regional centres – EDAS Scotland, EDAS South, EDAS North and a Northern Ireland Centre. These acted as regional information resource centres and were staffed by building professionals and academics with expertise in low energy design. Despite its primary purpose of project-specific design advice EDAS also intended to expand awareness and understanding of low energy design expertise throughout the construction industry.

In 1993 Energy Efficiency Advice Centres (EEACs) were setup as part of the UK Government's commitment to reduce carbon emissions in line with the agreement made in Rio [2]. These advice centres were set up to provide, complementary to the work of EDAS, free and impartial advice to householders on energy efficiency and renewable energy. Today EEACs provide advice to the domestic, business and public sector and support the uptake of energy saving measures and renewable energy technologies. At present the UK possesses a network of 52 Energy Efficiency Advice Centres of which 8 are based in Scotland, 3 in Wales, 1 in Northern Ireland and the remainder in England.

Source: http://www.est.org.uk/myhome/localadvice/map/

Figure 2.1: UK's EEAC network

The map above illustrates the various areas throughout the UK that are covered by individual advice centres. All advice centres are managed by the Energy Saving Trust (EST). They are operated locally which means that their activities only cover a certain region, which generally consist of several councils. The different activities of these advice centres are explained in chapter 3 and are evaluated at a later stage of this report.

After the national Energy Design Advice Scheme finished in 1998 the building design advice work has been taken over by the Carbon Trust which was launched in 2001. The Carbon Trust now provides free or discounted design advice for non-domestic renovation or new built projects. This is done in close work with a leading team of consultants.

2.2 The Role of EEACs for UK's Energy Policy

The work of Energy Efficiency Advice Centres supports several government strategies both at national and local levels including the UK's Climate Change Programme, the Energy Efficiency Commitment (EEC), the Home Energy Conservation Act (HECA) and UK's Fuel Poverty Strategy. These are in some ways related to another and seek as a superior designation sustainability of energy demand and supply.

2.2.1 UK's Climate Change Programme

The UK Government's sustainable energy policy is set out in the 2003 Energy White Paper and the UK Climate Change Programme published in 2000. In a news release on the 28th March 2006 [3] the Department for Environment, Food and Rural Affairs (Defra) announced, amongst others, three measures of the UK's Climate Change Programme with the intention to tackle greenhouse gas emissions. These are:

- Measures to improve household energy efficiency
- Renewed emphasis on encouraging and enabling the general public, businesses and public authorities to help achieve Government's targets
- Increased levels of microgeneration

Therefore, investing in advice that shows customers why being energy efficient and the use of renewable energy is advantageous, and how and with which financial support it can be achieved is a key delivery mechanism of these measures. Consequently, the potential benefits which Energy Efficiency Advice Centres can realise by promoting more sustainable energy use and renewable energy technologies to the public, local authorities and small businesses are:

- Lower energy bills and better value for money
- Reduced carbon dioxide emissions
- More sustainable building stock
- More efficient use of natural resources
- Reinforcement of the market for low carbon technologies and services

Energy Efficiency Advice Centres, therefore, lead one way to successfully reach UK's legally binding target under the Kyoto Protocol to reduce its greenhouse gas emissions by 12.5% below the base year (1990) levels between 2008 and 2012 as well as the domestic goal to reduce carbon dioxide emissions by some 20% below 1990 levels by 2020 [4].

2.2.2 Energy Efficiency Commitment

The Energy Efficiency Commitment is one of the main vehicles for delivering energy efficiency in households. It is a Government legislation that sets out targets on gas and electricity suppliers to achieve improvements in energy efficiency across the UK. This requires utility companies to assist households with the take up of energy efficiency measures as for example by subsidising the cost of installation. It makes up part of the Climate Change Programme and started in April 2002 requiring suppliers to spend an equivalent of £13.60 per customer per fuel on energy saving measures in order to achieve an energy saving target of 130TWh set by Defra [5]. The gas and electricity regulator Ofgem is responsible for overseeing the delivery of the EEC.

Energy Efficiency Advice Centres can act as project partners for energy suppliers by providing grant schemes that encourage and assist customers to make energy savings by installing certain measures. Such schemes are then part-funded by the energy supplier.

2.2.3 Home Energy Conservation Act

The Home Energy Conservation Act 1995 (HECA) came into force in 1996 and requires every UK local authority with housing responsibilities to achieve significant improvements in the energy efficiency of their respective housing stocks, across all tenures, over the following 10 to 15 years. Under this act local authorities should achieve a 30% improvement in energy efficiency in homes by 2010 which contributes to UK's Climate Change commitments [6]. In Scotland the Communities Scotland, the Scottish Executive's housing and regeneration agency, monitors progress on targets set for the Home Energy Conservation Act on behalf of Scottish Ministers [7].

In order to achieve these targets local authorities have been working with local Energy Efficiency Advice Centres. These help to focus the attention of local authorities more closely on the energy efficiency of all residential accommodation, and on developing an integrated approach to their housing and energy strategies.

2.2.4 UK Fuel Poverty Strategy

The UK Fuel Poverty Strategy was published by the Government in 2001 with the aim to seek an end to the problem of fuel poverty in particular to the blight of fuel poverty for vulnerable households by 2010. According to the Department of Trade and Industry a household is said to be in fuel poverty if it needs to spend more than 10% of its income on fuel to maintain a satisfactory heating regime which is usually 21˚C for the main living area, and 18˚C degrees for other occupied rooms [8]. Fuel poverty is caused by the interaction of a number of factors, but three specifically stand out. These are [8]:

- The energy efficiency status of the property
- The cost of energy
- Household income

The latest estimates suggest that, in 2003, there were approximately 2 million fuel poor households in the UK, with one and a half million of those in the vulnerable category [9]. Using the definition of fuel poverty it was estimated that approximately 369,000 Scottish households were living in fuel poverty in 2003 [10].

Energy advice centres provide practical solutions to help people on low incomes to keep their homes warm and dry without spending more than they can afford on fuel. They furthermore support local authorities in developing strategies to tackle fuel poverty and help to work towards the 2016 target for eradicating fuel poverty and providing affordable warmth as it is stated in 2005's Annual Progress Report on the UK Fuel Strategy [9].

2.3 Energy Advice Support Groups and Partnerships

Promoting energy efficiency advice nationally involves a large number of stakeholders and is supported by different organisations and partnerships which are chiefly interconnected. This creates a complex network of energy efficiency advice support throughout the UK. Figure 2.2 demonstrates the structure of energy advice support with respect to the work of the UK's network of Energy Efficiency Advice Centres.

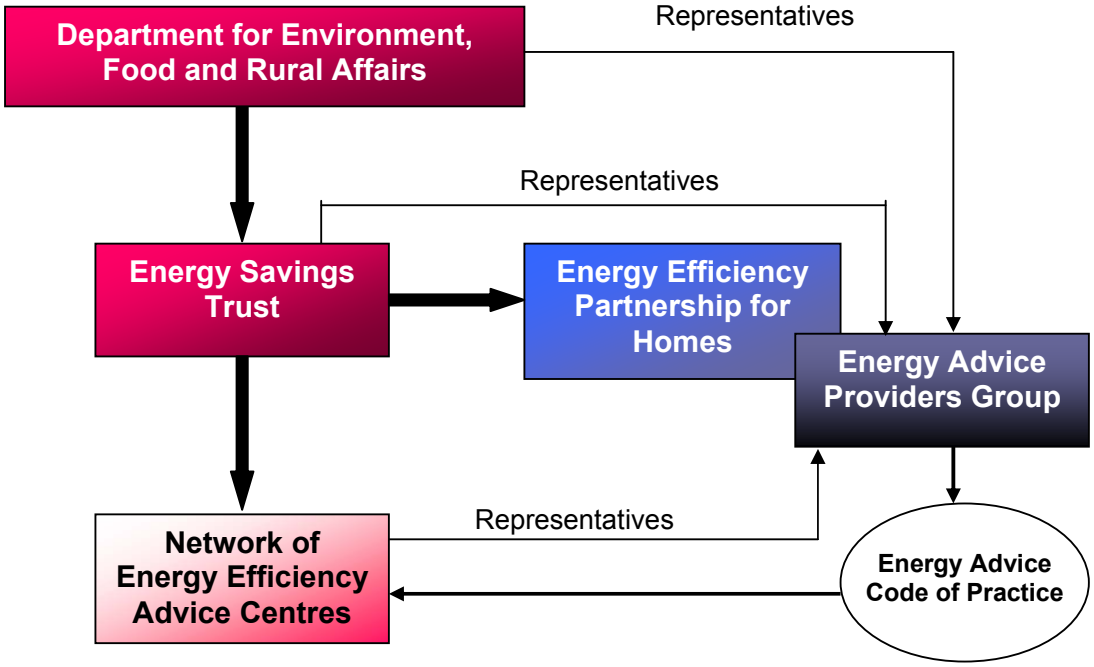

Figure 2.2: Network of energy efficiency advice support

Figure 2.2 shows three significant institutions – Energy Saving Trust, Energy Efficiency Partnership for Homes and Energy Advice Provider Group – whose work supports the UK's network of Energy Efficiency Advice Centres. These are discussed in the following sections.

2.3.1 The Energy Savings Trust

The Energy Saving Trust (EST) is an independent, government-funded body (funded by Defra) that works in partnership with organisations and businesses with the shared goal of promoting sustainable and efficient use of energy. It runs the UK's main

energy efficiency advice scheme for the domestic sector including the UK-wide network of 52 local Energy Efficiency Advice Centres. Every year Defra issues targets to the Energy Savings Trust in the form of numbers which need to be achieved during the year e.g. number of customers receiving energy efficiency advice. These targets will be allocated by the EST to the different Energy Efficiency Advice Centres with respect to the size and population intensity of the region to which the EEAC is assigned to.

The Energy Saving Trust's activities are designed to underpin and complement the work of the advice centres and other organisations active in the energy efficiency market. Hence, the EST supports the supply of energy efficiency products and services as well as energy efficiency training, and provides advice and support for actions. Furthermore, it facilitates partnerships concerned with energy issues.

2.3.2 The Energy Efficiency Partnership for Homes

The Energy Efficiency Partnership for Homes is a partnership of organisations that are concerned with energy efficiency in the home and alleviation of fuel poverty. It is a network of over 395 organisations from the public, private and voluntary sector. These can be local authorities, central government departments, charities or companies. The Energy Efficiency Partnership for Homes is an independent partnership but is facilitated by the Energy Savings Trust.

The Members of this partnership work together by sharing information and undertaking joint projects to [11]:

- Achieve more effective marketing of energy efficiency in homes
- Discuss, inform and influence public policy related to domestic energy efficiency
- Secure long-term government support for all involved in the UK domestic energy efficiency market
- Drive more rapid and effective development of national standards for energy efficiency and quality control
- Encourage industry best practice

Most of this work is coordinated through the operation of sector working groups who bring together major companies and organisations in each sector concerned with energy efficiency.

2.3.3 The Energy Advice Providers Group

The Energy Advice Providers Group (EAGP) is an important sector working group of the Energy Efficiency Partnership for Homes, which brings together representatives from energy suppliers, Energy Efficiency Advice Centres, self-funded energy agencies, the Federation of Energy Efficiency Advice Centres, Defra and the Energy Savings Trust. Although the Energy Advice Providers Group is funded by the Energy Savings Trust, the representatives of all non-governmental organisations invest their time voluntarily in order to develop together standards for domestic energy advice.

A vital achievement of the group has been the establishment of the Energy Advice Code of Practice which provides a Best Practice standard for the whole energy efficiency advice industry and is the key to ensuring that energy advice is effective independently wherever it comes from. The standards within the Code of Practice are designed to ensure that an advice provider is well run and has its own quality control mechanisms in place. According to the agenda of the EAPG meeting on the 4th April 2006 in London EST is responsible for delivering the Code of Practice, with EAPG acting as an Advisory Group [12].

2.4 References

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Chapter 3 ACTIVITIES OF ENERGY ADVICE CENTRES

The principal activity of Energy Efficiency Advice Centres is the energy advice to households which is accompanied by public information days on energy efficiency and the use of the local media to communicate the EEAC's advice service to the public. However, due to the procurement of increased local and national funding energy advice centres have developed their service since their establishment in 1993.

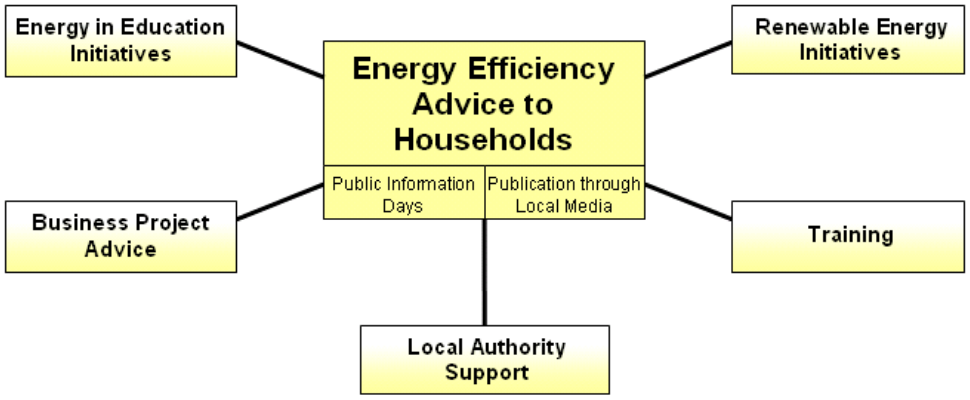

Figure 3.1: Activities of Energy Efficiency Advice Centres

Figure 3.1 demonstrates a summary of all possible activities with energy advice to households as the core service.

The intensity with which the different services are provided by each EEAC depends on its experience in the respective field, the demand for the different advice activities in the area, and the funding available. Energy Efficiency Advice Centres are furthermore active in procuring funding for various projects and the management of those. Such activities can be relatively time taking. However, these will find no further consideration in this report because of their administrative nature which has no direct impact on the benefits of the advice work. In this chapter the EEAC services outlined in Figure 3.1 are explained in detail.

3.1 Energy Efficiency Advice to Householders

Energy Efficiency Advice Centres provide free and impartial advice on energy efficiency measures and energy efficient behaviour to householders in the following ways:

- Verbally face-to-face
- Over the telephone
- Home Energy Check (HEC) reports
- Through its own web site
- Presentations and exhibitions (information stands)
- Leaflets on energy saving recommendations

Householders are encouraged to complete Home Energy Check forms which are then processed by the advice centre to produce a detailed energy efficiency report. This report is sent directly to the householders and provides advice on how to save energy in their home and improve comfort. As part of the report the energy advice centre makes suggestions on changes customers can make in their home by installing specific energy efficiency measures. It also provides a list of registered energy efficiency installers who can carry out the recommended work as well as information on any grants that are available to help cover at least part of the costs. Verbal advice is given to enquirers through a free hotline and is sometimes backed-up with information sent to the householder specific to their enquiry. In addition energy efficiency advice centres provide face-to-face advice to householders at presentations, exhibitions, directly in the office or in some cases at home visits. In most cases face-to-face advice is provided at information stands in supermarkets and other public places or through presentations to certain community groups e.g. elderly people. Leaflets on energy efficiency and renewable technologies are available at exhibitions, from the advice centres directly or from their web sites. In order to provide energy advice to customers electronically, EEAC web pages contain guides on energy efficiency measures and behavioural advice as well as overviews and case studies on renewable energy. Several advice centres additionally provide some brief advice on waste minimisation and recycling as well as on transport on their websites.

Energy efficiency measures advised by the EEAC can be classed into two categories - low cost and professional measure. Low cost measures can be for example low energy light bulbs, hot water tank insulation, room thermostats or draught proofing on doors and windows. Professional measures can be loft and wall insulation, a modern condensing boiler or energy efficient rated appliances. According to the Department of Environment, Food and Rural Affairs professional measures will save between 0.3 and 0.6 Mt of carbon in 2010 [1]. Alongside advising on installation of these measures energy advice centres point out ways in which customers can save energy by changing certain behaviour. A number of behavioural advice examples are stated in the following.

- "Ensure that thermostat on the water tank is set around 60°C."
- "Set room thermostat between 18°C and 21°C."
- "Run washing machine with a full load and a cool wash cycle of 30°C or 40°C."
- "Only boil as much water in the kettle as needed."
- "Draw the curtains when it is cold outside and the heating is on."

These are simple measures which are part of the Energy Saving Trust's 'Save your 20%' campaign. They are associated with no capital investment for the household and are important to raise people's awareness for areas of energy wastage.

Additionally energy advice centres try to reach domestic customers with help of the local press by occasionally circulating press releases on some EEAC activities or advertising certain grant schemes. However such press releases in the majority lack technical information and are written in a very basic way.

3.2 Energy in Education Initiatives

Many energy advice centres provide energy efficiency awareness sessions in schools targeting primary and secondary school children. For these school projects advice centres deliver a range of services such as class lessons, energy games, prize draws as well as energy and environmental resource packs. Another activity arranged at the end

of every year are energy calendar competitions where children are asked to provide pictures illustrating the best way to save energy at home.

Class lessons commonly cover conventional energy production, renewable energy and energy efficiency including ways to keep your home warm. All school activities shall motivate the pupils to learn about energy efficiency and renewable energy and to change their behaviour in order to save money on energy and keep their homes warm.

South West Scotland EEAC, for example, delivers energy advice to first and second year pupils who take part in energy efficiency lessons through the Home Economics Department and as part of a 'Green Issues' topic. These lessons are accompanied with a prize draw where the winner receives a solar powered radio. Additionally pupils fill in questionnaires about energy use in their home and receive a free energy advice report.

Strathclyde and Central EEAC also provided an education programme in Glasgow schools which was aimed to raise awareness of recycling and waste management additionally to energy awareness. However, the funding for this project ended and the project therefore had to be stopped.

3.3 Renewable Energy Initiatives

Energy advice centres employ, depending on the size of their region and the funding they receive for promoting renewable energy, a certain number of Renewable Development Officers who aim to provide local communities with expertise, support and in some cases grants helping them to take forward renewable energy projects successfully. The objectives of employing Renewable Energy Officers are:

- To support the development of community scale renewable projects
- To support the installation of household renewable systems
- To raise awareness of renewable technologies and their benefits

The role of the Renewable Development Officers can include contacting and meeting with partners to discuss potential projects and develop proposals, applying for funding to support projects, carrying out energy audits and feasibility studies, presenting project proposals or results of feasibility studies, and providing advice to

householders, community groups, local authorities and housing associations on installation, costs and benefits of micro-renewable technologies.

If a community considers investing in microgeneration for their power supply the Renewable Project Officer continues to provide technical advice and support in order to help the community to develop and deliver their project. The development of community projects can sometimes last over several years.

Supporting homeowners, schools and communities with the development of small-scale renewable energy projects, the advice centre will refer the client to the eligible grant available to fund the installation costs. Available grant schemes will be discussed in chapter 4 of this project.

Renewable Development Officers furthermore can support local installers and construction firms with starting an establishment in the field of renewable energy systems installation. In such cases companies usually approach their local EEAC for help with getting a recognised renewable installer. In South Ayrshire for example the South West Scotland EEAC is currently supporting a local company, whose traditional service includes retail refurbishment and building maintenance, to become a recognised renewable installer for solar water heating and ground source heat pumps in Ayrshire.

3.4 Local Authority Support

The Energy Saving Trust funds staff across the UK to provide dedicated energy saving advice and support to local authorities, housing associations and partner organisations. Working with local authorities includes a variety of projects that are accomplished by so called LESP (Local Energy Support Programme) Officers. These work with the above named groups in many ways, including [5]:

- Support with developing sustainable energy strategies
- Identifying funding opportunities and assisting with grant bids
- Coordination of local and regional energy partnerships

One main objective of LESP is to assist local councils in developing fuel poverty strategies. This is done with the aim to remove all households from fuel poverty.

LESP Officers work with local authorities and housing associations in order to promote energy efficiency in their housing stock and provide information on available funding streams. The Strathclyde & Central EEAC for example has been doing mail drops with Local Authorities for several years sending Home Energy Checks to those areas identified to have a high rate of fuel poverty.

An important task of the LESP Officer when providing energy advice for new council buildings is ensuring the interaction between housing associations, architects, builders and future tenants in order to encourage the construction of energy efficient buildings but considering these are uncomplicated to build and to use. Additionally support is provided to private landlords who contact the EEAC to seek help with implementing sustainable strategies in all their properties.

Energy advice centres do not provide direct building design advice, in the way it was done by EDAS, because of the missing technical expertise. In order to promote energy efficient building design advice centres occasionally arrange information forums on these topics for architects and housing associations or other interest groups. For these workshops the advice centre organises experts in energy conscious building design to hold presentations on specific topics and provide all interested groups with technical information on current best practice.

Local authority support furthermore includes keeping local authorities up to date with government initiatives and strategies regarding energy efficiency. Presently all Scottish LESP officers have to inform their local authorities on the Scottish Declaration on Climate Change which is based on its English equivalent the Nottingham declaration. This programme, which will be in place by the end of 2007, promises to 'co-ordinate and strengthen the wide range of activity taking place at local authority level and set the strategic framework and direction for future action' [2]. Paragraph 5.176 of the declaration indicates that all Scottish LESP Officers are committed to preparing the local authority declaration on Climate Change as well as to providing additional resources to assist the Sustainable Scotland Network develop a climate change programme for local government in Scotland [2].

3.5 Business Advice

Some Energy Efficiency Advice Centres employ a Business Advisor to specifically promote and provide energy efficiency and waste management advice to local businesses. There are 6 Business Advisors throughout Scotland who provide local enterprises with:

- Energy and waste audits
- Energy advice and training
- Access to funding packages
- Case studies and publications

All enterprises with yearly energy expenses above £10,000 are entitled to a free energy audit. The EEAC works with the chambers of commerce and utility companies in order to target businesses that qualify for this free energy survey [4]. These businesses will then be contacted by the EEAC offering free advice to them.

The Business Advisor in general conducts a brief survey of the business and its energy use and advises on various measures reaching from no and low cost to professional measures. If necessary, the business can be additionally referred to a professional energy audit provided by an energy consultancy contracted by the EEAC. The audit also includes quantifiable savings for measures requiring capital investment and signposts to funding packages. Additionally staff awareness presentations and programmes can be arranged with the advice centre which shall motivate all members of staff to save energy at work as well as at home. Such presentations highlight issues such as the Climate Change Levy and its effect on their organisation.

Business Advisors, furthermore work closely in partnership with Envirowise to identify companies that can benefit from the Envirowise Fast Track visit, which Business advisors can provide to companies that waste water or have disposal costs. During Fast Track visits business advisors help companies recognizing the true cost of their waste in terms of process, water or general waste. This also includes identifying possible ways for waste minimisation.

Energy Efficiency Advice Centres only deal with small and medium sized businesses with yearly energy expenses below £50,000 [4]. Larger businesses are directly referred to the Carbon Trust.

3.6 Training

Energy Efficiency Advice Centres can deliver both formal and informal staff and community group awareness training. This can include energy efficiency training to agencies with customer-facing staff such as Citizens Advice Bureaux, Housing Associations and Health Authorities.

For example, South West EEAC has trained groups of social workers and hospital staff who deal with day patients in order to raise their awareness of the energy efficiency measures and grants available. It is expected that these then pass on the information to their clients.

Some advice centres such as SCARF, the EEAC responsible for Aberdeen and North East Scotland, are registered examination and assessment centres for energy efficiency qualifications and therefore can also deliver training and assessment to industry requirements.

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Chapter 4 FUNDING

This chapter outlines how energy efficiency is financed in Scotland. It covers funding sources for energy advice activities as well as grants and loan schemes provided to Scottish citizens and businesses in order to support the uptake of energy saving measures and renewable energy technologies.

4.1 Financing EEAC Activities

The majority of funding income is provided by the Energy Saving Trust. This covers expenses for advice to households, business advice and the Local Energy Support Programme. Additionally funding from the EST can be assessed through its innovation stream. This is provided for innovative support projects (e.g. innovative grant schemes) for which advice centres have to bid successfully.

EEACs have widened their activities since they have been established and work now on a variety of projects which have different funding streams. Each project can have a number of different stakeholders who provide funding in order to satisfy their own interests e.g. achieve certain government set targets. Before a new project can be started the EEAC has to identify and procure the required funding from the Energy Savings Trust, local authorities, or other interest groups or initiatives. The funding structure, therefore, is likely to vary over time and is in general different for each advice centre, always depending on successful bidding for funds available. The project duration depends on the period of time for which funding is accessible. Contracts for funded projects can last from as little as 2 months up to 3 years. Figure 4.1 briefly describes possible funding streams for the different EEAC activities. This is based on information provided by the South West Scotland and Strathclyde & Central EEAC.

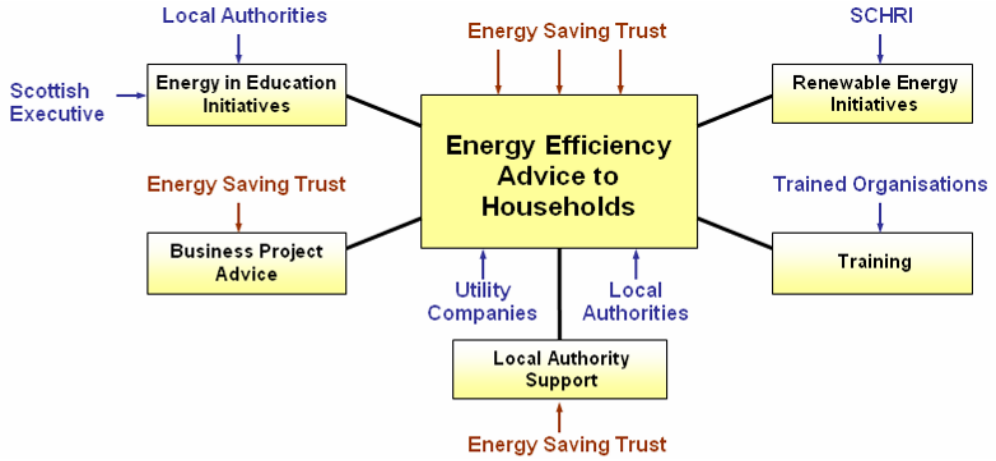

Figure 4.1: Funding sources for EEAC activities

Funded by the Scottish Executive and managed jointly by the Energy Savings Trust, the Scottish Community & Householder Renewable Initiative (SCHRI) provides advice and project support to assist the development of new community and household renewable schemes in Scotland. SCHRI funds the work of Renewable Development Officers employed by Scottish Energy Efficiency Advice Centres. There are SCHRI Development Officers in five EEACs in Southern, Central and Eastern Scotland and in the Highlands and Islands Enterprise offices in the north.

Due to their regulatory obligations to meet targets set for saving energy in the domestic electricity and gas market (EEC targets) energy suppliers like Scottish Power try to encourage and assist their domestic customers with installing measures such as cavity wall and loft insulation. One way of doing so is to support EEAC activities which promote energy efficiency in the home.

4.2 Grant and Loan Schemes

Since EEACs have been established numerous grant and loan schemes have been set up in order to complement the work by providing financial support for installing the advised energy efficiency measures as well as renewable technologies.

4.2.1 Grants for Energy Efficiency Measures

Each advice centre generally provides its own grant schemes which can apply to the whole area of coverage or only to several councils. The number of local grants

available depends on the number of projects for which the advice centre could successfully procure funding. Most of the grant schemes are funded by the 3 partners:

1) The Energy Savings Trust

2) Local Authorities

3) Energy Suppliers

The problem with this funding structure is that local grants are often only provided temporary since it happens that project partners (especially utility companies) suddenly stop funding the scheme when achieving their own targets.

The government furthermore provides grants to households where people are on certain benefits or aged above 60 years. This way the government aims to tackle fuel poverty by strategically improving energy efficiency in households with low incomes. In Scotland this scheme is known as Warm Deal and is run by EAGA Ltd on behalf of the Scottish Executive. Warm Deal provides grants of up to £500 to households on benefits and maximum £125 to people aged over 60 years [1]. It applies to the installation of:

- Cavity wall insulation
- Loft insulation
- Draught proofing
- Hot and cold tank, and pipe insulation

The Warm Deal scheme has so far insulated over 220,000 homes since its start in 1999. This accounts approximately for 10% of all of Scotland's housing stock [2].

The EST also maintains a database of currently available insulation and other energy related offers, which are in many cases provided by the different utility companies. This database can be accessed via the following link: http://www.est.org.uk/myhome/gid/index.cfm?sec=1

4.2.2 Grants for Renewable Energy

The Scottish Executive and the Department of Trade and Industry (DTI) both have grants available for the installation of renewable energy technologies. The Scottish Executive scheme is provided through Scottish Community & Householder Renewables Initiative (SCHRI) to which Scottish energy advice centres intend to refer in the first place. The DTI runs a grant scheme called Low Carbon Building Programme which covers a wider range of technology than SCHRI.

4.2.2.1 SCHRI Grants

The Scottish Community & Householder Renewable Initiative (SCHRI) offers grants to Scottish homeowners and house builders for the installation of renewable energy technologies and grants to Scottish communities for capital projects and development initiatives such as feasibility studies. In this context the community has to be a Scotland based, legally constituted non-profit organisation (e.g. charity, housing association, school). Additionally community grants are available for energy efficiency improvements in connection with a renewable system installation.

SCHRI provides grants for households of 30% of the installed costs up to a maximum of £4000. The amount of funding awarded to communities is determined on a case by case basis with the average grant being in the region of 50% where SCHRI can provide up to £10,000 for technical assistance and a maximum of £100,000 for capital expenditure [3]. Technical assistance funding is available for feasibility or scoping studies to a wide range of projects during their formative stage.

Technologies that are eligible for funding under SCHRI are:

- Micro hydro-electric
- Micro wind
- Solar, water and space heating
- Ground source heat pumps
- Automated wood-fuelled stoves and boilers

As this scheme will not fund photovoltaic installations, Scottish energy advisers would refer their customers, who plan to install such, to the Low Carbon Buildings Programme.

It has to be mentioned that SCHRI does not fund existing installations. This means customers have to wait for the grant application to be approved before the work can be carried out. However, this bureaucracy can present problems for new build projects and make the installation of renewable systems less attractive.

4.2.2.2 Low Carbon Buildings Programme

This programme started in April 2006 and is funded by the Department of Trade and Industry (DTI). It offers UK-wide grants for renewable energy technologies to householders, community organisations, schools, the public sector and businesses. The programme will run over 3 years and replaces the DTI's Clear Sky and Solar PV programmes which existed until March 2006 [4]. This grant scheme differs to previous programmes in that there are a number of energy efficient measures applicants must undertake before being eligible to apply for a grant. This way the programme promotes a more holistic approach to reducing carbon from buildings by encouraging applicants to consider energy efficiency alongside micro-generation.

The following technologies which are not covered by SCHRI are eligible for funding under the Low Carbon Building Programme:

- Solar photovoltaic
- Water and air source heat pumps
- Micro CHP
- Fuel Cells

The grant level available to householders depends on the type of technology, but it is in many cases subject to an overall 30% limit [5].

According to March 2006's budget statement the overall budget for the 3-year programme is around £80million of which around £30million are already assigned. The additional £50million will be allocated throughout the programme [5].

4.2.3 Loan Schemes

Despite grant schemes there are also interest free loan schemes available to clients of Scottish energy advice centres. Loans are mainly provided to businesses but some EEACs also offer loan schemes to their domestic customers.

4.2.3.1 Loan Action Scotland

This is a loan scheme offered only to Scottish businesses. If a business had an energy audit completed by an approved energy consultant there is the opportunity for an eligible company to gain a loan helping to invest into the advised energy reducing measures. Loan Action Scotland provides interest free loans to businesses from £5,000 to £50,000 [6]. Funded by the Scottish Executive the scheme is managed by Strathclyde & Central EEAC and aims to support small and medium sized companies taking action to reduce their energy bills. To be eligible the enterprise must have no more than 250 employees and a maximum turnover of £25million per year. This loan scheme supports a wide range of energy saving measures, including:

- Improved lighting and controls
- High efficiency heating
- Boiler/heating controls
- Heat recovery systems
- Building/piping insulation

The loans can be repaid over a period of up to 5 years for which it is assumed that the energy savings will cover the cost of repayments.

4.2.3.2 Other Loan Schemes

Sometimes interest free loans are also provided to domestic customers. The Strathclyde & Central EEAC for manages instance the 2 loan schemes HeatCare and EELS (Energy Efficiency Loan Scheme) that offer different interest free loans to Glasgow residents above and under 60 years. Through these schemes loans are available up to £2,500 and can be repaid over 36 months [7].

4.3 Reference

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Chapter 5 QUANTIFYING ENERGY ADVICE

This chapter focuses on the quantification of energy advice in the domestic sector. A number of studies over the past few years have explored the effects of giving energy advice to domestic customers. In autumn 2001 the Energy Advice Providers Group commissioned the first major study to evaluate domestic energy advice across all delivery mechanisms and all significant advice providers [1]. The survey was conducted by New Perspectives in association with BMRB International. The research aimed to:

- Evaluate the overall impact of energy advice and the relative effectiveness of different methods of delivering the advice
- Determine what actions result from giving energy advice and identify the benefits of following that advice

A follow-up study in 2004 then aimed to attribute energy savings to the actions in the form of behavioural changes which customers claimed to undertake as a result of being given behavioural advice.

The objectives of this chapter are to construct a review of the significant outcomes of both studies, which play an important role for the present valuation of domestic energy advice in the UK. Comments are made on some of the outcomes and conclusions are drawn where possible.

5.1 Effectiveness of Energy Advice to Households

The major part of the survey was carried out in January 2002, through a telephone survey of 1,900 interviews with people who had received energy advice from a variety of sources (e.g. EEACs, fuel companies, local authorities) between October, 2000 and March, 2001.

One of the first significant outcomes of the 2002 research project was that 70% of people who were questioned could remember getting advice and could recall at least some of the topics it covered. It should be mentioned that the Energy Advice

Providers Group who state in their campaign that "85% of consumers can remember getting that advice" [2] has misrepresented this fact.

The survey has furthermore shown that all forms of advice (except leaflets alone) can be effective in communicating at least two energy saving measures which customers should install in their homes, where loft and cavity wall insulation as well as low energy light bulbs and draught proofing were the measures most people recalled. Figure 5.1 indicates the ways people consider installing the energy efficient measures which they recall receiving advice on.

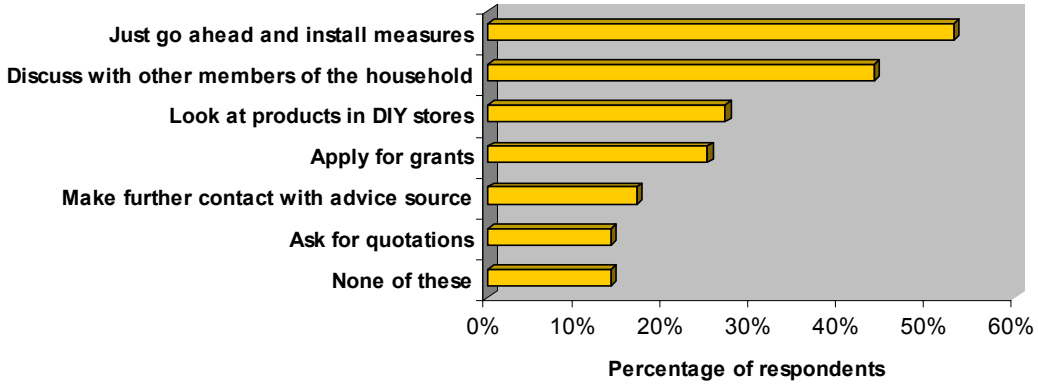

Figure 5.1: Ways people consider installing energy efficient measures

According to the survey only 14% of those who recall any measures advised do not consider installing anything, but over 50% of the people just go ahead and install advised measures. However, these outcomes are doubted, since it has been experienced during this project that the majority of people would not install measures such as insulation or a new boiler without the help of available grants. It is assumed that most of the people who replied that they just went ahead and installed measures might have installed a low energy light bulb, which in most cases they received for free.

Figure 5.2 demonstrates the types of measures which are identified to be installed in most instances within 9 to 15 month after receiving energy advice.

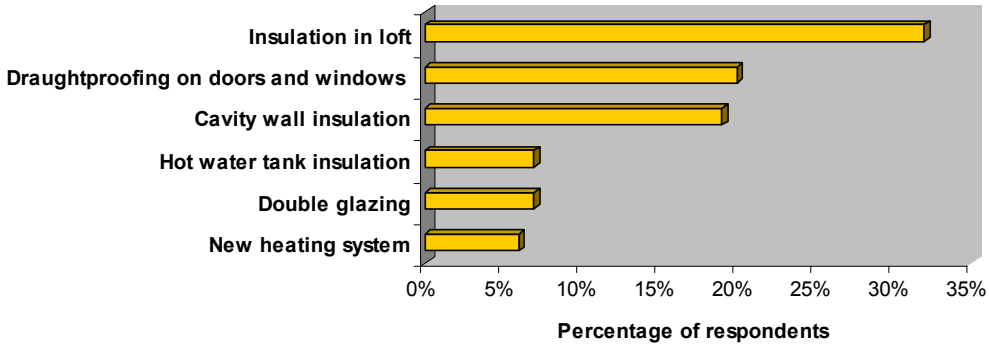

Figure 5.2: Energy efficiency measures installed after receiving energy advice

This figure demonstrates that loft and cavity wall insulation is installed more often than for example hot water tank insulation which is much cheaper. It is suspected this is the case because of the relatively large number of grants available for insulation. Additionally the outcomes of the study have shown that 48% of all clients advised by an EEAC install any energy saving measures, and 28% do this with help of grants or discounts [1].

As result of the survey it has been estimated that on average those who recall advice about energy saving measures go on to install about 1.5 measures each [1]. However, according to the report on the 2002 survey many homes lack around four to nine desirable energy efficiency measures and thus a further improvement of energy advice services is recommended in order to enable households to fulfil their full potential [1].

Despite installing recommended measures, households were questioned about changing their habits after receiving behavioural advice on e.g. the use of appliances, heating and lighting. Figure 5.3 demonstrates the percentage of clients who follow the different types of behavioural advice, where simple recommendations such as closing the curtains and internal doors are summarised as other energy saving tips.

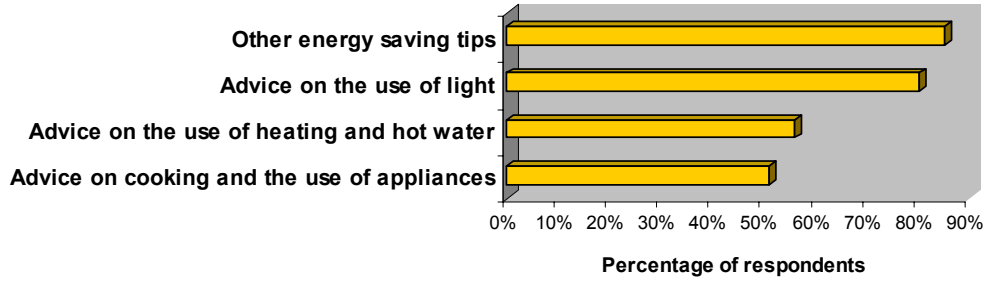

Figure 5.3: Following behavioural advice

When quantifying the effectiveness of behavioural advice it has been found that council and private tenants seem more likely to follow such advice rather than invest in costly energy saving measures which they might see as the landlord's responsibility. Hence, it is suggested that energy efficiency improvements have to be made more attractive to private landlords.

The main findings of New Perspective's report 'Benefits of Energy Advice' published in March 2002 were since then used by the Energy Saving Trust and the Energy Efficiency Partnership for Homes as part of their energy advice support campaign. These findings were published in an A4 leaflet 'Energy Advice – A Good Investment' [2] and are stated in the following.

- 70% of all households who receive any advice on measures do install some of the recommended measures within 9 to 15 months
- 75% of all behavioural advice is followed in some way
- Written reports and the combinations of written and verbal advice are the more effective ways of communicating advice about measures to install and the availability of grants
- Verbal advice is more effective at encouraging behavioural changes, and reports and leaflets on their own are less effective
- Client-led advice is followed more often than opportunistic advice

It has to be pointed out that this survey conducted by New Perspectives in 2002 aimed to quantify the effectiveness of energy advice which was provided by various sources. However, the results of the survey have further shown that in comparison to customers who were advised by Energy Efficiency Advice Centres rather fewer of those who received advice through local authority, fuel poverty schemes or from electricity companies went ahead to install measures or make use of grants and discounts [1]. It is therefore justified that energy advice centres are more effective in communicating energy advice to customers than local authorities or utility companies on their own.

5.2 Benefits of Energy Advice to Households

Another focus point of the survey was to identify benefits resulting from taking up recommendations. All respondents who followed any energy advice were asked about different improvements they had noticed since. The results were that:

- 63% have benefited from warmer and more comfortable homes
- 34% reported lower fuel bills, rising to 47% among those who received written reports and verbal advice
- 23% reported an improvement in health

With help of these outcomes it has been demonstrated that following energy advice brings real benefits to domestic customers.

5.3 Savings from Behavioural Changes

In April 2004 a second research project was conducted for the Energy Advice Providers Group by New Perspectives with support from Energy Inform and the Energy Saving Trust. Its work was based on the evidence from the interviews conducted in January, 2002. This second research project aimed to estimate the savings being made by customers who were advised on behavioural changes. Savings were expressed in terms of cost, energy and CO_2 savings.

In order to estimate the average savings likely to arise from each individual action, assumptions were made about annual space and water heating loads, CO_2 emissions per kWh fuel use, fuel costs and the space heating mix, on which many calculations were based. This was done through discussion between the different research partners. These savings figures were then applied to the number of households identified in the January, 2002 survey who acted upon certain energy advice [3].

Table 5.1 demonstrates a summary of results of the research project for the following four areas of behavioural advice:

- Advice on cooking behaviour and the use of appliances
- Advice on the use of heating and hot water

- Advice on the use of lighting
- Other tips for saving energy (e.g. block up unused chimneys)

Every area covers a number of different items of advice given to customers for each of which annual cost, energy and CO_2 were estimated for a common UK household. However the following figures only list the average savings estimated across the four main areas where all data are extracted from the report conducted by New Perspectives [3].

	Annual cost savings (£)	Annual energy savings (kWh)	Annual CO_2 savings (kg)
Heating/hot water	41.63	1514	343
Other tips	14.07	930	193
Lighting	12.27	185	80
Cooking/appliances	7.98	123	52

Table 5.1: Annual savings per area of behavioural advice followed

It is shown that the highest savings are reached by changing behaviour regarding heating and hot water use. The study demonstrated that the average annual savings made by each household following behavioural advice are:

- £58 off fuel bills
- 1,971kWh energy saved
- CO_2 emissions reduced by 494kgs

One significant finding of the 2004 research project was that to realise the full potential from behavioural changes, energy advice has to encourage changes in behaviour in all four of the main areas. This is justified by the survey outcomes which have shown that "households which followed all four main areas of behavioural advice may be saving as much as £150 p.a." [3] in comparison to the annual average savings of £58 from following any single item of behavioural advice.

5.4 References

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Chapter 6 ENERGY ADVICE IN OTHER COUNTRIES

Energy Advice Centres are established in various European Countries. Three of these are currently involved in the European RURASU (Rural Advice Support Units) project together with the University of Strathclyde and the Energy Agency in Ayr. The three European advice centres are located in Germany, Greece and Spain. The RURASU project is concerned with the work of the different advice centres, also called DASUs (Design Advice Support Units), and the knowledge transfer across them in order to optimise the activities of all involved parties. The work of the two DASUs eza!, energie & umweltzentrum allgau in southern Germany and PIERIKI Energy Advice Unit in northern Greece is seen as highly successful and their knowledge shall be transferred to existing and new advice centres. Both come from very different backgrounds and work in very differing environments.

In this chapter the work of both advice centres is explained with the objective to demonstrate differences in the advice work compared to energy advice centres in the UK. It is hoped that this chapter will give an impulse for generating ideas for possible improvements of UK's EEACs. Some recommendations are drawn from it which are mentioned in chapter 13 of this report.

6.1 Energy Advice Work in Germany

The German energy advice centre called eza! is a non-profit making company which has been established since 1998 in order to promote renewable energy and efficient use of energy in the built environment in the region Allgau in southern Germany. The area has 7 rural districts with a population of over 600,000.

The energy advice centre covers 4 main areas of work [1]. These are:

- Public work, media work and public consultations
- Education for architects and building design and service engineers
- Energy management in public buildings
- A partner network of 120 EZA partners (Architects, Engineers, RE installers)

The advice centre offers consultations on renewable energy systems and energy reducing measures for customers who are planning to build or renovate their home. In order to reach as many people as possible eza! possesses 40 consultation stations located in different council areas of its region. At these stations energy consultants, which are trained by eza!, can be approached by those who are interested for an initial free consultation. Additionally to an initial consultation, the advice centre also offers a building survey together with information on renovation opportunities for which customers have to pay a discounted fee. The way the advice centre targets households is in the form of large public exhibitions and through the local press as well as its web site. eza! is very successful in spreading its message through the yearly organised exhibition 'Altbautage' which focuses on ways and technologies to improve the energy efficiency of existing buildings and rehabilitation plans. Over 30% of all eza! customers got to know the advice centre and its work through this two-day event which attracts around 10,000 visitors [2]. In contrast to energy efficiency advice centres in the UK eza! makes intensive use of the media. It publishes its work nearly every week in form of press releases which contain extensive technical information and details on cost savings for different measures. Through these press releases eza! also informs about upcoming regulations such as the Energy Performance in Building Directive. Research has shown that an additional 29% of eza! customers have heard about the advice centre through a specific journal [2].

As mentioned above another main activity is training courses to members of the building sector from all over Germany. Such training courses on energy efficient building design and restoration cover various topics, including:

- Thermographic building analyses
- Insulation
- Energy efficient heating and ventilation design
- Renewable technologies
- Modelling and simulation software

Training courses have a duration over several weeks and are provided by qualified energy consultants registered with eza!. Additionally eza! offers consultation in the first project after completing the course.

Regarding energy management, eza! has more than 100 public buildings under contract with the aim to improve their control system as well as teaching house keepers how to reduce the building's energy bill and make investment suggestions.

A customer survey was conducted by a business management student in 2003 concerning the success of the eza! consultancy work [2]. Figure 6.1 demonstrates one significant outcome of this survey. It shows the percentage of respondents who have installed a certain measure after being advised on it in a consultation report following a building survey.

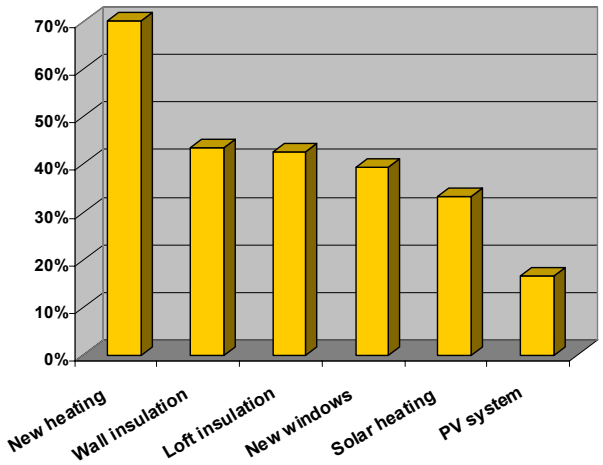

Figure 6.1: Uptake rates for the advised measures

Out of all eza! customers who were consulted on a new energy efficient heating system 70% actually installed a new system. In comparison to the results of the 2002 UK survey where only 6% of advised customers installed a new heating system [3], this is a very strong result. The overall success of the energy advice centre can be explained with its intense media work as well as detailed costumer consultation which on average last 45 minutes for initial consultation [4] and are followed by a second consultation in many cases.

Eza! is financed in a complete different way compared to UK's EEACs. The German advice centre works with funding from different levels where the main funding comes from its shareholders as well as the building and energy industries (architects, craftsmen and building contractors) for membership in eza! Partner Network and the participation in training sessions. Other funding for the work of eza! are the fees paid by customers for on-site energy consultancy services.

6.2 Energy Advice Work in Greece

The Greek advice centre called Pieria Energy Advice Unit (EAC) PIERIKI is part of the company-Pieriki Anaptixiaki S.A which is a local Development Agency. Its characteristic is that the profit of the company are not distributed to shareholders but are redistributed to other development projects. The advice centre is based locally in Pieria Prefecture, while the scientific support is conducted by the National University of Athens and Aristotle University of Thessaloniki.

Its main areas of work are [5] [6]:

- Consultations on renewable energy projects
- Energy audits and advice for enterprises
- Energy efficient building refurbishment plans

Regarding consultation on renewable energy systems the advice center conducts consultations related to major RES projects as well as small scale renewable and energy efficiency projects for local citizens. Initial consultations are provided by the advisers at local level who are experienced engineers. Further detailed consultations can be provided by the scientific partners of the advice centre who have advanced technical expertise. Additional to the scientific consultation the energy advice centre also deals with possible funding for each (major) project.

Energy efficiency advice to local enterprises is done in form of energy audits which are strongly related to the adoption of national legislations leading to energy and/or environmental certification of enterprises. Between 2002 and 2004 the advice centre carried out 66 business consultations following which 16 businesses (24% of the advised businesses) undertook energy efficiency improvements during the year 2005 [5].

Furthermore, the advice centre undertakes extended studies in retrofitting and rehabilitation of existing buildings mainly in the public sector but also in private buildings. PIERIKI EAC possesses a partnership network of professionals who are able to undertake the work required.

Similar to eza! in Germany and in contrast to the advice centres in the UK, the Greek advice centre makes intensive use of the media. The PIERIKI EAC has established a network with the local media covering newspapers, radios, TV channels and web-based newspapers. This way its actions are always published which attracts potential clients or renewable energy systems projects. The actions of the advice centre are also published at conferences in Greece or worldwide including the results of scientific analysis conducted either for the purpose of European Commission co-financed projects or for individual projects.

Unlike UK's energy advice system there are no grants for energy saving measures and renewable energy technologies available. Usually individuals funded under European or national projects are advised to adapt energy saving measures and/or renewable energy systems which are funded on a percentage depending on the programme. For this reason PIERIKI EAC organizes workshops with investors of other projects along with supporting actions such as architectural competitions on energy related subjects.

6.3 References

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Chapter 7 EVALUATION OF ENERGY ADVICE CENTRES IN THE PAST AND AT PRESENT

The first part of this chapter gives a brief overview of a previous evaluation method that has been used for the evaluation of the nationwide Energy Design Advice Scheme (EDAS) in 1997. It is intended to extract possible measures that are suitable for application as part of a new evaluation method for today's energy advice centres.

The second part of the chapter investigates how the Energy Saving Trust presently evaluates Energy Efficiency Advice Centres and sets out targets to them. This appraisal aims to identify whether a new approach for evaluating energy advice centres is actual needed or whether the Energy Saving Trust's evaluation procedure offers satisfying results.

7.1 Evaluation of the Energy Design Advice Scheme

In the case of the nationwide Energy Design Advice Scheme the evaluation was undertaken by an independent and experienced outside consultancy company. The following measures of effectiveness were quantified [1]:

- the number and type of consultation
- The annual rate of direct energy savings potential
- The cumulative energy savings potential
- The indirect energy savings potential through replication
- Feedback from customers
- The fraction of national construction advised by EDAS
- Dissemination of technical information

To simplify the task of monitoring EDAS various forms were used to assist in documenting all consultancy activities. These comprised [1]:

- A project record summary form
- A quarterly report form

- Customer questionnaires

The project record summary form was used by the person giving the advice to record details of the project and the form of advice dispensed. The quarterly report form was used by each regional centre to summarise its consultations each quarter. Furthermore, questionnaires were sent to each customer to obtain feedback on their views of the services and the incorporation of the advice received in their decision making.

Energy Efficiency Advice Centres which this project aims to evaluate are operated, unlike EDAS, at a local level and promote energy efficient measures and small scale renewable energy in the domestic and small-scale business sector in comparison to the nationwide scheme which focused on providing design advice to different interest groups involved in the building sector. The evaluation procedure can, therefore, not be completely applied to existing EEACs. However the way in which the effectiveness of EDAS was evaluated can be in some respect applied to the evaluation of local energy advice centres. Measures of effectiveness that are transferable to a new approach of EEAC evaluation could be:

- The number and type of consultations
- The annual rate of direct energy savings potential
- The cumulative energy savings potential
- Feedback from customers

It will be difficult for energy advice centres to estimate possible savings from replication but this is another aspect that could be taken in consideration. As it has been done for EDAS customer questionnaires can be used to document the impact of the advice provided. Furthermore for the EDAS evaluation a ratio of energy savings generated per expenditure was used. The same could be applied to EEACs in order to identify the amount of energy savings generated per £1 of government funding.

7.2 Evaluation of EEACs by the Energy Savings Trust

Energy Efficiency Advice Centres are given a number of targets for each financial year which they are required to achieve in order to secure funding for the following year. The targets concerning energy efficiency advice to households are given to each EEAC in terms of customer contacts and carbon savings. According to Mathieu Whitehead, Evaluation Manager from the Energy Savings Trust, the targets set to all Energy Efficiency Advice Centres are in the form of carbon savings rather than the number of customers who have been advised on energy efficiency [2].

To assess the amount of carbon savings enhanced by the EEAC work, every advice centre has to provide at the end of each financial year the details of all customers it has advised as well as the form in which advice was provided. The Energy Saving Trust then allocates a specific amount of carbon savings by separating into two principal ways in which energy advice was provided. These are [3]:

- Verbal advice
- Home energy check reports

Additionally a bonus of carbon savings is allocated to [3]:

- Follow-up advice
- Grant referrals

The respective carbon savings, which have been identified by the Energy Saving Trust based on the results of surveys conducted over the past years [3], are listed in the following table [4].

Form of energy advice	Cumulative carbon savings (kgC per advice)
Verbal advice	1956
Home energy report	451
Grant referral	120
Follow-up advice	40

Table 7.1: Cumulative carbon savings per form of EEAC advice to households

The carbon savings calculated with the help of the figures listed in table 7.1 are monitoring data that do not take into account customer's actions resulting from the advice given i.e. whether customers actually follow the recommendations.

Therefore, the Energy Saving Trust adjusts these figures in a follow up step after undertaking customer research in the form of a customer telephone survey [2]. For this research customers from different geographical areas, who have received energy advice in the previous year, are chosen in order to implement a survey which reflects the work of the whole EEAC network. These are interviewed on [2]:

- Their satisfaction with the advice given
- The number of measures installed
- Any behavioural changes made
- Any other energy advice providers contacted

The survey aims to assess how crucial the energy advice provided was for improving energy efficiency in the household. The outcomes of the survey will then be reflected in the carbon savings enhanced by each advice centre [2].

The following aspects of EST's evaluation method are particularly critical and are felt to reduce the quality of the evaluation considerably.

1) The carbon savings used for evaluation are based on the outcome of a survey with a small sample size

2) The carbon savings associated with grant referrals are comparably small

3) The evaluation only considers advice on energy efficiency and renewable energy to householders

The sample sizes of the surveys (2002 survey – 1900 respondents) on which the carbon figures are based seem to be too small to apply these figures nationwide. Furthermore, it has been experienced during customer questionnaires, which have been done as part of the project, that people referred to grants are more likely to go ahead with installing energy saving measures. Thus, the carbon savings associated with grant referrals do not seem to be large enough. Furthermore the Energy Saving

Trust does not take into consideration business advice or the work with local authorities. It also does not consider any installations that have been carried out by EEAC customers and recorded by the advice centres, such as insulation and heating as well as renewable energy installations.

Although the above described evaluation method is satisfying for the Energy Saving Trust and the Department for Environment, Food and Rural Affairs, it is regarded, for the purpose of this project, as a relatively poor evaluation method. Therefore this project aims to find a better approach to the evaluation of the effectiveness of Energy Efficiency Advice Centres.

7.3 References

1. Eclipse Research Consultants. Monitoring the Energy Design Advice Scheme – Final Report on the Operation of the Energy Design Advice Scheme 1992–1997, Cambridge March 1998
2. Mathieu Whitehead – EST Evaluation Manager; telephone conversation 13 June 2006
3. Alan McGonigle – Assistant Manager of the Energy Agency in Ayr, personal conversation 21 June 2006
4. EST cumulative carbon savings, provided by Patrick Thompson 19 June 2006

Chapter 8 A NEW APPROACH TO THE EVALUATION OF ENERGY ADVICE CENTRES

In order to evaluate the merit of Energy Efficiency Advice Centres, it is necessary to demonstrate the benefits that they bring. In the previous chapter it was discussed that the present evaluation by the Energy Saving Trust is a poor one since it, on the one hand, only evaluates the energy advice given to customers and therefore ignores the benefits of all other EEAC activities and, on the other hand, uses a very limited approach for calculating the achieved carbon savings. Hence, a new approach for evaluating the benefits of Energy Efficiency Advice Centres is required.

Although many aspects of EEAC operation are difficult to quantify, this chapter tries to set out a methodology for evaluating the effectiveness of individual energy advice centres which will be applied at a later stage of the project.

8.1 Introduction to the Methodology

The project's methodology was framed by Dr Paul Strachan from the University of Strathclyde as part of the European RURASU project (Work Package 7, December 2005) [1] and has been further developed during this project. Some ideas are based on the previous evaluation undertaken for the nationwide Energy Design Advice Scheme (EDAS).

The evaluation criteria that are suggested are subdivided into three categories:

- Quantifiable energy, carbon and cost savings
- Other quantifiable outcomes
- Non-quantifiable outcomes

These evaluation criteria can be applied to the various EEAC activities e.g. energy efficiency advice to households, business advice, and renewable initiatives. The criteria are expanded in the following sections.

8.2 Quantifiable Energy, Carbon and Cost Savings

The energy, carbon and cost savings can be obtained from an analysis of the advice and support undertaken by the advice centre. The analysis requires:

- Documentation of the advice to households, communities, small businesses, local authorities and other interest groups
- Estimation of the number of recommendations that are actually implemented
- Estimation of the energy, carbon and cost savings occurring from implemented recommendations

For the project the cost savings are defined as savings in fuel costs. Initial investments as well as maintenance cost are neglected in this report but should be included for a more detailed analysis. Benefits in terms of energy savings can be presented as annual or cumulative savings where cumulative savings require assumptions on the lifetime of the installed measures and can take into account lifetime reductions.

Additionally there is also the potential for benefits from replication of the advice given. This could fall into the following categories:

1) Neighbours and friends of householders, who implemented the recommendations for energy efficient or renewable systems, may also follow the same recommendations once they see the benefits

2) Communities who hear about successful renewable community projects may also install some renewable energy systems

3) Businesses who install measures to reduce high energy bills when they hear about other businesses that have done so after receiving an energy audit

The savings attributable to replication potential have to be estimated for each advice centre individually depending on its activities, focus groups, promotion of available grants and any form of customer response collected. Assuming a uniform percentage of replication for all advice centres would not provide a satisfying result due to varying EEAC projects and target groups. The survey undertaken in 2002 by New Perspectives showed that 33% of all respondents had told others outside their own

household how to save energy [2]. This figure can be taken into consideration when estimating the savings attributable to replication from other households.

8.2.1 Documentation

It is essential that every advice centre records and files the details of the advice given to its customers. This way it is possibly to give customers time (at least 6 month) to act on the received advice, and check at a later stage which recommendations have been implemented. However, the huge amount of customers targeted through energy efficiency exhibitions and presentations makes it difficult to keep a detailed documentation on customer details and the type of advice provided. For the 2 case studies of this report (chapter 9 and 10) the documentations that were available at the time of evaluation have been used.

Appendix A shows an example of a record form that is currently used to log phone calls. If there is no detailed documentation available, the number of households advised on energy efficiency, for instance, can be ascertained with help of:

- Number of phone logs
- Number of HEC reports sent out
- Number of home visits
- Number of presentations and exhibitions + average number of attendees

Furthermore, energy efficiency measures and renewable energy systems that are installed by customers with the help of a grant or loan scheme provided by the advice centre have to be recorded. This way actual savings and improvements can be identified through estimations as well as through follow-up contact. It is recommended to document the following information for each installation:

- Type of installation & level of upgrade
- Type & size of the property
- Main fuel for heating
- Customer contact details
- How the customer heard about the EEAC's service

Additional information need to be recorded for renewable energy installations depending on the type of system

8.2.2 Estimating the Number of Implemented Recommendations

The numbers of implemented recommendations are estimated in the following two steps:

a) Determining the number of implemented energy efficiency measures and renewable energy systems using records on installations undertaken with help of:
   - Grant and loan schemes for energy efficiency measures
   - Loan schemes for businesses
   - Grant schemes for renewable energy systems

b) Undertake a phone-based survey with a subset of advised customers to estimate the likelihood of uptakes of:
   - Recommended energy efficiency measures
   - Recommended behavioural changes

The results obtained from the telephone survey can then be extrapolated to all customers advised. The sample size for a telephone survey should ideally include a mixture of customers who received energy advice in its various forms, since the rate of uptakes can depend on the form of advice received. A simple questionnaire has been designed which can be used to capture information about the customer property, the uptake of recommendations as well as the helpfulness of the advice given and planned improvements. The questionnaire is available on request but not attached to this document due to its length.

Another way of assessing the uptake rate of recommendations could be with help of feedback forms issued to all advised clients. However, the experience of the EEACs is that the response rate using feedback forms is poor [3].

8.2.3 Estimating Resulting Energy, Carbon and Cost Savings

Wherever records on installation of energy efficient measures or renewable systems are available energy, carbon and cost savings can be calculated by using the detailed information available on the type of installation, the type of building and the main fuel used. The savings resulting from the installation of renewable energy systems are defined as savings in the renewable energy supply requirement. Hence, there are no energy savings resulting from replacing a conventional heating system with a biomass system, but there are possible carbon and cost savings.

Additionally for every energy efficiency advice provided to households the benefits in form of energy, carbon and cost savings shall be calculated using the outcomes of the phone-based customer survey. The savings shall be calculated using the following equations.

$$EnergySavings = N * \sum_{n=1}^{i} \left(x_n * a_n \right)$$

$$CarbonSavings = N * \sum_{n=1}^{i} \left(x_n * b_n \right)$$

$$CostSavings = N * \sum_{n=1}^{i} \left(x_n * c_n \right)$$

Where

N: number of customers advised

x_n: estimated percentage of customers acting on a certain advice ‘n’ (installing certain measures ‘n’)

a_n: Average energy savings associated with following the advice ‘n’ (installation of measure ‘n’)

b_n: Average carbon savings associated with following the advice 'n' (installation of measure 'n')

c_n: Average cost savings associated with following the advice 'n' (installation of measure 'n')

Using the above stated equations the savings can be estimated in the following two scenarios:

Scenario I - Detailed analysis: It uses a different estimated percentage 'x' of customers acting on a certain advice 'n' dependent on the way the customer received energy advice.

Scenario II - Simplified analysis: It uses a uniform percentage 'x' of customers acting on a certain advice 'n' estimated across all advised customers

The former is assumed to give a qualitative better result. However, it will be rather time consuming. As part of this project both strategies are used by means of a case study on South West Scotland EEAC. The results are compared and conclusions on the usefulness are drawn in section 9.4 of the report.

For estimating resulting energy, carbon and cost savings the following tools and figures can be used:

1) EEC spreadsheet 2005-2008
2) University of Strathclyde's Energy Rating Tool (SERT)
3) University of Strathclyde's Small Scale Renewable Energy Rating Tool
4) Savings estimated for following behavioural advice (extracted from New Perspective's research on 'Savings from Behavioural Advice')
5) DTI fuel price projections

The above stated tools and figures and their application in this project are discussed in the following sections.

8.2.3.1 EEC Spreadsheet 2005-2008

The EEC Scheme Submission Spreadsheet 2005-2008 is an administrative tool that Ofgem provides to suppliers obligated under the Energy Efficiency Commitment. The spreadsheet has been developed by Ofgem to detail the annual energy savings (kWh/a) associated with the common energy efficiency measures. It has the functionality to automatically calculate the annual carbon as well as lifetime carbon savings to an action and is available from Ofgem under certain copyright conditions.

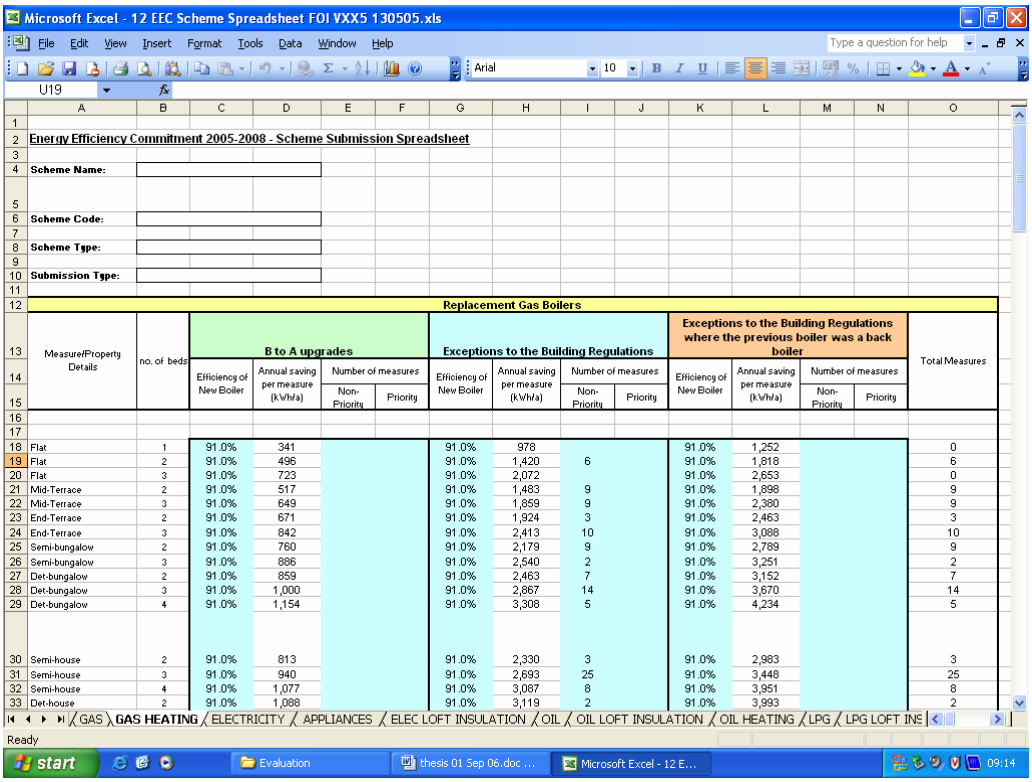
For insulation and heating measures the savings are derived from BRE data with some adjustments made for differences between national average heating energy consumption per household and the heating demand assumed in the Building Research Establishment's Domestic Energy Model (BREDEM) [4]. For the other measures the savings are mainly based on the current market mix. The energy savings resulting from insulation measures include an average comfort discount rate of 30% [5], since in practice some of the energy saving is taken in improved comfort – the home is kept at a higher temperature, or more rooms are heated. This allowance for comfort is based on the EST paper ' Monitoring Energy Savings achieved from Insulation Measures installed in Gas Heated Homes in SoP3 or EEC Schemes' as well as on the 'The measurement of heating standards and temperature in gas heated houses' which was conducted by an independent Energy Monitoring Company in 2004 [5]. The input screen of the EEC Spreadsheet 2005-2008 states the annual energy savings excluding this comfort discount. However, when using the spreadsheet the annual energy savings including the 30% comfort factor are calculated in a separate step and stated in the output section of the spreadsheet. The annual savings including the comfort discount are used for this project's evaluation.

The spreadsheet can be easily used to estimate energy and carbon savings when the following customer details are available:

- Type of installation (including level of upgrade)
- Type of property
- Number of bedrooms
- Main fuel for heating

The annual carbon savings resulting from each installation are calculated using the annual energy saving (minus the comfort taken) and the carbon intensity of the fuel saved. The carbon intensities for each fuel are consistent with Defra's Environmental Reporting – Guidelines for Company Reporting on Greenhouse Gas Emissions [4].

Figure 8.1 shows an example of an input and output section of the EEC spreadsheet 2005-2008 that has been provided by Ofgem as support of this project [6].



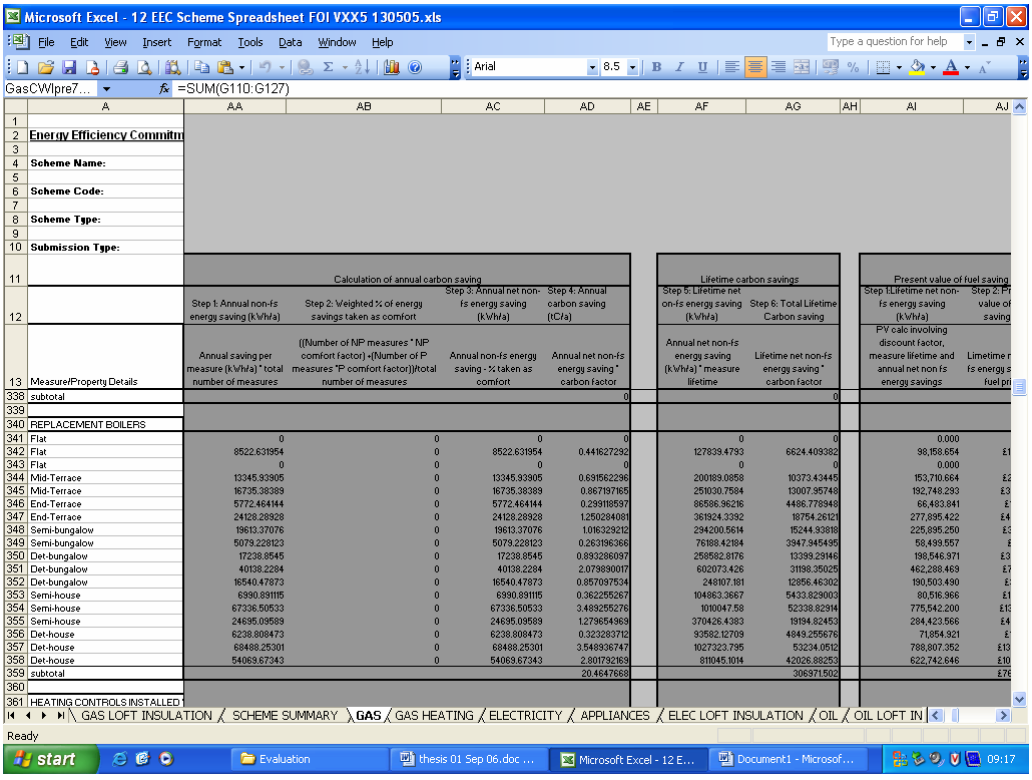


Figure 8.1: EEC spreadsheet 2005-2008

The energy savings regarding heating and insulation extracted from the spreadsheet are relatively high. This can be due to the consideration of increased heating efficiency projected for 2010 for which adjustments have been made to the BRE data as it is discussed in the consultation proposal from May 2004 [4]. Therefore, when using this tool for EEAC evaluation the savings estimated reflect an optimum situation. It shall be kept in mind that the actual savings could possibly be lower.

8.2.3.2 University of Strathclyde's Energy Rating Tool

This tool has been developed at the University of Strathclyde with the aim to provide a building energy rating tool which, unlike the Standard Assessment Procedure (SAP) [7], does not require a building survey. It builds on the previous University of Strathclyde work on informing upgrade strategy for Scottish housing stock [8]. During the development stage of Strathclyde's Energy Rating Tool (SERT) all results were checked by accurate modeling using ESP-r, an integrated building simulation tool. Defaults where used are based on the knowledge of the Scottish housing stock and supply systems which has been accumulated from a variety of sources including the Scottish House Condition Survey, the BRE Domestic Energy Fact File and the Building Market Transformation database [8].

The tool calculates the annual energy use, running cost and carbon dioxide emissions for an individual dwelling or a number of dwellings. The input data for the calculations can be entered manually using the Java data input screen, or the tool can be run from an input file. SERT allows estimating the annual energy use of a building considering building fabric and systems options that are found in the current housing stock and compare with annual energy use of the building when improvements such as advanced insulation, double glazing, air or ground source heat pump, solar hot water, micro-CHP or a biomass system are applied.

Figure 8.2 shows an example of the input screens and an output screen from the beta version of the java tool.

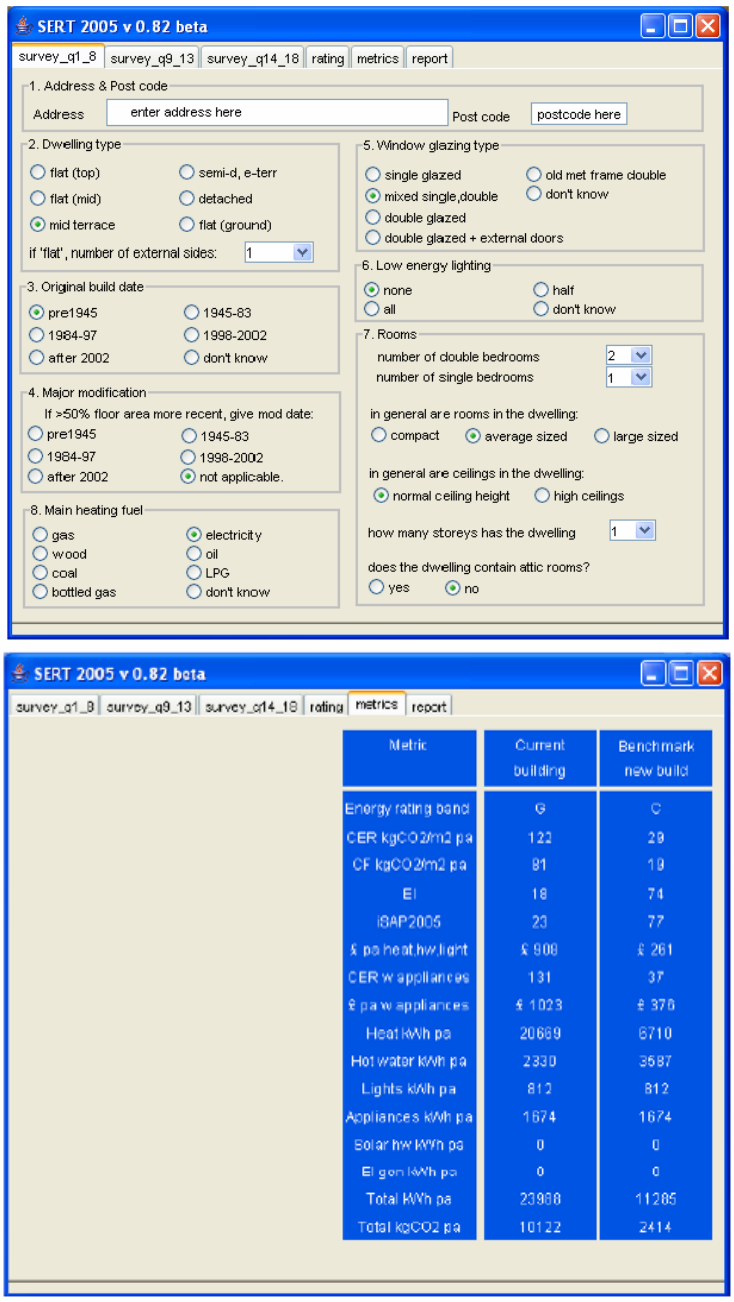


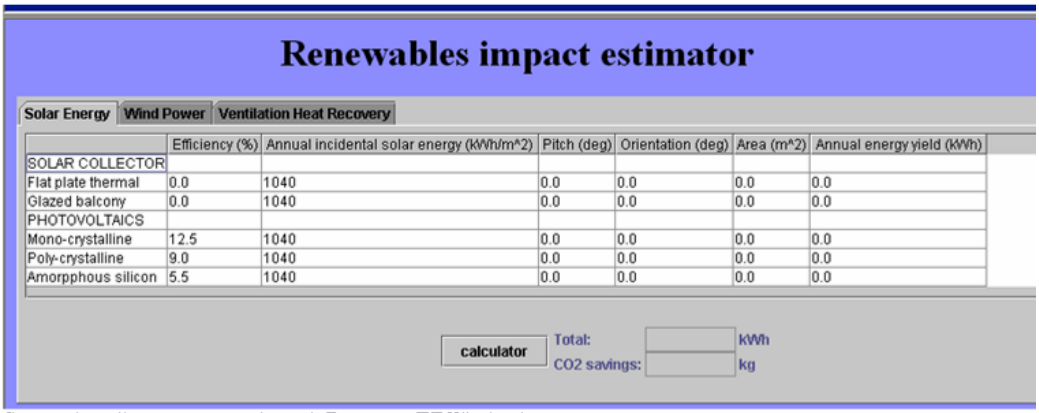
Figure 8.2: University of Strathclyde's Energy Rating Tool (SERT)

SERT, in contrast to the EEC spreadsheet, allows the creation of a combination of energy efficient measures for which the resulting energy savings can be calculated. On the other hand SERT requires a more detailed specification on the type of property which in many cases is not recorded when documenting on customer installations e.g. through a grant scheme. For this report the tool shall be used where detailed information on the existing building design and operation as well as the improvements undertaken are known. This way the annual energy use of the building can be

ascertained with help of SERT in a before and after scenario and the resulting energy and carbon savings can be calculated. Generally the tool can be of very practical use for energy advice centres when estimating the savings from household renewable installations when collecting all the required information on the building where the renewable system is installed.

8.2.3.3 University of Strathclyde's Small Scale Renewable Energy Rating Tool

The tool has been developed at the University of Strathclyde for planning of small scale renewable energy systems and can be used to estimate the energy and CO_2 savings for different systems depending on their size, location and other significant factors. It is a Java based tool that is easy to use and produces outcomes accurate within a tolerance of 10% to 15% [9].



Source: http://www.esru.strath.ac.uk/Programs/EEff/index.htm

Figure 8.3: Small Scale Renewable Energy Rating Tool

The tool can calculate the annual energy savings for solar heating systems, PV systems, wind turbines and ventilation heat recovery systems. The wind turbine and PV calculations here assume that grid electricity from the current generation mix (coal, gas, nuclear) is displaced by the generated electricity. For solar heating calculations the fuel displaced is assumed to be mains gas. The carbon savings achieved by displacing these fuels are based on the carbon intensity figures published by Defra [9]. Additionally to the outcomes from this tool it has to be taken into account the actual percentage of produced electricity used, which requires considering additional factors such as the battery system employed.

This Small Scale Renewable Energy Rating Tool shall be used in this report for calculating energy and CO_2 savings resulting from household and community renewable installations where detailed information on the building envelope are unknown.

8.2.3.4 Savings from Following Behavioural Advice

The average annual energy savings estimated in the 2004 research project [10] for the four main groups of behavioural changes are the most appropriate figures available for calculating savings that result from following advice on energy efficient behaviour. However, due to increases in fuel prices over the last 2 years the cost savings have been increased by 30% for the use in this project. This percentage increase has been derived from a comparison of the assumption made in the 2004 research with DTI's fuel price projection for 2006 (section 8.3.3.5). The data used in this project for estimating savings from following behavioural advice are listed in the table below.

	Energy savings (kWh/a)	Carbon savings (kgC/a)	Cost savings (£/a)
Cooking/appliances	123	14	10.37
Heating/hot water	1514	94	54.12
Lighting	185	22	15.95
Other tips	930	53	18.29

Table 8.1: Annual savings estimated for the 4 types of behavioural changes

The CO_2 savings have been converted into equivalent carbon savings using a multiplication factor of $^{12}/_{44}$ (1 kg C = $^{12}/_{44}$ * 1kg CO_2) [11].

8.2.3.5 DTI Fuel Price Projections

The fuel prices projected by the Department of Trade and Industry (except for LPG) are used in this report to quantify the annual cost savings resulting from an energy efficiency or renewable energy installation. Table 8.2 demonstrates the fuel prices in pence per kWh for the different types of fuel as they have been extracted from DTI's projections (October 2004) [5].

	Fuel price (pence/kWh)
Electricity (standard)	7.84
Electricity (heating)	5.60
Gas	2.00
Oil	1.44
Solid fuel	2.49
LPG *	3.00

* Source http://www.soteriologicgarden.net/reports/Energy/%20in%20the%20Home.doc

Table 8.2: Fuel prices in p/kWh including VAT

These values are projections for the year 2006 and were felt to be reasonable for calculating the annual cost savings of recommendation uptakes between April 2005 and March 2006. However since fuel prices have started to rise drastically after August 2006 and are predicted to increase continuously, up-to-date fuel prices have to be used for future calculations.

8.3 Other Quantifiable Outcomes

Other quantifiable benefits can fall into the following categories:

1) Increasing householder awareness
2) Increasing business awareness
3) Increasing local authority awareness
4) Job creation

These are explained in the following.

Increasing householder awareness:

Increasing householder awareness can be justified using the following information:

- Public presentations and exibitions on energy efficiency and renewable technologies (number, average number of attendees)
- Class presentations in local schools (number, average number of attendees)
- Local newsletters (number of newsletters and distribution)

- Articles in local newspapers (number, newspaper circulation figures)
- Television and radio publicity (number)
- Website (statistics)

Increasing business awareness:

The following information can be used to justify increasing business awareness as one outcome of the energy advice:

- Number of energy awareness presentations to businesses
- Number of staff trainings
- Number of energy surveys

Increasing local government awareness:

The benefits in form of increasing local authority awareness can be justified with help of the following statistics:

- Meetings with local authorities (number)
- Information forums/workshops for local authorities (number, average number of attendees)

Job creation:

The jobs created due to renewable energy systems deployment and energy efficiency refurbishments are practically difficult to estimate. For this project an assessment method is used which has been suggested in the 4th HECA Progress Report of North Ayrshire Council and is based on a case study on direct and indirect job creation published by the Energy Saving Trust in 1997. It is estimated that one job is directly created for every £40,000 of investment, and another indirect job for every £70,000 [12]. For the use of this report investment is defined as expenditure for installation of energy efficiency measures and renewable energy technologies. This only includes recorded installations undertaken with help of grant or loan schemes provided by the energy advice centre.

8.4 Non-Quantifiable Outcomes

There are other potential benefits from EEACs operation which are difficult to quantify. One of the most important of these is that the EEAC is perceived by its users to be free, unbiased and independent.

Other possible benefits include:

- General public and professional awareness of the importance of sustainable energy use and supply
- The promotion of best practice throughout the region
- Abatement of fuel poverty
- Increased awareness of new legislations amongst professionals
- Development of local climate change strategies and action plans

Some of these benefits result from the work of all energy advice centres and can not be identified individually.

8.5 Application of the Methodology

In the following two chapters the methodology is applied to 2 Scottish Energy Efficiency Advice Centres, one of these located in Ayr and the other one in Glasgow. A detailed evaluation has been done for the former of which some assumptions have been used for the case study of the EEAC in Glasgow. In both cases the evaluation period is the last financial year which lasted from April 2005 to March 2006. Existing records have been used in order to assess the outcomes of the work of both advice centres.

The benefits in form of energy, carbon and cost savings are estimated in form of annual savings. Additionally lifetime (cumulative) carbon savings are calculated for comparison with possible lifetime carbon savings identified using the EST evaluation procedure. It is assumed that the annual savings are achieved constantly over the whole lifetime of each measure. A lifetime discount is not included.

Furthermore, the cost-effectiveness of both advice centres is demonstrated. Cost-effectiveness of the EEAC work is simply defined as the amount of money saved over the lifetime of the induced improvements compared with the costs associated with all EEAC projects and activities. For this the associated costs equal government funding and do not include any additional expenditure for the different services (e.g. through Scottish Power funding). This way energy savings resulting from £1 government funding are estimated. For comparison purpose the ratio energy savings per customer advised will additionally be used.

8.6 References

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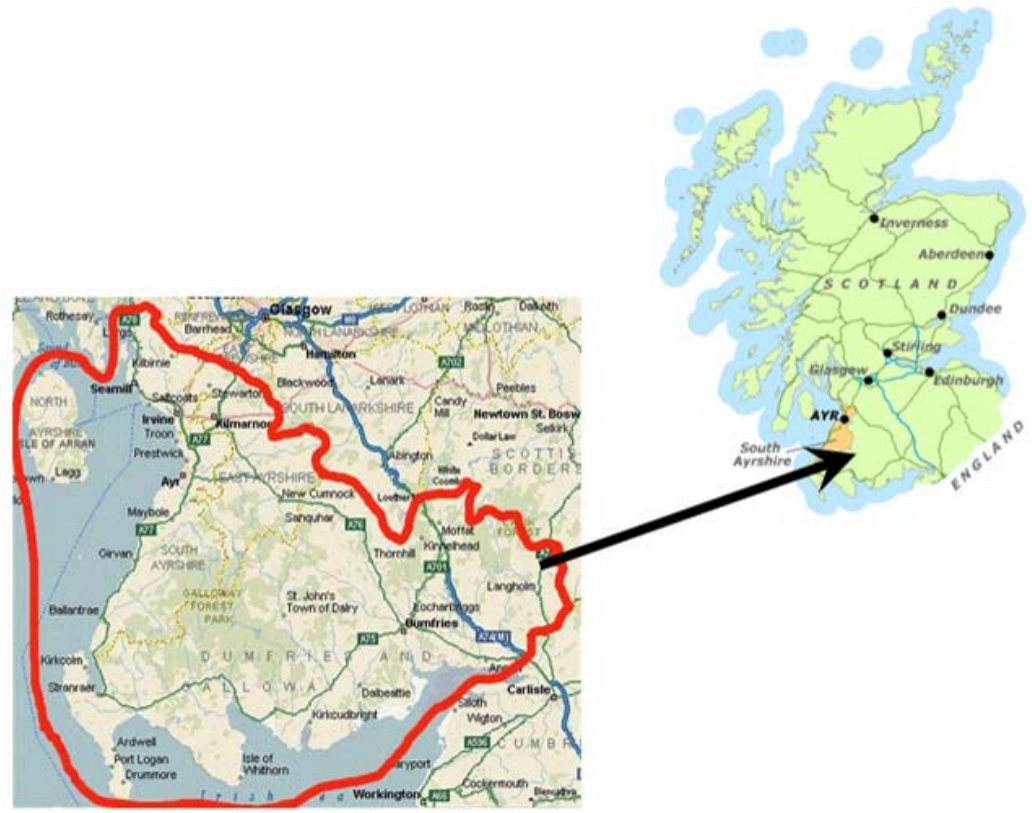
11. http://www.ch4.org.uk/glossary.php/Carbon+equivalent?term=C [accessed 10 July 2006]
12. North Ayrshire Council. Home Energy Conservation Act – 4th HECA Progress Report, 1st April 2003 – 31st March 2005, page 19, provided by Alan McGonigle 01 August 2006

Chapter 9 CASE STUDY: SOUTH WEST SCOTLAND EEAC

The South West Scotland EEAC is managed and operated by the Energy Agency in Ayr. The Energy Agency was established in February 1999 as South Ayrshire Energy Agency. It began as an innovative project using a combination of European Union and Local Authority funding. In April 2000 it bid successfully for a contract to be part of the network of 52 Energy Efficiency Advice Centres in the UK. In this report both names 'South West Scotland EEAC' and 'Energy Agency' are used when referring to this energy advice centre.

9.1 Description of the Region

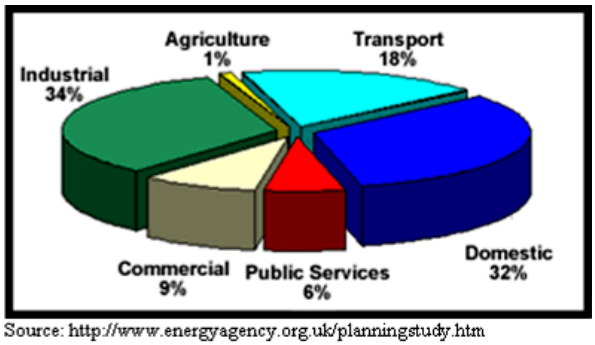
South West Scotland EEAC operates in the 4 local authority areas of South Ayrshire, East Ayrshire, North Ayrshire and Dumfries & Galloway as shown in the map below.



Source: http://www.energyagency.org.uk/aboutus.htm

Figure 9.1: Operational area of South West Scotland EEAC

The area has a population of over 500,000 and around 250,000 households [1]. It is a predominately rural area with the main towns of Dumfries, Ayr, Prestwick, Kilmarnock and Irvine. The area has a thriving small business community with scope for developing the growth of small to medium-sized enterprises. Figure 9.2 shows the energy breakdown by sector for South Ayrshire which is the principal target area due to the agency's location in Ayr.

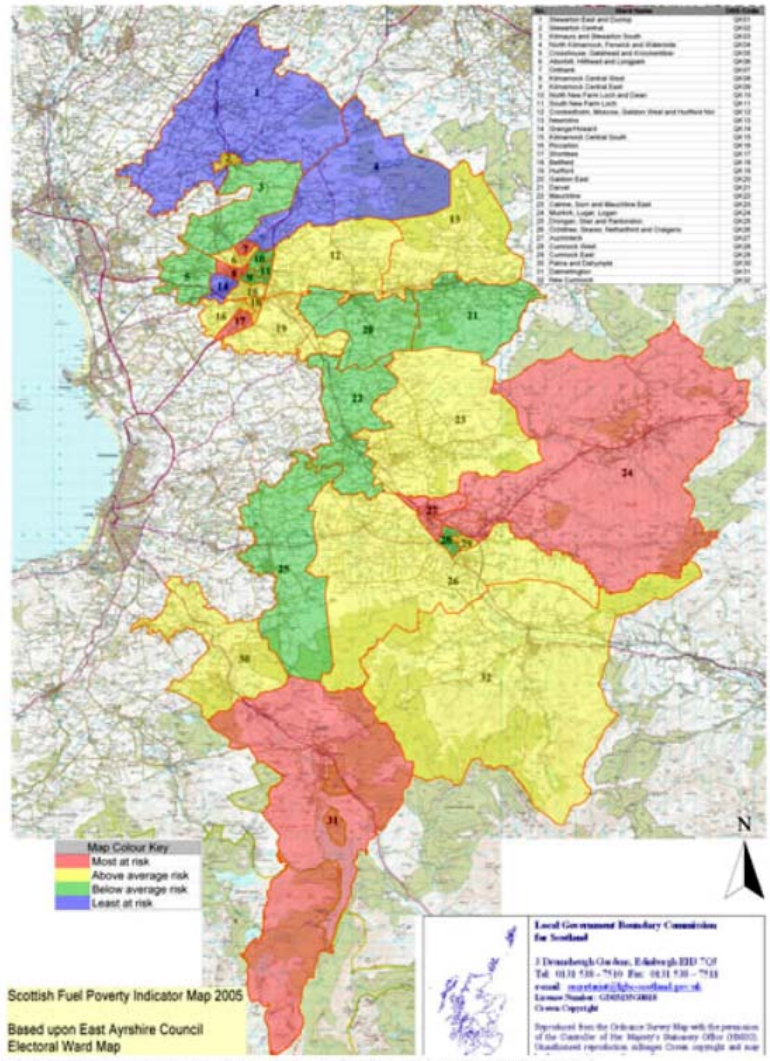


Source: http://www.energyagency.org.uk/planningstudy.htm

Figure 9.2: Energy consumption by sector in South Ayrshire

The majority of the public buildings in the region are old and relatively inefficient. There is a high proportion of privately owned properties. However, these are in a worse condition than the social housing stock in terms of repair and energy efficiency. Hence, there is an excellent potential for energy efficient improvements to the area's housing stock.

In East Ayrshire most areas are above average risk of containing households in fuel poverty. This is indicated in figure 9.3 (red and yellow areas) which shows the fuel poverty indicator for East Ayrshire, based on variables from the 2001 Census.



Source: http://www.est.org.uk/housingbuildings/calculators/povertyindicator/

Figure 9.3: Fuel poverty indicator for East Ayrshire

In the other 3 local authorities there are comparably small areas in which households are most at risk of being fuel poor.

There is also good potential of utilising renewable energy as an energy source for remote communities. Due to the area's coastal location the potential for utilising wind as renewable energy has a very high potential. There would be many rural communities and remote dwellings in the area that could benefit from small-scale wind energy developments.

9.2 EEAC Structure

Its main aims are to encourage the implementation of energy efficiency measures and small-scale renewable energy systems. The main sector of operation is the domestic sector with assistance also given to community groups. The Energy Agency has 8 full-time members of staff including 1 LESP and 2 Renewable Project Officers. A flowchart demonstrating the process involved in the Energy Agency's rural renewable energy project [2] is show in figure 9.4. However, the advice centre does not posses its own business adviser, since the area is covered by one of the two business advisers based in the Strathclyde & Central advice centre.

The energy agency possesses its own grant schemes provided to customers for taking up energy efficiency measures as well as a grant scheme for renewable energy systems (additionally to the SCHRI grant). These are:

- Warm Homes (insulation grant) for home owners (currently on hold)
- New Boiler Grant Scheme for home owners
- Boiler and Insulation Grant Schemes for private landlords
- Renewable Energy Grant Scheme for homeowners in rural communities with no access to the mains gas network (started in April 2006)

The grants are partly funded by the councils, Scottish Power and the Energy Saving Trust, where the schemes for private landlords and rural communities are successfully funded through the EST innovation stream. When targeting households by sending out letters on behalf of the council including referrals to these grant schemes, the energy agency experienced a response rate of 8% to 10% of which approximately 67% of the respondents install a heating or insulation measure. These figures have been derived from targeting 3000 households in Kilwinning. The energy agency currently does not directly target fuel poor households, but it is planned for future projects.

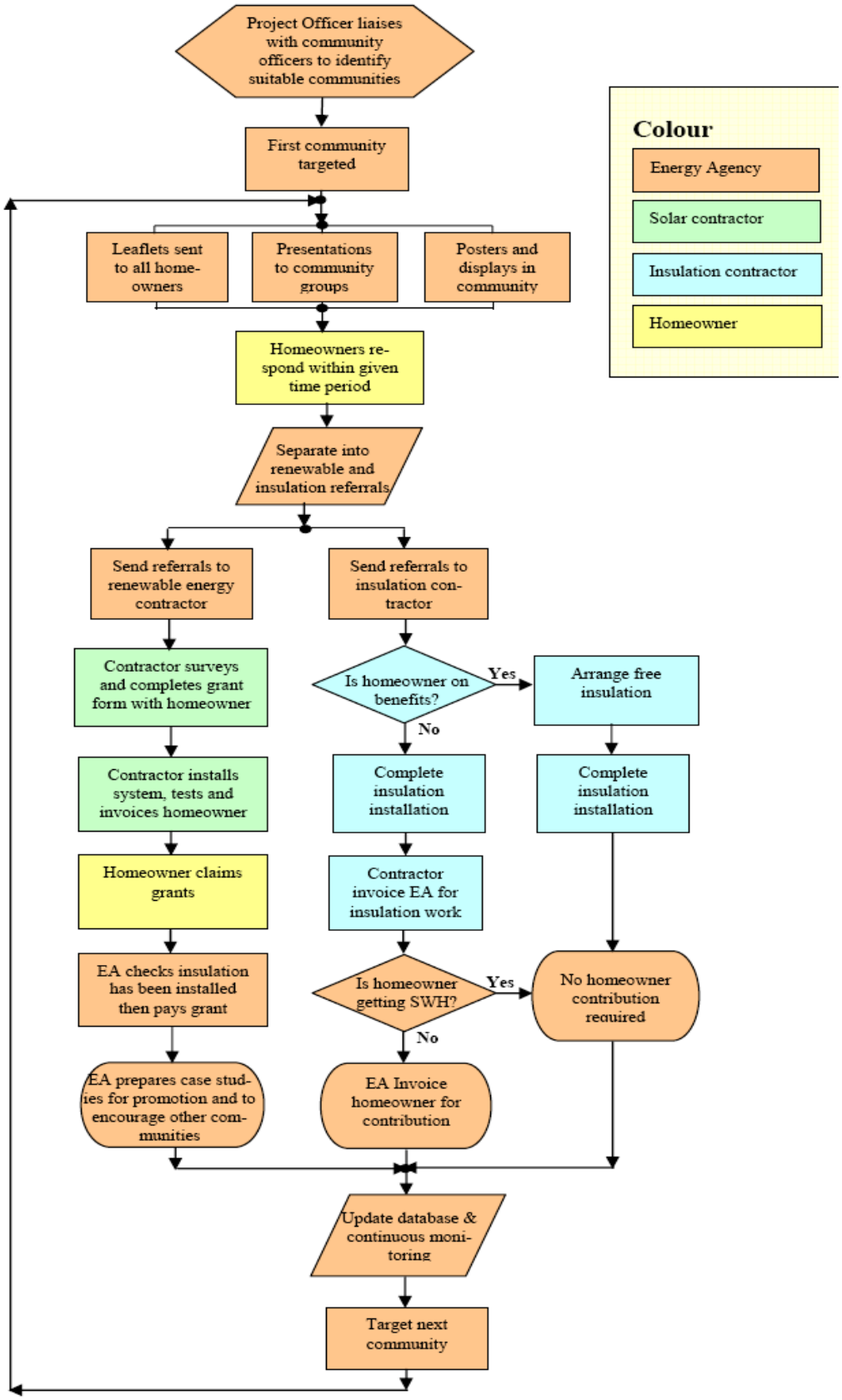


Figure 9.4: Process involved in the Renewable Energy Project

9.3 Evaluation of the EEAC's Effectiveness

The effectiveness of the EEAC is evaluated using the methodology discussed in the previous chapter. The evaluation is done for the financial year 2005/2006 using the following records provided by the energy agency:

1) Records on customer who installed energy efficiency measures with the help of local grants scheme

2) Records on installations of renewable systems by households and communities with the help of a SCHRI grant

3) Records on the total number of customers advised (including the form in which energy advice was received)

4) Records on all performed activities (presentations, information forums, school visits, press releases etc.)

Additionally a customer survey is conducted that aims to collect some customer feedback. A simple questionnaire has been designed which is used to capture information about the customer property, the uptake of recommendations as well as planned improvements and the helpfulness of the advice given. The questionnaire is available on request but not attached to this document due to its length. The survey consisted of 20 interviews with people who had received energy advice in a variety of ways. The sample structure of the survey is illustrated in Figure 9.5.

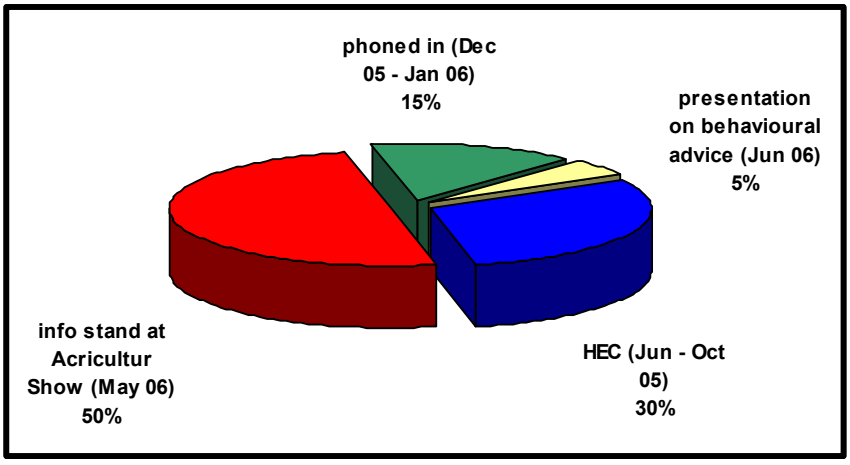


Figure 9.5: Sample structure of customer telephone survey

More than a half of the people interviewed received energy advice only shortly before the survey was conducted and therefore didn't have sufficient time to react on the advice they received. The reason for interviewing these customers was a lack of customer details currently accessible that predate April 06. Therefore, customers were also asked about planned installations which was taken into account for estimating the uptake rate for different measures at a later stage of this evaluation. The principal outcomes of the telephone survey are listed in Appendix B.1 of the report.

The benefits in terms of energy, carbon and cost savings are calculated, using the tools discussed in the previous chapter of this report, for 2 domains. These are:

A. **Energy efficiency advice to households**

B. **Renewable energy initiatives**

The benefits of the remaining activities (e.g. local authority support and education initiatives) are quantified in form of increasing awareness for energy efficiency and sustainable development.

9.3.1 Quantifying Energy, Carbon and Cost Savings

The energy, carbon and cost savings advanced by the energy agency through provision of direct energy efficiency advice to households (excluding pure provision of leaflets and guides) are quantified in the following two steps:

Step 1: Quantify savings resulting from installations through local grant schemes based on detailed records available

Step 2: Quantify savings resulting from uptakes of advised measures as well as behavioural changes based on the outcomes of the customer survey

In order to estimate the benefits in form of energy, carbon and cost savings a number of assumptions had to be made. All assumptions made are based on information confirmed by the Energy Agency and are stated in Appendices B.2 and B.3 of the report.

Step 1

To quantify the annual energy and carbon savings resulting from installations undertaking through the grant schemes, the records of installations have been processed by the type and size of the property in which measures were installed and have been feed into the EEC spreadsheet 2005-2008 which was supplied by Ofgem in order to support this research. Annual cost savings were calculated separately using the energy savings extracted from the spreadsheet together with average fuel costs predicted by DTI for the year 2006 (see section 8.3.3.3).

Table 9.1 summarises all quantified annual energy, carbon and cost savings for the different installed measures [3]. A detailed summary on installations undertaken as well as assumptions made to quantify the resulting savings can be found in Appendix B.2 of this report.

	Number of installations	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
Virgin loft insulation	189	1391	90.2	33437
Top-up loft insulation	46	104	6.6	2200
Cavity wall insulation	219	935	52.3	19055
Water tank insulation	16	10	0.6	247
Condensing boiler	146	400	20.8	8018
Total	616	2840	170.5	62957

Table 9.1: Annual savings from installed measures

The total lifetime carbon savings of all the installed measures are assessed with 5,314 tonnes C or equivalent 19,485 tonnes CO_2.

Step 2

Using the outcomes of the customer survey (Appendix B.1) for estimating the percentage of advised customers who follow diverse recommendations has taken into account the uptake of recommendations as well as planned improvements. Estimations are made for 3 main groups of advised customers as previous UK surveys have shown that the rate of uptakes depends on the form in which energy advice is received. The 3 groups are:

Group A: Customers who received home energy report or a home visit

Group B: Customers who phoned the energy agency

Group C: Customers who received advice at presentations/information stands

The estimated rate of uptakes for each group as well as for the average across all groups is listed in the following table. The uptake rate for low energy light bulbs is comparably high due to a free CFL bulb distributed to each customer who has received face-to-face advice from the energy advisers.

	Group A	Group B	Group C	Average across all 3 groups
Installation of				
Loft insulation (top-up)	8.3	6.6	1.8	4.5
Loft insulation (virgin)	3.4	1	1	1
Cavity wall insulation	6.6	3.4	3.6	4.5
Condensing boiler	3.4	6.6	1.8	3
Low energy light bulbs	33	33	73	55
Energy efficient appliances	1	1	9	5
Heating control	1	1	4.5	2.5
Draught proofing	9	1	1	2.5
Following advice on				
Cooking/appliances	1	1	27	15
Heating/hot water	33	33	18	25
Lighting	17	66	36	35
Others	17	1	9	10

Table 9.2: Estimated uptake rates in % for different recommendations

The percentage rates are based on the following assumptions:

1) The uptake rate for measures which are supported by local grant schemes is estimated by assuming that only 20% of all customers who install these measures do so without the help of a local grant. The remaining 80% are automatically recorded by the agency through their own grant schemes.

2) Only a half of all planned improvements will be realised

3) For recommendations which none of the respondents had implemented or plan to do so the uptake rate is assumed to be 1%.

In case the number of own grant schemes run by the energy agency decreases the percentage of customers who install measures without being recorded by the EEAC would automatically increase since customers would alternatively make use of

national grants and grants offered by utility companies. This has to be taken into account when using the values of table 9.2 for future evaluation.

Using the percentages listed in table 9.2 the number of installations as well as the number of behavioural changes have been estimated for 2 different scenarios. These are:

Scenario I: The benefits are calculated for each main group of customers advised using the differing uptake rates.

Scenario II: The benefits are calculated for the total number of customers advised using the average uptake rate which has been estimated across the 3 groups.

For each scenario the benefits in terms of energy, carbon and cost savings are calculated using the EEC spreadsheet 2005-2008 as well as the savings estimated for behavioural changes (see section 8.3.3.4). According to the statistics received from Alan McGonigle, Assistant Manager of the energy agency, and statistics extracted from the agency's 'event records' database a total number of 6,339 domestic customers have received any form of energy advice by the energy agency during the assessed financial year. Out of these 6,339 customers 2,107 belong to Group A, 2,569 to Group B and 1,663 fit into Group C. Table 7 shows the benefits estimated for both scenarios. Since some people phone the energy agency for information on certain events but do not directly receive energy advice, a discount rate of 5% has been assumed. Thus, the calculation for Group B is based on 2440 customers advised. Appendix A.3 outlines all estimations leading to the results in table 9.3 as well as all assumptions made.

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
All installations			
Scenario I	6067	330	145712
Scenario II	5198	288	135379
All behavioural changes			
Scenario I	3756	260	153213
Scenario II	3446	240	139746
Total			
Scenario I	9832	590	298925
Scenario II	8644	528	275125

Table 9.3: Annual savings based on customer survey outcomes

The total lifetime carbon savings are estimated at 10,888 tonnes C or equivalent 39,923 tonnes CO_2 for scenario I and at 9,621 tonnes C or equivalent 45,277 tonnes CO_2 for scenario II.

The benefits in form of energy, carbon and cost savings for all renewable energy systems installed with support of the energy agency are estimated in the following part of this section.

There have been 4 community renewable projects put into practice during April 2005 and March 2006 [4]. These are:

1) A 6kW wind turbine for a sport centre in Largs
2) A 50kW wind turbine for Gatehouse community initiative
3) A 45kW wood pellet heating system for Glenkens community & arts trust
4) A ground source heat pump (radiator heating) together with improved loft insulation (200mm top-up) for Beattock village hall

The specifications known for these installations are listed in the following tables.

	Turbine				Location
	Manufacturer	Rotor ' diameter (m)	Hub hight ' (m)	Lifetime ' (years)	Average annual '' wind speed (m/s)
6kW turbine Largs	Proven Energy	5.5	15	25	5.0
50kW turbine Gatehouse	AOC Inc	15	25	30	6.7

* given by the manufacturer

** from UK wind speed database http://www.bwea.com/noabl/

Table 9.4: Characteristics of community wind projects

	Property			Boiler	
	Annual heating ' requirements (kWh)	Existing ' heating system	Alternative ' heating system	Rated ' output (kW)	Lifetime '' (years)
Wood pellet heating system	151200	none	LPG or Electrical	45	25

* provided by the Energy Agency

** Source http://www.woodenergy.ie/case_studies/cs1/default.asp

Table 9.5: Characteristics of community biomass project

	Property			System		
	Annual heating * requirement (kWh)	Existing heating * system	Type of * property	Thermal * output (kW)	Electrical * input (kW)	Lifetime ** (years)
GSHP system	41440	electrical	midterrace	17	3.78	30

* provided by the Energy Agency

** source http://www.actionrenewables.org/fundinggshp.htm

Table 9.6: Characteristics of community GSHP system

Table 9.7 summarises the benefits in form of annual savings for the 4 renewable developments. The energy and carbon savings resulting from both wind turbines are calculated with help of the Small Scale Renewable Energy Tool. For the GSHP system these are estimated using SERT and for the wood pellet burner the savings are based on basic calculations. The carbon emissions associated with using wood fuel (emitted in harvesting, drying and transport) strongly depend on the individual system especially its distance from the source of wood. For this report a specific analysis of the carbon emissions is not conducted. The carbon emissions are assumed with 0.0109kg/kWh [5] as extracted from a feasibility study for Penrose National Trust Estate. All assumptions made for the outcomes of table 9.7 are stated in Appendix B.4.

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
6kW turbine Largs	6.2	0.7	490
50kW turbine Gatehouse	111.7	13.1	8760
45kW wood pellet boiler	-	15.9	3175
17kW heat pump *	26.6	3.1	1492
Total	144.6	32.8	13917

* plus loft insulation

Table 9.7: Annual savings from community renewable energy projects

The total lifetime carbon savings for the 4 community renewable installations are calculated with 901 tonnes C or equivalent 3,304 tonnes CO_2.

Additionally information on the number of household renewable projects within the assessed financial year have been provided by the Energy Saving Trust [6] since SCHRI grant offers to households are not recorded by EEACs themselves. The following renewable energy projects have been developed by households in the energy agency's area of coverage:

- 18 Solar water heating systems
- 17 Ground source heat pumps
- 2 Wind turbines
- 2 Biomass systems

The values provided represent the number of grants offered for each technology including completed projects and those still in progress. Some additional information on the different systems is provided which enables a rough estimation of the annual savings. These are summarised in table 9.8. The energy and carbon savings resulting from the solar water heating systems as well as from both wind turbines are calculated with help of the Small Scale Renewable Energy Tool. For the GSHP and biomass systems savings are estimated using basic calculations. All assumptions made are stated in Appendix B.5 of this report.

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
18 Solar heating systems	15.1	1.0	303
17 GSHP systems	599.8	35.4	1484
2 Biomass systems	none	5.8	1249
2 Wind turbines	11.7	1.4	915
Total	626.6	43.6	3951

Table 9.8: Annual savings from household renewable projects

The total lifetime carbon savings for all installations are estimated at 1,267 tonnes C or equivalent 4,646 tonnes CO_2.

For this report benefits attributable to replication are assumed to be in form of increasing public awareness rather than quantifiable energy and carbon savings. This assumption has been made in close cooperation with the energy agency. It is identified to be a very reasonable estimation considering the EEAC's focus groups as well as the ways the advice centre promotes its grant schemes.

9.3.2 Other Quantifiable Outcomes

There are other benefits from the work of the South West Scotland EEAC which could not be quantified inform of energy and carbon savings. These are the increasing awareness of householders, businesses and local authorities as well as possible jobs created in the area.

Increasing householder awareness

The energy agency organises information stands at a variety of locations such as supermarkets, Bingo galas and open information days at local resource centres in order to raise the public awareness for energy efficiency. Additionally, presentations were held to different target groups such as elderly people, hospital staff or private landlords, which inform about various ways to improve energy efficiency. There were additional presentations specifically on renewable energy held throughout the year. All these activities are listed in the following table.

	Total number of presentations	Average number of attendees
EE Presentations in day hospitals	12	12
EE Presentations to community groups	6	35
EE Exibitions/information forums	16	81
Presentations to private landlords	2	48
Presentations on renewable energy	2	47
Renewable energy fair	1	600

Table 9.9: Number of public presentations and information forums

There has been a renewable energy fair in November 2005. It was the first one of its kind and has received a very good response with around 600 visitors during the two day period.

The energy agency has a large contribution to increasing energy awareness among school children. The table below lists the details on class presentations in local schools for the assessed financial year.

	Total number of presentations	Average number of attendees	Total number of attendees
Primary school lessons + games	106	31	3299
Secondary school lessons	52	26	1358
School competition ceremonies	3	81	244

Table 9.10: Number of school presentations on energy efficiency and renewable energy

An increased public awareness is also achieved by the advice centre through press releases and articles in local papers as well as TV or radio adverts which do not only call attention to the necessity of energy efficiency but also point out the activities of the advice centre as well as local grants on offer. The press is also used to advertise the yearly renewable energy fair. Around 15 newspapers are used for publicity including the Ayrshire Post, the Irvine Herald and the Garrick Gazette.

	Total number
Press releases	14
Articles	11
TV/radio adverts	3

Table 9.11: Number of press releases, articles and adverts

In addition an Energy Guide was circulated to approximately 35,000 households in South Ayrshire (together with a grant referral) which resulted in around 120 applications for the Private Households Insulation Scheme.

Studying the statistics of the energy agency's website [7] 2983 web page visits have been identified for the assessed period. It can be said that on average more than 8 people visit the agency's web page per day.

The benefits of increasing householder awareness is also reflected in the 238 calls between April 05 and March 06, of which 60% were from rural areas, requesting advice about renewable energy and information on specific technologies as well as respective grants available. Of these 238 customers who approached the energy agency at least 20% heard about the EEAC service through word of mouth, 15% via different web sites (e.g. EST, utility companies), 16% through the local press and at least 5% got to know the EEAC through presentations.

All the people who installed an insulation measure with help of the energy agency's insulation grant have been asked how they heard about this grant scheme. The chart below demonstrates the outcome of the recordation.

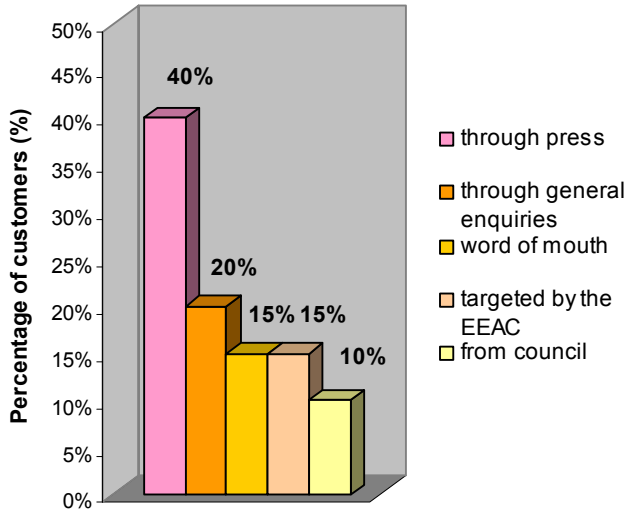


Figure 9.6: How customers heard about the Energy Agency's insulation grant

The outcomes indicate the high influence the energy agency has on the installation of energy efficiency measures in households by advertising their grant schemes through the local press.

Increasing business awareness

Although the energy agency does not posses its own business advisor its effectiveness in increasing business awareness can be quantified in the form of energy efficiency training provided to members of staff of local businesses.

	Total number of trainings	Average number of attendees
EE Staff training of Day Hospitals/Services	12	5
Training on Renewable energy use to Architects	3	5

Table 9.12: Number of staff trainings

Increasing the expertise of architects in renewable energy use and encouraging them to consider renewable technologies in their building design can lead to additional

energy and carbon savings when the knowledge gained is applied to future building projects.

Increasing local authority awareness

The increasing awareness of local authorities and housing associations as benefit of the energy agency's work is indicated in this report in the form of presentations and seminars given to them as well as key meetings with them and the number of local authorities that signed a strategy aiming to reduce energy consumption. It shall be mentioned that additionally several meetings were held with other interest groups (e.g. Scottish Power) in order to prepare events or discuss future projects.

	Total number
Information forums/presentations	6
Key meetings with LA + HA	13
SLAs signed	4

Table 9.13: Local authority support

Most key meetings with local authorities were held to initiate fuel poverty targeting and home energy projects. The events organised by the EEAC with the aim to increase the awareness of local authorities as well as housing associations towards energy efficient housing design and sustainable energy use include 2 Housing Association Forums of which the initial one was launched in September 2005. The EEAC (through LESP), furthermore, organised a Housing & Building Seminar for councillors, architects, housing associations and energy managers as well as a Renewable Energy Conference. In addition a presentation was held to 50 members of the Ayr Presbytery Committee to update on current energy efficiency measures as well as an energy efficiency training to Irvine Housing Association.

Job creation

The energy agency works with 3 local insulation installers for installing loft and cavity wall insulation, and 34 different heating installers have been used for a total of 146 jobs. Out of these the biggest insulation contractor is Clyde Insulation Contracts Ltd, and O'Neil Gas Services (30%) and Ayrshire Gasworks (16%) have installed

most of the condensing boilers. There are also 5 of the renewable systems installers, which are provisionally accredited under the SCHRI grant scheme, located in the energy agency's area of coverage and are likely to be contracted by EEAC customers.

It is estimated that one job is directly created for every £40,000 of investment, and another indirect job for every £70,000 [8]. Based on the expenditure for documented installation works of energy efficiency and renewable systems, table 9.14 shows an estimate of the jobs created from EEAC activities. The expenditure listed in table 9.14 includes:

- £539,446 for installation of insulation and heating measures [9]
- £318,905 for community renewable projects [9]
- £316,360 for household renewable projects [6]

Expenses are provided by the energy agency directly and by the Energy Saving Trust for householder renewable energy projects.

Expenditure (£)	Direct jobs created	Indirect jobs created	Total jobs created
1,174,711	29	16	45

Table 9.14: Number of potential jobs created by EEAC activities

The expenditure is for installation only. They do not include staff time or overheads to run the schemes. There is also the possibility for job creation through the work with local authorities which could lead to the creation of certain positions within the council (e.g. Environmental Advisers). However, it is not included in this evaluation.

9.3.3 Non-Quantifiable Outcomes

Non-quantifiable benefits resulting from the energy agency's effort are the provision of free and impartial advice on energy matters, development of sustainable local energy strategies as well as the promotion of best practice.

The promotion of best practice throughout the region is achieved through training on energy efficient heating and insulation installations provided to all by the energy agency contracted installers. In order to ensure the quality of heating installations

undertaken for domestic customers the energy agency spot checks around 10% of the jobs installed. This way the advice centre ensures that the condensing boilers installed through the local grant scheme have been installed to energy efficiency standards. For insulation measures spot checks are done by Scottish Power. The provision of best practice advice is secured with help of training courses and workshops to the EEAC staff provided by the industry itself or the Energy Saving Trust.

Another important outcome is the procurement of funding for grants. This is very important to the EEAC's effectiveness, since grants provide motivation for people to implement certain energy saving installations. The outcomes of the conducted customer survey have shown that the minority of people carry out installations without the help of a grant.

9.4 Conclusion

The Energy Agency's major work is concerned with promoting energy efficiency and renewable energy to homeowners, tenants, private landlords and community groups but also extensively to our future householders – schoolchildren of primary and secondary schools. Public energy efficiency awareness is raised through presentations to community groups, public exhibitions, provision of phone and written advice and the promotion of local grant schemes. The customer survey conducted in this project has shown that only 5% of the advised customers evaluate the advice given as 'not very useful'. The majority of customers feel the advice provided to them is useful (48%) or even evaluate it as very useful (21%). The reason for dissatisfaction with the advice provided could be the relatively general layout of HEC reports that do not necessarily provide household specific advice. Despite this positive customer response the outcomes of the customer survey have shown that some advised measures such as energy efficient appliances, draught proofing or heating control for the existing heating system only find little uptake. Insulation and heating measures find the most interest since there are grants available. However, the uptake rates for all energy efficiency measures are relatively small when compared to the outcomes of the German advice centre eza! (Figure 6.1).

Assessing the energy savings resulting from the provision of energy advice to domestic customers in its various forms it has been shown that the savings, which are

based on customer survey outcomes, can be reasonably calculated using uniform uptake rates across all groups of advised customers. The results of both scenarios assessed in this case study do not extremely differ and in some instances the average uptake rate (scenario II) seems rather reasonable. Hence, this report suggests using average uptake rates for future estimations.

A substantial amount of annual energy, carbon and cost savings have been quantified as result of the various activities of the energy agency throughout the period from April 2005 to March 2006. Across all evaluated activities the project has identified annual energy savings potential through energy efficiency installations of 11,484 MWh and 771 MWh through renewable energy projects. It can be said that the South West Scotland EEAC generated annual cost savings of £355,950 for its customers and reduced annual carbon emissions by 775 tonne. These furthermore lead to lifetime energy savings worth £6,736,266.

Furthermore, the evaluation identified carbon savings of 17,103 tonnes over the lifetime of the installed energy saving measures and followed recommendations which have been provoked during the assessed period. Applying the evaluation method that is used by the Energy Saving Trust would result in lifetime carbon savings of approximately 9,000 tonnes. It is shown that the actual savings are by far higher.

Taking into consideration the complete funding income [10] of South West Scotland EEAC it can be said that for each £1 of government funding energy savings worth £23.23 are generated. Its cost-effectiveness, of course, is influenced by the many assumptions in the calculation. It is based on direct energy savings through energy efficiency and renewable energy advice and support. As such it does not include:

- Any savings achieved through replication of the advice
- Possible savings resulting from the work with local authorities
- Any savings achieved through improving the energy consciousness of school children
- Any savings achieved through staff training presentations

Taking into consideration all additional benefits such as the general increase in public awareness towards reducing energy demand as well as the increase in energy awareness of local governments and the creation of 45 potential jobs in the region the outcomes of the advice centre's work are certainly satisfying. However, there is still vast scope for improvements.

9.5 References

1. Energy Agency Ayr, http://www.energyagency.org.uk/ [accessed 11 July 2006]
2. Manzano Laguna M J, Marnie A, Marquis L et al, Report on the set-up and operation of the rural DASUs-Operation – Specification for DASUs in South Ayrshire, Scotland and Cordillera Subbetica, Spain; RURASU Deliverable D.2.1 June 2006, Intelligent Energy Europe
3. Records on insulation and heating installations 2005-2006, provided by Alan McGonigle 18 July 2006
4. Records on community renewable energy projects 2005-2006, provided by Joe Fergusson 22 June 2006
5. Dulas Ltd. June 2004, A Renewable Energy Feasibility Study for Penrose National Trust Estate, produced by Dulas Ltd, page 6, http://www.clear-skies.org/CaseStudies/Documents/2124907%20-%20The%20National%20Trust%20-%20Penrose%20estate.pdf [accessed 27 July 2006]
6. Records on household renewable projects (SCHRI household grant commitments), emailed by Janet MacKechnie 11 August 2006
7. Energy Agency website statistics, emailed by Arnold van de Brug 11 July 2006
8. North Ayrshire Council. Home Energy Conservation Act – 4th HECA Progress Report, 1st April 2003 – 31st March 2005, page 19, provided by Alan McGonigle 01 August 2006
9. Installation costs for EE and community RE installations, provided by Alan McGonigle 03 August 2006 and 15 August 2006
10. EEAC funding income for the financial year April 05 to March 06, emailed by Alan McGonigle 28 August 2006

Chapter 10 CASE STUDY: STRATHCLYDE & CENTRAL EEAC

The Strathclyde & Central EEAC is managed and operated by the Wise Group in Glasgow. Its official launch took place in 1994 after a successful tender from the Wise Group who had already provided energy and benefits advice to the residents of Glasgow in the past. Strathclyde & Central is operated as one advice centre but actually consists of two EEACs covering the area of the Strathclyde and Central regional authorities. However, this project only evaluates the work of one EEAC - Strathclyde & Central West.

10.1 Description of the Region

The 2 advice centres managed by the Wise Group are called Strathclyde & Central West and Strathclyde & Central East. Figure 10.1 shows a map of the council areas covered by the two centres.

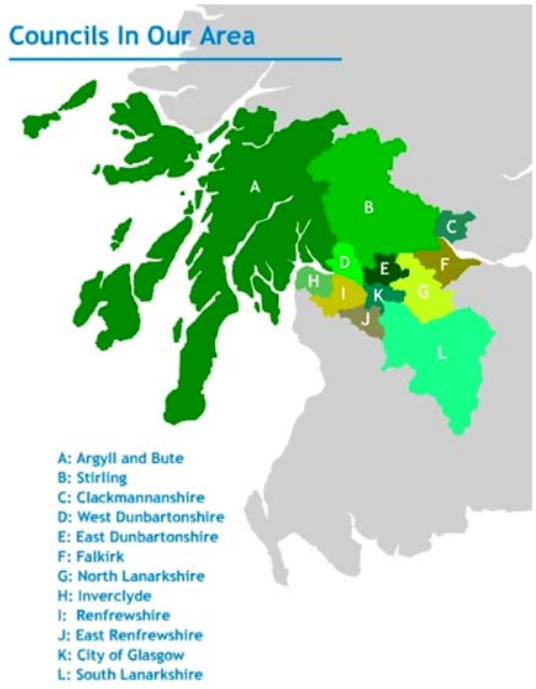
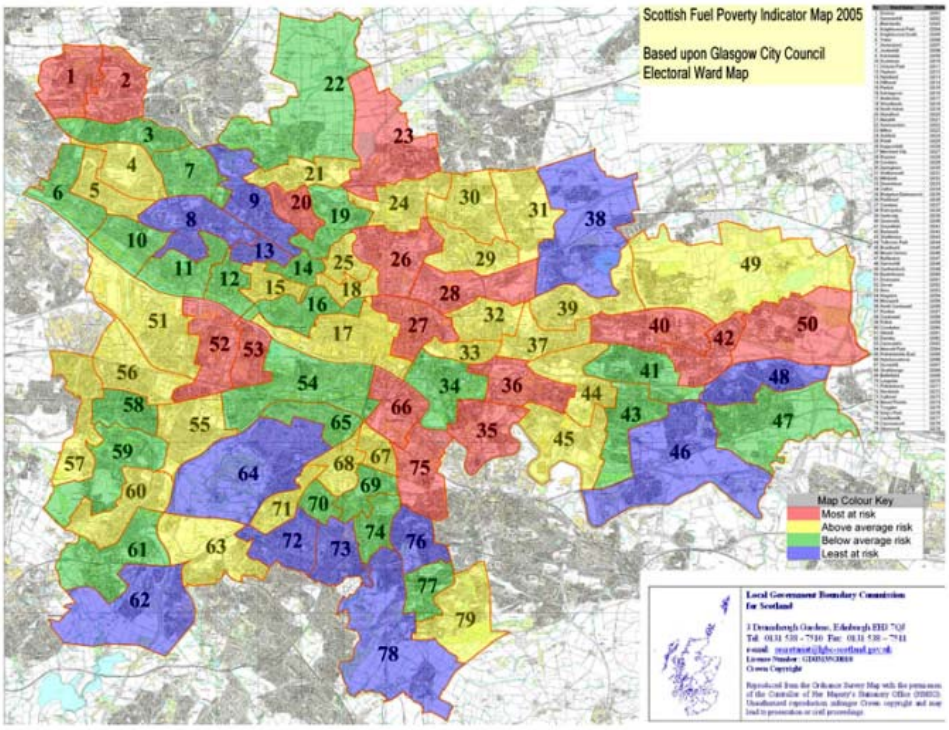


Figure 10.1: Council areas covered by Strathclyde & Central EEACs

Strathclyde & Central West, which is assessed in this report, operates in the 5 local authority areas of Glasgow City, East Renfrewshire, Renfrewshire, Inverclyde, and Argyll & Bute. The region has a population of over 1,000,000 and around 450,000 households with the majority of people living in urban areas. With Argyll & Bute the advice centre also covers a large rural area with a low population density and a good potential for renewable energy developments due to its remote location and potential wind resources.

In Glasgow City more than 50% of all areas are above average risk of containing households in fuel poverty. This is indicated in figure 10.2 (red and yellow areas).



Source: http://www.est.org.uk/housingbuildings/calculators/povertyindicator/

Figure 10.2: Fuel poverty indicator map of Glasgow City

In the other 4 local authorities there are also significant areas in which households are most at risk of being fuel poor. However in these council areas households are below average risk in most of the regions.

10.2 EEAC Structure

Strathclyde & Central West's main sector of operation is the domestic sector sustained by a strong emphasis on local authority support in order to secure grant and support schemes for households. As part of its local authority support programme the EEAC supported a successful bid by Glasgow City Council for funding from HECAction (EST funding stream) to manage the Energy Efficiency Loan Scheme (EELS) as well as HeatCare, an interest-free loan and grant scheme for over-60s home owners in Glasgow. The EEAC also specialised on targeting fuel poor households. Last year two additional projects started in conjunction with East Renfrewshire and Inverclyde council and are funded by Scottish Power. These projects target households in the two councils who have been identified for significant improvements through previously completed Home Energy Checks. Grants are available for cavity wall and loft insulation.

Strathclyde & Central EEAC (West and East) has 21 full-time members of staff including 3 LESP Officers and 1 Renewable Development Officer. The work of some members of staff (e.g. Renewable Development Officer) applies to both advice centres. Strathclyde & Central also posses 2 Outreach Energy Advisors contracted on behalf of Glasgow Housing Association in order to provide energy efficiency advice in form of home visits to their tenants. In contrast to the Energy Agency in Ayr, the advice centre also posses 2 business advisers and offers a loan (Loan Action Scotland) to support the uptake of energy saving equipment by enterprises.

10.3 Evaluation of EEAC Effectiveness

The effectiveness of the EEAC is evaluated using the same methodology as for the South West EEAC. The evaluation is done for the financial year 2005/2006 using the following records which were provided by the advice centre:

1) Records on insulation and heating installations through local loan or grant schemes

2) Records on installations of renewable systems by households and communities with the help of a SCHRI grant

3) Records on energy saving installations by businesses with the help of Loan Action Scotland

4) Records on the total number of customers advised

5) Records on all performed activities (presentations, information forums, school visits, press releases etc.)

The benefits in terms of energy, carbon and cost savings are calculated using wherever applicable the tools discussed in chapter 8 of this report. Savings are estimated for 3 domains. These are:

A. Energy efficiency advice to households

B. Energy efficiency advice to businesses

C. Renewable energy initiatives

The benefits of the remaining activities (e.g. local authority support and education initiatives) are quantified in form of increasing awareness for energy efficiency and sustainable development.

Due to a limited period of time and in some instances the lack of records a detailed assessment of these activities was not achievable but the outcomes are reasonable for demonstrating the EEAC's effectiveness. It has not been possible to conduct a customer survey for estimating the uptake of different recommendations. Therefore, the uptake rates estimated in the previous case study shall be used to quantify the benefits of the advice centre's work concerning energy advice to householders. The uptake rates used are the average percentages estimated across all groups of advised customers.

10.3.1 Quantifying Energy, Carbon and Cost Savings

The energy, carbon and cost savings advanced by the advice centre through the provision of direct energy efficiency advice to households (excluding the provision of leaflets and guides only) are quantified in the following two steps:

Step 1: Quantify savings resulting from installations through grant and loan schemes based on records available

Step 2: Quantify savings resulting from uptakes of advised measures as well as behavioural changes, using the uptake rates stated in table 9.2 of the report

In order to estimate the benefits in form of energy, carbon and cost savings a number of assumptions had to be made. All assumptions made are based on information confirmed by the advice centre.

Step 1

To quantify the annual energy and carbon savings resulting from installation of energy efficiency installations, records have been processed in the same way as in the previous case study. Records on installations of cavity wall and loft insulation were available only for East Renfrewshire and Inverclyde Council where grants were made accessible through funding from Scottish Power [1]. It is not known whether loft insulation was virgin or top-up installations. According to Patrick Thompson, Advice Service Manager of Strathclyde & Central, the common type of installation in the region is top-up loft insulation. This has been used for estimation based on a top-up level from 50mm to 250mm. Additionally there are records of 20 condensing boiler installations through the loan schemes EELS and HeatCare [1]. Due to missing customer details calculations have been done for a gas fired condensing boiler installed in a 2-bedroom semi-detached house, since this is assumed to be a common property type in Glasgow City Council. The table below summarises all quantified annual energy, carbon and cost savings for the different installed measures. A detailed summary on installations undertaken can be found in Appendix C.1 of this report.

	Number of installations	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
Loft insulation	155	266	15.07	5813
Cavity wall insulation	174	769	41.68	16136
Condensing boiler	20	47	2.42	932
Total	349	1081	59.17	22881

Table 10.1: Annual savings from installed measures

The total lifetime carbon savings of all the installed measures are assessed with 2,156 tonnes C or equivalent 7,905 tonnes CO_2. It should be noticed that the savings would be significantly higher if installation of virgin loft insulation had been assumed.

Step 2

According to the statistics provided by Patrick Thompson a total number of 14,672 domestic customers have received any form of energy advice from the advice centre during the financial year 2005/2006. Figure 10.3 indicates the number of customers and the form of advice given [2].

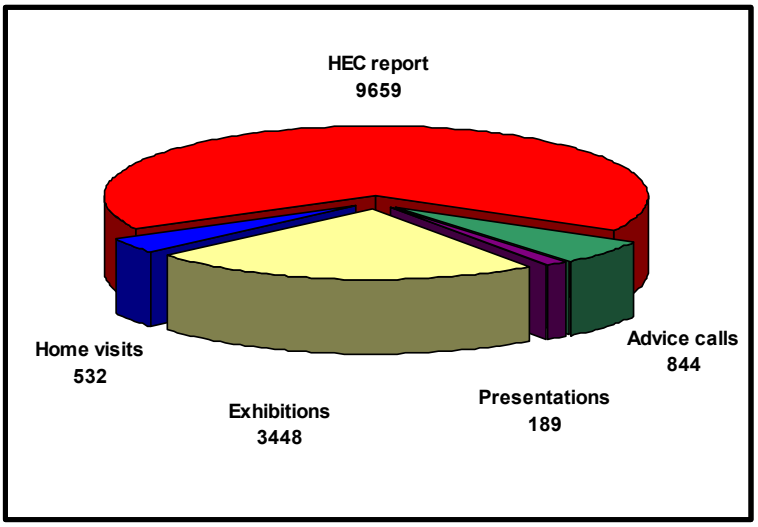


Figure 10.3: Ways households received energy advice

Using the uptake rates quantified in the previous case study (table 9.2) the advised number of households who installed different energy saving measures or followed various behavioural advices have been estimated and are summarised in Appendix C.2. The benefits in terms of energy, carbon and cost savings are calculated using the EEC spreadsheet 2005-2008 as well as the savings estimated for behavioural changes. The common property type across all 5 council areas is a 3-bedroom semi-detached house with a gas heating system for which the savings from installations are estimated. All additional assumptions equal the assumptions made in chapter 9 and can be found in Appendix B.3. All estimations leading to the results in table 10.2 are outlined in Appendix C.2.

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
All installations	9320	527	257914
All behavioural changes	8138	567	330070
Total	17458	1094	587984

Table 10.2: Annual savings based on customer survey outcomes

The total lifetime carbon savings are estimated at 17,561 tonnes C or equivalent 64,390 tonnes CO_2.

In addition to household installations, three local companies have taken action to reduce their energy consumption after receiving an energy visit from the EEAC as well as an energy audit from an energy consultancy working on behalf of the Scottish Executive or the Carbon Trust. The energy reducing technologies have been installed by the 3 businesses with help of Loan Action Scotland.

Client	Installed measure	Lifetime (years)	Existing fuel type
1	New heating system and linked compressor	15	Electricity
2	Steam system	15	Oil
3	Roof insulation and external cladding	30	Gas

Table 10.3: Professional business installations

Unfortunately there are no technical specifications available for each installation. The annual energy, carbon and cost savings used in this report have been estimated by the contracted consultancies. The calculations for the insulation and heating system were carried out by the Campbell Palmer Partnership Ltd and the estimates for the steam system by an independent Environmental Engineer. All estimates were derived by considering the current energy usage and efficiency rating of the machinery and its comparison to modern equipment. Table 10.4 summarises the annual savings that have been assessed for the 3 business installations [3].

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
New heating system	116.1	19.4	7620
Steam system	2158.5	146.8	76500
Insulation	75.8	3.9	1870
Total	2350.4	170.1	85990

Table 10.4: Annual savings from professional business installations

The total lifetime carbon savings resulting from the 3 business installations are calculated with 2,611 tonnes C or equivalent 9,573 tonnes CO_2.

Additionally to savings resulting from these medium and high cost installations there are also savings attributable to the implementation of no and low cost measures by some businesses after receiving an energy audit. This for example includes behavioural changes of the staff as well as the installation of low energy lighting. According to Angela Graham, Business Adviser of Strathclyde & Central, at least 10% of all businesses advised will cut down their energy bills with help of such low and no cost measures which can reduce their annual energy consumption by 10% to 20% [4]. For this project's evaluation such savings are estimated with 20% additional to the savings from the above stated installations. A lifetime of 10 years is assumed. Table 10.5 lists the total savings attributable to installation of low cost energy efficient business improvements.

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
Low cost business installations	470.1	34.0	17198

Table 10.5: Annual savings from low cost business installations

The total lifetime carbon savings attributable to no and low cost business installations are estimated at 340 tonnes C or equivalent 1247 tonnes CO_2.

The benefits in form of energy, carbon and cost savings for all renewable energy systems installed with support of the Renewable Development Officer of Strathclyde & Central EEAC are estimated in the following part of this section.

There have been 3 community renewable projects carried out between April 2005 and March 2006. These are:

1) A solar water heating (flat plate) system for a new built housing block (8 flats) for Partick Housing Association in addition to advanced wall (0.2 W/m^{2}K) and roof (0.12 W/m^{2}K) insulation and the use of two 60kW gas condensing boilers instead of eight 200W combi boilers

2) A 60kW wood chip heating system for Coachhouse Trust

3) A ground source heat pump (under floor heating) for Kirkhaven Hostel

The specifications for these installations have been provided by the Renewable Development Officer [5] and are listed in the following tables. Additionally assumptions are made as indicated.

	System				Property
	Total panel area (sqm)	Efficiency * (%)	System orientation	Lifetime ** (years)	Roof pitch (deg)
Solar water heating Partick HA	16	30	south facing	25	30

* source Energy Saving Trust Factsheet 3 - Solar Water Heating
** source http://www.actionrenewables.org/FactsheetPDFs/swh.pdf

Table 10.6: Characteristics of community solar water heating system

	Boiler		Property		
	Rated output (kW)	Design life * (years)	Annual heating ** requirements (kWh)	Boiler output	Existing heating system
Wood chip heating system	60	25	123557	space heating	gas warm air heaters

* Source http://www.woodenergy.ie/case_studies/cs1/default.asp
** based on heating bills

Table 10.7: Characteristics of community biomass system

	Property		System		
	Annual heating requirement (kWh)	Alternative heating system	Heating peak load (kW)	CoP	Lifetime * (years)
GSHP for Kirkhaven Hostel	92495	gas combi boiler	74.5	4	30

* source http://www.actionrenewables.org/fundinggshp.htm

Table 10.8: Characteristics of community ground source heat pump

Table 10.9 summarises the benefits in form of annual savings for these 3 renewable developments. The energy and carbon savings resulting from the solar water heating system are calculated with help of the Small Scale Renewable Energy Tool. Additionally the savings resulting from the advanced insulation and heating system have been estimated by John Gilbert Architects during the project development phase. For the GSHP system and the wood pellet burner the savings are based on basic calculations. All additional assumptions made for the outcomes of table 10.9 are stated in Appendix C.3.

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
16 sqm solar panels *	57.6	3.0	1152
60kW wood chip boiler	none	5.3	1112
74kW heat pump	85.7	2.9	881
Total	143.3	11.2	3145

* plus advanced insulation and heating system

Table 10.9: Annual savings from community renewable energy projects

The total lifetime carbon savings resulting from all 3 renewable community projects are calculated with 286 tonnes C or equivalent 1049 tonnes CO_2.

Additionally information of the number of household renewable projects has been provided by the Energy Saving Trust. The following renewable energy projects have been developed by households in the total Strathclyde & Central (East and West) area of coverage [6]:

- 21 Solar water heating systems
- 24 Ground source heat pumps
- 3 Biomass systems
- 1 Wind turbine (South Lanarkshire)

These in turn represent the number of grants offered for each technology including completed projects and those still in progress. Since this project's evaluation only considers Strathclyde & Central West it is assumed that 11 solar heating systems, 12 ground source heat pumps, and 2 biomass systems have been installed by advised households between March 05 and April 06 in the respective area. The energy and

carbon savings resulting from the solar water heating systems are calculated with help of the Small Scale Renewable Energy Tool. For the GSHP and biomass systems savings are estimated using basic calculations. All assumptions made are as indicated in Appendix B.5 of this report.

	Annual energy savings (MWh/a)	Annual carbon savings (tC/a)	Annual cost savings (£/a)
11 Solar heating systems	9.3	0.6	185
12 GSHP systems	423.4	25.0	1047
2 Biomass systems	none	5.8	1249
Total	432.6	31.4	2481

Table 10.10: Annual savings from household renewable energy projects

The total lifetime carbon savings resulting from all installations are estimated with 911 tonnes C or equivalent 3,340 tonnes CO_2.

Similar to the previous case study the benefits attributable to replication are thought to be in form of increasing public awareness rather than quantifiable energy and carbon savings.

10.3.2 Other Quantifiable Outcomes

There are other benefits resulting the work of the Strathclyde & Central West EEAC which could not be quantified inform of energy and carbon savings but generally in form of increasing awareness towards sustainable energy matters. Furthermore a number of potential jobs created are estimated in this section.

Increasing householder awareness

The EEAC's outcomes in form of increasing public awareness towards energy efficiency can be quantified with help of the indicators listed in table 10.11. The advice centre, similar to the Energy Agency in Ayr, aims to increase household awareness also by promoting energy efficiency and renewable energy in the education sector. Two lessons were held to 55 school classes with a period of 2 weeks in between.

	Total number of presentations	Average number of attendees
EE presentations	9	21
EE exhibitions	121	30
EE school lessons	110	30
Presentations on renewable energy	9	20

Table 10.11: Number of public presentations and exhibitions

The advice centre furthermore organised an Energy Saving Week event at the three main universities in Glasgow where free energy efficiency advice was offered to students and university staff. Another initiative which aimed to promote renewable energy to domestic customers was an 8-day Renewable Energy mobile exhibition in various towns in the West of Scotland.

Additionally to increasing public awareness through the provision of energy efficiency presentations to community groups and information forums (exhibitions) in supermarkets and other public places, the advice centre also uses the local press for communicating sustainable energy use to the public. This has been done through 12 articles in newspapers and magazines, and 1 radio interview between March 2005 and April 2006. Information provided by Strathclyde & Central EEAC demonstrates a total of 4868 web site visits during the assessed period. It can be said that in average 13 people visit the EEAC's web page per day.

Increasing business awareness

The contribution of the EEAC towards increasing company awareness of the importance of reducing energy demand in the business sector is quantified inform of the number of energy visits, and energy and Envirowise audits to individual businesses as well as advice presentations to a group of representatives of various companies. These figures are listed in the following table. A Continuous Professional Development training session on renewable energy use was, furthermore, held to a group of architects with an attendance of 12 staff.

	Total number
Energy site visits	68
Energy audits	58
Envirowise audits	37
Advice presentations	5

Table 10.12: Business advice

Although there are only records of 3 business installations of energy efficient measures, there have been 7 other applications for a Loan Action Scotland grant. There are different reasons why these have not been realised as for instance annual savings did not exceed the required £1000. However it indicates the awareness of the potential for reducing the company's energy consumption after receiving an energy audit organised by the energy advice centre.

Increasing local authority awareness

Another outcome of the work of its LESP officers is the enhancement of energy efficiency awareness of the 5 local authorities. As in the previous case study this work is indicated in the form of presentations and seminars held as well as key meetings with and strategies signed by the local authorities. Additionally several meetings were held with other interest groups in order to prepare events or discuss future projects.

	Total number
Information forums/presentations	6
Key meetings with LA + HA	20
SLAs signed	5

Table 10.13: Local authority support

Several events were organised by the EEAC with the aim to increase the awareness of local authorities as well as housing associations towards energy efficient housing design and sustainable energy use. These include:

- Energy Efficiency Strategy Consultation event
- Glasgow Fuel Poverty event
- 2 Social Housing Energy Forum events

- ‘Taking the Lead: Planning and Sustainable Energy’ event
- EE presentation & Workshop

The Glasgow Fuel Poverty Event for instance aimed to highlight the issues surrounding fuel poverty and to consult on the development of effective fuel poverty strategies.

The energy efficiency presentation with additional workshop was provided to Renfrewshire and Inverclyde stock transfer team as part of a project for which Faber Maunsell, a local consultancy company, has been employed in order to ensure that sustainable energy remains on the agenda throughout the existing process of stock transfer.

Job creation

Similar to the previous case study it is estimated that one job is directly created for every £40,000 of investment, and another indirect job for every £70,000 [7]. The accessible expenses include:

- £45,529 for heating installations (EELS and HeatCare) [8]
- £90,950 for insulation installations (estimated based on records of installations)
- £100,000 for the 3 business installation [9]
- £139,475 for community renewable projects [10]
- £225,466 for household renewable projects [6]

Table 10.14 demonstrates the estimated number of potential jobs created.

Expenditure (£)	Direct jobs created	Indirect jobs created	Total jobs created
601,420	15	8	23

Table 10.14: Number of potential jobs created

The estimation is based on installations recorded by the advice centre itself or the Energy Saving Trust. Potentially there are much larger expenses on energy efficiency

measures which are induced by the advice centre, but are not directly recorded by the EEAC itself.

10.3.3 Non-Quantifiable Outcomes

Non-quantifiable benefits resulting from the work of the energy advice centre are comparable to those of the Energy Agency in Ayr due to their similar operation. These are the provision of free and impartial advice on energy matters, development of sustainable local energy strategies as well as the promotion of best practice.

An additional benefit of the work of the advice centre is the decrease of fuel poverty in the area through selective promotion of energy saving measures and the grants available to fuel poor households. It has been identified that 40% of all recorded insulation installations have been undertaken in priority households where people were not able to pay for installation themselves.

Another important outcome is the procurement of funding for grants. Again this is a very important drive for the effectiveness of the advice centre, since grants provide motivation for people to implement certain energy saving measures and support people who are not able to pay for installation themselves.

10.4 Conclusion

The major work of the advice centre is concerned with promoting energy efficiency and renewable energy to householders and community groups. Promoting energy efficiency measures and supporting the installation of these is done in conjunction with local authorities and utility companies such as Scottish Power. Another significant activity is the consultation of small and medium scale businesses in form of energy site visits and energy or environmental audits. However during the assessed period only 3 businesses carried out major energy efficiency improvements with help of Loan Action Scotland after being given an energy audit by a contracted energy consultancy. This is a surprisingly low result which indicates that there have to be greater impulsions for local businesses to invest in energy saving technologies.

Significant benefits in the form of annual energy, carbon and cost savings have been quantified as result of the various activities of Strathclyde & Central West EEAC

throughout the period from April 2005 to March 2006. It have been found annual energy savings potential through energy efficiency installations in the domestic sector of 18,539 MWh and 2,821 MWh in the business sector, as well as energy savings of 576 MWh per annum through renewable energy projects. It can be said that the advice centre generated annual cost savings of £719,679 for its customers and reduced annual carbon emissions by 1,400 tonnes. This furthermore leads to lifetime energy savings worth £10,641,411.

The evaluation identified carbon savings of 23,865 tonnes over the lifetime of all installed measures and followed recommendations that have been provoked during the assessed period. Using the Energy Saving Trust's evaluation procedure would result in lifetime carbon savings of approximately 15,000 tonnes. Thus, it is demonstrated that the actual savings by far exceed the EST estimation.

Estimating cost-effectiveness based on the funding income [11] of the Strathclyde & Central West EEAC it can be said that for each £1 of government funding energy savings worth £40.46 are generated. The cost-effectiveness again is influenced by the many assumptions in the calculation and does not take into account possible savings attributable to replication or local authority support initiatives. Taking into consideration all additional benefits such as increasing awareness, decrease in fuel poor households as well as the creation of 23 potential jobs in the area, the outcome of the advice centre's work is certainly rewarding but there is, similar to the South West Scotland EEAC, still scope for improvements.

10.5 Reference

1. Records of insulation and heating installations 2005-2006, provided by Patrick Thompson 25 July 2006
2. Records of EEAC activities and the number of advised customers 2005-2006, emailed by Patrick Thompson 26 July 2006
3. Estimations of savings from the 3 business installations (Loan Action Scotland), emailed by Brian Canning 03 August 2006
4. Angela Graham - Business Adviser of Strathclyde & Central EEAC, telephone conversation 09 August 2006

5. Records on community renewable energy projects 2005-2006, provided by Neil Phillips 03 August 2006
6. Records on household renewable projects (SCHRI household grant commitments), emailed by Janet MacKechnie 11August 2006
7. North Ayrshire Council. Home Energy Conservation Act – 4th HECA Progress Report, 1st April 2003 – 31st March 2005, page 19,
   provided by Alan McGonigle 01 August 2006
8. EELS and HeatCare installation costs 2005-2006, emailed by Patrick Thompson 14 August 2006
9. Installation costs for the 3 business projects (loans provided), emailed by Brian Canning 09 August 2006
10. Installation costs for the 3 community RE projects, provided by Neil Phillips 16 August 2006
11. EEAC funding income for the financial year April 05 to March 06,emailed by Patrick Thompson 25 August 2006

Chapter 11 A COMPARISON BETWEEN THE EVALUATED ENERGY ADVICE CENTRES

In this chapter a comparison of the work and its effectiveness of the two evaluated energy advice centres is drawn. This mainly concerns the energy efficiency advice to households as well as renewable energy initiatives. It is aimed to conclude potential points of weakness and strength for both EEACs and to make some recommendations on possible improvements.

11.1 Comparison of the Advice Work

The two Scottish Energy Efficiency Advice Centres that have been evaluated in the previous two chapters differ significantly regarding the area they are covering. The work of Strathclyde & Central West mainly applies to urban regions, with Argyll & Bute the only remote rural area of coverage. On the other side the South West Scotland EEAC mainly works in rural areas with numerous remote communities and households. The business sector is extremely stronger in Strathclyde & Central West Scotland, not alone because of Glasgow City as covered council. That's why the advice centre in Glasgow in comparison to the one in Ayr employs a business advisor. Otherwise the remaining activities and services are similar for both advice centres apart from differences in the form of energy advice provision to domestic customers.

The ways energy advice is provided to domestic customers are in general similar for both advice centres. However the different forms of advice provision are used with differing intensities by both EEACs. This is indicated in figure 11.1 which demonstrates the percentage of households who received energy advice in a certain way.

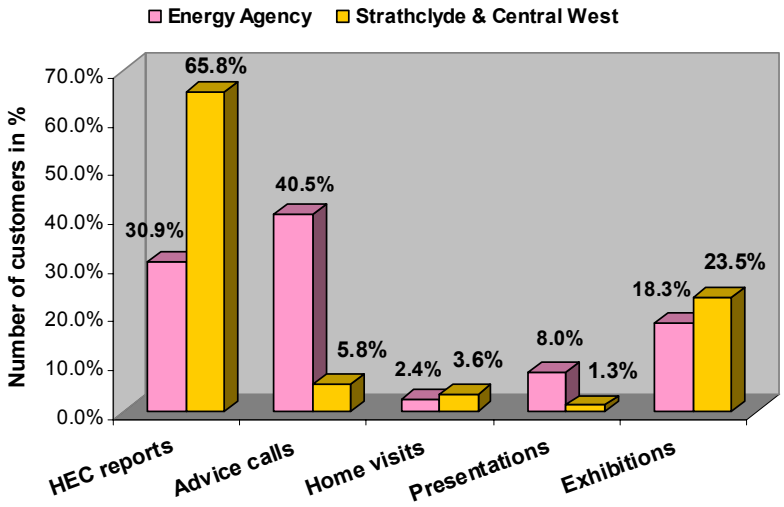


Figure 11.1: Comparison of the provision of energy advice to domestic customers

It can be said that the Strathclyde & Central West EEAC processes twice as many Home Energy Check forms as the Energy Agency in Ayr and thus its main form of advice provision is in a written form. According to the outcomes of the customer survey conducted in 2002 by New Perspectives written advice is rather remembered than verbal advice, and both forms of advice together are most effective. Therefore the approach of Strathclyde & Central West EEAC can be seen as effective. However, an increased emphasis on verbal advice provision could further improve its work but also create a closer relationship to its customers and further encourage general public awareness for example through more public presentations. In contrast, the Energy Agency in Ayr provides a majority of energy advice to households in verbal form. Its large fraction of advice calls demonstrates that many of its customers approach the EEAC themselves. This demand in energy specific advice possibly follows from its stronger public works in form of presentations and exhibitions but also due to more intensive media work. However, the advice centre should back up its verbal advice by encouraging people to fill in a HEC form which will lead to a report being sent to them. This is especially of importance for people advised at information stands in public places since this is often in a busy environment and specific advice might not be remembered but only the existence of the advice centre itself.

11.2 Comparison of the Effectiveness

The number of recorded energy saving installations, which have been carried out by advised customers during the last financial year with help of local grants or loan schemes, are compared for both advice centres in the figure below.

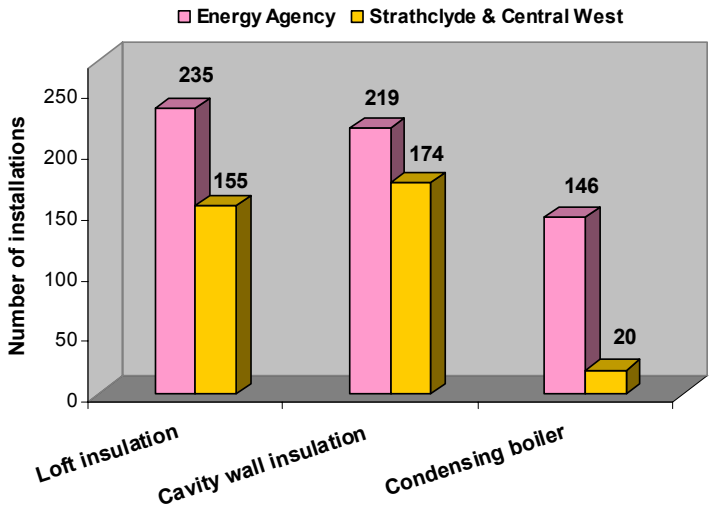


Figure 11.2: Comparison of energy efficiency installations

Surprisingly the number of installations in South West Scotland is significantly higher than for Strathclyde & Central West, although the number of people who received energy efficiency advice is less than the half. This could have various reasons. One important reason is the difference in promotion and recording of the grant schemes. Unlike the advice centre in Glasgow the Energy Agency in Ayr provides its grants to all its council areas and promotes it through letters sent out on behalf of the council, at presentations and exhibitions, on the telephone and sometimes in local newspapers. Customers wanting to take up a grant need to get in direct contact with the advice centre and every installation is recorded in detail including information on the way customers heard about the grant. On the other side Strathclyde & Central EEAC does not provide unique grant schemes to all its council areas and information on an area specific grant scheme is mainly provided through letters sent out on behalf of the councils (Inverclyde and East Renfrewshire). There is also a lack of records on all installations undertaken. Another explanation could be a higher uptake of national grants (e.g. Warm Deal) and offers provided by utility companies in Strathclyde & Central West due to the large number of vulnerable households in the coverage area.

In general the advice centre in Glasgow tries to target fuel poor households by promoting available grants to those, which the Energy Agency in Ayr has not specifically done.

There is also an outstanding difference between the two advice centres regarding renewable energy projects that have been developed within the assessed period. Figure 11.3 demonstrates the total number of renewable energy installations supported by both advice centres. These include community and household installations.

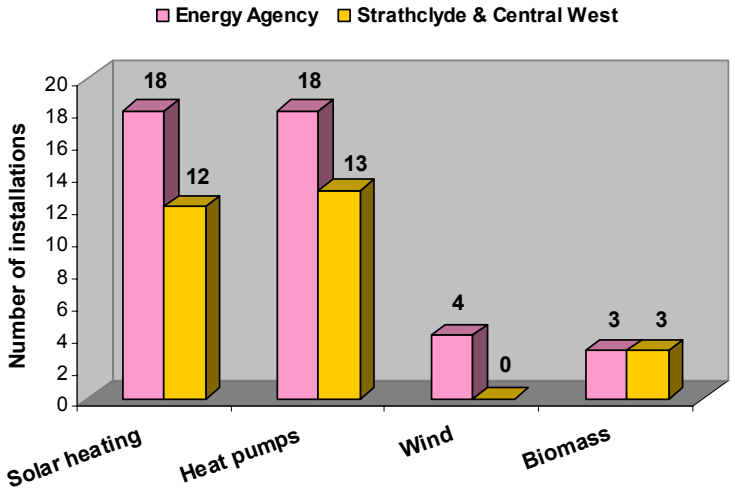


Figure 11.3: Comparison of renewable energy installations

Both EEACs have achieved the implementation of numerous renewable energy projects. In South West Scotland the number of renewable energy developments is higher than in Strathclyde & Central West Scotland. One obvious reason is the occurrence of many rural communities and remote dwellings in South West Scotland that can benefit from renewable energy developments. Furthermore, its coastal location is advantageous for small-scale wind energy developments. However, both characteristics also apply to Argyll & Bute, which is covered by the energy advice centre in Glasgow, but there have been no community renewable energy projects developed during the assessed period. The 3 community renewable installations are all based in Glasgow which leads to the conclusion that the distance between the advice centre and its customers is a significant aspect of the effectiveness of its work. Additionally Strathclyde & Central EEAC only possess one Renewable Development

Officer who covers both areas, West and East. This possibly leads to a shortage of intensive work in the remote regions which make 50% of the coverage area.

The lifetime energy savings resulting from the work of the energy advice centre can be applied to the total number of the EEAC customers. This ratio indicates the effectiveness of the EEAC work in its area and is rather appropriate for comparison purpose than the use of energy savings on its own. It estimated that the activities of the South West Scotland EEAC lead to annual energy savings worth £1062 per customer. Lifetime energy savings generated by the Strathclyde & Central West EEAC are worth £725 per customer when considering all services provided and £624 per customer when excluding savings resulting from business advice. Hence, the effectiveness of the South West Scotland EEAC is higher when demonstrated in form of this ratio. Looking at the cost-effectiveness of the advice centres on the other hand, the Strathclyde & Central West EEAC, however, seems to be more effective in generating energy savings per £1 of government funding provided. Its cost effectiveness has been estimated with energy savings worth £40.46 per £1 of government funding in comparison to the South West Scotland EEAC where £1 of government funding only leads to energy savings worth £23.23. However it has to be kept in mind that government funding only covers a part of the total EEAC expenditure, which is significantly influenced by the set-up of the organisation. In this report the cost-effectiveness based on total EEAC expenditure could not be evaluated but it is believed to be more suitable for comparison purpose.

11.3 Conclusion

The evaluation of both advice centres has shown that their activities result in significant savings in energy consumption and hence in the emission of carbon as green house gas. They furthermore generate savings in their customer's fuel bill and enhance general public awareness for efficient and renewable energy use. However, both advice centres should provide energy advice to households in a better balance of verbal and written energy advice.

In conclusion the South West Scotland EEAC seems to be more successful in realising energy saving installations with help of its grant schemes. However, it lacks in targeting fuel poor households. That should be part of its future work.

In order to enhance the installation of energy saving measures Strathclyde & Central West EEAC should provide a unique grant scheme available to households of all 5 council areas. All installations should be recorded by the advice centre directly with documentation on customer and property details. Additionally, Strathclyde & Central EEAC requires a second Renewable Development Officer due to its large working region of 12 council areas. This way it would be able to reach even remote areas such as Argyll & Bute where there is a good potential for renewable energy developments.

Chapter 12 PROSPECTS FOR THE WORK AND ITS EFFECTIVENESS OF SCOTTISH EEACS

The future development of the effectiveness of Energy Efficiency Advice Centres is affected by 3 main factors. These are:

- The development of public demand for sustainable energy
- The development of fuel prices
- The scope for improvements

It is obvious that the development of fuel prices significantly influences the demand for energy saving measures and renewable systems, but there are also other factors of influence such as the confidence in renewable energy technologies.

This chapter outlines the prospects for Energy Efficiency Advice Centres in Scotland by studying these factors with attention especially paid to the domestic sector.

12.1 Development of Public Demand for Sustainable Energy

The development of the public demand for sustainable energy is discussed by means of records available from the two evaluated energy advice centres and the Energy Saving Trust. This development study covers the demand for energy efficiency and renewable energy advice as well as the progression of sustainable installations over the last few years.

The hits on the web site of South West Scotland EEAC [1] show an extremely increasing public interest in energy efficiency after August 2005. This signifies the reaction to the rising fuel prices in the same month. The hits on the website have tripled since, which demonstrates that many people become more and more interested in eliminating wasted energy in order to keep their fuel bills as low as possible.

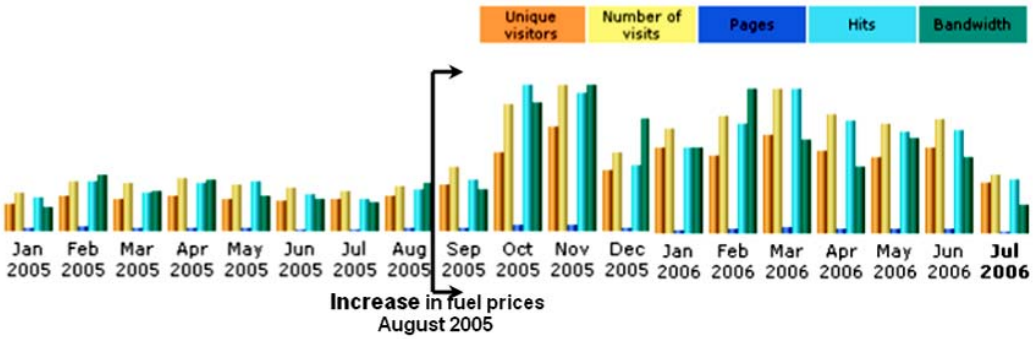


Figure 12.1: Web site statistics for South West Scotland EEAC web site

This development will be pushed further with the introduction of the Energy Performance Certificates for buildings in the year 2009, since that will lead to the direct confrontation with the energy performance of people's homes and that of other homes in comparison.

An increasing interest in sustainable energy is also demonstrated through the increase of household enquiries over the last 3 years. Figure 12.2 demonstrates the number of annual household enquiries on renewable energy systems and the grants available. This information has been collected by the Renewable Development Officers of the two EEACs since the start of the SCHRI grant scheme in 2003.

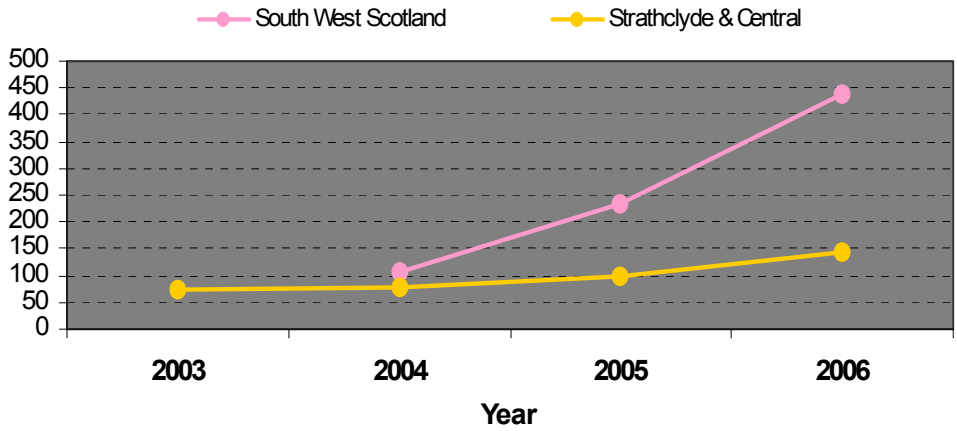


Figure 12.2: Annual household enquiries on renewable energy systems

A growing number of people are becoming aware of the financial benefits of renewable energy technologies considering the constantly price rise of conventional energy sources. But there is also an increasing amount of people who are generally enthusiastic about sustainable energy solutions since they choose to act socially

responsible. The existence of the grant scheme additionally generates demand. Looking at the previous development of domestic demand for renewable energy it can certainly be said that in future this will develop with a similar or even stronger ascent. The increasing establishment of renewable energy installers in the UK also boosts this development.

The progression of sustainable energy installations over the last few years is demonstrated by means of household renewable installations which were funded by the Scottish Community and Household Renewable Initiative. The data was made available by the Energy Saving Trust [2]. The data given for Strathclyde & Central cover both areas, East and West. Community renewable projects have not been taken into consideration due their long-lasting development stage.

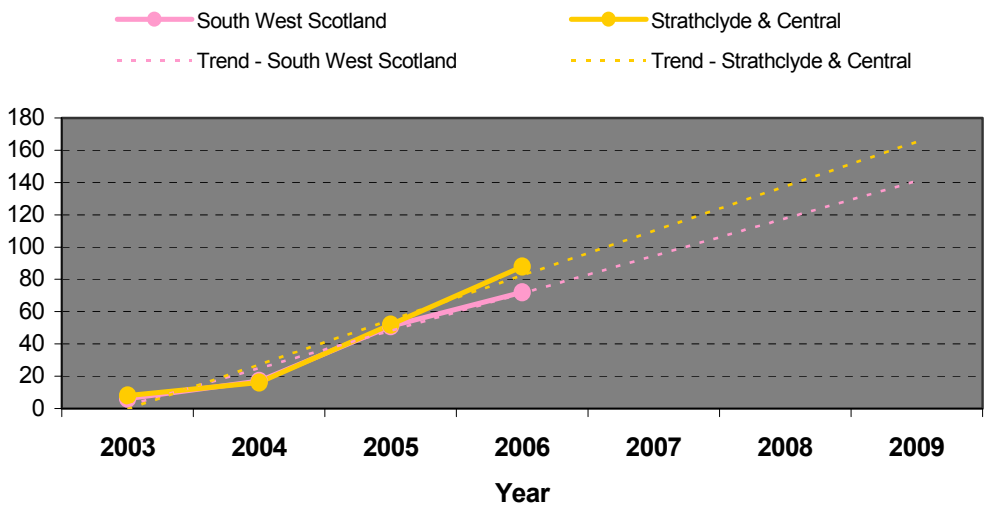


Figure 12.3: Annual household RE projects over the last years

The number of renewable installations for the year 2006, as demonstrated in the graph above, has been estimated by doubling the number of projects approved before July 2006. Based on the recorded renewable energy projects in the two EEAC areas it can be said that over the last 3 years the number of Scottish households installing renewable energy systems has enhanced by 140% on average each year. The reason for this trend is apart from the increasing fuel prices the growing confidence in micro-generation. Following this trend, it is estimated that in the year 2009 over 160 domestic renewable energy installations will be supported by South West Scotland

EEAC and just over 140 households will receive support from Strathclyde & Central EEAC.

12.2 Development of Fuel Prices

Looking at current fuel prices it can be said that these are already significantly higher than the fuel prices on which all estimations in chapter 9 and 10 are based. Oil prices for example are twice as high as the ones used for calculations. The annual savings for the following years therefore will be higher than in the year of installation. This has a very important positive impact on the cost effectiveness of both assessed EEACs.

Studying the cumulative price rises for example of Powergen it is shown that since the start of 2006 gas prices have gone up by 47.3% and electricity prices by 29.9%. This means that the company's gas prices have risen by 107.5% since 2003 with electricity prices up by 62.1%. An average annual gas bill has therefore increased by £333 since 2003 with electricity bills up by £151 [3]. Considering that these rises in energy bills would, for instance, more than finance professional cavity wall insulation, which in turn will save £130 to £160 [4] a year on fuel bills, makes the investment in energy saving measures more and more attractive. Increasing fuel prises will bit by bit also decrease large payback periods for some domestic renewable energy systems. This is a very important issue, as lower payback periods will result in an improved desirability for micro-generation.

A set of fuel price scenarios has been developed by the Association for the Conservation of Energy in October 2005 for a thirty-year period, which is the maximum product lifetime amongst a number of energy saving measures considered to improve hard to heat homes. The scenarios are based on well-established fuel and economic scenarios. These scenarios, shown in the graph below [5], aim to help users select a view of the future that they consider to give plausible percentage changes in fuel prices.

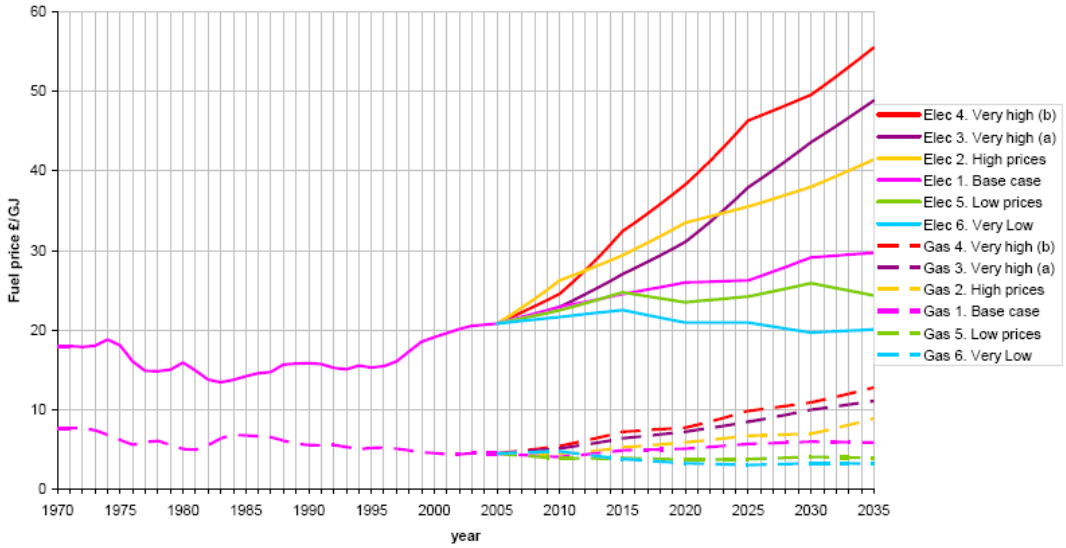


Figure 12.4: Fuel price scenarios

Considering the fuel price development within the previous year, after these scenarios have been developed, it is felt that the future fuel price development of scenario 4 is currently the most reasonable prediction. The fuel prices predicted for 2035 according to this scenario are up to 20 pence per kWh for electricity and 5 pence per kWh for gas, with oil prices rising similarly to the gas prices [5]. In this case the cost-effectiveness of the EEAC work would be much higher than at present, since energy savings resulting from advised measures will be worth more than double.

Rising fuel prices are of particular concern to those who are, or are at risk of becoming, fuel poor. Because fuel is paid for per unit consumed (i.e. per kWh), a percentage change in fuel prices has a much greater impact on a large fuel bill than on a small bill. This means there is even greater urgency to reduce fuel bills for the fuel poor when they live in homes that are costly to keep warm. The perspective of constantly rising fuel prices puts pressure on local authorities and social housing providers to intensively plan affordable warmth strategies (fuel poverty strategies). Hence, local authorities will further work in conjunction with the Local Energy Support (LESP) Officers of their local EEAC and more strategies are believed to be implemented.

12.3 Scope for Improvements

As part of the Scottish Housing Condition Survey in 2003/2004 an analysis of energy efficiency and fuel poverty for the domestic housing sector has been undertaken. Energy efficiency was measured with help of the National Home Energy Rating (NHER) and the Standard Assessment Procedure (SAP). Using NHER all dwellings are rated on a scale of 0 (poor) to 10 (excellent) based on the total energy costs per square metre of floor area. SAP on the other side rates dwellings on a scale of 1 to 100. The National Home Energy Rating of the Scottish housing stock resulted in a median of 6 and a median of 59 was assessed using SAP [6]. Based on the outcomes it can be said that the energy efficiency of the Scottish housing stock is on average moderate with only 40% of all dwellings rated at a 'good' and only 0.4% rated at an 'excellent' standard [6]. The majority of houses date pre 1964 with 18% of the housing stock built before 1919. These form the majority of those with a 'poor' NHER score as it is shown in the chart [6] below.

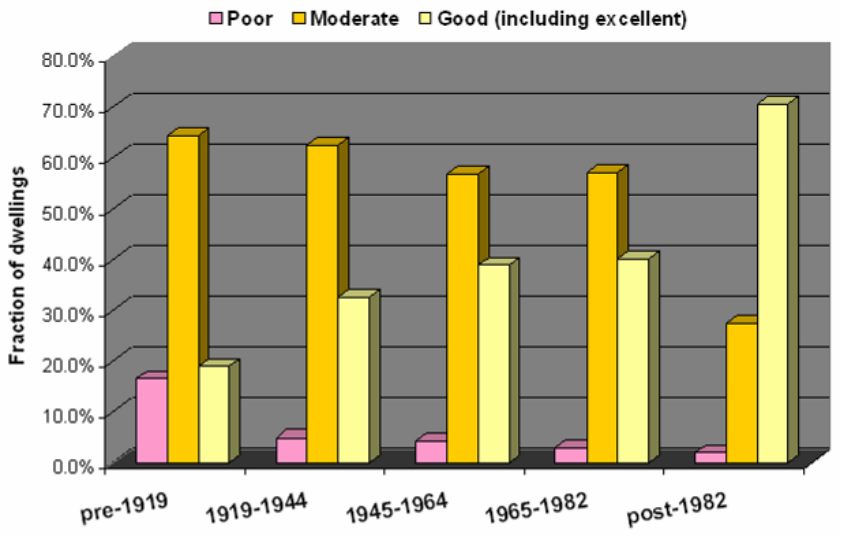


Figure 12.5: NHER bands by age of dwelling (Scottish housing stock)

Figure 12.5 indicates that there is great scope for energy efficiency improvements in the Scottish housing sector. The survey results furthermore demonstrated that especially private owned dwellings require significant improvements in order to achieve a 'good' or even 'excellent' energy efficient building performance.

In order to determine the magnitude of possible improvements to the current housing stock realistic upgrade scenarios were identified for the South Ayrshire council housing stock (7876 dwellings) as part of the European RURASU project. For each upgrade scenario the benefits in terms of energy and carbon savings were then calculated using the University of Strathclyde's Energy Rating Tool (SERT). The chart [7] below illustrates the impact of building fabric and energy technologies on the carbon footprint, where scenario 'as is' describes the current stock without any upgrades applied. Fabric upgrades class A are defined as advanced low cost fabric improvements including loft and floor insulation. Upgrades class B are major fabric upgrades resulting in U-values of 0.15 W/m^{2}K for the roof, 0.3 W/m^{2}K for walls and 0.6 W/m^{2}K for windows, which exceeds the current standards for new buildings according to the Scottish Building Regulations [8]. In the other scenarios energy supply options such as heat pumps, micro-CHP, community-CHP, biomass, solar water heating, photovoltaic or domestic wind turbines have been considered. The upgrades have only been applied to categories of dwellings where appropriated.

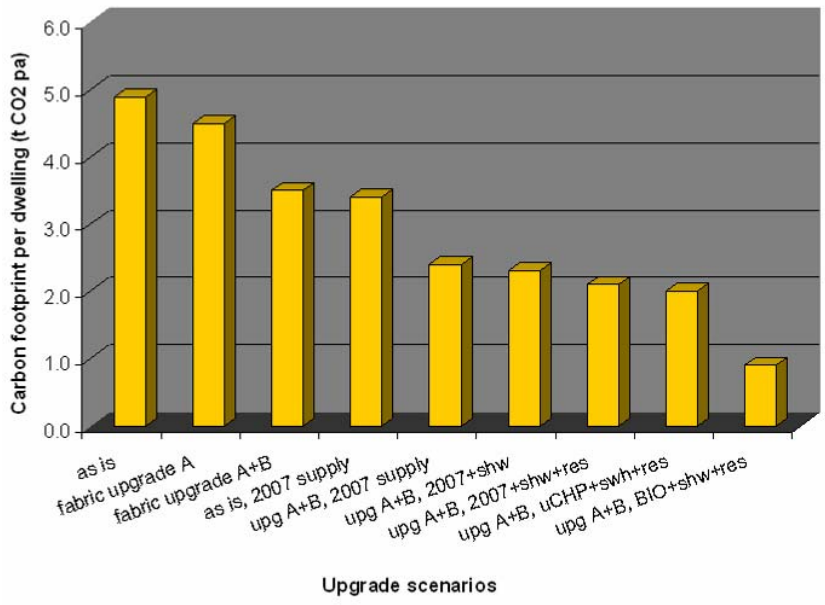


Figure 12.6: South Ayrshire council housing stock carbon footprint projection

The results show the carbon footprint per dwelling to be on average 4.9 tonnes of carbon dioxide per year while future scenarios are presented with emissions below 1 tonne. For the whole council housing stock in South Ayrshire this would lead to annual reductions of carbon dioxide emissions up to 30,987 tonnes or equivalent

8,451 tonnes of carbon [8]. Furthermore, it has been estimated that the combination of fabric improvements and heating system upgrades (scenario 5) on its own will already result in savings of more than a half of the annual carbon emissions. The outcomes of the South Ayrshire study demonstrate that there is massive scope for improvements of the current housing stock in Scotland and similar in the rest of the UK. It should be noted that the same upgrade scenarios applied to the private housing stock would result in even higher savings.

In this context it has to be mentioned that in this report the energy savings resulting from loft insulation are based on an insulation level of 250mm. However, this is changing to 300mm and above. The energy savings generated by energy advice centres when motivating households to install insulation will therefore be higher for future estimations which will increase the cost-effectiveness of the advice work.

12.4 Conclusion

In conclusion it can be said that the future perspectives for energy advice centres in Scotland are promising. Their effectiveness is predicted to grow for various reasons. To begin with, the advice provided will be seriously considered by a growing number of people and more and more customers will approach energy advice centres themselves. Reasons for this are extensively increasing energy bills as well as the growing confidence in renewable energy technologies and in the cost effectiveness of energy efficiency upgrades. Increasing public awareness will lead to a raising number of energy saving and renewable energy installations undertaken with support of the local advice centre. The effectiveness of the energy advice work is furthermore significantly influenced by rising fuel prices themselves as well as changes in levels of upgrading. Both will result in increased energy savings over the whole lifetime of the installed measures, which in turn will lead to a higher rate of savings generated per £1 of EEAC expenditure.

In this chapter it has been demonstrated that there is enormous scope for improving Scotland's housing stock. This certainly presents a challenge to Scottish energy advice centres to promote energy efficient upgrades and micro-generation with the goal to achieve an average energy efficiency of country's housing stock rated with 'good' including a rising number of houses rated with 'excellent'.

12.5 Reference

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Chapter 13 CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORK

13.1 Conclusions

The project has proven that a new approach to the evaluation of energy advice centres is needed in order to assess the real benefits of their work. After studying the work of Energy Efficiency Advice Centres in detail a methodology has been created as part of this research to help quantify the benefits of the advice work in terms of energy, carbon and cost savings but also considering further outcomes such as increasing awareness towards sustainable energy and potential jobs created through the work of the advice centre. The rationale behind the establishment of this methodology has been to demonstrate the real merit of supporting energy advice centres in Scotland.

The approach of this methodology is the evaluation of energy advice centres using 3 categories of evaluation criteria. These are:

- Quantifiable energy, carbon and cost savings
- Other quantifiable outcomes (e.g. increasing awareness, job creation)
- Non-quantifiable outcomes (e.g. promotion of best practice)

The main focus has been on quantifying the energy, carbon and cost savings resulting from various EEAC activities. Therefore a number of tools and figures have been identified that could be easily adopted by energy advice centres themselves. These are:

- The EEC spreadsheet 2005-2008
- The University of Strathclyde's Energy Rating Tool (SERT)
- The University of Strathclyde's Small Scale Renewable Energy Rating Tool
- The Savings estimated for following behavioural advice (extracted from New Perspective's research on 'Savings from Behavioural Advice')

Additionally updated fuel prices should be used for the estimation of cost savings. However, before estimating the energy, carbon and cost savings resulting from

implemented recommendations, the different advice activities have to be documented and the number of implemented recommendations has to be identified. Implemented recommendations are identified in the following two steps:

a) Determining the number of implemented energy efficiency measures and renewable energy systems using records on installations undertaken with help of grant or loan schemes

b) Undertaking a phone-based survey with a subset of advised customers to estimate the likelihood of uptakes of the recommended energy efficiency measures as well as behavioural advice

The methodology has been applied to 2 different Scottish EEACs and their effectiveness has been evaluated for the previous financial year. A customer survey has been conducted as part of the evaluation study of the South West Scotland EEAC. The significant outcomes of this survey are:

- 69% of customers find the advice given useful or very useful
- 55% of customers advised install low energy light bulbs
- 10% to 15% of customers install loft insulation, cavity wall insulation or a condensing boiler
- The majority of customers undertake installations with help of a grant
- Measures such as draught proofing, heating control for the existing heating system or energy efficient appliances generate little customer interest
- 30% of customers would like to receive follow up advice

When applying the developed methodology to the 2 Scottish EEACs – South West Scotland EEAC (Ayr) and Strathclyde & Central West EEAC (Glasgow) –significant benefits resulting from the work of both advice centres have been identified. These are:

Annual energy savings of 12,255 MWh for South West Scotland EEAC and 21,935 MWh for Strathclyde & Central West EEAC

It has been estimated that the work of South West Scotland EEAC leads to annual energy savings worth £354,477 and lifetime savings worth £6,736,266. Annual energy savings resulting from the work of Strathclyde & Central West are worth £719,679, leading to lifetime savings worth £10,641,411.

Lifetime carbon savings of 17,103 tonnes for South West Scotland EEAC and 23,865 tonnes for Strathclyde & Central West EEAC

Both case studies have shown that the EEAC activities result in lifetime carbon savings far higher than estimated by the Energy Saving Trust. It has been demonstrated that the quantified lifetime carbon savings are on average 75% higher than estimated by the Energy Saving Trust.

Cost-effectiveness ratio of 23.23 for South West Scotland EEAC and of 40.46 for Strathclyde & Central West EEAC

It has been identified that £1 of government funding leads to energy savings worth £23.23 resulting from the effort of South West Scotland EEAC and savings worth £40.46 generated through the work of Strathclyde & Central West EEAC. Based on the results of both case studies it can be said that the merit of supporting the work of Scottish EEACs is on average energy savings worth £32 generated for each £1 of government funding, and is even predicted to increase in future. The difference between the two EEAC's is largely a result of differences in their activities.

Creation of 45 potential jobs through South West Scotland EEAC and 23 potential jobs through Strathclyde & Central West EEAC

It is shown that despite their cost-effectiveness the merit of their work also includes other benefits, such as the establishment of potential jobs, which are created through the investment in energy efficiency and renewable energy general, Further benefits identified in this project are an increasing awareness of householders, businesses and local authorities, the decrease of fuel poor households, the promotion of good practice as well as the development of sustainable local energy strategies.

The future perspectives for advice centres in Scotland have been proven to be promising. Studying the current housing stock has identified an enormous scope for energy efficient improvements. This combined with the increasing demand for energy

advice, rising fuel prices and changing levels of upgrades will positively influence the cost-effectiveness of Scottish EEACs.

13.2 Recommendations

A number of problems and barriers that Energy Efficiency Advice Centres are currently facing have been identified throughout this project. To begin with the targets set by the Energy Saving Trust since April 2006 in the form of customer contacts are extremely high, as the number of domestic customers who are required to receive energy advice are up to twice as high as the amount of people consulted in the previous financial years. It has been found that this only leads to target hunting, in many cases through a very shallow provision of energy advice at information stands e.g. in supermarkets with the aim to get as many contact details as possible. The project certainly disagrees with that form of target setting, since it significantly reduces the quality of the advice provided and therefore the likelihood of customers acting on the advice.

It is believed that Scottish (and all UK) energy advice centres should provide more face-to-face consultations in their offices or in customer homes. At the moment energy advice provided to customers is often relatively general and might not take into consideration property specific characteristics. There have been even problems with the Home Energy Check reports in the past as these sometimes contain conflicting information and therefore might not seem trustworthy or are confusing for customers. Eza!, the advice centre in Germany, has demonstrated that customers are more likely to take up recommendations after receiving an individual consultation lasting around 45 minutes and a follow up consultation if necessary. It is recommended that advice centres in Scotland employ more people with technical experience who are able to provide such detailed consultations. Furthermore the provision of property surveys and energy efficiency reports based on the specific survey outcomes is felt to generate a larger awareness of potential improvements in the owner's home and customers will therefore more likely invest in recommended energy saving measures. Additionally the outcomes of New Perspectives study in 2002 have shown that customers who received both written and verbal advice seemed more likely to discuss the uptake of recommendations, to apply for a grant, or just to

go ahead and install the recommended measures. This suggests that it is important to encourage those who get only written reports or telephone advice to keep in touch with their energy adviser to secure their support and help until recommended measures have been installed. The result of the customer survey conducted in this project further justifies this since at least 30% of the respondents would like to get additional information and support but did not contact the EEAC themselves. The results of the 2002 survey have also shown that client-led advice is followed more often. It is important for future EEAC work not only to generate increasing public awareness but also to generate an increasing interest for saving energy in the home and investing into EE and RE technologies. Therefore, Scottish energy advice centres have to communicate their work and the benefits more intensively through the local press as done by both advice centres in Greece and Germany. The work of the EEACs should be published in a certain frequency at least every fortnight. Such press releases need to contain more technical information and should demonstrate case studies on renewable energy developments in the area as well as potential savings from installing advanced insulation, a new heating system or various renewable technologies. More advertisement has also to be made for energy saving measures which currently have a very low uptake such as energy efficient appliances, draught proofing or heating control for the existing heating system. It is believed that people's interest will grow when they are confronted with the amount of money they can save on their fuel bill especially at this time where fuel prices are rising constantly. Press releases should further educate the public about future legislation such as the upcoming European Building Performance Directive and their influence on property owners.

Another problem currently facing EEACs is the missing customer feedback on the quality of installation undertaken with help of a local grant scheme. Furthermore no feedback is received on the actual benefits customers experience after installing recommended measures. That's why it should be mandatory that customers who make use of a grant have to provide feedback on the work of the installer as one condition for receiving the grant. This could be done by filling in a questionnaire on the installer's work and the satisfaction with the installation itself, which is then sent to the advice centre in order to claim a part of the installation cost back. Such feedback would support the promotion of best practice throughout the region as installers who got an unsatisfying rating could receive training in order to improve their work up to

the required standard. Additionally several renewable energy installations should be monitored. This would provide information on the actual energy savings which could be compared with the estimated savings and possible conclusions on e.g. the influence of customer behaviour on the effectiveness of the system can be drawn. Generally, all installations (e.g. insulation and heating measures) should be recorded in detail and processed in a spreadsheet depending on the level of upgrade type as well as the type and size of the property and the main type of fuel. This way resulting energy and carbon savings can be easily estimated by feeding this information into the EEC spreadsheet 2005-2008, which has been identified in this project as a handy tool for self-evaluation for energy advice centres.

A different barrier to the effectiveness of the advice work of Scottish EEACs is the insecure funding for several EEAC projects. At the moment many projects (grant schemes) are partly funded by utility companies such as Scottish Power which withdraw the funding as soon as they achieve their EEC targets. In such a case the EEAC has to stop the whole project. It often happens when the projects start to be successful. It has been experienced during this project's customer survey that this situation leads to customer frustration and mistrust in the EEAC service. Other projects such as education programmes in Glasgow schools were stopped because of the withdrawal of funding. In order to create a consistent service Scottish advice centres would have to procure other funding sources. One option could be the creation of a partner network of architects, building designers, and installers etc. as it has been successfully developed and run by eza! in Germany. The partners then financially support the work of the advice centre and benefit from advertisement for and referrals to them in turn.

Scottish EEACs currently do not provide energy design advice to architects and building designers due to missing technical experience as well as equipment. However, training courses could be provided to them on energy efficient design strategies such as the passive house approach and the use of renewable energy in the building envelope. Similar to the German advice centre, these training courses could last over several weeks and should be held by a contracted professional energy adviser. A fee for the course would have to be paid by the participants, since a free provision is financially not feasible. When successfully completing the course

participants could then be offered the opportunity to become a member of the EEAC partnership network.

Other recommendations for complementing the work of Scottish Energy Efficiency Advice Centres are the use of Strathclyde's Energy Rating Tool for local authority support initiatives and the employment of more practical workshops on renewable energy in local schools. SERT could be used by LESP officers to support the development of strategies for upgrading the current council housing stock and identifying the potential benefits of several upgrade plans. The final version of SERT, which should be available by the end of the year, will provide additional capital costs and payback period for a number of different fuel cost projections. It is recommended that all LESP officers are familiar with the tool and its use should support the advice provided to local authorities, housing associations as well as private landlords. It is furthermore thought that EEACs should use more hands-on workshops in schools to get students, especially secondary school children, interested in renewable energy and let them experience how it works. Ideas for workshops, such as building a solar car, as well as project guides can be obtained from 'Plugging into the sun', a UK registered charity, or the European Sustainable Energy Education Forum (ESEEF) from the following web sites:

1) http://www.pluggingintothesun.org.uk/
2) http://ssf.ises.org/ssf/index.xsp

Overall this thesis recommends an extension of the energy advice network in Scotland. The evaluation of the South West Scotland EEAC has demonstrated that 60% of all customers advised on installing renewable energy systems live in rural areas. It is beneficial for the promotion and development of renewable energy projects that EEACs are located where there is a good potential for utilising wind, water or biomass or where people live in remote areas and can benefit from renewable systems. It has been shown by means of Argyll & Bute that it is difficult to support regions if there is a large distance to their nearest advice centre. It is felt that the approach of the German advice centre eza! is rather successful because it possesses 40 consultation stations throughout its region which form contact points for interested customers. A similar approach could be implemented in Scotland to build up a closer contact between the advice centres and their clients.

13.3 Future Work

The thesis forms a good starting point for quantifying the merit of supporting energy advice centres in Scotland as well as in other countries.

The customer survey undertaken in this project has a relative small sample size including customers who have received energy advice only one month before the survey was undertaken. For future work estimating the uptake of recommendations by domestic customers requires a more detailed analysis. Each advice centre could conduct an individual customer survey with a sample size of at least 100 advised customers. Customer should be questioned who have received energy advice 9 to 15 month in advance. This way they can still remember the advice given and had time to act upon it.

The investigation into benefits resulting from energy advice to businesses could be extended and the outcomes from Local Authority Support initiatives could be further explored, since this project was not able to identify possible energy savings resulting from the Local Energy Support Programme. Similar to the survey conducted with households in 2002, surveys could be carried out with advised businesses, but also with advised housing associations and private landlords in order to identify the benefits of energy advice in these sectors.

It is also suggested that a more detailed analysis of energy savings attributable to replication is undertaken, as it was not possible to quantify this within the scope of the project.

Furthermore, the benefits in the form of job creation could be considered in more detail. In this project the estimation of possible jobs created is purely based on the expenditure for energy efficient and renewable energy installations. Thus, an investigation into job creation resulting from the advice centre's work with Local Authorities as well as resulting from energy audits given to businesses could identify a much higher potential for new jobs.

APPENDIX A – Phone Advice Record Form

Verbal Advice Call Log Sheet

Name:	
Address:	
Postcode:	Telephone:

Energy Efficiency

- ☐ Loft Insulation
- ☐ Heating (General)
- ☐ Electric Heating
- ☐ Heating Installer
- ☐ Insulation (General)
- ☐ Insulation Installer
- ☐ White Goods
- ☐ -cookers
- ☐ Audio/Visual/PCs
- ☐ Building Fabric
- ☐ Fuel Bill Advice
- ☐ -Green Tariffs
- ☐ Energy Services
- ☐ Glazing
- ☐ Boilers
- ☐ -Condensing
- ☐ Controls
- ☐ -Electronic controllers
- ☐ Appliances general
- ☐ -white goods
- ☐ EER General
- ☐ Local retailer info
- ☐ Events info
- ☐ Behavioural
- ☐ Grant information
- ☐ Lighting
- ☐ Cavity Wall Insulation
- ☐ -cavity fillings
- ☐ Solid Wall Insulation

Renewable Energy

- ☐ Photovoltaics
- ☐ Solar Hot Water
- ☐ Small-scale Hydro
- ☐ Micro CHP
- ☐ Fuel Cells
- ☐ Passive Design
- ☐ Renewables (general)
- ☐ Small-scale wind
- ☐ Heat Pumps
- ☐ Biomass
- ☐ Green Tariffs
- ☐ Grant Information

Grant Referrals

- ☐ EEC – CWI
- ☐ EEC – LI
- ☐ EEC – Heating
- ☐ EEC – Appliances
- ☐ Warm Deal

Notes

Energy Saving Trust (EST), the data controller, is collecting your data for the purpose of providing energy advice to help you reduce your energy use. EST will retain your data for the purposes of undertaking research and statistical analysis into the energy efficiency of housing stock.

In future, EST may wish to send you further information including details of grants, special promotions and free offers which can save you money on your energy bills.

Are you happy to receive this information? (please tick box if happy) ☐

Date:	Call taken by:
Where did customer hear about us:	
Logged into Sense by:	Date:

APPENDIX B – South West Scotland EEAC

B.1 Principal Outcomes of Customer Survey

Type of advice recalled	Form of receiving energy advice			
	HEC	Presentation/info stand	Phoned in	Total
Insulation measures	67%	36%	67%	50%
Heating measures	33%	36%	100%	45%
Other energy saving measures	33%	28%	67%	35%
Behavioural advice	33%	45%	67%	45%
Renewable energy systems	50%	28%	0%	30%
Grants	50%	36%	67%	45%

Valuation of the received advice	Form of receiving energy advice			
	HEC	Presentation/info stand	Phoned in	Total
Very useful	20%	27%	0%	21%
Useful	60%	46%	33%	48%
OK	20%	27%	33%	26%
Not very useful	0%	0%	33%	5%
Not useful at all	0%	0%	0%	0%

Measures installed	Form of receiving energy advice			
	HEC	Presentation/info stand	Phoned in	Total
Loft insulation (top up)	33%	0%	33%	15%
Loft insulation (virgin)	17%	0%	0%	5%
Cavity wall insulation	33%	9%	0%	15%
Condensing boiler	17%	0%	33%	10%
New Central heating	0%	9%	33%	10%
Low energy light bulbs	33%	73%	33%	55%

Customers who installed measures	Form of receiving energy advice			
	HEC	Presentation/info stand	Phoned in	**Total**
Received a grant	50%	100%	50%	57%
Received free CFL	17%	82%	0%	85%

Following behavioural advice	Form of receiving energy advice			
	HEC	Presentation/info stand	Phoned in	**Total**
Cooking/appliances	0%	27%	0%	15%
Heating/hot water	33%	18%	33%	25%
Lighting	17%	36%	66%	35%
Other	17%	9%	0%	10%

Planned improvements	Form of receiving energy advice			
	HEC	Presentation/info stand	Phoned in	**Total**
Loft insulation	17%	18%	0%	15%
Cavity wall insulation	0%	18%	33%	15%
Condensing boiler	0%	18%	0%	10%
Heating control	0%	9%	0%	5%
Energy saving appliances	0%	18%	0%	10%
CFLs in the whole house	0%	9%	0%	5%
Draught proofing	17%	0%	0%	5%

Need for follow-up advice	Form of receiving energy advice			
	HEC	Presentation/info stand	Phoned in	**Total**
Customer who would like to get additional advice	17%	40%	33%	30%

B.2 Installations through local grant scheme

Insulation installations	Existing Heatig Fuel														
	Gas			Oil			Electricity			LPG			Solid fuel		
	L (v)	L (t)	C	L (v)	L (t)	C	L (v)	L (t)	C	L (v)	L (t)	C	L (v)	L (t)	C
Detached House															
1 or 2 bedroom		1		4	2	1							3		
3 bedroom	11	2	16	8	1	2	3			1			2		
4 bedroom +	7	2	12	6	1	4	2	1	1	2		1	2	1	
Semi-det. House															
1 or 2 bedroom	6	2	10	1	2	1			1						
3 bedroom	18	1	29	1		1	3						1		1
4 bedroom +	6		1	1			1								
Detached Bungalow															
1 or 2 bedroom	6	2	14	2			2	1	1	1			1	1	
3 bedroom	16	6	33	1	6	7	3		1	3	1	1	1		
4 bedroom +	3	4	7	1	2	3				1		1			
Semi-det. Bungalow															
1 or 2 bedroom	8	3	13	2			2	1							
3 bedroom +	5	1	4	1		4	1			1		1			
Midterrace															
1 or 2 bedrooms	3		10	1											
3 bedroom	6	1	5	1											1
Endterrace															
1 or 2 bedrooms	4		13		1	1	1								1
3 bedrooms +	4		13	1			1			1					
Flat															
1 bedroom	4		1				1								
2 bedrooms	4		1												
3 bedrooms	4		1										1		

L(v): Loft (virgin) insulation L(t): Loft (top-up) insulation C: Cavity wall insulation

Tank Insulation Installations	Existing Heating Fuel				
	Gas	Oil	Electricity	LPG	Solid fuel
All property types	10	2	4		

Condensing boiler installations	Heating Fuel for Condensing Boiler		
	Gas	Oil	LPG
Detached House			
2 bedroom	2	1	
3 bedroom	19		1
4 bedroom +	13		
Semi-detached House			
2 bedroom	3		
3 bedroom	25		
4 bedroom +	8		
Detached Bungalow			
2 bedroom	7		
3 bedroom	14		
4 bedroom +	5		
Semi-detached Bungalow			
2 bedroom	9		
3 bedroom +	2		
Midterrace			
1 or 2 bedrooms	9		
3 bedroom	9		
Endterrace			
1 or 2 bedrooms	3		
3 bedrooms +	10		
Flat			
1 bedroom			
2 bedrooms	6		
3 bedrooms			

Assumptions on which the following estimations are based

1. For the use of solid fuel calculations are based on coal as fuel
2. Loft insulation: Professional loft insulation of 250mm according to Building Regulations; top-up insulation assumed from 50mm existing insulation.
3. Cavity wall insulation: Savings calculated for pre 1976 properties. Assumption made based on the housing stock outlined in RURASU Deliverable D.3.2, page 32.
4. Condensing boiler: Savings are calculated for upgrading from ‘Exceptions to the Building Regulations’ as this is the minimum standard in Scotland. Source Technical Guidance Manual Issue 1 to the EEC 05-08, page 25.

Savings from Installations	Heating Fuel					
	Gas	Oil	Electricity	LPG	Solid fuel	Total
Loft (virgin) insulation						
Total No of installations	115	31	20	10	13	189
Annual energy savings (kWh/a)	798270	200616	141250	82380	168725	1391242
Annual carbon savings (t/a)	41.36	13.68	16.57	4.81	13.81	90.22
Annual cost savings (£/a)	15965	2889	7910	2471	4201	33437
Lifetime carbon savings (t)	1240.95	410.35	496.94	144.24	414.14	2706.63
Loft (top-up) insulation						
Total No of installations	25	15	3	1	2	46
Annual energy savings (kWh/a)	56327	31285	6378	2648	7467	104105
Annual carbon savings (t/a)	2.92	2.13	0.75	0.16	0.61	6.57
Annual cost savings (£/a)	1127	451	357	79	186	2200
Lifetime carbon savings (t)	87.56	63.99	22.44	4.64	18.33	196.96
Cavity wall insulation						
Total No of installations	183	24	4	4	4	219
Annual energy savings (kWh/a)	763170	109941	18632	18418	24607	934768
Annual carbon savings (t/a)	39.55	7.50	2.19	1.08	2.01	52.32
Annual cost savings (£/a)	15263	1583	1043	553	613	19055
Lifetime carbon savings (t)	1581.84	299.84	87.40	43.00	80.53	2092.61
Tank insulation						
Total No of installations	10	2	4			16
Annual energy savings (kWh/a)	7150	1360	1505			10015
Annual carbon savings (t/a)	0.37	0.09	0.18			0.64
Annual cost savings (£/a)	143	20	84			247
Lifetime carbon savings (t)	3.70	0.93	1.77			6.40
Condensing boiler						
Total No of installations	144	1		1		146
Annual energy savings (kWh/a)	394934	2080		2974		399988
Annual carbon savings (t/a)	20.47	0.14		0.17		20.78
Annual cost savings (£/a)	7899	30		89		8018
Lifetime carbon savings (t)	306.72	2.13		2.60		311.45

B.3 Uptake of recommendations based on survey outcomes

Number of uptakes	Group A		Group B		Group C			Average across all groups	
	Uptakes (%)	Number of uptakes	Uptakes (%)	Number of uptakes	Uptakes (%)	Number of uptakes	Total number of uptakes	Uptakes (%)	Total number of uptakes
Installation of									
Loft insulation (virgin)	8.3	175	6.6	161	1.8	30	366	4.5	279
Loft insulation (top up)	3.4	72	1	24	1	17	113	1	62
Cavity wall insulation	6.6	139	3.4	83	3.6	60	282	4.5	279
Condensing boiler	3.4	72	6.6	161	1.8	30	263	3	186
Low energy light bulbs	33	695	33	805	73	1214	2715	55	3416
Energy efficient appliances	1	21	1	24	9	150	195	5	311
Heating control	1	21	1	24	4.5	75	120	2.5	155
Draught proofing	9	190	1	24	1	17	231	2.5	155
Following advice on									
Cooking/appliances	1	21	1	24	27	449	494	15	932
Heating/hot water	33	695	33	805	18	299	1800	25	1553
Lighting	17	358	66	1610	36	599	2567	35	2174
Others	17	358	1	24	9	150	532	10	621

No of customers advised: 2107 Group A 2440 Group B 1663 Group C 6210 Total

Group A: HEC reports & home visits Group B: telephone advice Group C: Presentations and exhibitions

Savings from following recommendations	Annual energy savings per uptake (kWh/a)	Annual carbon savings per uptake (tC/a)	Annual cost savings per uptake (£/a)	Number of uptakes		Annual energy savings (MWh/a)		Annual carbon savings (tC/a)		Annual cost savings (£/a)		Lifetime carbon savings (tC)	
				I	II	I	II	I	II	I	II	I	II
Installation of													
Loft insulation (virgin)	6491	0.336	130	366	279	2376	1811	123	94	47514	36220	3689	2812
Loft insulation (top up)	1816	0.094	36	113	62	205	113	11	6	4104	2252	319	175
Cavity wall insulation	7073	0.367	141	282	279	1995	1973	103	102	39892	39467	4140	4096
Condensing boiler	3605	0.187	72	263	186	948	671	49	35	18962	13411	738	522
Low energy light bulbs	68	0.008	5	2715	3416	185	232	22	27	14474	18211	348	437
Energy efficient appliances	153	0.018	12	195	311	30	48	4	6	2339	3731	53	84
Heating control	1665	0.086	131	120	155	200	258	10	13	15664	20233	155	200
Draught proofing	598	0.031	12	231	155	138	93	7	5	2763	1854	143	96
Followed advice on													
Cooking/appliances	123	0.014	10.37	494	932	61	115	7	13	5123	9665	35	65
Heating/hot water	1514	0.094	54.12	1800	1553	2725	2351	169	146	97416	84048	846	730
Lighting	185	0.022	15.95	2567	2174	475	402	56	48	40944	34675	282	239
Others	930	0.053	18.29	532	621	495	578	28	33	9730	11358	141	165
Total						9832	8644	590	528	298925	275125	10888	9621

Scenario I: Different uptake rate for group A, B and C

Scenario II: Average uptake rate across all customer groups

Assumptions on which the above estimations are based

1. All assumptions made in Appendix B.2 apply.
2. The common property type for the area is a 3 bedroom detached house with a gas heating system for which the savings from installations (EEC2 figures) are estimated.
3. Savings estimated for using low energy light bulbs are based on the use of 2 retail CFLs.
4. Savings estimated for the use of energy efficient appliances are based on the use of one appliance with annual energy savings that equal the average savings of all listed A+ appliances.
5. For heating control the use of a room thermostat (installed without a replacement boiler) is assumed.
6. For estimation of lifetime savings from following behavioural advice it is assumed that the advice is followed for 5 years.

B.4 Community renewable energy installations – additional assumptions

1. Wind turbines: Generated electricity is assumed to be 100% utilised replacing electricity from the grid.
2. Wood pellet system: Calculations are based on 90% boiler efficiency alternative to an electrical heating system; Fuel costs are assumed with 3.50 pence per kWh delivered energy from wood pellets, source http://www.nef.org.uk/logpile/pellets/cost.htm; carbon emissions are 0.01091kg/kWh for wood and 0.11727kg/kWh for electricity.
3. GSHP: Calculations based on Midterrace property built before 1945 with 2 double and 2 single large sized and high ceiled bedrooms, mixed single and double glazed, electrical space and water heating.

B.5 Household renewable energy installations – assumptions

1. All assumptions made use as far as possible information provided by the EST.
2. Solar water heating systems: Calculation based on an average system using a flat plate collector, $3m^2$ area, 30% efficiency, south facing on a 30deg tilted roof; the existing heating fuel is assumed to be gas.
3. GSHP systems: Calculation based on an average system with a CoP of 4; annual requirements are assumed with 23,300kWh for space heating and 3000kWh for DWH, source: Sutherland Tables for Comparable Heating Costs Scotland (May 2006) – Space and Water Heating for Houses; replaced heating system is oil heating with 70% (35% for DWH) efficiency.
4. Biomass boilers: Calculation based on wood pellet boiler with 90% efficiency; annual heating requirements are assumed as above, replacement of electrical heating with 100% (70% for DWH) efficiency, for fuel prices and carbon emissions see appendix B.4.
5. Wind turbines: 2.5kW and 6kW Proven turbine with rotor diameters of 3.5m and 5.5m; annual average wind speed assumed with 5.5m/s; 100% utilisation of generated electricity replacing electricity from the grid.

APPENDIX C – Strathclyde & Central West EEAC

C.1 Installations through local grant schemes

Insulation installations	Existing Heatig Fuel									
	Gas		Oil		Electricity		LPG		Solid fuel	
	L (t)	C	L (t)	C	L (t)	C	L (t)	C	L (t)	C
Detached House										
1 or 2 bedroom	6	5						1		
3 bedroom	20	26	3	2						
4 bedroom +	18	17	2							
Semi-det. House										
1 or 2 bedroom	11	14						1		
3 bedroom	28	30	2	2						
4 bedroom +	2	4								
Detached Bungalow										
1 or 2 bedroom	4	3			1	1				
3 bedroom	2	5								
4 bedroom +	3	2	1							
Semi-det. Bungalow										
1 or 2 bedroom	3	1				1				
3 bedroom +	1	2								
Midterrace										
1 or 2 bedrooms	3	4				2				
3 bedroom	12	10			1	1				
Endterrace										
1 or 2 bedrooms	6	2			1					
3 bedrooms +	7	11								
Flat										
1 bedroom		2								
2 bedrooms	9	18			5	4				
3 bedrooms	3	1			1	2				

L(t): Loft (top-up) insulation C: Cavity wall insulation

Savings from Installations	Heating Fuel				
	Gas	Oil	Electricity	LPG	Total
Loft insulation					
Total No of installations	138	8	9		155
Annual energy savings (kWh/a)	234244	14962	16306		265512
Annual carbon savings (t/a)	12.14	1.02	1.91		15.07
Annual cost savings (£/a)	4685	215	913		5813
Lifetime carbon savings (t)	364.14	30.60	57.37		452.11
Cavity wall insulation					
Total No of installations	157	4	11	2	174
Annual energy savings (kWh/a)	714962	21923	21475	10601	768960
Annual carbon savings (t/a)	37.05	1.50	2.52	0.62	41.68
Annual cost savings (£/a)	14299	316	1203	318	16136
Lifetime carbon savings (t)	1481.92	59.79	100.74	24.75	1667.19
Condensing boiler					
Total No of installations	20				20
Annual energy savings (kWh/a)	46606				46606
Annual carbon savings (t/a)	2.42				2.42
Annual cost savings (£/a)	932				932
Lifetime carbon savings (t)	36.23				36.23

Assumptions on which the above estimations are based

1. Loft insulation: Professional top-up loft insulation from 50mm to 250mm.
2. Cavity wall insulation: Savings calculated for pre 1976 properties. Assumption made based on property details provided by the advice centre.
3. Condensing boiler: Savings are calculated for upgrading from ‘Exceptions to the Building Regulations’. Estimations based on a 2-bedroom semi-detached house.

C.2 Uptake of recommendations based on Energy Agency customer survey

Number of uptakes	Group A		Group B		Group C			Average across all groups	
	Uptakes (%)	Number of uptakes	Uptakes (%)	Number of uptakes	Uptakes (%)	Number of uptakes	Total number of uptakes	Uptakes (%)	Total number of uptakes
Installation of									
Loft insulation (virgin)	8.3	846	6.6	56	1.8	65	967	4.5	660
Loft insulation (top up)	3.4	346	1	8	1	36	391	1	147
Cavity wall insulation	6.6	673	3.4	29	3.6	131	832	4.5	660
Condensing boiler	3.4	346	6.6	56	1.8	65	468	3	440
Low energy light bulbs	33	3363	33	279	73	2655	6297	55	8070
Energy efficient appliances	1	102	1	8	9	327	438	5	734
Heating control	1	102	1	8	4.5	164	274	2.5	367
Draught proofing	9	917	1	8	1	36	962	2.5	367
Following advice on									
Cooking/appliances	1	102	1	8	27	982	1092	15	2201
Heating/hot water	33	3363	33	279	18	655	4296	25	3668
Lighting	17	1732	66	557	36	1309	3599	35	5135
Others	17	1732	1	8	9	327	2068	10	1467

No of customers advised: 10191 Group A 844 Group B 3637 Group C 14672 Total

Group A: HEC reports & home visits Group B: Telephone advice Group C: Presentations and exhibitions

Savings from following recommendations	Annual energy savings per uptake (kWh/a)	Annual carbon savings per uptake (tC/a)	Annual cost savings per uptake (£/a)	Number of uptakes		Annual energy savings (MWh/a)		Annual carbon savings (tC/a)		Annual cost savings (£/a)		Lifetime carbon savings (tC)	
				I	II	I	II	I	II	I	II	I	II
Installation of													
Loft insulation (virgin)	5528	0.287	111	967	660	5346	3648	278	189	106912	72970	8326	5683
Loft insulation (top up)	1477	0.077	30	391	147	578	217	30	11	11550	4342	903	340
Cavity wall insulation	4323	0.224	86	832	660	3597	2853	186	148	71935	57064	7455	5914
Condensing boiler	2693	0.140	54	468	440	1260	1185	66	62	25206	23698	983	924
Low energy light bulbs	68	0.008	5	6297	8070	428	549	50	65	33571	43023	806	1033
Energy efficient appliances	153	0.018	12	438	734	67	112	8	13	5254	8804	118	198
Heating control	1536	0.080	120	274	367	421	564	22	29	32996	44195	329	440
Draught proofing	520	0.027	10	962	367	500	191	26	10	10005	3817	519	198
Followed advice on													
Cooking/appliances	123	0.014	10.37	1092	2201	134	271	15	31	11324	22824	76	154
Heating/hot water	1514	0.094	54.12	4296	3668	6504	5553	404	345	232500	198512	2019	1724
Lighting	185	0.022	15.95	3599	5135	666	950	79	113	57404	81903	396	565
Others	930	0.053	18.29	2068	1467	1923	1364	110	78	37824	26831	548	389
Total						21424	17458	1274	1094	636479	587984	22479	17561

Scenario I: Different uptake rate for group A, B and C

Scenario II: Average uptake rate across all customer groups

C.3 Community renewable energy installations – additional assumptions

1. Wood pellet system: Calculations are based on 90% efficient boiler replacing warm air heaters (LPG) of 90% efficiency; Fuel costs are assumed with 2.1 pence per kWh delivered energy from wood chips, source http://www.nef.org.uk/logpile/pellets/cost.htm; carbon emissions are 0.01091kg/kWh for wood and 0.11727kg/kWh for electricity.
2. GSHP: Calculations based on CoP of 4 for under floor heating assuming 100% space heating; Efficiency of alternative gas combi boiler assumed to be 85%.