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THE REBOUND EFFECT: SOME QUESTIONS ANSWERED

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The Rebound Effect: Some Questions Answered

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Key Words: General equilibrium, energy efficiency, rebound effects, disinvestment.

JEL codes: D57, D58, R15, Q41, Q43

Introduction – an overview of the problem of 'rebound' effects

Greenhouse gas (and other pollutant) emissions from energy use are now taken to be a problem both internationally and for individual national and regional governments. A number of mechanisms are being employed to reduce energy consumption demand. A central one is increased efficiency in the use of energy. The Intergovernmental Panel on Climate Change (IPCC) of the United Nations (IPCC, 2007) projects that by 2030 energy efficiency gains will provide a substantial part of the remedy for climate change by reducing global energy consumption to approximately 30% below where it would otherwise be. Such a reduction is argued to be almost sufficient to offset energy consumption increases driven by projected global economic growth. Similarly the widely cited Stern report (Stern, 2007), and the International Energy Agency (e.g. IEA, 2009), attach crucial importance to the potential for efficiency improvements to reduce energy use and related emissions. Within the European Union, one of the EU 20-20-20 targets for member states is to reduce energy consumption by 20% through increased energy efficiency (see, for example, European Commission, 2009). Moreover, the European Strategic Energy Technology Plan (SET-Plan) – see, for example, European Commission (2010) – places energy efficiency at the centre of its Smart Cities and European Electricity Grid Initiatives (among the European Industrial Initiatives (EII)). At the UK level, the UK Energy White Paper (2003) describes energy efficiency as one of the most cost effective and safest ways of addressing energy and climate policy objectives. In Scotland, the recently published 'Energy Action Plan', the Scottish Government sets out Scotland's first national target to improve energy efficiency and how this will be achieved with the use of grants given to local authorities. In the Appendix to this paper, for the reader's information, we provide a summary overview of energy efficiency policy instruments currently active within the UK and Scotland.

However, the straightforward link between increased energy efficiency and reduced energy consumption has been questioned. This is due to the notion of the 'rebound effect'. Rebound occurs when improvements in energy efficiency actually stimulate the direct and indirect demand for energy in production and/or consumption. It is triggered by the fact that an increase in the efficiency in the use of energy acts to reduce the implicit price of energy, or the price of effective energy services for each physical unit of energy used (Jevons, 1865; Khazzoom 1980; Brookes 1990; Herring, 1999; Birol and Keppler, 2000; Saunders, 1992, 2000a,b; Schipper, 2000). The rebound effect implies that measures taken to reduce energy use might lead to increases in carbon emissions, or at least not offset them to the extent anticipated. The question of whether rebound provides a possible explanation as to whether UK energy use at the macro level has not reduced in line with energy efficiency improvements is raised in a report by the UK House of Lords (2005). Following this report, the UK Energy Research Centre (UKERC) conducted a review of evidence on energy efficiency and rebound, published in UKERC (2007), and later in 2007 the UK Economic and Social Research Council, ESRC, funded the current project to investigate economy-wide rebound effects using multi-sectoral computable general equilibrium (CGE) modelling techniques. Previous non-technical papers on the key findings of this research, published in the Fraser Commentary and in the Welsh Economic Review, can be found in Turner (2009b), Turner et al et al (2009, 2010).

The purpose of the current paper is to clarify some issues relating to the phenomenon of rebound effects. The paper originates from an interview with the Principle Investigator, Dr Karen Turner (University of Stirling, formerly of the University of Strathclyde) by Maggie Koerth-Baker, a science journalist working on a book for Wiley & Sons about the future of energy in the United States. The following is not a precise transcript of that interview; rather it picks out and develops key issues from the questions posed and the answers given.

MKB (Question). My understanding, after doing some reading, is that the situation that led to Jevons' famous observation (the Jevons Paradox – see Jevons 1865; Brookes, 1990) was a little more complicated than simply an issue of one technology improvement directly lowering price of coal, which directly increased use. That is, there were specific applications of the improved engine that really mattered to the effect and a lot more factors going into it. Is my understanding correct? And how does that impact debates about backfire/Jevons Paradox today?

KT (Answer). There are two important points here. First, rebound is basically driven by the change in an *implicit* or *effective* price, not an actual market price (though this may be affected as well). Jevons's basic point was that if we increase the efficiency with which we use any factor of production, we lower its implicit price. That is, in the case of energy, we get more energy services from a given input of energy, thereby lowering the price of the former, if not the latter. This, like any price change, will trigger a positive demand response and it is the strength of this demand response both directly and indirectly (knock on effects throughout the economy) that gives us rebound. Thus, rebound occurs as a result of the upward pressure on demand for energy, which will partially or even wholly offset the initial efficiency effect (decreased demand as less energy is required to maintain a given level of production or consumption).

Therefore, the change in the implicit price of energy when efficiency is improved in its use is what triggers both direct and also economy-wide rebound effects (the former affecting the change in energy use by the producer or consumer whose efficiency has increased, the latter affecting what happens to energy use at the economy wide level). The key point is that the implicit price change is the source of rebound effects. The complications come in terms of just how that implicit price is affected by an energy efficiency improvement. For example, factors such as the costs involved in implementing an efficiency improvement may limit the fall in the implicit price.

A second issue is that Jevons seemed to be more concerned about the extreme case of rebound, commonly referred to as 'backfire', where the demand response to the change in the implicit price of energy is so strong that there is a net increase in energy use. This is a less likely outcome than partial rebound, but it is an important one, because it entirely negates the energy (and pollution) saving properties of energy efficiency improvements (if not the economic benefits). Therefore, it is important to investigate the circumstances under which rebound may grow into backfire and to consider any complicating factors.

MKB (Question). My understanding is that a lot of the evidence for full backfire comes from economic modeling using computable general equilibrium (CGE) as a basis. Skip Laitner at the American Council for an Energy Efficiency Economy (ACEEE) has some interesting criticisms of that basis (see Laitner, 2000), in particular that it assumes purely rational behaviour that we don't actually see in real-life consumers, and thus isn't likely to show real-world applicable results in a model. I'm curious about your perspective on that.

KT (Answer). Again, there are two issues here. First, it is not only CGE models that generally assume rationality. However, it is possible to build in representation of, for example, irrational or habitual behaviour into economic models – for example, treatments of inertia that prevents uptake of energy efficiency improvements and/or changes in behaviour in response to changes in prices - where it is appropriate or useful to do so. More generally, if behaviour is affected by factors such as bounded rationality, imperfect information, it is important to understand such behaviours and identify appropriate analytical frameworks.

Secondly, yes, rebound will grow when we take a wider range of economic responses into account, as we do in considering economy-wide rebound effects. However, our evidence for backfire (a net increase in energy use when efficiency improves) is quite limited. In the case of Scotland, we find that backfire only tends to occur when we have increased energy efficiency in the relatively highly energy-intensive energy supply sectors, particularly where trade and competitiveness effects are important (see Turner et al, 2009; and Turner, 2009b). Generally, backfire requires an economy-wide (direct and derived) demand response that is highly responsive (more that proportionate) to the initial implicit price change.

MKB (Question). The studies that look at specific technology areas (home heating or personal transportation) and at direct rebound in those areas show reasonably low rebound effects, usually on the order of 10-40% or so, looking at some reviews done by Steve Sorrell (e.g. Sorrell led the UKERC, 2007, study). Why are those so different from what CGE modelling studies come up with? Is it simply a factor of not looking at indirect or economy-wide effects?

KT (Answer). As explained in the last answer, indirect and/or economy-wide effects will add to the size of rebound. Moreover, economy-wide rebound effects will depend on the nature and structure of the economy in question (what type of supply and demand linkages, presence of local energy supply etc). Therefore, there is no implication that results of micro and macro studies are inconsistent. In some cases, the direct effects will dominate. For example, one piece of work in our project (carried out with Sam Anson from the Scottish Government) involved investigating the impacts of increased energy efficiency in the Scottish commercial transport sector (Sam wrote his MSc dissertation in this area, which we then developed into a paper – see Anson and Turner (2009) and also Turner et al (2010). Here we found that, aside from some key impacts on the Scottish refined oil supply sector, economy-wide rebound effects were not very big. Instead, the own sector effects (energy use within the Scottish commercial transport sector itself) dominated and our rebound estimates were similar in magnitude to what had been found in micro studies.

MKB (Question). Is it possible to measure direct rebound in reality in a more accurate way? What would we have to know in order to do that? What about indirect? It seems almost impossible to tease out of all the different variables and unknowns?

KT (Answer). Many studies use econometric techniques to examine the key relationship for direct rebound, which is the price responsiveness (or price elasticity) of demand in response to the change in the implicit price of energy. CGE studies also use empirical techniques to consider economy-wide rebound. However, in specifying CGE models, knowledge of the responsiveness of direct and indirect (derived) demands to changes in the implicit price of energy, and the knock on effects on other prices (e.g. the actual price of output in sectors where there is an efficiency improvement will fall) is crucial. This can be problematic (see Turner, 2009a) and is a focus of our continued research in this area.

However, the key issue is understanding causality. This won't just be in terms of changes in prices and demand. Speaking to UK policymakers at the UK Department of Energy and Climate Change, DECC, we understand that the gap between expected and actual energy savings when energy efficiency increases will not only be due to rebound.[1] There will also be issues such as whether equipment works as anticipated (i.e. in terms of the desired efficiency improvement actually being realised). Therefore, it is important to consider all the causal process that may occur in response to an increase in energy efficiency, whether they only partly delay its implementation, or whether there are likely to be lasting rebound effects as prices (and incomes) change throughout the system.

In terms of disentangling effects, this can be difficult because different effects will be interdependent. For example, if energy efficiency improves in production the first (and direct) response to the resulting fall in the implicit price of energy will be a substitution effect away from other inputs in favour of energy. This allows the price of output to fall in that sector and the other sectors that purchase its outputs as inputs to their own production. This in turn triggers positive competitiveness effects, which further stimulate rebound (as activity levels

[1] The project team made a presentation on energy efficiency and rebound effects to the Department of Energy and Climate Change (DECC) on Monday 20th September 2010. Following the presentations, a round-table discussion was held with DECC analysts.

increase) and also GDP growth. However, if the initial substitution effects are weak, this will limit the size of the positive competitiveness effects, and so on.

MKB (Question). In your work, you mention several issues in modelling and calculating rebound/backfire effects that aren't widely taken into account, like supply side responses. Are there other factors that aren't being widely considered? Do these unconsidered factors tend to push more towards full backfire or away from it?

KT (Answer). The focus of our research on this project has been to consider the economy-wide effects that impact on the rebound effect. However, while the wider literature has tended to focus on the additional demand responses to the price (and income effects) that drive rebound, our research on the ESRC First Grant has had something of a more novel focus by investigating the importance of supply-side effects. We have looked at two types of supply-side effect. First, we have focussed in all our analyses on the role of labour and capital markets in allowing the economy to expand (or not), thus making them important determinants of economy-wide rebound.

Second, we have also looked at the response of local energy supply sectors. We have looked at two specific effects here. First, where there is local supply of energy in the form of, for example, locally generated electricity or locally refined oil, the initial reduction in demand for energy in response to increased energy efficiency (as less energy is required to maintain a given level of production or consumption) will put downward pressure on the actual as well as the implicit price of energy. This may cause what we have referred to as 'disinvestment' effects (Anson and Turner, 2009; Turner, 2009a; Turner et al 2010). To explain, if demand is sufficiently responsive, then any decrease in actual energy prices will exacerbate rebound. However, if demand is not sufficiently responsive, then revenues and profits will fall in local energy supply sectors, which will lower the return on capital and cause a contraction in capacity in these sectors. This tightness in local energy supply will drive output prices back up, and this will act to constrain rebound over the longer run.

We have also found that as a result of the initial contraction in demand for energy as efficiency increases, negative multiplier effects may also act to offset *economy-wide* rebound, potentially to the extent that energy savings at the macro level are larger than may have been anticipated. Negative multiplier effects occur because as demand falls for the output of local energy supply sectors less inputs are required to produce a lower output level. This will trigger negative multiplier effects back down the supply chain (in the production sectors where outputs are used as intermediate inputs to production). Given that energy supply sectors tend to be relatively energy-intensive, these negative multiplier effects are likely to be particularly important in energy supply itself (see Turner, 2009a). The key issue is whether negative multiplier effects are large enough to entirely offset rebound effects so that total energy use in the economy contracts. In our research we have found evidence for such 'negative rebound' effects at the UK level. However, negative multiplier effects seem to be of less importance in the Scottish case, probably due to the greater trade in energy (which stimulates demand to a greater extent as prices fall).

Another important issue that has emerged from our research (and one which we have only recently begun working on) is that there is a difference in terms of how energy efficiency improvements in consumption activity (such as household energy use) transmit to the wider economy relative to what happens if efficiency increases in production. In the latter case, increases in the efficiency with which any input is used will act as a productivity increase, stimulating competitiveness and GDP along with energy use. That is, it takes the form of a positive supply-side shock. However, in the case of household use of energy, increased efficiency acts a demand disturbance. The disinvestment and negative multiplier effects abo e are again important as reduced demand for energy in the household sector, and in the wider economy as the demand contraction spreads, will impact on revenues and activity levels in local energy supply. However, the net impact on economic activity in general and energy use in particular depends on how households spend the money that they save as they increase energy efficiency. If they demand more energy, rebound will grow, but if they demand other, non-energy, goods and services then the economy may grow with more limited rebound (see Druckman et al, 2009, for research into the issue of how households may redirect their spending). However, demand shifts change prices throughout the economy, with the implication that domestic demand may crowd out export demand (where there is upward pressure on prices).

MKB (Question). You mention in your work that rebound and backfire effects vary by technology and location and have to be considered on individual policy decision basis. Why would it vary by location? Don't consumers behave fairly similarly throughout the Western world?

KT (Answer). It may be that direct rebound may be expected to be similar among consumers across the Western world (though even within a single country things like income levels will matter). This is because direct rebound is likely to depend largely on behavioural responses. However, indirect and economy-wide rebound effects depend on the structure of economic activity. For example, when we have looked at Scotland and the UK, even where we set up our model so that parameters governing direct rebound (e.g. how producers substitute between energy and other inputs in production in the sector targeted with the efficiency improvement) are identical, we get quite different economy-wide rebound effects. This is due to the different structure and composition of economic activity at the economy-wide level in general, particularly (but not exclusively) the importance and openness to trade of the Scottish energy supply sectors relative to their national counterparts.

MKB (Question). What does all of this mean for the idea that we can use efficiency to mitigate the economic impact of combating climate change? Does rebound effect necessarily kill ideas of decoupling economic growth from GHG emissions?

KT (Answer). No. Only the extreme case of rebound (backfire) where there is a net increase in energy consumption in response to increased energy efficiency will cause energy use and related emissions to rise with GDP. Where rebound is less than 100% (which is most cases in our work and in the wider literature), this means that we will not realise one for one energy savings in response to an efficiency improvement. Particularly, where increased energy efficiency takes place in on the production side of the economy (so that it takes the form of a productivity improvement), even some reduction in energy use produces what we may refer to as a ‘double dividend’: increased economic growth with falling pollution levels. Generally, where energy efficiency improvements lower prices and improve competitiveness, and so long as we do not encounter increased energy use and emissions through backfire, this must be a positive outcome. However, the GHG emission issue is of course an important one in the context of rebound and provides an important context for further research. We have begun to look at this in particular in a new paper that is forthcoming in Energy Economics (Turner and Hanley, 2010).

MKB (Question). What role can coupling energy efficiency technologies with automation play in reducing direct rebound effects? For instance, if I get a more energy

efficient heater, but I have it linked up with programmable thermostats aren't I less likely to end up using more heat?

KT (Answer). This is a very important issue. In the current project we haven't got to the point of looking at specific technologies. However, rebound properties of any specific energy efficiency improvement will depend not only on costs of introducing efficiency improvements, but also on how well energy users are able to recognise and respond to the implicit price change. For example, if a household purchases a more energy efficient fridge, the price effect is automatic and will be reflected in the next electricity bill. On the other hand, if a household installs loft insulation, they need to undertake further activity, such as appropriate adjustments to thermostats/heating controls, before the efficiency improvement and subsequent price effect are realised. We've identified this type of issue as a core focus for future research (we have an application with colleagues at the Universities of Stirling and Strathclyde, most of whom are contributors elsewhere in this special issue, submitted to the European Research Council to continue our rebound research into a number of the areas discussed here).

MKB (Question). What role can coupling energy efficiency technologies with information play? I'm thinking, in particular, about computer feedback systems designed to show you how much energy you're using compared to various times in the past. Do we know how people respond if they're made aware of the fact that they're rebounding?

KT (Answer). Again, I think this is a very important question, and it links back to the previous one. In the examples given above, people find out quite quickly about the savings they make from installing a more energy efficient fridge, so this is the point at which they will make decisions on how to use the income freed up from their electricity bill. Therefore it is also a point at which information may be useful to them about the implications of rebounding by using more energy (and perhaps incentives put in place to prevent them from doing so). However, in the other example, where people have to adjust their behaviour after they install loft installation, there is also the issue that (due to a combination of habit and lack of information) they may continue to spend too much on heating (i.e. not realising the full energy savings that are possible, and/or getting to the point of rebound). In such circumstances technologies such as smart meters may help people make informed decisions to adjust their behaviour and realise potential energy savings. The bigger job is influencing how they spend the funds freed up when efficiency improves. There may be a role for policy here. For example, also on the production side of the economy, incentives may be required to induce energy users to realise the full energy savings that are possible (especially when it may lower total consumption/production costs to use more energy, given that its implicit price has fallen).

MKB (Question). Cap and trade and carbon taxes have also been discussed as a way to counteract rebound effect. Do you see one or the other as being more effective in this way? Also, when we use these policies we're basically setting incentives for people to use less energy. The cheapest way to use less energy is efficiency. Why doesn't that stall rebound or backfire even under these policies?

KT (Answer). Basically anything that offsets the decrease in the implicit price of energy that triggers rebound will act counteract it. However, there are two important issues to consider. First, particularly in production, where the lowering of the implicit price of energy triggers a productivity improvement, rebound is not necessarily a bad thing (only the extreme case of backfire increases energy use and emissions). It just means we have to work harder at achieving desired energy savings (e.g. energy efficiency targets may have to be proportionately larger than energy reduction ones to allow for rebound). If there is a need to prevent rebound, taxes are a possibility. However, carbon tax is perhaps a bit too indirect, that is it would be better to focus directly on the energy use where the price change occurs. Revenues could be partly used to bring energy efficiency improving technologies to the market (this is already done in the case of the UK Climate Change Levy). Nonetheless, taxes are distortive and it is difficult to design an optimal tax to address something as specific as the change in energy prices as a result of efficiency improvements (particularly where actual as well as implicit prices change). Before taking such a step, and to preserve the full economic benefits of improved efficiency, it would be useful for policymakers to consider the type of information issues discussed above. That is, try to help people understand the issues involved and encourage them to adjust their own behaviour voluntarily.

Closing comments

The objective of this paper has been to use the Q&A format of the interview designed by Maggie Koerth-Baker to communicate key issues regarding the rebound effect and key findings from the ESRC First Grant project in a non-technical manner. A full set of outputs from the project can be found on the ESRC Today web-site URL below). However, interested readers may address questions directly to Karen Turner at karen.turner@stir.ac.uk.

http://www.esrcsocietytoday.ac.uk/esrcinfocentre/viewawardpage.aspx?awardnumber=RES-061-25-0010

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http://www.ukerc.ac.uk/Downloads/PDF/07/0710ReboundEffect.

Appendix.

Summary of Energy Efficiency Policies in the UK

The Sustainable Energy Act 2003 required the UK Government to publish a statutory aim for residential energy efficiency in the UK. This requirement was fulfilled in the 2004 Energy Efficiency Action Plan, which set out to save 3.5 million tonnes of carbon per year by 2010 through energy efficiency measures in the household sector. The range of measures implemented by the UK Government are summarised below.

Table A.1 Policy Levers and Examples of Energy Efficiency Policies

Levers to Reduce Household Energy Consumption Instrument	 Examples
Regulation	**Building Regulations, The Home Energy Conservation Act 1995**
Grants and Fiscal Incentives	**Code for Sustainable Homes, Energy Efficiency Commitment, Carbonn Emissions Reduction Target, Supplier Obligation,, The Warm Front Scheme, Improving the energy efficiency of our homes and buildings**
Information and Awareness Raising	**Energy Certificates and air-conditioning inspections for building, Supplier Obligation (metering and labelling), Energy Saving Trust programmes, Energy Performance Certificates, Labelling, Billing and Metering**

<u>Regulation</u>

Building Regulations (England and Wales) 2002
Building Regulations (England and Wales) 2005/6

Part L of the regulatory building framework sets the standards for energy efficiency measures and practices in the construction of new domestic buildings and for improvements to existing buildings. For energy efficiency measures contained in the building regulations see the link below. http://www.communities.gov.uk/documents/planningandbuilding/pdf/Energyefficiencyrequirements.pdf.

The Home Energy Conservation Act 1995

The Home Energy Conservation Act 1995 requires all UK energy conservation authorities to prepare an energy conservation report indentifying cost effective measures likely to result in the energy efficiency of all residential accommodation in their area.

Grants and Fiscal Incentives

The Code for Sustainable Homes and the Energy Efficiency standard for Zero Carbon Homes

The Code for Sustainable Homes (the Code) is the national standard for the sustainable design and construction of new homes. It applies in England, Wales and Northern Ireland. The Code goes further than the current building regulations, but is entirely voluntary, and is intended to help promote high standards of sustainable design. The Code sets minimum standards for energy and water use at each level and, within England, replaces the Eco Homes scheme, developed by the Building Research Establishment (BRE).

http://www.communities.gov.uk/planningandbuilding/sustainability/codesustainablehomes/
http://www.communities.gov.uk/documents/planningandbuilding/pdf/1415525.pdf

The Warm Front Scheme

Warm Front (the Scheme) is a key programme of the Department of Energy and Climate Change (the Department) to tackle fuel poverty by improving energy efficiency in privately owned properties in England.
http://www.nao.org.uk/publications/0809/the_warm_front_scheme.aspx

CRC Energy Efficiency Scheme

The Carbon Reduction Commitment Energy Efficiency Scheme (CRC) is the UK's mandatory climate change and energy saving scheme. It has been designed to raise awareness in large organisations, especially at senior level, and encourage changes in behaviour and infrastructure.

http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/crc.aspx

Carbon Emissions Reduction Target (CERT)

The Carbon Emissions Reduction Target (CERT) requires all domestic energy suppliers with a customer base in excess of 50,000 customers to make savings in the amount of CO_2 emitted by householders. Suppliers meet this target by promoting the uptake of low carbon energy solutions to household energy consumers, thereby assisting them to reduce the carbon footprint of their homes.

http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/cert/cert.aspx

Supplier Obligation

The Supplier Obligation instrument developed by DEFRA gives suppliers and consumers a shared incentive to reduce carbon emissions from homes. As a way of providing feedback on household energy use directly to each household, 'smart' meters have been introduced. A 'smart' meter replaces the existing meter which can constantly monitor energy use and costs. From the supplier perspective, the smart meter provides the energy supplier with direct feedback on energy use through smart communication channels. This means that meters no longer have to be read manually.
Supplier obligation requires that the supplier provide detailed information where possible (for example on utility bills) to highlight where energy savings and improvements can be made.
http://www.sd-commission.org.uk/pages/supplier-obligation-project.html

Information and Awareness Raising

Improving the energy efficiency of our homes and buildings: Energy Certificates and air-conditioning inspections for building

The range of initiatives introduced from January 2009 to help improve the energy efficiency in buildings and meet the UK's carbon emissions. It covers: energy performance Certificates (EPCs) for homes and buildings; display Certificates for public buildings; inspections for air conditioning systems.
http://www.communities.gov.uk/documents/planningandbuilding/pdf/714826.pdf

The Energy Saving Trust (EST)

The Energy Saving Trust (EST) is funded by the UK Government to support household energy efficiency activities. The EST has several core activities directed at household consumers, for example:

1. Implementing Energy Efficiency Advice Centres (EEACs) which provide advice to consumers and help them to assess their energy use and refer them on to any available grant offers.

2. The Sustainable Energy Network (SEN) designed by the EST as a key delivery route for more effective advice to consumers, engaging proactively and enabling individuals to make personal commitments to reduce carbon. In addition to energy efficiency, SEN's will promote carbon saving through renewables and transport.

3. On-line Home Energy Checks – a personalised report showing consumers how much energy and money they can save in their home.

4. The *Save Your 20%* consumer marketing campaign, which is a source of information and call to action for consumers to reduce their energy use and install energy efficiency measures.

5. Accreditation of products under the Energy Saving Recommended label. This directs consumers to products that save the most energy and maintenance of an on-line searchable database of energy efficient products.

6. For local authorities and registered social landlords, EST administers a number of programmes including Practical Help which is a tailored source of information and support on delivering energy efficiency to their communities.

Labelling

From an industry perspective the UK continues to work closely with the EU commission, supporting a mandatory labelling scheme which requires domestic appliances to display energy information. This applies to household refrigerators and freezers, washing machines, electric tumble dryers and air conditioning units. As well as statutory labelling the UK Government is also encouraging voluntary actins by industry to provide customer information as an alternative to enforced regulation.

From a household perspective the UK Government promotes metering and billing schemes which aim to raise awareness about energy use in the domestic sector to the domestic sector. With the support of energy suppliers and in line with the measures stated in the Energy White Paper , consumers are aided to better understand more about their energy use.

Energy Efficiency Policies from the Scottish Government

Scotland

The Scottish Government is committed to reducing carbon emissions in line with the UK targets and also to meet the Scottish Climate Change Target to reduce emissions by 80% by 2050. As well as implementing policies and measures set at the UK level the Scottish Government has also implemented strategies and measures specific for Scotland.

Some Scottish measures are implemented in the same fashion as those at the UK level. For example, raising household awareness and giving advice is in the hands of the Scottish Energy Saving Trust (EST).

A short overview of the Scottish Government's approach to energy policy is available from the link below.
http://www.scotland.gov.uk/Resource/Doc/237670/0065265.pdf

As well as the measures outlined in the document above, two agendas published by the Scottish Government outline the measures and instruments specific to Scotland that will be used to achieve energy efficiency and climate change targets. The links to these published agendas are given below.

Conserve and Save: Energy Efficiency Action Plan

Scotland's first national target to improve energy efficiency will consist of £10 million in grants to local councils to offer free insulation measures and provide energy saving advice to 100,000 households. Scotland's Energy Efficiency Action Plan includes a headline target to reduce total energy consumption by 12 per cent by 2020.

http://www.scotland.gov.uk/Resource/Doc/326979/0105437.pdf

The Low Carbon Economic Strategy

The Low Carbon Economic Strategy (LCES) is an integral part of the Government's Economic Strategy to secure sustainable economic growth, and a key component of the broader approach to meet Scotland’s climate change targets and secure the transition to a low carbon economy in Scotland. The Strategy has been developed with, Scottish Enterprise, Highlands and Islands Enterprise, Transport Scotland, Scottish Environment Protection Agency, Scottish Development International, Scottish Funding Council, Skills Development Scotland, Visit Scotland and COSLA.

http://www.scotland.gov.uk/Resource/Doc/331364/0107855.pdf