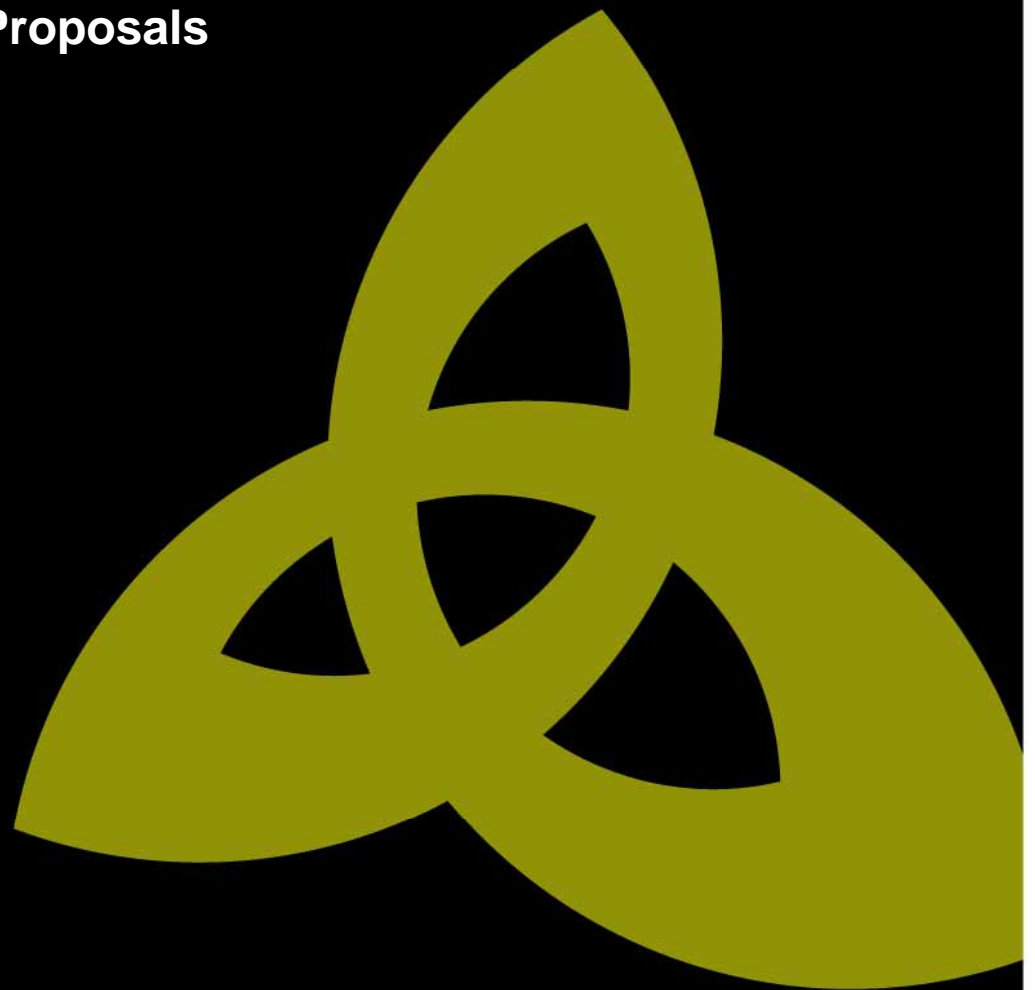


# Carbon Emissions Reduction Target April 2008 to March 2011

**Consultation Proposals**

**May 2007**



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**defra**  
Department for Environment  
Food and Rural Affairs

Department for Environment, Food and Rural Affairs  
Nobel House  
17 Smith Square  
London SW1P 3JR

Website: [www.defra.gov.uk](http://www.defra.gov.uk)

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Defra  
Climate Change and Energy: Household and Markets  
Zone 3/G19  
Ashdown House  
123 Victoria Street  
London SW1E 6DE

Tel: 020 7082 2458  
Email: [cert2007consultation@defra.gsi.gov.uk](mailto:cert2007consultation@defra.gsi.gov.uk)

We are moving offices on 1 August 2007. Requests after this date should be sent to:

Department of Environment, Food and Rural Affairs  
Climate Change and Energy: Household and Markets  
4<sup>th</sup> Floor  
Ergon House  
17 Smith Square  
London SW1P 3JR

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This consultation is published alongside the Energy White Paper. The wide range of measures set out in the White Paper take forward our commitment to meeting the two long-term energy challenges. They are:

- tackling climate change by reducing carbon dioxide emissions both within the UK and abroad; and
- ensuring secure, clean and affordable energy as we become increasingly dependent on imported fuel.

This consultation will further help to formulate our long term energy policy. Other consultations will take place later in the year.

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## Executive summary

This document is the Government's statutory consultation on the Carbon Emissions Reduction Target 2008-11 (CERT). The CERT is the name for the obligation previously referred to as the Energy Efficiency Commitment 2008-11 or EEC3. The CERT has the same underlying framework and purpose as the EEC mechanism, with the additions allowed by the Climate Change and Sustainable Energy Act 2006 to include microgeneration and behavioural measures within the scheme. The term EEC will be used throughout this document to refer to the underlying mechanism and its current EEC 2005-2008 (EEC2) and previous EEC 2002-2005 (EEC1) phases, while CERT refers to the specific obligation to be imposed during the period April 2008 to March 2011.

The Government proposes to:

- impose the CERT mechanism to 2011 at around double the level of activity of the current EEC 2005-08
- extend its scope to include, in addition to energy efficiency measures, microgeneration and other measures for reducing the consumption of supplied energy
- introduce new approaches for innovation and flexibility
- maintain a focus on low-income consumers.

In developing our proposals for the scale and framework of the CERT there are a number of key priorities which the Government aims to balance: to keep costs at a reasonable level (and thereby minimise the cost passed through to consumers); to maximise cost-effective carbon savings; to maintain equity and contribute to the delivery of our statutory fuel poverty objectives, by ensuring that low-income households benefit. Our proposals have thus been informed by detailed analysis of the constraints and impacts imposed by these priorities.

The level of the overall target for each phase of the EEC is established using an illustrative mix of possible measures to demonstrate the feasibility of the target. The overall target, together with the estimated costs and benefits of the CERT 2008-2011 are set out in the Illustrative Mix of Measures<sup>1</sup> appended to the Partial Impact Assessment at Annex 1 to this paper.

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<sup>1</sup> The illustrative Mix is also available at <http://www.defra.gov.uk/corporate/consult/cert2008-11/index.htm>

The data and assumptions underlying the Illustrative Mix are based on a wide range of sources, including information provided by energy suppliers, by representatives of the industries concerned, and by experts, including the Energy Saving Trust, AEA Energy and Environment and the Buildings Research Establishment.

The Illustrative Mix is an analytical tool used by the Government to explore the implications of various options and to explain our underlying assumptions in setting the overall target and other key elements of the CERT framework. It demonstrates the feasibility of achieving the target. It should be emphasized that it does not necessarily reflect the way in which suppliers might choose to proceed in practice, nor is it intended to suggest particular targets or levels of activity that must be derived from any particular measure or approach.

We believe we have achieved a balanced approach, which sets very challenging but achievable carbon abatement targets, while continuing to contribute effectively to our fuel poverty objectives, without increasing costs to consumers beyond reasonable levels. The CERT is designed to encourage greater flexibility and innovation in suppliers' business models, paving the way for a new obligation framework post-2011.

### **Level of the CERT obligation**

The Government proposes that the total CERT obligation on all suppliers for the period 1 April 2008 to 31 March 2011 should be lifetime savings of **42** million tonnes of carbon (MtC) This would equate to an annual saving of about 1.1 MtC at the end of the programme.

In view of the primary objective of the CERT obligation to reduce carbon emissions and the inclusion of microgeneration and other measures to reduce the consumption of supplied energy, it is proposed to use lifetime carbon savings to denominate both the overall CERT obligation and the scores of individual measures. This would supersede the fuel-standardised, lifetime-discounted terawatt hours currently used under EEC.

The annual carbon saving of about 1.1 MtC from the CERT will add to the expected annual carbon savings of about 0.3 MtC and about 0.5 MtC by 2010, respectively from EEC 2002-05 and EEC 2005-08.<sup>2</sup>

### **Cost to consumers**

The potential non-ongoing costs to consumers (if passed on in full by energy suppliers) are estimated to be no more than around **£97** over the three-year period.

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<sup>2</sup> The annual carbon savings for EEC1 and EEC2 were previously estimated to be about 0.4 MtC and 0.6 MtC in 2010; however, recent evidence suggests that some measures have lower savings than previously assumed which reduces these estimates.

This nominal cost of the CERT 2008-11 is slightly more than double that of the current EEC 2005-2008 in real terms.

### **Benefits for consumers**

The Government estimates that on average the annual ongoing benefit per household, in terms of lower energy bills or increased comfort, would be around **£31 a year** for the lifetime of the measures. These benefits will continue for many years (in some cases several decades) beyond the CERT period.

### **Low-income consumers**

The Government remains committed to helping low-income households through the CERT. It proposes that suppliers should be required to focus at least **40%** of the carbon savings of the CERT 2008-11 on a priority group of consumers in receipt of certain income or disability benefit or tax/pension credits. This is to ensure that they have a comparable opportunity to benefit from CERT measures as able to pay consumers. The priority group makes up about a third of all households.

The Government also proposes a new approach to allow suppliers more flexibility in meeting their priority group requirement, while at the same time potentially increasing the number of households being removed from fuel poverty and maintaining the overall carbon reduction impact of the scheme.

### **Innovation and Flexibility**

The Government proposes to introduce a new route for demonstration activity to support trials of innovative approaches, and also to continue to support market transformation.

## Section 1

### Introduction

1.1 This document sets out the Government's proposals for the Carbon Emissions Reduction Target 2008-11. Sections 15 and 16 of the Climate Change and Sustainable Energy Act 2006 made amendments respectively to section 33BC of the Gas Act 1986 and section 41A of the Electricity Act 1989 to allow the Secretary of State to impose on electricity and gas suppliers an obligation to achieve a carbon emissions reduction target. This will replace the current energy efficiency target. The amendments also allow the Secretary of State, by order, to include in the mechanism for achieving the target microgeneration and behavioural measures alongside the energy efficiency measures of the current EEC. Following the EEC3 Initial Consultation in summer 2006<sup>3</sup> the Government has decided to consult on this basis. To reflect this change, the previous term "EEC3" will in future be replaced with the name for the new obligation "CERT".

1.2 In the 2007 Energy White Paper<sup>4</sup>, the Government reaffirmed that obligations on energy suppliers in the household sector are a key part of the UK's response to climate change. Over this decade, household energy service demand is expected to rise by over 2% per year, while energy efficiency has historically improved by around 1% per year. Together with other lesser factors (for example, changes to the fuel mix at power stations and in housing), the net effect would be almost no change in carbon emissions, if no policies were in place. The Energy White Paper sets out a range of actions in the household sector to drive demand for carbon abatement products and services and to support householders in taking effective action. The effect is expected to be a net reduction in carbon emissions from households of 4-5MtC per year by 2010.

1.3 The CERT will form an important part of this mix, encouraging innovative approaches and partnerships for delivery of reduced carbon emissions, improving the availability of carbon abatement products and services for all consumers. The CERT is expected to deliver annual savings of 1.1 MtC at the end of the programme, equivalent to around 3% reduction in demand, relative to business as usual.

1.4 For 2008-11, the Government proposes both to increase the scale of the EEC and to extend its scope. Under the current EEC, electricity and gas suppliers are required to achieve their obligations towards meeting the target for the promotion of improvements in energy efficiency in the household sector. In February 2007 the Government commenced the relevant amendments of the Climate Change and

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<sup>3</sup> The Energy Efficiency Commitment April 2008 to March 2011 - Initial Consultation (July 2006) <http://www.defra.gov.uk/corporate/consult/eec3/index.htm>

<sup>4</sup> Meeting the Energy Challenge <http://www.dti.gov.uk/energy/whitepaper>

Sustainable Energy Act 2006 that allow the reduction of carbon emissions by microgeneration and behavioural measures to be included for the first time. The scale of activity required under CERT 2008-11 is proposed to be around twice that of the current EEC 2005-08.

1.5 As under the EEC, there will be a focus on helping low-income consumers who are in receipt of certain income-related or disability benefits, tax credits and pension credit. This is to ensure that low-income consumers are as able as other consumers to receive a share of CERT benefits and, as a consequence, it is also expected to contribute to the alleviation of fuel poverty.

1.6 The Government proposes to introduce a new approach to flexibility and innovation within the CERT including a new route for demonstration activity, as well as continuing to support market transformation.

1.7 In the 2006 Energy Review<sup>5</sup>, the Government announced that an obligation on the household energy suppliers would remain until at least 2020 and that it would explore the possibility of a shift in 2011 from a measures-based approach to one based on outcomes, that is an overall reduction in carbon or delivered energy from the household sector. If households are to play their part in achieving the Government's long-term climate change objectives then we need to see demand for fossil-fuel based energy decline over time, with annual emissions falling from around 40 MtC today to around 30 MtC by 2020. Energy efficiency, low and zero carbon technologies and changes to consumer behaviour must all play a part. Our vision is for all of these to be driven increasingly by consumers themselves, with consumer demand creating a robust, self-sustaining market for low carbon measures and services. CERT will play an important part in the transition towards this world.

1.8 The Energy White Paper confirmed our commitment to this approach, setting out the key elements of a work programme to evaluate the benefits of the options for a future supplier obligation which could provide stronger incentives for energy suppliers to reduce the carbon emissions of their customers. We intend to reach a clear conclusion on the direction for the post-2011 supplier obligation in 2008. As part of this process a Call for Evidence is being issued in summer 2007 to solicit early views from stakeholders on the development of the future framework.

## **Process**

1.9 This document is the statutory consultation on the legislation for the CERT 2008-11 required under the Electricity Act 1989 and Gas Act 1986. It is issued following detailed close engagement with a wide range of stakeholders, including electricity and gas suppliers, representatives of relevant industries, local authorities and other representative bodies and organisations with an interest in carbon abatement, fuel poverty and the environment. The Government held two

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<sup>5</sup> The Energy Challenge: Energy Review Report 2006 Cm 6887 (July 2006)  
<http://www.dti.gov.uk/files/file31890.pdf>

consultation events in March 2006 and October 2006, with the support of the Energy Efficiency Partnership for Homes, with very effective contributions and feedback from a wide range of stakeholders. In July 2006 it issued an Initial Consultation on the EEC3 in order to solicit early views to inform the current consultation. The Initial Consultation focussed on issues relating to:

- commencement of the relevant provisions of the Climate Change & Sustainable Energy Act 2006, to allow a wider range of measures to contribute towards CERT activity, including microgeneration and behavioural measures
- the transitional arrangements from EEC2 to EEC3
- the approach to social equity under EEC3
- the potential for the EEC to evolve towards or include a system for trading.

1.10 The Initial Consultation closed on 23 October 2006 and a summary of responses was published on 12 January 2007.<sup>6</sup> An initial version of the Illustrative Mix was published in September 2006 for stakeholder comment<sup>7</sup>.

1.11 In response to the informal consultation the Government has decided to proceed with the current consultation on the basis of the new CERT framework, that is an obligation set in terms of lifetime carbon savings (non-discounted) and the inclusion of microgeneration and behavioural measures. In addition the Government agreed to set at an early stage the carbon saving scores for the established measures to be used in the Illustrative Mix, in order to support transition from EEC2 to CERT. These were published for consultation on 12 January 2007 and the summary of consultation responses and the final scores were published in March 2007<sup>8</sup>.

1.12 This document takes account of the comments received throughout the whole of the informal consultation process, particularly the Initial Consultation in summer 2006. It also takes account of the latest information on the costs of carbon saving measures and other parameters that are likely to determine suppliers' costs in meeting their CERT obligations, including information about delivery of the current EEC. The Government intends to hold further jointly hosted events with the Energy Efficiency Partnership for Homes in England and Scotland in June 2007 to offer key stakeholders an opportunity to discuss the issues set out in this consultation, as well as initial views on the post-2011 framework.

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<sup>6</sup> <http://www.defra.gov.uk/corporate/consult/eec3/responses-summary.pdf>

<sup>7</sup> <http://www.defra.gov.uk/environment/energy/eec/pdf/illustrative-mix.pdf>

<sup>8</sup> <http://www.defra.gov.uk/corporate/consult/eec3-2007/index.htm.pdf>

## Next steps

1.13 After considering the responses to this consultation, the Government will lay before Parliament the Statutory Order for the CERT 2008-11 in autumn 2007, with a view to it coming into force in December 2007. The Order is subject to debate in and approval by both Houses of Parliament.

1.14 Comments on all aspects of the proposals contained in this document are invited, and should be sent by **15 August** 2007 to Gill Hulatt as detailed below.

Please note we are moving offices on 1 August 2007. Comments before this date should be sent to:

Gill Hulatt  
Department for Environment, Food and Rural Affairs  
Zone 3/G16  
Ashdown House  
123 Victoria Street  
London SW1E 6DE  
Email: [cert2007consultation@defra.gsi.gov.uk](mailto:cert2007consultation@defra.gsi.gov.uk)  
Fax: 020 7082 2458

Comments after 1 August 2007 should be sent to:

Gill Hulatt  
Department of Environment, Food and Rural Affairs  
Climate Change and Energy: Household and Markets  
4<sup>th</sup> Floor  
Ergon House  
17 Smith Square  
London  
SW1P 3JR

(Email address will remain unchanged)

1.15 In line with Defra's policy of openness, at the end of the consultation period copies of the responses we receive may be made publicly available through the Defra Library (Ergon House, 17 Smith Square, London SW1P 3JR). The information they contain may also be published in a summary of responses and shared with other Government Departments and Devolved Administrations. If you do not consent to this, you must clearly request that your response be treated confidentially. Any confidentiality disclaimer generated by your IT system in e-mail responses will not be treated as such a request. You should also be aware that there may be circumstances in which Defra is required give information to third

parties on request, in order to comply with its obligations under the Freedom of Information Act 2000 and the Environmental Information Regulations.

1.16 The library will supply copies of consultation responses to personal callers or in response to telephone or e-mail requests (tel: 020 7238 6575, email: [defra.library@defra.gsi.gov.uk](mailto:defra.library@defra.gsi.gov.uk)). Wherever possible, personal callers should give the library at least 24 hours' notice of their requirements. An administrative charge will be made to cover photocopying and postage costs.

1.17 If you have any complaints about the consultation process (as opposed to comments about the issues which are the subject of the consultation) please address them to: Marjorie Addo, Defra's Consultation Co-ordinator, Area 7B Nobel House, 17 Smith Square, London SW1P 3JR, or email: [consultation.coordinator@defra.gsi.gov.uk](mailto:consultation.coordinator@defra.gsi.gov.uk)

## Section 2

### Carbon Emissions Reduction Target 2008-11: description of the scheme

2.1 Under the Electricity Act 1989 and the Gas Act 1986, as amended by the Utilities Act 2000 and the Climate Change and Sustainable Energy Act 2006, the Government has the power to impose on electricity and gas suppliers an obligation to achieve a carbon emissions reduction target (CERT). The Government is responsible for setting both the level of the overall target on suppliers and the framework for the operation of the scheme.

2.2 The Government proposes to set obligations for a CERT that will include promotion of:

- measures for improving energy efficiency
- measures for increasing the amount of electricity generated or heat produced by microgeneration
- measures for increasing the amount of heat produced by any plant which relies wholly or mainly on biomass and the capacity of which does not exceed 3 megawatts thermal
- measures for reducing the consumption of supplied energy, such as behavioural measures.

2.3 The promotion of measures for improving energy efficiency is a continuation of suppliers' activity under the current EEC. Energy efficiency is integral to the Government's overall policy of saving energy and one of the key components of the UK Climate Change Programme. The Illustrative Mix of Measures appended to Annex 1 includes scores for these measures.

2.4 The inclusion of microgeneration and measures for reducing the consumption of supplied energy will provide suppliers with more flexibility in the measures they can adopt to meet their targets. It reflects the Government's wish to encourage a holistic approach to carbon abatement in the household sector, encouraging consumers to take advantage of a combination of energy efficiency, microgeneration and behavioural measures to reduce their carbon emissions. For the avoidance of doubt, it should be noted that it is not proposed to include separate targets for these new measures within the CERT – suppliers will continue to have full flexibility in which measures they choose to meet their obligations and we expect established energy efficiency measures to continue to dominate energy suppliers' activity.

2.5 The Government proposes to include a new route for demonstration of new and innovative approaches and measures to which accurate carbon savings cannot yet be attributed. It also intends to continue to support market transformation for new products and services. Suppliers would be free to adopt any combination of these incentives for innovation activity but, in order to limit the loss of carbon from the scheme, their combined use should not exceed 5% of a supplier's obligation.

2.6 The Illustrative Mix of Measures sets out our approach to determining *ex-ante* scores for microgeneration measures. We have developed scores for wood stoves, woodchip boilers, micro-hydro, micro-wind, solar thermal, solar PV and ground source heat pumps. However, *ex-ante* scores for some forms of microgeneration (for example, micro-wind and microCHP) and behavioural approaches are more difficult to set in view of the site-specific nature of some technologies, or because of limited available evidence on performance in the field. Such technologies might however still be included within the CERT via the innovation route described below. Guidelines by Ofgem (the Office of Gas and Electricity Markets) on its proposed approach to microgeneration and behavioural measures in the CERT will be set out in its consultation on administrative procedures, planned for summer 2007.

2.7 The inclusion in the CERT mechanism of measures for increasing the amount of heat produced by plant that relies wholly or mainly on biomass, with a capacity not exceeding 3 megawatts thermal, is to enable suppliers to promote community heating schemes for which the source of energy is biomass. The Government considers that the definition of microgeneration in the 2006 Act, with a maximum capacity of 50 kilowatts in relation to the generation of electricity, would allow the promotion of small community schemes. In relation to the production of heat, however, the maximum capacity of 45 kilowatts thermal is not sufficient for community-level activity, which would require a capacity of up to 3 megawatts thermal.

2.8 The CERT will continue to maintain a focus on low-income customers via a priority group obligation. The Government also proposes to introduce a new route for flexibility in approaches to the priority group obligation, which would enable energy suppliers to deliver measures likely to have more impact on the alleviation of fuel poverty, while protecting the overall carbon reduction impact of the scheme.

2.9 Ofgem is responsible for the detailed administration of the CERT programme. It proposes to issue a consultation document in summer 2007 on administration procedures for the CERT 2008-2011. This is expected to include issues such as:

- proposed changes to current procedures
- accreditation of microgeneration measures
- administration of the demonstration route
- administration of the Priority Group flexibility option
- additionality of activity, for example regarding appliances
- interaction with other Government programmes and initiatives.

## **Objectives of the CERT**

2.10 The purpose of the CERT obligation is to help electricity and gas consumers in the household sector to reduce the carbon impact (footprint) of their home by using energy more efficiently, reducing consumption and using energy from microgeneration sources. In doing so they will reduce their fuel costs and/or enjoy greater comfort.

2.11 Through achieving carbon savings, the primary aim of the CERT is to make a significant contribution to the UK's legally binding target under the Kyoto protocol to cut greenhouse gas emissions by 12.5% below 1990 levels by 2008–2012 and its domestic goal to cut emissions of carbon dioxide by 20% below 1990 levels by 2010. We want to see all homes achieve their cost-effective carbon abatement potential and the 2007 Energy White Paper sets out our future plans to offer support and advice to householders, including a commitment to a significant energy supplier obligation to 2020. The CERT will require energy suppliers to double their current effort so that even more customers are likely to benefit both directly and indirectly from supplier activity. Since, like the existing EEC, the CERT will provide particular help to low-income consumers, who spend a larger proportion of their income on energy, it is expected that it will also contribute to the alleviation of fuel poverty.

## **Framework of the CERT scheme**

2.12 The sections below set out the Government's proposals for the structure of the CERT. The overall target on all suppliers and the criteria for operation of the scheme will be set in secondary legislation: a draft Statutory Order is at Annex 2.

### ***Application of the CERT***

2.13 The Government proposes that obligations under the CERT should apply to gas and electricity suppliers. Companies that are both licensed electricity suppliers and licensed gas suppliers will have one obligation for each fuel, reflecting the way in which the Utilities Act 2000 is structured.

2.14 The Government proposes that there should be a threshold of 50,000 customers per supplier group for each fuel, below which a supplier would not be subject to a CERT 2008-2011 obligation. This is to recognise the potentially higher cost of running carbon saving programmes on a smaller scale and to help avoid barriers to entry to the supply market.

2.15 It is proposed that the CERT obligation will relate to reductions in carbon emissions by domestic consumers in Great Britain.

2.16 Continuing the approach of the current EEC, it is envisaged that a supplier will be able to promote CERT measures to consumers generally and not just its own customers.

***Type of fuel savings to be eligible***

2.17 Suppliers will be able to achieve their CERT obligations through consumers' savings of electricity, gas, coal, liquid petroleum gas and oil, and through use of biomass, water, wind, solar power and geothermal sources.

***Overall target***

2.18 The Government proposes that the total CERT obligation on all suppliers for the period 1 April 2008 to 31 March 2011 should be lifetime savings of **42** million tonnes of carbon (non-discounted).

***Low-income consumers***

2.19 In the 2006 Energy Review the Government made clear that more is required to meet our statutory target of eradicating fuel poverty, and highlighted commitments to enhance delivery. In the 2007 Energy White Paper we set out action taken and progress that has been made to date, the scale of the problem that still exists and our short and medium term policies to tackle fuel poverty and reach those most in need. The Government remains firmly committed to tackling fuel poverty but does recognise the scale of this challenge, given the significant fuel price rises in the last 2 years.

2.20 Further commitments are made in the White Paper to help enhance delivery on our fuel poverty targets. Key commitments include: enabling the sharing of benefit information to enhance targeting of assistance; improved provision of benefit entitlement checks to maximise household income; encouraging energy companies to do more to support their most vulnerable customers and taking forward work to provide the Secretary of State with powers to enforce action if none is done voluntarily.

2.21 In order to ensure that low-income consumers are as able as other consumers to benefit from CERT measures, it is proposed that electricity and gas suppliers will be required in CERT 2008-11 to achieve at least **40%** of their obligation in households which are in receipt of benefits similar to those that apply under the current EEC:

- income support
- housing benefit
- council tax benefit
- income based jobseekers allowance
- attendance allowance

- disability living allowance
- disablement pension benefit (which must include constant attendance allowance)
- war disablement pension (which must include the mobility supplement or constant attendance allowance)
- child tax credit\*
- working tax credit\*
- state pension credit

\* In the case of child tax credit and working tax credit, the income of the consumer in receipt of the credit should be £15,592 or less. This threshold has been increased from £14,600 under the current EEC. It is based on an uprating of the 'low-income cut-off' used for tax credits, which is recognised as being an indicator of low income under the current tax system.

2.22 The Government's proposal to set the priority group obligation at 40% reflects limited remaining potential and capacity constraints in delivering to this sector, alongside increasing cost implications, which are passed on to customers, including low-income consumers, via their fuel bills. We accept that this scale of priority group obligation will be challenging, but we believe it to be achievable. It should be noted that although the figure of 40% may seem lower than the EEC2 priority group obligation of 50% it represents an actual increase in activity aimed at low-income consumers. Because the overall level of activity under CERT will be roughly double that under EEC2, the activity in the Priority Group would increase by about 60%, with the amount of CERT costs directed at the Priority Group being well over 50% and about £1.6bn worth of activity. Low-income consumers will also continue to benefit from activity delivered under previous phases of the EEC.

### ***Priority group flexibility option***

2.23 The Government has worked with stakeholders on the potential for the EEC framework to contribute effectively to the alleviation of fuel poverty, via the priority group of low-income households, including consideration of the feasibility of new, more flexible approaches. The Government has considered a priority group flexibility option based on the following criteria:

- maintaining the equitable principle that all consumers, who contribute to the costs of the CERT through their fuel bills, should have similar opportunity to benefit from measures
- providing suppliers with more options in meeting their priority group obligations
- potentially increasing the number of households removed from fuel poverty
- maintaining so far as possible the overall carbon saving from CERT.

2.24 The Government therefore proposes a **priority group flexibility option**, under which an energy supplier would be able to notify Ofgem that it wished to reduce a proportion of its priority group obligation by a specified amount, in return for undertaking other specified carbon abatement measures in a focussed section of the priority group aimed at alleviating fuel poverty.

2.25 A supplier who took up this option would still be required to achieve its full CERT carbon abatement obligation by directing activity to domestic consumers generally, rather than to those in the priority group. However, since the cost of directing measures to priority group consumers is higher than for other consumers, it would have done so at a reduced cost and this notional saving could be used to fund additional specified measures expected to support alleviation of fuel poverty.

2.26 It is proposed that, in order to ensure that the additional measures are focussed towards those households most likely to be at risk of fuel poverty and which are less likely to have benefited from previous EEC and other activity, the additional measures should be delivered in households, specified in the draft Order, which are:

- in the priority group
- and in private sector homes
- and which are off the gas grid.

Analysis (included in Annex 3) suggests that such households have a greater propensity to be in fuel poverty than other members of the priority group. In addition such properties are considered to be particularly hard to treat and are less likely to have benefited from measures under EEC.

2.27 It is proposed that a supplier could choose from the following measures, specified in the draft Order, which are considered to be more likely than other carbon saving measures to remove such households from fuel poverty:

- solid wall insulation
- heating systems using biomass
- ground source heat pumps.

The number of installations of such measures that would need to be carried out will be determined using a translation factor to be specified in the Order. Section 3 of Annex 3 sets out two possible approaches to determining the translation factor, which would attribute a nominal carbon saving to each measure installed. On the basis of applying the same translation factor to each of the above measures, the alternative approaches result in a carbon saving per measure of either 86.7tC or 29.3tC. Comments are invited on the methodology underlying the approaches set out in Annex 3 or any intermediate or alternative approaches which might be adopted to determine the translation factor.

2.28 In order to maintain a basic level of equity for all priority group consumers, the Government proposes setting a maximum percentage of a supplier's priority group share that may be treated in this way. Since the priority group makes up around a third of the population, the Government considers that a minimum level of the CERT carbon savings to be directed to the priority group should be 35% of the overall obligation set for a supplier. On this basis, it is proposed that a supplier could apply the priority group flexibility option to no more than 5% of its CERT obligation, that is one eighth of its priority group obligation. For equity reasons, a supplier will not be allowed to credit any carbon savings from the flexibility option measures towards meeting their CERT target, since this would potentially further reduce the activity directed towards low-income customers. In addition, suppliers will not be able to combine an incentive for innovation activity (see below) with the priority group flexibility option.

2.29 If the priority group flexibility option were used in full by suppliers, this would correspond to a value of around £70 million in the case of a translation factor of 86.7tC per measure, or to a value of around £210 million in the case of a translation factor of 29.3tC per measure, for measures aimed at fuel poverty, while still protecting achievement of the overall CERT carbon target. The focus on measures and customer groups that would not usually be attractive to energy suppliers under the CERT mechanism will also give them some room to explore these options and start to explore the wider market potential for supplier obligations and fuel poverty approaches post 2011.

### ***Innovation activity***

2.30 The Government wishes to introduce new approaches to support and encourage innovation into the EEC/CERT mechanism, particularly to promote action to support positive consumer engagement with their energy use and systematically to gather the knowledge and experience generated to feed into the development of the Supplier Obligation post-2011.

2.31 Under the CERT obligation, the Government proposes to encourage two key approaches to innovation:

- demonstration activity
- market transformation activity.

### ***Demonstration activity***

2.32 The EEC3 Initial Consultation considered the possibility of allowing suppliers to count towards their obligation innovative measures *to which accurate carbon savings cannot yet be attributed*, referred to in these proposals as **demonstration activity**. The majority of respondents addressing the issue were supportive of a "ring-fence" for schemes using such measures or approaches. The Government envisages that a range of technical measures and technologies could be included in the

demonstration route, but expects it to be a particularly effective route for behavioural measures and approaches.

2.33 The underlying principle is to share the risk of promoting innovative approaches to carbon abatement between Government and suppliers. Suppliers will be able to undertake demonstration activity with upfront confidence about the expected contribution that activity will make to their overall CERT obligation. However, since there is a risk that the activity might result in a lower level of carbon saving than anticipated, or none at all, suppliers will only be able to meet a limited proportion of their CERT obligation in this way.

2.34 The Government proposes that a supplier should be able to make a request to Ofgem to undertake demonstration activity. The proposed activity must be such that it may reasonably be expected to promote a reduction in carbon emissions. The supplier must also provide Ofgem with the following information:

- how the action is expected to promote a reduction in carbon emissions
- how the supplier will determine the action has reduced carbon emissions and assess its effectiveness in promoting reduced carbon emissions
- the estimated cost of promoting the action and a breakdown of that cost.

2.35 Ofgem will determine whether the proposed action qualifies for meeting part of the supplier's CERT and the amount of the target to be offset by the proposed action. It will do so on the basis of a translation factor set out in the Order, which is based on the estimated cost of the proposed activity. The proposed translation factor and underlying methodology is set out in section 2 of Annex 3. The supplier will need to provide a robust justification of its project's cost estimate to Ofgem. A supplier undertaking demonstration activity will also be required to provide Ofgem with robust monitoring information, which may be published in a manner that Ofgem thinks fit.

2.36 Where, after a project is completed, but before the end of the CERT period, it becomes possible to attribute a quantified carbon saving score to demonstration activity measures, it is proposed that an energy supplier will have the option to request Ofgem to attribute to those measures the actual carbon saving score, rather than the reduction in carbon emissions which it would otherwise have determined using the translation factor. This would be in recognition of the fact that Ofgem was satisfied that the reduction in carbon emissions achieved by the measure was capable of being ascertained to the same degree of certainty as other qualifying actions. It would not mean that energy suppliers could reuse that element of their demonstration activity ring-fence. In cases where the outcome of the project suggests that the carbon saving is less than attributed by the demonstration route, energy suppliers will not be penalised and the percentage of the target attributed to demonstration activity will stand.

2.37 In order to constrain the risk of loss of carbon, the percentage of a supplier's target to be achieved by demonstration activity should not exceed **5%** of their obligation. This is expected to be equivalent to up to £127m worth of activity.

### ***Market transformation activity***

2.38 The second of the proposals for innovation is called **market transformation activity**. This continues the EEC2 approach of incentivising activity which relates to innovative measures *for which carbon savings can be attributed*. In such cases Ofgem will attribute an additional 50% of carbon savings to a measure which was not determined by Ofgem to be qualifying action under EEC 2002-2005; and which it is satisfied will achieve a significantly greater carbon saving than any similar action determined as a qualifying action under EEC 2002-2005.

2.39 This provision is intended to ensure that innovative measures identified under EEC2 continued to be supported, whilst also encouraging suppliers to bring forward new measures for CERT.

2.40 If suppliers took up this incentive the overall carbon savings of the programme would be reduced. Accordingly, the Government proposes that the percentage of a supplier's target to be achieved by market transformation activity should not exceed **5%**.

### ***Combination of innovation routes***

2.41 Energy suppliers will be able to use both demonstration activity and the market transformation uplift to contribute to their CERT obligations, although they will not be able to use more than one route for the same action. The overall ring-fence proposed for both these types of innovation activity, in order to reduce loss of carbon from the scheme is 5%. Given the increased scale of CERT, this is equivalent to the overall proportion of EEC2 that was used to incentivise innovation. Suppliers may therefore meet up to 5% of their CERT obligation from demonstration activity or from market transformation activity, or from a combination of both types of activity as long as the total innovation activity does not go beyond the 5% limit.

### ***Energy services/whole-house approaches***

2.42 In the 2007 Energy White Paper the Government committed to increasing the provision of support to householders, to make the process of improving the carbon rating of their home as clear and as easy as possible. We expect that CERT, in combination with new tools such as Energy Performance Certificates to be launched in 2007, will encourage and support householders in taking a holistic view of the carbon impact of their home and to take as much potential action as possible to reduce that impact.

2.43 Under previous phases of the EEC we have encouraged energy suppliers to take an “energy services” approach, which were early attempts to define and support a whole-house method. We continue to encourage energy suppliers to offer innovative whole-house approaches to their customers, linked to the information that the Energy Performance Certificate can provide. We expect that the innovation routes described above will allow energy suppliers flexibility to develop a range of new approaches to holistic customer services.

2.44 In 2007, CLG and Defra will be jointly hosting a seminar to consider with key stakeholders how to achieve the greatest potential from the Energy Performance Certificate, as a driver to lead householders to the support they need to make the changes recommended within them, and offering a clear route to action.

2.45 We are aware that some market players are already working to offer householders energy audits and other tools for whole-house approaches and we will monitor the initial stages of the development of the EPC market this summer and its developing role in driving carbon abatement measures. We would welcome consultees’ views on links between the CERT, EPCs and whole-house approaches and the extent to which it might be desirable to encourage energy suppliers to, for example, undertake all of the cost-effective measures identified in an EPC.

#### ***Transition from the current EEC 2005-08 to the CERT 2008-11***

2.46 In the 2006 Climate Change Programme, Budget 2006 and the 2006 Energy Review, the Government recognised that appropriate transitional arrangements between one phase of the EEC and the next are essential and stated its intention to allow unlimited carry-over of activity from the current phase of EEC to the CERT obligation. It is therefore proposed that suppliers will be able to count towards their CERT 2008-2011 targets any action taken under the EEC 2005-2008 that is surplus to their EEC 2005-2008 obligation. This is intended to help smooth the transition and increase energy suppliers’ flexibility and provides a tool for them to manage and mitigate risks. This carry-over provision will not, however, apply to action taken by suppliers under the EEC 2002-05, since that action could have been counted towards their EEC 2005-08 obligations.

2.47 Ofgem will be responsible for determining whether this action qualifies for the CERT 2008-2011. In keeping with the flexible nature of the CERT, it will not be necessary for action that is carried over to be subject to the priority group obligation. However, it will still be necessary for suppliers to achieve their priority group obligation under CERT 2008-11.

2.48 As confirmed in the 2007 Energy White Paper, in response to the initial consultation in summer 2006 the Government published in March 2007 the scores to be attributed under CERT 2008-11 to established energy efficiency measures like insulation and energy efficient lights. This builds on the earlier announcements of unlimited carry-over from the current phase of the EEC, with the aim of supporting

and facilitating smooth transition to the CERT 2008-11. It is hoped that the early decisions about these scores will aid energy suppliers and other stakeholders in making plans for early work on CERT.

2.49 The Government proposes that suppliers should be able to submit schemes to Ofgem once the Order has come into force, potentially in December 2007. Ofgem will be able to consider such schemes for approval before 1 April 2008 when their obligations will commence.

### ***Determination of a supplier's individual carbon emissions reduction obligation***

2.50 Ofgem will be responsible for the apportionment of the overall target by determining for each supplier a carbon emissions reduction obligation.

2.51 Suppliers with less than 50,000 domestic customers will be exempt from CERT. This is in order to avoid barriers to entry to the energy supply market. If a supplier has fewer than 50,000 domestic customers on 31 December 2007, but more than 50,000 on 31 December 2008 or 31 December 2009, it will be subject to an obligation for the remaining full years of the programme.

2.52 As for the current EEC, the Government proposes that the overall target should be apportioned between suppliers in relation to their numbers of domestic customers. It is proposed that suppliers should submit to Ofgem, by 14 January 2008, their customer numbers per licence as at 31 December 2007. Ofgem should notify suppliers of their obligation by 31 January 2008.

2.53 Suppliers should also submit to Ofgem their customer numbers as at 31 December 2008 and 31 December 2009. This information will be used to adjust each supplier's obligation according to changes in their domestic customer base taking account of the threshold of 50,000. Ofgem will give written notification to a supplier of any alteration in its obligation by 31 January 2009 and 31 January 2010 respectively.

### ***Qualifying CERT measures***

2.54 The types of measures that a supplier may use to meet its CERT obligation are referred to as qualifying actions. A supplier should achieve its obligation by promoting qualifying actions. The Government proposes that suppliers should be required to notify Ofgem of their proposals for complying with their obligations.

2.55 It is proposed that Ofgem should be responsible for determining whether an action proposed by a supplier (perhaps as part of wider scheme or programme of measures) would qualify for the purpose of achieving its CERT obligation. Ofgem should notify a supplier of its approval of an action and notify the supplier of the carbon savings expected to result from that action. These will be measured in terms of carbon savings over the lifetime of the measure. Ofgem intends to consult on its

proposed Administration Procedures, including the criteria for qualifying action, in summer 2007.

2.56 The Government considers combined heat and power to be a form of energy efficiency and that this includes community heating or other applications where the fuel is purchased by a landlord who is not himself a domestic consumer, since the fuel is in effect being bought on behalf of and for the benefit of domestic consumers.

2.57 In order to indicate the kind of activity that might enable suppliers to achieve the overall CERT for 2008-2011, the Government has produced the Illustrative Mix of Measures at the Appendix to Annex 1, which includes explanatory notes on the underlying assumptions and calculations. It is open to suppliers what schemes they submit to Ofgem, which may or may not reflect measures in the Illustrative Mix.

2.58 The Government proposes that once a supplier has completed a scheme it should notify Ofgem. Ofgem should then determine the reduction in carbon emissions that has actually resulted from the actions taken within the scheme.

### ***Trading***

2.59 The Government proposes that suppliers should be able to trade with each other the whole or part of their carbon emissions reduction targets. Qualifying action, which has been approved by Ofgem, can also be transferred from one supplier to another.

2.60 In the EEC3 Initial Consultation in summer 2006 we referred to the work that was undertaken for the Government by NERA Economic Consulting on the potential for trading within the EEC mechanism and the feasibility of evolving the EEC towards a formal tradable white certificate scheme<sup>9</sup>. The study had concluded that market mechanisms, such as vertical trading (that is tendering) and temporal trading (that is carry-forward), already form an effective element of the EEC mechanism, but that a move to a formal white certificate scheme would not provide sufficient additional benefits to justify its introduction at this stage. We sought stakeholders' views on the study and any other "trading" issues. Of those respondents who commented on trading the overall view was that, although trading was an interesting aspect worthy of further exploration, it was premature to consider trading for CERT. We therefore intend to focus future work on the potential for trading in the development of a supplier obligation post 2011.

### ***Monitoring and reporting***

2.61 Ofgem will be responsible for the monitoring of suppliers' performance in meeting their CERT obligations. Ofgem will be authorised to require information

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<sup>9</sup> Energy Efficiency and Trading: options for increased trading in the Energy Efficiency Commitment. <http://www.defra.gov.uk/environment/energy/eec/pdf/eec-trading.pdf>

from suppliers about their proposals for complying with any aspect of their obligation and their progress towards achieving it.

2.62 Ofgem will be required to provide an annual report to the Secretary of State on suppliers' progress towards meeting their targets and their priority group obligations, as well as on progress towards achievement of the overall carbon emissions reduction target.

### ***Enforcement***

2.63 Ofgem will be responsible for the enforcement of each supplier's CERT obligation. The obligation imposed upon each supplier under the Order is a relevant requirement of the supplier's electricity or gas licence. The enforcement provisions allow Ofgem to make such Orders as are necessary to ensure compliance with the obligation and/or to impose a financial penalty on the supplier.

# Annex 1

Partial Impact Assessment, and

Appendix: Illustrative Mix of Measures

## Summary: Intervention and Options

<b>Department</b>	<b>Impact Assessment of Carbon Emissions Reduction Target 2008-2011</b>
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<b>Stage</b>	<b>Partial</b>	<b>Related Publications:</b>
	<b>04/05/07</b>	<b>Illustrative Mix of Measures</b>

Available to view or download at:

<http://www.defra.gov.uk/corporate/consult/cert2008-11/index.htm>

**Contact name for enquiries:** Iris Rooney

**Telephone number:** 020 7082 8713

**What is the problem under consideration? Why is government intervention necessary?**

Reduction of carbon emissions to reduce our impact on climate change and meet national, EU and international targets. For the household sector to deliver its share of necessary activity to improve energy efficiency and take up renewable sources of energy, we need to ensure that homes reduce their carbon emissions and consumers are made more aware of how their decisions and behaviour can affect carbon emissions.

**What are the policy objectives and the intended effects?**

The purpose of the CERT obligation is to help electricity and gas consumers in the household sector to reduce the carbon impact (footprint) of their home by using energy more efficiently, reducing consumption and using energy from renewable/microgeneration sources. In doing so they will reduce their fuel costs (and/or enjoy greater comfort). Through achieving carbon savings, the primary aim of the CERT is to make a significant contribution to the UK's legally binding target under the Kyoto protocol to cut greenhouse gas emissions by 12.5% below 1990 levels by 2008–2012 and its domestic goal to cut emissions of carbon dioxide by 20% below 1990 levels by 2010. It is expected that it will also contribute to the alleviation of fuel poverty.

**What policy options have been considered? Please justify any preferred option.**

1. A CERT obligation that would double the level of activity of the Energy Efficiency Commitment (EEC) 2005-08. This is the preferred option: an achievable target that would meet the Government's objectives by delivering the maximum possible level of carbon savings and maintaining equity for consumers.
2. A CERT obligation that would increase by 50% the level of activity of EEC 2005-08.
3. An obligation on energy suppliers based on a tradable target set in terms of reducing absolute energy demand or carbon emissions from the household sector.
4. A CERT obligation based on a formal tradable white certificate scheme.
5. Not imposing a CERT obligation.

**When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?** Autumn 2011

**Ministerial Sign-off** For consultation stage Impact Assessments:

*I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.*

Signed by the responsible Minister:



Date: 4 May 2007

**Ministerial Sign-off** For final proposal/implementation stage Assessments:

*I have read the Impact Assessment and I am satisfied that (a) it represents a reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.*

Signed by the responsible Minister:

Date:

## Summary: Analysis and Evidence

Policy Option	Description		
<p><b>ANNUAL COSTS</b></p> <p>One off (Transition) <span style="background-color: #ffff00; padding: 2px 10px;">£ 3.2bn</span> Yrs <span style="border: 1px solid black; padding: 2px 10px;">3</span></p> <p><b>Average Annual Cost</b> (excluding one-off)</p> <p style="background-color: #ffff00; padding: 2px 10px;">£ 5m</p>	<p>Description and scale of <b>key monetised costs</b> by 'main affected groups'</p> <ul style="list-style-type: none"> <li>- Cost to energy suppliers to promote carbon reduction measures (usually by subsidising them), which may be passed on to customers (£2.5bn)</li> <li>- Cost to householders to pay for the balance of installing carbon reduction measures (£0.5bn)</li> <li>- Cost to Local Authorities and Social Landlords contributing to the cost of measures installed in the social sector (£0.2bn)</li> </ul> <p style="text-align: right;"><b>Total Cost (PV)</b> <span style="background-color: #90ee90; padding: 2px 10px;">£ 3.2bn</span></p>		
<p><b>Other key non-monetised costs</b> by 'main affected groups'</p> <p>'Hassle factor' – time of householders to get measures installed</p>			
<p><b>ANNUAL BENEFITS</b></p> <p>One off <span style="background-color: #ffff00; padding: 2px 10px;">£ 0</span> Yrs <span style="border: 1px solid black; padding: 2px 10px;"></span></p> <p><b>Average Annual Benefit</b> (excluding one-off)</p> <p style="background-color: #ffff00; padding: 2px 10px;">£ 633m + SCC</p>	<p>Description and scale of <b>key monetised benefits</b> by 'main affected groups'</p> <ul style="list-style-type: none"> <li>- Energy cost savings and improved comfort for householders (Annual benefits: £666, £633 excl. VAT on energy; PV: £12.4bn, £11.8bn excl. VAT on energy)</li> <li>- Benefits to society of avoided damage from climate change due to reduced CO<sub>2</sub> emissions (social cost of carbon (SCC)) of £1.1-3.9bn (£2.0bn).</li> </ul> <p style="text-align: right;"><b>Total Benefit (PV)</b> <span style="background-color: #90ee90; padding: 2px 10px;">£ 13.8bn</span></p>		
<p><b>Other key non-monetised benefits</b> by 'main affected groups'</p> <ul style="list-style-type: none"> <li>- Improvement in energy security due to reduced energy demand</li> <li>- Supporting innovation via incentives</li> <li>- Helping to address fuel poverty</li> <li>- Improvement in air quality</li> </ul>			
<p><b>Key Assumption/Sensitivities/Risks</b></p> <p>Cost of measures; Future energy prices; Mix of measures, i.e. numbers of installations for each measure (including considerations of constraints such as remaining potential, industry capacity, and demand); Savings per measure; social cost of carbon</p>			
Price Base Year 2007	Time Period Years 08-51	<b>Net Benefit Range (NPV)</b> £ 9-12bn	<b>NET BENEFIT (NPV Best estimate)</b> £ 10.6bn
What is the geographic coverage of the policy/option?		Great Britain	
On what date will the policy be implemented?		1 April 2008	
Which organisation(s) will enforce the policy?		Ofgem	
What is the total annual cost of enforcement for these organisations?		Estimated £1.3-1.5m on the basis of costs of administering the EEC	
Does enforcement comply with Hampton principles?			
Will implementation go beyond minimum EU requirements?		No	
What is the value of the proposed offsetting measure per year?		There is none	
What is the value of the changes in greenhouse gas emissions?		£1.1-3.9bn	

Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro 0	Small 0	Medium 0	Large 0
Are any of these organisation exempt	N/A	N/A	N/A	N/A

<b>Impact on Admin Burdens Baseline</b> (2005 Prices)				
Increase of	£ -	Decrease of	£ -	<b>Net Impact</b> £ (Increase - Decrease) -

Key:

Annual Cost: Constant Prices

(Net) Present Value

# Evidence Base for Summary Sheets

## Introduction

1. The Electricity Act 1989 and the Gas Act 1986, as amended by the Utilities Act 2000 and the Climate Change and Sustainable Energy Act 2006, contain powers for the Secretary of State, by Order, to impose an obligation on electricity and gas suppliers to achieve carbon emissions reduction targets.

2. This partial Impact Assessment (IA) considers the impact of a draft Order setting the framework for a carbon emissions reduction target to be imposed by the Secretary of State for the period 1 April 2008 to 31 March 2011. The draft Order would set a total obligation of 42 million tonnes of carbon (MtC) lifetime savings (which is equivalent to 1.1 MtC annual net savings). Suppliers would meet their targets by encouraging and assisting domestic consumers to take up carbon reduction measures.

3. The obligation will be known as the Carbon Emissions Reduction Target (CERT) (previously also known as Energy Efficiency Commitment 2008-11 or EEC3) and will apply in England, Scotland and Wales. The draft Order includes a requirement on suppliers to achieve at least 40% of their carbon savings from a priority group of low-income consumers.

4. The CERT would build on the success of the Energy Efficiency Commitment (EEC) as the Government's principal policy mechanism for cost-effective delivery of energy saving measures to households. The first phase of the EEC (2002-05) stimulated about £600m investment in energy efficiency and delivered net benefits to householders in excess of £3 billion. It is expected to save 0.3 MtC annually by 2010, with overall cost-effectiveness of about £300 per tonne of carbon saved (i.e. net benefits) and costs to suppliers of around £3.20 per customer per fuel per year. Around 10 million households have benefited from EEC 2002-05. EEC 2005-08 requires broadly double the level of activity of EEC 2002-05 and is expected to deliver 0.5 MtC annually by 2010.

5. The Climate Change Programme Review in 2006 has shown that EEC is one of the most cost-effective policies to reduce carbon emissions, with large net benefits. It was therefore decided to maximise carbon emission reductions via this policy mechanism.

6. The 2006 Act allowed the Government to extend the scope of the EEC to include microgeneration and behavioural measures, as well as energy efficiency. This will provide suppliers with more flexibility in meeting their targets and will enable a more holistic approach to carbon abatement in the household sector.

7. This document, together with the Illustrative Mix of Measures at the Appendix, demonstrate that CERT is very cost-effective. Further cost-effective opportunities continue to be available after CERT and on this basis the Energy Review 2006 and Energy White Paper 2007 committed to a supplier obligation at least to 2020.

### **Barriers to household energy efficiency – rationale for intervention**

8. It has long been observed that levels of energy efficiency in the household sector are not optimal, either from a personal or societal standpoint. Simple measures which would cost-effectively reduce consumers' energy bills remain undone. When climate change and the broader benefits of reduced energy usage (other environmental benefits, security of supply, fuel poverty) are taken into account, the gap between the ideal and what is achieved in practice is even greater. It is considered that this is due in part to a number of market failures and other barriers which prevent or impede consumers from taking up energy saving opportunities.

9. These barriers must be overcome if we are to deliver energy savings from the household sector, and particularly if we wish to see a situation whereby energy saving measures are in demand from consumers. To the extent that these barriers can be overcome through policy intervention there is an important role for Government to intervene to correct what markets cannot deliver on their own.

The main barriers to household energy saving can be characterised in several distinct categories:

- **Basic financial barriers:** These include the potentially higher (upfront) costs of energy efficient products and the interest rates available to households.
- **Hidden costs:** These include “transaction costs” associated with finding reputable providers, time costs of disruption, and the costs of differences in quality of product or service—all of which may reduce the net benefit derived from efficiency measures.
- **Lack of information:** If households do not know their level of energy expenditure, how energy use can be reduced, by how much, or at what cost, they are unlikely to consider investment in energy efficiency.
- **Risks and uncertainty:** Uncertainty about future energy prices may deter households from investing, since they cannot be assured of future savings; households also may not be certain whether their tenure at a property will be sufficiently long for future savings to repay an initial outlay. In addition, households may be wary of the risk associated with new (or unfamiliar) products or services, and they may not trust energy suppliers or others who are promoting energy saving measures.
- **Poorly aligned incentives:** The most commonly cited barrier of this kind is the “landlord-tenant split”, whereby landlords under-invest in

energy-efficiency because tenants pay energy bills, or tenants do not economise on energy because the landlord pays the energy bill. Similar misalignments occur in the building industry and among property developers, often due in part to asymmetries of information. Failure to incorporate environmental or other externalities (such as energy security) into energy markets is also included here.

- **Psychological / sociological barriers:** This category refers to a range of less tangible barriers that may explain consumer behaviour that does not conform to perfect “economic rationality”. These may include inertia in decision-making (which may be due to loss-aversion and concerns about regret), the use of rules-of-thumb rather than more complicated full optimisation, and preferences that depend on the behaviour of others.
- **Regulatory barriers:** There are aspects of the energy market and its regulatory framework that could make it more difficult for households to benefit from or consider energy efficiency. Examples include limits on the types of “contracts” offered to households by suppliers, assignment of responsibility for metering, and treatment of (high-efficiency and/or low-carbon) distributed generation.

(Source: NERA)

10. There are also other important practical factors that can potentially impede the delivery of improvements to household energy efficiency including a lack of appropriate market-ready technologies, lack of appropriate skills and supply-side constraints on the supply and installation of measures.

11. Household energy suppliers are well-placed to deliver carbon savings from their customers, and are able to tackle many of the barriers outlined above to do so. Suppliers are able to tackle financial barriers, with an ability to source measures in bulk thus securing them at lower cost than individual consumers, they can also subsidise measures as they currently do under EEC, or offer finance, potentially repaid via customer bills and linked to energy savings. By supporting delivery of measures they can reduce some hidden costs such as the finding of suitable measures and engaging trustworthy installers, although to some hidden costs are inevitable – disruption and changes to quality of service, for example. Suppliers are uniquely placed to provide information about a consumers’ energy consumption, and are well placed to inform them about the potential measures on offer. Suppliers can mitigate some of the risks and uncertainty faced by consumers, around the value of energy savings and energy prices, and technical risks of measures installed, but there are others that they cannot, such as length of tenure or the option value of waiting for new or improved technologies. While suppliers are well placed to deliver energy savings from consumers, there remain barriers that they cannot tackle on their own, and successful delivery of savings from households will need to be supported by action by Government and others (as shown in the Energy White Paper 2007).

## Evidence base

12. EEC has been in operation since 2002 and was preceded by the Energy Efficiency Standard of Performance. A large amount of evidence has been accumulated over the years, partly based on experience and evaluation, and partly based on a programme of commissioned research carried out to address specific issues. In addition there are several data sources that are collecting relevant information on an ongoing basis and are published regularly, such as the English House Condition Survey<sup>1</sup> and the Domestic Energy Fact File<sup>2</sup>. Much of this evidence is available from Defra's websites on EEC<sup>3</sup> and Research and analysis<sup>4</sup>. Where appropriate the relevant references are given in the Illustrative Mix document (see Appendix) and in other relevant documents available on Defra's website. Ofgem publishes quarterly updates and annual reports on EEC.<sup>5</sup> More generally, evidence on energy efficiency policies was presented as part of the Energy White Paper 2002, the Energy Efficiency Action Plan 2004, the HMT/Defra Energy Efficiency Innovation Review 2005, the UK Climate Change Programme Review 2006, the Energy Review 2006 and the Energy White Paper 2007.

## Options considered

13. In order to meet the Government's policy objective of saving energy and reducing carbon emissions from households, five options were considered.

**Option 1: a CERT obligation that would double the level of activity of the Energy Efficiency Commitment (EEC) 2005-08.** As stated in summary, this is the preferred option. The proposed target of 42 MtC lifetime savings (which is equivalent to 1.1 MtC annual net savings) would deliver the maximum possible level of carbon savings whilst maintaining equity for consumers. On the basis of the detailed analysis set out below, the Government considers this to be a challenging but achievable target.

**Option 2: a CERT obligation that would increase by 50% the level of activity of EEC 2005-08.** This would not go far enough towards meeting the Government's policy objective of making a significant contribution in the household sector to the Government's Kyoto target to reduce greenhouse gas emissions and to its domestic target to reduce carbon dioxide emissions. The costs of this option would be lower than option 1. While this option would have lower costs, it would also have lower carbon savings and lower net benefits than option 1.

**Option 3: an obligation on energy suppliers based on a tradable target set in terms of reducing absolute energy demand or carbon emissions from the household sector.** This would require primary legislation and

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<sup>1</sup> <http://projects.bre.co.uk/energyuse/>

<sup>2</sup> [www.defra.gov.uk/environment/energy/research/domestic/index.htm](http://www.defra.gov.uk/environment/energy/research/domestic/index.htm)

<sup>3</sup> [www.defra.gov.uk/environment/energy/eec/index.htm](http://www.defra.gov.uk/environment/energy/eec/index.htm)

<sup>4</sup> [www.defra.gov.uk/environment/energy/research/](http://www.defra.gov.uk/environment/energy/research/)

<sup>5</sup> [www.ofgem.gov.uk](http://www.ofgem.gov.uk)

accordingly is being evaluated as one option for the household obligation on energy suppliers from 2011 to at least 2020 that the Government announced in the 2006 Energy Review.

**Option 4: a CERT obligation based on a formal tradable white certificate scheme.** A study undertaken for Government by NERA Economic Consulting on options for increased trading in the Energy Efficiency Commitment concluded that trading already forms an effective part of the EEC mechanism and that a move to a formal white certificate scheme would not provide any additional benefits. It would also require primary legislation and forms part of the consideration for the supplier obligation post-2011.

**Option 5: not imposing a CERT obligation.** This would not meet the Government's objectives of reducing carbon dioxide emissions and would do nothing to mitigate the risks of climate change. It would be a retrograde step not to build on the success of the current EEC and would be damaging to industries that have expanded to meet its demands and planned on the basis of an increased obligation announced by Government in the 2006 Climate Change Programme.

Further assessment of the relative impact of these options will be included in the full IA.

### **Benefits and costs**

14. The costs and benefits of CERT options (particularly the level of the target) are established using an Illustrative Mix of Measures representing a balanced selection of measures. The data and assumptions underlying the Illustrative Mix are informed by information provided by energy suppliers, by representatives of the industries concerned, and by experts, including the Energy Saving Trust (EST) and the Building Research Establishment (BRE).

15. The analysis behind the illustrative mix takes account of a number of issues including:

- The likely **number of each possible measure** installed over the period 2008–2011. This has been assessed to take account of potential constraints such as the current state of the housing stock, of other physical and market constraints, of typical replacement cycles for boilers and appliances, and of consumer demand;
- Estimates of the **unit cost of each measure** are based upon the set of EEC 2005-2008 illustrative mix figures, allowing for 3 years' inflation to convert to 2007 prices. While real costs per measure have declined significantly over the successive Energy Efficiency Standards of Performance (EESoP) and EEC 2002-2005 and 2005-08 schemes, it is recognised that from 2008 the costs for some measures, such as insulation, are likely to increase;
- The **supplier contribution** is the share of the direct cost of the measures that the supplier is likely to have to meet, in order to induce the householder to take up the offered CERT measure. This is based

on the cost to the supplier and the final price that the consumer is prepared to pay. The difference is the supplier contribution, or inducement cost. The level of the subsidy or inducement cost will depend on the householder's willingness and ability to pay. For this reason, households on income or disability benefits (the Priority Group) are expected to require higher inducement than other households.

- In estimating the CERT carbon savings, it has been assumed that when suppliers offer a measure under the CERT, they will unavoidably pick up and meet the cost of assisting consumers who would have taken the measure in any event (**deadweight**), as well as stimulating additional take-up. Thus the lifetime carbon savings attributed to the CERT, count the savings benefits from all installations, including the business as usual deadweight. This avoids the otherwise intractable problem of allocating deadweight to supplier's activity when determining the carbon savings they have achieved;
- Indicative estimates of **suppliers' costs of developing and administering the CERT** programmes additional to the inducement cost, are on average around 15% of the suppliers' direct costs, but higher for lower cost measures and lower for higher cost measures;
- **Energy improvement** is defined as the benefit to the household from an energy efficiency measure, either from lower bills, or from increased comfort (for example, in terms of increased warmth);
- The **annual carbon saving** resulting from each installation has been calculated using the annual energy saving, minus the comfort taken, and the carbon intensity of the fuel saved (e.g. for condensing boilers this would be the carbon intensity of gas). The carbon intensities for each fuel are consistent with Defra's Environmental Reporting – Guidelines for Company Reporting on Greenhouse Gas Emissions.
- The **assumed lifetimes** for the measures in the Illustrative Mix are generally the same as those used in setting the EEC 2005-08 targets and were estimated following discussions with experts including the BRE and EST.
- The annual carbon savings are multiplied by the assumed lifetimes to give **lifetime carbon savings** for each measure, i.e. the scores, which is the basis for counting towards the CERT target. We consulted on the scores for established measures which are now set.<sup>6</sup>

16. The analysis has taken account of concerns that the industry may be unable to meet suppliers' demands for extra activity. Views from the energy suppliers, the insulation manufacturers, and the insulation installers were considered, in addition to independent reports on the insulation industry.<sup>7</sup> Overall this risk is considered to be relatively low/moderate. (see Appendix, section 2.3)

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<sup>6</sup> [www.defra.gov.uk/corporate/consult/eec3-2007/index.htm](http://www.defra.gov.uk/corporate/consult/eec3-2007/index.htm)

<sup>7</sup> [www.defra.gov.uk/environment/energy/eec/pdf/supply-chain-review.pdf](http://www.defra.gov.uk/environment/energy/eec/pdf/supply-chain-review.pdf)

17. The analysis has also considered the possibility that the energy efficiency measures included in the Illustrative Mix may not perform as expected and do not deliver the proposed carbon impact. There is a risk that some of the measures do not deliver the full energy saving potential as determined, because of different behaviour/usage than assumed or because of physical underperformance. Continuing monitoring studies are eliminating or reducing this risk. Furthermore, allowance for potential underperformance of insulation measures is implicitly included in a “reduction factor” of 50%, as studies suggest that actual savings in the field are less than theoretical savings.<sup>8</sup> This reduction factor includes a factor of 15% for comfort taking.<sup>8</sup> So therefore the risk on carbon savings due to underperformance is considered low. Given the uncertainty about future energy prices, and the potential for some price reductions in the near future, there is some risk that the benefits may be slightly overstated (see below for sensitivity).

18. The carbon savings of 1.1MtC/yr at the end of the programme are estimated net of comfort taking and of business as usual activity. The annual energy savings are the basis on which the energy cost benefits are calculated, using 2006 energy prices for each fuel. On the other hand, the obligation target score is set in terms of lifetime carbon savings (gross of deadweight). The lifetime of the carbon reduction measures must be taken into account when determining the lifetime carbon savings, and are typically in the range of 10-40 years. The appraisal period is therefore 2008-51.

19. CERT as proposed would benefit the **environment** by reducing carbon emissions by about 1.1 MtC per year at the end of the programme and 34 MtC net savings over the lifetime of the measures, helping to tackle climate change and improve local air quality (see Appendix, Table 8). The annual carbon savings equate to about 3% of current emissions. In addition reduced energy demand will moderate wider environmental impacts of energy extraction, production and supply. In contributing to the Government’s climate change abatement programme, all consumers will share the benefits such as cleaner air and the mitigation of carbon emissions from reduced energy production. CERT is expected to be highly cost-effective with around £250 benefits per tonne of carbon saved (excluding ancillary benefits). (see Appendix, Table 8)

20. Considering the social cost of a tonne of carbon is possibly £35-£140 in 2000, rising by £1 per year, the carbon savings equate to additional benefits of £1.1-3.9bn or about £2.0bn (net present value).

21. CERT as proposed would provide **social benefits** through reducing fuel bills and improving comfort, thus also contributing to the alleviation of fuel poverty and the risk of ill health caused by cold homes, particularly for children and the elderly. CERT activity reduces carbon emissions from the housing stock and improves the energy efficiency in most cases. CERT would also provide particular help to those on low-incomes (or disability benefits) by requiring 40% of energy savings to be focussed on a priority group of those in

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<sup>8</sup> [www.defra.gov.uk/environment/energy/research/pdf/insulationmeasures-review.pdf](http://www.defra.gov.uk/environment/energy/research/pdf/insulationmeasures-review.pdf)

receipt of benefits and tax credits or pension credit which make up about a third of all households.

22. It is estimated that the cost to suppliers is around £97 per household for the 3 years of the CERT programme (see Appendix, Table 8). If passed on to customers in full, this is equivalent to about 3-3.5% of annual energy bills. This is roughly an additional 1.5-2% or £15-20 per household compared to today's energy bills which include costs for the current EEC.

23. These costs are balanced by average annual benefits, in terms of lower energy bills or increased comfort, of about £31 per household for the lifetime of the measures, continuing for many years (often several decades) beyond the CERT period (see Appendix, Table 8). On average, the net impact on energy bills is therefore negligible for the 3 years of the programme, and afterwards energy bills would reduce by around 3% on average (unless a similar obligation continues).

24. The EEC/CERT does not dictate what measures suppliers must take in order to meet their obligations. The suppliers are operating in a competitive market and so will want to retain customers by keeping prices down.

25. CERT as proposed would provide **economic benefits** in promoting innovation by creating market opportunities for new or more efficient technologies and by providing certain incentives for demonstration and market transformation. CERT will also contribute to improving security of energy supply by reducing demand in the domestic sector.

26. Costs for the current (and past) EEC were based on discussions with energy suppliers, the relevant industries and the Energy Saving Trust taking into account evidence from the energy suppliers about the costs of past programmes and the costs of the Government's Warm Front programme. The costs for CERT have been similarly estimated on the basis of discussions with suppliers of carbon reduction products and services, plus information about the costs of the EEC 2005-08. (see Appendix, Section 2.4)

27. The costs given in this IA are the total net resource costs, not just the subsidies expected to be given by suppliers through the CERT. In other words, some beneficiaries of the CERT programme are given a 100 per cent subsidy, whilst others part fund the product or service provided. All the monies spent by the suppliers, homeowners and landlords are counted, and then debited by the estimated business as usual investment in these energy savings measures during the CERT period. The corresponding savings are discounted at the 3.5 per cent Treasury rate.

28. The estimated ongoing annual energy savings to consumers, including comfort taking, would reach a total of around £775M in gross terms by the end of the CERT period. This represents approximately £609M net of business as usual activity. It is estimated that the measures installed under the CERT would provide an average annual ongoing gross financial benefit for consumers, in lower energy bills or increased comfort, of about £31 per

household. These benefits will continue beyond the CERT period, for the lifetime of the measures. The gross benefit per household to priority group consumers is estimated to be higher than the average, at around £37 a year (see Appendix, Table 8). Overall savings (net of business as usual improvements) to householders are estimated to amount to a net present value of around £12.4bn over the lifetime of the measures. Comfort taking is estimated to account for around 12%. As the benefits of CERT are due to energy savings (or comfort taking with equivalent value), the magnitude of the benefits is directly proportional to the energy prices. Even if energy prices were halved, and even when excluding the social cost of carbon, the benefits would still be almost twice as large as the costs.

29. The cost to the suppliers for the three years of the obligation under the CERT is estimated to be no more than about £97 per household or around £17.5 per gas or electricity consumer bill per year, averaged over the three years (see Appendix, Table 8). Energy suppliers may pass some or all of this cost through to their domestic customers. Passed on in full, it corresponds to an average energy price rise of around 3-3.5%. The net resource cost over the CERT period (i.e. total cost of measures net of business as usual deadweight, plus implementation costs) is approximately £3.2bn, of which implementation costs (indirect costs) are estimated to make up around £436M, i.e. less than 15% of the total (see Appendix, Section 2.4).

30. The above analysis of costs and benefits relates to the Government's Illustrative Mix of Measures. Under the EEC 2002-05 and the current EEC, the measures adopted by suppliers have been broadly in line with the Illustrative Mixes for the respective programmes.<sup>9</sup> However, if suppliers were to adopt a different mix of measures, the outcomes in terms of costs and benefits could be slightly different, because of the differing cost/savings ratios of measures, and disparate prices of electricity and fossil fuels.

31. The proposed target is based on comprehensive analysis. If, in the event of unforeseen circumstances that significantly affected the Government's assumptions, it were necessary to reconsider the level of carbon reduction obligation, any amendment would be effected by a further statutory instrument, following consultation.

### **Equity and fairness**

32. The Government has considered how it can best achieve its climate change abatement objectives through the CERT whilst ensuring equity and fairness for consumers. Under the CERT, obligated suppliers will seek to meet their targets as cost-effectively as possible. These costs will potentially be passed on in full or in part to consumers of electricity and gas through their bills. For those consumers receiving energy efficiency measures under CERT the savings are likely to outweigh any increase in their bills. Some consumers

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<sup>9</sup> See e.g. evaluations of EEC 2002-05 and Ofgem's quarterly and annual reports on EEC.  
[www.defra.gov.uk/environment/energy/eec/pdf/eec-evaluation.pdf](http://www.defra.gov.uk/environment/energy/eec/pdf/eec-evaluation.pdf)  
[www.defra.gov.uk/environment/energy/eec/pdf/eec-assessment.pdf](http://www.defra.gov.uk/environment/energy/eec/pdf/eec-assessment.pdf)

may receive measures at no cost, while others may receive subsidised measures.

33. Those on low incomes are most likely to be affected by any increase in energy bills since they spend a higher proportion of their income on electricity and gas. In recognition of this the draft Order would require suppliers to direct at least 40% of their carbon savings to a Priority Group of low-income consumers in receipt of certain income-related benefits or tax credits which make up about a third of all households. This will ensure that low income consumers receive a fair share of the benefits of the CERT.

34. The CERT Priority Group is defined as householders in receipt the following benefits or tax credits:

- council tax benefit
- housing benefit
- income support
- income based jobseekers allowance
- attendance allowance
- disability living allowance
- disablement pension which includes a constant attendance allowance
- war disablement pension which includes a mobility supplement or a constant attendance allowance
- child tax credit (where the consumer's relevant income is £15,592 or less)
- working tax credit (where the consumer's relevant income is £15,592 or less)
- state pension credit.

There is no strong correlation between income and energy efficiency/consumption, except for the poorest households (EHCS data). Various research studies show that there is no significant difference between the Priority Group and other households. However, for poorer households the fuel bills are a higher proportion of their income.

35. The draft Order includes a flexibility option, under which an energy supplier would be able to notify Ofgem that it wished to reduce a proportion of its priority group obligation by a limited amount, in return for undertaking in the priority group other carbon abatement measures that are expected to support alleviation of fuel poverty. These measures should be directed to priority group consumers off the gas grid and not in social housing, since they are more likely to be in fuel poverty and less likely to have benefited from measures under EEC. A supplier who took up this option would still be required to achieve its full CERT obligation by directing the activity to domestic consumers generally, rather than to those in the priority group. However, since the cost of directing measures to priority group consumers is higher than for other consumers, it would have done so at a reduced cost and this notional saving could be used to fund additional specified measures expected to support alleviation of fuel poverty.

36. There are a proportion of consumers whose energy bills will increase as a result of CERT, but who may not receive corresponding energy saving measures under the scheme. These are most likely to be households living in private rented accommodation and some owner occupiers in older houses, which do not have the potential for cavity wall insulation, and/or who may have already carried out all cost-effective energy saving measures in their home. Further assessment of this group of consumers will be included in the full IA. While such consumers may not receive fabric measures under CERT, however, they may still benefit from retail goods promoted by suppliers, such as energy efficient appliances and light bulbs.

37. Manufacturers and suppliers of carbon reducing products and services such as cavity wall insulation, loft insulation, solid wall insulation, heating systems and microgeneration technologies will benefit from a growth in the size of these markets. It is not possible to know what changes in the pattern of production and consumption will result in other areas of the economy and hence whether there are losses as a result of these gains.

### **Competition issues**

38. Competition issues arise in two different markets – the market for energy supply and the market for energy/carbon saving measures. CERT does not create any barriers to entry into the market for the supply of electricity or gas. However, since it is an obligation on suppliers, it does raise the entry costs, although these costs may be passed through to consumers.

39. Suppliers' individual CERT obligations are based on their customer numbers. So as not to deter new entry by small firms and to reflect the relatively higher costs incurred by small companies, the obligations are not imposed on firms supplying less than 50,000 customers.

40. Suppliers are able to pass on the costs of their obligations under the CERT. A supplier that is inefficient and pursues high-cost carbon reduction measures or that increases its prices simply in order to increase economic rent is likely to lose customers, who have the freedom to switch to another supplier.

41. Suppliers have an incentive to keep the costs of their obligations under CERT as low as possible in order to minimise the amount of any pass through. This reflects the competitive supplier market and the drive to retain or acquire customers. Suppliers therefore have an incentive to be competitive in the supply of energy/carbon saving products and services. Barriers to entry into the market for most efficient energy/carbon saving products and services are relatively low.

42. Whilst some suppliers may choose to undertake a large proportion of their obligations through in-house contractors, there is no reason to suppose this will reduce competition in the rest of the energy supply market.

43. It is possible that short run bottlenecks could develop in the supply of certain energy efficient products such as loft insulation or cavity wall insulation, given a projected rapid expansion in the market for these products. Any resulting price increases are likely to be short lived, given that new market entry is possible. The indication given in the 2006 Energy Review that there will be a supplier obligation from 2011 to at least 2020 could help induce new market entry.

### **Small firms' impact test**

44. The proposals will not impose costs on small businesses. The draft Order does not apply to new and small energy suppliers with fewer than 50,000 customers. This means that new entrants would not have to set up CERT programmes while at an early stage. The draft Order contains other provisions that avoid the risk of creating barriers to new entrant companies: where a supplier prefers not to set up its own CERT programmes, then it may transfer all or part of its target to another supplier, purchase accredited performance from another supplier or contract out the operation of its programme.

### **Race equality, gender equality and rural proofing**

45. Under CERT, there will be opportunities for all consumers to benefit from measures, regardless of race or gender. There will be opportunities for consumers in both rural and urban areas to benefit.

### **Consultation**

46. In developing its proposals for CERT, the Government has engaged with a wide range of stakeholders, including electricity and gas suppliers, representatives of energy efficiency industries, local authorities and other representative bodies and organisations with an interest in energy efficiency, carbon reductions, fuel poverty and the environment. The Government held two consultation events in March 2006 and October 2006, with the support of the Energy Efficiency Partnership for Homes. In July 2006 the Government issued an Initial Consultation on the EEC3 in order to solicit early views to inform the current consultation. This closed in October 2006 and the summary of consultation responses was published on 12 January 2007. Defra published a first draft Illustrative Mix of measures in September 2006 and consulted on the energy and carbon savings for well-established measures between 12 January and 12 February 2007 with a summary of responses published in March 2007.

47. The proposals reflected in the draft Order take account of the comments received throughout the whole of the informal consultation process, particularly the initial consultation in summer 2006. They also takes account of the latest information on the costs of carbon saving measures and other parameters that are likely to determine suppliers' costs in meeting their CERT obligations, including information about delivery of the current EEC.

## **Implementation and enforcement**

48. The Regulator, Ofgem, will be responsible for the operation of the CERT, including monitoring and enforcement. The draft Order provides for this. The procedures that suppliers will follow in order to achieve their energy efficiency targets will be set out in Ofgem's Administration Procedures. Ofgem will publish a consultation document on these procedures in summer 2007.

## **Monitoring and evaluation**

49. Ofgem will report annually to the Secretary of State on progress on CERT and the Government will review the three-year programme in autumn 2011.

## **Summary**

50. The draft Order proposes that the CERT for 2008-2011 will have an overall obligation of 42 MtC lifetime savings which is equivalent to net savings of about 1.1 MtC per annum.

51. CERT as proposed will make a significant contribution to the Government's UK Climate Change Programme. It will provide financial and welfare benefits for consumers, particularly those on low incomes, and work alongside other relevant Government policies to deliver reductions in carbon emissions.

52. The proposed level of obligation should stimulate a significant increase in energy/carbon savings without placing onerous costs on the energy supply companies – or the consumer. Building on the success of the EEC, CERT will continue to provide energy suppliers with the freedom and incentive to develop the most innovative and cost-effective programmes of energy/carbon saving measures.

53. In conclusion, the Government considers that option 1 in paragraph 13 above is likely to contribute effectively to the reduction of carbon emissions in the household sector, at reasonable cost to suppliers and consumers with substantial benefits to the UK, and taking account of the practical capacity of the energy saving and microgeneration industries in the relevant period.

## Complementary Impact Tests

Type of test undertaken	Stage reached	Impact?	Results annexed?
Competition Assessment		No	See paragraphs 38-43 above
Small Firms Impact Test		No	See paragraph 38 above
Legal Aid			
Sustainable Development		Yes	Throughout document
Carbon Assessment		Yes	See paragraphs 15 and 18-20 above
Other Environment		Yes	See paragraphs 19-20 above
Health Impact Assessment			
Race Equality		No	See paragraph 45 above
Disability Equality		Yes	See paragraph 21 above
Gender Equality		No	See paragraph 45 Above
Human Rights			
Rural Proofing		No	See paragraph 45 above

## Appendix

### Illustrative Mix of Measures for CERT 2008-11

#### 1 Introduction

This note describes the draft Illustrative Mix of measures for the Carbon Emission Reduction Target (CERT) formerly known as Energy Efficiency Commitment 2008-11 (EEC3).

This work should be seen as a development from considerations for EEC 2005-08 (and previous schemes) and many of the principles and assumptions are similar to those of EEC 2005-08 (EEC2) (see for example EEC2 consultation document and Background note to EEC2 Illustrative Mix<sup>1</sup>). It follows on from the first EEC3 consultation<sup>2</sup>, the first draft Illustrative Mix<sup>3</sup> and the consultation on the savings/scores for the standard measures<sup>4</sup>, and takes account of stakeholders' and experts' input.

The Government announced in Budget 2006 that its ambition for EEC3 was an increase of 50-100%; and that five of the major suppliers had agreed to an additional combined 250,000 insulation measures during EEC2 (and subsequently one supplier confirmed further 50,000 measures), which Government would allow to count towards their EEC3 targets.

The current Illustrative Mix has been constructed to be as ambitious as possible and at the same time to be reasonable and achievable. It is also used to gauge the likely impact on a number of key variables, particularly overall costs and benefits, implications for the energy efficiency industry (and especially the Cavity Wall Insulation (CWI) sector), and for the share of the Priority Group (PG).

The overall lifetime carbon savings are 42 MtC, delivering annual net savings of 1.1 MtC at the end of the programme – roughly doubling EEC 2005-08 which is estimated to save about 0.5 MtC per year.<sup>5</sup> The Priority Group share of the target is 40%.

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<sup>1</sup> [www.defra.gov.uk/environment/energy/eec/](http://www.defra.gov.uk/environment/energy/eec/)

<sup>2</sup> The Energy Efficiency Commitment April 2008 to March 2011: Initial consultation, (Defra, July 2006), [www.defra.gov.uk/corporate/consult/eec3/consultation.pdf](http://www.defra.gov.uk/corporate/consult/eec3/consultation.pdf)

<sup>3</sup> The first draft Illustrative Mix of measures for the Energy Efficiency Commitment 2008-11, (Defra, September 2006), [www.defra.gov.uk/environment/energy/eec/pdf/illustrative-mix.pdf](http://www.defra.gov.uk/environment/energy/eec/pdf/illustrative-mix.pdf)

<sup>4</sup> Energy, cost and carbon saving calculations for the draft EEC 2008-11 Illustrative Mix, (Defra, January 2007), [www.defra.gov.uk/corporate/consult/eec3-2007/index.htm](http://www.defra.gov.uk/corporate/consult/eec3-2007/index.htm)

<sup>5</sup> The annual carbon savings for EEC2 were previously estimated to be about 0.6 MtC in 2010; however, recent evidence suggests that some measures have lower savings than previously thought which reduces this estimate.

### **1.1 A general description of the model**

Energy, fuel cost and carbon savings were calculated for a range of domestic carbon-saving measures. An estimate was made of the number of installations of each measure likely to be made during the course of EEC3. This estimate is our approximation of the way in which suppliers might approach their EEC obligations. However, it must be emphasised that it is purely illustrative for analysis purposes and does not necessarily reflect the way in which suppliers might choose to proceed in practice, nor is it intended to suggest particular targets or levels of activity that can be derived from any particular measure. For each measure, the estimated number of installations was multiplied by the saving per unit to calculate the total energy, cost and carbon savings. These values were summed to estimate the total benefits.

### **1.2 Evaluation of savings**

Annual energy savings from heating and insulation measures were estimated using BREDEM. Savings for other measures were calculated by various methods, based on their likely effect on the energy consumption of a 'base case' dwelling (see also below under 2.2). Delivered energy savings were multiplied by fuel carbon intensity and fuel cost factors obtained from DTI, to derive annual carbon and fuel cost savings respectively. A lifetime for each measure was used to calculate lifetime carbon savings. The resulting values form the basis of the 'score' which Ofgem would attribute to each measure, to be credited toward the target for each of the energy supply companies under the EEC. The scores for standard, well-established measures have been subject to consultation<sup>4</sup> and the final scores have been published in March<sup>6</sup>; we therefore do not seek any further views on those scores.

### **1.3 Evaluation of number of installations**

As an illustration of how a scenario for achieving a particular target might look, the number of measures to be installed under EEC3 was estimated. This was based on past experience under previous phases of EEC, the likely cost-effectiveness of each measure for the suppliers and the likely limit of capacity of the installation and manufacturing industry. Generally speaking, the most cost-effective measures are assumed to be close to the maximum number that could be installed during the EEC3 period. In addition, for each measure an assumption was made on the proportion of installations to be made in the priority group.

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<sup>6</sup> [www.defra.gov.uk/environment/energy/eec/pdf/illustrativemix-final2007.pdf](http://www.defra.gov.uk/environment/energy/eec/pdf/illustrativemix-final2007.pdf)

## **2 Assumptions and inputs**

### **2.1 General inputs**

The following general inputs are used by the model (figures in brackets represent what was assumed for the Illustrative Mix):

- Number of households projected for 2011 (26.2 million)
- Number of customers and annual energy bills (48.1 million)
- Number of households in the priority group (8.8 million)
- A discount rate to be applied to benefits accruing in future years (standard Treasury Green Book discount rate of 3.5%)

The number of households in Great Britain is projected to increase from 25.3 million in 2005 to 26.2m in 2011 (Source: Office of National Statistics); this is also the number of electricity customers. Ofgem estimates that there are about 21.1m gas customers today. If we project forward at the same rate as the number of households, the number of gas customers increases to 21.9m. The total number of energy customers is therefore projected to be 48.1m.

The number of households in the priority group is estimated to be about 8.5-9.0 million households as explained in Note A. We use a central value of 8.8 million. This is consistent with assumptions used for EEC1 and EEC2.

### **2.2 Savings**

The following inputs relating to savings are also required (and are shown in the tables below):

- Energy, fuel costs and carbon savings for each measure (with each of the 7 heating types considered)
- The level of comfort taking expected in each case
- For each measure, the proportion of installations in dwellings with each heating type
- The expected number of years during which the measure will provide benefits (i.e. the 'lifetime' of the measure)

The energy, cost and carbon savings shown in the tables below are those averaged over all heating types considered.

As mentioned above, the scores for standard, well-established measures (shown in the top half of Table 1 and Table 2) are the final scores; we therefore do not seek any further views on those scores.

**Table 1:** Annual savings per measure for the average 3-bed semi-detached house (weighted average of all fuels, and taking account of any correction factors)

	Gross savings			Comfort factor	Net savings	
	Energy MWh/yr	Cost £/yr	Carbon tC/yr		Energy MWh/yr	Carbon tC/yr
Cavity wall insulation	3.54	112	0.20	15%	3.01	0.17
Loft insulation (professional)	1.75	55	0.10	15%	1.49	0.085
Loft insulation (DIY)	1.50	47	0.086	15%	1.28	0.073
Glazing E to C rated	0.46	14	0.026	15%	0.39	0.022
A/B rated boilers (exceptions)	1.87	54	0.10	0%	1.87	0.10
Fuel Switching	7.12	317	1.11	0%	7.12	1.11
Heating controls - with boiler	0.18	5.3	0.010	0%	0.18	0.010
Heating controls - extra	1.46	43	0.077	0%	1.46	0.077
CFLs - retail	0.0080	2.2	0.0022	0%	0.0080	0.0022
CFLs - direct	0.0080	2.2	0.0022	0%	0.0080	0.0022
Appliances - Cold	0.037	6.9	0.0072	0%	0.037	0.007
Appliances - Wet	0.10	10	0.012	0%	0.10	0.012
Appliances - iDTVs	0.027	5.8	0.0059	0%	0.027	0.0059
Hot water cyl. insul. topup	0.94	29	0.054	0%	0.94	0.054
Draughtproofing	0.74	23	0.043	15%	0.63	0.036
Solid wall insulation	11.79	371	0.68	15%	10.03	0.58
<b>Measures below are open for consultation</b>						
Wood burning stoves (sec)	0.18	15	0.16	0%	0.18	0.16
Biomass boilers (prim)	2.61	468	1.99	0%	2.61	1.99
PV (2.5 kWp)	2.12	212	0.25	0%	2.12	0.25
SWH (4m <sup>2</sup> )	1.55	50	0.089	0%	1.55	0.089
mWind (1 kWp, 10% LF)	0.88	88	0.10	0%	0.88	0.10
mHydro (0.7kWp, 50% LF)	3.07	307	0.36	0%	3.07	0.36
Heat pumps	12.5	389	1.00	0%	12.50	1.00

**Table 2:** Lifetime carbon/CO<sub>2</sub> savings for the average 3-bed semi-detached house – the EEC ‘scores’ (weighted average over all fuels)

Measure	Lifetime (years)	Carbon savings (tonnes)	CO <sub>2</sub> savings (tonnes)
Cavity wall insulation	40	6.92	25.4
Loft insulation (professional)	40	3.42	12.53
Loft insulation (DIY)	40	2.93	10.75
Glazing E to C rated	20	0.45	1.64
A/B rated boilers (exceptions)	12	1.17	4.28
Fuel Switching	20	22.2	81.2
Heating controls - with boiler	12	0.11	0.42
Heating controls - extra	12	0.92	3.39
CFLs - retail	17.7	0.039	0.14
CFLs - direct	17.7	0.039	0.14
Appliances - Cold	12	0.086	0.32
Appliances - Wet	12	0.15	0.53
Appliances - IDTVs	7	0.041	0.152
Hot water cyl. insul. topup	10	0.54	1.98
Draughtproofing	20	0.72	2.66
Solid wall insulation	30	17.3	63.3
<b>Measures below are open for consultation</b>			
Wood burning stoves (sec)	20	3.26	12.0
Biomass boilers (prim)	20	39.8	146
PV (2.5 kWp)	25	6.21	22.8
SWH (4m <sup>2</sup> )	25	2.22	8.14
mWind (1 kWp, 10% LF)	10	1.03	3.78
mHydro (0.7kWp, 50% LF)	20	7.21	26.4
Heat pumps	20	19.9	73.0

In addition we take account of the difference in dwelling size for PG and non-PG homes compared with the average 3-bed semi-detached house as shown in Table 4. Based on EHCS data for floor area, PG dwellings are 15% smaller while non-PG dwellings are 7% larger than the average, i.e. a floor area factor of 0.85 and 1.07 respectively. A geometric factor is applied as appropriate for each measure. The corrected saving = (saving of a 3-bed semi) x (floor area factor)<sup>(rate of variation with dwelling area)</sup>. A value of 1 for the rate of variation means the saving is linearly proportional to floor area; a value of 0 means it is independent of floor area.

Energy prices were provided by DTI, based on information from the second quarter of 2006 (see following table, which also shows the fuel carbon intensity figures that were used). Prices for electric space and water heating and heat pumps assume an average cost per kWh derived from an appropriate proportion of on-peak and off-peak electricity.

**Table 3:** Carbon content and retail prices (including VAT) for each fuel type

<b>Fuel type</b>	<b>kgC/kWh</b>	<b>p/kWh</b>
Gas	0.0518	2.9
Electricity (standard)	0.1175	10.0
Electricity on-peak	0.1175	12.0
Electricity off-peak	0.1175	4.4
Oil	0.068	3.4
Coal	0.082	2.3
Logs	0.0068	2.2
Wood chips	0.0068	1.6

Fuel prices include VAT (at 5%) when calculating fuel cost saving benefits to consumers (this is included in the tables above), but exclude them when calculating the overall net present value and cost-effectiveness of the scheme.

A discount rate of 3.5% is applied to future benefits in line with Treasury's Green Book. Future carbon savings (used to calculate lifetime carbon savings) are not discounted.

**Table 4:** Net savings for average 3-bed semi-detached, PG and non-PG dwellings (the floor area of PG dwellings is assumed to be 85% of the average 3-bed semi, and 107% for non-PG dwellings)

Measure	Average 3-bed semi-detached			Rate of variation with dwelling area	Annual fuel cost savings (£/yr)		Annual Carbon savings (tC/yr)		Lifetime Carbon Savings (tC)	
	Annual fuel cost savings (£/yr)	Annual Carbon savings (tC/yr)	Lifetime Carbon Savings (tC)		PG	non-PG	PG	non-PG	PG	non-PG
Cavity wall insulation	94.9	0.173	6.92	0.5	87.5	98.1	0.160	0.179	6.38	7.16
Loft insulation (professional)	46.8	0.085	3.42	1.0	39.8	50.1	0.073	0.091	2.91	3.66
Loft insulation (DIY)	40.2	0.073	2.93	1.0	34.1	43.0	0.062	0.078	2.49	3.14
Glazing E to C rated	12.3	0.022	0.45	0.6	11.1	12.8	0.020	0.023	0.41	0.47
A/B rated boilers (exceptions)	54.3	0.097	1.17	0.6	49.2	56.5	0.088	0.101	1.06	1.21
Fuel Switching	317.0	1.108	22.15	0.6	287.6	330.2	1.005	1.153	20.09	23.07
Heating controls - upgrade with boiler	5.3	0.010	0.11	0.7	4.7	5.6	0.009	0.010	0.10	0.12
Heating controls - extra	42.7	0.077	0.92	0.7	38.1	44.8	0.069	0.081	0.82	0.97
CFLs - retail	2.2	0.0022	0.039	0.0	2.2	2.2	0.0022	0.0022	0.039	0.039
CFLs - direct	2.2	0.0022	0.039	0.0	2.2	2.2	0.0022	0.0022	0.039	0.039
Appliances - Cold	6.9	0.0072	0.086	0.5	6.4	7.1	0.0066	0.0074	0.079	0.089
Appliances - Wet	10.4	0.012	0.15	0.5	9.6	10.8	0.011	0.013	0.13	0.15
Appliances - iDTVs	5.8	0.0059	0.041	0.5	5.3	6.0	0.0054	0.0061	0.038	0.043
Tank insulation - top-up	29.2	0.054	0.54	0.0	29.2	29.2	0.054	0.054	0.54	0.54
Draughtproofing	19.9	0.036	0.72	1.0	16.9	21.2	0.031	0.039	0.62	0.78
Solid wall insulation	315.6	0.576	17.27	0.5	290.9	326.4	0.531	0.595	15.92	17.86
<b>Measures below are open for consultation</b>										
Wood burning stoves (secondary)	14.8	0.163	3.26	0.6	13.5	15.5	0.148	0.170	2.96	3.40
Biomass boilers (primary)	467.6	1.989	39.79	0.6	424.1	487.0	1.804	2.072	36.09	41.43
Photovoltaic panels (2.5 kWp)	211.5	0.249	6.21	0.0	211.5	211.5	0.249	0.249	6.21	6.21
Solar Water Heater (4m <sup>2</sup> )	49.6	0.089	2.22	0.0	49.6	49.6	0.089	0.089	2.22	2.22
mWind (1 kWp, 10% LF)	87.7	0.103	1.03	0.0	87.7	87.7	0.103	0.103	1.03	1.03
micro Hydro (0.7kWp, 50% LF)	306.8	0.361	7.21	0.0	306.8	306.8	0.361	0.361	7.21	7.21
Heat pumps	388.8	0.995	19.90	0.6	352.6	404.9	0.903	1.036	18.05	20.73

### **2.3 Number of installations**

The number of installations for each measure is shown in the main Illustrative Mix table below (Table 7).

The number of installations takes account of what in our view would be the cost-effectiveness for suppliers, prioritising the most cost-effective measures from their perspective.

An estimate was made in each case of the maximum number of installations for the EEC3 period. Several limiting factors were identified and quantified:

- The remaining technical potential (i.e. how many homes, which could have the measure, remain without it)
- The maximum number of installations that physically could be installed during the 3 year period (i.e. the maximum capacity of the relevant installation or manufacturing industry)
- The likely limit of consumer demand for the measure

For each measure, the lowest of these factors would be the limiting one and this was noted as the maximum possible for the EEC3 target setting exercise.

For CWI, the most important measure, we assume a total of 3.18m installations under EEC3, including 180,000 installations<sup>7</sup> that suppliers committed to carry-over and install prior to April 08, making use of the unlimited carry-over arrangements as announced in the 2006 Budget. The maximum number of CWI installations is limited by the capacity of the insulation industry; Defra commissioned ESD to review the insulation industry supply chain (first in 2005 with an updated review in Feb. 2007) and they concluded that the projected maximum capacity for the 3-year EEC3 period is 3.0m CWI installations.<sup>8</sup>

For the Priority Group, the number of CWI installations is limited by the remaining potential. Taking account of churn due to people moving house and more importantly moving in and out of the Priority Group, and taking account of about 20% of households that cannot be reached (e.g. householders not willing to have CWI, or where it is not feasible or practicable to identify potential customers), the practical remaining potential is estimated to be 1.3m. See Note B for detailed analysis.

We assume that there might be 2.4m professional installations of loft insulation, plus a further 600,000 DIY installations. This is well within the maximum industry capacity of more than 1m per annum as identified in ESD's study on the insulation industry supply chain.<sup>8</sup>

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<sup>7</sup> We assume that the carry-over commitments of 300,000 insulation measures is split 60:40 between cavity wall and loft insulation.

<sup>8</sup> UK Insulation Sector Supply Chain Review, ESD, February 2007, [www.defra.gov.uk/environment/energy/eec/pdf/supply-chain-review.pdf](http://www.defra.gov.uk/environment/energy/eec/pdf/supply-chain-review.pdf)

CFLs remain fairly cost-effective and we assume a total of 65m CFLs, partly via retail, partly via direct mail out.

Instant feedback devices such as handheld display units are potentially attractive in terms of cost-effectiveness. However, such monitors will be mandated for electricity (see Energy White Paper 2007), and hence they are not eligible under EEC. We have therefore not included any of these devices in the Illustrative Mix.

Estimating the number of installations for micro-generation technologies is particularly difficult as these are often young markets with relatively large uncertainties. Suppliers may also be interested in promoting these technologies for other marketing and strategic reasons other than EEC cost-effectiveness considerations. In any case we expect that the contribution by micro-generation technologies will be relatively small compared to the EEC target. However, conversely EEC support could potentially significantly contribute to the market transformation of these technologies. More details on micro-generation are included in Note C.

For retail schemes, the proportion of installations in the Priority Group is assumed to be the same as under EEC1 (based on EEC1 outturn)<sup>9</sup>.

## **2.4 Costs**

Costs are estimated as part of the Impact Assessment (IA). In this context, we are attempting to estimate the maximum potential cost that could be passed on to consumers as suppliers work to meet their targets. Our estimated costs are therefore not intended to necessarily reflect the actual costs borne by energy suppliers (as energy suppliers may be able to deliver their targets more cost-effectively) or the level of cost they may choose to pass through to their customers. Suppliers are not required to report any costs – they are commercially sensitive as EEC operates in a competitive market. Estimates are based on knowledge of the relevant markets.

Our estimated costs are made up of the direct installation cost of the measure and the indirect costs (e.g. administration and marketing) related to that measure's promotion and installation. The total cost is assumed to be split between the energy supply company, the householder and, for measures installed in social housing, the social housing provider. The contribution from each, as a proportion, is listed for each measure both for the priority and non-priority groups. In most cases, the proportion of cost met by the priority group is assumed to be lower than for the non-priority group. These contributions are based on EEC1 outturns<sup>9</sup> – see the tables below (Table 5 and Table 6) for details of cost assumptions.

The remaining potential for the most cost-effective measures (particularly cavity wall insulation) in the social sector is diminishing, as a result of

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<sup>9</sup> Evaluation of the Energy Efficiency Commitment 2002-05, Eoin Lees Energy 2006, [www.defra.gov.uk/environment/energy/eec/pdf/eec-evaluation.pdf](http://www.defra.gov.uk/environment/energy/eec/pdf/eec-evaluation.pdf)

activities carried out under past schemes. Activity in the social sector is therefore considerably reduced for these measures compared with previous schemes. However, there are still substantial opportunities for some measures, including the more costly measures such as solid wall insulation and micro-generation, being co-financed by local authorities and social landlords.

The installation costs assumed in the model are based on current prices, which are generally assumed to be 5% higher than those quoted in the EEC2 Illustrative Mix taking account of inflation. As described in section 2.2 Savings, dwellings of PG households are assumed to be 85% of the size of an average 3-bed semi-detached house, and 107% for non-PG households. For each measure, a certain fraction of the cost is assumed to be dependant on the size of the dwelling (as shown in Table 5).

Indirect costs are very difficult to estimate. Sometimes they are partially passed on by suppliers to contractors e.g. to include search costs and are quoted as part of the unit cost; however, in our analysis we assume that the unit cost consists only of the installation cost.

Indirect costs are assumed to be a percentage of the unit cost of the measure. A fixed percentage tends to give unrealistically high admin costs for expensive measures. Using bands (e.g. 20% if less than £500, 10% if more, etc.) leads to jumps where if a measure was cheaper by a small amount its admin cost would be nearly doubled. To avoid such discontinuities, the following empirical formula was used as the most practical way of assigning values.

$$\% \text{ of unit cost} = 250 / (\text{unit cost} + 1000)$$

The percentage is higher for low cost measures (reaching a maximum of 25% for the cheapest), but falls off exponentially as the cost increases. This means that the absolute indirect cost rises at an ever-slower rate as the unit cost increases. This gives an indirect cost of 20% at a unit cost of £250 and 10% at a cost of £1500.

Some of the costs have changed compared to those published in the first draft Illustrative Mix:

- Cavity wall insulation is assumed to be 10% more expensive than previously estimated because we expect the market to tighten as industry capacity limits are approached.
- DIY loft insulation is assumed to have a slightly lower cost than previously assumed, since it appears not to have risen as fast as inflation since earlier phases of EEC.
- The cost assumed for wet appliances has been increased from £100 to £200 on the basis of a refined estimate from Market Transformation Programme. (This is the marginal cost of installing an A-rated tumble dryer.)

**Table 5:** Average costs of individual measures (the cost might depend to some degree on the size of the dwelling; the floor area of PG dwellings is assumed to be 85% of the average 3-bed semi, and 107% for non-PG dwellings)

Measure	Unit cost of measure (£)	Proportion of cost affected by dwelling area	Unit cost of measure (£)		Indirect costs (£)		Total cost (£)		Annual costs (£)
	3-bed semi-detached		Priority	Other	Priority	Other	Priority	Other	
Cavity wall insulation	380	0.5	352	393	65	71	417	464	0
Loft insulation (professional)	286	0.5	265	296	52	57	317	353	0
Loft insulation (DIY)	120	0.9	104	128	24	28	127	156	0
Glazing E to C rated	212	0.5	196	219	41	45	237	264	0
A/B rated boilers (exceptions)	212	0.1	209	213	43	44	252	257	0
Fuel Switching	2014	0.5	1863	2084	163	169	2026	2253	50
Heating controls - upgrade	90	0.5	83	93	19	21	103	115	0
Heating controls - extra	148	0.5	137	154	30	33	167	187	0
CFLs - retail	2.1	0	2.1	2.1	0.5	0.5	2.6	2.6	0
CFLs - direct	3.2	0	3.2	3.2	0.8	0.8	4.0	4.0	0
Appliances - Cold	21	0	21	21	5.2	5.2	26	26	0
Appliances - Wet	200	0	200	200	42	42	242	242	0
Appliances - iDTVs	1.5	0	1.5	1.5	0.4	0.4	1.9	1.9	0
Tank insulation - top-up	14	0	14	14	3.4	3.4	17	17	0
Draughtproofing	101	0.5	93	104	21	24	114	128	0
Wood burning stoves (sec)	1417	0.1	1396	1427	146	147	1541	1574	0
Biomass boilers (primary)	5272	0.1	5193	5309	210	210	5403	5519	60
Photovoltaic panels (2.5 kWp)	9375	0	9375	9375	226	226	9601	9601	94
Solar Water Heater (4m <sup>2</sup> )	3000	0	3000	3000	188	188	3188	3188	15
mWind (1 kWp, 10% LF)	1600	0	1600	1600	154	154	1754	1754	29
micro Hydro (0.7kWp, 50% LF)	1890	0	1890	1890	163	163	2053	2053	19
Heat pumps	7835	0.75	6954	8246	219	223	7172	8469	39
Solid wall insulation	3180	0.5	2942	3291	187	192	3128	3483	0

**Table 6:** Cost contributions for individual measures

Measure	% of unit cost met by supplier		Total cost to supplier (£)		Cost met by householder (£)		Cost to social housing provider (£)	
	Priority	Other	Priority	Other	Priority	Other	Priority	Other
Cavity wall insulation	89.8%	56.3%	374	261	23	198	19	5
Loft insulation (professional)	89.1%	64.3%	283	227	11	117	24	9
Loft insulation (DIY)	33.4%	35.9%	43	56	85	100	0	0
Glazing E to C rated	95.0%	50.0%	225	132	12	132	0	0
A/B rated boilers (exceptions)	95.8%	81.0%	241	209	11	49	0	0
Fuel Switching	87.4%	51.3%	1769	1156	3	956	253	141
Heating controls - upgrade with boiler	79.8%	43.0%	82	49	13	62	8	3
Heating controls - extra	79.8%	43.0%	134	80	21	102	13	5
CFLs - retail	41.4%	43.0%	1.1	1.1	1.6	1.5	0.0	0.0
CFLs - direct	98.9%	83.1%	3.9	3.3	0.0	0.7	0.0	0.0
Appliances - Cold	56.7%	51.5%	15	14	11	13	0	0
Appliances - Wet	49.8%	51.0%	120	123	121	118	0	0
Appliances - iDTVs	50.0%	50.0%	0.9	0.9	0.9	0.9	0.0	0.0
Tank insulation - top-up	95.1%	80.4%	16	14	1	3	0	0
Draughtproofing	91.5%	76.7%	105	98	1	27	9	3
Wood burning stoves (secondary)	50.0%	28.0%	771	441	0	871	771	262
Biomass boilers (primary)	50.0%	33.3%	2701	1840	0	3220	2701	460
Photovoltaic panels (2.5 kWp)	50.0%	20.0%	4800	1920	0	7681	4800	0
Solar Water Heater (4m <sup>2</sup> )	50.0%	28.0%	1594	893	0	1764	1594	531
mWind (1 kWp, 10% LF)	50.0%	21.7%	877	380	0	1325	877	49
micro Hydro (0.7kWp, 50% LF)	50.0%	20.0%	1027	411	0	1643	1027	0
Heat pumps	50.0%	30.0%	3586	2541	0	4517	3586	1412
Solid wall insulation	74.8%	58.5%	2338	2038	86	1184	704	261

### **3 Outcomes**

Table 7 below shows the draft Illustrative Mix of measures with the number of installations (including deadweight), and annual and lifetime carbon savings for each measure and in total. The overall lifetime carbon savings (including deadweight installations), in other words the target for EEC3, is 42 MtC lifetime savings. The lifetime carbon savings net of deadweight are 34.2 MtC. The corresponding net annual savings at the end of the programme are about 1.1 MtC.

Table 8 shows various key outputs including costs and benefits.

#### **3.1 Costs**

The overall cost to suppliers is estimated to be about £2.5 billion or about £97 per household for the 3 years, i.e. about £32 per year or around 3-3.5% of energy bills, if passed on in full. This is around £45-£60 per household for the 3 years (or 1.5-2% of energy bills) on top of current EEC2 costs and today's energy bills. The EEC3 costs are between 2 and 2.5 times the EEC2 costs. To understand the main factor in this, doubling the EEC2 net carbon saving – with no other changes – is likely to increase EEC2 cost by around 80-90%, once the effect of deadweight is accounted for. A second factor is much reduced contribution from the social sector, since the remaining potential for many measures in this sector will be small by the end of EEC2. This has a substantial impact on supplier costs in the PG, although with a proportionally smaller impact on overall costs. Together with other smaller changes, some of which could decrease costs and others increase them, the overall effect is somewhere over a doubling.

#### **3.2 Benefits**

EEC3 is very cost effective, with net benefits of around £250/tC.

At the household level, the annual costs could be about £32 per year for 3 years. However, average benefits build up to a similar level by the end of the 3<sup>rd</sup> year, and thereafter continue for around 30 years on average (the major measures have quoted lifetimes of 40 years). The PG receives about 40% of the lifetime net benefits, although well over 50% of the scheme costs are spent on it and it constitutes only around 1/3 of household numbers.

The overall net present value of the programme is a benefit of about £8.6bn or more than £10bn if the social cost of carbon is included. The maximum cost to suppliers, which they may pass on to their customers via energy bills, is estimated to be about £97 over the EEC3 period per household, while households benefit by over £500 on average over the lifetime of the measures (taking account of their own contribution to the cost but excluding the impact on fuel bills); the benefits are of course zero for households who do not install any measures, while the benefits for those who do can be much greater.

### **3.3 Implications for key measures**

The most important measures are cavity wall and loft insulation, which provide about 3/4 of the target score (lifetime carbon savings) and nearly 2/3 of the annual carbon savings. Fuel switching and CFLs are the other important measures, with about 11% and 6% respectively of the score.

### **3.4 Priority group share**

The priority group share is 40% of the target. Our analysis shows that this is the maximum practical potential; in other words, it is challenging but achievable. It is based on the number of installations that may be delivered in the PG as shown in the Illustrative Mix (Table 7). As in the Illustrative Mix more generally, cavity wall insulation is the most important measure for the priority group. The remaining potential in the priority group is limited to about 1.3 million cavities as described earlier (see Section 2.3) and in Note B. Other important measures are loft insulation and fuel switching followed by CFLs.

The social sector is very attractive for suppliers as the proportion of priority group households is high (with about ¾ of households in the social sector being in the priority group) and local authorities and social landlords often provide co-financing. Although (as discussed in Section 2.4) the remaining potential for the most cost-effective measures in the social sector is diminishing, there are still substantial opportunities for some measures, including the more costly measures such as solid wall insulation and micro-generation.

**Table 7:** Draft Illustrative Mix of measures showing the number of installations and business-as-usual deadweight (DW) installations, cost-effectiveness (C-E) ranking, lifetime carbon saving score, and annual carbon savings (net of deadweight)

MEASURE	CE rank		Number of installations				Lifetime carbon savings (MtC)				Percentage of target			Annual carbon savings (MtC/yr)		
	PG	NP	PG	non-PG	Total	Deadweight	PG	non-PG	Total	DW	PG	non-PG	Total	PG	non-PG	Total
Cavity wall insulation	5	5	1,300,000	1,880,000	<b>3,180,000</b>	240,000	8.29	13.46	<b>21.75</b>	1.66	49.2%	53.4%	51.7%	0.194	0.308	<b>0.502</b>
Loft insulation (professional)	8	9	1,200,000	1,200,000	<b>2,400,000</b>	210,000	3.49	4.39	<b>7.88</b>	0.72	20.7%	17.4%	18.7%	0.082	0.097	<b>0.179</b>
Loft insulation (DIY)	1	1	75,000	525,000	<b>600,000</b>	225,000	0.19	1.65	<b>1.83</b>	0.66	1.1%	6.5%	4.4%	0.000	0.029	<b>0.029</b>
Glazing E to C rated	18	18	0	50,000	<b>50,000</b>	0	0.00	0.02	<b>0.02</b>	0.00	0.0%	0.1%	0.1%	0.000	0.001	<b>0.001</b>
A/B rated boilers (exceptions)	16	17	54,988	108,726	<b>163,714</b>	0	0.06	0.13	<b>0.19</b>	0.00	0.3%	0.5%	0.5%	0.005	0.011	<b>0.016</b>
Fuel Switching	7	7	126,000	84,000	<b>210,000</b>	180,000	2.53	1.94	<b>4.47</b>	3.97	15.0%	7.7%	10.6%	0.066	0.000	<b>0.066</b>
Heating controls - upgrade with boiler	21	22	50,000	50,000	<b>100,000</b>	0	0.01	0.01	<b>0.01</b>	0.00	0.0%	0.0%	0.0%	0.000	0.001	<b>0.001</b>
Heating controls - extra	12	10	200,000	200,000	<b>400,000</b>	0	0.16	0.19	<b>0.36</b>	0.00	1.0%	0.8%	0.9%	0.014	0.016	<b>0.030</b>
CFLs - retail	3	4	5,280,000	34,720,000	<b>40,000,000</b>	18,000,000	0.21	1.35	<b>1.56</b>	0.70	1.2%	5.4%	3.7%	0.007	0.068	<b>0.075</b>
CFLs - direct	9	11	20,000,000	5,000,000	<b>25,000,000</b>		0.78	0.19	<b>0.97</b>		4.6%	0.8%	2.3%	0.035	0.000	<b>0.035</b>
Appliances - Cold	14	16	344,174	1,506,226	<b>1,850,400</b>	0	0.03	0.13	<b>0.16</b>	0.00	0.2%	0.5%	0.4%	0.002	0.011	<b>0.013</b>
Appliances - Wet	23	23	22,680	97,320	<b>120,000</b>	0	0.00	0.01	<b>0.02</b>	0.00	0.0%	0.1%	0.0%	0.000	0.001	<b>0.001</b>
Appliances - iDTVs	2	2	75,000	425,000	<b>500,000</b>	0	0.00	0.02	<b>0.02</b>	0.00	0.0%	0.1%	0.1%	0.000	0.003	<b>0.003</b>
Tank insulation - top-up	4	3	150,000	150,000	<b>300,000</b>	60,000	0.08	0.08	<b>0.16</b>	0.03	0.5%	0.3%	0.4%	0.007	0.006	<b>0.013</b>
Draughtproofing	13	14	50,000	50,000	<b>100,000</b>	0	0.03	0.04	<b>0.07</b>	0.00	0.2%	0.2%	0.2%	0.002	0.002	<b>0.003</b>
Wood burning stoves (secondary)	17	15	6,000	6,000	<b>12,000</b>	0	0.02	0.02	<b>0.04</b>	0.00	0.1%	0.1%	0.1%	0.001	0.001	<b>0.002</b>
Wood chip boilers (primary)	6	6	10,000	20,000	<b>30,000</b>	1,951	0.36	0.83	<b>1.19</b>	0.08	2.1%	3.3%	2.8%	0.018	0.037	<b>0.055</b>
Photovoltaic panels (2.5 kWp)	20	19	0	2,000	<b>2,000</b>	1,165	0.00	0.01	<b>0.01</b>	0.01	0.0%	0.0%	0.0%	0.000	0.000	<b>0.000</b>
Solar Water Heater (4m <sup>2</sup> )	19	21	20,000	20,000	<b>40,000</b>	589	0.04	0.04	<b>0.09</b>	0.00	0.3%	0.2%	0.2%	0.002	0.002	<b>0.004</b>
mWind (1 kWp, 10% LF)	22	20	1,000	6,000	<b>7,000</b>	676	0.00	0.01	<b>0.01</b>	0.00	0.0%	0.0%	0.0%	0.000	0.001	<b>0.001</b>
micro Hydro (0.7kWp, 50% LF)	10	8	0	2,000	<b>2,000</b>	79	0.00	0.01	<b>0.01</b>	0.00	0.0%	0.1%	0.0%	0.000	0.001	<b>0.001</b>
Heat pumps	15	13	14,000	14,000	<b>28,000</b>	1,587	0.25	0.29	<b>0.54</b>	0.03	1.5%	1.2%	1.3%	0.013	0.013	<b>0.025</b>
Solid wall insulation	11	12	20,000	20,000	<b>40,000</b>	0	0.32	0.36	<b>0.68</b>	0.00	1.9%	1.4%	1.6%	0.011	0.012	<b>0.023</b>
<b>Total</b>							16.9	25.2	<b>42.0</b>	7.9	100.0%	100.0%	100.0%	0.46	0.62	<b>1.08</b>

The carbon savings would be reduced if any incentives e.g. in the form of uplifts were introduced.

**Table 8:** Key results of the draft Illustrative Mix of measures

	<b>PG</b>	<b>non-PG</b>	<b>Total</b>
Score - lifetime carbon savings (MtC)	16.9	25.2	<b>42.0</b>
Lifetime carbon savings net of deadweight (MtC)	14.5	19.7	<b>34.2</b>
Annual savings net of deadweight (MtC/yr)	0.46	0.62	<b>1.08</b>
Annual fuel costs savings (£m/yr)	305	454	<b>759</b>
Annual benefits per household (£/yr)	37.2	28.5	<b>31.4</b>
Scheme cost (£m)	1357	1174	<b>2531</b>
Suppliers' cost per household (£)	154.2	67.4	<b>97</b>
Suppliers' cost per bill per year (£)	28.0	12.3	<b>17.5</b>
Average cost-effectiveness for suppliers (£/tC)	80.5	46.6	<b>60.2</b>
Benefits per household (£)	671	520	<b>571</b>
Total benefits of whole programme (NPV) (£m)	3416	5149	<b>8565</b>
Cost effectiveness of scheme (£/tC saved)	-236	-261	<b>-251</b>
Lifetime net benefits per household (£)	662	463	<b>530</b>
Proportion of households	34%	66%	<b>100%</b>
Energy cost benefits	40%	60%	<b>100%</b>
Programme cost	54%	46%	<b>100%</b>
Target score (MtC)	<b>40%</b>	60%	<b>100%</b>

## **Note A:**

### **Calculation of the number of households in the Priority Group**

#### **1 Benefits making up Priority Group**

According to the Electricity and Gas (Energy Efficiency Obligations) Order 2004, a household is in the priority group if they receive:

- (a) council tax benefit;
- (b) housing benefit;
- (c) income support;
- (d) an income-based jobseeker's allowance;
- (e) an attendance allowance;
- (f) a disability living allowance;
- (g) a war disablement pension which includes a mobility supplement or a constant attendance allowance;
- (h) a disablement pension which includes a constant attendance allowance;
- (i) pension credit; or
- (j) child tax credit or working tax credit with an income of no more than £14,600.

#### **2 The Family Resources Survey**

The Family Resources Survey (FRS) collects information on the incomes and circumstances of private households in the United Kingdom. It has been running since October 1992. During the 2004-05 full survey year approximately 26,000 households were interviewed in Great Britain.

In terms of the groups making up the Priority Group, the survey contains data on receipt of all applicable Priority Group benefits except disablement pension. It also does not collect whether someone in receipt of war disablement pension has a mobility supplement included in that payment. Unlike the main administrative data of the Department for Work and Pensions (DWP), the survey allows household level data to be derived.

#### **3 Derivation of the numbers of households in the Priority Group**

The way the overall level of Priority Group households was derived was to start with those benefits received at individual level and then collapse the data set into ultimately a household level data set.

At an individual level, this dataset contains whether someone is in receipt of income support, jobseeker's allowance, attendance allowance, disability living allowance, war disablement pension and pension credit (amongst other

benefits). The assumption was made to include all war disablement pension cases, as it was not possible to separate out those that received a mobility component. The effect of this assumption was small. This data was used to derive how many households were in the Priority Group because they were receiving these benefits, which produced a figure of around 5.5 million Priority Group households.

At a household level, this dataset contains whether the household is in receipt of council tax or housing benefit. This brings an additional 1.1 million households into the Priority Group, who received council tax or housing benefit, but not income support, jobseeker's allowance, attendance allowance, disability living allowance, war disablement pension or pension credit.

Finally, at a benefit/family unit level, this dataset contains whether someone in the unit is in receipt of tax credits and the family income. This income was not adjusted to make it fully consistent with the applicable income used to derive the tax credit award, as this is not directly available in the survey and is dependent on individual circumstances. We therefore included all those cases where the family income was no greater than £280 per week. The addition of the tax credit criteria was assessed to bring around a further 0.4 million households into the Priority Group

Combining households containing any of the above benefits or tax credits gives an overall figure of 7.0 million Priority Group households.

#### **4 Why this will be an underestimate**

Table 9 compares overall benefit and tax credit receipt at an individual or family unit level for the FRS and DWP administrative data. Administrative data is based on larger samples or even information on all claimants, and covers information such as age and gender of claimant, duration of their spell on benefit and geographical locations of claimants. It is difficult to collapse this data down to household level, and to bring in tax credit and housing and council tax benefit data, which makes it difficult to derive the size of the Priority Group from this source alone.

**Table 9:** FRS and administrative data compared

<b>Benefit</b>	<b>FRS data</b>	<b>Administrative data</b>	<b>Ratio of FRS to administrative data</b>
Income Support	1,745,902	2,139,000	82%
Pension Credit	1,681,148	2,432,300	69%
Housing Benefit	3,407,021	3,932,800	87%
Council Tax Benefit	4,666,928	4,879,200	96%
Jobseeker's Allowance	561,026	739,800	76%
Attendance Allowance	977,027	1,510,400	65%
Disability Living Allowance (Care Component)	1,628,358	1,922,900	85%
Disability Living Allowance (Mobility Component)	1,681,804	2,134,500	79%
Working Tax Credit – family unit level	1,241,988	1,729,000	72%
Child Tax Credit – family unit level	3,942,431	4,166,000	95%

Source: Table M.6 of the 2004-05 FRS publication.

## **5 Addressing the undercount – scaling up the FRS statistics**

Given the 7.0 million estimate will be an underestimate, there are various options to derive an estimate of the true Priority Group size. The first way is to scale up the estimates above based on the undercount data above.

The most straightforward way of approximating this effect is to work out the average percentage undercount on the FRS relative to administrative data, weighted by the numbers claiming the benefit. This gives an overall undercount of benefits on the FRS of around 84 per cent, so scaling up the Priority Group by this amount gives an estimated size in 2004-05 of around 8.3 million households.

This is a crude approximation, which does not incorporate any adjustments to reporting rates for household receiving multiple benefits. A possible refinement is therefore to average each of the benefit undercount data when the individual is on multiple benefits. This increases the estimated total to around 8.5 million households.

**Table 10:** Adjusted and unadjusted FRS data compared

<b>Benefit</b>	<b>Original FRS estimates</b>	<b>Adjustment for undercount</b>
Main DWP benefits	5.5	6.8
Addition of Council Tax and Housing Benefit only recipients	1.1	1.3
Addition of tax credit only recipients	0.4	0.4
<b>Total</b>	<b>7.0</b>	<b>8.5</b>

## **6 Addressing the undercount – use of administrative data**

An alternative way of addressing the undercount issue is to apply the profile of benefit recipients on the Family Resources Survey to administrative data. This has the advantage of using data that is not subject to the same survey variability. It also allows more timely estimates to be produced.

The Work and Pensions Longitudinal Study is based on DWP's complete claimant database. It estimates that the overall number of individuals in receipt of various combinations of Pension Credit, Income Support, Disability Living Allowance, Attendance Allowance or Jobseekers Allowance (income-based) in May 2006 is around 7.8 million. The average number of households in receipt of these benefits over the four quarters making up the FRS survey year is 7.6 million. The increase is due to the number of benefit recipients increasing over the period for all benefits except income support. Data is accessible via <http://193.115.152.21/100pc/tabtool.html>.

According to the FRS, the number of households containing someone in receipt of these benefits is around 90 per cent of the number of individuals receiving these benefits. This implies around 7.0 million households in May 2006 contain someone in receipt of Pension Credit, Income Support, Disability Living Allowance, Attendance Allowance or Jobseekers Allowance (income-based). The figure for the quarters making up the FRS survey is around 6.8 million.

According to the FRS, around a quarter of households in receipt of council tax benefit were not in receipt of any of the benefits detailed above, and there were very few households who were in receipt of only housing benefit. According to DWP data, around 5.1 million households were in receipt of Council Tax Benefit in May 2006. This means an additional 1.3 million households are in the Priority Group for that period. In terms of the period corresponding to the FRS survey, the figure was around 4.9 million, implying an additional 1.2 million households in fuel poverty. DWP's Council Tax and Housing Benefit data is based on a survey of Local Authorities and therefore is not as robust as their other benefit data.<sup>10</sup>

<sup>10</sup> See <http://www.dwp.gov.uk/asd/hbctb.asp> for details.

Finally, according to HMRC administrative data<sup>11</sup>, in April 2006, around 1.8 million individuals were in receipt of tax credits where the applicable income is less than £14,600, with 1.7 million over the FRS period. The relevant income banding published by HMRC goes from £10,000 to £20,000, and it has been assumed around half of the family units in this band have an applicable income less than £14,600. This is based on a random sample of 10 per cent of single adults (with or without children) and 20 per cent of couples. The FRS gives a much lower figure of households earning less than £14,600 on tax credits, but this might be because of the income definition differences or because of the banding approximation.

According to the FRS, around 55 per cent of tax credit recipients receiving earning less than £14,600 are not in receipt of any other benefits and the number of households containing someone in receipt of these tax credits is around 95 per cent of the number of family units receiving them. This means an additional 0.9 million households are estimated to be in the Priority Group in May 2006, and also an additional 0.9 million in the FRS period.

**Table 11:** Administrative and scaled FRS data compared

<b>Benefit</b>	<b>Adjusted FRS data</b>	<b>Administrative data (FRS period, Apr 2004 to Mar 2005)</b>	<b>Administrative data (May 2006)</b>
Main DWP benefits	6.8	6.8	7.0
Addition of Council Tax and Housing Benefit only recipients	1.3	1.2	1.3
Addition of tax credit only recipients	0.4	0.9	0.9
<b>Total</b>	<b>8.5</b>	<b>8.9</b>	<b>9.2</b>

<sup>11</sup> <http://www.hmrc.gov.uk/stats/personal-tax-credits/cwtc-quarterly-stats.htm>

**Note B:  
Remaining potential for cavity wall insulation**

**1 Number of cavities uninsulated based on EHCS 2004, SCHS, WCHS data**

Before 1983 the majority of dwellings were built without cavity wall insulation.

Subsequent changes to the wall U-value in the Building Regulations Part L were as follows:

- from 1983: U-value 0.6 (formerly 1.0)
- from 1991: U-value 0.45, but 0.6 if double glazed
- from 1996 to 2002: U-value 0.45, or other value if 'Target U-value method' used, (e.g. 0.6 if a condensing boiler was installed).

From 2003 the U-value improved again to 0.35 and the majority of dwellings were built with insulated cavity walls.

A survey of England and Wales building control applications in 1998 indicated that a significant proportion of walls were still being built without insulation<sup>12</sup>.

A 'consensus estimate' from within BRE suggested:

- 90% unfilled when built in 1983 to 1990
- 50% unfilled when built in 1991 to 2002
- very few unfilled when built from 2003.

EHCS 2004 data recorded, for cavity walls believed to be unfilled at date of survey<sup>13</sup>

- 950,000 or 52% of cavity walls unfilled (in 2004) for 1981-1990 dwellings
- 800,000 or 34% of cavity walls unfilled (in 2004) in post 1990 dwellings.

This implies a decrease in % of unfilled walls from date built to 2004, from 90% to 52% for 1980s dwellings, and 50% to 34% for 1990s dwellings. One would expect such a decrease due to installation of retrofit insulation in a proportion of the walls.

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<sup>12</sup> BRE report for DETR/BR 1998. Review of the operation of the 1995 Edition of the Regulations for the Conservation of Fuel and Power (England and Wales)

<sup>13</sup> John Riley. Personal communication.

These numbers compare with an EHCS 2004 total for dwellings of all ages, of 9.217 million cavity walls unfilled (in 2004).

There are uncertainties in the EHCS 2004 data for dwellings built between 1983 and 2002, because of the difficulty of identifying, in 2004, whether the cavity wall contains insulation that was installed when built. In addition there is no indication whether these would be over or underestimated. Retrofit insulation installed at a later date can be identified more easily from the drill holes.

However, overall the above gives consistent data for the transitional period between most dwellings built without cavity wall insulation and most dwellings built with insulation.

The EHCS 2004 data of 9.217 million total cavity walls unfilled (in 2004) is therefore used for England. Similar data is used from the WHCS 2004, and from the SHCS 2002 with some adjustment to update it to 2004.

	England (source) <i>EHCS 2004</i>	Scotland <i>SHCS 2002</i>	Wales <i>WHCS 2004</i>	GB
households	21.613m	2.192m	1.209m	25.014m
houses with cavity walls	15.042m	1.582m	0.786m	17.410m
% houses with cavity walls	70%	72%	65%	
cavities uninsulated	9.217m	1.238m <sup>1</sup>	0.456m	10.911m
% cavities uninsulated	61%	78%	58%	

<sup>1</sup>corrected to 2004 value

## 2 Taking account of unfillable cavity walls

The above number of uninsulated cavity wall dwellings is then reduced to allow for situations where they should not be filled, such as the following:

- Height of wall greater than 12 meters. (The number of high rise dwellings, four or more storeys, with uninsulated cavities is indicated by EHCS 2004 data<sup>14</sup> as 330,000.)
- Construction appropriate to locality, including its exposure (insulation is acceptable if the outer leaf construction is in accordance with the requirements for local exposure conditions)
- Cavity width less than 50mm (40mm for UF foam)
- Walls below ground level (unless certain that water is drained from cavity)

<sup>14</sup> John Riley, BRE. Personal communication.

- Finlock gutters, unless they have been lined
- Water penetration or rising damp is evident.

Cavity walls in dwellings of timber frame, steel frame, concrete construction, system built, or natural stone, should also not be retrofit insulated, but these are excluded from 'cavity walls unfilled' in EHCS. Areas of tile hanging, timber boarding, recessed panels should also not be retrofit insulated, but these are normally a small proportion of the wall area and do not affect the above numbers.

An estimate that 5% of households with cavity walls are 'unfillable' has been applied. Note that this must be 5% of the historical original number of 'uninsulated when built' cavity walls. (Both of these are essentially fixed numbers since 2003, when the majority of cavity walls started to be insulated when built.)

The historical number of uninsulated cavity wall households is obtained as follows.

- the number of dwellings built annually from 1983 to 2003
- estimating that 90% of these are cavity walls
- using the estimates above for the percentage built with cavity wall insulation during these years

This gives 1.261 million dwellings built with insulated cavity walls

Subtracting this from the 2004 figure of 17.410 million cavity wall GB dwellings gives

16.149 million households as the historical number of uninsulated cavity walls, so 5% of this is an estimated 'unfillable' 807,000 households.

This reduces the 10.911 million GB households with uninsulated cavity walls to

10.103 million GB households with 'fillable' cavity walls in 2004.

### 3 Priority Group (PG) and 2004-8 installations

Analysis of EHCS data combined with benefit receipt data for England, Wales and Scotland from DWP's Family Resources Survey indicates that about 28.5% of households in Great Britain with uninsulated cavity walls are in the Priority Group. Of the 10.103 million households, this gives

- 2.878 million dwellings in the Priority Group,
- 7.225 million dwellings in the non Priority Group.

Estimates of insulation installed from 2004 to 2008 as a result of EEC and Warm Front are then subtracted, as follows:

	<b>Priority Group</b>	<b>Non Priority Group</b>
<b>Households with 'fillable' cavity walls GB 2004</b>	<b>2.878m</b>	<b>7.225m</b>
EEC 2004-05	0.200m	0.150m
EEC 2005-08	0.650m	0.625m
Warm Front 03/04 + 04/05 + 05/06	0.100m	0
Warm Front 06/07 + 07/08	0.066m	0
Other fuel poverty programmes 03-08	0.033m	0
<b>Remaining 'fillable' cavity wall households 2008</b>	<b>1.829m</b>	<b>6.450m</b>

### 4 Effect of churn

There is a constant movement of households into and out of the Priority Group, as individuals move in and out of eligibility for the relevant benefits. Due to the larger proportion of households with 'fillable' cavity walls in the non Priority Group, this movement provides an overall net gain to the Priority Group of households with 'fillable' cavity walls.

EHCS 2004 data indicates:

- 9.100 million households in the Priority Group, so from table above, 20.1% are 'fillable'
- 15.914 million households in the non Priority Group, so from table, 40.5% are 'fillable'

Other work indicates an estimate for this churn of 20% over the period 2005-8, which gives the number of households moving between PG and non-PG group as 1.820 million. Thus around 366,000 households with 'fillable' cavity walls move from PG to non PG, and around 738,000 move from non PG to PG,

- This is a net movement of 372,000 of households with fillable cavity walls, moving from non PG to PG.

One may also consider the effect of individuals in owner occupied households with 'fillable' cavity walls who refuse to have insulation installed. During the three years of EEC3 some of these will move, thus removing this barrier.

Assuming that

- 10% of households with 'fillable' walls have individuals who refuse installation, and
  - 17% of owner occupied households move in any three year period,
- gives 90,000 likely to move during EEC3, 79% of which have 'fillable' cavity walls, giving an additional 71,000 households.

Dividing this between PG and non PG gives

- 18,000 additional in the Priority Group
- 53,000 additional in the non Priority Group.

	PG	non PG
<b>'Fillable' cavity wall households 2008</b>	<b>1.829m</b>	<b>6.450m</b>
Churn from movement of benefits	0.372m	-0.372m
Churn of those refusing insulation	0.018m	0.053m
<b>With effect of churn</b>	<b>2.219m</b>	<b>6.131m</b>

Finally, these numbers are reduced to allow for householders not willing to have cavity wall insulation installed, where it is not feasible, or where it is impracticable to identify potential customers. An estimate of 20% of the historical original number of 'uninsulated when built' cavity walls is used, after a reduction of 5% to allow for households with 'unfillable' cavity walls in this historical original number.

The historical number of households with 'uninsulated when built' (as before) is 16.149 million households. 5%, then 20%, of this gives 3.068 million households. Using the proportion in the Priority Group of 28.5% gives the following values:

	PG	non PG
<b>'Fillable' after effect of churn</b>	<b>2.219m</b>	<b>6.131m</b>
Estimate of 'unreachable' (20%)	0.874m	2.194m
<b>Remaining practical potential 2008</b>	<b>1.345m</b>	<b>3.937m</b>

## Note C:

### Microgeneration measures

Microgeneration often have a greater uncertainty of their saving potential. The figures and assumptions shown in this document are indicative and more detailed work is required in many cases to establish firm values.

#### 1 Description of measures

##### 1.1 Biomass boilers

Biomass boilers can be installed in individual homes or sometimes more effectively in community systems.

For the Illustrative Mix we consider **individual boilers** and assume that 100% of the space and water heating energy are provided by a boiler burning wood chips, at an efficiency of 65%, with a responsiveness of 0.75. It should be noted that this implies changing fuel and therefore the energy savings are the difference of the energy content of two different fuels. We have assumed that woodchip boilers would not be installed in homes with gas heating or oil central heating. They would therefore be installed only in the following types of home:

- Electric storage heating (10%)
- Electric non-storage heating (10%)
- Solid fuel central heating (30%)
- Solid fuel non-central heating (50%).

For electricity, the energy savings are negative, although the carbon savings are positive due to the much lower carbon intensity of wood.

(Note that compared to the first draft of the Illustrative Mix, the calculation for this measure has been improved, resulting in a small decrease in carbon savings. The larger change in energy saving is due to the use of a previous approximation in the calculation, which was reasonable in terms of carbon, but not energy.)

Alternatively, wood pellet boilers (rather than wood chip boilers) may be more appropriate for individual homes.

Under CERT, **community biomass schemes** up to 3 MW thermal and CHP schemes of any size, are eligible. Existing schemes for blocks of flats, such as those in Sheffield and Barnesley, have attracted local authority funding.

Whilst community biomass schemes are not shown in the list of measures, they may be more cost-effective and/or appropriate compared to individual boilers, particularly in the social sector for example.

## **1.2 Wood burning stoves**

The assumption used for the savings for wood burning stoves is that 10% of space heating would be obtained from wood (burned at an efficiency of 65%) instead of the main heating fuel. It is assumed that wood stoves are installed in homes without gas or oil based heating systems.

(Note that compared to the first draft of the Illustrative Mix, the calculation for this measure has been improved, resulting in a small decrease in carbon savings. The larger change in energy saving is due to the use of a previous approximation in the calculation, which was reasonable in terms of carbon, but not energy).

## **1.3 Photovoltaic panels (PV)**

A 2.5 kWp PV system is assumed. The annual electrical output is estimated by applying a factor 846 kWh/yr per kWp, implying an annual output of 2115 kWh/yr. Both the size and conversion factor are based on a recent EST Element Energy microgeneration report<sup>15</sup>.

## **1.4 Solar water heating**

For solar water heating, it is assumed that a typical flat plate unit with a collector area of 4m<sup>2</sup> would be fitted and that its efficiency (in the form used in BREDEM) is 58%. These inputs result in the calculated provision of 33% of annual hot water needs for the dwelling modelled.

## **1.5 Micro wind turbines**

A 1 kWp unit is assumed to be installed. An average load factor of 10% is assumed for the 8766 hours in a year, leading to a figure for annual electricity generation of 0.877 MWh/yr. The load factor (LF) is highly dependent on the mean windspeed, turbulence and also on the distribution of wind speeds. It is expected that, depending on location, the load factor could vary between 5% and 30%. The value chosen here corresponds to a mean wind speed of 4.7 m/s, and Weibull parameters A and k of 5.3 m/s and 2 respectively. This is a little higher than the average wind speed in a built up area, but it has been assumed that most micro-wind turbines will be installed in areas which are windier than the average.

The lifetime of micro wind turbines is assumed to be 10 years, which is consistent with estimates by some manufacturers such as WindSave.<sup>16</sup> Some other manufacturers quote longer lifetimes (e.g. Proven – 25 years, Swift – 20 years). However, the cost per kW is roughly twice the cost assumed here.

(Note that compared to the first draft of the Illustrative Mix, the assumed wind turbine has been changed from 1.5 kWp to 1.0 kWp, and the load factor reduced from 17% to 10%.)

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<sup>15</sup> "The Potential for Microgeneration, Study and Analysis", Element Energy, November 2005

<sup>16</sup> [www.windsave.com/](http://www.windsave.com/)

### **1.6 *Micro hydro***

It is assumed that a micro hydro turbine of 0.7 kWp is installed and that it has an annual average load factor of 50%, leading to an annual output of 3068 kWh/yr. Size, load factors and lifetime are based on the EST Element Energy microgeneration report<sup>15</sup>.

### **1.7 *Heat pumps***

We are assuming ground source heat pumps where the space heating is provided using electricity at an efficiency of 300% (with responsiveness of 1) and water heating would be achieved at an efficiency of 150%.

### **1.8 *Micro-CHP***

Micro combined heat and power (m-CHP) units are currently the object of a Carbon Trust trial measuring their in-situ performance. However, it looks like there may be delays in launching commercial products and micro-CHP may not be deployed in significant numbers during the EEC3 period. It is therefore not included in the Illustrative Mix. Of course micro-CHP would be eligible under EEC3 if the savings can be verified, for example following the Carbon Trust trials.

## 2 Costs assumed

Costs of microgeneration and therefore possible numbers of installations under EEC3 are difficult to ascertain, because the industry is immature. It would seem reasonable to assume that costs shall drop as the industry becomes more established; however, in the interests of caution, no attempt has been made to model the possible decrease in prices. The prices assumed for microgeneration are therefore at the lower end of today's range (see Table 12).

**Table 12:** Cost of microgeneration measures

Type of measure	Capacity	Cost	Marginal cost	Comments
Wood burning stoves (sec)	4-5kW	£1500	£1417	4-5kW capacity
Biomass boilers (prim)	15kW	£5000 if central heating does not need to be installed, £6900 if it does.	£5272	Average weighted marginal cost.  <a href="http://www.savenergy.org/pdf/EST_RE_Factsheet_s_05/Biomass.pdf#search=%22biomass%20boiler%2015kW%20%2B%20cost%22">www.savenergy.org/pdf/EST_RE_Factsheet_s_05/Biomass.pdf#search=%22biomass%20boiler%2015kW%20%2B%20cost%22</a>
PV (2.5 kWp)	2.5 kWp	£9375		
Solar Water Heating	4m <sup>2</sup>	£3000		Flat plate solar water heaters
Micro-wind	1kW	£1500		Windsave devices
Micro-hydro	0.7kW	£1890		Assumes weir or pond already in place. Low head. <a href="http://www.est.org.uk/myhome/generating/types/hydro/">www.est.org.uk/myhome/generating/types/hydro/</a>
Heat pumps	8kW	£9500	£7835	Includes fitting of underfloor heating (£3000). Costs: <a href="http://www.kensaengineering.com/pdf/254.pdf">www.kensaengineering.com/pdf/254.pdf</a> , Kensa Engineering. Price changed since previous calculations.

### 3 Proportion of costs met by suppliers

Using data from the Low Carbon Buildings Programme, we can ascertain the level of subsidy necessary for each measure to be adopted at current prices.

**Table 13:** Assumed proportion of costs met by the suppliers in the non-PG

<b>Measure</b>	<b>Proportion of capital cost met by supplier in the non-PG</b>	<b>Cost to supplier per measure including admin costs</b>
Wood burning stoves (sec)	17%	£277
Biomass boilers (prim)	30%	£1656
PV	20%	£1920
SWH	17%	£542
mWind	20%	£351
mHydro	20%	£411
Heat pumps	20%	£1694

In the following analysis, it has been assumed that the Low Carbon Buildings Programme will not contribute to EEC measures; the cost of the measure shall therefore be shared between the supplier and the householder, in the proportion given in the table above. Given the relatively high costs of microgeneration, it has been assumed that microgeneration measures are either delivered in the non-priority group, or for the PG in the social sector with financial contributions of 50% by local authorities / social landlords.

#### 4 Relative cost effectiveness of each measure to suppliers

The table below shows the relative cost-effectiveness of each measure installed to the supplier. It is assumed that the proportion of costs met by the suppliers is as given in Table 13. Micro-generation measures are shown in bold. Note that the ranking of cost effectiveness is different in the priority and non-priority groups.

**Table 14:** Cost effectiveness of each microgeneration measure for suppliers – priority group and non priority group (microgeneration measures are shown in bold).

Rank in PG	Measure	Rank in non-PG	Measure
1	Loft insulation (DIY)	1	Loft insulation (DIY)
2	Appliances – iDTVs	2	Appliances – iDTVs
3	CFLs – retail	3	Tank insulation – top-up
4	Tank insulation – top-up	4	CFLs – retail
5	Cavity wall insulation	5	Cavity wall insulation
<b>6</b>	<b>Biomass boilers (prim)</b>	<b>6</b>	<b>Biomass boilers (prim)</b>
7	Fuel Switching	7	Fuel Switching
8	Loft insulation (professional)	<b>8</b>	<b>Micro-hydro</b>
9	CFLs – direct	9	Loft insulation (professional)
<b>10</b>	<b>Micro-Hydro</b>	10	Heating controls – extra
11	Solid wall insulation	11	CFLs – direct
12	Heating controls – extra	12	Solid wall insulation
13	Draught proofing	<b>13</b>	<b>Heat pumps</b>
14	Appliances – Cold	14	Draughtproofing
<b>15</b>	<b>Heat pumps</b>	<b>15</b>	<b>Wood burning stoves (sec)</b>
16	A/B rated boilers (exceptions)	16	Appliances – Cold
<b>17</b>	<b>Wood burning stoves (sec)</b>	17	A/B rated boilers (exceptions)
18	Glazing E to C rated	18	Glazing E to C rated
<b>19</b>	<b>Solar water heating</b>	<b>19</b>	<b>PV</b>
<b>20</b>	<b>PV</b>	<b>20</b>	<b>Micro-Wind</b>
21	Heating controls – upgrade with boiler replacement	<b>21</b>	<b>Solar water heating</b>
<b>22</b>	<b>Micro-Wind</b>	22	Heating controls – upgrade with boiler replacement
23	Appliances – Wet	23	Appliances – Wet

## 5 Micro-generation mixes

**Table 15: Number of micro-generation installations**

<b>Measures</b>	<b>Priority Group</b>	<b>Non-priority group</b>	<b>Total</b>
Wood burning stoves (secondary)	6,000	6,000	12,000
Biomass boilers (primary)	10,000	20,000	30,000
Photovoltaic panels (2.5 kWp)	0	2,000	2,000
Solar water heater (4m <sup>2</sup> )	20,000	20,000	40,000
Micro-wind (1 kWp, 10% LF)	1,000	6,000	7,000
Micro hydro (0.7kWp, 50% LF)	0	2,000	2,000
Heat pumps	14,000	14,000	28,000
<b>TOTAL</b>	<b>51,000</b>	<b>70,000</b>	<b>121,000</b>

Deadweight figures have been taken from the EST report for the DTI “Potential for Microgeneration”, November 2005.

## 6 Results

Number of microgen installations in priority group	51,000		
Number of microgen installations in non-priority group	70,000		
Total number of microgen installations	121,000		
Capital cost of microgeneration to householders in the priority group	0	£m	
Capital cost of microgeneration to householders in the non-priority group	195	£m	
Cost of microgen to supplier for priority group installations	115	£m	
Cost of microgen to supplier for non-priority group installations	100	£m	
Total cost of microgen to supplier	215	£m	
Total costs of EEC to suppliers	2531	£m	
Proportion of suppliers' costs that come from microgen	8.5%		
Carbon savings from microgen (priority group)	0.68	MtC/lifetime	
Carbon savings from microgen (non-priority group)	1.22	MtC/lifetime	
Total lifetime carbon savings from microgen	1.90	MtC/lifetime	
Total lifetime carbon savings from EEC3	42.05	MtC/lifetime	
Percentage lifetime carbon savings from microgen	4.5%		no discount, no comfort taking
Carbon savings/ year from microgen, priority group	0.033	MtC/yr	
Carbon savings / yr from microgen, non-priority group	0.054	MtC/yr	deadweight subtracted
Total carbon savings per year from microgen	0.09	MtC/yr	
Total carbon savings per year, all measures	1.08	MtC/yr	
Percentage of annual carbon savings from microgen	8.2%		

## 7 Conclusions

Initial analysis suggests that microgeneration can contribute to the reduction of carbon emissions in the household sector under EEC3. Scenario IV suggests that 8.2% of the annual carbon savings under EEC3 could be achieved from microgeneration at a cost of 8.5% of the total budget for suppliers. However, microgeneration measures remain much more expensive for the householder than other measures and their installation under EEC3 may depend upon householders being persuaded to pay. The analysis presented here assumes that housing associations or local government will contribute to funding microgeneration in the PG.

## Glossary

3-bed semi	3-bedroom semi-detached house
BRE	Building Research Establishment
BREDEM	Building Research Establishment Domestic Energy Model
CERT	Carbon Emission Reduction Target, also known as EEC3
CFL	Compact Fluorescent Light
CHP	Combined Heat and Power
CWI	Cavity Wall Insulation
DIY	Do-it-yourself
DTI	Department for Trade and Industry
DWP	Department for Work and Pensions
EEC1	Energy Efficiency Commitment 2002-05
EEC2	Energy Efficiency Commitment 2005-08
EEC3	Energy Efficiency Commitment 2008-11, also known as CERT
EHCS	English House Condition Survey
ESD	Energy for Sustainable Development Limited
EST	Energy Saving Trust
FRS	Family Resources Survey
GSHP	Ground Source Heat Pump
HMRC	Her Majesty's Revenue and Customs
iDTV	integrated Digital Television
kgC	kilogramme of carbon
kW	kilo watt
kWh	kilo watt hours
kWp	kilo watt peak
LF	Load Factor
LI	Loft Insulation
m-CHP	micro-CHP
m-Hydro	micro-Hydro
m-Wind	micro-Wind
MtC	Million tonnes of carbon
MW	Mega watt
MWh	mega watt hours = 1000 kWh
non-PG, NP,	Others – non-Priority Group
Ofgem	Office for gas and electricity markets
p.a.	per annum
PG	Priority Group
prim	primary (heating system)
prof	professional
PV	Photovoltaic panels
sec	secondary (heating system)
SWH	Solar Water Heating
SHCS	Scottish House Condition Survey
tC	tonne of carbon
VAT	Value added tax
WHCS	Welsh House Condition Survey
yr	year

# Annex 2

Draft Electricity and Gas (Carbon Emissions Reduction) Order 2007

*Draft Order laid before Parliament under section 33BC(12) of the Gas Act 1986, section 41A(12) of the Electricity Act 1989 and 103(5) of the Utilities Act 2000 for approval by a resolution of each House of Parliament.*

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D R A F T   S T A T U T O R Y   I N S T R U M E N T S

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**2007 No.XXX**

**ELECTRICITY**

**GAS**

**The Electricity and Gas (Carbon Emissions Reduction) Order  
2007**

*Made* - - - - - \*\*\*

*Coming into force* - - - - - \*\*\*

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- SCHEDULE 1 — MEANING OF HOUSEHOLDER
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The Secretary of State makes this Order in exercise of the powers conferred by section 33BC of the Gas Act 1986(a), section 41A of the Electricity Act 1989(b) and section 103 of the Utilities Act 2000(c).

The Secretary of State has consulted the Gas and Electricity Markets Authority, the Gas and Electricity Consumer Council, electricity distributors, electricity suppliers, gas transporters, gas suppliers and such other persons as he considers appropriate.

A draft of this instrument has been approved by a resolution of each House of Parliament pursuant to sections 33BC(12) of the Gas Act 1986, 41A(12) of the Electricity Act 1989 and section 103(5) of the Utilities Act 2000.

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(a) 1986 c.44. Section 41A was substituted for s.41 by s.70 of the Utilities Act 2000 (c.27).  
(b) 1989 c.29. Section 33BC was inserted (as s.33BB) by s.10(1), Schedule 3, paragraph 6 of the Gas Act 1995 (c.45). Substituted (and renumbered as s.33BC) by s.99 of the Utilities Act 2000.  
(c) 2000 c.27.

# PART 1

## Introduction

### Citation and commencement

1. This Order may be cited as the Electricity and Gas (Carbon Emissions Reduction) Order 2007 and comes into force on xxth xxx 2007.

### Interpretation

2. In this Order—

“carbon emissions reduction obligation” means the reduction in carbon emissions a supplier must achieve in the obligation period;

“carbon emissions reduction target” means the target for the reduction in carbon emissions stated in article 3(1);

“demonstration qualifying action” has the meaning given by article 8(3);

“domestic customer” means an owner or occupier of domestic premises in Great Britain who is supplied with electricity or gas at those premises wholly or mainly for domestic purposes;

“energy” means energy from biomass, coal, electricity, gas, geothermal sources, liquid petroleum gas, oil, solar power, water or wind;

“householder” has the meaning given in Schedule 1;

“market transformation qualifying action” has the meaning given by article 8(4);

“new supplier” has the meaning given in article 4(2);

“notification” means notification in writing and includes notification by electronic mail or facsimile;

“obligation period” has the meaning given in article 5(3) or 5(4);

“priority group” means persons who—

- (a) use energy in domestic premises wholly or mainly for domestic purposes;
- (b) are in receipt of at least one of the benefits described in paragraph 2 of Schedule 2 to this Order; or
- (c) are in receipt of at least one of the credits described in paragraph 3 of Schedule 2 and whose relevant income is £15,592 or less (where “relevant income” has the same meaning as in Part 1 of the Tax Credits Act 2002(a));

“qualifying action” means an action falling within article 9;

“specified reduction” has the meaning given in article 14(3).

“supplier” has the meaning given by article 4.

## PART 2

### Carbon emissions reduction target and carbon emissions reduction obligations

#### Carbon emissions reduction target

3.—(1) The carbon emissions reduction target for the period 1st April 2008 to 31st March 2011 is [x].

(2) The Authority must ensure that the sum of all carbon emissions reduction obligations imposed on suppliers equals this target.

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(a) 2002 c.21.

## Supplier

4.—(1) A person is a supplier if—

- (a) he is—
  - (i) an electricity supplier for the purposes of Part I of the Electricity Act 1989, or
  - (ii) a gas supplier for the purposes of Part I of the Gas Act 1986; and
- (b) on 31st December of the years 2007, 2008 or 2009, he supplies electricity or gas to at least 50,000 customers (including those supplied by its holding company or subsidiary or by a subsidiary of any holding company).

(2) A new supplier is a supplier to whom sub-paragraph (1)(b) applies only on 31st December 2008 or 2009.

(3) Where a person satisfies paragraph (1) both in respect of the supply of electricity and the supply of gas, he is to be treated as a separate supplier in respect of each supply.

(4) A supplier must notify the Authority by—

- (a) 14th January 2008; and
- (b) each anniversary of that date,

of the number of its domestic customers on the previous 31st December.

(5) A supplier who ceases to be a supplier after 31st December 2007 but who continues to hold a supply licence under section 6(1)(d) of the Electricity Act 1989 or section 7A of the Gas Act 1986 must continue to be treated as a supplier.

(6) In sub-paragraph (1)(b), “holding company” and “subsidiary” have the same meaning as in sections 1159 and 1160 of, and Schedule 6 to, the Companies Act 2006(a).

## Determining carbon emissions reduction obligations

5.—(1) The Authority must determine a supplier’s carbon emissions reduction obligation.

(2) The Authority must refer to the matters in article 6 when determining the obligation.

(3) The obligation period—

- (a) commences on 1st April 2008, except for a new supplier; and
- (b) ends on 31st March 2011.

(4) For a new supplier who satisfies article 4(1)(b) on—

- (a) 31st December 2008, the obligation period commences on 1st April 2009;
- (b) 31st December 2009, the obligation period commences on 1st April 2010.

(5) The Authority must notify a supplier of its carbon emissions reduction obligation by 31st January prior to the commencement of the obligation period.

## Matters to be considered by the Authority

6.—(1) The matters referred to in article 5(2) are—

- (a) the carbon emissions reduction target;
- (b) total customer numbers; and
- (c) supplier customer numbers.

(2) For a supplier, except a new supplier—

- (a) total customer numbers are the total number of domestic customers supplied on 31st December 2007;

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(a) 2006 c.46.

- (b) supplier customer numbers are the number of domestic customers supplied on 31st December 2007.
- (3) For a new supplier—
  - (a) total customer numbers are the mean of the total number of domestic customers supplied by suppliers on 31st December 2007 and on each anniversary of that date;
  - (b) supplier customer numbers are the mean of—
    - (i) the number of domestic customers supplied by the supplier on 31st December prior to the commencement of the obligation period; and
    - (ii) zero for each 31st December prior to that date until 31st December 2007.

**Review of obligation by Authority**

7.—(1) On receipt from all suppliers of the information required under article 4(4), the Authority must—

- (a) review a supplier’s carbon emissions reduction obligation; and
- (b) notify a supplier of any amendment to its obligation by 31st January immediately following the review.

(2) The review must be carried out by reference to—

- (a) the carbon emissions reduction target;
- (b) the mean of the total number of domestic customers supplied by suppliers on 31st December 2007 and on each anniversary of that date; and
- (c) supplier customer numbers.

(3) Supplier customer numbers are the mean of the number of domestic customers supplied by a supplier on—

- (a) 31st December prior to the commencement of the obligation period;
- (b) for a new supplier, each 31st December prior to that date since 31st December 2007; and
- (c) each 31st December subsequent to the commencement of the obligation period.

(4) For the purposes of paragraph (3), where the number of domestic customers on 31st December is less than 50,000, the number is deemed to be zero.

**PART 3**

**Qualifying actions and carbon emissions reductions**

**Achievement of carbon emissions reduction obligations**

8.—(1) A supplier must achieve its carbon emissions reduction obligation by promoting qualifying actions.

(2) If a supplier promotes—

- (a) demonstration qualifying actions;
- (b) market transformation qualifying actions,

no more than 5% of its carbon emissions reduction obligation may be achieved by these actions.

(3) A demonstration qualifying action is an action—

- (a) which may reasonably be expected to promote a reduction in carbon emissions; and
- (b) is approved by the Authority under article 11(2).

(4) A market transformation qualifying action is an action which the Authority—

- (a) did not approve as a qualifying action under the Electricity and Gas (Energy Efficiency Obligations) Order 2001<sup>(a)</sup>; and
- (b) is approved by the Authority under article 11(2).

### **Qualifying actions**

- 9.** A qualifying action is an action which—
- (a) a supplier has notified to the Authority under article 10; and
  - (b) the Authority approves under article 11.

### **Notification of intention to promote actions**

- 10.**—(1) A supplier must notify the Authority of an action that it intends to promote.
- (2) A supplier must inform the Authority how the intended action—
- (a) will promote a reduction in carbon emissions and, if appropriate, how it would amount to a market transformation qualifying action; or
  - (b) would amount to a demonstration qualifying action.
- (3) The information required in relation to a demonstration qualifying action must include—
- (a) how the action is expected to promote a reduction in carbon emissions;
  - (b) how the supplier will—
    - (i) determine whether the action has reduced carbon emissions; and
    - (ii) assess the effectiveness of the action at promoting a reduction in carbon emissions;
  - (c) the estimated cost of promoting such an action and a breakdown of that cost.

### **Approval of actions by the Authority**

- 11.**—(1) Paragraph (2) applies where a notice has been received under article 10.
- (2) The Authority must approve an action as qualifying towards a supplier's carbon emissions reduction obligation if the Authority is satisfied that the action falls within paragraph (3).
- (3) An action referred to in paragraph (2) must be promoted by a supplier for the purpose of—
- (a) achieving improvements in energy efficiency;
  - (b) increasing the amount of electricity generated or heat produced by microgeneration;
  - (c) increasing the amount of heat produced by any plant—
    - (i) which relies wholly or mainly on biomass; and
    - (ii) the capacity of which to produce heat does not exceed 3 megawatts thermal; or
  - (d) reducing energy consumption.
- (4) The Authority must not approve—
- (a) a demonstration qualifying action unless it is satisfied that—
    - (i) suitable monitoring arrangements will be put in place to assess its effectiveness at promoting a reduction at reducing carbon emissions; and
    - (ii) the breakdown of costs for promoting the action are reasonable and accurate;
  - (b) a market transformation qualifying action unless it is satisfied that the particular action will achieve a significantly greater reduction in carbon emissions than a similar qualifying action of that type.
- (5) The Authority must notify the supplier of its decisions under this article and give reasons for those decisions.

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<sup>(a)</sup> S.I. 2001/4011, as amended by S.I. 2003/1180.

(6) In this article—

- (a) microgeneration has the same meaning as in section 26 of the Climate Change and Sustainable Energy Act 2006<sup>(a)</sup>; and
- (b) plant includes any equipment, apparatus or appliance.

### **Carbon emissions reductions**

**12.**—(1) Where the Authority approves—

- (a) a qualifying action, except a demonstration qualifying action, it must estimate the carbon emissions which will be reduced by that action;
- (b) a demonstration qualifying action, it must determine the amount of carbon emissions which will be reduced by that action [by reference to [translation factor]]  
and notify the supplier of that estimate or determination.

(2) In making that estimate or determination, the Authority must apply the appropriate carbon co-efficient values, set out in Schedule 3, to the qualifying action.

(3) Where the Authority approves a market transformation qualifying action, it must attribute to that action an estimated reduction in carbon emissions under paragraph (1) which is 50% higher than it would attribute to a qualifying action of that type which is not so approved.

## **PART 4**

### **Priority group obligations**

#### **Priority group obligations**

**13.**—(1) A supplier must achieve the priority group obligation.

(2) The priority group obligation means at least—

- (a) [40%]; or
- (b) such lower percentage (but no less than 35%) approved by the Authority under article 14, of the carbon emissions reduction obligation is achieved by qualifying action carried out in the priority group.

#### **Flexibility in priority group obligations**

**14.**—(1) A supplier may apply to the Authority to reduce its priority group obligation.

(2) A reduction in the priority group obligation is conditional on the supplier achieving—

- (a) its carbon emissions reduction obligation; and
- (b) the additional carbon emissions reduction achieved by the specified reduction approved by the Authority under article 15.

(3) A specified reduction means a reduction in carbon emissions achieved by an action or actions—

- (a) listed in paragraph (4);
- (b) with values for the reduction in carbon emissions stated in paragraph (5); and
- (c) promoted to a householder in the priority group whose property is not supplied with gas through pipes.

(4) The actions referred to in paragraph (3) are the installation of—

- (a) biomass boilers;

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(a) 2006 c.19.

- (b) ground source heat pumps; and
- (c) solid wall insulation.

(5) The values referred to in paragraph (3) are—

- (a) a biomass boiler is worth [X tonnes of carbon];
- (b) a ground source heat pump is worth [X tonnes of carbon];
- (c) a single installation of solid wall insulation is worth [X tonnes of carbon].

### **Applications to reduce priority group obligations**

**15.**—(1) A supplier must include in its application to reduce its priority group obligation—

- (a) the percentage reduction sought in the priority group obligation;
- (b) the supplier's calculation of the relevant priority group reduction;
- (c) the specified reduction and how the supplier intends to achieve it; and
- (d) how the supplier will achieve its carbon emissions reduction obligation if the application is approved.

(2) The relevant priority group reduction means the reduction in carbon emissions represented by the percentage reduction sought in the priority group obligation.

(3) The Authority must approve an application if it is satisfied that—

- (a) the information supplied under paragraph (1) is accurate; and
- (b) the specified reduction is equivalent to the relevant priority group reduction.

(4) The Authority must notify the supplier whether or not it approves the application.

(5) If the application is approved, the Authority must notify the supplier of the amended priority group obligation which will apply if the specified reduction is achieved.

(6) A specified reduction approved by the Authority under this article does not count towards the supplier's carbon emissions reduction obligation.

## **PART 5**

### **Reporting and monitoring**

#### **Reporting and monitoring**

**16.**—(1) A supplier must provide to the Authority in writing information relating to—

- (a) its proposals for complying with any aspect of its carbon emissions reduction obligation;
- (b) whether it has complied with that obligation; and
- (c) a specified reduction approved under article 15,

in such form and at such time as the Authority may reasonably request in writing.

(2) Where a supplier promotes a demonstration qualifying action it must provide to the Authority—

- (a) monitoring information; and
- (b) an assessment of the effectiveness of such action,

in such form and at such time as the Authority may reasonably request in writing.

(3) Information provided under paragraph (2) may be published by the Authority in such form as it thinks fit.

(4) By 31st July 2009 and 31st July 2010 the Authority must submit to the Secretary of State a report setting out in respect of the year ending on the preceding 31st March the progress made—

- (a) by each supplier towards complying with its—

- (i) carbon emissions reduction obligation;
  - (ii) priority group obligation; and
- (b) towards achieving the carbon emissions reduction target.

## PART 6

### Excess actions, final calculations, determination and reporting

#### Credit of excess actions

**17.**—(1) Not later than 30th April 2008, a supplier may apply to the Authority to credit towards its carbon emissions reduction obligation the reduction in carbon emissions achieved by excess action.

(2) Excess action means the number of qualifying actions—

- (a) approved by the Authority under the Electricity and Gas (Energy Efficiency Obligations) Order 2004(a) (“the 2004 Order”); and
- (b) which exceeded that required by the supplier to meet its energy efficiency obligation under the 2004 Order.

(3) The reduction in carbon emissions achieved by excess action must be calculated in accordance with this Order.

(4) The Authority must approve the application if it is satisfied that the supplier—

- (a) has met its energy efficiency obligation under the 2004 Order; and
- (b) has excess action.

#### Final calculations of reductions in carbon emissions

**18.**—(1) A supplier must notify the Authority not later than 30th April 2011 of the number and type of qualifying actions which it has completed—

- (a) in the priority group; and
- (b) otherwise than in the priority group.

(2) On receipt of that notification, the Authority must determine, except in the case of a demonstration qualifying action, the reduction in carbon emissions that should be attributed to those actions.

(3) In making that determination, the Authority must apply the appropriate carbon co-efficient values, set out in Schedule 3, to the qualifying action.

(4) If appropriate, a supplier must notify the Authority not later than 30th April 2011 how it has carried out the specified reduction.

#### Final determination and reporting

**19.**—(1) The Authority must determine whether a supplier has achieved its carbon emissions reduction obligation and notify the supplier of that determination not later than 31st July 2011.

(2) Not later than 31st July 2011 the Authority must submit to the Secretary of State a final report setting out whether—

- (a) each supplier has complied with its—
  - (i) carbon emissions reduction obligation;
  - (ii) priority group obligation; and

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(a) S.I. 2004/3392.

- (b) the carbon emissions reduction target was achieved.

## PART 7

### Enforcement

#### Enforcement

20. A requirement placed on a supplier under this Order is a relevant requirement for the purpose of—

- (a) Part I of the Electricity Act 1989; and  
(b) Part I of the Gas Act 1986.

Date *Name*  
Minister of State  
Department for Environment, Food and Rural Affairs

## SCHEDULE 1

Article 2

### MEANING OF HOUSEHOLDER

1. In relation to England and Wales, householder means a person who is—

- (a) a freeholder;  
(b) in the case of England only, a leaseholder with a term of 21 years or more unexpired at the time the specified reduction is promoted; or  
(c) a tenant, including a sub-tenant who has—  
(i) a protected occupancy or statutory tenancy under the Rent (Agriculture) Act 1976(a);  
(ii) a statutory tenancy under the Rent Act 1977(b);  
(iii) a secure tenancy under Part IV of the Housing Act 1985(c) or an introductory tenancy under Chapter I of Part V of the Housing Act 1996(d);  
(iv) a licence to occupy which meets the conditions in paragraph 12(a) and (b) Schedule 1 to the Housing Act 1985(e) (almshouse licences); or  
(v) an assured agricultural occupancy under Part I of the Housing Act 1988(f),  
at the time the action is promoted to him.

2.—(1) In relation to Scotland, householder means a person who is the owner or tenant of a dwelling.

(2) For the purposes of this paragraph—

- 
- (a) 1976 c.80; sections 2 and 3 make provision for protected occupancy and section 4 for statutory tenancy. Section 3 has been amended by section 76(3) of the Housing Act 1980 (c.51) and section 81 of and Schedule 8 to the Civil Partnership Act 2004 (c.33), section 4 by those provisions and section 155 and paragraph 72 of Schedule 23 to the Rent Act 1977 (c.42) and sections 39 and 140 of and Schedule 4 (Part II) and Schedule 18 to the Housing Act 1988 (c.50). Section 5 was last amended by sections 128 and 137 of and Schedule 6 to the Criminal Justice and Police Act 2001 (c.16). There are other amendments to the 1976 Act not relevant to these Regulations.  
(b) 1977 c.42, as last amended by paragraph 94 of Part I of Schedule 4 to the Constitutional Reform Act 2005 (c.4).  
(c) 1985 c.68, as last amended by paragraph 4 of the Schedule to S.I. 2005/1379.  
(d) 1996 c.52, as last amended by paragraphs 256 to 258 of Part 1 of Schedule 4 to the Constitutional Reform Act 2005.  
(e) Paragraph 12 of Schedule 1 to the Housing Act 1985 was amended by section 78(1) of and paragraph 12 of Schedule 6 to the Charities Act 1992 (c.41).  
(f) 1988 c.50, as last amended by paragraph 6 of the Schedule to S.I. 2005/1379.

- (a) “owner” includes any person who under the Land Clauses Acts(a) would be enabled to sell and convey land to promoters of an undertaking;
- (b) “tenant” includes a person who—
  - (i) is a service occupant;
  - (ii) has a licence to occupy a dwelling; or
  - (iii) is a cottar within the meaning of section 12(5) of the Crofters (Scotland) Act 1993(b),  
and, in any case, a sub-tenant.

## SCHEDULE 2

Article 2

### BENEFITS AND CREDITS

**1. In this Schedule—**

“the 1983 Order” means the Naval, Military and Air Forces etc. (Disablement and Death) Services Pensions Order 1983(c);

“the 1983 Scheme” means the Personal Injuries (Civilians) Scheme 1983(d);

“the 1992 Act” means the Social Security Contributions and Benefits Act 1992(e);

“attendance allowance” means—

- (a) an attendance allowance payable under section 64 of the 1992 Act;
- (b) an increase of an allowance payable in respect of constant attendance under a scheme under, or having effect under, paragraph 4 of Schedule 8 to the 1992 Act;
- (c) a payment made under article 14, 15, or 16 of the 1983 Scheme or any analogous payment;
- (d) any payment based on the need for attendance which is paid with a war disablement pension; or
- (e) any payment intended to compensate for the non-payment of a payment, allowance or pension mentioned in any of paragraphs (a) to (d) of this definition;

“constant attendance allowance” means an allowance payable under regulations made under paragraph 7(2)(b) of Schedule 8 to the 1992 Act;

“mobility supplement” means a supplement payable under article 26A of the 1983 Order or under article 25A of the 1983 Scheme (including payment intended to compensate for the non-payment of such a supplement);

“war disablement pension” means—

- (a) any retired pay, pension, or allowance granted in respect of disablement—
  - (i) under powers conferred by or under the Air Forces (Constitution) Act 1917(f), the Personal Injuries (Emergency Provisions) Act 1939(g), the Pensions (Navy, Army,

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(a) Defined in Schedule 1 to the Interpretation Act 1978 (c.30).

(b) 1993 c.44.

(c) S.I. 1983/883; relevant amending instruments are 1983/1116, 1983/1521, 1986/592, 1990/1308, 1991/766, 1992/710, 1993/598, 1995/766, 1996/1638, 1997/286 and 2001/409.

(d) S.I. 1983/686; relevant amending instruments are S.I. 1983/1164, 1983/1540, 1984/1289, 1986/628, 1990/1300, 1991/708, 1992/702, 1995/455, 1997/812 and 2001/420.

(e) 1992 c.4.

(f) 1917 c.51 (7 & 8 Geo. 5).

(g) 1939 c.82 (2 & 3 Geo. 6).

Air Force and Mercantile Marine) Act 1939(a), the Polish Resettlement Act 1947(b) or section 151 of the Reserve Forces Act 1980(c); or

(ii) under article 10 of the 1983 Order;

(b) without prejudice to paragraph (a) of this definition, any retired pay or pension to which any of paragraphs (a) to (f) of sections 64(1) of the Income Tax (Earning and Pensions) Act 2003(d) applies.

2. The benefits relevant for the purposes of paragraph (a) of the definition of the priority group in article 2 are—

- (a) council tax benefit(e);
- (b) housing benefit;
- (c) income support;
- (d) an income-based jobseeker's allowance(f);
- (e) an attendance allowance;
- (f) a disability living allowance(g);
- (g) a war disablement pension which includes—
  - (i) a mobility supplement; or
  - (ii) a constant attendance allowance;
- (h) a disablement pension(h) which includes a constant attendance allowance; and
- (i) state pension credit(i).

3. The credits relevant for the purposes of paragraph (b) of the definition of priority group in article 2 are—

- (a) child tax credit(j); and
- (b) working tax credit.

## SCHEDULE 3

Articles 12(2) and 18(3)

### CARBON CO-EFFICIENT VALUES

<i>Fuel Source</i>	<i>Carbon Co-efficient value</i>
Coal	0.082
Electricity	0.1175
Gas	0.0518
Liquid petroleum Gas	0.0584
Oil	0.068
Wood	0.0068

(a) 1939 c.83 (2 & 3 Geo. 6).

(b) 1947 c.19 (10 & 11 Geo. 6).

(c) 1980 c.9.

(d) 2003 c.1.

(e) Council tax benefit, housing benefit and income support are provided for in Part VII of the 1992 Act.

(f) Jobseeker's allowance is provided for in Part I of the Jobseeker's Act 1995 (c.18); see in particular section 1(4) for a definition of "income-based jobseeker's allowance".

(g) Disability living allowance is provided for in Part III of the Social Security Contributions and Benefits Act 1992 (c.4); see in particular section 71.

(h) Disablement pensions are provided for in Part V of the 1992 Act; see in particular section 103.

(i) State pension credit is provided for in the State Pension Credit Act 2002 (c.16).

(j) Credit tax credit and working tax credit are provided for in Part I of the Tax Credits Act 2002 (c.21).

## **Annex 3**

### **Analysis for CERT flexibility options**

#### **1 Introduction**

The proposals for CERT include several flexibility options for the promotion of innovation and for the priority group. This note describes the underlying analysis for these options particularly with respect to translation factors. Further details about the flexibility options are contained in the relevant sections of the consultation document.

The translation factors for the flexibility options are based on cost assumptions detailed in the Illustrative Mix. The average cost-effectiveness for suppliers is £60.2 per tonne of lifetime carbon saving, or 16.6 kgC for every pound spent.

#### **2 Innovation demonstration option**

It is proposed that a certain ring-fenced part of the target may be used to demonstrate new measures for which the savings are as yet unquantified. Suppliers would be required to submit costed proposals (with various requirements including provisions for monitoring and evaluation) to Ofgem who will, where appropriate, approve them. Suppliers will be credited for this activity according to the value of the project. The proposed basis for the translation factor is the Illustrative Mix average cost-effectiveness for suppliers; in other words for every £60.2 project cost the supplier would be credited with 1 tonne of lifetime carbon saving towards their CERT obligation. For example, a £1M project would give 16.6 ktC. On this basis, 5% of the overall target corresponds to £127M.

#### **3 Priority group flexibility option**

The proposed priority group (PG) flexibility option would allow suppliers to reduce their priority group obligation, but continue to meet their overall carbon obligation, by transferring up to 5% of the total carbon savings from the priority group to the non-priority group, provided that in return certain additional “fuel poverty” measures were delivered. These additional measures would be roughly equivalent to the notional savings to suppliers as it is more costly to deliver measures in the priority group than in the non-priority group.

In order to increase the focus on addressing fuel poverty, the proposal is that these additional measures should be installed in priority group households that are off the gas network and in the private sector. Data from the English House Condition Survey indicates that this would increase the propensity of

fuel poor households from around 15% in the priority group to around 50% in this more focussed group. It is proposed that a supplier could choose from the following specified measures, which are more likely than other carbon saving measures to provide adequately heated homes and remove such households from fuel poverty:

- solid wall insulation
- ground source heat pumps
- biomass boilers.

Other measures were considered. However, micro-CHP is only likely to be installed on the gas grid; micro-wind and PV are not considered to be measures most helpful for those living in fuel poverty as they do not directly contribute to providing adequately heated homes. Solar thermal is discussed in more detail below. Given the focus on off gas network dwellings, fuel switching (that means the installation of gas central heating) is not included.

Since the proposed measures would be installed in the private sector, in this analysis we assume that no local authority funds are available for these additional measures.

In the analysis below we also include solar thermal for comparison.

### 3.1 Cost of measures

In general, in the Illustrative Mix, PG homes are assumed to be slightly smaller than non-PG ones, and therefore to have lower heating requirements. The cost of heating measures is therefore reduced in the “average” PG home.

**Table 1:** Capital cost of measures

Measure	Range of full capital costs	Size adjustment for PG	Range of full capital costs for PG
Solar Thermal	£2,500 - £3,500	100%	£2,500 - £3,500
Solid wall insulation	£3,180	92.5%	£2,941
Biomass boilers if replacing solid fuel central heating	£4,000 - £6000	98.5%	£3,940-£5,910
Biomass boilers if replacing electric storage or non-central heating systems	£5,900-£7,900	98.5%	£5,812-£7,782
Ground source heat pumps (GSHP)	£7,500 - £11,000	88.8%	£6,656 - £10,206

As these measures are aimed at fuel poor households, we would expect that suppliers will have to pay for the full cost of the measures (rather than the marginal costs, as assumed in the Illustrative Mix).

Mid-point estimates of the average capital costs, including installation, are as follows:

**Table 2:** Average capital costs for an average (PG and non-PG) and PG dwelling

	Full capital cost	
	Average	PG
Solar thermal	£3,000	£3,000
Solid wall insulation	£3,180	£2,941
Biomass boilers if replacing solid fuel central heating	£5,000	£4,925
Biomass boilers if replacing non-central heating	£6,900	£6,797
Ground source heat pumps	£9,500	£8,436

### 3.2 Annual savings of measures

Carbon and cost savings vary depending on the heating system in which the measures are installed. For solid wall insulation, these figures take account of comfort taking (15%). The annual benefits are a key element in determining the impact on fuel poverty.

As with investment costs, the savings vary with the size of the dwelling (although not necessarily exactly in the same way) and an adjustments to carbon and cost savings is made for the PG.

**Table 3:** Adjustment to PG savings due to smaller than average dwellings

Solar water heating	100.0%
Solid wall insulation	92.2%
Wood boilers	90.7%
Heat pumps	90.7%

The carbon and cost savings, adjusted for the PG home size are given in

Table 4. These values, together with the range of capital costs, are used to inform the calculation of the PG flexibility option.

**Table 4: Carbon and cost savings for PG homes**

	Solar thermal			Solid wall insulation		
	Percentage installed in properties with each heating system	Cost saving to householder (£/year)	Carbon saving (kgC/year)	Percentage installed in properties with each heating system	Cost saving to householder (£/year)	Carbon saving (kgC/year)
Gas CH	0.00%	n/a	n/a	0.00%	n/a	n/a
Electric storage	38.19%	74	146	38.19%	539	1,069
Oil CH	48.61%	51	102	48.61%	305	607
Solid fuel CH	4.86%	46	168	4.86%	353	1,275
Gas non-CH	0.00%	n/a	n/a	0.00%	n/a	n/a
Electric non-CH	7.64%	123	145	7.64%	524	615
Solid fuel non-CH	0.69%	123	145	0.69%	325	1,178

	Biomass boilers			Heat pumps		
	Percentage installed in properties with each heating system	Cost saving to householder (£/year)	Carbon saving (kgC/year)	Percentage installed in properties with each heating system	Cost saving to householder (£/year)	Carbon saving (kgC/year)
Gas CH	0.00%	n/a	n/a	0.00%	n/a	n/a
Electric storage	10.00%	565	1,612	33.33%	478	1,083
Oil CH	0.00%	188	912	11.11%	142	407
Solid fuel CH	30.00%	183	1,900	22.22%	176	1,412
Gas non-CH	0.00%	n/a	n/a	0.00%	n/a	n/a
Electric non-CH	10.00%	772	1,084	22.22%	605	521
Solid fuel non-CH	50.00%	471	1,929	11.11%	354	1,388

n/a = not applicable – fuel poverty measures will be installed in homes off the gas grid.  
CH = central heating

These figures are used to give weighted carbon and cost savings.

**Table 5: Weighted average cost and carbon savings for PG homes**

	Weighted average annual cost saving to householder (£/year)	Weighted average annual carbon saving (kgC/year)	Lifetime (years)	Weighted average lifetime carbon savings (tC)
Solar thermal	66	126	25	3.14
Solid wall insulation	414	820	30	24.6
Biomass boilers	424	1,804	20	36.1
Heat pumps	388	990	20	19.8

Benefits to the fuel poor households per measure installed are similar for GSHP, solid wall insulation and biomass boilers, being estimated at around £409 per household per year. This would make a real contribution to reducing fuel poverty in those households in which these measures are installed. However, savings per measure per year for solar thermal are on average £66 per household per year. This is because savings are low if solar thermal is installed in oil or solid fuel centrally heated homes. If it is installed only in electrically heated or solid fuel non-centrally heated homes, the savings are somewhat more substantial (£123 per household per year).

Additional carbon savings are broadly similar for GSHP, solid wall insulation and biomass boilers, but are an order of magnitude lower for solar thermal. These two points suggest that perhaps solar thermal should not be included as a “fuel poverty” measure, or that it should be restricted to electrically heated / solid fuel non-centrally heated homes only.

### **3.3 Translation for PG flexibility option**

The notional amount of “money saved” when transferring PG work to the non-PG may be defined in several different ways, for example:

**a)** The difference between the average cost to suppliers per tonne of carbon saved in the PG and in the non-PG, i.e. the Illustrative Mix average cost-effectiveness for suppliers. This assumes that on average the suppliers would swap “averagely cost effective” measures in the PG for “averagely cost-effective measures” in the non-PG.

**b)** The difference between the least cost-effective measures in the PG equivalent to 5% of the target and the average cost of measures in the non-PG. This scenario assumes that the suppliers transfer expensive measures in the PG to average measures in the non-PG.

**c)** The difference between the least cost-effective measures in the PG and in the non-PG, equivalent to 5% of the target. This gives similar results to option **a)**; hence option **c)** is not discussed any further.

The average cost-effectiveness for suppliers for the PG is £80.5/tC while it is £46.6/tC for the non-PG. For scenario **a)**, 5% of the target would therefore correspond to £71.3M. The least cost-effective measures in the PG that make up 5% of the target have an average cost-effectiveness of £147/tC. For option **b)**, this would correspond to additional measures worth £211M.

Table 6 and Table 7 show the translation factors and number of possible installations of fuel poverty measures according to each scenario, respectively. These tables also shows the additional lifetime carbon savings that would be made in each case.

**Table 6:** Translation factors and number of possible measures installed via the flexibility option if used in full for each measure

**Scenario a:** based on average cost differential £/tC in PG and non-PG

<b>Measure</b>	<b>Number of fuel poverty measures (thousands)</b>	<b>Translation factor - tC per fuel poverty measure</b>	<b>Additional lifetime carbon savings (MtC)</b>
Fuel switching	38.2	54.9	0.77
Solid wall insulation	24.2	86.7	0.60
Solar thermal	23.7	88.4	0.07
GSHP	8.5	248	0.17
Biomass boilers	12.2	173	0.44

NB: fuel switching is not a proposed measure, but has been shown for comparison.

**Table 7:** Translation factors and number of possible measures installed via the flexibility option if used in full for each measure

**Scenario b:** based on cost differential – least-cost effective measures in the PG, and average costs in the non-PG

<b>Measure</b>	<b>Number of fuel poverty measures (thousands)</b>	<b>Translation factor - tC per fuel poverty measure</b>	<b>Additional lifetime carbon savings (MtC)</b>
Fuel switching	113	18.5	2.28
Solid wall insulation	71.8	29.3	1.77
Solar thermal	70.4	29.9	0.22
GSHP	25.1	83.9	0.50
Biomass boilers	36.0	58.3	1.30

NB: fuel switching is not a proposed measure, but has been shown for comparison.

**Table 8:** Illustrative Mix of measure for the PG ranked by cost-effectiveness showing the proportion of the carbon target from each measure

Cost-effective Rank	Measure	Lifetime carbon saving per individual measure, including comfort factor (tC)	Illustrative Mix – number of installations	Lifetime carbon savings per category of measure (MtC)	Percentage of PG target	PG installations as a percentage of overall carbon target
1	Loft insulation (DIY)	2.49	75,000	0.187	1.11%	0.44%
2	Appliances - iDTVs	0.04	75,000	0.003	0.02%	0.01%
3	CFLs - retail	0.04	5,280,000	0.206	1.22%	0.49%
4	Tank insulation - top-up	0.54	150,000	0.081	0.48%	0.19%
5	Cavity wall insulation	6.38	1,300,000	8.294	49.21%	19.72%
6	Biomass boilers (prim)	36.09	10,000	0.361	2.14%	0.86%
7	Fuel Switching	20.09	126,000	2.532	15.02%	6.02%
8	Loft insulation (prof)	2.91	1,200,000	3.487	20.69%	8.29%
9	CFLs - direct	0.04	20,000,000	0.779	4.62%	1.85%
10	mHydro	7.21	0	0	0.0%	0.0%
11	SWI	15.92	20,000	0.318	1.89%	0.76%
12	Heating controls - extra	0.82	200,000	0.165	0.98%	0.39%
13	Draughtproofing	0.62	50,000	0.031	0.18%	0.07%
14	Appliances - Cold	0.08	344,174	0.027	0.16%	0.06%
15	Heat pumps	18.05	14,000	0.253	1.50%	0.60%
16	A/B rated boilers (exceptions)	1.06	54,988	0.058	0.35%	0.14%
17	Wood burning stoves (sec)	2.96	6,000	0.018	0.11%	0.04%
18	Glazing E to C rated	0.41	0	0	0.00%	0.00%
19	SWH	2.22	20,000	0.044	0.26%	0.11%
20	PV	6.21	0	0	0.00%	0.00%
21	Heating controls - upgrade with boiler replacement	0.10	50,000	0.005	0.03%	0.01%
22	mWind	1.03	1,000	0.001	0.01%	0.00%
23	Appliances - Wet	0.13	22,680	0.003	0.02%	0.01%

Total lifetime carbon saving of PG measures is 16.9 MtC.

The flexibility option allows for the transfer of 5% of the total carbon target (not 5% of the PG target). This is equivalent to transferring all of the funds for the shaded measures, and a small proportion of the PG loft insulation funds (equivalent to about 136,000 loft installations).

By contrast, if the PG flexibility option was used to the full extent for transferring cavity wall insulation from the PG to the non-PG it would be equivalent to doing about 294,000 CWI installations in the non-PG instead of about 330,000 CWI installations in the PG (in addition to doing fuel poverty measures as described above).

### **3.4 Weighting measures by their annual benefits**

The flexibility option is designed to focus on addressing fuel poverty and one could argue that the measures allowed under this option should be weighted by their likely contribution to that end, e.g. proportional to the annual benefits. As described in Section 3.2, the installation of solid wall insulation, ground source heat pump, or biomass boiler in a house off the gas grid is quite similar and predicted to save around £409 per household per year (for a 3 bed semi-detached PG house). It would therefore be justified to provide the same credit for these measures as they have a similar impact on addressing fuel poverty. This could be based on the solid wall insulation which is expected to be the main measure of the fuel poverty measures and it is also the most cost-effective one of them. We therefore propose that *the same translation factor would apply to all fuel poverty measures. This would be 86.7 tC per measure under scenario a or 29.3 tC per measure under scenario b.*

In contrast to the three measures discussed above, the installation of solar thermal in the same property is predicted to save only around £66 per household per year. In order to maintain the same overall benefits to the fuel poor (as a group), the translation factor would be reduced by a factor of  $409/66 = 6.2$  which effectively increases the number of solar thermal installations by that factor in the flexibility option. However, suppliers' costs would increase by the same factor.

Considering that such a weighting would make this measure much less attractive to suppliers and that the savings are relatively small and therefore less likely to lift a household out of fuel poverty, we are proposing not to include solar thermal in the list of eligible measures for the PG flexibility option.

## **Annex 4**

### **List of consultees**

- 730 Energy Limited
  
- Access Energy Solutions Limited
- Accord Energy Ltd
- AEP Energy Services Limited
- AES Energy Limited
- Affinity Power Limited
- Age Concern England
- Alstom Power Generation Ltd
- Association of Manufacturers of Domestic Appliances (AMDEA)
- Association for the Conservation of Energy/BEEF
- Atlantic Gas Limited
  
- BEAMA Energy
- BizzEnergy Limited
- BizzEnergy@home Limited
- Bord Gais Eireann
- BP Gas Marketing Limited
- BP Power Trading Limited
- British Council for Sustainable Energy (BCSE)
- British Energy Direct Limited
- British Gas Connections
- British Gas Pipelines Limited
- British Gas Trading Limited
- British Rigid Urethane Foam Manufacturers
- British Urethane Foam Contractors Association (BUFCA Ltd )
- British Wind Energy Association
- Broomleigh Housing Association
- Builders Merchants Federation
- Building Research Establishment (BRE)
- Business Energy Solutions Limited
  
- Caboodle Energy Limited
- Cambridge Gas Company Limited
- Carbon Trust
- Cavity Insulation Guarantee Agency (CIGA Agency) / Eurosol

- Caythorpe Gas Storage Limited
- Central Networks East Plc
- Central Networks West Plc
- Centre for Sustainable Energy (CSE)
- Centrica
- Charlotte Russe Holding Inc. (CHIC)
- Chartered Inst. of Water and Env. Man. (CIWEN)
- Chartered Institute of Environmental Health
- Cherwell Energy Limited
- Cinergy Global Trading Limited
- Citigen (London) Limited
- Cofathec Heatsave Ltd
- Combined Heat & Power Association (CHPA)
- Commercial Gas Direct Limited
- Concord Silvania
- Confederation of British Industry
- Consumers Association
- Contract Natural Gas Limited
- Convention of Scottish Local Authorities (COSLA)
- Corona Energy Retail 1 Limited
- Corona Energy Retail 2 Limited
- Corona Energy Retail 3 Limited
- Corona Energy Retail 4 Limited
- Corona Energy Retail 4 Limited
- Council for Energy Efficiency Development (CEED)
- Countrywide Farmers Plc
- CP Gas Limited
- CPL Petroleum Ltd
- Creative Environmental Networks (CEN)
- Credit Lyonnais
- Crown Oil Limited
- Crowthorne Electricity Supply Limited
- Crowthorne Gas Supply Limited
- Cumbria Energy Limited
  
- Data Energy Management Services Limited
- Department of Communities and Local Government (DCLG)
- Distrigas S.A.
- Distrigaz S.A/NV

- Dixons Group Plc
- Dong Naturgas A/S
- Draught Proofing Advisory Association Ltd
- Department of Trade and Industry
- Dysons Insulations Ltd
  
- E.ON UK Gas Limited
- E.ON UK Plc
- Eaga Partnership Ltd
- ECONnergy UK Limited
- Economy Gas Limited
- Economy Power Limited
- EDF Energy Customers Plc
- EDF Energy Networks (EPN) Plc
- EDF Energy Networks (LPN) PLC
- EDF Energy Networks (SPN) PLC
- EDF Trading Limited
- El Paso Merchant Energy Europe Limited
- Electricity 4 Business Limited
- Electricity Direct (UK) Limited
- Electricity Network Company Limited, The
- Electricity Plus Supply Limited
- Energetics Electricity Limited
- Energetics Gas Limited
- Energy Action Scotland (EAS)
- Energy Conservation and Solar Centre (ECSC)
- Energy Data Company Limited
- Energy Efficiency Partnership for Homes
- Energy For Business Limited
- Energy Retail Association
- Energy Saving Trust (EST)
- Energy Supplies Limited
- Energy Supplies UK Limited
- Energy Systems Trade Association
- EnergyCo2 Limited
- energywatch
- English Nature - Kent Team
- Eni UK Limited
- Enizade Ltd

- Enron Capital & Trade Resources Limited
- Enron Direct Limited
- Enron Gas and Petrochemicals Trading Limited
- ES Pipelines Limited
- ESP Connections Limited
- ESP Networks Limited
- ESP Pipelines Limited
- Essential Power Limited
- Euronext Ltd
  
- Federation of Authorised Energy Ratings
- Fellside Heat and Power Limited
- First Utility Limited
- Fortum Direct Limited
- Friends of the Earth
- Fuel Poverty Advisory Group
  
- Gas Plus Supply Limited
- Gascan
- Gas Transportation Company Limited, The
- Gaz de France ESS (UK) Limited
- Gaz de France Marketing Limited
- Gaz de France Sales Limited
- Gaz de France Solutions Limited
- Gazprom Marketing & Trading Limited
- Glass and Glazing Federation
- Global Natural Gas Limited
- Good Energy Limited
- Ground Source Heat Pump Association
- GTC Pipelines Limited
  
- Haven Power Limited
- Heating and Ventilating Contractors' Association
- Help the Aged
- HM Treasury (HMT)
- Housing Corporation
- HydroWingas Limited
  
- ICD Gas Limited
- Immingham CHP LLP

- Independent Pipelines Limited
- Independent Power Networks Limited
- Ineos Chlor Energy Limited
- INEOS Enterprises Limited
- Innogy Cogen Ltd
- Institute of Domestic Heating Engineers
- Institution of Electrical Engineers (IEE)
- Insulated, Render and Cladding Association (INCA)
- International Power Fuel Company Limited
- International Power Plc
- Intoto Utilities Limited
  
- Laing O'Rourke Energy Limited
- Lighting Association
- Lighting Industry Federation Ltd
- Local Government Association (LGA)
- Louis Dreyfus Energy Limited
- Macquarie Bank Limited
- Macquarie Commodities Finance (UK) Limited
- Magnox Electric Limited
- Micropower Council
- Midlands Energy Saving
- Midlands Gas Limited
- Monal Utilities Limited
- Morgan Stanley Capital Group Inc
- Mowlem Energy Limited
  
- National Assembly for Wales
- National Energy Foundation
- National Grid Gas Plc
- National Housing Federation
- National Insulation Association
- National Pensioners Convention
- National Right to Fuel Campaign
- Nationwide Gas Limited
- Natural Gas Shipping Services Limited
- North Sea Gas Limited
- North Wales Gas Limited
- Northern Electric Distribution Limited

- Northern Gas Networks Limited
- Northern Gas Supplies Limited
- Norvic Gas Limited
- Nottingham Energy Partnership
- Npower Cogen Trading Limited
- Npower Commercial Gas Limited
- Npower Direct Limited
- Npower Gas Limited
- Npower Limited
- Npower Northern Limited
- Npower Northern Supply Limited
- Npower Yorkshire Limited
- Npower Yorkshire Supply Limited
  
- Office of Fair Trading
- Office of Gas and Electricity Markets (Ofgem)
- Oil Firing Technical Association (OFTEC)
- Opus Energy Limited
  
- Pan-Utility Limited
- Pennine Natural Gas Limited
- Pentex Oil and Gas Ltd
- People for Action
- Powergen Retail Gas (Eastern) Limited
- Powergen Retail Gas (Northwest) Limited
- Powergen Retail Limited
- Powerrelate Limited
- Premier Petroleum Limited
- Primary Connections Limited
- Public Utilities Access Forum (PUAF)
  
- Quadrant Pipelines Limited
  
- R S Energy Limited
- Ravenheat Manufacturing Ltd
- Regent Gas Limited
- Renewable Energy Association
- Renewable Energy Company Ltd
- RJB Mining (UK) Ltd
- RLtec

- Rotating Electrical Machines Association
- Royal Society for the Protection of Birds
- Ruhrgas Aktiengesellschaft
- RWE Npower Plc
- RWE Trading GmbH
  
- Saturn Gas Limited
- Scotland Gas Networks Plc
- Scottish Executive
- Scottish Federation of Housing Associations
- Scottish Hydro Electric Gas Limited
- Scottish Hydro Electric Power Distribution Plc
- Scottish Power Energy Retail Limited
- Seeboard Energy Gas Limited
- SEEBOARD Energy Limited
- Sempra Energy Europe Limited
- Sentinel Housing Group
- SHAL Housing Ltd
- Shell Gas Direct Limited
- SHELTER Scotland
- Slough Energy Supplies Limited
- Small Business Service
- SmartestEnergy Limited
- SME Energy Limited
- Society of British Gas Industries
- Solar Trade Association
- Solid Fuel Association
- South Wales Electricity Limited
- Southern Counties Fuels Limited
- Southern Electric Gas Limited
- Southern Electric Power Distribution Plc
- Southern Gas Limited
- Southern Gas Networks Plc
- SP Distribution Limited
- SP Gas Limited
- SP Manweb Plc
- Sport Energy
- SSE Energy Limited
- SSE Energy Supply Limited

- SSE Pipelines Limited
- Standard Bank London Limited
- Star Energy Gas Storage Services Limited
- Star Energy Oil and Gas Limited
- Statoil (UK) Limited
- Statoil Gas Trading Limited
- Sustain Ltd
- Sustainable Development Commission
- SWALEC Gas Limited
- SWEB Energy Limited
  
- Team Gas and Electricity Limited
- Telecom Plus PLC
- Tonbridge & Malling Borough Council
- Total Energy Gas Supplies Limited
- Total Gas & Power Limited
- Total Gas Marketing Limited
- Totalfinaelf Gas Limited
- Tradelink Solutions Limited
- Trafigura Energy Ltd
- TXU Europe (AHG) Limited
- TXU Europe (AHGD) Limited
  
- UK HECA Secretariat (requested)
- UK Utilities (Gas) Limited
- United Utilities Electricity Plc
- Utilita Electricity Limited
- Utilita Gas Limited
- Utilitease Limited
- Utility Grid Installations Limited
- Utility Link Ltd
  
- Vitae Energy Limited
- Vitol Gas Limited
- Vitol S.A.
  
- Wales & West Utilities Limited
- Welsh Local Government Association
- Western Gas Limited
- Western Power Distribution (South Wales) Plc

- Western Power Distribution (South West) Plc
- Wilton Energy Limited
- WINGAS GmbH
  
- Yorkshire Electricity Distribution Plc
  
- Zest4 Gas Limited