Energy Act 2011

Green Deal Impact Assessment

CONTENTS

Impact Assessment for the Green Deal elements of the Energy & Climate Change Bill **Lead department or agency:** **Other departments or agencies:**	**Impact Assessment (IA)** **IA No: DECC**0015 **Date:** 09/12/2010 **Stage:** Final for Primary Legislation / Development for Secondary Legislation **Source intervention:** Domestic **Contact for enquiries:** Peter Roscoe 0300 068 5026, peter.roscoe@decc.gsi.gov.uk

Summary: Intervention and Options

What is the problem under consideration? Why is government intervention necessary?
The UK is committed to achieving a 34% reduction in its CO2e emissions by 2020 relative to 1990 and at least an 80% reduction by 2050. There remains a considerable amount of cost effective abatement potential from energy efficiency measures in the domestic and business sectors which, if taken up, will mean that Carbon Budgets are met at a lower overall cost to society. Government intervention is needed to correct market failures and overcome financial and behavioural barriers that act to reduce the take-up of this abatement, while ensuring that equity considerations are adequately addressed.

What are the policy objectives and the intended effects?
To improve the energy efficiency of the existing building stock in the UK, including households and non-domestic properties, in order to reduce greenhouse gas emissions cost-effectively and fairly, contributing to our legally binding targets and improving the security of UK energy supply. It aims to do this by: providing a framework that offers access to accredited assessments and installations of measures; removing up-front costs with a new financing mechanism linked to energy bills; extending the Energy Company Obligation to maximize cost-effective energy efficiency savings and support the most vulnerable users; and, to regulate to enable owners and tenants in the private rented sector to benefit from improved energy efficiency.

What policy options have been considered? Please justify preferred option (further details in Evidence Base)
This overarching Impact Assessment presents illustrative scenarios (Low and High) of the potential impacts from the combination of primary and secondary legislation. Secondary legislation has not yet been developed, so the impacts presented here are only illustrative and in no way pre-empt policy decisions that have not yet been made. No particular scenario is considered more likely than any other. Individual sections within this Impact Assessment consider the instruments set out in primary legislation in the Energy & Climate Change Bill which will enable the delivery of the Government's objectives. These sections cover Green Deal Finance arrangements; the accreditation of Green Deal Assessors and Installers; new Energy Company Obligations to deliver thermal efficiency equitably and to provide information on the Green Deal; and the mandating of action by landlords in the private rented sector to carry out energy efficiency investments. Please refer to individual sections within this Impact Assessment for a consideration of the options relating to each section of legislation.

When will the policy be reviewed to establish the actual cost and benefits and the achievements of the policy objectives?	**Secondary legislation will be subject to consultation and further impact assessments.**
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	**These will be developed alongside secondary legislation**

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: 1/06/2011**

Summary: Analysis and Evidence
Description: Green Deal Overarching Impacts

Price Base Year 2010	PV Base Year 2010	Time Period Years 52	Net Benefit (Present Value (PV)) (£m)		
			Low: 8,000	High:12,000	Best Estimate: -

COSTS (£m)	Total Transition (Constant Price)		Average Annual (excl. Transition)	Total Cost (Present Value)
Low	-	-	-	15,000
High	-		-	21,000
Best Estimate	-		-	-

Description and scale of key monetised costs by 'main affected groups'
Direct impacts from the proposed primary powers are likely to be negligible at this stage. Secondary legislation will set out the details of the Green Deal Programme. This overarching development stage impact assessment (for secondary powers) considers illustrative scenarios for the full Green Deal, i.e. including primary and illustrative secondary legislation approaches. The high and low numbers presented are illustrative estimates of varying consumer uptake that could occur after primary and secondary legislation have been passed. They are not forecasts as the detail of the policy and secondary legislation is still to be determined. The high and low estimates do not reflect varying energy and carbon prices (for more detail on energy price sensitivities see annex 5).

Other key non-monetised costs by 'main affected groups'
No direct impacts from primary legislation. See individual sections in this IA for a discussion of potential costs arising from secondary legislation.

BENEFITS (£m)	Total Transition (Constant Price)		Average Annual (excl. Transition)	Total Cost (Present Value)
Low	-	-	-	23,000
High	-		-	33,000
Best Estimate	-		-	-

Description and scale of key monetised benefits by 'main affected groups'
See aggregate costs and benefits section for more details. The high and low numbers presented are illustrative estimates of varying consumer uptake that could occur after primary and secondary legislation have been passed. They are not forecasts as the detail of the policy and secondary legislation is still to be determined. The high and low estimates do not reflect varying energy prices (for more detail on energy price sensitivities see annex 5).

Other key non-monetised benefits by 'main affected groups'
Health benefits for vulnerable groups whose houses improve in terms of their thermal efficiency; air quality benefits associated with reduced energy consumption; security of UK energy supply improved as a result of lower energy consumption.

Key assumptions/sensitivities/risks
The analysis presented in the illustrative scenarios is subject to a very high degree of uncertainty. Secondary legislation has not yet been developed, so the scenarios should not be seen as pre-empting the final outcome of policy development. In addition, the evidence on which the analysis is based is subject to uncertainty. Take-up of Green Deal Finance will depend on the way in which consumers react to the changes proposed in this Bill. These changes will increase the trust that consumers have in the information they receive, increase the availability of credit and improve the way in which energy efficiency investments are perceived. The responses of consumers are currently not well understood.

Impact on admin burden (£m):			Impact on policy costs (£m):			In scope
Costs: 0	Benefit: 0	Net: 0	Costs: 0	Benefits: 0	Net: 0	Yes/No

What is the geographic coverage of the policy/option?			GB		
From what date will the policy be implemented?			2012/13		
Which organisation(s) will enforce the policy?			n/a		
What is the total annual cost (£m) of enforcement for these organisations?			0		
What is the CO_2 equivalent change in greenhouse gas emissions?			Traded: 0	Non-traded: 0	
Does the proposal have an impact on competition?			Not at primary stage		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			Costs: 0	Benefits: 0	
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	Micro 0	< 20 0	Small 0	Medium 0	Large 0
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any specific impact tests undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, click on the link for the guidance provided by the relevant department. (Double-click to open links in browser.)

	Impact	Page ref within IA
Statutory equality duties[1]? Women Equality Unit: Gender Impact Assessment (PDF) Disability Rights Commission: Disability Equality Scheme DisplayText cannot span more than one line!	Yes	Annex

Economic impacts		
Competition? Competition Impact Assessmentt	Yes	Annex
Small firms? Small Firms Impact Test	Yes	Annex

Environmental impacts		
Carbon emissions? http://www.defra.gov.uk/environment/index.htm	Yes	Annex
Wider environmental issues? Guidance has been created on the Defra site	Yes	Annex

Social impacts		
Health and well-being? Health: Health Impact Assessment	Yes	Annex
Human rights? Ministry of Justice: Human Rights	Yes	Annex
Justice?	Yes	Annex
Rural proofing? Commission for Rural Communities	Yes	Annex

Sustainability? Defra: Think sustainable	Yes	Annex

[1] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2010, once the Equalities Bill comes into force.

Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in References section.

References

Include the links to relevant legislation and publications, such as public impact assessment of earlier stages (e.g. Consultation, Final, Implementation).

No.	Legislation or publication
1	**The Energy Bill http://www.decc.gov.uk/en/content/cms/legislation/energy_bill/energy_bill.aspx**
2	**Consultation on proposed amendments to the Carbon Emissions Reduction Target 2008-2011 http://www.decc.gov.uk/en/content/cms/consultations/open/cert/cert.aspx**
3	**extending the Carbon Emissions Reduction Target supplier obligation to December 2012 http://www.decc.gov.uk/en/content/cms/consultations/cert_ext/cert_ext.aspx**
4	**Consultation on Community Energy Saving Programme (CESP) http://www.decc.gov.uk/en/content/cms/consultations/open/cesp/cesp.aspx**
5	**Planning Act 2008 http://webarchive.nationalarchives.gov.uk/+/http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyimplementation/reformplanningsystem/planningbill/**
6	**Climate Change Act 2008, http://www.decc.gov.uk/en/content/cms/legislation/cc_act_08/cc_act_08.aspx**
7	**Household Energy management strategy http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/hem/hem.aspx**

+ Add another row

Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the Annual profile of monetised costs and benefits (transition and recurring) below over the life of the policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains a saving emissions table that you will need to fill in if your measure has an impact on Carbon emissions.

Annual profile of monetised costs and benefits* - (£m) constant prices

High Scenario – Domestic Sector only

	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9
Transition costs	-	-	-	-	-	-	-	-	-	-
Annual recurring cost	-	-	-	-	-	-	-	-	-	-
Total annual costs	1,666	1,982	2,285	2,439	2,566	3,061	3,450	3,833	1,104	1,666
Transition benefits	-	-	-	-	-	-	-	-	-	-
Annual recurring	-	-	-	-	-	-	-	-	-	-
Total annual benefits	175	350	532	711	898	1,108	1,325	1,575	1,591	1,621

* For non-monetised benefits please see summary pages and main evidence base section, Detailed information for the impacts on the non-domestic sector is not available.

Low Scenario – Domestic Sector only

	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9
Transition costs	-	-	-	-	-	-	-	-	-	-
Annual recurring cost	-	-	-	-	-	-	-	-	-	-
Total annual costs	917	744	726	1,178	1,730	2,191	2,911	3,201	837	837
Transition benefits	-	-	-	-	-	-	-	-	-	-
Annual recurring	-	-	-	-	-	-	-	-	-	-
Total annual benefits	115	191	266	353	477	632	820	1,028	1,039	1,058

* For non-monetised benefits please see summary pages and main evidence base section, Detailed information for the impacts on the non-domestic sector is not available.


Microsoft Office
Excel Worksheet

EVIDENCE BASE

Distinction between the Impacts of Primary and Secondary Legislation

1. This development stage impact assessment presents two illustrative scenarios (Low and High) of the potential impact of the Green Deal policy as a whole, including both primary and secondary legislation. This has been done to aid Parliamentary debate. However, it should be noted that secondary legislation has not yet been developed. The illustrative scenarios presented in this Impact Assessment should be seen only as indicative of the broad scope of potential outcomes and in no way pre-empt the detail of the secondary legislation. For example, the design, scope and ambition of the new Energy Company Obligation (ECO) has yet to be developed and decisions to inform development of secondary legislation have not yet been taken.

2. It should also be noted that all the costs and benefits associated with the Green Deal are expected to result from secondary legislation.

Problem Under Consideration

3. Under the Climate Change Act 2008, a system of legally binding carbon budgets has been established to set the trajectory towards the Government's target to reduce UK greenhouse gas emissions by at least 80% compared to the 1990 baseline by 2050. Each carbon budget lasts five years and the first three, covering the period 2008-2022, were set in May 2009. The fourth budget, which runs from 2023-2027, must be set by 30 June 2011. In order to meet the UK's carbon budgets cost effectively, abatement is required from across all the sectors responsible for emissions. Improvements to energy efficiency in domestic and non-domestic buildings offer substantial cost effective abatement opportunities which, if exploited, can make a significant contribution to making these cuts (see Figure 1[1] - which presents a marginal abatement cost curve for domestic energy efficiency measures).

4. 146 MtCO2e (24%) of UK emissions are generated by the UK domestic building stock[2]. These emissions arise either directly from the burning of fossil fuels for heating or indirectly from electricity consumption. Emissions levels in the domestic (homes and communities) sector have remained relatively unchanged over the last 20 years (see Figure 2 for a summary of the recent history of emissions in the domestic sector). A step change is therefore required over the first three carbon budget periods.

5. The UK also suffers from the poor thermal efficiency of a significant proportion of its housing stock. In 2007 an estimated 22% of the housing stock in England had a SAP energy rating of 40 or below. In conjunction with rising energy prices this has led to an estimated 3.3 million UK households living in fuel poverty in 2008[3]. Of these, 3.25 million households were considered vulnerable to the negative health impacts of living in poorly heated homes[4].

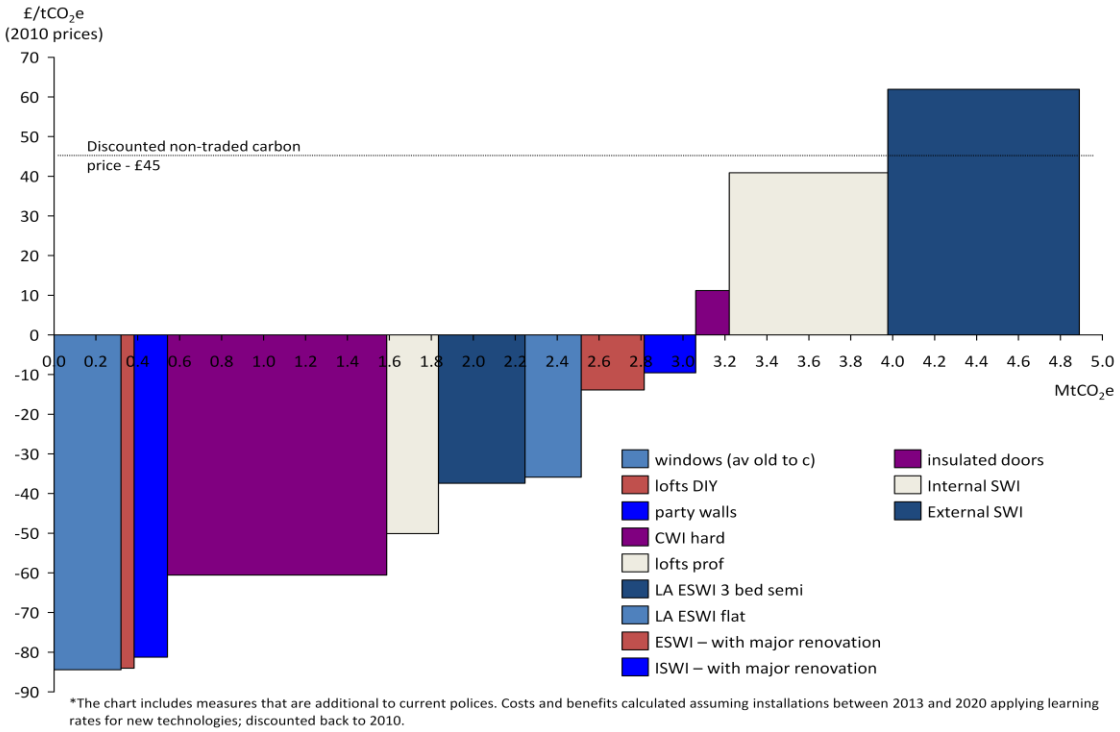
[1] The marginal abatement cost curve has been updated since the last Government publication on household energy efficiency (Warmer Homes, Greener Homes, 2010) to include new estimates of the emissions reductions from solid wall insulation, revised estimates of the amount of lofts and cavities that it would be feasible to insulate and the inclusion of additional energy efficiency measures (glazing, door insulation and party wall insulation).

[2] 84 $MtCO_2e$ in the non-traded sector (as a result of direct fossil fuel use e.g. gas or coal), and 62 $MtCO_2e$ of traded sector emissions (as a result of electricity consumption) that are attributable to households.

[3] http://www.decc.gov.uk/en/content/cms/news/pn10_106/pn10_106.aspx

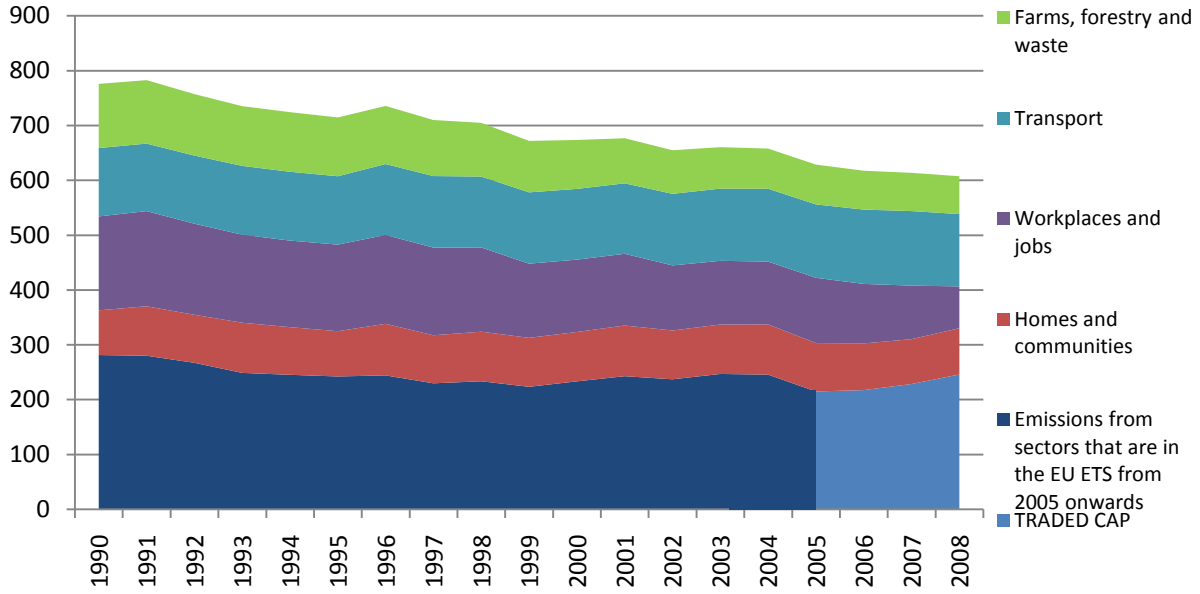
[4] English House Conditions Survey, 2007

FIGURE 1: Domestic energy efficiency non-traded sector marginal abatement cost curve in 2020*



*The chart includes measures that are additional to current polices. Costs and benefits calculated assuming installations between 2013 and 2020 applying learning rates for new technologies; discounted back to 2010.

FIGURE 2: UK territorial emissions (1990 to 2008)[5]



6. The problems outlined above are particularly prevalent in the private rented sector (PRS) which suffers from landlord / tenant incentive incompatibility problems. Landlords face the costs of installing energy efficiency measures while tenants pay the energy bills. The sector contains a substantial proportion of energy inefficient properties. 26% of all dwellings with the lowest Energy Performance Certificate rating (G) are in the private rented sector[6]. 20% of those living in the PRS are in fuel poverty, and they represent 18% of the total number in fuel poverty in the UK[7].

7. There is a justification for intervention where government action can remove barriers or address market failures that are acting to prevent the take up of cost effective energy efficiency measures. The problem for Government is to ensure that it intervenes effectively, whilst not significantly increasing burdens, market distortions or financial pressures on vulnerable groups, energy users or organisations. The box below explains the proposed policy approach and sets out the sub sections of this impact assessment.

[5] Traded sector emissions are those indirectly arising from electricity consumption and are capped at the EU level by the EU Emissions Trading System. Non-traded sector emissions are those falling outside the EU ETS and arise from the direct burning of fossil fuels.
[6] English Housing Survey 2008. The private rented sector represents around 15% of all dwellings.
[7] DECC (2010), "Fuel poverty 2008 – detailed tables. Annex to the annual report on fuel poverty statistics"

Box 1 - What is the Green Deal?

The Energy Bill includes provision for a new "Green Deal" framework which is expected to revolutionise the energy efficiency of British properties.

In a nutshell, the Government is putting in place a framework which will enable private firms to offer consumers energy efficiency improvements to their homes at no upfront cost, recouping payments through energy bills.

At the heart of the Government's proposals is an innovative financing mechanism which allows consumers to pay back through energy bills. This means consumers can see the savings which have been generated on the same bill as the Green Deal charge. The Green Deal differs from conventional lending – it is not a loan since the bill-payer is never liable for the full capital cost of the measures, only the charges which are due whilst they are the bill-payer.

There are a number of important consumer protections which are detailed below. These include the following prerequisites for all Green Deal plans:

1. The *expected* savings must be greater than the costs.
2. The measures must be accredited and the claimed savings must be those approved through this accreditation.
3. The measures installed must have been recommended by an accredited, independent adviser who has assessed the property.
4. The measures must be installed by an accredited installer.
5. The Green Deal provider must take account of the individual circumstances of the consumer and give appropriate advice within the terms of the Consumer Credit Act.
6. The presence of a Green Deal must be properly disclosed to subsequent occupiers including alongside energy performance information.
7. Energy suppliers must collect the Green Deal and pass it on within the existing regulatory safeguards for collecting energy bills – including protections for vulnerable consumers.

This is a market mechanism and there is no Government guarantee that bills will fall for individual consumers – Government cannot control how much energy individuals consume in their own homes. It is right to leave ultimate responsibility with the consumer for reducing consumption after the Green Deal has been installed. Not every household will be able to save on their fuel bills without additional support. Fuel poor households may not save money because many do not have the heating turned on long enough to heat their homes sufficiently, so energy efficiency means they will enjoy warmer homes, not cash savings. Likewise, homes which can only be made energy efficient through major measures which are currently less cost effective, will also need additional support. Alongside Green Deal, the Government is planning to reform the existing energy company obligations (Carbon Emissions Reductions Target, CERT, and Community Energy Saving Programme, CESP) so energy companies are more focused on alleviating fuel poverty and improving solid wall properties.

The sub-sections of this IA, below the overarching section, reflect the elements of the Green Deal. The options for finance arrangements in Section A and A.1 are intended to unlock consumer demand by improving access to affordable capital and making energy efficiency investments more attractive; Section B deals with options for the accreditation regime that should underpin consumer confidence in the new arrangements; the Energy Company Obligation powers discussed in Section C are expected to support the roll-out of socially-cost-effective measures and protection for the vulnerable; Section D considers powers for the private rented sector, which may become necessary if early Green Deal arrangements are not successful in breaking down the market failures in this sector; Section E discusses powers to provide energy consumers with more information on their bills.

Green Deal Rationale – Overcoming Market Failures and Barriers To Take-up of Cost-effective abatement measures

Negative externalities from carbon dioxide emissions

8. Climate change is caused by the emission of greenhouse gases into the atmosphere. An externality exists as those who emit do not have to bear directly the full cost of their actions. The price of energy does not always reflect these external costs. For example, VAT on gas is low (5%) and there is no carbon price attached to residential gas use, whereas electricity prices include the cost of carbon determined in the EU Emissions Trading System. Therefore, investment decisions which are cost effective to society may not appear as cost effective to consumers. The proposed Energy Company Obligation (ECO) (see Section C) is likely to subsidise those more expensive but socially cost-effective measures[8, 9].

Information

9. Lack of information and information asymmetry (adverse selection): a market failure preventing the take up of cost effective measures is the lack of trusted information for consumers (including businesses) who do not have easy access to, or a full understanding of, information on the range of energy efficiency measures available to them[10][11][12]. Information barriers are likely to be exacerbated where the energy efficiency measure is a relatively new or technical product, and consumers are also likely to have a low level of trust in providers of goods that are, in many cases, once in a lifetime purchases. Given these characteristics, consumers may not feel confident in assessing the risk of buying a poor quality service and may prefer to withdraw from the market or heavily discount the claimed savings from energy efficiency measures[13]. These problems can be addressed via the accreditation of assessors and installers, providing trusted sources of energy efficiency services (see Section B), while the Green Deal Finance proposal (see Section A) should create a flexible market framework facilitating branded suppliers with existing customer relationships to come forward and market their services.

10. Information bias (moral hazard): without controls there is a risk that expert advice would be offered by those with incentives to promote a particular industry or installer. This (moral hazard) market failure can be, at least partially, overcome by the availability of accredited assessors (see Section B). For the accreditation scheme to be trusted, surveillance of assessors accredited under the scheme must be sufficiently vigilant, with adequate penalties for those who fail to provide objective energy-efficiency-advice. The expected payoff for advisors who break the guidelines of the scheme must be lower than their expected payoff when providing impartial advice. Secondary legislation will seek to achieve this balance.

Inertia / Hidden Costs

11. Consumer inertia[14]: The concept of bounded rationality may explain some inertia, i.e. that consumers can only cope with a limited amount of information at any one time. However, cultural and other psychological factors are likely to have a role to play. Information campaigns from trusted sources, should help to nudge some behavioural change. Increasing take up of measures

---

[8] For a discussion of carbon valuation in public policy appraisal see: http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/valuation/valuation.aspx

[9] Where subsidies are offered, the energy companies would be expected to pass on the costs to their consumers, thereby increasing energy prices in the short-term.

[10] Royal Institute for Chartered Surveyors (2010) "Energy Efficiency and Value Project" noted a lack of consistent or easy to access information on energy efficiency and that this influenced a low level of demand for energy efficiency measures.

[11] A survey of commissioned by DECC from IFF (2010) found that 56% of individuals that reported they were not planning on installing loft insulation said in follow up questions that they had not considered the idea.

[12] It is important to note that under the Energy Performance of Building Regulations, there is a duty on estate agents to disclose either the Energy Performance Certificate (EPC) in full or the EPC property asset rating, along with the written particulars of a domestic property which is on the market for sale. This implements the Energy Performance of Buildings Directive. The Department for Communities and Local Government (CLG) is considering proposals to amend the regulations to remove the element of choice (creating an obligation on agents to produce the EPC at the same time as the written particulars). CLG is also considering proposals to extend the regulations to cover the non-domestic and rental sectors. These proposals would improve the information available to consumers and support Green Deal objectives.

[13] Akerlof (1970) "The Market for Lemons", Quarterly Journal of Economics

[14] 19% of people that have not installed basic, low cost, insulation measures are completely unengaged with the issue. Defra (2009) Public Attitudes and Behaviours Toweards the Environemnt Survey 2009 and Energy Saving Ttust (2009) Qualitative research

should lead to some momentum to overcome inertia as many consumers obtain their most trusted information from others in their circle of friends, family and local community. [15]

12. The presence of real, but "hidden" costs, for example the real costs of devoting the time required to assess potential investment options, will also explain some inaction. This is true for households and particularly for organisations, for whom management time and attention is a more closely monitored scare resource. Simplified processes for accessing Green Deal investments (from accredited assessment and installation through to simple and cost-competitive finance packages) should reduce the costs to households and organisations.

Access to Capital and Discount Rates

13. Access to capital: Many households cannot access conventional finance markets to fund energy efficiency improvements, while other households and businesses may face high costs of capital that do not reflect the particular nature of energy efficiency investments i.e. a reliable stream of bill savings. Attaching repayment charges to energy bills should reduce the cost of capital faced by consumers as the cost of default in relation to energy bills is substantially lower than that for consumer credit. This, to a large extent, is the result of consumers' unwillingness to risk having their energy supply cut off. The domestic energy bill cost of default runs at circa 1.5% of gross revenue, compared with broader consumer credit costs of default which are significantly higher (see section A below for more details). A key principle of the Green Deal is that only costs which are likely to be offset by savings can be added as a Green Deal charge on energy supply. This principle will be applied to both domestic and non-domestic consumers. This means that Green Deal Finance (GDF) is likely to reduce outgoings, thus improving cash flow and potentially lowering the risk of default on energy bills further (see Section A). Meanwhile, those households currently excluded from capital markets are likely to be able to fund energy efficiency investments at relatively low costs of capital, with interest rates determined, in part, by secondary legislation clarifying the exact terms of where the risk of default on Green Deal payments lies.

14. Credit risks: Adverse selection and moral hazard could undermine confidence in the Green Deal finance arrangements. Finance providers require both an incentive to ensure appropriate risk assessment, and the information to make good risk assessments. The combination of these factors will enable them to offer better financial terms and effectively overcome the barrier outlined above. This suggests that finance providers should be liable for losses associated with their investments. This will incentive them to perform checks on the credentials of customers, installers and assessors and the integrity of the works. However, with energy companies responsible for administering the charge and pursuing missed payments this may result in a moral hazard. Section A.1 discusses these risks and discusses a system to share collected payments in order to ensure that finance providers are liable, but energy companies face an incentive to collect green deal charges that matches their incentive to collect energy bill payments.

15. Private discount rates: High short-run private discount rates[16], potentially exacerbated by the information problems highlighted above, mean that consumers are likely to value up-front capital costs substantially more highly than future bill savings. This creates a barrier to the uptake of energy efficiency measures and lead to procrastination over decision making. A potential psychological explanation is that immediate costs and benefits of investments are very real and weighted more heavily in a decision than more distant costs and benefits which are more abstract. The Green Deal finance proposal (see Section A) changes the time profile of the costs and benefits of energy efficiency investments. There would no longer be a large up-front cost, and because of the bill savings principle set out above, the investment would be expected to show a net benefit, or a neutral balance of benefits and costs, in all time periods. By changing the time profile in this way, an investment that had previously been evaluated negatively, would receive a positive evaluation. This exemplifies the broader behavioural point that the way that energy efficiency investments are framed to energy users can affect whether they are likely to be taken up.

Incentive Incompatibility

16. Mismatch of tenure/repayment period: A number of years' worth of bill savings are often needed to cover the capital costs of an energy efficiency investment. Occupants may not expect to remain in

[15] Cabinet Office and Institute of Government (2010) "MINDSPACE influencing behaviour through public policy", cites a range of studies that describe situations where people tend to stick to default behaviours, adhere to "norms" of behaviour and respond differently to information that comes from different sources.

[16] Individuals' discount rates are not consistent over time and can be described by hyperbolic discount functions, where the rate of pure time preference is initially very high but declines over time (Frederick, Loewenstein and O'Donoghue 2002).

a property for the duration of that period (households move every seven years, on average) and also may not expect to be able to fully capitalise the benefits of their investment into the property's market value. This barrier can be overcome by attaching finance to the energy bill such that if the house is sold, then so is the charge (see Section A). In principle, in a well functioning market, the property price should change to reflect at least the expected bill savings. There is some evidence from Australia[17] and the USA[18] that identified increases in some property values as a result of energy efficiency improvements. For example, installing ceiling insulation at an approximate cost of AUD$1,200 will, on average, improve the energy performance of a poorly insulated home by at least 1 "star". A 1 star improvement in energy rating was associated with an additional AUD$8,979 on the selling price of detached houses. However, currently there is no evidence to suggests that the same effect exists in the UK. The Royal Institution of Chartered Surveyors suggested that there is currently little demand for energy efficiency from UK home buyers and as such market participants do not assign value to it[19]. This suggests that there is an apparent failure in the property market to fully capture the expected bill savings from energy efficiency improvements in house prices.

17. Misaligned incentives: Rents may be largely determined by factors such as location and number of bedrooms, and probably do not reflect the energy efficiency of the property. Where this is the case the landlord has little incentive to invest as only the tenants receive the benefit of lower fuel bills. This is borne out by the data on take-up of measures under previous Supplier Obligations. Over the Energy Efficiency Commitment and Carbon Emissions Reduction Target[20] years (2001-2008) wall cavities in the private rented sector have been filled at a particularly low rate, rising from 28.4% filled in 2001 to only 31.8% in 2008. The rate in the owner-occupied sector was significantly greater with filled cavities rising from 35.3% to 48.5%[21]. While the introduction of the Green Deal may go some way to overcoming this problem, by routing charges through tenants' bills so that landlords do not have to bear the direct costs, it is likely that the take up of cost-effective abatement measures will remain relatively low in the private rented market. If needed, regulation of the private rented sector (see Section E) will ensure take up of energy efficiency measures where cost-effective, and improve the living conditions of some of the worst housing in the stock.

Green Deal Rationale – Equity Considerations

18. The high costs of maintaining adequate internal temperatures, particularly in buildings with poor quality heating systems or inadequate levels of insulation, can leave low income and vulnerable households subject to dangerous health risks [22,23, 24]. The proposed ECO will allow for the provision of heating systems and energy efficiency measures which improve the living conditions of some of the most vulnerable households in society. This will in part address the health risks these consumers face (see Section C).

19. The annex containing the specific tests contains a more detailed exploration of the equality considerations of these powers.

Policy Objectives

Overall goal

20. To improve the energy efficiency of existing building stock in the UK, including households and non-domestic properties, in order to reduce our carbon emissions cost-effectively and fairly, contributing to our legally binding targets and improving the security of UK energy supply.

---

[17] Department of the Environment, Water, Heritage and the Arts (2008), "Energy Efficiency Rating and House Price in the ACT"

[18] Nevin, R. and Watson, G., "Evidence of Rational Market Valuations for Home Energy Efficiency", The Appraisal Journal, 1989; and Longstreth, M., Coveney, A. R., Bowers, J. S., "The Effects of Changes in Implicit Energy Costs on Housing Prices", The Journal of Consumer Affairs, Vol. 19, No. 1, 1985

[19] Royal Institution of Chartered Surveyors (2010) "Energy Efficiency and Value project"

[20] Since April 2002 there has been an obligation on the six large energy companies to achieve reductions in carbon emissions in the household sector in Great Britain. The Carbon Emissions Reduction Target (CERT) began in April 2008 and will run until December 2012. Previous to CERT, the Energy Efficiency Commitment (EEC) ran from April 2002 to March 2008.

[21] English Housing Condition Survey, 2007, English Housing Survey, 2008

[22] http://whqlibdoc.who.int/euro/ehs/EURO_EHS_31_part2.pdf

[23] Howden-Chapman, P. et al., (2007). Effects of insulating houses on health inequality : Cluster randomised study in the community. *British Medical Journal*, doi:10.1136/bmj.39070.573032.80

[24] Barnes, M. et al., (2008). *The Dynamics of Bad Housing : The Impacts of Bad Housing on the Living Standards of Children.* London : National Centre for Social Research

Objectives in order to achieve this

a. To provide a framework which makes it easier for people and businesses to access accredited energy efficiency assessments and installations of measures.

b. To remove the barrier of high upfront costs for energy efficiency measures by creating a new type of financing mechanism that links repayments to energy bills and transfers automatically when a property changes hands.

c. To extend the Energy Company Obligation in a way that complements this mechanism, to maximise the cost-effective energy efficiency savings that can be made across the housing stock, paying particular attention to the needs of the most vulnerable who may need additional support, and to key technologies such as solid wall insulation.

d. To maximise the opportunities for both owners and tenants to enjoy the benefits of energy efficient properties through possible regulations on the private rented sector.

21. The following sections deal with the impacts of these elements. First, the aggregate impacts of the Green Deal policy as a whole are analysed; illustrative scenarios are presented to provide Parliament with an indication of the broad scope of the policy. Second, individual assessments are made of the costs and benefits that can be directly attributed to the individual elements of the Bill after possible options for secondary legislation have been taken into account.

Aggregate costs and benefits

Aggregate impact of the primary powers

22. By themselves the primary powers neither impose costs nor generate benefits for businesses, households or the public sector. One would expect that interested parties might expend some resource in scrutinising the detail of the primary powers to better predict how they might be impacted by secondary legislation in the future. Additionally, costs might be incurred by companies if they begin to plan their response to their expectation of the likely shape of the secondary legislation. However it is difficult to determine whether companies will do this, and if so, how many resources they would devote to it. To limit the potential for resources to be expended unnecessarily, more details on the shape of the Green Deal raft of policies will be consulted upon next year, allowing sufficient planning time before secondary legislation comes into force.

Illustrative scenarios of the potential impacts of secondary legislation in the domestic sector

23. This section presents two illustrative scenarios (Low and High) of the potential impact of the Green Deal policy as a whole, including both primary and secondary legislation. This has been done to aid parliamentary debate. However, it should be noted that **secondary legislation has not yet been developed. The scenarios presented in this Impact Assessment should be seen only as illustrative of the broad scope of potential outcomes and in no way pre-empts the detail of the secondary legislation**. For example, the design, scope and ambition of the new Energy Company Obligation (ECO) has yet to be developed and decisions that will inform it have not yet been taken.

24. Since the detail of the policies, particularly the scope and size of the ECO, has not yet been developed, it is not possible to provide an illustration of the impact of each individual policy. It is however possible to give an indication of what the overall impact of the installation of energy efficiency measures as a result of the collection of policies might look like, subject to caveats. More detailed analysis of the potential costs and benefits associated with the specific elements of the package of policies are examined in Sections A to E of this impact assessment.

25. It is important to note the consumer response to the new Green Deal Finance package is highly uncertain. This is partly owing to the lack of free market activity in a sector that has been dominated by the offers subsidised by energy companies wishing to fulfil their obligations under the Energy Efficiency Commitment (EEC) and the Carbon Emissions Reduction Target (CERT); and partly owing to the novel aspects of the Green Deal policy package which aim to change consumer behaviour by overcoming the barriers set out above. Research work is planned that is expected to improve Government's ability to assess consumer response.

26. The illustrative scenarios set out two possible levels of take up of insulation measures between 2013 and 2020. In addition the maximum feasible potential over the period is presented[25] (see

[25] The feasible potential is calculated under the assumption that the entire housing stock could be retrofitted with insulation over a twenty year period, the first portion of which would take place between 2013 and 2020.

Table 1). The choice of measures used in the scenarios should not be taken as an indication of the list of measures qualifying for Green Deal Finance or the ECO. For example, heating measures are not included in the scenarios. However it is likely that some heating measures will be included in further analysis undertaken to accompany consultations on secondary legislation; in order to consider options for a thermal efficiency target as part of the Energy Company Obligation. Examples of the cost effectiveness of heating and insulation measures for an individual property are presented in section C (The Energy Company Obligation).

27. The high and low scenarios were derived by taking 25% and 50% respectively from the maximum feasible potential for all insulation measures except loft, cavity and solid wall insulation (see Annex 4 for details).While the scenarios do not explicitly model the expected take-up of measures under the Green Deal and the Energy Company Obligation, the high scenario can be thought of as reflecting very strong take-up of Green Deal Finance while the low scenario reflects the risk that demand for measures under the Green Deal is more muted. In this scenario, the carbon savings resulting from the take-up of measures are lower than those expected from the sector in order to meet Carbon Budgets26 and a large number of cost-effective measures would remain uninstalled.

28. Both scenarios assume that, in the absence of the Green Deal policy package, no insulation installations would take place, i.e. in the counterfactual scenario, no action takes place beyond natural replacement that complies with building regulations. This is based on the reasonable, but simplifying, assumption that most households that might have taken up cost-effective insulation measures in the absence of the policy will already have done so over the period to 2012. During this period the energy supply companies will have targeted the households which are most likely to take up measures, in order to help the suppliers to meet their obligations (EEC and CERT)[27].

Table 1: Assumed total number of installations for each measure (2013-2020)

Measure	Number of installations (m)		
	Low	High	Maximum feasible potential
Lofts	2.3	3.4	4.5
Cavity wall	0.5	2.3	4.0
Solid wall	1.8	2.2	3.1
Glazing	0.7	1.0	1.4
Party wall	0.5	0.7	0.9
Insulated doors	1.3	1.9	2.5

29. Table2 aggregates the costs and benefits in the domestic sector associated with the two scenarios outlined above. The standard cost-benefit analysis methodology for use in the appraisal of energy and climate change policies has been used (see Green Book supplementary guidance)[28]. Particular assumptions relevant to the measures being installed in the scenarios are set out in Annex 4, along with more detailed sensitivity analysis in Annex 5. As can be seen, with the assumed number of measures installed over the period, the net benefit to society is £6.4bn - £10.9bn, with a total non-traded sector carbon saving in 2020 of 3.3- 4.9MtCO_2e[29].

[26] link to Low Carbon Transition Plan: http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/lc_trans_plan/lc_trans_plan.aspx

[27] There would still be a low level of activity without the policy, as early adopters move house but, for the reasons set out above, it is thought that this effect is small enough to ignore for the purposes of this analysis. The detail of the counterfactual will be scrutinised in secondary legislation, when there is more information about consumer preferences and the detail of the policy.

[28] http://www.hm-treasury.gov.uk/data_greenbook_detguidance.htm#Environment

[29] Non-traded sector carbon emissions are those that fall outside of the EU ETS. Because the EU ETS cap is fixed, it is only changes in UK non-traded sector emissions that constitute actual changes in global emissions, the UK's net carbon account and emissions that count towards the UK's carbon budgets. The inclusion of heating measures in this analysis would only have a marginal impact on the level of carbon savings and could potentially lead to a small decrease in non-traded sector emissions savings as more homes switch to gas central heating.

Table 2: Domestic sector - Total costs and benefits as a result of the installation of measures[30]

	Low	High
Total Cost (£bn)	14.3	21.5
Total Benefit (£bn)	20.8	32.4
Net Benefit (£bn)	**6.4**	**10.9**
Non-traded Carbon Saving ($MtCO_2$, 2020)	3.3	4.9
Change in Traded Carbon Saving (net purchase of EU Allowances) ($MtCO_2$, 2020)	0.6	1.0
Non-traded Carbon Saving ($MtCO_2$, lifetime)	113	176
Change in Traded Carbon Saving (net purchase of EU Allowances) ($MtCO_2$, lifetime)	11	17

30. The finance required to deliver the illustrative scenarios covers the technology, installation and "make good" costs associated with installing measures. The amount of finance is assumed to increase over time as the level of take up rises. In the low scenario, the amount of finance increases from £0.8bn in 2013 to £2.5bn (average over the period of £1.4bn), while in the high scenario it increases from £1.4bn in 2013 to £3.0bn in 2020 (average over the period of £2.1bn).[31] It should also be noted that the measures being financed include expensive measures, such as solid wall insulation, and that a number of all types of measures would be expected to be installed in vulnerable households. In the latter circumstance it would be expected that the Energy Company Obligation (ECO) would, at least in part, be responsible for providing finance; in the former the ECO or alternative private finance could be expected to contribute. Further analysis will be developed to accompany consultations on the scope of the new Energy Company Obligation.

Illustrative scenarios of the potential impacts of secondary legislation - in the non-domestic sector

31. To analyse the potential effects of the Green Deal in the non-domestic sector, two illustrative scenarios are presented, reflecting the fact that the secondary legislation has yet to be developed. However, a number of differences between (a) the way in which the potential future policy is modelled; and (b) the strength of the evidence base, mean that the approach taken differs in some respects from that taken in the domestic sector.

32. The non-domestic sector shares some, but not all of the characteristics of the domestic sector. It differs in that one would expect organisations, on average, to be more aware of the cost of their energy use and the value to them of energy efficiency measures. One would also expect them to be less credit-constrained and to follow a more standard model of investment appraisal i.e. one not so skewed by time-inconsistent discounting of future payments and expected energy bill savings. In addition, at the smaller-emitting end of the non-domestic spectrum in particular, there have been fewer policies aimed at increasing the take-up of measures. This means that, in the non-domestic sector, one would expect to see more take-up of measures in the counterfactual scenario.

33. The non-domestic sector is also more heterogeneous than the domestic sector, with buildings much more likely to significantly change their use, potentially rendering some changes to the energy-using characteristics of buildings less useful with a change of occupant. For the purposes of this analysis, it is assumed that only measures that would be paid for under the Green Deal Finance model (see Section A) within five years, assuming a private discount rate of 10%, would be taken up, thereby avoiding, to a large extent, the possibility of measures becoming redundant before their capital costs have been covered by the value of their associated energy savings. In addition, it is not proposed that the future Energy Company Obligation will cover the non-domestic sector. This combination of factors means that a lower level of take-up as a result of the Green Deal would be expected in the non-domestic sector.

34. The analysis below presents scenarios which vary the assumption on the level of additional uptake above business as usual (BAU) improvements in the energy efficiency of the public and

[30] Discounted costs and benefits in 2010 prices

[31] The finance cost is only the capital cost of the installation of measures (thus it omits the administration anc household hassle costs) and it is undiscounted

commercial sectors. As in the domestic sector, the detail of which measures will be included in the list of measures qualifying for Green Deal finance has yet to be decided.

35. The analysis of the 10% and 20% voluntary uptake scenarios is based on updated versions of the non-domestic marginal abatement cost curves which have been produced for the Committee on Climate Change[32]. The updated model applies a BAU uptake of energy efficiency measures over the period 2010-2020. The scenarios presented below illustrate the impact of accelerating expenditure of capital on energy efficiency improvements by 10% and 20% per annum above BAU uptake. These BAU uptake projections, which assume only the existing policy landscape, were derived by extrapolating historical penetration rates and incorporating assumptions regarding future take-up. These comprised, amongst others, a consideration of the replacement frequency of energy efficiency measures; the influence of payback on purchasing decisions; and the impacts of existing policies. Average capital expenditure would be £8m per annum in the 10% scenario and £17m in the 20% scenario. The third scenario gives the additional benefit expected from regulation of the private rented sector described in Section D.

Table 3: Non-domestic Scenarios	10% additional uptake	20% additional uptake	Regulation of the private rented sector
Energy Savings (£m, present value)	170	330	279
Capital costs (£m, present value)	75	145	105
Carbon Savings Non-Traded (MtCO2)	0.8	1.5	2.1
Carbon Savings Traded (MtCO2)	0.4	0.8	2.0

36. There are substantial overlaps between the scope of the NDGD and other policies. However, these figures concern those emissions that are not covered by the Carbon Reduction Commitment (CRC), Climate Change Agreements (CCAs) or EU Emission Trading Scheme (ETS)s, and so overlaps of policies have been accounted for. This mainly comprises non-energy-intensive organisations.

Aggregate impact of the secondary powers

37. The illustrative scenarios have been used to gross up the costs and benefits specifically associated with each power and identified in the sections below. Table 4 presents those costs and benefits. As can be seen, the illustrative scenarios show much greater impacts in the domestic sector than in the non-domestic sector. This is owing to the particular characteristics of the sector, and the overlaps with existing policies (see non-domestic sector section above).

Table 4: Summary of costs and benefits associated with illustrative scenarios of possible secondary legislation

Take-up Scenario	Low			High		
Discounted Costs and benefits (£bn, 2010)	**Costs**		**Bens**	**Costs**		**Bens**
Additional information on energy bills	0		0	0.04		0
Accreditation [33]	.006		-	.01		-
Green Deal Finance energy company billing[34]	.65		-	1.06		-
Energy companies provision of data to finance providers[35].	0.03			0.04		

[32] http://www.theccc.org.uk/other_docs/BRE%20MAC%20Curves%20-%20Technical%20Documentationt1%204%20%283%29.pdf
[33] Please note that benefits may arise from reducing the risk of catastrophic failure (see section B).
[34] This adds resource costs associated with default and from call handling
[35] See section A.1.

Costs of PRS regulation not included in overarching impact[36]	0.023			0.023		
Green Deal overarching impact[37]	14		21	22		33
Which includes						
Domestic	14		21	22		32
Non domestic	0.08		0.2	0.15		0.4
Non Domestic PRS regulation	0.045		0.135	0.16		0.7
Total (£bn)	**15bn**		**21bn**	**23bn**		**33bn**

Distributional analysis – the domestic sector

38. Currently it is difficult to estimate the distributional impacts of the illustrative scenarios as the secondary legislation underpinning Green Deal Finance (GDF) and the Energy Company Obligation (ECO) has not yet been developed. However, it is possible to provide an illustration of the impacts on the energy bill of individual households in particular situations.

39. Under GDF the consumer will expect to cover the repayment of the capital cost through the savings in their energy bill, thus there will be no direct impact on other consumers. Alternatively, under the ECO the cost of installations are likely to be partly covered by an energy company and it is expected that this cost would be spread across all of their customers. The CERT Extension post-consultation impact assessment[38] suggested that the potential increase in energy bills as a result of all CERT Extension installations might be £61 for households (in 2011/12) that do not receive a measure in 2011-12. This has the effect of increasing the number of households in fuel poverty in the short run, but, under the assumption that measures are focussed on lower income groups, reducing the number of households in fuel poverty in the long-run.

40. Consider two illustrative examples of the effect of financing measures through GDF and ECO. In Example 1, cavity wall insulation and loft insulation, is installed at a capital cost (including technology costs, installation costs and make good costs) of £659 under a Green Deal Finance package with a five year payback period and an interest rate of 5% per annum. Under the Green Deal, the householder (owner-occupier or renting tenant) would pay Green Deal charges of £150 per annum for five years and would expect to see bill savings of £175 per annum[39] for the remaining lifetime of the insulation[40] while they remain in the property. The householder would expect to benefit every year and there would be on impact on prices or the bills of other consumers.

41. In Example 2, the same installations are made in a similar property occupied by a vulnerable household qualifying for ECO subsidy. In this case, the householder would receive the benefits of lower energy bills (£175 per year). The cost of the installation would be shared across all the energy company's consumers; assuming they have 50,000 customers then their customers' bills would be, an average of,£0.01p higher in the year in which the installation takes place.

42. The impact of energy bill changes will vary across income groups as a result of their different marginal utilities of consumption; lower income groups are likely to place a greater value on an additional £1 saving than higher income groups. By considering these different marginal utilities of consumption it is possible to estimate the equity weighting for the income deciles. Applying the equity weightings in Annex 6 to the example above would imply that annual savings of £175 per annum would be equivalent for households in the lowest income decile; while bill increases of £0.03 would be equivalent to £605 per annum.

43. Detailed distributional analysis will be presented in the impact assessments accompanying consultation on the Energy Company Obligation.

[36] See section D.
[37] Includes direct costs and benefits of measures installed
[38] http://www.decc.gov.uk/en/content/cms/consultations/cert_ext/cert_ext.aspx see page 23.
[39] Assuming constant energy prices.
[40] Assumed to be 42 years (see Annex 4 for more details).

Section A Green Deal Finance Charge	Impact Assessment (IA)
	IA No: DECC0015A
Lead department or agency:	**Date: 09/12/2010**
Other departments or agencies:	**Stage:** Final for primary powers, development for secondary
	Source intervention: Domestic
	Contact for enquiries: Benedikt.koehler@decc.gsi.gov.uk

Summary: Intervention and Options

What is the problem under consideration? Why is Government intervention necessary?
The overarching section above discusses the problems that the Green Deal addresses. Relevant here are barriers to energy efficiency investment created by: time inconsistent private discount rates; the relative lack of capitalisation of the value of investments into property prices, which mitigates against investment in measures that generate long-term benefits; and access to capital markets.

What are the policy objectives and the intended effects?
The Green Deal is unlike many Government interventions that rely on regulation, taxes or subsidies to deliver carbon reductions, as the Green Deal package is intended to be a catalyst for creating an innovative market where demand for energy efficiency measures will bring forth supply along the entire value chain. The finance proposals here are intended to draw out consumer demand: by improving access to capital; framing the investment in a way that ensures that there is no upfront cost to the occupier, or landlord; and highlighting that the value of the energy savings are always expected to outweigh the repayment costs. Key policy objectives are to ensure that consumers should only pay the Green Deal Charge whilst they remain in the property and that they should never be liable to pay back the full amount spent at once. If successful the Green Deal will unlock private demand for energy efficiency and lead to the take-up of insulation measures.

What policy options have been considered? Please justify preferred option (further details in Evidence Base)
Primary powers are proposed that, subject to forthcoming secondary legislation, will allow Green Deal Providers to place a charge on energy supply.
The following options for the Green Deal Charge collection and transfer have been considered:
a) charge on the energy bill collected by energy companies and which transfers between bill payers on change of occupancy (preferred option).
b)charge on the property collected by Local Authorities which transfers between owners on sale.
c)charge on consumers' assets which does not transfer
d)no nothing, no Green Deal Charge

When will the policy be reviewed to establish the actual cost and benefits and the achievements of the policy objectives?	To be set out at secondary legislation
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	To be set out at secondary legislation

Summary: analysis and evidence **Description: Charge on energy bill collected by the Energy Company**

Price Base Year 2010	PV Base Year 2010	Time Period Years 8	Net Benefit (Present Value (PV)) (£m)		
			Low: -650	**High:** -1050	**Best Estimate: -**

COSTS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition)	Total Cost (Present Value)
Low	Optional	Optional	**650**
High	Optional	Optional	1050
Best Estimate	-	-	**-**

Description and scale of key monetised costs by 'main affected groups'

No costs are expected to arise from primary legislation itself. Costs to energy companies are expected to arise when secondary legislation emerges around Green Deal dimensions such as the requirements on Green Deal providers and the measures which will be eligible for Green Deal.

Indicative estimates of the costs associated with Green Deal finance have been aligned with the illustrative domestic sector scenarios set out in the overarching section of this IA. Transition costs, in relation to Green Deal finance are not expected to be particularly significant (providing changes to billing from the range of Green Deal measures are incorporated at the same time – see Table 4 in the overarching section above). However, the total continuing cost for Green Deal providers of administering Green Deal may be similar to the cost of administering Energy Efficiency Commitments (EECs) - 18% of capital costs was reported in work for Ofgem. Considering scenarios reported in the overarching section: 18% of capital costs would be £1.6bn or £2.6bn, for the low and high scenarios (NPV). However, Green Deal Finance is only one element of Green Deal (the Energy Company Obligation also being key here), so Green Deal Finance related administration costs are likely to only represent a proportion of this 18%.

A bottom up approach to estimating specific elements of Green Deal finance costs (queries to energy companies and resource costs of extra defaults) suggests significant costs, but of a smaller scale. Average annual costs of managing extra domestic sector billing queries could be as high as £85m to £140m per annum (depending on the scenario) and £590m to £950m for the full period. These estimates are conservatively high as the methodology assigns the likelihood of querying to the number of measures installed, as opposed to the number of households with Green Deal charges (which has not been estimated). One would expect a proportion of the measures to be installed in households as packages.

Costs arising from extra domestic sector defaults (on the Green Deal charge) will depend on the default rate and the cost of handling defaulters. Annual costs associated with default could be of the order of £20m (of which half is assumed to constitute resource costs and half transfer payments), assuming default rates associated with domestic sector energy bills. Offsetting this, to some extent, is the possibility that there will be reduced defaults as energy consumption falls.

The total costs specifically associated with extra queries and extra defaults from Green Deal Finance are estimated to be between £650m and £1,050m (NPV) relative to a world with no Green Deal Finance. Many of these costs are likely to be spread across the Green Deal Finance mechanism and the Energy Company Obligation, depending on the way in which the ECO is specified (to be determined in secondary legislation).

Costs of installation and wider economic impacts (e.g. carbon impacts) are excluded, as these are covered in the illustrative take-up scenarios covering the Green Deal policy as a whole – see overarching section for details. A full examination of the costs and benefits of the Green Deal Charge will be set out in the IA accompanying consultation on secondary legislation.

Other key non-monetised costs by 'main affected groups'

Other administration costs are likely to be associated with Green Deal, including costs arising from: a central registry/regulator; loan administration/securitisation; and accreditation (the latter is considered in Section B of this Impact Assessment). The two former items are not considered specifically in this IA, but will be investigated further in preparing for secondary legislation.

BENEFITS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition)	Total Cost (Present Value)
Low	Optional	Optional	**Optional**
High	Optional	Optional	**Optional**
Best Estimate	-	-	-

Description and scale of key monetised benefits by 'main affected groups'

Benefits to affected groups will ensue after passage of Secondary Legislation. Take-up of Green Deal Finance by consumers will, potentially, generate large benefits as investment decisions move towards individual and societal optimum points. Benefits from the installations themselves are considered in the overarching section of this IA above.

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks

Primary powers proposed have no direct costs and benefits.

Impact on admin burden (£m):			Impact on policy costs (£m):			In scope
Costs: 0	**Benefit:**	**Net:0**	**Costs:** 0	**Benefits:**	**Net:** 0	Yes

What is the geographic coverage of the policy/option?			Great BritainSpecify Other			
From what date will the policy be implemented?			Depends on secondary			
Which organisation(s) will enforce the policy?			No enforcement for primary			
What is the total annual cost (£m) of enforcement for these organisations?			No costs for primary			
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** 0		**Non-traded:** 0	
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:** 0		**Benefits:** 0	
Does the proposal have an impact on competition?			Not at primary			
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro** 0	**< 20** 0	**Small** 0	**Medium** 0	**Large** 0	
Are any of these organisations exempt?	No	No	No	No	No	

Policy Background

44. A key Government objective is to increase the take-up of cost-effective energy efficiency measures so that Carbon Budgets can be met cost-effectively; central to this is the creation of a new way for private companies to finance energy efficiency measures which does not add to household or business debt, and is not a conventional loan. Property owners and tenants should only pay the Green Deal charge while they remain in the property enjoying the benefits of the work, leaving the new occupier to pay the charge when they leave, and should never be liable to pay back the full amount spent at once (unlike a conventional loan).
45. This section considers four options for charge collection and transfer between occupants (summarised in table A1 below):
    a. By Energy Company (EC) – preferred option;
    b. By Local Authority;
    c. By Finance provider.
    d. Do nothing – no Green Deal Charge
46. The criteria for assessing the above options are proposed as: the costs to society; the behavioural benefits; the costs of default (to minimise the finance charge); and the facilitation of the transition of charge between successive occupants (to allow longer payback periods).

Table A1- Assessing options for charging arrangements

	Option a)	Option b)	Option c)	Option d)
Criterion / Description	Energy Company	Local Authority	Finance Provider	Do nothing – no charge
Ease of transfer	Energy bill already does this.	Not easy, as charge would be on property (see below), but council tax already does this.	Very difficult – no precedent	No charge, but similar arrangements might be possible, however very difficult
Behavioural Benefits	Potentially aligns energy savings with energy bills – could trigger positive psychological response	Compared with a) weak link between energy savings and council tax/land charge bill	Compared with a) weak link between energy savings and e.g. bank repayments schedule.	Market failures and barriers would remain
Cost of Default	c.1.5%[41], (may be lower if default rate on energy consumption is reduced)	Costs of default likely to be higher than a) (2.9% arrears in 2009 – see below)	Likely to be significantly higher than a) because it would need to be classified as a junior charge when secured to a property (raising the impact to the lender of default) and there is likely to be little or no capitalisation / transfer between occupants.	The default rate for unsecured loans is significantly higher (see chart in Footnote 6).
Costs to society	£650 to £1,060m (estimated resource costs from defaults and extra queries)	Higher than a) as costs of default likely to be higher	Higher than a) and b) as cost of defaults likely to be higher	No charge, so no costs

[41] Information from Ofgem's 2008 Energy Supply Probe, has been used to estimate this cost of bad debt, URL: http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20Initial%20Findings%20Report.pdf

Security of the loan

47. The distinction between secured and unsecured loans is important in this context; the greater the level of collateral and security the lower the risk of write-off and, therefore, the lower the cost of capital. Option d) above represents a counterfactual where energy efficiency loans are not secured and, therefore, likely to be subject to a high cost of capital. The other options are all envisaged as forms of secured loans with varying costs of capital (discussed below).

Charge Collection and transfer via finance provider (Option c)

48. In many instances the investments envisaged under Green Deal will require a payback period beyond a typical borrower's period of tenure. The traditional business model of finance providers cannot cater to Green Deal Finance (GDF), as each change in a dwelling's owner would require a new loan agreement. This may deter finance providers from entering the market because they will be concerned that the occupant will move on before the charge is paid off; without a link to the property itself this is likely to provide an insuperable hurdle. Theoretically, this impediment could be overcome by registering the Green Deal as junior charge on a property.

49. It is worth noting that in the US the expansion of finance for energy efficiency investments secured by charges on property has been stymied by mortgage providers refusing to lend against properties with an outstanding PACE arrangement (a senior charge).[42] So PACE arrangements must be extinguished before a mortgage will be advanced.

50. A further impediment to placing Green Deal charge billing with finance providers lies in the policy aim of making consumers aware of the intrinsic connection between their energy use and the potential and actual saving resulting from installation of a measure. If billings for energy demand are kept separate from Green Deal charge statements, this would be more difficult to achieve. The fact that finance providers have not made an effort to develop this market demonstrates their business model currently is not suitable for processing Green Deal Finance.

51. Another argument against collection of Green Deal charges by finance companies is that the distinction between Green Deal charges and conventional loans would be blurred. Arguably, finance companies would count the Green Deal against a consumer's overall debt capacity and thus the Green Deal would reduce borrowing capacity.

Charge collection and transfer via Local Authorities (Option b)

52. Local Authorities levy Council Taxes and Business Rates on properties and therefore have an inbuilt avenue for processing payments from a consumer, irrespective of owner. This key difference puts Local Authorities in a position of comparative advantage vis-à-vis finance providers.

53. However, Local Authorities are not able to invoice Green Deal charges together with fuel bill payments, thus missing the critical element of documenting Green Deal charges and energy payments on a single statement. The same drawback that would ensue from billing by finance providers would occur in this case, namely that consumers could lose sight of the cost-effectiveness of the Green Deal offering.

54. Similar to the situation with option c), mentioned above, mortgage and other claims on a property do not sit easily together. Mortgage lenders are averse to weakening their charge on a property by permitting registration of a competing charge. In theory the Local Authority charge could become a junior charge on the property, but in this case the cost of capital would be relatively high compared with the preferred option.

Charge Collection and transfer via energy companies (Option a – preferred option)

55. The preferred option a) (via energy companies) has the potential to ensure that the customer sees a transparent and helpful link between charges for energy demand and the Green Deal charge. Overall, the combined charge for Green Deal and energy is expected to be no higher than it would otherwise have been for energy in the absence of the Green Deal (subject to modelled estimates of future energy prices and consumption patterns). The detail of the presentation on bills of the two charges will be developed for consultation on secondary legislation. The challenge is to juxtapose the cost of Green Deal charge with the lower-than-otherwise cost of energy demand in a manner that supports the behaviour change essential for Green Deal, but avoids confusing consumers with out of date or irrelevant information, for instance taking into account that

[42] The US PACE programme features many analogies to the Green Deal, but has chosen to secure repayments based on a property charge repaid through local property taxes. For ensuing objections, see: http://green.blogs.nytimes.com/2010/08/31/homeowners-must-pay-off-energy-improvement-loans/)

consumption patterns may have changed since a particular Green Deal Finance package was initiated.

56. This innovative option, that does not involve securing the loan against the property, provides a relatively secure approach that would not interfere with the mortgage market.

Costs of Default[43] and Administering Green Deal Finance Charge

57. **Option a)** – information from Ofgem[44] suggests that the costs of default are about 1.5% of total revenue for energy supply companies. This is a relatively low cost. As mentioned above, it is possible that the Green Deal will reduce default rates further as bills are reduced. However, in the interests of prudence the 1.5% rate is used for the cost-benefit estimates below (This is an innovative charge and it is not yet known whether attitudes to bill paying would change as a result of a reconstitution of the bill consumers receive from energy companies). There will also be significant costs of administering Green Deal Finance. The Energy Company route is thought to offer the lowest costs because of the relationship that already exists between energy company and consumer.

58. **Option b)** - Default costs on council tax are thought to be higher than via energy bills. Data [45] from the Certified Institute of Public Finance Accountants suggests that, at 31 March 2009, arrears made up 2.9% of the net amount collectable. This percentage may differ from the amount finally written off, which is likely to be a smaller percentage. It does not include the costs of managing the arrears, which are likely to be very significant.

59. **Option c)** - Information from the Bank of England suggests that the cost of default via the finance provider route would be significantly higher than the preferred approach. Write-off rates on credit cards and other unsecured lending[46] are relatively high (10% and 5% respectively in 2010 and about 4% and 3% over the last 20 years) compared with the cost of default expected via energy

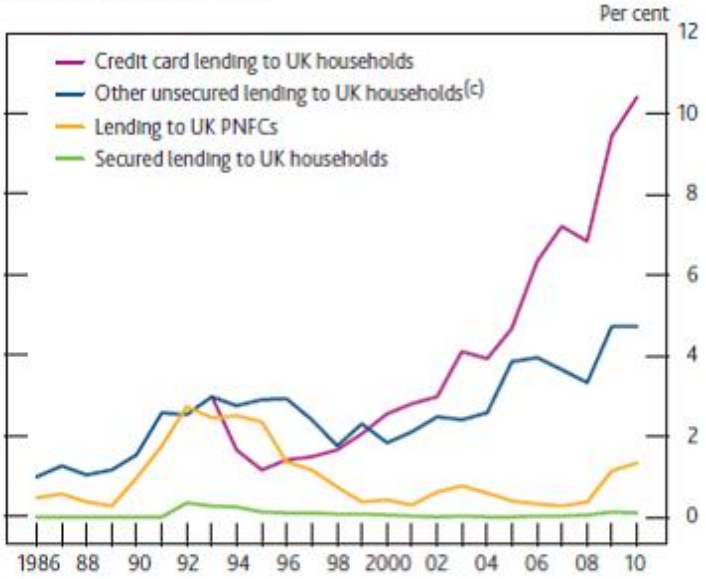
---

[43] Costs of Default include costs of handling bad debt, e.g. extra load on back office, as well as the eventually written off amount of lost revenue. The latter component can be characterised as a transfer payment because the bad debtors are receiving services at the cost of other consumers and shareholders. The former component is a resource cost.

[44] Ofgem op cit

[45] cipfastats.net website - "At 31st March 2009 arrears totalled £663m or 2.9% of net amount collectable"

Chart 4.13 UK banks' and building societies' annual write-off rates(a)(b)



Sources: Bank of England and Bank calculations.

(a) Building societies are included from 2008 onwards.
(b) Write-offs of unsecured lending to UK households and lending to UK PNFCs series were estimated from 1986–92, and for secured lending to UK households from 1992–96. See Cattermole, A (2004), 'UK banks' write-offs of bad debt', Bank of England Monetary and Financial Statistics.
(c) Prior to 1992, all write-offs to individuals were allocated to 'other unsecured lending'.

46

Chart from Financial Stability Report: June 2010", http://www.bankofengland.co.uk/publications/fsr/2010/fsr27sec4.pdf

companies. Write-off rates on junior charges on secured lending on properties would be significantly higher than those for senior charges. It is important to note that the write off rates do not include the costs of managing default, which are expected to be significant.

Cost benefit analysis for the preferred option – charge on energy bill; collection and transfer by Energy Company

60. The preferred option is to channel Green Deal charge collection via Energy Companies (ECs). The advantages are that ECs maintain a commercial relationship with a dwelling irrespective of its owner as Green Deal obligations pass from an incumbent owner/tenant to its successor. Further, the psychological link between Green Deal charge and energy consumption remains transparent.

61. There is a further benefit, in cases of payment delinquency or default: in instances where consumers fall in arrears, ECs are in a position to ensure that Green Deal commitments are not neglected at the expense of payments for fuel bills. In addition, subject to the structure of Green Deal Finance, in the case of default, ECs, potentially, have a powerful disciplining tool at their disposal in that they are in a position to install prepayment meters and, as a last resort, impose disconnection. This partly explains the lower default costs seen on energy bills.

62. Costs in connection with billing fall into the category of administrative burden rather than administrative cost.[47] Here, the concern is with cost burdens incurred by mandatory compliance with Green Deal provisions whereby energy companies consolidate in a single invoice the costs for use of energy and the charge for Green Deal Finance. Processes for installing and administering billing procedures are costs that would not occur but for the provisions of the Green Deal. Hence, they are a material component of costs imposed on business by the Green Deal.

63. Costs and benefits are discussed in turn.

Costs

64. The requirement on ECs to provide a full range of billing processes that route payments from consumers to finance providers imposes a set of unavoidable costs that are broken down into the following components:

    a. Invoice layout changes

    b. Book-keeping and processing payments (receipt by ECs and transfer to finance providers)

    c. Cost of queries around set up of charges (these queries may be recurring)

    d. Churns

    e. Costs of handling overdue payments and defaults

    f. Staff training

65. Cost components are discussed presently. First, general comments are in order.

66. The energy market for the most part is characterised by large companies servicing a very large customer franchise. Accordingly, they draw on considerable expertise in developing best practice for processing customer bills, and will be looking to reduce back office costs on an ongoing basis. Advances in software development are continuous and investment in back office upgrade will recur frequently. Energy companies will not need to acquire additional skills to handle the logistics of invoicing and processing Green Deal Finance, and so are well equipped to contain the actual costs of transition and administration. Conceivably, these costs are likely to be small relative to the existing back office cost block. However, at this stage our understanding of back office cost components is limited but will become clearer as policy develops, and will be set out in more detail in the IA accompanying consultation on secondary legislation.

67. Already at this stage, however, it is possible to describe some characteristics of the incremental costs, which will be broken down into fixed and variable costs. Overhead cost comprises the installation of systems to accommodate the additional charging for Green Deal Finance. Variable costs depend on level of take-up. This applies to back office costs in connection with handling customer queries, and to costs from defaults. These two variable cost components are discussed presently.

[47] The BRE's Standard Cost Model defines administrative cost as arising from 'information obligations' and burdens as costs 'sustained simply because it is a requirement from regulation.' (SCM, 3.1.4 and 3.1.5)

68. It is important to note that the supply of energy efficiency measures by energy companies is estimated (under the EEC regime[48] to involve administration costs for energy companies of at least 18%. It is not clear what cost components from the Green Deal Finance list (a to f above) would be covered by this proportion, there is likely to be some overlap. This 18% would represent £1.6bn or £2.6bn (NPV) under the low and high scenarios discussed in the overarching section above.

Overhead costs

69. Billing, booking, and transferring funds need not require a radical scaling up of back office functions. Costs are most likely to be comprised of one-off enhancements to IT systems, and given the large customer base of an EC there are likely to be substantial economies of scale. The level of cost is likely to be contingent on an EC's software upgrade cycle. If billing changes are introduced at the point in time when software is undergoing a periodic renewal, then costs are likely to be relatively small. This situation probably applies to the "Big Six" energy companies that account for the vast majority of the energy supply market[49]. However, for those companies that operate on a comparatively small scale, and could therefore be burdened with material increments to their operating costs, the position is unclear. Preparation for secondary legislation will consider whether an opt-out clause from the Green Deal should apply to this group.

Specific overhead cost components include

70. Changes to invoice layout: These costs occur only once and will be combined with the requirements of Better Billing.[50]

71. Booking: These costs will occur only once, consisting of changes to accounting systems to create subaccounts and to open accounts for onward transmission of funds to finance providers.

72. Costs relating to invoicing and booking are likely to adjust but not materially expand the remit of back offices. ECs are accustomed to working in a mass market and given the economies of scale involved in back office functions, costs ensuing from adding customers or changing billing are likely to be marginal.

73. An added complication to back office procedures lies in the administration of customers transferring in or out of an EC's clientele. Booking errors may occur in charging for consuming energy, but also in respect of charging for Green Deal Finance. All payments create operational risks.

Variable costs

Costs of handling overdue payments and defaults

74. The share of default risk between energy companies and finance providers is currently under review. Options include attributing to energy companies the entire default risk (possibly with the exception of some special circumstance such as the total accidental destruction of the property or very long term vacancies, where insurance cover may provide protection); another option would be for Green Deal Finance to rank senior to energy bill payments (such that Green Deal charges would have first claim on proceeds from a customer's payments); and a third option would be for Green Deal charges to rank *pari passu* with energy bills (such that customer payments would be applied pro rata to energy bills and to Green Deal charges).

75. Subject to the structure of Green Deal Finance, it is expected that it will be impossible for customer to default on the Green Deal charge without defaulting on the energy bill as a whole; (non-)payment will be entirely fungible. The same sanctions regime as currently exists for energy debt, with built-in protections for vulnerable consumers, will apply to Green Deal customers. A further regime for pre-payment meter consumers may be necessary as there is likely to be a risk of disconnection if the Green Deal Charge is given priority over energy consumption. It is expected that customers who take advantage of the Green Deal will reduce rather than increase their outgoings connected to energy demand. Taken together, energy bill defaults for Green Deal customers are likely to be very similar to equivalent customers without a Green Deal.

---

[48] Eoin Lees report on EEC, referenced in the Ofgem document here: http://www.ofgem.gov.uk/Sustainability/Environment/Policy/EnvAdvGrp/Documents1/Eoin%20Lees%20EEC2%20evaluation%20presentation.pdf

[49] The Big Six Energy Companies are (in particular order): EON, EdF, SSE, Scottish Power, Centrica, RWE.

[50] The separate section on Better Billing refers. It is assumed that invoicing layout changes will be undertaken in a single, combined step.

76. There are reasons to believe that defaults might be lower. For example, retail energy prices are extremely volatile causing periodic spikes in cost which low income consumers are unable to accommodate from other funds. Such spikes therefore precipitate an increase in defaults. However, a Green Deal home is protected from price volatility because a proportion of their bill is fixed at the Green Deal charge level: a lesser proportion of the bill is affected by retail energy price spikes. Assuming low income consumers are risk averse (given the high costs of financial distress), this is a positive utility gain. On the other hand those consumers who have been able to manage their energy consumption around peaks and troughs of income will now find it more difficult to do so. In addition, in many cases Green Deals may have a maturity that extends beyond an individual consumer's tenure, and so a commitment attractive to an incumbent householder or organisation may not necessarily appeal to their successor tenant. Such cases may lead to disputes between consumer and energy company. Moreover, there will be some migration of poor credit risks into dwellings where prior owners have drawn down Green Deal Finance, but this is as likely in reverse so the aggregate effect will be broadly similar default rates.

77. One factor that may increase default costs is the issue of void periods. Whereas zero or minimal energy will be consumed during a void period, i.e. creating little if any outstanding arrears, the Green Deal finance charge will continue at the same rate as when the property is occupied, so potentially building up arrears that will need to be managed.

78. It is pertinent to discuss the implications on energy company costs under assumption of a material increase to potential liabilities. Such would be the case if energy companies take on liability for default risks arising from Green Deal take up, and whether that liability is for the full charge or capped at a lower level.

79. For the sake of modelling the potential scale of default cost, an example follows. The illustrative scenarios set out in the overarching section of this IA (and in Annex 4 - see tables 4a and 4b) for roll out of energy efficiency measures have been adopted. It is assumed that a default cost of 1.5% would apply to a full year's investment cost under Green Deal Finance. Total costs of £136 to £216 million are suggested by the scenarios. These represent the net present value of 1.5% of total annual investment cost over the period from 2012 to 2020. . Potentially a proportion of this cost will be in respect of written off charges; another element will be in respect of handling costs to administer the default. A rough attribution of 50:50 between the two may be appropriate and is adopted for the sake of illustration..

Quantification of costs – capital and call centre

80. Capital expenditure will be required to make changes to equipment and IT to accommodate changes to customer invoices. In the case of changes to bills (see Section E below), the expected range of capex costs is between £0 and £43 million. It is assumed that Green Deal Finance would not significantly increase this cost.

81. However, In the case of Green Deal Finance, there are additional costs from changing booking systems and opening bank accounts with Green Deal Finance providers, as well as from transferring payments, currently these are not quantified.

82. Energy companies may experience increased queries from customers regarding individual elements of their bills, once energy companies begin invoicing customers for fuel demand as well as for debt service. An increase in customer queries will result in additional work for back office staff handling queries. The following section evaluates the potential scale of increased requirement on energy company back offices.

83. Utility call centres comprise a substantial proportion of the call centre industry.[51] The key cost component is staffing (72% of cost). An evaluation of some scenarios of potential cost effects of additional call frequency is in order.

84. In 2004, utilities maintained 30,740 agent positions handling 2,799 million minutes of customer calls. The average staff member will handle some 1,518 hours of calls/year. In 2004, annual salaries for call centre staff have been ca. £13,000 to £14,000 (2004) depending on experience (with average management salary of £25,000). Staff costs accordingly would total ca. £430 million, equal to ca. £473 million in 2010[52]. Assuming staff costs comprise 72% of costs[53] the total cost block would be in the region of £656 million.

[51] The following section uses The UK Contact Centre Industry: A Study (BERR, 2004).
[52] Adjusting for cumulative inflation of 10% between 2004 and 2010.

85. No exact forecast of the exact rate of increase in customer traffic has been attempted. However, the introduction of Green Deal Finance could add significant pressure on call centre resources. The Central Office of Information (COI) has highlighted factors that could lead to increased demand for call centre resources. Of particular potential importance are the introduction of new computer systems, sudden increases in demand, or changed requirements prompted by policy change. Changes wrought by the introduction of Green Deal fall into each of these categories.

86. Therefore, it is pertinent to estimate the scale of resource requirement that might be observed. One possible comparator is the introduction of Smart Metering, where our analysis for Impact Assessments expects the volume of calls to drop by ca. 30%. The introduction of Green Deal need not result in a change of this magnitude, since Smart Meters will be installed in all households and SMEs, whilst Green Deal Finance will only apply to a segment of consumers.

87. Projections of take up are used to build a scenario of the possible increase in call frequency. Again using trajectories shown in Annex 4 (tables 4a and 4b) below, the illustrative total numbers of measures are 5.5m and 3.4 m per year over the period (high and low scenarios). At the extreme end of the scale, if one assumes that this equates to separate measures being installed in separate properties, this represents a significant percentage (13 - 21%) of the customer base of UK energy companies, whose franchises cover practically the entire population. For sake of illustration, using this proportion, and assuming further that this volume adds a corresponding amount to the cost base of call centres, the resulting increment would be between £85m to £135m p.a. However, this is a conservatively high estimate of costs given that one would expect many of the measures to be installed as packages in individual properties. This has not been modelled for this development stage IA.

[53] Thus ignoring the effect of scale economies.

Title:	Impact Assessment (IA)
Section A.1 allocation of liability for default on Green Deal charge (Addendum to Energy Bill Impact Assessment)	IA No: DECC0015A (amended)
Lead department or agency: Department of Energy and Climate Change	Date:
Other departments or agencies:	Stage: **Error! Unknown document property name.** for primary, development for secondary
	Source of intervention: **Domestic**
	Type of measure: **Primary legislation**
	Contact for enquiries: Joseph.Hamed@decc.gsi.gov.uk

Summary: Intervention and Options

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

For the Green Deal to help reduce the barrier of upfront capital costs and minimise financing costs it is important that all parties' incentives are correctly aligned to minimise the risks of default. Appropriate arrangements for liability for default can reduce adverse selection and credit risks. It can incentivise finance providers to take reasonable measures to assess the riskiness of Green Deal opportunities at their initiation and to properly assess the credit risk of all parties involved. It can also reduce operational risks by incentivising those processing payments to do so promptly and those responsible for pursuing missed payments robustly. Primary legislation can specify a clear definition and firm legal standing for this liability and avoid inconsistencies that could otherwise create doubt or complications amongst potential investors.

What are the policy objectives and the intended effects?

The policy objective is to strike the correct balance between the risks involved in the Green Deal to finance providers, the costs of default and the potential socialisation of energy company liabilities.
Reducing the risk of default on Green Deal payments is expected to lead to improvements in the terms of finance offered to Green Deal customers and therefore increase Green Deal take-up. However, exposure of Energy Companies to liabilities, risks an impact on their balance sheets and increases their costs of borrowing which could ultimately be passed on to energy customers in the form of higher energy prices.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

All options are considered against a counterfactual of no Green Deal and no continuation of a supplier obligation to improve the energy efficiency. An option describing the implications of not specifying liability is also discussed but is not considered in the detailed cost benefit analysis.
Options for default liability:
1 – Energy company fully liable for GD repayments
2 – finance providers bear the cost of customer default on Green Deal charges. Energy companies are also required to share data on payment history with Green Deal providers.
3 – (preferred option) collected payments are shared in proportion to Green Deal charge and energy bills, the remaining loss is borne by finance providers. Energy companies are required to pass information on customers' payment histories to finance providers to help them assess risk.
The preferred option offers balanced incentives for the finance provider (who will be entering into credit agreements and providing finance) to monitor the risk of Green Deal investments, whilst also ensuring the energy supplier is incentivised to collect and pass on payments in a timely manner. Finance providers' risk assessments are informed by the provision of information on customers payment histories from energy companies to all providers on a level playing field. This is expected to minimise the costs of default of the Green Deal and to avoid potential distortions from loading energy companies' balance sheets with additional liabilities. This also reduces the risk that the number of non-performing Green Deals damages the reputation of the Green Deal and has a second round impact on take up. Specifying these three requirements in regulations will prevent uncertainty and avoid the need for potentially costly and complicated agreements to be struck and support the possibility for lower interest rates and greater Green Deal take-up, and provide greater certainty for all parties.

Will the policy be reviewed? Secondary legislation will be subject to consultation and further impact assessments What is the basis for this review? This will be developed alongside secondary legislation	
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	This will be developed alongside secondary legislation

Summary: Analysis and Evidence

Policy Option 3

Description: Finance providers take liability for customer default on Green Deal charges, with energy companies (as agents of the finance providers) required to split collections proportionately between the two claims

Price Base Year 2010	PV Base Year 2010	Time Period Years 52	Net Benefit (Present Value (PV)) (£m)		
			Low:	High:	Best Estimate: 5,200

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low				
High				
Best Estimate				9,500

Description and scale of key monetised costs by 'main affected groups'

No costs or benefits are expected to arise from primary legislation.
Illustrative costs and benefits based on affordability are included in the table above in accordance with advice from BIS/BRE, these are not additional to the scenarios presented in the overarching impact assessment as they are quantified against a counterfactual of "no Green Deal" and no supplier obligation.
The scenario described here represents the outcomes of an analysis of the relationship between technical potential for domestic insulation measures and affordability without the context of consumer preferences or any interaction with the future Energy Company Obligation.
Costs of customer default (£78m-£108m) for the high and low take up scenarios.
Energy companies will face costs of sharing data with finance providers (potentially up to £38m).

Other key non-monetised costs by 'main affected groups'

Reduced costs to energy companies of bearing liabilities.
Reduced potential costs of restricting competition in the energy and Green Deal markets.
All costs associated with non-domestic sector Green Deals.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low				
High				
Best Estimate				14,700

Description and scale of key monetised benefits by 'main affected groups'

No benefits are expected to arise directly from primary legislation
Illustrative costs and benefits for secondary have been presented (as mentioned above)
Increased Green Deal take-up would deliver additional benefits (after accounting for the costs of measures) to customers in terms of energy saving and greater thermal comfort, and to society in terms of reduced carbon emissions, improved air quality and a reduction in the requirement to purchase EU ETS allowances.
Improved financial terms to customers will enable energy companies to pass more of the cost of meeting the Energy Company Obligation on to the direct beneficiaries.

Other key non-monetised benefits by 'main affected groups'

Second round benefits of reducing risks, from reducing the rate of non-performing Green Deal arrangements that might damage the reputation of the Green Deal to future customers and investors and have a second round impact on take up.

Key assumptions/sensitivities/risks — Social Discount rate (%): **3.5-3%**

Financial market confidence is difficult to predict .Several aspects of GD undefined, the ranking of options in terms of risks and benefits is expected to be correct, but the magnitudes are speculative.
GD trajectories are illustrative, the analysis is based on "financial affordability" and does not describe likely take up of the Green Deal, as the interaction of the energy company obligation, consumer preferences, and financial affordability will determine take up.

Direct impact on business (Equivalent Annual) £m):			In scope of	Measure qualifies
Costs: 0	Benefits: 0	Net: 0	**Yes**	IN

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			Great Britain		
From what date will the policy be implemented?			01/01/2010		
Which organisation(s) will enforce the policy?			No enforcement for primary		
What is the annual change in enforcement cost (£m)?			No costs for primary		
Does enforcement comply with Hampton principles?			Yes/No		
Does implementation go beyond minimum EU requirements?			Yes		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			Traded: 0	Non-traded: 0	
Does the proposal have an impact on competition?			Not at primary		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	Micro 0	< 20 0	Small 0	Medium 0	Large 0
Are any of these organisations exempt?	No	No	No	No	No

Evidence Base

Overview

88. This section discusses the costs and benefits of regulations that are intended to define the ownership and status of the risk of deficient or late payment of the Green Deal finance charge. The benefits of increased investment in energy efficiency improvement that might result from better financial terms are compared to the costs that liability might impose on energy companies' financial position.

89. The specific costs and benefits of this amendment cannot be costed with accuracy before decisions on the details of the secondary legislation have been made. Further, many of the costs and benefits for subtleties of the potential Green Deal finance system are difficult to predict without also estimating how the market might develop. As such this section is based primarily on a qualitative assessment of the costs and benefits, although some quantitative analysis of the potential impacts is presented in line with the illustrative scenarios in the rest of this Impact Assessment.

Problem under consideration

90. The problem under consideration is how the liability for customer default or losses due to late payment should best be shared between finance providers and the energy companies. The appropriate arrangements for liability can overcome moral hazard and adverse selection and incentivise risk management on the part of finance providers and prompt collection on the part of energy companies.

Rationale for intervention

91. The Green Deal finance relationship is subject to the risk of adverse selection, notably the greater energy companies' share of cost of default (as opposed to finance providers) then the less finance providers face an incentive to require risk assessment of customers and to check the credentials of other counterparties (such as installers and assessors). In the extreme, if finance providers faced no downside risk then there might be circumstances when they prefer more risky Green Deal opportunities to safe ones, essentially having loans underwritten by energy companies. This problem could be exacerbated significantly in a model where deals were arranged by a small number of agents acting on behalf of a diverse pool of investors. In such a case it can be difficult for the investors to collectively ensure that agents are properly incentivised.

92. The relationship between Green Deal finance providers and Energy Companies who administer repayments is potentially subject to a moral hazard. This is where one party (in this case the finance provider) would benefit from the actions of others (collection of the Green Deal charge by energy companies) who may not be fully incentivised to carry out that action. Whilst energy companies have a direct financial incentive to collect energy bill payments, their incentive to collect Green Deal charges is based on regulatory enforcement. Financial market confidence is likely to be greater if energy companies face an immediate financial incentive to collect payments and pursue Green Deal debt. An indirect incentive such as a fine associated with failure to comply with licence conditions might be perceived as a weaker incentive, and would not provide any compensation to the finance providers for their losses.

93. In order that finance providers are able to make informed judgements of the risk associated with any Green Deal investment they will benefit from access to information that energy companies hold on customers' payment history. Whilst energy companies may have some incentive to make this information available, it will be that this information is available promptly and consistently in a large number of cases to reduce the potential for adverse selection. This data will also enable those providing finance to acquire a more accurate risk rating from ratings agencies. This should enable them to achieve more competitive interest rates should they seek to refinance Green Deal investments.

94. Defining liability for the risk of default can offer all parties clarity on the risk and align the incentives of energy companies and finance providers. The Green Deal is intended to reduce barriers to investment caused by upfront capital costs. Reducing both moral hazards and the risk of adverse selection should lead to favourable Green Deal terms and promote take up of the Green Deal. This should ultimately contribute to carbon emissions reduction targets, resulting in the benefits of energy savings, CO_2 emissions, air quality and comfort that have been identified in the overarching section of this impact assessment.

Policy objectives

95. The direct objective is to define responsibility for repayment processing and liability structures, increasing finance providers confidence by reducing their expected losses from deficient or delayed repayments; and to avoid over-exposing energy companies to a significant deterioration in their financial position in order to protect consumers from potential knock-on impacts on energy prices, and to maintain capability to make future investments.

96. Increased investor confidence is expected to lead to more attractive financial offers to customers, which is expected to increase take up of the Green Deal.

Definition of main parties

97. In the analysis that follows we refer to, three main parties:

    a. **Finance providers** are those who provide cash up front to cover the costs of Green Deal installations and who are in turn entitled to collect the Green Deal charges when they are repaid by the customer. In practice this could include financial institutions and/or Green Deal providers depending upon the finance model. Where a financial institution's capital is at risk, it may itself place requirements on Green Deal providers accessing finance that will minimise default and delinquency risk.

    b. **Energy companies** – who are responsible for collecting payments from customers and passing them to finance providers.

    c. **Customers** – who agree to pay the Green Deal charge that is attached to their energy meter.

98. Other parties such as those installing or those arranging Green Deal agreements are not considered in detail, although are sometimes referred to. In principle, a single entity might take on several roles in this process, in which case it can be assumed that the moral hazards are dealt with within the organisation. However, such entities will still be required to work with others, in particular energy companies are responsible for making repayments to any finance provider.

Policy options

99. As in the rest of this impact assessment all options are compared to a counterfactual in which Green Deal powers are not used and there is no continuation of the existing supplier obligation[55]. Under this counterfactual it is assumed that take up of most of the main measures modelled in this impact assessment are negligible[56]. The options considered in detail in this impact assessment are as follows:

    a. Option 1 – energy company liable for customer default – the energy companies bears the full liability for default losses that might be incurred by their customers.

    b. Option 2 – finance providers bear the cost of customer default on Green Deal charges. Energy companies are also required to share data on payment history with Green Deal providers.

    c. Option 3 – the total amount collected is divided proportionately between the amount owed for the energy charge and the amount owed for Green Deal charges on the meter[57]. Finance providers bear the cost of any residual, uncollected Green Deal charges. Energy companies are also required to share data on payment history with Green Deal providers.

100. The preferred option is option 3. This option incentivises finance providers to make appropriate risk assessments, and requires energy companies to provide them information to help that assessment. This also provides energy companies with a direct financial incentive to collect outstanding Green Deal payments. Finance providers will also be reassured by their right to receive a share of any collected revenue. Energy companies are required to share information with finance providers so that they can make appropriate risk assessments using information on payment histories.

101. A non regulatory option has also been considered. This option would entail leaving the regulations without specifying who bears the liability for default. It is difficult to predict the outcomes

[55] This counterfactual is that used for the purposes of the overall impact assessment.

[56] This is based on the assumption that conventional loans have been available for some time, and there has not been significant uptake of household energy efficiency measures such as insulation, other than that delivered through other policies, such as the boiler scrappage scheme, previous supplier obligations, or as mandated by building regulations.

[57] Therefore, if the Green Deal Payment is 20% of the total amount of the bill, suppliers pass on 20% of whatever payment they do receive from the customer.

of this option as it would depend on the relationship between energy companies and finance providers. In principle, for a Green Deal to occur these parties would need to come to some arrangement that specifies the relevant liabilities. In practise such an agreement would be very difficult to make robust whilst preserving consumers right to switch energy supplier. There is no reason that a new entrant to the energy market would need to sign up to previous agreements that might determine liability and payment responsibilities. It would be unlikely that they would opt to take on risks and responsibilities that increased their costs. The risk that a consumer would make such a switch and undermine the agreement would represent a great uncertainty in the eyes of finance providers and may significantly reduce their appetite for Green Deal investments. For these reasons it is considered that this option would result in minimal Green Deal activity, and this option is not considered in detail in the cost-benefit analysis that follows.

Costs and benefits

102. In this section the monetised costs and benefits are listed along with the qualitative considerations. This is followed by an assessment of each option against each cost, benefit and qualitative factor. Costs and benefits are summarised in the two tables at the end of this section, along with the discussion of the relative merits of the options.

Costs

103. The following costs may result from the regulation and each is discussed in turn for each option below:

a. **Costs of customer default** – These costs arise from two sources, potential adverse selection that could lead to high risk investments being made, and potential moral hazard with energy companies lacking an incentive to process payments. The first risk is greater when Green Deal providers lack an incentive to check credentials of customers and other parties involved in the installation of the measure. The second risk is greater where the energy company lacks a direct finance incentive to process payments promptly and pursue missed payments. The illustrative total level of default discussed in section A of this impact assessment is in the range £136m to £216m depending upon the take-up scenario (based on the default rate for energy bills). Around half of this was considered (for illustrative purposes) to reflect resource costs associated with default. These might be administrative costs such as pursuing payments and enforcing sanctions. The options considered here are expected to have an impact on that default rate, and on the total costs of default. Table A2 below describes three alternative write-off rate scenarios[58] and a reference rate based on write-off rates for unsecured lending (see section A). The specific default cost that is considered to be relevant to each scenario is presented in the discussion of each option.

Table A2: default cost scenarios in relation to reference write off rates

	Write-off rate (%)	Total write-off (£m NPV)		Cost of default (£m NPV)	
		low take-up	high take-up	low take-up	high take-up
Low - Option 3	1.5	136	216	68	108
Medium – Option 2	2.7	242	384	121	192
High - Option 1	3.8	348	552	174	276
Benchmark - consumer lending	5.0	453	720	227	360

b. **Costs of providing data on customer payment histories** – for options where finance providers are incentivised to make risk assessments, availability of good data on payment histories is important, both to make an accurate assessment at the outset, and to enable access to low cost finance. This requires energy companies to make information available to Green Deal providers as part of the Green Deal process. This will constitute an additional cost to business as the requirements are likely to require additional effort on the part of energy companies.

[58] The medium and high rates are based on 33 and 66% points in the range between the energy bill rate and the benchmark.

Benefits

104. The following benefits may result from the regulation and each is discussed in turn for the options below:

a. **Static impacts on Green Deal take-up** – An improved risk rating leads to higher investor confidence which is expected to lead to lower interest rates and better deals for consumers. This benefit is supported by finance providers ability to provide comprehensive data on the payment history of Green Deal recipients, as this data can be used by ratings agencies to better assess risks and improve refinancing options. This leads to the benefits discussed in the overarching section of this impact assessment (energy savings, comfort taking, reduced carbon emissions, and air quality improvement). These installations also incur additional installation costs and hassle costs. However, as these result from (previously constrained) consumer choice, and as consumers are protected by the principle that repayments should not exceed bill savings, these installations are expected to constitute a net benefit to society.

Qualitative considerations

105. There are several qualitative considerations that have not been included in the net present value estimates:

a. **Financial accounting implications of energy companies bearing liabilities** – we have received financial advice on the accounting implications of the options. The accounting treatment of assets and liabilities is crucial, as under some options energy companies bear liabilities but cannot be credited with a corresponding asset. In this circumstance they face a deterioration of their credit status, and may face higher costs of capital or limitations on their capacity to borrow. Whilst this might be offset in principle by those who do hold the assets, this represents a distortion of the credit market.

b. **Competition in the energy market** – the possibility of a Green Deal charge potentially changes the relationship between customers and energy companies. This may have have implications for competition in the energy market by changing the costs faced by providers in line with the relative number of customers that enter into Green Deal arrangements.

c. **Competition in the Green Deal market** – This cost is not significant relative to the baseline as there is no Green Deal market foreseen in the absence of secondary legislation. However, under some of the options some potential Green Deal providers may be in an advantageous position in the Green Deal market.

d. **Dynamic impacts on Green Deal take up** – the analysis of take-up presented above is essentially static. There is likely to be a consumer and investor reaction to the observed level of default. For example if the default rate turns out to be high, this could damage the reputation of the Green Deal.

Option 1 – Costs and benefits of energy company liable for customer default.

106. Monetised costs:

a. **Costs of customer default** - in this case the finance provider does not face losses in the event that a risky investment does not perform. In principle finance providers have no incentive to prefer safer investments to more risky ones. This could continue up until the point where energy companies may struggle to cover the repayments. This would be expected to lead to an expansion in Green Deal investments, but a significant increase in the risks associated with those investments. Finance providers have no incentive to double check the credentials of customers, and other parties, such as installers or the initial Green Deal assessment, all of these factors checks would be expected to reduce the risks of non-performing Green Deal investments. This is considered to result in the high default costs monetised in table A2 above as between £174m and £276m. This cost is not considered to be higher than that for unsecured consumer lending, as there is still some security provided by the sanctions associated with energy bill default, and the possibility that a future bill payer will make future repayments.

b. **Costs of providing data on customer payment histories** – under this option energy companies might voluntarily provide information on payment histories to finance providers, as they bear the liability for default and face the costs of chasing payments, however there is no guarantee that finance providers would use that information to control the risks of their investment. Any costs would not be a direct consequence of regulation in this option.

107. Monetised benefits:

a. **Static impacts Green Deal take-up** – the risks to finance providers are relatively low as they do not bear liability for default. This should enable them to offer favourable financial terms to Green Deal recipients. An illustrative picture of the benefits from this take up scenario are presented according to a low interest rate scenario[59].

108. Qualitative considerations

a. **Financial accounting implications of energy companies bearing liabilities** – financial advice suggests that under this option energy companies will face a significant negative credit impact.

b. **Competition in the energy market** – under this option energy companies who happen to have more Green Deal customers will be disadvantaged with respect to other energy companies as they will face greater liabilities and a relatively high negative credit impact.

c. **Competition in the Green Deal market** – energy companies who were themselves Green Deal finance providers would face a disadvantage as their competitors (i.e. Green Deal providers that were not energy companies) would not bear the liability for default associated with the assets that they hold**.**

d. **Dynamic impact on Green Deal take-up** – The benefits described above are not considered to be sustainable in this option. Ultimately this option would be expected to increase the risk associated with Green Deal investments as described above. This may have second round impacts on consumer and investor confidence that could significantly reduce the benefits in the medium term.

Option 2 – costs and benefits of finance providers bearing liability for customer default.

109. Monetised costs:

a. **Costs of customer default** – the risks associated with adverse selection are expected to be minimised here, as finance providers face an incentive to make appropriate risk assessments of all parties involved. However there is an absence of a clear direct financial incentive for energy companies to collect payments on behalf of finance providers. This is likely to lead to a somewhat higher default rate, although the costs of each default may fall as energy companies may be less likely to incur resource costs in chasing non-payment of Green Deal charges[60]. The potential role of the regulator in enforcing licence requirements to process payments is expected to ensure some level of enforcement activity, although there may remain a risk to the timeliness of payments. This is considered to result in a lower level of default costs than option 1, and a figure of between £121m and £192m is used to quantify this costs corresponding to the medium default cost scenario presented in the table A2.

b. **Costs of providing data on customer payment histories** – under this option energy companies would be mandated to provide information on customers payment history to finance providers . This would better enable finance providers to make their assessments of risk and achieve a lower risk rating. However, this imposes a burden on energy companies of providing data, this is estimated to be between £27m and £38m[61] for the illustrative Green Deal take-up scenarios presented in annex 4.

110. Monetised benefits:

a. **Static impact on Green Deal take-up** – Without the implicit underwriting of payments by energy companies in option 1 risks to finance providers are higher in general, so higher risks can be expected. There is an additional risk from the finance perspective that relates to the moral hazard that energy companies are not incentivised to pursue missed payments and collect and pass on payments quickly. As discussed under the default costs sections there are some incentives provided by the regulatory framework, however these will not reassure finance providers as much as a direct financial incentive such as that present in option 3. In particular

[59] Specific rates have not been quoted as it is difficult to predict the likely levels that might emerge at this stage, this analysis is intended to explore the likely variation in take up for plausible differences in interest rates rather than simulate an absolute take-up trajectory.

[60] Although this in turn could be offset by potential action on the part of finance providers.

[61] These estimates are adapted from initial indicative information provided by energy companies, in conjunction with the illustrative Green Deal take-up trajectories presented in annex 4. The specific information provided is commercially sensitive.

there is no guarantee of timely compensation in the event that the regulator issues a fine to an energy company following investigation. The benefits are quantitatively illustrated according the low interest rate plus 2 percentage points.

111. Qualitative considerations:

a. **Financial accounting implications of energy companies bearing liabilities** – energy companies will face no costs from bearing additional liabilities. Finance providers are not materially worse of through holding liability, as they also hold the corresponding asset, that is, the claim on future payments.

b. **Competition in the energy market** – this option is not considered to have any adverse impact on competition in the energy market.

c. **Competition in the Green Deal market** – Under this option a finance provider who was vertically integrated with an energy company would have a competitive advantage over an independent finance provider. The reason for this is that the independent provider would be uncertain that the energy company's payment collection and processing systems had a direct financial incentive to process payments promptly. However, the vertically integrated finance provider could be certain of these issues as the moral hazard would be dealt with within the integrated company. This has a potential implication for the number of finance providers entering the Green Deal market.

d. **Dynamic impact on Green Deal take-up** - this option is not expected to lead to any significant second round impacts on take-up.

Option 3 – costs and benefits of parity – payments are split between finance providers and energy companies in proportion to the charge and the energy bill, with the finance provider bearing the cost of outstanding payments

112. Monetised costs:

a. **Costs of customer default** – the risks associated with adverse selection are expected to be minimised here, as finance providers face an incentive to make appropriate risk assessments of all parties involved. This is supported by the requirement for energy companies to provide data on customers' repayment histories that enables those assessments to be based on more information. This also providers an incentive for energy companies to pursue unpaid Green Deal charges to the same extent as they do energy bills. This assumed to lead to the lowest level of default corresponding to that of energy bill default rates (with which Green Deal payments share parity). This corresponds to the costs of £68m to £108m identified in table A2 above and that are consistent with those identified in section A.

b. **Costs of providing data on customer payment histories** – under this option energy companies would be mandated to provide information on customers' payment history to finance providers . This would better enable finance providers to make their assessments of risk and achieve a lower risk rating. However, this imposes a burden on energy companies of providing data, this has been roughly estimated to be between £27m and £38m[62] for the illustrative Green Deal take-up scenarios presented in annex 4.

113. Monetised benefits:

a. **Static impact on Green Deal take-up** – the risks to finance providers are relatively high as they bear full liability for default. However, counterparty risks are minimised as energy companies' financial position is largely maintained. In addition the exposure of finance providers to risk should encourage appropriate assessment of risks before Green Deals are agreed and provide an additional party to check credentials of recipients and third parties such as installers. These checks are supported by the mandatory provision of data on repayment history to finance providers. This will also enable finance providers attempt to achieve efficient refinancing of Green Deal investments and achieve further reductions in interest rates. The equal status of Green Deal and energy bill payments is considered to offer an incentive to energy companies that will reassure finance providers about the collection incentives of energy companies. These benefits are quantitatively illustrated according to an interest rate scenario which is 1.5 percentage points higher than the low scenario used to estimate the take up under option 1.

[62] See footnote 61 above.

114. Qualitative considerations:

a. **Costs of bearing liability** – energy companies will face no costs from bearing additional liabilities formally. Although there may be some deterioration of their financial position, since they have to share collected payments with Green Deal finance providers.

b. **Competition in the energy market** – this option is not considered to have any adverse impact on competition in the energy market.

c. **Competition in the Green Deal market** – parity is excepted to clarify the position of repayment incentives in the eyes of all potential Green Deal providers. This is expected to result in lower barriers to competition in the Green Deal market.

d. **Dynamic impact on Green Deal take-up** - this option is not expected to lead to any significant second-round impacts on take-up.

Comparison of costs and benefits

115. Table A3 summarises the monetised costs and benefits of the three options and table A4 summarises the non-monetised benefits.

116. The costs of default are highest under option 1 as finance providers lack an incentive to check credentials which is expected to lead to adverse selection and an increase in the underlying risk of Green Deals. Option 2 is expected to lead to lower costs of default, as there is no incentive for adverse selection. The costs of default are somewhat higher than under option 1 as they are expected to increase since energy companies do not face a direct incentive to collect payments. Option 3 is considered to lead to default risks on a par with those of energy bill collections and equivalent to those identified in Section A.

117. Benefits of take up are highest under option 1 where finance providers face less risk as their investments are essentially underwritten by energy companies. This enables them to offer lower interest rates at which more potential investments are affordable under the Green Deal alone[63]. Under option 2 benefits of take up are lowest as finance providers face full liability and energy companies lack a direct financial incentive to pass on charges promptly or to pursue missed payments. Whilst they might face a regulatory incentive, this is likely to offer less reassurance to finance providers (than option 3) who will perceive a higher risk.

118. Overall the net present value of option 1 is the highest, however option 3 is preferred on the balance of consideration of the qualitative considerations summarised in table A4. "-" implies an expected reduction in net benefits, "+" indicates an expected increase in net benefits, and "0" indicates no significant impact is expected. The four qualitative considerations are all expected to reduce the net benefits of option 1. This is expected to offset the difference in NPV caused by increased take-up. In particular the reputational risks to the Green Deal could directly undermine the monetised benefits of increased take up, whilst the implications for competition and the impact on energy companies balance sheets could lead to other sources of consumer detriment and costs to businesses. Option 3 offers the best balance between increased take up through greater financial confidence, and qualitative considerations.

[63] The possibility for contributions from other sources has not been taken into account in the analysis.

Table A3: Monetised costs and benefits

PV £bn, 2010		**Option 1** Energy company liable	**Option 2** Finance providers bear losses	**Option 3** parity
Costs				
Costs of consumer default		0.17 -0. 30	0.12 - 0.19	0.07 - 0.11
Energy company costs of providing data		-	0.03 - 0.04	0.03 - 0.04
Static impact on Green Deal take up	installation costs	6.4	5.0	5.4
	administration	1.2	0.9	1.0
	other household costs	3.7	2.6	3.0
Benefits				
Static impact on Green Deal take up	Energy savings for society (non-traded)	6.3	4.9	5.4
	Energy savings for society (traded)	2.5	2.0	2.2
	Carbon savings (non-traded)	4.2	3.3	3.6
	Carbon savings (traded)	0.2	0.2	0.2
	Total air quality impact	0.2	0.2	0.2
	Comfort	3.6	3.0	3.2
Monetised Net Present Value		**5.6**	**4.9**	**5.2**

Table A4: qualitative considerations

	Option 1 Energy company liable	**Option 2** Finance providers bear losses	**Option 3** parity
Financial accounting treatment of liability	-	0	0
Competition in energy market	-	0	0
Competition in Green Deal market	-	-	0
Dynamic impacts on Green Deal take-up	-	0	0

Methodology for estimating the sensitivity of static Green Deal affordability to the interest rate

119. This section briefly summarises the methodology for quantifying estimates of the benefit of static impacts on Green Deal affordability in different interest rate scenarios. The methodology is as follows (further detail and underlying assumptions is presented in annex 7) :

a. The technical potential (or high or low take up scenario) is disaggregated into a number of "situations" each describing the building/dwelling's size and primary fuel.

b. The installation costs of each measure in each situation are estimated according to fixed and variable cost assumptions, including household cash costs, excluding other household costs (i.e. value of lost floor space or time).

c. The estimated energy savings for each measure in each situation are scaled according to the building/dwelling size, according to adjustment factors that have been estimated by Ofgem.

d. Other time varying factors such as learning effects, expected trends in boiler efficiency and energy prices are incorporated as described in annex 7.

e. The maximum amount that could be borrowed is estimated according to the present value of the expected savings described by (c) and (d) for a given interest rate. If this is greater than the

total installation cost described in (b) then that installation is classified as affordable at that point in time[64].

120. This is an estimate of the affordability of technical potential, not an estimate of actual take up or the desirability of these investments to consumers. The latter is a function of the interaction of consumer preferences and their personal discount rates, as well as technical potential and the terms of the financial offer and suppliers activity to meet the Energy Company Obligation. The scenarios produced by this analysis are therefore not directly comparable to the high and the low trajectories introduced in the overarching section of this impact assessment. Instead this analysis explores the likely sensitivity of those trajectories to different interest rate scenarios, in the absence of any assumed energy company obligation. This analysis examines the sensitivity of these trajectories to one of the potential sources of variation, and therefore does not supersede the assumed installation trajectories.

Risks and Assumptions

121. Financial market confidence is difficult to predict and the assessment of ratings agencies will depend upon the details that they observe in practice and the arrangements that are outside of the scope of this legislation. Furthermore the exact interest rate will be determined by characteristic of potential finance providers as well as the assessment of risk and the characteristics of the investments themselves.

122. The modelled installations trajectories are illustrative, reflective only of technical potential and modelled financial affordability, this does not reflect consumers preferences either for the measures themselves, or the finance offers that may face them, not does it account for likely energy company behaviour to meet the energy company obligation.

Direct costs and benefits to businesses

123. No direct costs and benefits at primary stage as secondary legislation is required before the Green Deal can commence. Costs and benefits would be realised at that stage. If required, a compensatory 'out' will be identified for any 'in' as and when secondary legislation is proposed.

124. The costs and benefits of the Green Deal as a whole are assessed in the overarching IA. In itself, the allocation of liability will not result in any net cost to business, as the vast majority of costs will be a transfer between businesses, i.e. between Green Deal providers and energy companies..

125. **Costs of default** – it is expected that a large fraction of this cost will be borne by energy companies activities in pursuing missed payments, this is expected to lead to the region of £78m - £108m in NPV terms for the illustrative Green Deal take up scenarios between 2013-2020. These costs are in line with those identified in section A of this impact assessment.

126. **Costs of bearing liability** - Potential costs to business could result from other options, where customer default liability borne by energy companies might increase, however the preferred option minimises these costs.

127. **Energy company costs of providing data to finance providers** – The exact size of this cost to energy companies will depend on the specification of secondary legislation however initial estimates (described above) suggest that this might constitute a total cost to business of £27m-£38m, in NPV terms for the period 2013-2020 according to the illustrative scenarios presented in annex 7.

[64] As a simplifying assumption, each investment opportunity is appraised once as described by the take up scenarios. Opportunities are not reassessed later, when expected learning effects or energy price trends might change the affordability assessment.

Section B Green Deal – Accreditation of Assessors and Installers	Impact Assessment (IA)
	IA No: DECC0015B
	Date: 09/12/2010
Lead department or agency:	Stage: Final for Primary Legislation / Development for Secondary
Other departments or agencies:	Source intervention: Domestic
Summary: Intervention and Options	Contact for enquiries: Benedikt.koehler@decc.gsi.gov.uk

What is the problem under consideration? Why is government intervention necessary?
The overarching section refers. Problems are that many consumers: either are not aware of their carbon footprint or do not know how to reduce their carbon footprint; have no expertise in assessing the energy efficiency of their property or the quality of installations and of installers; and are inexpert in the planning process and in obtaining consents. Experience in other countries suggests that damages can be large, and the take-up of energy efficiency measures severely hampered, if workmanship is of a poor quality. These problems necessitate a considered market regime for accreditation of trades people to increase the take-up of cost-effective energy efficiency measures.

What are the policy objectives and the intended effects?
Green Deal will be a catalyst for consumer demand for energy efficiency measures to generate supply of energy advice, installation of measures, and finance. A regulatory regime will facilitate the supply of good quality and trusted advice and installations.
Market-led action to improve energy efficiency in the built environment will reduce the need for subsidised measures.

What policy options have been considered? Please justify preferred option (further details in Evidence Base)

Option A: Green Deal does not proceed ("Do nothing")
Option B: Green Deal proceeds without mandatory accreditation regime
Option C: Green Deal proceeds with accreditation regime ("Preferred option")

When will the policy be reviewed to establish the actual cost and benefits and the achievements of the policy objectives?	**Review to be decided by Secondary Legislation**
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	**To be determined in preparing for Secondary Legislation**

Summary: Analysis and Evidence
Description:
Primary powers to allow Government to frame an appropriate Green Deal accreditation scheme.

Price Base Year 2010	PV Base Year 2010	Time Period Years 8	Net Benefit (Present Value (PV)) (£m)		
			Low: -6	High: -10	Best Estimate: -

COSTS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition)	Total Cost (Present Value)
Low	-	-	6
High	-	-	10
Best Estimate	-	-	-

Description and scale of key monetised costs by 'main affected groups'
Primary legislation imposes negligible costs, whilst stakeholders await secondary legislation. Possible secondary legislation will affect householders, energy assessors and installers. Already in today's market, some accreditation costs are involved in the supply of energy efficiency installations. Existing similar or voluntary accreditation schemes are thought to have costs in the low £millions per annum (see table B5, costs are in range between £6 and £9.9 million); the preferred option c) (Government framework) may add costs. Further work will be carried out to accompany consultation on secondary legislation.

Other key non-monetised costs by 'main affected groups'
See above

BENEFITS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition)	Total Cost (Present Value)
Low	-	-	-
High	-	-	-
Best Estimate	-	-	-

Description and scale of key monetised benefits by 'main affected groups'
Benefits from primary legislation are nil.
Benefits from secondary legislation benefits are likely to include the increased take up of energy efficiency measures (overarching section refers). The reduction in risk of damages is potentially significant. For example the value of one month's installation business (in scenarios up to 100,000 installations) could exceed £150m. In addition to reducing the costs of interrupting the rollout of measures, in case of a recall reduced costs would also include lower making good costs and indirect damages.

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks
For primary legislation, n/a.
For secondary legislation, see below.

Impact on admin burden (£m):			Impact on policy costs (£m):			In scope
Costs: 0	Benefit: 0	Net: 0	Costs: 0	Benefits: 0	Net: 0	Yes

What is the geographic coverage of the policy/option?			**Great Britain**		
From what date will the policy be implemented?			**2012/13**		
Which organisation(s) will enforce the policy?			**Not decided**		
What is the CO_2 equivalent change in greenhouse gas emissions?			**Traded: 0**	**Non-traded: 0**	
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs: 0**	**Benefits: 0**	
Does the proposal have an impact on competition?			**Not at primary stage**		
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro 0**	**< 20 0**	**Small 0**	**Medium 0**	**Large 0**

Policy Background

128. The Green Deal will provide consumers with the opportunity to install energy efficiency measures, repaying installation costs over time through savings on their energy bills. Confidence in the professionalism of assessors and installers of energy efficiency measures will strengthen consumer demand for energy efficiency measures that help the UK to meet its carbon budgets cost-effectively.

129. It is paramount that consumers feel assessors and installers are trustworthy and reliable.

Primary powers proposed

130. Primary legislation proposes Government frame an accreditation regime via secondary legislation.

131. The following sections first provide a high level comparison of individual options for secondary legislation with discussion of costs and benefits.

132. Potential options are as follows:

a. Option A: Green Deal does not proceed ("Do nothing")

b. Option B: Green Deal proceeds without mandatory accreditation regime

c. Option C: Green Deal proceeds with accreditation regime ("Preferred option")

Options Evaluation

133. The following table features policy options. Further discussion follows.

Table B1: Appraisal of options

Criteria	Option A: Green Deal does not proceed ("Do nothing")	Option B: Green Deal proceeds without mandatory accreditation regime	Option C: Green Deal proceeds with accreditation regime ("Preferred option")
Overcoming market failures (information asymmetry) and barriers (inertia)	No change	Existing voluntary structure provides some help	Sets standards; delegates certification where possible
Effect on Market	Consumer detriment persists	Market inefficiency persists	Facilitates market efficiency
Cost	N/A	Defective installations could incur costs of hundreds of £ millions (see Australian example)	Administration and training costs

Option A: Green Deal without mandatory accreditation/certification

134. There are disadvantages to permitting market forces to provide advisory and installation services to householders without requiring accreditation.

135. In efficient information markets, competition raises quality. In inefficient information markets, on the other hand, competition is blocked. An example is markets where sellers have no prospect of repeat sales and hence care less about their reputation.

136. Where inefficient markets impair competition, consumers require protection. Markets for advice and installation are a case in point. Providers of energy advice and installation compete in a market

with little prospect of repeat sales, which weakens the incentive to safeguard reputation as a key competitive strength.

137. Consumers, on their part, find it difficult to observe differences in quality of assessors and installers competing for custom. Moreover, when assessors and installers are tied to particular providers, consumers may have doubts whether advice is impartial.

138. Consumer needs are heterogeneous, and each consumer needs individual advice. Consumers need to spend time and effort to evaluate the quality of assessors. However, the market has no mechanism to evolve a quality benchmark. In the absence of repeat sales consumers have no comparators to assess the quality of professional services.

139. The appropriateness of measures transpires only once measures have been installed. Consumers discover quality *ex post*. By then, consumers have expended costs in terms of time and effort. Without the prospect of repeat sales and of established means to seek redress, such risks act as a deterrent to taking action.

140. The rationale for imposing accreditation is to avoid the detriment to consumer welfare where suppliers can enter the market without quality checks. The potential detriment would lie in undetected underperformance of domestic energy installations, and in low quality of supply. Evidence from Australia, set out below in Box B1, shows that these costs can be considerable.

141. Stories of so called "cowboy builders" carrying out shoddy workmanship would reduce trust and credibility for the overall scheme. The experience of the Australian market refers.

Option B: Costs from non-accreditation

142. In markets where consumers lack the means to evaluate the quality of goods, information asymmetry between buyers and sellers implies product quality becomes transparent only after the purchase has been concluded. In such circumstances, consumersmay suffer damage from substandard goods and services that have been offered in the market without restriction.[65]

143. An apt illustration for this contingency is the sequence of events in 2009 in Australia's domestic energy efficiency market, where absence of quality monitoring inflicted substantial damage on consumers. The following section discusses the Australian experience. A synopsis of the Hawke report's diagnosis of the failures in this case is presented in Box B1[66].

144. Australia's Aus$2.4 billion Energy Efficient Homes Package offered consumers a staggered set of rebates on investment in measures.[67] The programme applied to some 2.9 million households. The effect was dramatic, with demand for installations increasing by a factor of six.

145. The attractive subsidy – roughly equivalent to the entire upfront cost of installation - led to a rapid expansion of the insulation-installation industry and numerous under-qualified installers entered the market. Quality assurance procedures were stretched: specifically, metal foil insulation on roofs has been linked to many fires and even to fatalities resulting from interaction between foils and electric wiring. Damages in terms of repairs have been substantial, not to mention the loss to consumer confidence.

146. The damage has been considerable. Faulty interaction between electrical wiring and metal foil led to accidents where five contractors have been killed, and 87 houses caught fire. The government's rebates of ca. A$1 billion have been exceeded by repair costs of some A$1.5 billion. In addition to costs from repairs, government expenditure has been directed towards safety inspection of homes, and for compensation to installation companies following termination of the scheme. The cost of income support for redundant workmen alone comes to A$41 million.

147. Australia's experience serves as a proxy for demonstrating the potential costs ensuing from a market that does not preclude market entry by market professionals without regard to independent validation of qualifications. It is pertinent to evaluate what costs might arise in the UK market.

---

[65] Rational economic behaviour would be for a consumer to exhibit a measure of trust in a counterparty that equals that counterparty's trustworthiness. Markets are inefficient when customers have too much or too little trust. See: Braynov, S., and Sandholm, T. (2002) Contracting With Uncertain Level Of Trust. Computational Intelligence 18(4): pp. 501-514

[66] Hawke (2010), "Review of the Administration of the Home Insulation Programme" http://www.climatechange.gov.au/~/media/publications/energy-efficiency/Home-Insulation-Hawke-Report.ashx

[67] Aus$1,200 for owner-occupied dwellings, Aus$1,000 for rented properties

148. Repercussions in terms of costs would be considerable. The volume of installations envisaged under Green Deal are potentially substantial and any reputational damage to the market would stymie the up scaling of installation rollout. The commercial value of insulations per annum, could reach several billion Pounds Sterling. A discussion of scenarios follows.

Box B1 - The Australian Home Insulation Programme

In 2000 the Australian Home Insulation Programme, a component of the Energy Efficient Homes Package, took over from, and expanded, an existing energy efficiency programme; with the additional aim of generating an economic stimulus to support jobs and small businesses.

The programme had funded the installation of insulation in over 1 million homes, in less than a year of the full scheme being in place. It was terminated in February 2010 amidst concerns regarding poor quality workmanship and materials, fraud perpetrated by unscrupulous operators, and reports linking over 100 house fires and four deaths to the installation of insulation.

The Hawke report identified a number of key issues with the HIP and its implementation:

- A strong and consistent regulatory framework is important to minimise risks and safety issues in relation to installation of insulation.
- Rapidly scaling up delivery meant relying on untested new entrants to the industry, which had consequences for the possibility of fraud and low quality work
- Shortages in the supply chain led to the use of new or imported products which some have claimed were inferior;
- Householders incentive for vigilance was reduced due to the lack of an upfront payment and no requirement for multiple quotes (between June and November 2009)
- Risks were identified and mitigated via a fraud and compliance program, a registration regime, a national training program, and modifications to the regime.
- There were short timelines for implementation of the compliance and audit regime.
- Compliance and audit processes that were in place were overwhelmed by unforeseen levels of activity under the HIP.

Option B: Scenarios of damage costs

149. Some consideration of the potential scale of damages in a market without accreditation is in order; the following discussion is high level but gives an indication of order of magnitude.

150. Drastic damages of the scale experienced in Australia are highly unlikely in the UK. However, given the small size of the Australian market, even minor installation 'recalls' would incur substantial costs.

151. The following table shows illustrative scenarios for the size of the UK installation market over the period 2012 until 2020.

Table B2: Measures and installations in the UK

Measure	Number of installations (m)	
	Low	High
Lofts	2.3	3.4
Cavity wall	0.5	2.3
Solid wall	1.8	2.2
Glazing[68]	0.7	1.0
Party wall	0.5	0.7
Insulated doors[69]	1.3	1.9

[68] Additional to Building Regulations

152. Assuming insulations were found to require repair, the effect would be drastic. Considering an annual installation rate for cavity wall insulations of up to 300,000, equal to a monthly figure of some 24,000: it follows that even a short interruption of this ambitious programme may cause material holdups. The impacts on business from delays in Green Deal rollout by only a single month would be considerable, e.g. in terms of business turnover:

Table B3: Rollout delay loss of business turnover

	in £ million	
	Low	High
Lofts	£7	£10
CWI	£2	£9
SWI	£143	£174

153. Direct costs would comprise repairs of low quality insulations, while compensation to installers for loss of income, if rollout were to be suspended by Government, would represent a transfer. Other impacts would comprise the loss of consumer confidence and consequent reduction of transaction volume, leading to a more shallow trajectory of Green Deal rollout and consequent delay and reduction in carbon and energy saving benefits.

154. The discussion now turns to the costs and benefits from the introduction of accreditation and certification schemes.

Option C: Green Deal with Accreditation/Certification

155. Quality control imposed by regulation remedies this shortcoming. The Green Deal eliminates impediments to consumer action by providing quality assurance of energy advice.

156. Accreditation and certification are two related but distinct activities. 'Certification' is the process that leads to ascertaining someone has a particular qualification, and 'accreditation' is the process by which certification is awarded responsibly. Each activity comprises particular costs.

157. An independent, arm's length body should validate qualifications of assessors and installers. However, it is not the intention to preclude wider market entry of suppliers without independent certification. Subject to further consideration, accreditation and certification will be optional. Market forces would determine whether an independent certification regime succeeds. However, it is expected that the Green Deal Finance mechanism will only accept accredited assessors and installers.

158. Consumers would receive an assessment of likely savings and payback periods of the most appropriate measures for their home and their particular circumstances. This would inform their choice of installation.

159. In addition, the assessment would be transferable between prospective Green Deal providers. Consumers may shop around for the best deal once they have received their recommendations. A clear qualification, accreditation and redress mechanism would enable consumers and their Green Deal Providers/ finance providers to rely on recommendations.

160. Accreditation will protect consumers against poor advice and facilitate an effective complaints procedure.

161. An accreditation scheme sets standards for market entry, the training curriculum, and the process and methodology for calculating the carbon, energy and bill saving potential from energy efficiency improvements. Independent authorities would vet assessor and installer quality. Quality control is a badge that helps convince consumers of the credibility and worth of services on offer. In this way, higher professional standards in the domestic energy sector help to reduce customer inertia.

162. The accreditation regime of assessors and installers has several variants. They share the aim of designing a two-layered regime where Government would mandate a public sector regulator to oversee private sector certificators responsible for codes of practice.

[69] Additional to Business-as-usual (see Annex 4)

163. Oversight of assessor and installer quality within a framework designed by Government offers inherent advantages, especially trust in independence of the process. However, this approach may impose additional cost on the system without compensating benefits. One obvious example would be that a Green Deal provider may prefer to deploy their own assessor, in which case government accreditation would have burdened the process with costs. The options for Government-designed framing of the accreditation/certification regime are discussed presently.

164. In all cases, the framework aims to obviate the potential market failure that customers are undersupplied either with quality or quantity of goods and services. It is pertinent to set out our evaluation of potential costs that have been observed in a market that did not provide for quality control through accreditation. The review of market developments in Australia (above) explains why this option is rejected.

Option C: Discussion of Costs and benefits

165. Introduction of an accreditation/certification scheme is not costless. Evaluation of these costs requires some evaluation of the market context. An evaluation of costs and benefits of accreditation and certification follows.

166. Government control of the entire accreditation and certification process precludes the risk of regulatory arbitrage, which may ensue when market practitioners may opt to choose for themselves a particular certification that permits market entry whilst shirking the costs of acquiring a more demanding but appropriate qualification. In that case, consumers could be provided with goods and services that are not delivered to a desirable standard.

167. Complete Government oversight also blocks the provision of goods and services under Green Deal that are not within the range of certificated products. This contingency may emerge when innovation brings to the market untested goods that have not been thoroughly vetted. Comprehensive Government oversight implies that, in practice, substandard goods will not enter the market.

168. However, complete Government oversight also has inherent disadvantages that may incur unnecessary costs. Specifically, Government regulators operate at arm's length from commercial practice, have no profit responsibility and lack incentive to promote innovation. Market overseers lacking incentive to accelerate technological progress will likely slow the pace of innovation.

169. Our current preference is for authority for the accreditation and certification process to be delegated to market entities where possible. However, particular risks and costs of this approach require precautionary safeguards which will be subject of further preparatory work.

170. These risks are the corollary of those that are avoided when Government takes control of the entire accreditation and certification process. Specifically, when some, but not all market activities, are automatically subject to independent scrutiny, market participants may skew their activities such that they are subject to whichever oversight regime offers the most lenient conditions for pursuing business.

171. The corresponding benefit, however, is that involvement by market entities will bring to the process an unquestioned commitment to ensuring innovation is brought to the market as quickly as possible. Furthermore, involvement by market participants will ensure that the running costs of the regulatory regime will not be higher than necessary and that obsolete rules are terminated.

172. Therefore the preference - at this stage - is for a framework put in place by Government with a private sector role in ensuring compliance with quality standards. Government would set standards for compliance by certificated assessors. Accreditation bodies would define quality standards of assessors, complaints resolution and for regular returns to the regulator against a number of performance criteria.

173. By way of illustration, this approach is likely to emulate the model in place for Energy Performance Certificates. Accordingly, the accreditation process would comprise three levels:

a. Oversight: Government appointed regulator devises standards for accreditation bodies, collects regular reporting returns, and carries out spot checks. The function would also envisage an independent arbitrator function for consumer complaints.

b. Certification bodies: A code of conduct requires advisers and installers under their scheme to comply with certain standards. They would carry out regular QA checks and report to the regulator on quality and consumer protection.

c. Assessors: Participating assessors comply with a code of conduct and take out professional indemnity insurance. Assessors and their accreditation bodies would deal with the majority of consumer complaints in the first instance.

174. Sample approaches under consideration include application of existing British Standards in the area.[70] Building control related schemes may also be relevant.

Option C: Costs and Benefits from Accreditation and Certification

175. Regarding the cost of establishing an accreditation body, a source of cost estimates for setting up an accreditation scheme is the Impact Assessment (IA) for Energy Performance Certificates (EPCs), which describes one of the options "to require the experts to be accredited by an independent body which in turn will call for suitable qualifications to be held."[71] According to the RIA, there are "costs required for setting up accreditation schemes, but this cost is relatively small in the context of the production of EPCs."[72] The British Board of Agrément corroborates this assessment; establishment costs are less than £50,000.

176. Ancillary overhead items, such as rent or IT incur further costs. Evaluation of such costs has not been attempted at this stage.

177. Regarding certification, there are separate costs to consider. The first is the expected size of the market for energy assessors. The IA regarding EPCs can provide pointers.

178. The closest comparator to the advice requirements for the Green Deal can be found in relation to the framework for the EPC. Although the advice and accreditation scheme for the Green Deal will necessarily be more in-depth and the certification process more rigorous, the previous RIA regarding EPCs and the current operation of the market provides pointers on likely cost.

179. An EPC energy assessor can accomplish four visits/day, at a unit cost of £97. Government estimates for the number of advisers required for the EPC sector range from 1,600 to 4,500. Costs of certification of an assessor are £650.[73] Assuming the number of prospective assessors matches that for EPC advisers, the aggregate accreditation costs range from £1,040,000 to £2,925,000. These figures may increase subject to standards required for the Green Deal (especially as regards the non-domestic sector).[74]

180. Regarding benefits of introducing accreditation, these lie in avoidance of the costs incurred under the counterfactual, which would be a market where assessors are not certificated. The risks to consumers in such markets lie in exposure to mis-selling. Whilst the damages in this case are not as large as those in other advice sectors (for example, the mortgage endowment market or the pension mis-selling market are egregious examples of mis-selling), they are still likely to be sufficiently severe to warrant reputational damage to the Green Deal.

181. Certification provides compliance with training and qualification standards. Costs of certification of installers of microgeneration are used as a proxy to gauge the range of costs under different certification scenarios. There, costs per installer range from £550 to £1,800 p.a.[75] The BBA corroborates this estimate; accordingly annual recurring costs are £1,785 for cavity wall installers or £1,200 for loft installers. Certification is awarded to firms rather than to individuals, so the total expense for certification is far less than the total number of installers (since firms may employ several installers).

---

[70] E.g. EN45011 might be relevant in accrediting Green Deal scheme providers; EN17024 may also be relevant for the accreditation of individual competency standards.

[71] Explanatory Memorandum to the Energy Performance of Buildings Regulations 2007 No. 991, p. 16

[72] Ibid, p. 62

[73] Source: British Board of Agrément

[74] Costs of training costs are ignored; it is assumed that training costs are incurred irrespective of the requirements imposed for compliance with certification schemes. The relevant costs would be those that were additional to training costs incurred in any event. For the sake of information, using as a benchmark training costs in the EPC sector, these costs may be in the region of £2,000.

[75] Internal DECC source

182. To put this into context of market turnover, aggregate estimates of current good quality cavity wall insulation installer certification costs comprise some 0.3% of market turnover.[76] Based on this assumption, three worked examples of the annual cost follow.

Table B4: Cost estimates

	Total Turnover £m		**0.3%**	
	Low	High	Low	High
SWI	£1,710	£2,090	£5	£6.3
CWI	£24	£108	£0.1	£0.3
Loft	£81	£120	£0.2	£0.4

183. In the 'do nothing' scenario (Option A) we would not expect these costs to continue as take-up would be expected to dwindle to close to zero without policy intervention. In the Green Deal scenario with no Green Deal accreditation and certification (Option B), we would expect these types of costs to continue but not in a consistent way across the assessor and installer sectors, i.e. while some companies would acquire certification of a standard comparable to the Green Deal standard, there would remain a number of companies whose standards were not as high. In the preferred scenario we might expect these costs to increase as more assessors and installers would undertake certification in order to qualify as a Green Deal supplier. If higher standards were to increase trust and lead to higher take-up, greater costs would ensue as more assessors and installers would need to meet Green Deal standards. It is likely that under the take up scenarios assumed in the overarching section most assessors and installers would want to qualify as Green Deal suppliers and therefore incur the costs of accreditation. The assessment of impacts of the options at secondary stage will have to consider the burden of various options on the assessment and installation industries[77].

184. For the sake of setting the context of these scenarios, it should be noted there are positive economies of scale in certification schemes; the greater the number of professionals and the larger their aggregate turnover, the lower the cost of certifications as this overhead cost of doing business is spread across a larger number of units.

185. The table shows ranges for cost scenarios from the combined costs of accreditation and certification regime for assessors and installers. Note that these scenarios aggregate installer certification costs in respect of insulation of solid walls, cavities and lofts (see Table B4). It is not deemed plausible that separate certification processes would be established for installation of other measures requiring less onerous training needs (for the sake of illustration, for measures such as insulation of doors).

Table B5: Scenarios for aggregate costs (£m)

	Low	High
Assessors	1.0	2.9
Installers	5.0	7.0
Total	6.0	9.9

[76] Trade Association estimate

[77] This includes recognising the role played by existing accreditation schemes such as Gas Safe and the Competent Persons Schemes that may offer options to secure accreditation of installers without additional burden.

Section C Primary powers for the Energy Company Obligation	Impact Assessment (IA)
Lead department or agency: Department of Energy and Climate Change	**IA No:** DECC0015C
Other departments or agencies:	**Date: 09/12/2010**
	Stage: Final for Primary Legislation / Development for Secondary Legislation
	Source intervention: Domestic
	Contact for enquiries: Robert Towers 0300 068 6542

Summary: Intervention and Options

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

The domestic sector has the potential to play a big role in meeting the UK's carbon budgets by delivering cost-effective emission reductions. Under Green Deal there is a range of policies aimed at helping householders install cost effective energy efficiency measures. However there are a range of market failures (positive externalities) and barriers (e.g. consumer inertia) that are likely to continue to restrict households from undertaking cost-effective abatement measures in hard to treat houses e.g. where measures are more expensive, such as solid wall insulation, or where they are more difficult to install. In addition, the thermal efficiency of the poorest parts of the housing stock puts the most vulnerable households, many of whom are in fuel poverty, at risk of negative health outcomes. Consequently it is necessary to gain the powers to intervene to ensure that energy and thermal efficiency programmes are focussed on delivering measures in vulnerable and hard to treat houses.

What are the policy objectives and the intended effects?

The objective of the powers in the Energy Bill for the Energy Company Obligation (ECO) is to ensure that there is the flexibility to design an obligation that underpins the effectiveness of the Green Deal and contributes towards carbon and fuel poverty targets in a cost effective and fair manner. The precise design and scope of the ECO will be set out in secondary legislation at a later stage a formal public consultation on detailed options. The detailed design options will be accompanied by more detailed impact assessments at the consultation stage

What policy options have been considered? Please justify preferred option (further details in Evidence Base)

Two options are considered: taking that primary powers (the preferred option) or not. Three scenarios have been examined with respect to the future development of secondary legislation.

Scenario A: Green Deal does not proceed ("Do nothing")
Scenario B: Green Deal proceeds without Energy Company Obligation
Scenario C: Green Deal proceeds with Energy Company Obligation ("Preferred scenario")

When will the policy be reviewed to establish the actual cost and benefits and the achievements of the policy objectives?	To be set out in IA accompanying consultation on secondary legislation
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	To be set out in IA accompanying consultation on secondary legislation

Summary: Analysis and Evidence

Description: Powers to improve design of Energy Company Obligation

Price Base Year -	PV Base Year -	Time Period Years -	Net Benefit (Present Value (PV)) (£m)		
			Low: -	High: -	Best Estimate: -

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-		-	-
High	-		-	-
Best Estimate	-		-	-

Description and scale of key monetised costs by 'main affected groups'

There are no direct costs or benefits as a result of the primary powers. The wider costs and benefits (including administrative costs) associated with illustrative scenarios of the take-up of measures resulting from future secondary legislation are set out in the overarching Green Deal IA.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-		-	-
High	-		-	-
Best Estimate	-		-	-

Description and scale of key monetised benefits by 'main affected groups'

See above.

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks

Secondary legislation has not yet been developed, so the scenarios in the overarching section should not be seen as pre-empting the final outcome of policy development. In addition, the evidence on which the analysis is based is subject to uncertainty (see Annex 4).

Impact on admin burden (£m):			Impact on policy costs (£m):			In scope
Costs: 0	Benefit: 0	Net: 0	Costs: 0	Benefits: 0	Net: 0	Yes

What is the geographic coverage of the policy/option?	GB

From what date will the policy be implemented?			2013		
Which organisation(s) will enforce the policy?			TBD		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** 0	**Non-traded:** 0	
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:** 0	**Benefits:** 0	
Does the proposal have an impact on competition?			No (for primary legislation); a full competition assessment will be undertaken before consultation on secondary legislation.		
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro** 0	**< 20** 0	**Small** 0	**Medium 0**	**Large** 0

Problem under consideration

186. Climate change results from the negative externalities caused by greenhouse gas emissions (GHGs). The Climate Change Act committed Government to reduce UK greenhouse gas emissions by at least 80% by 2050 relative to 1990. The first three carbon budgets (2008-2022) mean that UK carbon emissions must fall by at least 34% in 2020 relative to 1990 levels.

187. The household sector has the potential to play a big role in delivering the emissions reductions required to meet these targets cost-effectively. The energy that households use to heat their homes and water accounts for 13% of the UK's total greenhouse gas emissions (and over 80% of total household energy use), and cost-effective abatement measures are available in the sector. DECC analysis suggests that the most cost effective route to meet economy wide reductions in emissions in the second and third carbon budget periods involves the housing sector delivering at least a proportional share of reductions, primarily through improving energy efficiency[78]. However there are a range of barriers that restrict households from undertaking these abatement measures (discussed below) that are additional to the financial barriers that will be resolved (for some groups) by the Green Deal Finance (GDF) policy (see Section A). As a result it is necessary to gain the powers to ensure that these cost effective energy savings are achieved.

188. A household is defined as fuel poor if it has to spend more than 10% of its income to achieve an adequate level of warmth[79] in the home. The Government has a statutory target to eradicate fuel poverty, as far as reasonably practicable, in England, Scotland and Northern Ireland by 2016 and in Wales by 2018, as detailed in the 'UK Fuel Poverty Strategy'[80] published in November 2001.

189. Since 2004, the number of households living in fuel poverty in the UK increased from around 2 million to 4.5 million (2008). Over the same period, the number of households living in fuel poverty in England has increased from an estimated 1.2 million to 3.3 million households in 2008[81].

190. There are three key drivers of fuel poverty; household income, domestic energy prices and the thermal efficiency of the home. Poorer thermal efficiency of the home results in a larger energy consumption requirement to heat the home to an adequate standard. In 2007, around 40% of houses with a SAP[82] rating of 30 or below were lived in by fuel poor households and over 70% of all fuel poor households reside in a home with a SAP of 50 or below[83].

191. Vulnerable households often suffer from inadequate thermal comfort and health. A significant number of poorer households do not heat their homes to an adequate level of thermal comfort

[78] See the Low Carbon Transition Plan: http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/lc_trans_plan/lc_trans_plan.aspx and the Initial Assessment of Impacts for the Household Energy Management Strategy: http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/hem/hem.aspx

[79] Defined as 21°C for the main living area and 18°C for other rooms

[80] UK FP Strategy

[81] http://www.decc.gov.uk/assets/decc/Statistics/fuelpoverty/610-annual-fuel-poverty-statistics-2010.pdf

[82] Standard Assessment Procedure

[83] http://www.decc.gov.uk/assets/decc/Statistics/fuelpoverty/610-annual-fuel-poverty-statistics-2010.pdf

(21°C in the principal occupied room[84]). This is likely to have a significant impact on both the mental health of household members, through stress associated with struggling to pay energy bills, and on the physical health of all household members, owing to lower temperatures within the home.

Strategic Overview and Policy Objective

192. A supplier obligation has been in existence for a number of years now, starting with the Energy Efficiency Commitment in 2002 and currently embodied by the Carbon Emissions Reduction Target (CERT) extension, which takes the obligation out to the end of 2012[85].

193. The Electricity Act 1989 and the Gas Act 1986, as amended by the Utilities Act 2000, the Climate Change and Sustainable Energy Act 2006 and the Climate Change Act 2008, contain powers for the Secretary of State, by Order, to impose an obligation on electricity and gas suppliers to achieve carbon emissions reduction targets. The existing legislative basis is set by the Electricity and Gas (Carbon Emissions Reduction) Order 2008 (SI 2008/188)[86] as amended by the Electricity and Gas (Carbon Emissions Reduction) (Amendment) Order 2009 and 2010.

194. CERT applies in England, Scotland and Wales and commenced on 1st April 2008, concluding on 31st December 2012. Through the Order, Government sets electricity and gas suppliers who have more than 50,000 domestic customers an overarching household carbon saving obligation. Suppliers must promote (e.g. by marketing or through subsidy) measures to a domestic energy user which can be proven to reduce that households carbon footprint through increased energy efficiency or reduced energy. Certain percentages of the carbon saving obligation have to be achieved in a priority group, and within that a super priority group, of low income, vulnerable and elderly households. Under the extension to CERT, 68% of the carbon savings must be met from professionally installed insulation measures.

195. The Community Energy Savings Programme (CESP)[87], using effectively the same powers as CERT, has the twin objective of significantly reducing the fuel bills of some of those living in deprived areas (defined as Super Output Areas in the bottom decile of the income domain of the Indices of Multiple Deprivation); and contributing to the improvement of the energy efficiency of the existing housing stock in order to reduce the UK's GHG emissions. It provides incentives for "whole house", treatments and for significant measures such as solid wall insulation, and for intensive area based approaches to the uptake of household energy efficiency. It runs from September 2009 to 31st December 2012.

196. Ministers have set out broad objectives for the new obligation (to start when CERT and CESP expire at the end of 2012). A key objective, as announced in the Annual Energy Statement[88], is that it should underpin the Green Deal and provide support for those households which may need additional support or are otherwise not attractive to Green Deal Providers. This could include lower-income and vulnerable households and those in harder-to-treat properties, which require measures such as solid wall insulation that may not be fully funded under the Green Deal.

197. The evidence base for, and detailed design of, the Energy Company Obligation will be based around ongoing evaluations of activity under both CERT and CESP. These evaluations are underway but have yet to report.

198. The precise design and scope of the ECO will be set out in secondary legislation at a later stage following a formal public consultation on detailed options. The detailed design options will be accompanied by a detailed impact assessment at the consultation stage.

199. The objective of the primary powers in the Energy Bill for the Energy Company Obligation (ECO) is to provide the basis for the drawing up, in secondary legislation, of a mechanism (i) that ensures the take-up of cost-effective energy efficiency measures by those consumers likely to need additional support to make a Green Deal Finance package viable; and (ii) that provides energy efficiency and heating systems to the most vulnerable households at most risk of fuel poverty.

200. As further explored below this implies that there may be two main roles for the future ECO:

---

[84] As stipulated by the World Health Organisation
[85] http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/cert/cert.aspx
[86] www.opsi.gov.uk/si/sis05-02.
[87] http://www.decc.gov.uk/en/content/cms/consultations/open/cesp/cesp.aspx
[88] http://www.decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/237-annual-energy-statement-2010.pdf

i. Support for Solid Wall Insulation and other technologies, which have a positive social return but a negative private return (owing to the absence of a carbon price on domestic gas and high private discount rates); and

ii. Support for vulnerable and low income households with a high propensity to be fuel poor. This includes the provision of both energy efficiency measures and basic central heating measures, not previously possible under a wholly carbon-focussed obligation.

201. Earlier supplier obligations, while fundamentally focused on energy efficiency, have tended to adopt the specific metric of carbon-saving. While this is understandable given the demands of carbon budgets – and carbon saving will remain at the heart of the new obligation - this exclusive focus has precluded the delivery of certain measures, particularly heating systems. The Warm Front scheme provides certain heating systems to a targeted group of vulnerable households in England. This will continue until the Green Deal and new Energy Company Obligation are launched. There is a need to continue to ensure the delivery of a wider set of measures, including some that will not necessarily deliver carbon savings. For example, new heating systems (where there is no working system already) and heating system repairs will not always save carbon, but they are usually the most cost-effective way to bring significant and long term improvements to a household's ability to heat their home to a decent level affordably. The delivery of heating measures will form an important part of the Government's fuel poverty alleviation strategy by offering a long term solution to fuel poverty. It may therefore be necessary to set two separate targets under the obligation in order to define and track progress towards these objectives:

i. Increased thermal efficiency. The intention would be to focus on low income vulnerable households with a high propensity to fuel poverty, with companies obliged to deliver measures in order to improve households' ability to heat their home affordably (i.e. a notional home heat cost reduction target). Analysis (below) confirms that the most cost effective means of meeting this target will be through new central heating systems (where there is no working system) and insulation measures, including cavity wall and loft insulation measures (where opportunities remain).

ii. Increased energy efficiency. The intention would be to focus on insulation measures that reduce carbon emissions cost-effectively (i.e. have a positive net present value to society) but are not attractive enough to consumers at current energy prices (i.e. have a negative net present value to consumers), for example solid wall insulation in many cases. By providing joint support with Green Deal finance, it is hoped that a high level of take-up of these energy efficiency improvements can be delivered in a way that maximises the contributions to the costs of measures from the consumers that will benefit from them.

202. Powers are being requested in the Energy Bill to enable the Secretary of State to secure the ability to do the following, through secondary legislation, the detailed policy of which, will be consulted on publicly in 2011:

a. impose a notional home heat cost reduction target alongside a carbon emissions reduction target;

b. prescribe the measures which qualify towards meeting a home heat cost reduction target and carbon emissions reduction target;

c. stipulate the score which should be attributed to any eligible measure or the method by which a score should be determined, and to determine the methodology for accounting these;

d. prescribe the standards to which a measure must be installed or the specifications which must be met;

e. target the obligations at particular types of people living in particular types of property and/or location;

f. direct obligated companies to offer support to specific households referred to them by Government or its agencies;

g. require information from energy companies for the purposes of assessing the effectiveness of the new obligation towards meeting its policy objectives and to assist in the design of future policies;

h. require the Regulatory Authority to produce guidance;

i. give powers to the SoS allowing him to direct the administration of the scheme to a body of his choice, and for the relevant compliance powers to also be adopted;

j. take "bridging" powers enabling the Secretary of State to incentivise or oblige ECO companies to work with and through a wide range of Green Deal providers.

Rationale for intervention

203. The clauses in the bill for the Energy Company Obligation aim to address a range of market failures, barriers and equity considerations, in the context of the wider Green Deal powers in the Bill. The case for an obligation on energy companies to deliver carbon savings is clear, as set out in CERT and CESP impact assessments[89]. The focus here is on the case for additional powers to direct the future energy company obligation in more specific ways.

204. The overarching section of this impact assessment examines the full range of market failures and barriers addressed by the Green Deal. The key market failure pertaining to the ECO is:

i. Climate change and other externalities: Given that gas prices do not reflect the external cost of carbon emissions, it is unlikely that the Green Deal finance and accreditation measures on their own would drive the take up of solid wall insulation and other more expensive energy efficiency measures. However when the reduction in negative externalities (climate change and air quality) are considered as well as the private benefits then there is a strong argument for installing solid wall insulation (SWI) in many cases, i.e. it is a cost effective way of meeting the UK's carbon budgets.

205. The key barrier is:

ii. Consumer inertia, which may act to prevent some consumers from taking up worthwhile investment opportunities using Green Deal finance packages.

206. The main equity arguments for an Energy Company Obligation are that:

[89] http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/cert/cert.aspx http://www.decc.gov.uk/en/content/cms/consultations/open/cesp/cesp.aspx

i. The Government has a target to eradicate fuel poverty[90] in England by November 2016, and end fuel poverty in vulnerable households by 2010, as far as reasonably practicable. A home heat cost reduction target would seek to directly contribute towards removing households from fuel poverty, helping the poorest and most vulnerable households at risk of detriment as a result of cold housing by reducing the amount of spending on energy required to achieve an adequate standard of warmth. This includes a focus on heating (where no working system exists) systems as well as basic insulation (where opportunities remain).

ii. Green Deal finance may not be suitable for some people on lower incomes. For example, some low-income households under-heat their homes significantly. In these cases, the benefits of measures to improve the thermal performance of properties are likely to be taken in terms of increased temperatures in the home, rather than through bill savings (rebound effect). They may not therefore be able to generate the savings needed to pay back the investment under the Green Deal finance model.

iii. Climate change and energy policies are likely to increase all households' energy bills[91]. Lower income groups tend to spend a greater proportion of their income on energy. Consequently, those at the bottom end of the income distribution tend to be disproportionately affected by such policies. This effect is magnified by the lower propensity for poorer households to take up, and benefit from, the energy efficiency and small scale renewable measures offered through these policies.

Impact of primary powers

207. There are no direct costs or benefits associated exclusively with the primary powers. They are likely to be scrutinised by companies and other interested parties expecting to be affected by future policy, but it is unlikely that implementation planning by organisations will begin until consultation on secondary legislation.

208. The primary powers will enable the development of policies that are expected to have a net positive benefit for society. Detailed analysis will be included in the Impact Assessment accompanying secondary legislation. The following section presents a broad discussion of potential scenarios for secondary legislation.

Identification of potential scenarios for secondary legislation

209. Scenarios identified for the possible powers in the Energy Bill for the ECO are as follows:

- Scenario A: Do nothing - the current supplier obligation (CERT) would end on December 31st 2012 and no Green Deal finance or accreditation regime, or regulation of the private rented sector would be in place.
- Scenario B: No ECO – in this scenario there would be a Green Deal finance and accreditation and accreditation policy, and the possibility of regulation of the private rented sector, but no Energy Company Obligation.
- Scenario C: Energy Company Obligation in place alongside other Green Deal policies.

Scenario evaluation

210. Scenario A represents the counterfactual against which the whole Green Deal package is compared. As discussed in the overarching section of this Impact Assessment, it is assumed that, in the absence of new policy, take-up of energy efficiency measures would not occur, since previous supplier obligations have incentivised the take-up of most of the available potential (loft and cavity wall insulation installations by early adopting households with the greatest propensity to engage with energy efficiency investments). In addition, without policy, home heating and energy

[90] Households are classed as being in fuel poverty if they would have to spend more than 10% of their income to sufficiently heat their home – defined as 21°C for the main living area, and 18°C for other occupied rooms.
[91] See http://www.decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/236-impacts-energy-climate-change-policies.pdf

efficiency measures would not be installed in vulnerable homes. The UK would be at serious risk of not meeting its carbon budgets and the number of people in fuel poverty would increase.

211. Under Scenario B it is expected that the rest of the Green Deal package would help owner-occupiers, landlords and tenants to overcome barriers to the take-up of measures that are cost-effective to them, even at current gas prices e.g. the insulation of most cavity walls and lofts. However, as discussed above, it is unlikely that the private benefits would be large enough, in many cases, for solid wall insulation and other more expensive measures to attract investment. As in Scenario A, there would be no support for vulnerable and poor households, which would have negative equity implications, and while some carbon savings would occur, it seems clear that, if carbon budgets are to be met cost-effectively, measures such as solid wall insulation are required to be installed.

212. Under Scenarios A and B, it might be possible to use existing primary powers to develop a post-2010 supplier obligation of some description, similar to the current model. However, in the absence of the Warm Front policy, this would not allow for the installation of measure that improve the thermal efficiency of buildings without generating carbon savings (e.g. through the installation of central heating systems and the taking of greater "comfort" by tenants / owner occupiers). Therefore, a scenario in which a new supplier obligation based purely on existing powers is developed, has not been considered.

213. Scenario C would see the development of an ECO that would incentivise the take-up of solid wall insulation and other cost-effective energy efficiency measures that are not thought to be attractive enough to consumers at current energy prices; and improve the thermal efficiency of properties occupied by those most likely to be vulnerable to fuel poverty.

Illustration of possible measures under ECO

214. Table C2 below aims to illustrate a few of the possible measures that might be available under the ECO for an individual household. This in no way pre-empts the final list of measures qualifying for the ECO. As can be seen the illustration compares the NPV per capital cost for the different measures. All measures are net beneficial to society. The benefits are energy reductions, comfort taking, air quality improvements and carbon savings; there are also additional costs associated with the hassle involved in installation and the administration costs of running the scheme. The detail of the assumptions that underpin this analysis and detail of more measures can be found in Annex 6. Separate results with equity weightings are presented; this is to demonstrate the economic impact[92] of delivering measures to lower income households.

215. This table demonstrates that both energy efficiency and heating measures have positive net present values and, when considering the equity weighted results, heating repairs become more valuable. The equity weighting is applied to the comfort taken and the hassle costs associated with each measure. For more detail on the equity weightings see annex 6.

Table C2: Net present value for individual measures including equity weighting[93]

Measure	Cost (£)	NPV[94] (£2010)	Equity weighted NPV (£)
Cavity Wall Insulation (hard to treat)	£1620	£2,110	£3,230
Loft insulation (professional)	£280	£370	£510
External Solid Wall Insulation (ESWI) with renovation	£7600	£1,750	£4,000
ESWI in Local Authority	£4800	£3,790	£4,690
Heating repairs	£770	£580	£1,760
Boiler replacement	£2520	£1,540	£3,660

[92] The equity weighting associated with each income decile is calculated as the ratio between the marginal utility of consumption for that decile and the average marginal utility of consumption across all deciles. These are calculated in accordance with Green Book guidance using the median level of income in each income decile.
[93] For the purposes of these cost estimates, all measures are assumed to be installed in 3-bed semi-detached properties.
[94] Using a social discount rate of 3.5%

Possible impacts of secondary legislation

216. The costs and benefits directly associated with the measures delivered under the Green Deal package as a whole (including estimates of administrative costs) are set out in the overarching section of the IA, which considers illustrative scenarios of take-up of measures.

217. Further costs and benefits will be associated specifically with the ECO. These are discussed, largely in qualitative terms, below. Consultation Impact Assessments alongside proposals for secondary legislation will present more detailed analysis once policy is more developed.

218. There would be some small costs to Government if the design of the promotional material were to be prescribed by Government.

Linking to Green Deal Finance

219. The primary powers are framed in general terms and would allow the Secretary of State, amongst other things, to encourage or incentivise energy companies through secondary legislation to meet part of their obligation through co-funding measures with Green Deal finance providers, and/or to do so through a variety of different Green Deal providers.

220. It is likely that the most cost-effective option for energy companies will, in very many cases, be to work with Green Deal finance providers and co-fund measures, and it would not be the intention to use these general powers in ways which simply operated to inject an artificial subsidy from the ECO into the Green Deal finance market. However, the Green Deal market does not yet exist and there may be unforeseen hurdles and complications. In particular, there is a risk that energy companies, who currently dominate the energy efficiency market owing to their obligations under CERT, might be in a position to extend their dominance into the market for Green Deal finance and result in diminished choice for consumers and higher costs. The powers to encourage the delivery of ECO subsidy through a variety of different Green Deal partnerships might help tackle this issue if it proves to be the case. At the moment there is no evidence upon which to undertake a formal competition assessment, as no Green Deal Finance market exists, but such an assessment would be undertaken prior to consultation in the event that secondary legislation was deemed necessary.

Directing measures to particular locations and types of recipient

221. The primary powers enable, through secondary legislation, the targeting of the obligation at particular types of people in particular types of property or location if deemed necessary. In addition, Government may direct obligated companies to offer support to specific households referred to them by Government or its agencies. This could impose additional costs on energy suppliers (and hence feed through to customer bills), but would potentially lead to a more equitable distribution of measures on a geographic basis. A detailed assessment of the need for secondary legislation on this issue would be undertaken as part of consultation.

Collection of more detailed monitoring information

222. The primary powers enable, through secondary legislation, the collection of detailed monitoring information to ensure that the policy can be adequately reviewed and changed if necessary. Additional costs would be borne by energy companies to the extent that information of this sort was not already collected for internal purposes. Benefits would be expected to ensue from policy based on better evidence. The details of the information sought will be set out in consultation accompanying secondary legislation.

Section D Private Rented Sector **Lead department or agency:** Department of Energy and Climate Change **Other departments or agencies:**	Impact Assessment (IA) **IA No:** DECC0015D (Amended) **Date: 19/05/2011** **Stage: Final** **Source intervention:** Domestic **Contact for enquiries:** joseph.hamed@decc.gsi.gov.uk

Summary: Intervention and Options

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

The costs of improving properties in the private rented sector (PRS) are borne by landlords but the benefits of lower energy bills generally fall to current or future tenants. This is in addition to externalities that accrue to society or could reduce the burden on public health services, and inertia amongst landlords. The Green Deal partially resolves this barrier for current tenants expecting long tenures. However, in a sector that is predominantly high turnover the Green Deal on its own is unlikely to exploit all cost-effective energy-efficiency improvements in the PRS. This is important because the PRS currently has the highest proportion of thermally inefficient G-rated homes of any sector, and contains a substantial number of households in fuel poverty.

What are the policy objectives and the intended effects?

The objective of the policy is to achieve cost-effective energy-efficiency improvements in the PRS that are not expected to occur otherwise, owing to the barriers identified above. Resultant energy efficiency improvements will lead to reduced greenhouse gas emissions; reduced energy bills; reduced fuel poverty; improved air quality; improved energy security; reduced costs to firms and unlock health benefits associated with warmer homes, and consequently reduce the burden of cold related illnesses on the National Health Service.

What policy options have been considered? Please justify preferred option (further details in Evidence Base)

The "do nothing" counterfactual (option 1) is a projection of business as usual improvement of the rented housing stock based on current rates of improvement plus an increase following the introduction of the Green Deal.

The preferred option (option 2) here represents regulatory powers consisting of three components:

Component 1 - Regulations state that landlords should not refuse consent for reasonable requests for energy efficiency improvements from tenants that can be financed through the Green Deal, from 2016.

Component 2 – Regulations state that properties let to domestic tenants from 2018 must meet a minimum energy efficiency standard(e.g. above an "F" rating) or to have received all reasonable energy efficiency improvements that can be financed through the Green Deal or Energy Company Obligation (even if the property remains below an "F" rating).

Component 3 – Regulations state that properties let to non-domestic tenants from 2018 must meet a minimum energy efficiency standard (e.g. above a G rating) or to have received all reasonable energy efficiency improvements that can be financed through the Green Deal.

Non-regulatory approaches that have been tried in the past are considered in the evidence base.

When will the policy be reviewed to establish the actual cost and benefits and the achievements of the policy objectives?	Secondary legislation will be subject to consultation, post implementation review and further impact assessments
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	These will be developed alongside secondary

	legislation

Summary: Analysis and Evidence Policy Option 1

Description:

Introduction of primary powers to regulate energy efficiency standards in the PRS

Price Base Year 2010-	PV Base Year 2010	Time Period Years 52	Net Benefit (Present Value (PV)) (£m)		
			Low: 1,206	High:2,237	Best Estimate: 1,807

COSTS (£m)	Total Transition (Constant Price)		Average Annual (excl. Transition)	Total Cost (Present Value)
Low	1,604		-	1,604
High	2,493	-	-	2,493
Best Estimate	**1935**		**-**	**1,935**

Description and scale of key monetised costs by 'main affected groups'

The regulation will impose costs on all landlords to understand the regulations.

Once the Green Deal becomes active there will be additional costs of implementing measures such as installation costs (that will be covered in financial terms by Green Deal finance and ultimately borne by the bill payer in the future, or the landlord when a property is void, and hassle costs borne either by a sitting tenant or a landlord to organise and arrange installation).

The estimates included above represent the costs and benefits expected in the domestic sector to result from this regulation, they contribute to the scenarios identified in the overarching section of this impact assessment.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)		Average Annual (excl. Transition)	Total Cost (Present Value)
Low	-		130	**2,810**
High	-	-	218	**4,729**
Best Estimate	**-**		**173**	**3,743**

Description and scale of key monetised benefits by 'main affected groups'

Benefits are expected to arise from the commencement of the Green Deal in 2012 as landlords anticipate the date of the regulation coming into force in 2018. They are likely to incorporate energy efficiency improvements into their normal cycle of improvements in void periods before 2018, potentially reducing some of the hassle costs included above.

Benefits are expected to accrue to those responsible for paying energy bills in rented domestic and non-domestic properties, in addition to improvements in air quality and reduction in greenhouse gas emissions that benefit wider society. Differential impacts on specific groups are addressed in the specific tests section of the overarching impact assessment.

Other key non-monetised benefits by 'main affected groups'

Some benefits to landlords may result from the potential to charge higher rent, face reduced void costs, or receive higher sale prices on improved properties. The proposals in this section contribute to ensuring the take-up of cost-effective energy efficiency improvements in the PRS. The level of benefits for the non-domestic sector has not been modelled in detail; its likely scale is presented in the impact assessment.

There are significant potential benefits to health and reduced NHS costs that may result from warmer homes.

The certainty of regulation will build confidence in the energy efficiency industry potentially leading to growth and increased employment, and longer term benefits to consumers.

Key assumptions/sensitivities/risks

It is assumed that the increased certainty of regulation in 2018 will encourage uptake from the start of the Green Deal. The trajectory for installations assumes early action leading to a high degree of compliance; this represents the regulation in a relatively burdensome form see paragraph 274. In the domestic sector, low and high estimates reflect the sensitivity to future energy and carbon prices. Alternatively, in the non-domestic sector, the low and high estimates

reflect the level of “undeliverability” and the impact of other policies.

Direct impact on business (Equivalent Annual) £m):			In scope of OIOO?	Measure qualifies
Costs: 5	Benefits: -27.7	Net: -22.7	**Yes**	IN

What is the geographic coverage of the policy/option?			TBC		
From what date will the policy be implemented?			1/4/2018 for minimum standards, 1/4/2016 for implementing reasonable requests from tenants		
Which organisation(s) will enforce the policy?			Enforcement is to be set out in secondary legislation		
What is the total annual cost (£m) of enforcement for these organisations?			Enforcement is to be set out in secondary legislation		
What is the CO_2 equivalent change in greenhouse gas emissions?			**Traded:** 22.6 MtCO2e	**Non-traded:** 11.5 MTCO2e	
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:** 100	**Benefits:** 100	
Does the proposal have an impact on competition?			No		
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro** -	**< 20** -	**Small** -	**Medium** -	**Large** -
Are any of these organisations exempt?	No	No	No	No	No

Specific Tests

The specifics impact tests for the proposals discussed here are presented alongside the impacts of the other components of the impact assessment in Annex 3.

What is the problem under consideration?

223. The private rented sector (PRS) contains a considerable number of cost effective abatement opportunities. 66% of PRS homes have uninsulated wall cavities compared with 49% in the owner occupied sector, and 41% of lofts in the sector have less than 100mm of insulation compared with 26% in the owner occupied sector[95]. The PRS also has a disproportionately large number of homes with the lowest energy performance certificate (EPC) rating (G) than the other domestic sectors, 6% compared with 3% in the owner occupied sector[96].

224. The PRS accommodates many of the country's fuel poor; 20% of the households in the English PRS are fuel poor[97]. Improving energy efficiency in the buildings in the PRS can make an important contribution to the reduction of the number of people in fuel poverty and the adverse health consequences that are associated with living in poorly heated homes.

225. There are some barriers particular to the PRS that may prevent the sector from achieving its full energy efficiency potential. Notably, the benefits of reduced fuel bills often fall to tenants rather than the landlords who are responsible for making energy efficiency investments; and for properties that experience frequent short tenancies those benefits are spread across a large number of independent tenants. The information failures in the PRS are particularly strong with a diverse set of owners, and tenants, who have failed to take advantage of as many subsidised energy efficiency measures as other sectors[98]. The Green Deal should go some way towards improving the quality of the PRS housing stock and tackling the problem of fuel poverty, but barriers are likely to remain.

226. The Non-Domestic Sector is already covered to some degree by other policies (i.e. the Carbon Reduction Commitment (CRC) and Climate Change Agreements (CCAs). The non-domestic Green Deal is intended to work with parts of the sector not covered by those policies; it is estimated that those parts of the sector contain £2.1 billion of the £4 billion cost-effective potential for energy efficient savings measures[99]. Latest figures from the Energy Performance Certificate (EPC) registry for England and Wales[100] records that some 9.6% of registered non-domestic buildings had an EPC rating of G, while a further 8% had an F rating. In the non-domestic sector, approximately 62% of properties are rented and a relatively large proportion of rented properties were built before 1985, when regulatory requirements on energy performance of new buildings were introduced.

227. The split of responsibility for energy efficiency improvements and bill payments mentioned above is also an issue in the non-domestic PRS. This barrier will be partially overcome by Green Deal Finance (see Section A) which provides a mechanism whereby the tenant who benefits from the measure would pay for it. However, the Government considers that, in addition to the availability of Green Deal Finance, the introduction of mandatory standards will further improve the energy efficiency of this sector.

Overview of energy efficiency in the PRS

228. There are many privately cost-effective measures that could improve the energy efficiency of the UK housing stock (insulating cavity walls, lofts etc). There are many further opportunities which are socially cost effective (more expensive solid wall insulation for example) but which, in the absence of energy prices that fully reflect all externalities may not be privately cost-effective to tenants and landlords.

229. In recent years Government policy has been aimed at encouraging improvement in the energy efficiency of buildings through schemes such as the Carbon Emissions Reduction Target (CERT) and its predecessor the Energy Efficiency Commitment (EEC). Whilst this has resulted in significant uptake of energy efficiency measures across the UK housing stock, the existing stock of PRS accommodation has not shown the same level of uptake of energy efficiency measures. Whilst the

[95] English Housing Survey 2009.
[96] English Housing Survey 2009.
[97] DECC (2010) " Trends in fuel poverty in England 2003-2008" Based on the "full income" definition of fuel poverty. This increases to 26% if the "basic income" definition is used.
[98] Under "supplier obligations" such as the Energy Efficiency Commitment and the Carbon Emissions Reduction Target, for example.
[99] AEA: Assessing the carbon dioxide emissions and cost-effective carbon savings potential for organisations not covered by EU ETS, CCAs or CRC (forthcoming).
[100] EPC Register for England and Wales, data as at 25/8/10

average level of energy efficiency in the PRS has caught up with, and exceeded that of the owner occupied sector, this has been driven primarily by the entry into the market of high efficiency new builds.

230. The PRS has shown itself to be relatively unresponsive to energy efficiency incentives in the past. Over EEC and CERT years (2001-2008), PRS wall cavities have been filled at a very low rate, rising from 28.4% filled in 2001 to only 33.5% in 2009[101]. The rate in the owner-occupied sector was significantly greater with filled cavities rising from 35.3% to 50.6% during this period, even though landlords have had access to the same offers of subsidies that have been available to the rest of the housing stock. The EEC and CERT did not target PRS properties specifically, and suppliers may have opted to pursue owner occupiers who are easier to target through billing addresses.

231. Where other non-regulatory interventions have been implemented such as the Landlords Energy Savings Allowance[102]; the Energy Saving Trust's contact centre; and a range of voluntary accreditation schemes, the sector has been relatively unresponsive. These interventions are discussed in more detail in the paragraphs below.

Barriers to investment in cost effective energy efficiency measures

232. The low level of take up of energy efficiency measures in the PRS is thought to be caused by a wider set of barriers than those that constrain the rest of the UK housing stock; these are discussed in the overarching section of this IA. In particular misaligned incentives, information failures, and inertia seem to be more prominent in the PRS than in other sectors.

Incentives

233. Where properties are owned by a landlord but lived in by tenants, the cost of installation of energy efficiency measures traditionally falls on the landlord, with the benefits of lower energy use and bills, commonly falling to tenants. In situations in which rents do not fully reflect differences in the thermal efficiency of properties there is little incentive for landlords to improve the energy efficiency of their properties.

234. Tenants often expect to stay in rented properties for short periods of time[103], this means that some of the bill savings will accrue to future tenants, rather than those who will bear a proportion of any disruption costs. This magnifies the problems of high discount rates that commonly affect the investment behaviour of individuals.

235. While the Green Deal financial proposals will overcome some of these issues by placing the payments from energy efficiency measures on tenants bills, the short-term nature of much of the rental market may mean that in the absence of regulation to improve standards, many cost-effective abatement opportunities could remain untapped.

Landlord inertia

236. A Harris interactive poll of private landlords in 2009 revealed that[104]:

- 54% of private landlords that think their properties have un-insulated lofts are not considering insulating them in the future.
- 64% of private landlords that think they have un-insulated wall cavities in their rental properties are not considering filling them in the future.

237. At the least energy efficient end of the rental market, regulation can act to improve the living standards of the most vulnerable in society. The Rugg review of the PRS and the motivations of landlords described a problematic "slum rental" market at the very bottom end of the PRS, where properties experienced high tenant turnover and were often of very poor quality.[105]

Policy background: alternatives to regulation

238. A number of non-regulatory approaches to encouraging the take up of energy efficiency measures in the PRS have been tried. These approaches are discussed below:

[101] English Housing Condition Survey, 2007. English Housing Survey 2009.
[102] Claimed by only 2050 taxpayers in 2007/08.
[103] Rugg and Rhodes (2008), found that 40% of PRS residents had lived in their current address for less than 12 months.
[104] 'Private Landlords Research' Harris Interactive (February 2009) for EST and EEPH; EST research.
[105] Rugg and Rhodes (2008) "Review of Private Rented Sector Housing" for Communities and Local Government

239. Information services: Landlords are unlicensed and very few are members of national landlords associations so it is very hard to target them with information, advice and offers. Very few proactively seek advice from the Energy Saving Trust (only 1-2% of calls to the Energy Saving Trust contact centre come from private landlords). However, since 2008 Landlords have been required to provide EPCs for all properties let to new tenants which is likely to have had some impact on take up of energy efficiency measures although the evaluation of this policy is yet to report.

240. Fiscal Incentives: The Landlords Energy Saving Allowance offers an income tax deduction of up to £1,500 per property against profits for expenditure to install certain insulation measures. Only 2,100 individual landlords claimed the LESA in 2007/2008 with total claims of £1.2 million.

241. Voluntary approaches: Few landlords are affiliated to any representative body so it is difficult to set up voluntary schemes to encourage them to improve the energy efficiency of their stock. Only 40,000 landlords (3.3%) are affiliated to a landlord association. Many Local Authorities have set up voluntary accreditation schemes to work with landlords to raise standards. They often partner with local and national landlords associations to help achieve their aims. However, in almost all cases subscription remains low, e.g. Liverpool's Citywide Accreditation Scheme has amassed only 250 landlord members in 5 years.

242. Subsidised offers: The rate of cavity wall insulation, loft insulation and boiler upgrade has been very slow in the PRS over nine years of subsidised offers under the supplier obligations, and what progress has been made in the sector overall seems to be related to the entry to the sector of new purpose built apartment blocks. Over EEC and CERT[106] years (2001-2009) PRS wall cavities have been filled at a particularly low rate (see above).

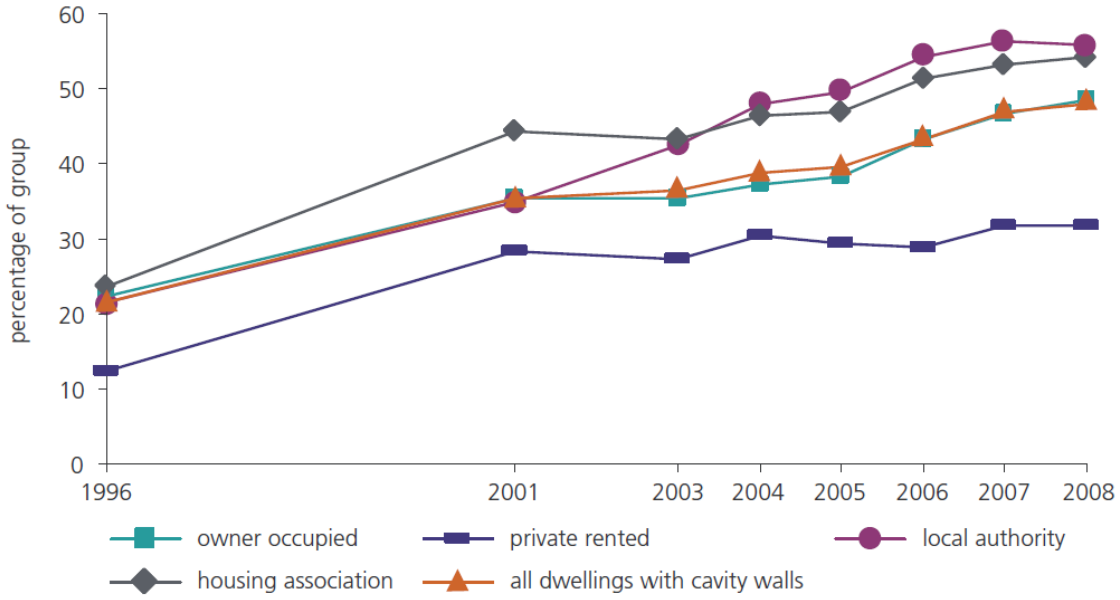
243. In the first two years of the Carbon Emissions Reduction Target scheme, from April 2008-March 2010 there were around 1.2 million loft insulation installations, 1.9% of these were in the PRS compared to 91% in the owner occupier sector. Similarly, of around 1 million cavity wall installations over the same period, 1.4% were in PRS compared to 92% in the owner occupier sector[107].

244. Take up and impact of these non-regulatory options does not seen to have made a substantial impact in terms of insulating lofts and cavities in the PRS. This unresponsiveness may have been in part caused by the barriers associated with split incentives which may be overcome by Green Deal finance. Although in a sector with relatively high tenant turnover the benefits may still be spread thinly leaving no one party sufficient incentive to ensure installations are made. It is therefore considered that regulation may be required to secure the benefits of energy efficiency improvements in the PRS.

[106] Since April 2002 there has been an obligation on the six large energy companies to achieve reductions in carbon emissions in the household sector in Great Britain. The Carbon Emissions Reduction Target (CERT) began in April 2008 and will run until December 2012. Previous to CERT, the Energy Efficiency Commitment (EEC) ran from April 2002 to March 2008.

[107] Energy Saving Trust 'Homes Energy Efficiency Database' This is an under-representation of the total amount of installations as there is some under reporting in this database, thought to primarily be related to installations in social housing. This means the percentage of PRS installations may be lower than the figure provided.

Figure D1: Dwellings with insulated cavity walls by tenure, 1996-2008[108]



Base: all dwellings with cavity walls
Note: underpinning data are presented in Annex Table 5.2
Source: English House Condition Survey 1996–2007, English Housing Survey 2008, dwelling sample

Policy Landscape

245. Green Deal finance and the Energy Company Obligation are expected in combination to do the following:

a. Where a measure is cost effective and repayments are lower than expected bill savings, then Green Deal Finance should overcome the barriers associated with capital investment by tying finance of measures to the energy meter. In this case a landlord could install a measure at no financial cost to themselves.

b. In cases where a measure offers bill savings that are lower than the expected costs of repayment the Energy Company Obligation may provide a subsidy to the landlord which would enable investments with external benefits to be made, given the absence of a carbon price in the cost of domestic gas. In this case, as above, a landlord could install an energy efficiency measure at no financial cost to themselves.

246. The Green Deal and Energy Company Obligation will therefore allow landlords to upgrade their properties without having to cover upfront costs of energy efficiency measures. Finance will be attached to the meter in the property and as such only the bill payer (in most cases the tenant rather than the landlord) will be required to make financial repayments. This mechanism removes the split incentive problem which, in part, has held back progress in the sector. And in the long-run, landlords should be in a better position to benefit from the potential for higher rental yields, longer tenancies and shorter void periods. Green Deal measures in the PRS may be subject to higher default risk than other sectors with more tenant turnover and void periods; secondary legislation relating to the Green Deal Finance powers will detail the burden of this risk.

247. Alongside the Green Deal, Government is looking at ways to improve communication and targeting of the PRS so that private landlords are in a strong position to take advantage of the Green Deal market. However as mentioned earlier, it is more difficult to communicate with, and target programmes at, PRS landlords than other segments of the housing market.

248. Even with these initiatives however, a number of the barriers listed above may remain and may leave many energy efficiency measures uninstalled in the PRS. Such an outcome would fail to help many of the large number of households living in fuel poverty in the PRS.

[108] English Housing Survey, Housing Stock Report, 2008.

Policy objectives and intended effects

249. The objective of regulation in the PRS would be to overcome the remaining barriers to the installation of cost-effective energy efficiency measures in the case that Green Deal does not do this and, in so doing:

a. Avoid CO2 emissions;

b. Reduce energy bills, improve thermal comfort and reduce fuel poverty;

c. Improve air quality;

d. Improve health outcomes, thereby, reducing the burden on the NHS; and

e. Improve energy security through lower energy demand.

250. Landlords who would not otherwise invest in cost-effective energy efficiency measures for their properties, even under no financial cost (given the availability of Green Deal finance and, potentially, subsidy under the Energy Company Obligation) would be required to:

a. Honour reasonable requests for consent from their tenants for energy efficiency improvements in domestic properties, where a finance package is available; and

b. make reasonable energy efficiency improvements in the least efficient domestic and non-domestic properties where a finance package is available.

251. Regulation of the PRS as discussed here is expected to have a differential impact on some groups in society. These impacts are discussed in the specific tests annex, 3; along with the other measures that form part of this Impact Assessment. In particular the PRS is home to a high proportion of young households, and black or minority ethnic households, so any regulation to improve the standard of housing in this sector could be expected to improve the outcomes for those groups relative to others.

Powers Requested

Power to make regulations to require landlords not to unreasonably withhold consent to energy efficiency improvements

252. The Secretary of State shall regulate to provide that, from April 2016, all domestic landlords should not refuse a tenant's request for consent for reasonable energy efficiency improvements that can be financed under the Green Deal or Energy Company Obligation.

Power to make regulations to impose minimum energy efficiency standards on PRS properties

253. The Secretary of State shall regulate to introduce a minimum energy efficiency standard (likely to be set at 'E' through secondary legislation) for the domestic and non-domestic private rented sector from April 2018. This would require all landlords wishing to rent their property from April 2018 to ensure that their property was above an F rating, or to undertake all energy efficiency improvements that can be financed under the Green Deal or Energy Company Obligation (even if that does not take the property above an F rating).

Exemptions and protections for landlords and tenants

254. Under this power landlords would only be compelled to undertake installations where a finance package was available to cover the upfront financial costs of the measures.

255. The energy bill payer's consent would be required in order to set up any Green Deal finance arrangement that might be required.

256. Secondary legislation may set out a number of exemptions, for example:

a. Where proposed works were likely to reduce the value of the property in question;

b. Properties of a particular description or function (to be specified in secondary legislation); and

c. Where the landlord can show that he is not able to obtain necessary consents or permissions to the installation of the proposed measures (e.g. from the freeholder, energy bill payer, or other interested parties).

Option Considered

257. The preferred option is appraised against a counterfactual reflecting business as usual progress under a scenario including the Green Deal and Energy Company Obligation without any regulation of the Private Rented Sector.

258. For the purposes of understanding the implications of each power the impact on take up of each of the three components has been examined in turn. The quantified benefits that are presented are cumulative, so include those attributable to the earlier components.

a. Component 1: The primary power is awarded to compel landlords to accept reasonable requests for consent from domestic tenants to improve the energy efficiency of their properties (where Green Deal finance is available to cover the upfront costs).

b. Component 2: The power to impose minimum energy efficiency standards in domestic PRS properties is taken. This component is modelled according to a scenario for secondary legislation whereby PRS properties that are F or G rated must either improve to an E rating or carry out all reasonable measures if they are to be rented from 2018.

c. Component 3: The power to impose minimum energy efficiency standards in the domestic PRS properties extends to non-domestic rented properties. This component is modelled according to a scenario for secondary legislation whereby non-domestic PRS properties or G rated must either improve to an F rating or carry out all reasonable measures if they are to be rented from 2018.

Supply in the PRS

259. Any regulation of the PRS has the potential to place costs (financial or otherwise) on at least some landlords. Where costs are high there is a potential risk that landlords may be forced to leave the market. Any regulation on energy efficiency standards in the PRS will be designed to ensure that landlords need not meet any upfront financial costs for energy efficiency measures. This section examines the costs and benefits to the landlord from this policy and discusses the net cost and the likely impacts on supply in the context of what has been observed following previous regulation of the sector. The costs are quantified later in the impact assessment in the net costs to business assessment.

Costs to landlords

260. **Installation costs:** This is the most significant cost of the policy representing over two thirds of the total cost. Landlords would not be required to install measures unless they had access to upfront finance through the Green Deal, potentially in combination with subsidy through ECO, that is sufficient to cover the costs of the installation of the measures. As such, no financial cost associated with the installation of measures would fall on the landlord.

261. **Costs of assessment:** In cases leading to Green Deal installations the costs of assessment could also be part of the Green Deal charge. It is possible that a small number of landlords would be required to undertake Green Deal assessments that do not result in Green Deal arrangements. Such assessments may incur costs, although these are expected to be small in addition to the requirement to obtain an Energy Performance Certificate.

262. **Hassle costs:** With the liability for any Green Deal payments falling on the tenant, the only costs which should fall on the landlord are a proportion of the "hassle costs" which are comprised of the time spent researching and organising installations[109]. The presence of accredited Green Deal assessors and installers may also help ease the burden of these costs by providing recommendations and reducing search costs. By allowing a lag time before regulation would come into force, landlords would have time to schedule installations so as to minimise the hassle to them, for example during periods of no occupancy or re-decoration.

263. **Costs in void periods:** Void periods may result in potential costs to landlords

[109] See for example, Ecofys (2009) "The hidden costs and benefits of domestic energy efficiency and carbon saving measures" report for further details on hassle costs. "Make good" costs are considered to be negligible when combined with refurbishment. The remainder of hassle costs are time costs that might fall on tenants or landlords in researching, organising and preparing the property for the installation of a measures. Time costs are valued according to Department for Transport guidance.

264. The void costs related to Green Deal repayments are likely to be relatively small in proportion to the foregone rents. This cost itself might be reduced in improved properties as higher tenant satisfaction may lead to reduced expected void costs.

265. **Costs of understanding regulations**: It is assumed regulation places some costs on all landlords as they must acquaint themselves with the regulation and understand whether it applies to their property. This cost is likely to be in terms of time rather than cash. Landlords have a five year period before the 2016 regulation relating to tenants requests, and a seven year period for the 2018 regulation relating to minimum standards, so this need not represent an immediate burden on their time.

Benefits to landlords

266. In principle, there are benefits to landlords that could outweigh the costs that they bear. These could result if expected energy bill savings were reflected in rental prices or house prices. As set out in the overarching section of this impact assessment there is some evidence that improved energy efficiency measures can be capitalised into house prices in the USA[110,111] and Australia[112]. However, currently there is limited evidence of this in the UK house and rental markets. What anecdotal evidence exists, from the Royal Institution of Chartered Surveyors[113], suggests that energy efficiency is not currently taken into account in surveyors assessments. Whilst it seems unlikely that the entire cost of the energy efficiency improvement may be reflected in house prices, it is possible that some fraction of that may be captured in the value of landlords property.

267. The National Landlords Association has identified three likely benefits to landlords from energy efficiency improvements[114].

a. Increased tenant satisfaction and reduced void periods as discussed above.

b. In conjunction with future EU requirements to display energy efficiency ratings, improvements should make properties easier to let.

c. Energy efficiency improvements should protect the fabric of properties, reducing damp, mould, condensation which may reduce long term maintenance costs.

Net costs to landlords and impact on supply

268. As discussed above, landlords will not face the majority of the costs of these improvements. The quantitative impacts, shown later in this impact assessment, identify over £300m costs in total, of which are around £60m are estimated to be borne by landlords in time and hassle (as discussed above). These residual costs that are faced by the landlord may be offset by the potential benefits of increased rents, reduced length of void periods and improved quality of the accommodation[115]. The benefits have not been quantified, however they could be considered to be a share of the total net bill savings (estimated to be £300m[116] in NPV terms); landlords may be able to secure these through rent increases, reflecting the property improvement, or reduced void periods related to higher tenant satisfaction. Whilst it is unlikely that the market price will reflect the full value of the investments (owing to the barriers discussed above), it is likely that a share of the benefits will accrue to landlords. This analysis suggests that that share would have to be 1/6th of the total net bill savings for landlords to face no net negative welfare costs. To put this amount into context, if all of these benefits were realised through increased rents, this would constitute 0.5% of the total rental income expected in F+G rated homes over the five year period between 2013 and 2018[117].The benefits could also be seen in terms of increased house values, or reduced void periods.

---

[110] Nevin, R. and Watson, G., "Evidence of Rational Market Valuations for Home Energy Efficiency", The Appraisal Journal, 1989

[111] Longstreth, M., Coveney, A. R., Bowers, J. S., "The Effects of Changes in Implicit Energy Costs on Housing Prices", The Journal of Consumer Affairs, Vol. 19, No. 1, 1985

[112] Australian Government, "Energy Efficiency Rating and House Price in the ACT", 2008

[113] RICS (2010), "Energy Efficiency and Value Project".

[114] http://nlauk.wordpress.com/2010/11/11/landlords-to-be-dealt-a-fair-hand

[115] The impact assessment for the introduction of Energy Performance Certificates suggested that some of these benefits were likely to fall to landlords, however no direct evidence on the impact of EPCs is yet available. http://www.communities.gov.uk/documents/planningandbuilding/doc/324462.doc

[116] This is based on the estimated total energy savings 586, less the repayments to cover installation and 'make good' costs.

[117] Based on 550,000 occupied F+G rated homes in the PRS, an average weekly rent of £100, giving £2.8bn per year or £13bn over a five year period discounted at 3.5%. Initial analysis of the English Housing Survey (2008) suggests that the assumptions used to derive these estimates are conservative.

269. If the benefits to landlords do outweigh the costs then it is unlikely that this regulation will have an negative impact on the supply of properties. The cost of this regulation is unlikely to be a significant driver of exit from the market in the context of much larger exit costs. Entry to the market would be lower if prospective landlords do not expect the benefits of the investments to outweigh the perceived costs.

270. The details of secondary legislation will be accompanied by a revised assessment of the costs and benefits to landlords alongside an analysis of the impact on the supply of properties in the domestic PRS. This view will be informed by hedonic pricing analysis for the domestic and non-domestic property sectors, which will detect the value the market attaches to more energy efficient buildings. In turn, this will inform the decisions to specify details such as exemptions that can protect the market from any undue burden. In addition, Government is committed to ensuring there are no net negative costs on landlords.

271. The examples in box D1 below show the breakdown of costs and benefits to landlords and tenants for some indicative Green Deal packages in the PRS.

Box D1: Examples of Green Deal measures in the PRS

Example 1

The Green Deal accredited assessor recommends loft insulation top up and cavity wall insulation through a Green Deal finance arrangement of £659 with a 5 year payback period at 5% interest. This leads to a bill saving of £175 per year for 42 years (assuming constant energy prices) and finance repayments of £150 per year for 5 years. The table below shows the benefits and costs to the landlord and tenant, there are additional benefits to society of reduced carbon emissions, improved air quality etc.

	Landlord	Tenant
Individual costs	Upfront financial cost = 0 Potential void cost = £13 per month that property is vacant	Green Deal finance repayments = £150 per year for 5 years
Shared costs	Hassle costs[109] = £125	
Individual benefits	Possible reduced void periods if improvements lead to greater tenant satisfaction.	Possibility to take some benefits as increased comfort, leading to health benefits.
Shared benefits	Share of £25 per year for the first 5 years and, share of £175 per year for the remaining 37 years, either as lower bill payment (tenants), or possible higher rents (landlord)	

Example 2

The assessor recommends solid wall insulation through a £5000[118] Green Deal finance arrangement with 25 year payback at 5% interest. This leads to bill savings of £393 per year for 36 years (assuming constant energy prices) and repayments of £355 per year for 25 years. The table below shows the benefits and costs to the landlord and tenant.

	Landlord	Tenant
Individual costs	Upfront financial cost = 0 Potential void period cost = £30 per month that property is vacant	Green Deal finance repayments = £355 per year for 25 years
Shared costs	Hassle costs[109] = £210	
Individual benefits	Possible reduced void periods if improvements lead to greater tenant satisfaction.	Possibility to take some benefits as increased comfort, leading to health benefits.
Shared benefits	Share of £38 per year for the first 25 years and, share of £393 per year for the remaining 11 years,	

[118] It is likely that this cost would cover direct "make good" costs and is the residual cost after a likely ECO subsidy.

Example 3

A property requires internal solid wall insulation costing £12,800 to install including 'make good' costs of redecoration. This would lead to expected bill savings of £393 per year for 36 years (assuming constant energy prices). However, a Green Deal finance package on its own would not be able to cover this cost given the expected bill savings. Without any subsidy (for example from ECO) the landlord would be able to refuse the request as it would impose significant upfront costs.

These examples assume that measures are installed in a typical three bed semi-detached house. They illustrate that the only costs landlords will face are hassle costs (time), and these are low owing to the nature of the sector and the regulation being foreshadowed (landlords can carry out works in natural void/redecoration periods). However the benefits are potentially high for all parties. In example 3 where this is not the case, the landlord is protected and is not required to make the "unreasonable" installation where finance is not sufficient to cover the installation costs.

The regulation potentially provides a net benefit to the landlord; the tenant; future tenants; and to society. In addition, landlords are protected from having to meet the upfront costs of installing measures.

Costs and Benefits

272. The scenarios used in this section do not account for exemptions that are to be specified in secondary legislation and are based on the assumption of full compliance, secondary legislation will set out the policing and enforcement mechanisms. These impacts will be set out in more detail in the Impact Assessments accompanying secondary legislation. The Impact Assessment will also go to the Reducing Regulation Committee for consideration at this stage.

Counterfactual

273. The counterfactual for the regulatory option considered in this chapter is based on a relatively low level of business as usual uptake reflecting the existence of the Green Deal and a continued Energy Company Obligation. It is difficult to predict how landlords will respond to the Green Deal, hence the assessment of take up in this scenario is based on what has been observed under existing policies.

274. Under the Carbon Emissions Reduction Target (CERT) between April 2008 to March 2010, there were an estimated 11,800 lofts insulated and 7,100[119] wall cavities filled per year in the PRS, which equates to around 1% of the available opportunities estimated from the EHCS in 2007 per year of the programme. From 2013 it is assumed that this rate of take up doubles to 2% per year following the introduction of the Green Deal. Thus the counterfactual option is assumed to lead to take up that covers 14% of the measures available to the PRS in 2007 by 2017, the end of the period by which the majority of installations are assumed to have taken place in order to comply with the regulations in 2018. These installations, presented in the table below are subtracted from the estimates of the impact of regulations. The period 2013-2017 is used to demonstrate the costs and benefits of the regulation. This reflects a scenario where landlords pre-empt the regulation so that all are compliant by 2018. This represents the costs and benefits of the regulation in a relatively burdensome form, and is therefore considered to be conservative. Assuming impacts over a longer period would reduce costs (in present value terms) but increase benefits (as the real value of energy savings and emissions reduction is expected to increase over time). This is a simplifying assumption as compliance cannot be estimated in advance of details about enforcement and exemptions.

Table D1. Measures assumed to be installed as a matter of course by 2017 **('000s)**

Loft Insulation	24
Loft Insulation top up	148
Cavity Wall Insulation	115
Double Glazing	117

Component 1: Power to require domestic landlords to agree to reasonable requests for consent to energy efficiency improvements from tenants

275. Tenants often have short tenancies. For those tenants with tenancies of a few years or less, it is unlikely that the bill savings under Green Deal will repay the hassle costs of requesting consent for a measure from their landlord.

276. Longer term tenants who may have an incentive to request measures, may not want to risk losing their tenancy by confronting the landlord, especially in the case that tribunal is required.

[119] Based on energy savings trust Homes Energy Efficiency Database.

277. Still, there may be some cases where tenants feel comfortable requesting measures and where landlords, knowing the obligation to consent, will do so. It is assumed that third parties may act on behalf of tenants to make requests.

278. Assuming that only tenants who are in residence for more than 5 years (22%) have an incentive to request measures and that 10% of these tenants do so, it might be expected that 2.2% of the measures identified in table D4[120] are installed, leaving:

Table D2. Measures assumed to be installed on the request of tenants or third parties acting on their behalf by 2017 **('000s)**

loft insulation	3
loft insulation top up	20
cavity wall insulation	16
double glazing	16

279. This would result in the following quantified costs and benefits:

Table D3: Quantified costs and a benefits of component 1 in present value terms

£m (2010)	Low	Central	High
Costs:			
Installation Costs	19	19	19
Hidden Costs	4	4	4
Understanding the regulations[121]	11	11	11
Total	**34**	**34**	**34**
Benefits:			
Change in Energy Use	23	43	67
Change in non-traded emissions	11	22	32
Change in value of traded emissions rights required	0	1	1
Change in Air Quality	2	2	2
Change in comfort	10	14	18
Total	**47**	**82**	**121**
Non traded carbon savings (MtCO2)	-0.48	-0.48	-0.48
NPV	**13**	**47**	**87**

280. The high and low scenarios reflect the high and low scenarios for future energy and carbon prices as set out in the supplementary Green Book guidance.

281. Costs to landlords: This option entails costs to landlords of understanding the regulations that are estimated to be £11m in NPV terms, in addition to potential costs of repayments in void periods that are estimated to be around £5-£7 million in NPV terms for the installations assumed to result from this scenario[122].

Component 2: power to impose minimum energy efficiency standards in the domestic private rented sector.

282. In addition to the measures assumed to be requested in component 1, this scenario presents a case whereby all F and G rated properties in the PRS receive measures[123]. This represents an over estimate as no account has been taken of potential exemptions.

[120] After subtracting the measures assumed to be installed in the no power counterfactual.

[121] This estimate assumes that each of 1.2m landlords spends an average of 30 minutes understanding the regulations. That time is valued at £20 per hour according to the gross wage for professional occupations from the ONS Annual Survey of Hours and Earning s (2010) http://www.statistics.gov.uk/downloads/theme_labour/ashe-2010/2010-occupation.pdf , this estimate is discounted from 2013 to 2010 at 3.5%.

[122] This is based on high and low interest rate scenarios, and the characteristics of the measures assumed to result from option 1, This includes the interest costs that are not included in the social value of the £20m installation costs identified in the table D3.

[123] The required measures are based on work by BRE of the total number of measures required in the PRS for all properties rated F or G to be upgraded to E. English Housing Conditions survey 2007.

283. Table D4 sets out an estimate of the total number of measures that would be required for all PRS properties to reach an E rating.

Table D4: Measures required in F and G rated properties in the PRS, including measures included in the counterfactual, and assumed to result from component 1 in F+G rated properties **('000s)**

Cavity Wall Insulation	243
Loft Insulation	148
Loft Insulation top-up	250
Solid Wall Insulation	79
Double Glazing	35
Attributable to Boiler Regulations[124]*:*	
Boiler Upgrades	275
Boiler Replacements	152
Smaller Measures tied to boilers	169

284. These measures form an upper estimate of those that could be installed in the PRS as a result of the combination of three policies:

a. Green Deal Finance

b. Energy Company Obligation

c. Private Rented Sector Regulation

285. While it is the regulation in the PRS that would be expected to drive take-up in the sector, the presence of Green Deal finance is required in order to make the take-up possible. This is because the regulation will only require measures to be installed if financial arrangements are in place that mean that landlords bear no up-front financial costs.

286. It is important to note that the take-up of measures in the PRS would not necessarily be additional to that achieved elsewhere in the domestic sector since, depending on the design of the ECO, it is likely that effort in the PRS could displace effort elsewhere in meeting ECO targets.

287. Given the lack of a carbon price on domestic sector gas, expensive measures such as solid wall insulation are unlikely to offer expected bill savings that completely offset the costs without the aid of additional support – in this case an ECO subsidy. The opportunity for energy companies to meet ECO targets through installations of this sort in the PRS may decrease the costs of delivering the ECO or allow for a higher target. However, owing to the early stage of policy development in this area, this effect has not been quantified and the impacts of solid wall insulation installations in the PRS are not counted in the cost benefit analysis presented here.

288. Other measures (cavity wall insulation, loft insulation including top-ups and double glazing) are assumed not to require ECO subsidy in order for the expected bill savings to outweigh the benefits[125]. Therefore, all PRS installations of the measures above the counterfactual are attributed to the regulation in the following cost benefits analysis.

289. Assumptions (except in the cases noted below where assumptions have been adjusted) regarding the lifetime, energy savings and costs of measures can be found in Annex 4 along with the methodology for valuing carbon savings, air quality improvements and energy savings. A comfort factor of 15% has been assumed throughout[126]. It is assumed that 24% of the measures in

[124] Measures related to boilers are not counted toward the analysis of this regulation as boiler regulations are already in place which are expected to lead to a high market concentration of efficient boilers by 2015. However, it is possible that measures related to boilers will be available as part of a Green Deal finance package. The list of qualifying measures is still to be determined.

[125] In the case of double glazing it is assumed that properties receive other benefits, improved security, appearance, sound insulation; these benefits may result in increased property prices, or higher rental incomes.

[126] Comfort taking (or take back) is the direct rebound effect attributed to taking more heat (comfort) rather than bill savings when the energy bill is reduced. The assumed level of comfort for insulation measures in this analysis is 15% of total savings. This is consistent with previous analysis in CERT and CERT extension. The source for this assumption can be found on the DECC website at: http://www.decc.gov.uk/media/viewfile.ashx?filepath=what%20we%20do/supporting%20consumers/saving_energy/analysis/insulationmeasures-review.pdf&filetype=4 Little evidence is available on the size of comfort taking in the non-domestic sector, but there is reason to think that it would be smaller than the domestic sector's because of the way in which work spaces are used.

the counterfactual would be in F & G properties – the rest are assumed to be in properties with higher initial EPC ratings[127].

290. The estimated impact components 1 and 2 over and above the counterfactual, and excluding those installations attributable to other aspects of the Green Deal, would be the installation of the measures shown in the table below.

Table D5: Assumed number of additional measures attributable to components 1 and 2 (excluding those assumed under the counterfactual) **('000s)**

loft insulation	128
loft insulation top up	245
cavity wall insulation	230
double glazing	60

291. Assumptions are the same as those used in the non-PRS (see Annex 4) with the exception of the following, related to hidden costs:

a. It is assumed that double glazing will be prohibitively expensive if not combined with a refit, hence additional hidden costs are negligible.

b. A lower hidden cost for loft insulation has been used, £125 rather than £165 based on the Ecofys estimates for professionally installed loft insulation rather than DIY.

c. A lower hidden cost for cavity wall insulation has been used, £100 rather than £170, as it is expected that the PRS still contains some "easy to treat" properties so the midpoint of the Ecofys estimates of hidden costs has been used.

292. This would result in the following costs and benefits:

[127] This is based on the proportion of the PRS that is rated F&G, and implies an equal rate of progress for F&G properties, and A-E properties. Take up might be higher in lower rated properties, as more of the opportunities might be in those properties, However, it might also be lower owing to the barriers discussed above. On balance we have assumed that the rates of progress are equal.

Table D6: Quantified costs and benefits of components 1 and 2 in present value terms

£m (2010)	Low	Central	High
Costs:			
Installation Costs	215	215	215
Hassle Costs[128]	56	56	56
Understanding the regulations[121]	11	11	11
Additional costs of assessment[129]	12	12	12
Total	**295**	**295**	**295**
Benefits:			
Change in Energy Use	301	551	861
Change in non-traded emissions	142	286	430
Change in value of traded emissions rights required	6	12	17
Change in Air Quality	29	29	29
Change in comfort	131	175	231
Total	**609**	**1053**	**1568**
Non traded carbon savings (MtCO2)	-6.26	-6.26	-6.26
NPV	**314**	**758**	**1274**

Costs:

293. Installation costs represent the technology cost of measures, their installation and any associated "make-good" costs. As no up-front costs will be borne by landlords, it is assumed that these costs are repaid over time by tenants to finance providers.

294. Hidden costs, for the measures considered here, primarily relate to time spent (by the landlord) researching, coordinating and managing the installation of measures. It is expected that where landlords can install measures during void periods and whilst other repairs or refurbishment is taking place these costs might be somewhat reduced.

Administration, Policing and Enforcement Costs to Local Authorities

295. Local Authorities would incur new administration and enforcement costs[130]. In order to limit the impact on council tax payers these costs would be covered by a transfer from central government[131]. This section highlights the areas in which costs might be incurred and provides some estimates to illustrate the likely size of the burden – although a further assessment of these costs would accompany the development of any secondary legislation. Some costs of potential enforcement may not be represented in the estimates below.

296. Administration costs: Local Authorities might incur expenditure to monitor an estimated 682,000 F&G properties. This might involve assessing new EPCs and ensuring that they are above any minimum standard. .

297. Policing costs: To provide a rough indication of policing costs the following calculation assumes 1% of PRS properties require 2 hour inspections:

- Number of F and G rated Properties in the PRS: 682,000

[128] Hassle costs are primarily composed of time taken by owners or tenants to research measures, arrange for installation, prepare the property for installation and any oversight, cleanup or redecoration costs associated with the installation. See the Ecofys (2009) "The hidden costs and benefits of domestic energy efficiency and carbon saving measures" report for further details. These costs may be overestimates as the existence of Green Deal accredited assessors and installers may reduce research costs, and combining measures with other refurbishment may introduce economies of scale.

[129] It is possible that some PRS properties will not have EPCs by 2018, this is expected to be around 10% of the properties covered by this component of the regulations. This is based on the proportion of assured and regulated properties whose tenants have lived in the property for 10 or more years (Rugg and Rhodes (2008)). Each landlord is expected to undertake an EPC assessment costing £50. These are assumed to occur at even rate between 2013 and 2017, and the costs have been discounted to 2010 present value estimates.

[130] It is likely that this power would impose burdens in addition to their current administration and enforcement costs of the housing health and safety rating system and trading standards etc. so any new enforcement mechanism would be in addition to these existing mechanisms.

[131] Since secondary legislation would not come into force until 2015, this would occur after the period described in the 20 October spending review (up to March 2015).

- Assume 10% receive a new EPC per year[132]: 68,200
- Inspections required (1%)[133]: 682
- At £86 per inspection (2 hours at £43 per hour)[134]: £ 58,650 per year.

298. The results of inspections might be challenged by landlords which would lead to tribunals to determine the reasonableness of requests. This would lead to further costs to the parties involved, although it is difficult to estimate the likely level of challenge and the number of cases that would incur such costs. Tribunals in this areas are expected to cost around £1,200 on average[135], however, it is important to note that the cost will vary considerably depending on the type, complexity, location etc. of the case**.**

Quantified Benefits

299. Benefits are calculated on the basis of the Supplementary Green Book Guidance for valuing impacts of changing energy use and greenhouse gas emissions[136].

300. Installing the measures above would result in a decrease in energy demand of 0.9TWh in 2020. This would result in 0.16MtCO2 saved in the non-traded sector in 2020. As fuel savings from measures would last up to 42 years, there is a total expected saving of 6.5 MtCO2 of non-traded carbon emissions.

Un-quantified Benefits:

301. Energy Security: With less energy demand from the PRS (0.9TWh per year), these measures would contribute to reducing the strain on UK energy supply, and therefore improve the UK's energy security. Much of this reduction is expected to be in gas consumption owing to the proportion of homes heated by gas. The UK's production of gas from the UK continental shelf is projected to fall year-on-year. These measures will help to reduce the demand for gas and also help to reduce the temperature-driven variability of gas demand in winter (in particular, it could put downward pressure on the 'peak demand' for gas). These measures would therefore help to make a small reduction in the amount of investment that may be required on the supply-side of the gas market in order to maintain the security of the UK's gas supplies.

302. Health Benefits: The fuel poor are more likely to suffer as a result of living in poorly heated homes. Many studies[137,138, 139] have found that poorly heated homes can increase the chances and the frequency of both the young and the elderly from suffering from ailments such as asthma, bronchitis, pneumonia and influenza. As a result of avoiding these illnesses, such vulnerable householders could require less emergency assistance and/or hospitalisation. Illness in the young can affect their development and lead to days of school and work for their parents. There is likely to be a benefit to the economy as a result of a reduction in the health impacts of cold, damp housing, although it is difficult to quantify this link. By focusing on elderly and young groups on low incomes with a higher than average propensity to be fuel poor, the PRS regulation could lead to improved warmth in households with a consequent positive impact on health.

303. A recent study by the Building Research Establishment for the Chartered Institute of Environmental Health[140] suggests that preventing excess cold in the PRS by increasing each F or G rated dwellings' SAP rating to 50 (within the E band) could save the NHS between £50m and £270m per year. Only a proportion of this benefit would be attributable to these regulations. That study is likely to include measures that would be attributable to business as usual repair and refurbishment,

---

[132] EPCs must be renewed every 10 years, this assumes a n average rate of renewal. A possible reduction in this time period might increase the monitoring costs, and bring potential enforcement activity forwards in time.
[133] This assumes a significantly higher inspection rate than at used in Communities and Local Government methodology which assumes 0.1%. This is a conservatively high estimate that might reflect the instigation of investigations by turnover, tenants request, or requests from other parties.
[134] According to CLG methodology.
[135] Estimate of £1,192 provided by CLG based on residential property tribunals in 2008-9.
[136] See http://www.hm-treasury.gov.uk/green_book_guidance_environment.htm, and http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx.
[137] http://whqlibdoc.who.int/euro/ehs/EURO_EHS_31_part2.pdf
[138] Howden-Chapman, P. et al., (2007). Effects of insulating houses on health inequality : Cluster randomised study in the community. *British Medical Journal*, doi:10.1136/bmj.39070.573032.80
[139] Barnes, M. et al., (2008). *The Dynamics of Bad Housing : The Impacts of Bad Housing on the Living Standards of Children.* London : National Centre for Social Research
[140] BRE "The Health Costs of cold dwellings" (2011) http://www.foe.co.uk/resource/reports/warm_homes_nhs_costs.pdf

measures that would be attributable to other policies[141], and measures whose installation may not be covered by a Green Deal finance package. In addition it is noted in the study that other household behavioural factors could still lead to the adverse outcomes associated with the hazards of excess cold following home improvement. The total repair costs cited in the study are ten times those assumed to result from the measures attributed here to the regulation of F+G homes. Nevertheless, this evidence suggests that there is considerable potential for this regulation to save NHS resources.

304. Reduction in Fuel Poverty: Any reduction in fuel poverty, alongside the associated health benefits, will help Government achieve its fuel poverty reduction commitments. By focusing measures on the lower rungs of the PRS, energy efficiency improvements will be concentrated on the sector of the housing stock with a very high proportion of fuel poor residents.PRS residents are more likely to live in deprived areas than those in the owner occupied sector, 10% of PRS dwellings were in the most income deprived areas, compared to 5% of those in the owner occupied sector[142].

305. Increased certainty to the energy efficiency industry: The definitive nature of the regulations in the final option are likely to build confidence in the energy efficiency industry that this is a future demand for their products. This brings direct benefits to the industry associated with increased employment and growth along with potential longer term benefits to customers who may benefit from lower prices.

306. Reducing the costs of meeting the UK's Renewable Energy Target: Any decrease in energy use in 2020 will mean that less renewable energy has to be generated in order to meet the 15% target in 2020. At the margin, meeting this target is likely to be very costly. Reductions in energy use that are sustained to 2020 will mean that it might be possible to avoid the most costly renewable technologies being installed.

307. These benefits would also arise on proportionately smaller scale under option 1.

Component 3: Regulate to ensure all G and F-rated non-domestic buildings are raised to an E-rating

308. There is evidence that regulation in the non-domestic sector could drive significant cost-effective savings in energy use and carbon emissions. Targeting the rented sector is particularly important in the non-domestic sector, where 62% of buildings are rented. There is evidence that taking this action in the non-domestic sector could drive significant, cost-effective action – a recent Carbon Trust report states that "To address emissions from the UK's existing non-domestic buildings and help overcome the landlord-tenant divide, Government could require all non-domestic buildings to achieve an Energy Performance Certificate (EPC) rating of at least F by 2020."

309. The non-domestic building sector is a complex community of different industries including investors, developers, designers, builders, owners, landlords and tenants. The building stock comprises a multitude of different building forms, sizes, uses and ages, plus a complex inter-play within every building between heat and cooling demand and building fabric.

310. In addition to barriers that exist in the domestic sector, there are also a large number of additional complexities. The non-domestic sector faces a cycle of inertia between different actors. This is an example taken from the Carbon Trust report[143]:

Funder: 'I would provide finance but there is no occupier demand.'

Owner/developer: 'I would specify but the funder won't provide finance and tenants are not asking for them.'

Contractor: 'I could build but the developers won't specify.'

Tenant: 'I might choose an energy efficient building but there aren't any and energy is not a material cost of occupancy.'

311. The scenario presented here would see the targeting of only the worst performing buildings in the non-domestic sector, covering all commercial and industrial buildings that are G or F-rated if cost-

[141] In particular regulations on the minimum efficiency of boilers.
[142] English Housing Conditions Survey 2007
[143] Building the future, today. Transforming the economic and carbon performance of the buildings we work in. Carbon Trust.

effective savings are not achieved under the Green Deal. This represents almost 30% of buildings-related emissions. [144]

312. The Carbon Trust (CT) estimates that an F-rated building is at least 33% more energy-efficient than a G-rated building on average, with a further improvement on average of 18% from F-rated to E-rated. Using CT methodology, it is estimated that bringing all G-rated buildings up to an average F-rating would require an initial investment of £800 million. This would reduce emissions by 4.2MtCO2e per annum while saving up to £307 million per annum in energy costs, through simple, cost-effective measures. Further adjustments are made to the CT estimates to model the costs and benefits of moving all G and F-rated buildings to E-rated. It is estimated that this would involve an upfront cost of £1641 million and result in a reduction in emissions of 7.2 MtCO2e per annum, saving £525 million per annum in energy costs.

Table D7: Quantified costs and benefits of component 3 in present value terms, after accounting for other policies and adjusting for assumptions about feasibility

£m (2011)	LOW	CENTRAL	HIGH
Installation costs	-£924	-£1,123	-£1,316
Additional costs	-£185	-£225	-£263
Assessment costs	-£69	-£84	-£98
Finance costs	-£132	-£209	-£521
Total	**-£1,309**	**-£1,640**	**-£2,198**
Energy savings (Variable element)	£1,104	£1,347	£1,582
Air quality benefits	£50	£61	£71
Lifetime non-traded carbon savings	£610	£746	£877
Lifetime EU Allowance savings	£437	£536	£631
Total	**£2,201**	**£2,690**	**£3,161**
Net Present Value	**£892**	**£1,049**	**£963**
Lifetime non traded carbon savings (MtCO2)			
Lifetime non traded carbon savings (MtCO2)	13.34 9.38	16.32 11.46	19.19 13.47

313. The non-domestic sector analysis presented in table D7 is based on an estimate of what fraction of the non-domestic sector benefits identified by the Carbon Trust could be achieved by this regulation after accounting for other agreed policies, and assumptions about other reasons that measures may not be feasible or appropriate for a Green Deal. Not all buildings will be able to raise their rating from a G or F to an E-rating, due to the substantial diversity in the type of buildings in the non-domestic sector. For instance, there may be a limited availability of cost-effective measures or legal protection from modification of historical buildings. Furthermore, compliance with the regulatory requirements may not be universal. To account for these constraints, an 'undeliverability' factor has been applied (35%, 25%, and 15% of the identified abatement potential for the Low, Central and High take-up scenarios respectively), and a consideration of the distribution of the cost-effectiveness of measures has been made. The rate of turnover has also been taken into account. This analysis assumes pre-emptive take up from 2013 onwards to represent the regulation in a relatively burdensome form. The actual profile of take up is likely to depend upon the level of enforcement the details of which are to be determined.

314. Any regulation may also impose a cost on Local Authorities from an enforcement perspective. In particular, a requirement for landlords to meet a particular performance rating for a building. These enforcement costs, and the effects on the supply of properties in the PRS have not been quantified in the analysis as they will depend on the precise nature of the policy and the level of enforcement.

Net Costs to business:

315. Costs to landlords: This component entails the same costs to landlords of understanding the regulations as component 1, i.e. £11m in NPV terms. There are also potential costs of additional assessments estimated to be £12m in NPV terms. In addition there are increased potential costs of repayments in void periods that are estimated to be around £34-£43 million in NPV terms for the

[144] Information provided by Landmark Information Group

installations assumed to result from this scenario[145]. The quantified net cost to landlords is therefore £61.5m in NPV terms. These are potentially offset by unquantified benefits to landlords.

316. Unquantified benefits to landlords: The costs to landlords may potentially be offset by potential increase in rental prices, house prices or reduced void periods from the improved quality of the property[146]. These are not included however sensitivity analysis suggests that were this benefit to amount to one sixth of the net energy saving benefits then this would offset the costs to landlords.

317. There are quantified benefits to energy companies from reduced purchase of EU allowances under the Emissions Trading Scheme, these are estimated to be around £12m in NPV terms.

318. There are potential benefits to businesses from regulation in the non domestic sector that result in net bill savings estimated to be in the region of £140m. With an additional reduction in the purchase of EU-ETS allowances worth £536m to business.

319. Table D8 summarises the estimates of the equivalent annual net costs to business (EANCB). This calculation is sensitive to the time period over which the net costs are distributed. This table presents EANCB(1) based on the 4 year period between the commencement of the Green Deal and the commencement of the regulations when the majority of costs are expected to be borne. EANCB(2) spreads the net cost over 52 years which is the total lifetime of measures used in the overarching Green Deal impact assessment. This will be relevant for benefits that derive from long lived insulation measures. In both cases the EANCB is negative as the expected benefits to non-domestic tenants from energy savings outweighs the costs to landlords.

Table D8: Equivalent annual net costs to business (EANCB)

	Net present cost	4 years EANCB(1)	52 years EANCB(2)
Domestic			
Landlords costs	61.5m	16.2	2.47
Reduced purchase of EUAs	-12m	-3.15	-0.48
Non Domestic			
Non domestic landlord costs[147]	61.5m	16.2	2.47
Non domestic tenants energy savings[148]	-140m	-36.8	-5.63
Reduced purchase of EUAs	-536m	-141	-21.54
Total	-565m	-148.6	-22.71

Risks and Assumptions

320. There are a number of key assumptions in this cost benefit analysis:

a. The assumption of homogeneous costs: The analysis assumes that all domestic measures are installed in average 3-bed semi-detached houses. This could have two skewing effects. Firstly the overall costs and benefits could be higher/lower depending on whether the average property size was higher/lower. Secondly, there may be properties which are difficult to treat and therefore cost substantially more than the average. It is expected that future analytical work will explore variations in costs and effectiveness of measures for a more detailed breakdown of house types.

b. Timing of installations: This Impact Assessment assumes, for simplicity and in the absence of data, that installations occur over 5 years from 2013 to 2017. However, with variation in tenancy periods, when requests might be made, and the window of time that might be available for landlords to respond to a request – there is considerable uncertainty in the timing of actual

[145] This is based on high and low interest rate scenarios, and the characteristics of the measures assumed to result from option 2, This includes the interest costs that are not included in the £230m social installation costs identified in the table.

[146] In principle this benefit could be as much as the net energy saving (after subtracting installation costs) estimated to be roughly £300m based on table D6, depending upon the relative bargaining power of landlords and tenants. However, since the current UK house or rental markets is not considered to accurately price energy efficiency, the actual benefit is likely to be some fraction of that amount. To offset the costs to landlords roughly 1/6 of these net energy savings would need to be captured by landlords, however we have no evidence to suggest whether the price effect would be of this size.

[147] In the absence of an estimate of the numbers of landlords in this sector the same costs as for the domestic sector have been assumed.

[148] The net present cost of the energy savings for non domestic tenants is taken as the energy savings minus installation and assessment costs.

installation of measures. The starting period assumed is intended to reflect a possibility of early movement

c. Exemptions: Final legislation will set out exemptions as set out above. This analysis does not take account of these exemptions owing to the lack of clear policy detail at this stage. However it is likely this would reduce the overall costs and benefits of the scheme.

d. Effectiveness of regulation: This analysis assumes that policing of the scheme is fully effective in securing the assumed improvements in properties that will benefit from them.

Section E: Additional information on energy bills	Impact Assessment (IA)
	IA No: DECC0015E
Lead department or agency: Department of Energy and Climate Change	**Date: 09/12/2010**
	Stage: Final
Other departments or agencies:	**Source of intervention:** Domestic
	Type of measure: Primary legislation
	Contact for enquiries: Nina.Roney@decc.gsi.gov.uk

Summary: Intervention and Options

What is the problem under consideration? Why is government intervention necessary?
There are a number of concerns with the level of consumer engagement in the energy market. Many consumers find navigating the various tariff options on offer confusing and difficult, and are not aware of how much they could save by doing this. We think that it would be most effective to communicate with consumers at the time of billing, giving them an idea of how they can start saving. Government intervention will be needed to have the powers to mandate action by energy suppliers, should a voluntary agreement not be forthcoming.

What are the policy objectives and the intended effects?
The coalition programme states that: 'We will increase households' control over their energy costs by ensuring that energy bills provide information on how to move to the cheapest tariff offered by their supplier.' A number of options are being considered and Government is in consultation with consumer groups and suppliers to examine these further. Key policy objectives are to give people the information they need to take control of their household energy costs, and to increase consumer engagement with energy costs.

What policy options have been considered? Please justify preferred option (further details in Evidence Base) There are a number of options under consideration, full analysis of the proposed options will be done if / when secondary legislation is required. This policy will focus on informing customers of the cheapest tariff available to them. For example some potential options being considered are:

1. Energy bills tell customers what premium (if any) they pay over and above the supplier's cheapest tariff (this may be defined by time-point, historic consumption, durability and/or exclusion of certain tariffs e.g. social tariffs). The cheapest tariff could be defined as the cheapest tariff that the supplier offers at the time of billing and can include time limited offers, on-line only deals and tariffs that use a different payment method to the one customers are currently on. One possibility is to use the definition of the cheapest tariff in the social tariff agreement, which is the "lowest tariff that supplier offers in the customer's area on an enduring basis".
2. Energy bills tell people what premium (if any) they pay over a particular tariff selected as a benchmark e.g. standard online direct debit.

When will the policy be reviewed to establish its impact and the extent to which the policy objectives have been achieved?	It will be reviewed 01/01/2015
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	Dependant on the policy option chosen, monitoring methods will be chosen.

Summary: Analysis and Evidence Policy Option 1
Description:

Price Base Year	PV Base Year	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low:	High:	Best Estimate: £0 m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	-	**0**
High	-	-	**43**
Best Estimate	-	-	**22**

Description and scale of key monetised costs by 'main affected groups'
There will be no costs associated with the primary legislation. If a voluntary agreement cannot be reached and secondary legislation is required then there are expected to be total costs associated with the secondary legislation in the range of £0-£43m with a best estimate of £22m.
If secondary legislation is required then the costs to suppliers of changing their bills will depend on the option chosen and the magnitude of change required. Costs would include up-front system changes that are required: including new printers, extra storage, IT staff costs and bill re-design. There will also be potential on-going costs from increase printer running costs.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional	Optional	**0**
High	-	-	**0**
Best Estimate	-	-	**0**

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'
There are no benefits associated with the primary legislation. However if a voluntary agreement is reached or secondary legislation is required then, depending on the level of switching in relation to the cheaper tariff information consumers may benefit in terms of cheaper energy bills. There could also be small improvements in the level of competition in the market.

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5%

Impact on admin burden (AB) (£m):			Impact on policy cost savings	In scope
New AB:	**AB savings:**	**Net:**	**Policy cost savings:**	No

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			Great Britain		
From what date will the policy be implemented?			01/01/2010		
Which organisation(s) will enforce the policy?					
What is the annual change in enforcement cost (£m)?					
Does enforcement comply with Hampton principles?			Yes/No		
Does implementation go beyond minimum EU requirements?			N/A		
What is the CO_2 equivalent change in greenhouse gas emissions?			**Traded:** 0	**Non-traded:** 0	
Does the proposal have an impact on competition?			Yes		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small**	**Medium**	**Large**
Are any of these organisations exempt?	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

Problem under consideration

321. There are a number of concerns regarding the level of consumer engagement in controlling their energy costs. For example, although four fifths of consumers have switched either gas or electricity suppliers once, very few have switched more than once, suggesting that households are not acting to minimise their energy costs. Also, many consumers find navigating the various tariff options on offer confusing and difficult, and are not aware of how much they could save by doing this. This lack of engagement also has effects on the level of competition in the market by only placing a weak constraint on energy prices set by supply companies.

322. As the UK steps up to the challenge of cutting carbon emissions and global competition for scarce energy resources intensifies, it will become increasingly important to help consumers save money on their energy bills. To do this, consumers will need to identify the best tariffs to control their energy costs.

Background

323. Ofgem in their *Energy Supply Probe - Initial Findings Report* found that some consumers were switching on the basis of poor or partial information. They concluded that, as a result, the high levels of customer switching may not be exerting as much constraint on suppliers' prices as it could and that as many as one third of switchers may not achieve a price reduction.

324. To remedy this Ofgem determined to promote more active customer engagement through a number of improvements to the quantity and quality of information suppliers provide to their consumers.

325. From July 2010 new licence conditions were introduced requiring suppliers to include on all bills information on the customer's tariff, their energy consumption for the last 12 months and

the projected costs. Also, from July 2010 suppliers were required to issue an annual statement to all customers. This will contain the information required on bills plus the principal terms and conditions of the tariff and any premiums or discounts as compared with the supplier's standard monthly direct debit tariff. This information is only provided once a year, and does not necessarily refer to the cheapest tariff for the supplier.

326. Government thinks that more can be done to engage consumers, and that providing more information is the key to this. The coalition commitment states that two pieces of information will be included on customer bills, on the cheapest tariff and on consumption comparisons. Although enabling powers are not required to implement consumption comparisons, the policies will be implemented together either via secondary legislation or through a voluntary agreement.

Rationale for intervention

327. Currently consumers face a lack of information due to complex pricing and billing structures, making it hard for them to compare tariffs and make informed decisions regarding their choice of tariff and the level of their consumption. This leads to a significant level of consumer inertia. This proposal should give consumers some feedback on how well they are controlling their costs relative to the cheapest tariff available. By providing them with a clear cheapest price available from their current supplier this should improve transparency in the retail energy market, allow consumers to make better informed decisions and increase competitive pressures.

328. With energy prices likely to rise due to climate change measures and other influences it is important to give consumers more information to allow them to better control their energy costs. Giving consumers an illustration of savings and explaining how they can be accessed should act as a 'call to action', making it easier for them to find a better deal and cut their energy costs.

329. Government intervention is necessary to have the powers to mandate action by energy suppliers, should a voluntary agreement not be forthcoming that improves the information on customer bills to a level deemed satisfactory by the Secretary of State.

Key policy objectives

330. This policy would enable the Secretary of State to pass secondary legislation requiring energy suppliers to provide their customers with additional information on their bills. The coalition programme states that: 'We will increase households' control over their energy costs by ensuring that energy bills provide information on how to move to the cheapest tariff offered by their supplier.' A number of options are being considered and Government is in consultation with consumer groups and suppliers to examine these further. The key policy objectives are:

a. To give people the information they need to take control of their household energy costs in a format that provides a clear 'call to action' or 'nudge' to do so;

b. To increase consumer engagement with energy costs.

Options under consideration

331. There are a number of options under consideration. Full analysis of the proposed options will be done if / when secondary legislation is required. This policy will focus on informing customers of the cheapest tariff available to them. There are several options under this proposal outlined below.

Proposal: Cheapest tariff information for suppliers to inform customers what the cheapest tariff they offer is for example by requiring that:

a. Energy bills tell people what premium (if any) they pay over and above the supplier's cheapest tariff (this may be defined by time-point, historic consumption, durability and/or exclusion of certain tariffs e.g. social tariffs).

b. Energy bills tell people what premium (if any) they pay over a particular tariff selected as a benchmark e.g. standard online direct debit.

332. The cheapest tariff could be defined as the cheapest tariff that the supplier offers at the time of billing and can include time limited offers, on-line only deals and tariffs that use a different payment method to the one customers are currently on. One possibility is to use the definition of the cheapest tariff in the social tariff agreement, which is the "lowest tariff that supplier offers in the customer's area on an enduring basis".

Process of implementation

333. We are currently working with suppliers in order to secure an agreement to proceed with passing the information on to consumers through a voluntary agreement.

334. We propose to take enabling powers in the Energy Bill in order to implement this policy should an agreement with suppliers not be possible.

Costs and benefits of the options

335. Given the uncertainty surrounding the outcome of the voluntary agreement and the exact detail of the likely option to be enacted, the following assessment discusses a possible range of outcomes for the costs and benefits. If the Government needs to use the powers to mandate action by the energy suppliers then a further impact assessment will be required.

Proposal benefits

336. The options identified are aimed at providing an effective 'nudge' to move onto a cheaper tariff by providing consumers with more information in an easily accessible form. If more customers switch onto cheaper tariffs, and as a result save money, there would be a benefit to energy consumers, though this would largely be a transfer from the energy company to the customer. There would also be a resource saving to the economy if more consumers move onto tariffs with lower administration costs e.g. online and direct debit tariffs.

337. Consumers that benefit from cheaper tariffs as a result of the policy may decide to increase their energy usage as a result. The welfare derived from this increased energy usage is a social benefit that should be valued as part of the appraisal of the policy, however it is offset by the social cost of the increased energy usage which includes the resource cost of energy production and supply, as well as carbon and air quality costs.

338. These effects are difficult to quantify given that it is not known how many customers will become more active as a result of the cheaper tariff information, and how the energy companies may adjust their tariff structures in reaction to a significant amount of switching to cheaper tariffs. The level of switching by the customers will also depend on how the information is presented. For example, the behavioural response is likely to be higher if the potential saving is highlighted directly on the bill, rather than only being accessed via a link to a website.

339. There could be some effects on competition in the market if the policy influences the level of switching in the market. As customers become more aware of the potential to save money on their bill, they may also be encouraged to look at alternative energy suppliers.

340. Depending on the particular option chosen there is the potential for perverse effects which will reduce the benefits and will need to be allowed for in any future policy design. For example, there have been some presentational concerns expressed about using a 'backward' look, potentially alienating the customer by pointing out what they have lost out on, rather than what they could save in the future. There is also the concern that consumers will decide to pay what they 'should' have paid rather than what they owe. Showing the customer what they can save in the following twelve months could help to avoid this negative reaction.

341. It is not considered that this policy would have adverse impacts on any particular income group of consumers or that the policy benefits will be particularly confined to any income group. Equality considerations are covered in the specific impact test for the Green Deal IA as a whole.

Proposal costs

342. There are no costs associated with the primary legislation; however, energy companies would face some costs if either a voluntary agreement is reached or secondary legislation is required. It is not possible to give a detailed breakdown of costs at this stage before the policy has been designed. The costs of these proposals are likely to cover potential up-front system changes that are required incl. new printers, extra storage, IT staff costs and bill re-design. There would also be potentially on-going costs from increased printer running costs. The potential range of costs is quite broad from £0-£43 million reflecting the policy uncertainty, and at this stage our best estimate is simply the half-way point of £22 million.

343. These costs would be shared by other polices that also require changes to bills and would be implemented at the same time. These policies include the provision of consumption comparisons for which new primary powers are not required and new information on bills in relation to Green Deal Finance.

344. The high cost figure is based on evidence collected for the EU third internal energy package (information provided under a confidential agreement). It represents a high-cost scenario, similar to the bill redesign requirements following the Ofgem Probe Remedies. Set-up costs are assumed to be £1.5 million for all companies and the annual running costs are assumed to be £0.5 million per company (for the largest 6 suppliers only), covering more expensive printer running costs (paper, ink, etc), as well as increased postage. The on-going costs of this policy may decline over time as more customers switch to online billing. The cost figures were provided on a confidential basis.

345. For simplicity, it has been assumed that the costs would not differ between large and small suppliers for the fixed upfront costs, suggesting that the top end of our range is very unlikely to be met. It is assumed that the costs are borne by twelve suppliers (roughly the number operating today). In reality, the costs are likely to differ between suppliers depending on the number of customers, billing methods, and how advanced and easy it is to change a company's billing system is. One would expect the fixed costs to be much lower for the smaller suppliers.

Annexes

Green Deal Impact Assessment

Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their actual costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

Basis of the review: To be developed in preparing secondary legislation.
Review objective: To be developed in preparing secondary legislation.
Review approach and rationale: To be developed in preparing secondary legislation.
Baseline: To be developed in preparing secondary legislation. However, it is worth noting that the baseline (or counterfactual) used in the illustrative scenarios presented elsewhere in this document is the world as envisaged by the projections in Updated Energy Projections 40, June 2010[149] minus the impact of the "Supplier Obligation" post 2012 policy.
Success criteria: To be developed in preparing secondary legislation.
Monitoring information arrangements: To be developed in preparing secondary legislation. However, it is likely that information about a wide range of performance indicators will be collected, e.g. accredited assessors and installers may be required to provide information on the advice and installations they provide. Energy Companies carrying out their proposed obligations are also likely to have to provide information about the installations they carry out. DECC is developing a National Energy Efficiency Data framework that will provide a hub for effectiveness data, i.e. standard Green deal data will be linked with granular energy consumption and other data to allow evaluation of policy effectiveness, in terms of carbon and increased energy efficiency.

[149] Updated Energy Projections website: http://decc.gov.uk/en/content/cms/statistics/projections/projections.aspx

Reasons for not planning a PIR: A PIR will be developed in preparing secondary legislation.

Annex 2 - Equality impact assessment

Stage One: Screening for Impact	
Name of service/procedure/policy or project: Green Deal Primary powers	
Project lead completing assessment:	Robert Towers
Position:	Economic Advisor
Division/directorate:	NCCCS

1. What is the main purpose of the service/procedure/policy or project?

The impact assessment, which this EIA is linked to, is a final IA of the primary powers to ensure the flexibility to develop the appropriate Green Deal policies to be agreed through secondary legislation. As part of the policy development there will be an extensive evaluation of the potential equality impacts of policy options.
Consequently this EIA is focussed on the primary powers, however an illustration of the possible equality impacts is discussed.

The Green Deal is a market-led, consumer-driven policy to promote energy efficiency improvements in homes and workplaces; it does not involve Government delivery of installations nor Government direction of outsourced services nor Government finance. Government's role is threefold: (1) to establish, through legislation, a financial mechanism with adequate consumer protections (such as accreditation and advice) which private firms can utilise to sell energy efficiency to consumers; (2) to reform existing carbon reduction obligations on energy companies to be more focussed and cost effective; and (3) to drive demand in order to overcome consumer inertia.

2. List the main activities of the project/policy. For strategies list the main policy areas.

As these are only primary powers there is no resulting policy or project, but this is the first step towards the development of the policies.

Primary powers are being taken to allow the development of policies to create a finance scheme to resolve the issue of the up-front cost of energy efficiency measures being installed into homes and businesses. This scheme will be supported by accreditation for assessors and installers, an obligation on energy companies to support vulnerable and hard to treat households, the promotion of the finance scheme, and possible regulation of the private rented sector if necessary.

3. Who will be the main stakeholders/users of the service/procedure/policy or project ?

The main stakeholders for the primary powers will be interested players in the energy efficiency and consumer finance market.

Once the policies have been developed and passed through secondary powers the stakeholders could potentially be every home and business in the country.

4. Does this piece of work result in any of the following?		
Written information being provided to the public or staff – either in paper or electronic format.		No
People contacting DECC.		No
People visiting DECC's premises, or other premises arranged by DECC.		No
A service being delivered to staff/the public at set days/times each week.		No
Staff being required to wear a uniform or adhere to a dress code.		No
DECC staff holding face to face meetings with people.		No

5. Have you already consulted with people about this work? If yes, briefly describe what you did and with whom.

No – The primary powers will be laid before parliament, but the detail of the Green Deal policies will be consulted on next year before secondary powers are laid.

6. Use the table to tick:

a) Where you think that the service/procedure/policy or project could have a negative impact on any of the equality strands, that is, it could disadvantage them

b) Where you think that the service/procedure/policy or project could have a positive impact on any of the groups or contribute to promoting equality, equal opportunities or improving relations within equality strands.

	Positive impact	Negative impact	No impact	Reason and evidence (provide details of specific groups affected)
Age			√	The primary powers will not directly impact the elderly or young.
Gender			√	It is not anticipated that there will be any disproportionate impact on gender as a result of these powers.
Sexual orientation			√	It is not anticipated that there will be any disproportionate impact on sexual orientation as a result of these powers.
Race			√	The primary powers are not expected to impact disproportionately on any one ethnic group,

Religion or belief			√	The primary powersare not expected to impact disproportionately on any one ethnic group
Disability			√	The primary powers do not directly impact the disabled or long term sick,

7. If you have indicated there is a negative impact on any group, is that impact:		
Legal? (not discriminatory under anti-discriminatory legislation)	Yes	No
Intended?	Yes	No
Level of impact?	High	Low

The above table has considered the equality impact from the point of view of the primary powers. As these powers have no direct impact on any group, but are enabling powers for the development of the policies, which will be agreed in secondary legislation, then there is no equality impact.

Although the Green Deal policy is only in the infancy of its development, the paragraphs below will aim to offer an illustration of what the equality impacts may be for the equity strands suggested (although this may change as the policy develops). Further discussion of other specific impacts can be found in the specific impact tests annex in the accompanying Impact Assessment.

Age

The majority of the policies under GD are likely to be split equally across all age groups. The exceptions are ECO (energy company obligation) and regulation of the private rented sector (PRS). These two policies are unlikely to be split equally across all age groups, although the ECO policy should have the flexibility to focus on all groups.

The ECO policy will aim to have the flexibility to focus on vulnerable groups e.g. the young and old (see below). In addition the introduction of a home heat cost reduction target will enable a wider set of measures to improve the warmth and financial circumstances of these vulnerable groups. Consequently the ECO will have a positive impact on age by promoting equality.

The elderly form a large proportion of those in fuel poverty (52% of fuel poor households contain somebody aged 60 or over and 44% somebody aged 65 or over). Evidence suggests older people are in general more vulnerable to detrimental health impacts if they are fuel poor or live in homes which are not adequately heated, compared to the average healthy adult of working age[150].

[150] http://whqlibdoc.who.int/euro/ehs/EURO_EHS_31_part2.pdf

Children who are fuel poor or live in homes which are not adequately heated suffer from many of the same health risks as older people[151], including respiratory illness[152], developmental problems[153] including poor weight gain. Infants in fuel poor households are also at 30% greater risk of admission to hospital or primary care facilities when other contributory factors have been accounted for.

In the PRS young adults are overrepresented (47% of 20 to 24 year olds in 2006/ 2007)[154]. Over 55s are underrepresented with only 5% in the PRS and a much higher proportion in owner occupation.

Age	Proportion in PRS
20-24	47%
25-29	32%
30-34	21%
35-44	12%
45-54	9%
55+	5%

Because of this skew, if regulation of private landlords was brought into force it could do more for young adults. This would be a positive impact as it will be contributing to promoting equality across all groups.

Gender

The majority of the policies under GD will have a no impact on gender in secondary powers. The exception might be the PRS. Couples and multi-person households make up the majority of the PRS (61% of households). 16% of PRS households comprise a single male living alone and the equivalent figure for females is 11.6%.

The PRS has a particularly high proportion of lone parents with dependent children, on housing benefits (31% of all private rented households).[155] Office of National Statistics figures suggest that in approximately 9 out of 10 of these households a female will be the single parent.[156]

Improving the energy efficiency of the housing stock in the private rented sector could have a particular positive effect on this section of society, with benefits for single mothers. It is not possible to draw any more detailed inferences about ramifications for gender equality. It will be important to look to maximise benefits when developing secondary legislation.

Sexual Orientation

The policies under GD will have no impact on sexual orientation.

Race

It is unlikely that any Green Deal policy agreed in secondary will have a disproportional impact on particular races. However, it is recognised that there are some ethnic groups that

[151] ibid
[152] Howden-Chapman, P. et al., (2007). Effects of insulating houses on health inequality : Cluster randomised study in the community. *British Medical Journal*, doi:10.1136/bmj.39070.573032.80
[153] Barnes, M. et al., (2008). *The Dynamics of Bad Housing : The Impacts of Bad Housing on the Living Standards of Children*. London : National Centre for Social Research
[154] The Rugg Review
[155] The Rugg Review
[156] Labour Market Review, Office of National Statistics, 2006

are strongly represented in inner city, poor quality housing. As ECO will be focussing on vulnerable and hard to treat housing and inner city accommodation tends to be PRS, it is possible that these ethnic groups may benefit disproportionately.

Fifty two percent of inward migrants to England live initially in the PRS.[157] The breakdown of ethnic groups in the PRS is as follows:[158]

Ethnic Group	Proportion of group in the PRS (%)
White	33.9
Black	33.7
Asian	32.7
Other	38.3
All minority	35.7

The least populous ethnic minorities are the most highly represented group (by proportion). This group may stand to gain most if regulations are brought into force.

If the these impacts are significant then they would create a positive impact as they would improve relations between strands. However, it is not possible to draw any more detailed inferences about the likely impacts. It will be important to look to maximise benefits when developing secondary legislation.

Religion or Belief

The policies under GD should not have an impact on sexual orientation.

Disability

The majority of GD policies should not have an impact on the disabled or sick. However the ECO policy should have the flexibility to focus on these groups. In addition the introduction of a home heat cost reduction target will enable a wider set of measures to improve the warmth and financial circumstances of these vulnerable groups. Thirty eight percent of fuel poor households contain someone who is registered disabled or long term sick.

32.9% of the long term ill/ disabled live in non-decent homes. This is almost as high a proportion as for the rest of the population. 15.2% live in homes that fail to provide a reasonable degree of thermal comfort, which is a slightly higher proportion than that found in the rest of the population (14.8%).

Though Government does not have statistics specific to the PRS it is reasonable to assume that, as the PRS has the highest proportion of non decent homes and homes that fail to provide a reasonable degree of thermal comfort the proposed regulation of private landlords would have a positive effect on the long term ill/ disabled. However, it is not possible to draw any more detailed inferences about the likely impacts. It will be important to look to maximise benefits when developing secondary legislation.

As a result of this discussion no negative impacts have been identified from the possible GD policies that might result from the secondary legislation. However it is expected that there may be certain instances where a positive impact is seen.
However, it will be important to look closely at likely outcomes during the development of secondary legislation.

[157] The Rugg Review
[158] English Housing Survey, 2008-2009

If the negative impact is possibly discriminatory and not intended and/or of high impact you must complete section two of this form. If not, complete the rest of section one below and consider if completing section two would be helpful in making a thorough assessment.
7. a) Could you minimise or remove any negative impact that is of low significance?
b) Could you improve the strategy, project or policy's positive impact? If so, explain how. You may wish to use the action sheet at the end of section two.
8. If there is no evidence that the strategy, project or policy promotes equality, equal opportunities or improved relations – could it be adapted so that it does? If so, explain how.
Please sign and date this form, keep one copy and send one copy to the Deputy Director of Corporate Services.

Signed:	Date:

Section two: full assessment	
Name of service/procedure/policy or project:	
Date:	
Part A	
1. Looking back at section one of the EIA, in what areas are there concerns that the strategy, policy or project could have a negative impact?	
Age	Disability
Gender	Race
Sexual orientation	Religion or belief
2. Summarise the likely negative impacts	
3. **Consultation** a) What previous or planned consultation on this topic/policy area/project has taken place/will take place with groups/individuals from equality strands? If there has already been consultation what does it indicate about the negative impact of this service/procedure/policy or project?	
Equality strands	Summary of consultation carried out or planned
Age	
Gender	
Sexual orientation	
Race	
Disability	
Religion or belief	
What consultation has taken place/or is planned with DECC staff – including staff that have, or will have, direct experience of implementing service/procedure/policy or projects ?	

b) Check that research/studies/reports concerning the equality strands and the likely impact have been used to plan the project and guide it **or** indicate what research you intend to carry out.

Equality strands	Title/type/details of report/research
Age	
Gender	
Sexual orientation	
Race	
Disability	
Religion or belief	

c) If there are gaps in your previous or planned consultation and research, are there any experts/relevant groups that can be contacted to get further views or evidence on these issues?

YES (please list them and explain how you will obtain their views)

NO

Part B

Complete this section when consultation and research has been carried out.

4. a) As a result of this assessment and available evidence collected, including consultation, state whether any changes will be made or planned as a result of the policy, strategy or project.

b) As a result of the assessment and available evidence is it important that DECC commissions specific research on this issue or carries out monitoring/data collection? You may wish to put this information directly on to the action sheet at the end of this form.

5. Please indicate impact remaining following consultation and research and subsequent additions or amendments to the strategy, project, policy or decision.				
	Positive impact	Negative impact	No impact	Reason and evidence (provide details of specific groups affected)
Age				
Gender				
Sexual orientation				
Race				
Religion or belief				
Disability				

6. Will the changes planned ensure that negative impact is:		
Legal? (not discriminatory, under anti-discriminatory legislation)	Yes	No
Intended?	Yes	No

7. a) Have you set up a monitoring/evaluation/review process to check the successful implementation of the strategy, project or policy?			
Yes		No	

b) How will this process further assess the impact on the equality strands and ensure the strategy/project/policy is non-discriminatory?
Details

Please complete the action plan form, sign the EIA, retain a copy and send a copy of the full EIA to be signed by your director.	
Signed: (completing project lead)	
Name:	**Date:**
Signed: (Director)	
Name:	**Date:**

Equality impact assessment action plan

Please list below any recommendations for action that you plan to take as a result of this impact assessment.

Issue			
Action required			
Resource implications			
Comments			
Lead officer		**Timescale**	

Annex 3: Specific impact tests

Statutory equality duties

Fuel poverty impact

1. By far the largest potential impact for the policies contained within Green Deal relate to the fuel poor. This category cuts across a number of equalities areas including disability, race and age. The primary powers suggested for the ECO aim to enable the development of the ECO policy that will aim to help the fuel poor and associated equalities issues. Separate consideration of each of these equalities issues are provided below.
2. As of 2007, over 90% of the fuel poor were in the lower three income deciles[159] and 41% were living in F&G rated homes. Energy prices rose sharply in 2008 leading to upward pressures on fuel poverty, so the incidence of fuel poverty amongst each group is likely to be higher now. As such, there is a an opportunity to bring many of the lowest performing homes up to a band E, saving householders money on energy bills.
3. The powers outlined as part of this impact assessment do not have a direct impact on the level of fuel poverty but provide the potential to bring many of these households out of fuel poverty through targeted policies (including a home heat cost reduction target) that improve the efficiency of a household. The powers should also enable the development of a policy that aims to avoid a situation where the cost of the policy impacts disproportionately on those on low incomes, by requiring more information from energy companies, the flexibility to vary the obligation and target the obligation on particular people living in particular property types or location.
4. As of 2007, 33% of fuel poor households lived in homes built before 1919 and 43% of the fuel poor households lived in homes without cavity wall insulation (defined as cavity walls in less than half the dwelling), it is likely that a large proportion of fuel poor households will fall into the 'hard to treat' category. The primary powers for ECO will allow some form of coordination between the GDF and ECO, which will allow these 'hard to treat' homes to still receive measures.
5. Forthcoming policies on fuel poverty will set out the direct benefits to the fuel poor in more detail.
6. In future consultation on the detailed design of the ECO, the Government will discuss different options for the targeting of the scheme, and include information on potential fuel poverty impacts as part of the accompanying Impact Assessment.

Age Impact

7. The primary powers will have no direct effect on any particular age group. However, they should enable policies like ECO, which will have the flexibility to focus on vulnerable groups. All other policies under Green Deal will not impact any particular groups over

[159] English House Condition Survey 2007 (http://www.communities.gov.uk/documents/statistics/pdf/1133548.pdf)

others, except the possible regulation of the PRS. Young adults are overrepresented in the PRS (47% of 20 to 24 year olds in 2006/ 2007)[160]. If the PRS lags behind the owner occupied sector in the installation of heating and insulation measures then this group will suffer; the possible regulation of the PRS may have a positive impact on this particular group.

8. More detail on the age impact can be found in the equality impact assessment form. It will be important to look closely at likely outcomes during the development of secondary legislation.

Impact on the disabled and sick

9. The primary powers do not directly impact the disabled or long term sick. The majority of GD policies should not have an impact on the disabled or sick. However the ECO policy should have the flexibility to focus on these groups. In addition the introduction of a home heat cost reduction target will enable a wider set of measures to improve the warmth and financial circumstances of these vulnerable groups.

10. More detail on the disabled and sick impact can be found in the equality impact assessment form. It will be important to look closely at likely outcomes during the development of secondary legislation.

11. The impact of additional information on bills for the disabled has been considered and only identified a potential issue with blind or partially sighted consumers. However it is likely that they will still be able to benefit from the policy because there are standard license conditions on energy companies that ensure blind, partially sighted customers or those acting on their behalf have a readily accessible bill. These conditions would remain unchanged following any changes to the bill information introduced by this policy.

Race Impact

12. The primary powers are not expected to impact disproportionately on any one ethnic group. It is unlikely that any Green Deal policy agreed in secondary will either. However, it is recognised that some ethnic groups are strongly represented in inner city, poor quality housing and in the PRS. Consequently the ECO and possible regulation in the PRS may have a positive impact on these groups. However, it is not possible to draw any more detailed inferences about the likely impacts. More detail on the race impact can be found in the Equality impact assessment form. It will be important to look closely at likely outcomes during the development of secondary legislation.

Gender Impact

13. It is not anticipated that there will be any disproportionate impact on gender as a result of these powers or policies.

14. It is also unlikely that the majority of the policies under GD will have a gender impact in secondary powers. The exception might be the PRS where single mothers may benefit from the policy.

[160] The Rugg Review

15. More detail on the gender impact can be found in the Equality impact assessment form. It will be important to look closely at likely outcomes during the development of secondary legislation.

Human Rights

16. There are no human rights issues associated with the primary powers or the future ECO policy.

17. Proposals for the private rented sector engage Article 1 of Protocol 1 to the European Convention on Human Rights, as they will affect landlords' property rights by controlling the use of rented property.

Economic impacts

Competition

18. Overall, the Green Deal is pro-competition, as it facilitates the provision of carbon efficiency measures through market forces. The creation of a larger market for energy efficiency measures promotes innovation, and benefits the creation of employment and entrepreneurial opportunity in sectors hitherto reliant on Government intervention. Overall, the Green Deal releases scope for market dynamism. Conceivably, energy companies may discover the Green Deal is a catalyst for innovation to their business model.

19. The accreditation requirements will introduce potential competition impacts as companies who seek and gain Green Deal accreditation will gain a competitive advantage in the market for installation of relevant measures over those without. However, the opportunity will exist for all companies operating in the market that are able to satisfy other requirements (in relation to financing etc), or are already members of a recognised accredited scheme, to apply for Green Deal accreditation, and policymakers will seek to ensure that access to such accreditation and training is not hindered in other ways eg. cost – see also Small firms impact below.

20. The new ECO needs to be viewed alongside the new market that will be created, by other policies in this Bill, for the provision of Green Deal finance. Through Green Deal finance offers, more households should be encouraged to take responsibility for making energy efficiency improvements which are financed through the market at no expected net cost to themselves. It is crucially important that the market for Green Deal finance develops in an open and dynamic way which offers the greatest possible choice to consumers, thus encouraging overall consumer take-up, and ensuring that measures are wherever possible funded by the same customer as receives the measure itself – a desirable outcome in equity terms. In practice, to ensure there is free delivery of surveys, some or all Green Deal customers will be cross-subsidising the cost of surveys undertaken for customers who do not subsequently take up any measures.

21. The Office of Fair Trading guidance lists four key questions to assess whether policies have an impact on competition. Below is an assessment of these questions applied to the Green Deal. The primary powers will have no direct impact on the level of competition in energy supply/distribution market or in the installation market. However

the four questions are considered for possible policy scenarios which the primary powers may enable.

Directly limit the number or range of suppliers?

22. Currently the Supplier Obligation is only applied to energy companies with more than 50,000 customers in recognition of the economies of scale available to larger firms. This also significantly removes any barriers to entry caused by the policy. Any new entrants into the market would have no initial customers and so would not face an initial barrier and there is no reason to suggest existing firms would be forced out of the market by the legislation.

23. As part of the ongoing evaluation and analysis of the Energy Company Obligation there will be a review of the level of this 50,000 customer threshold before the commencement of the extension period, to ensure that the level is set correctly to achieve the outcomes above.

Indirectly limit the number or range of suppliers?

24. It is likely that the most cost-effective option for energy companies will, in very many cases, be to work with Green Deal finance (GDF) suppliers and co-fund measures, in which case secondary legislation would not be needed. However, the Green Deal market does not yet exist and there may be unforeseen hurdles and complications. In particular, there is a risk that energy companies, who currently dominate the energy efficiency market owing to their obligations under CERT, might be in a position to extend their dominance into the market for Green Deal finance and result in diminished choice for consumers and higher costs. At the moment there is no evidence upon which to undertake a formal competition assessment, as no Green Deal Finance market exists, but such an assessment would be undertaken prior to consultation in the event that secondary legislation was deemed necessary.

25. To ensure there is full competition in the survey market, there should be a charging mechanism established that ensures any accredited company would be paid for undertaking a survey. This is because the Green Deal survey would be free at the point of delivery and customers would be free to take up or reject the survey's recommendations. If taken up, customers would also be free to choose which supplier should undertake the installation. It is still unclear how this charging mechanism would be implemented in practice. Without it, survey organisations face a high risk of losing money on conducting surveys and vertical integration of survey suppliers with the Green Deal provider would be likely. With an agreed mechanism, the risk of customers declining a Green Deal would pass to another party in the supply chain. Without a detailed agreement on this structure, however, it is unclear where this risk would lie and how it would impact on competition in the energy efficiency market.

Limit the ability of suppliers to compete?

26. Some energy companies may be disadvantaged by not being able to reap economies of scale benefits to the same degree as their larger competitors. This may affect, in particular, suppliers – with greater than 50,000 customers – that are nevertheless relatively small in comparison with their competitors. However, energy companies would be expected to organise their obligation as they wish. This would include contracting out

the obligation, which would allow for economies of scale to be achieved alongside other firms of similar size.

27. There is a growing trend for energy companies to build their own installation companies (through training or buying small firms). If this trend continues then the installation market would change from a vast number of small firms to only one large installation firm per energy company. This might limit the ability of some installers to compete as they might not be able to form arrangements for work with energy companies. Smaller firms have previously formed into groups to organise work with large energy companies. There is no reason why this could not continue with the focus being on GDF providers rather than energy companies.

Reduce suppliers' incentives to compete vigorously?

28. Under ECO, energy companies are likely to be able to pass on the costs of the obligations. An energy company that is inefficient is likely to lose customers, who have the freedom to switch to another supplier. Energy companies have an incentive to keep the costs of their obligations as low as possible in order to minimise the amount of any pass through. This reflects the competitive energy company market and the drive to retain or acquire customers. Energy companies therefore have an incentive to be competitive in the supply of energy/carbon saving products and services.

29. The Green Deal is expected to involve many more companies then just the energy companies. However energy companies have a market advantage and could create an entry barrier by restricting the form of information about Green Deal presented to their consumers. If this was the case then non-energy companies would find it difficult to compete for consumers. Consequently by setting powers for generic promotion of the Green Deal by all energy companies, no market barriers can be put in place. This would ensure that no groups in the market are unfairly advantaged.

30. It is likely that there will be competition issues as a result of the secondary powers for Green Deal policies. However, as the detail of these policies is as yet unknown a detailed analysis is not currently possible or appropriate. However, a detailed competition assessment will be completed in the consultation impact assessment later next year. Appropriate conditions will be put in place to ensure that competition issues can be evaluated and monitored as the policy is rolled out. If competition is unfairly distorted the Government can review the situation and make suitable changes.

Small firms

31. Guidance from the Department for Business, Innovation and Skills stipulates that an impact assessment should include an assessment of impacts on small businesses.

32. The primary powers are likely to have a minimal impact on small businesses. There may be a small impact as a result of interested small firms facing a proportionally higher cost to understand the primary powers and their implications.

33. However, independent analysis commissioned by DECC into the previous supplier obligation phase states that the obligation has led to no discernable evidence that the impact of the scheme has in any way had a deleterious effect on smaller companies. It argues that the obligation has typically resulted in the smaller players in the insulation and lighting business organising themselves to be effectively a "bigger player" thus

overcoming the perceived problems for energy suppliers of dealing with small businesses.

34. This has been the case until recently. Evidence is now suggesting that some of the large energy companies that will be obligated under the scheme are tending to create their own installation organisations by either buying up small installation firms or training up their own staff. Consequently smaller firms may become marginalised in the future even if they organise themselves into a 'bigger player'. If this becomes the case then there should be lower costs as a result of economies of scale, however there could also be detrimental impact on the market, due to a lack of competition, variety and thus potential innovation or cost savings associated with small business competition. An example of this innovation is of one firm in the UK now installing cavity wall insulation into high rise properties by abseiling, creating large cost savings (no scaffold is necessary). After CERT extension there will be very few easy and homogenous loft and cavity installations left; every installation under ECO/GDF will be different. So innovations by small firms, like the example above, will be necessary to ensure that costs remain low.

35. Currently there are a limited number of players in the insulation market. Work by the Office of Fair Trading suggests that many suppliers have sub-contracted their CERT requirements to EAGA[161]. This means that the only way for most installers to access the funding from energy suppliers is through EAGA. This puts EAGA in the position of administering Warm Front, complying with CERT on behalf of energy suppliers, installing energy efficiency measures, manufacturing insulation through a subsidiary and approving installers under Warm Front, that is, EAGA appears to control most of the market. This control means that most installers have to go through EAGA to gain access to the market, it is worth reiterating that EAGA is in direct competition with other installers. Consequently the move by many energy companies to boost their own installation businesses may actually be beneficial for competition and smaller companies.

36. It is likely that the most cost-effective option for energy companies will, in very many cases, be to work with Green Deal finance providers and co-fund measures, in which case secondary legislation would not be needed. However, the Green Deal market does not yet exist and there may be unforeseen hurdles and complications. In particular, there is a risk that energy companies, who currently dominate the energy efficiency market owing to their obligations under CERT, might be in a position to extend their dominance into the market for Green Deal finance and result in diminished choice for consumers and higher costs. At the moment there is no evidence upon which to undertake a formal competition assessment, as no Green Deal Finance market exists, but such an assessment would be undertaken prior to consultation in the event that secondary legislation was deemed necessary.

37. The uncertain nature of the charging structure for surveyors, along with the potential for vertical integration of the supply market, is a potential risk for small firms that needs to be considered when secondary legislation is being put in place.

38. Depending on the design of the better billing policy there could be a greater impact on small suppliers in terms of the average cost of the policy that will disadvantage them

[161] EAGA appears to have been chosen by the suppliers because it is the only firm which has sufficient experience of administering and installing energy efficiency measures under the Government's different schemes. This is largely as a result of its role as administrator of Warm Front.

relative to the larger suppliers. Some of the options being considered could require systems changes with large fixed costs placing a greater burden on small suppliers. The power being taken will enable this to be carefully considered in the design of the policy, with the potential to treat small suppliers differently.

39. Small and medium sized firms have called for a light touch accreditation framework due to concerns that excessive additional administrative burdens could fall disproportionately on smaller business. There is also a need to ensure that access to training and accreditation does not impose an excessive cost on smaller businesses through high upfront fees. Policymakers will seek to ensure that the accreditation requirements do not present an excessive burden for small businesses.
40. Fuel billing: small energy companies have less than 1% market share. They will not be required to introduce Green Deal billing processes. This means they do not have to incur overheads, unless they perceive Green Deal charge collection as an advantage.
41. Exemption from ECO: it is likely that a threshold will be drawn beneath which firms will be exempt from the obligation to deliver the ECO. They are likely to find their competitive position enhanced in comparison with the counterfactual world (i.e. no ECO in place).
42. The PRS primary powers introduce no regulation and so should have no effect on competition. Secondary legislation would inflict costs on landlords. These are largely 'per property' hassle costs. Some costs, such as originally organising finance or installation could benefit from economies of scale. Meaning that those landlords (sometimes firms) which own many properties may face less hassle costs per property than smaller landlords. However, economies of scale are a natural advantage of larger firms and as such should not be attributed to the design of policy. Regulation would offer equal opportunities and requirements for each property, regardless of the owner.

Environmental impacts

Greenhouse gas assessment

43. The primary powers will have no direct impact on greenhouse gases, however they enable powers in secondary that if taken up will create carbon savings. A key area of policy development between primary powers and secondary powers is a discussion around the interaction of a home heat cost reduction target and a carbon target. It is possible that some measures that might be delivered under a home heat cost reduction target could increase carbon and so have a detrimental impact on the carbon target. A solution to this issue will be discussed and developed over the year.
44. By ensuring that measures are properly installed, the accreditation requirements are expected to help ensure that the Green Deal properly delivers its policy objective of increasing energy efficiency, thereby reducing greenhouse gas emissions. Poorly installed measures will not perform as expected, resulting in higher energy use and GHG creation.

Wider environmental issues

45. The primary powers will have no direct impact on wider environmental issues, however any future carbon savings enabled by the powers are likely to create improvements in

local air quality. There may also be air quality impacts associated with some possible thermal efficiency measures; changing from coal to gas fuelled heating for example.

Social impacts

Health and well being

46. The powers will have no direct impact on health and well being however they should enable a policy (via secondary) to be developed which is expected to deliver positive health and wellbeing benefits, including reducing the inequity of healthy living conditions, as a result of installing measures to meet the carbon and home heat cost reduction targets. The major benefit is increased comfort. A proportion of energy savings provided by installed measures (especially in vulnerable households served by the priority and super priority group targets) are expected to be used to increase comfort (increasing the internal temperature of the home) as heating the home becomes relatively cheaper. As this is a rational consumer decision it has positive benefit and is valued at the retail price, the price that homeowners are willing to forego for improved comfort.

47. In addition this improvement to the property (in particular warmth) will improve the health of vulnerable individuals living in the property. As mentioned above the elderly and young suffer detrimental health impacts from properties that are not adequately heated. An illustration of the health benefits that may be possible can be found in the 'Warm Front Better Health' publication[162], a summary of a long term review of the Warm Front programme. Warm Front delivers subsidised insulation and heating measures to vulnerable households and has been shown to have a significant positive effect on incidence of respiratory disease in children, depression/ anxiety and winter deaths (reduction per 1000 individuals, per year: c.3 children, c.150 and c.0.4 winter deaths respectively). These results are for the Warm Front scheme only and cannot currently be applied to other policies, however it gives an indication of the possible health impact of improvements to households.

48. When designing the better billing policy we need to be consider the message sent to those consumers who are vulnerable and likely to under heat their homes due to cost. It is important that those consumers continue to heat their homes to a safe level, although they may have higher energy needs than the average consumer. This is a particular concern with the consumption comparison policy and we will consider the messaging carefully.

49. Proper accreditation of Green Deal installation companies will help ensure that installers carry out installation in full compliance with relevant health and safety measures, thereby reducing the potential for any adverse impacts on either themselves or those residing in the property. Poor training for installers participating in a similar Australian scheme resulted in the death of 4 installers and a number of fires, which emphasises the need for a proper, robust training and accreditation scheme.

Justice system

[162] www.apho.org.uk/resource/view.aspx?RID=53281

50. The primary powers are not expected to have any impact on the justice system.

Rural proofing

51. The characteristics of rural housing are different to those found in urban areas. This, coupled with the generally lower density of properties in rural areas compared to urban, present a different set of challenges to any delivery approach. Primary powers are likely to have a negligible impact.
52. Under the current schemes (Carbon Efficiency Reduction Target), suppliers have tended to target the most cost-effective areas, which tend to be dense urban areas. Therefore, rural areas have generally not been targeted to the same extent.
53. With approximately 33% of rural properties having solid walls (compared to 26% for urban), any delivery mechanism to complete solid wall insulation and other more significant measures also needs to be geared up to deliver in rural communities.
54. Consumers in rural areas are more likely to be off the gas grid and therefore will not be eligible for many of the cheaper tariffs (as most of these are for dual fuel customers). Consumption comparisons may not also be of use as these consumers will either heat their homes using electric heaters (and therefore their electricity consumption will be higher than the average) or another source, for example heating oil or LPG, will have much lower fuel consumption than average. We will need to take this into consideration in the design of the policy.
55. Evidence suggests that the PRS plays a more substantial role in rural settings. According to the 2001 census, 7.7 per cent of all households were in rural areas, but 9.4 per cent of all privately renting households were in rural areas.
56. The rural PRS is distinctive in terms of the higher proportion of households living in tied accommodation. Data from the 2001 census indicate that, in urban areas, 83.6 per cent of tenants were renting from a landlord or agent, and 3.7 per cent were renting from an employer. In the most rural areas, 66.1 per cent were renting from a landlord or agent, and 14.9 per cent were renting from an employer (Rhodes, 2006b).
57. In the more sparsely populated rural locations households tend to stay in their tenancies for longer, and this means that lettings generally become available less frequently. Being tied to particular properties for extended periods of time may reduce tenants' capacity to make demands of their landlords. If this is the case the benefits of regulating private landlords might be particularly significant in rural properties. However, it is not possible to draw any more detailed inferences about the likely impacts. It will be important to look to maximise benefits when developing secondary legislation.

Sustainable development

58. Although the primary powers will not have a direct impact on sustainable development they do act as to enable the development of the ECO which will create sustainable development.
59. Living within environmental limits: One of the targets of the future ECO will be to reduce carbon emissions from the GB domestic sector. This will also reduce energy demand and thus reduce our resource use and contribute to improved security of energy supply.

60. Ensuring a strong, healthy and just society: The ECO is expected to deliver positive health and wellbeing benefits, including reducing the inequity of unhealthy living conditions. The major benefits are increased comfort and improved physical and mental health of vulnerable groups (and associated benefits).

61. The impact on business is expected to be positive in that the energy efficiency industry – manufacturers, retailers and installers will benefit from the revenue and employment benefits stimulated by the energy company investment needed to meet the obligation. We assume the costs of the scheme can, and are, passed on in total to household electricity and gas consumers. Energy companies have an incentive to keep the costs of their obligations under CERT as low as possible in order to minimise the amount of any cost pass through to consumers. This reflects the competitive supplier market and the drive to acquire and retain customers.

62. Indicative proposals for what secondary PRS legislation would look like have been constructed and an initial assessment suggests that, if enacted, these regulations would have the following positive impacts across three essential tenets of 'sustainability':

    a. Environmental: reduced Green House Gas Emissions; reduced air pollution (e.g. NOx and SOx) from reduced combustion of fossil fuels

    b. Economic: reduce use of Energy; increased energy security; lower fuel bills for both landlords and tenants

    c. Social: increased energy efficiency for a large number of fuel poor households giving them the opportunity to reduced their fuel bills or take increased comfort; related benefits for other vulnerable households including a high proportion of single parent families in receipt of housing benefit

63. However, it is not possible to draw any more detailed inferences about the sustainability of proposals for PRS regulation at this stage. It will be important to look to maximise sustainability when developing secondary legislation.

Annex 4: assumptions and cost effectiveness of individual measures for the overarching domestic illustrative scenarios

This annex sets out the background to the costs and benefits presented in this document and the summary sheets. The costs in the domestic overarching scenarios have been calculated using a purpose built model, which considers the feasible number of installations of each measure that could be installed in each year of the policy (see tables A4.3 and A4.4) and the total costs of installing these measures in that year. These costs, i.e. the input assumptions (see table 1), include installation costs, which will decrease as learning occurs within the industry (see table A4.2), admin costs and the 'make good', disruption and time costs experienced by the household. This provides the total costs for each measure for the period 2013 to 2020. The benefits are calculated using the inter-departmental analysts group (IAG) tool kit developed by DECC[163] which uses the assumed kWh energy savings for each measure to monetise the energy savings to society as well as the carbon, air quality and comfort[164] savings. The total costs and benefits by measure are presented in Tables A4.5a, b and c.

List of tables and figures:

- Table A4.1: Input assumptions –The table presents the assumptions that have been used to calculate the costs and benefits of each measure. The costs presented are for 2010, however, as mentioned above installation costs should decrease with time through learning by doing and innovation, see table A4.2. Counterfactuals are taken into consideration for all measures (what would happen anyway). The cost numbers presented in these tables are the central estimates. Sensitivity analysis focuses on varying the rollout of measures by proportions of the maximum feasible potential (table A4.3). Additional sensitivity analysis of cost and future carbon and energy price assumptions are included in Annex 5
- Table A4.2: Learning rates by measure – This table considers the fall in costs associated with learning; either via learning by innovation or learning by doing. Table A4.2 shows the learning rate for each measure for the period 2010 to 2020. The learning rates are only applied to installation costs, not administration or household costs.
- Table A4.3: Feasible potential installations table – the table aims to illustrate the total number of installations that may be achievable during the 2013 to 2020 period. Foot notes describe how these numbers were decided upon. Low, high and maximum technical potential scenarios are presented.

[163] http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx

[164] Comfort taking (or take back) is the direct rebound effect attributed to taking more heat (comfort) rather than bill savings when the energy bill is reduced. The assumed level of comfort for insulation measures in this analysis is 15% of total savings. This is consistent with previous analysis in CERT and CERT extension. The source for this assumption can be found on the DECC website at: http://www.decc.gov.uk/media/viewfile.ashx?filepath=what%20we%20do/supporting%20consumers/saving_energy/analysis/insulationmeasures-review.pdf&filetype=4

- Tables A4.4a, b and c: Trajectories for installation – this table presents estimates for the rate of installation of the different measures over the period of the programme.
- Figure A4.1: Illustration of the trajectories for installation for the high scenario.
- Table A4.5: Indicative illustration of measures tables – The table presents the total costs and benefits of delivering the number of installations considered in the feasible potential assumptions table, over the period 2013 to 2020 as suggested in the trajectories table, for each measure. Thus the results are not for an individual measure but the feasible potential over the period. All prices are discounted back into 2010 prices using a discount rate of 3.5%. It is assumed that the capital costs are faced in the year of installation of the measure[165] whilst the benefits continue for the life time of the measure. The carbon cost effectiveness indicator (CEI) in the tables demonstrates how much it would cost per measure to save one tonne of carbon in the non-traded sector, this takes into consideration the cost of the measure and any additional benefits. The CEI can be used to compare the different measures and to create an efficient scenario.
- Figure A4.2: A MAC curve of the feasible insulation measures to meet the carbon target. MAC curves show for each measure; the potential for abatement in the year in question (2020 in this case); and the net cost to society of delivering a tonne of abatement (which can be compared to the published benchmark values to determine cost-effectiveness).
- Table A4.6: Sources of assumptions table – these tables offer more information on the sources used for the input assumptions.
- Table A4.7 and A4.8: Cost sensitivity analysis tables

It should be noted that this annex presents an indicative view on the type of measures that may be installed and the 'bundle' of measures may be very different in reality. Additionally the costs, benefits and feasible potential are the current best estimate for each of the measures, with time these estimates may change as more information and evidence is gained.

The total costs and benefits presented in table A4.5 are used to calculate the carbon cost effectiveness of the main measures that are available to households to improve the energy efficiency and carbon output of their home. These cost effectiveness calculations are used to produce the marginal abatement cost curve (MACC) which demonstrates the most efficient scenario of measures that could be employed under post 2012 delivery (moving from the left of the MACC to the right). The analysis of this annex feeds into the main document which discusses the different delivery scenarios. Additionally the results for the different measures can be combined to create the overall net cost and benefit on society.

[165] The maintenance costs will continue over the life time of the measures and it assumed that all household costs are spread over a ten year payback period, with a cost of capital of 10%.

Input assumptions

Installation costs have been given in 2010 prices, but the learning table below explains how these costs may fall over time. Explanations and sources for these assumptions are either included in foot notes or in a separate table below which details the studies used. The cost assumptions below do not take into consideration the potential for lower costs from installing more than one measure at once and therefore estimates are erring on the side of caution. It is assumed that installations go into an 'average' household (unless otherwise stated), which is taken to be a semi-detached property. The benefits given are for houses with a gas heating system, however when considering more than one property the assumed fuel mix is the existing heating system split of 88% gas, 8% electric, 4% oil and 0% coal.

Table A4.1: Input assumptions

Central assumptions[166]	LA external SWI[167]		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing	Door insulation	Party wall[168]
	3 bed semi	Flats	During major renovation[169]	Individual installation	During major renovation	Individual installation	Professional	DIY	Hard[170]	Easy	Old to double		
Life time (yrs)	36	36	36	36	36	36	42	42	42	42	20	30	42
Installation cost (£)[171]	4800	3160[172]	7600	7600	5000	5000	283	128	1620[173]	376	450	350	500

[166] These are just the central cost assumptions – sensitivity analysis is undertaken in annex 5 using high and low cost estimates (table 7 and 8) as well as high and low energy and carbon prices.
[167] The local authority installations assume that measures are installed into local authority owned properties or coordinated by LAs, consequently this also acts as a proxy for installation by bulk. The costs are lower as a result of economies of scale.
[168] Party wall insulation aims to fill the cavity between semi-detached and terrace houses. Currently no known installations have been made, but it is assumed that the process would be similar to installing CWI, but with a greater velocity to ensure that the cavity is filled.
[169] This assumes that there will be no 'make good' or other household costs.
[170] It is assumed that the remaining cavities will either be technically hard to treat or strong laggards who refuse to receive the measure, thus costs will be much higher. Technically hard to treat cavities have some additional problem which makes them more expensive to treat. A more-than-4 storey flat block would be a good example, as this requires scaffolding which is expensive but otherwise the cavity is normal. Likewise tiling or other covering on most/all of the surface of the building – but where the cavity is standard to treat. The formal BRE definitions are here; hard to treat are category 3: http://www.communities.gov.uk/documents/statistics/pdf/1072658.pdf p248
[171] See learning table (below) for detail on the cost of installation for solid wall and renewable heat with time. In addition the counterfactual for external solid wall is that walls will receive a re-rendering when appropriate whether solid wall installation has been installed or not.

Central assumptions[166]	LA external SWI[167]		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing	Door insulation	Party wall[168]
	3 bed semi	**Flats**	**During major renovation[169]**	**Individual installation**	**During major renovation**	**Individual installation**	**Professional**	**DIY**	**Hard** [170]	**Easy**	**Old to double**		
Maintenance costs (£)	0	0	38[174]	38	0	0	0	0	0	0		0	0
Admin costs (% of installation)	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Household costs (£)[175] of which:	**1500**	**1000**	**0**	**5210**	**3400**	**6866**	**126**	**165**	**170**[176]	**71**	**35**	**75**	**170**[177]
'make good'	1500	1000	0	5000	0	2000							
Household time cost			0	200	0	552			125	71			
Disruption			0	10	0	914							
Loss of floor space[178]			0	0	3400	3400[179]							

[172] Based on the EEPH Purple report [http://www.eeph.org.uk/uploads/documents/partnership/SWI%20supply%20chain%20review%208%20May%2020091.pdf] 2 bed terrace/ flats are assumed to have at least a 33% lower cost than a 3-bed semi-detached

[173] This is based on bids received from LAs and RSLs under the SHESP programme (more details of SHESP here: http://www.homesandcommunities.co.uk/energy-saving-programme), these bids have then been scaled up to represent an average home (3 bed semi-detached) using the ratios between size and economies of scope similar to those used in the EEPH work.

[174] Maintenance costs assumed to be 0.5% of the total (2010) costs per year for external solid wall insulation. Although some maintenance is included in the counterfactual most solid wall houses are brick or masonry finish are not currently rendered, so there will be a need to re-render solid wall insulation in addition to the counterfactual maintenance.

[175] These costs are derived from the ECOFYS report [http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/analysis/analysis.aspx] for the majority or measures, although separate assumptions for 'making good' are taken from the EEPH Purple report.

[176] This is the 'high' estimate from the ECOFYS report

[177] The hidden cost is assumed to be the same as hard cavity wall insulation

[178] Loss of floor space, time and disruption costs may not be a physical cash impact but are a valuation of the impact on the individual and the possible impact on the future value of the home.

[179] The Ecofys report assumed that there would be a loss of floor space cost of £6800 for both low and high cost situations, however the text suggests that they had chosen to leave this cost out of the total household cost calculation, as a result it has been assumed that although the loss of floor space could cost as much as £6800 in the high case, the low case should assume a zero cost. The central cost estimate uses the average of the low and high estimates, however it is currently unknown as to whether solid wall installation will have a negative impact on the value of the property, it is just as likely that it could have a positive impact. This impact depends on consumer behaviour and other government policies.

Central assumptions[166]	LA external SWI[167]		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing	Door insulation	Party wall[168]
	3 bed semi	Flats	During major renovation[169]	Individual installation	During major renovation	Individual installation	Professional	DIY	Hard[170]	Easy	Old to double		
Estimate of annual energy saved 2010[180], after correction for underperformance of insulation[181] but before comfort correction – Gas heated home (kWh/year)[182]	**10547**	**6855**[183]	**10547**	**10547**	**10547**	**10547**	**768**	**768**	**3928**	**3928**	**2340**	**645**	**1964**[184]

[180] The assumed level of saving falls with time as the average gas boiler efficiency improves. For example the kWh saving for SWI in 2020 is 9514.

[181] Evidence suggests that cavity wall and loft insulations have not in general achieved the level of savings in reality as suggested by physics models. Consequently an underperformance reduction of 35% has been applied. ["Review of Differences between Measured and Theoretical Energy Savings for Insulation Measures", Glasgow Caledonian University, 2006]. Following discussions within DECC it was decided to apply a level of underperformance for solid wall insulation, especially as it is still a relatively new technology, with few field trials in place. Scientists within DECC suggested an underperformance level (prior to comfort taking) of 15%, to reflect defects in the application of insulation and problems with representing the technology in BREDEM (Building Research Establishment Domestic Energy Model), such as accounting for thermal bridges that exist even after 'correct' application of the insulation. This change for SWI was made because the assumptions underpinning the GD IA are for both GDF and the ECO, consequently some assumptions have had to be developed to ensure consistency for both policies. The 15% underperformance for SWI is applied as it is expected that (as was found with loft and cavity wall insulation) there is likely to be a lower level of saving from SWI in real life situations than calculated by physics models. This needs to be taken into consideration for the application of a finance regime based on the level of assumed savings from a measure and consequently the ECO. This assumption is subject to further evidence gathering and analysis, including through consultation with industry. As such any new assumptions have not been applied to operational schemes like CERT and CESP, although any final decisions will need to be reflected into the evaluation of the energy and carbon saving benefits from these operational schemes, and so their contribution to carbon budgets. Please note that both CERT and CESP incentivise SWI beyond its theoretical cost effective carbon saving potential to stimulate the market.

[182] The annual energy saving is given for gas centrally heated homes, unless otherwise stated, however the saving may vary across fuel types. These estimates take into account the impact of smart meters (this reduces the average heating consumption and thus average savings by about 1.5% a year per measure). The kWh savings presented vary over time due to the assumed improved efficiency of boilers over time. The savings presented are for 2020 and are lower for earlier years (due to lower boiler efficiency) but constant post 2020.

Central assumptions[166]	LA external SWI[167]		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing	Door insulation	Party wall[168]
	3 bed semi	Flats	During major renovation[169]	Individual installation	During major renovation	Individual installation	Professional	DIY	Hard[170]	Easy	Old to double		
Comfort taken (%)	15	15	15	15	15	15	15	15	15	15	15	15	15

Cost assumptions for solid wall taken from the EEPH Purple report: http://www.eeph.org.uk/uploads/documents/partnership/SWI%20supply%20chain%20review%208%20May%2020091.pdf, whilst energy saved is calculated within DECC. Cost and energy savings for renewable heat technologies are from the NERA report http://hmccc.s3.amazonaws.com/docs/NERA%20Renewable%20Heat%20MACC%20report%20final%20revision.pdf

Learning rates

When a product moves from infancy to a mature product in design and in the market, one would expect a certain level of cost reduction due to learning, either through innovation (improved capital/labour productivity) or through learning by doing[185] (improved labour productivity). The table below presents estimates of what these learning rates may be for the technologies under consideration. Learning improvements are only assumed for solid wall insulation as it is currently in its infancy. Solid wall insulation learning rates are based on the learning rates witnessed by cavity wall insulations over a 12 year period[186]. The other technologies are assumed to already have a strong market position, consequently no learning improvements are assigned.

Table A4.2: Learning rates

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

[183] Assume that a flat of 50m^2 uses 35% less heating than a 80m^2 semi-detached house, as according to Lowe(2007) "Technical options and strategies for decarbonising UK housing. Building Research & Information 35, 412–425".
[184] This is assumed to be half of the cavity wall saving as it is one wall of two houses, thus this saving is for two houses (semi-detached) rather than one.
[185] Learning by doing refers to labour learning by the experience of the production process, therefore increasing labour productivity without external innovation. This was originally coined by K J Arrow in 'The Economic Implications of Learning by Doing', Review of Economic Studies, vol. xxix (1962), 155-73
[186] The numbers in the table only reflect the first 11 years of this period

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cavity wall insulation	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Loft insulation professional (from > 60mm)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SWI external	1.00	0.94	0.87	0.85	0.83	0.81	0.79	0.77	0.73	0.72	0.71
SWI internal	1.00	0.94	0.87	0.85	0.83	0.81	0.79	0.77	0.73	0.72	0.71
Internal SWI – with major renovation	1.00	0.94	0.87	0.85	0.83	0.81	0.79	0.77	0.73	0.72	0.71
LA ESWI 3 bed semi	1.00	0.94	0.87	0.85	0.83	0.81	0.79	0.77	0.73	0.72	0.71
LA ESWI flat	1.00	0.94	0.87	0.85	0.83	0.81	0.79	0.77	0.73	0.72	0.71
External SWI – with major renovation	1.00	0.94	0.87	0.85	0.83	0.81	0.79	0.77	0.73	0.72	0.71
Glazing	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Insulated door	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Party wall insulation[187]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Feasible potential for installation of measures

The feasible potential table below provides estimates of the total number of installations of the different measures that could be achieved over the period of the policy (2013 to 2020). These assumptions are based on the remaining potential for lofts and cavities, the CCC report[188] for solid wall installation and NERA's report on renewable heat technologies. The two reports aim to take into consideration the supply and demand factors that might influence the feasible level of installation in the market as compared to the technical potential.

[187] Although this is a new measure that has not begun production, neither the technology or the skills are new and therefore it assumed that there will be little learning. In addition it is likely that the cost assumptions are low estimates.

[188] http://www.theccc.org.uk/reports/progress-reports

For solid wall insulation, the Committee on Climate Change (CCC) "stretch" ambition of 3.3m installations[189] was used in the maximum feasible potential; the CCC's "extended" ambition of 2.3m installations is used for the high scenario, whilst the low scenario is 20% lower than the high scenario.

For cavity wall insulation the low scenario assumes that only the remaining normal (relatively easy to treat) cavities are filled[190], whereas in the high scenario, half the remaining technically feasible, but hard to treat, cavity walls are also filled.

For loft insulation, the high scenario assumes that all feasible installations except 'laggard' properties[191] are filled, whilst the gap between technical feasible potential and the number of installations in the low scenario is twice the size (a further 1.1m fewer installations).

Table A4.3: Feasible Potential

Feasible potential 2013 – 2020 (million installations)	LA external SWI		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing[192]	Door insulation[193]	Party wall insulation
	3 bed semi	Flats	During major renovation	Individual installation	During major renovation	Individual installation	Professional	DIY	Hard[194]	Easy			
Low	**0.30**	**0.30**	**0.16**[195]	**0.50**	**0.13**	**0.41**	**1.84**	**0.46**[196]		**0.50**	**0.70**	**1.27**	**0.47**[197]

[189] From the CCC first progress report, 12 October 2009: http://www.theccc.org.uk/reports/1st-progress-report
[190] Using the appropriate lower installation costs.
[191] Laggard properties are those that refuse to install a measure even if the full capital cost is subsidised.
[192] Glazing installations are assumed to be beyond the normal replacement rate; as building regulations requires the installation of more efficient windows at replacement.
[193] Door insulation is assumed to be beyond business as usual door replacements.
[194] There is the potential for 3.5m 'hard' to treat cavities, the feasible potential of this group is unknown and therefore it is assumed that no more cavities are filled above the remaining number to reach the 'where practicable' target of 75% of all cavities.
[195] The CCC suggest an extended ambition of 2.3m solid walls by 2022 and a stretch ambition scenario of 3.3m solid walls installations by 2020 (40% of the technical potential). The numbers above are split across the different solid wall types; 2/3rd external solid wall and 1/3rd internal solid wall, (this is consistent with the current split); 0.6m of the external solid wall is then installed in social housing; the split for private installations is ¼ during major renovation and ¾ not. The split between during major renovation or not is based on work by CLG that considers the amount of renovations undertaken each year for amending part L of the building regulations: http://www.communities.gov.uk/documents/planningandbuilding/doc/1295086.doc
[196] DIY loft insulation has had a high score in CERT 2011-12, because it has been assumed that a reasonable number of empty lofts remain. However, these are likely to be filled in the near future, and the DIY figure has been reduced to the same savings as professional top ups.

Feasible potential 2013 – 2020 (million installations)	LA external SWI		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing[192]	Door insulation[193]	Party wall insulation
	3 bed semi	Flats	During major renovation	Individual installation	During major renovation	Individual installation	Professional	DIY	Hard[194]	Easy			
High	**0.30**	**0.30**	**0.22**	**0.66**	**0.18**	**0.55**	**2.72**	**0.68**	**1.75**	**0.5**	**1.04**	**1.91**	**0.71**
Maximum feasible potential	**0.30**	**0.30**	**0.34**	**1.04**	**0.28**	**0.86**	**3.60**	**0.90**	**3.5**	**0.5**	**1.39**	**2.54**	**0.94**

Installation trajectories – Cumulative

The level of installation will vary per year for different measures. The rate of installation depends on supply and demand factors. However detailed supply and demand information for most of the measures under consideration is unavailable. Consequently indicative scenarios have been created. It is assumed that loft and cavity wall installations per year will be declining whilst all other measures will see an increasing in the rate of installation. Tables A4.4a, A4.4b and A4.4c illustrate these indicative trajectories for the low and high and maximum feasible potential scenarios.

Table A4.4a: Cumulative installation trajectories for all measures; low scenario

(Millions)	2013	2014	2015	2016	2017	2018	2019	2020
CWI easy	0.30	0.40	0.50					
Loft insulation professional (from > 60mm)	0.88	1.6	2.16	2.56	2.72	-	-	-
External SWI	0	0	0	0.02	0.08	0.18	0.33	0.50
Internal SWI	0	0	0	0.01	0.07	0.15	0.28	0.41
Internal SWI – with	0	0	0	0.00	0.02	0.05	0.09	0.13

[197] There is currently the technical potential of 5m installations, but at the moment a market does not exist (and so we have no observed cost estimates). A conservative assumption of the feasible potential is adopted.

(Millions)	2013	2014	2015	2016	2017	2018	2019	2020
major renovation								
LA ESWI 3 bed semi	0.05	0.1	0.15	0.2	0.25	0.3	-	-
LA ESWI flat	0.05	0.1	0.15	0.2	0.25	0.3	-	-
External SWI – with major renovation	0	0	0	0.01	0.03	0.06	0.11	0.16
CWI hard	0	0	0	0	0	0	0	0
DIY loft >60mm	0.22	0.4	0.54	0.64	0.68	-	-	-
Glazing	0.05	0.10	0.17	0.24	0.33	0.43	0.56	0.70
Door insulation	0.07	0.17	0.31	0.47	0.65	0.85	1.06	1.27
Party wall insulation	0.01	0.02	0.04	0.07	0.12	0.19	0.31	0.47

Table A4.4b: Cumulative installation trajectories for all measures; high scenario

(Millions)	2013	2014	2015	2016	2017	2018	2019	2020
CWI easy	0.30	0.40	0.50					
Loft insulation professional (from > 60mm)	0.88	1.6	2.16	2.56	2.72	-	-	-
External SWI	0	0.03	0.07	0.12	0.19	0.32	0.49	0.66
Internal SWI	0	0.02	0.06	0.10	0.16	0.27	0.40	0.55
Internal SWI – with major renovation	0	0.01	0.02	0.03	0.05	0.09	0.13	0.18
LA ESWI 3 bed semi	0.04	0.07	0.12	0.19	0.27	0.30	-	-
LA ESWI flat	0.04	0.07	0.12	0.19	0.27	0.30	-	-
External SWI – with major renovation	0	0.01	0.02	0.04	0.06	0.11	0.16	0.22
CWI hard	0.4	0.85	1.17	1.45	1.6	1.7	1.74	1.75
DIY loft >60mm	0.22	0.4	0.54	0.64	0.68	-	-	-
Glazing	0.07	0.15	0.25	0.36	0.49	0.65	0.83	1.04

(Millions)	2013	2014	2015	2016	2017	2018	2019	2020
Door insulation	0.10	0.25	0.46	0.71	0.98	1.27	1.58	1.91
Party wall insulation	0.01	0.02	0.05	0.10	0.17	0.29	0.46	0.71

Figure A4.1 demonstrates the potential annual installation rate of a range of measures between 2013 and 2020 as a result of GDF and ECO for the high scenario. The figure demonstrates an estimate of the remaining feasible technical potential for lofts and cavity wall insulations; this includes 'hard to fill' cavities, which cost on average more than three times normal cavities to install. The other measures included in figure one are assumed to have an increasing rate of installation each year.

Figure A4.1: Suggested annual roll out of possible measures under GDF and ECO (million installations)

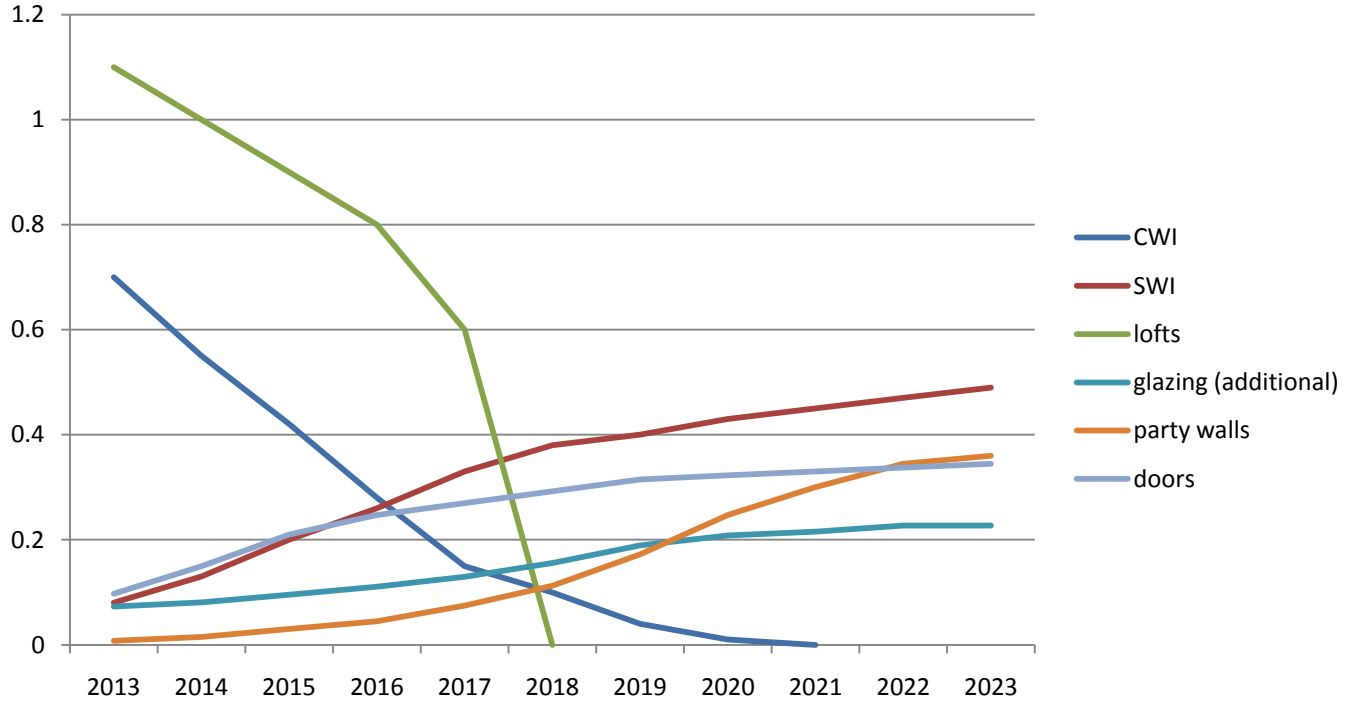


Table A4.4c: Cumulative installation trajectories for all measures; maximum feasible technical potential

(Millions)	2013	2014	2015	2016	2017	2018	2019	2020
Loft insulation professional (from > 60mm)	0.96	1.84	2.64	3.28	3.6	-	-	-
External SWI	0.01	0.06	0.15	0.28	0.44	0.60	0.82	1.04
Internal SWI	0.01	0.05	0.13	0.24	0.36	0.50	0.68	0.86
Internal SWI – with major renovation	0.00	0.02	0.04	0.08	0.12	0.16	0.22	0.28
LA ESWI 3 bed semi	0.05	0.10	0.15	0.20	0.25	0.30	-	-
LA ESWI flat	0.05	0.10	0.15	0.20	0.25	0.30	-	-
External SWI – with major renovation	0.00	0.02	0.05	0.09	0.14	0.20	0.27	0.34
CWI hard	0.77	1.52	2.2	2.8	3.31	3.68	3.9	4
DIY loft >60mm	0.24	0.46	0.66	0.82	0.9	-	-	-
Glazing	0.10	0.21	0.33	0.48	0.65	0.86	1.11	1.39
Door insulation	0.13	0.33	0.61	0.94	1.3	1.69	2.11	2.54
Party wall insulation	0.01	0.03	0.07	0.13	0.23	0.38	0.61	0.94

Indicative illustration of measures

The tables below present the total costs and benefits of delivering the number of installations considered in the feasible potential assumptions tables, spread over the period (2013 – 2020) as suggested in the trajectories tables (4a, b and c), for each measure. Thus the results are not for an individual measure but the feasible potential over the period. Assumptions discussed on cost and benefit inputs, learning rates, feasible potential and installation trajectories are run through a model built by DECC. All the numbers in the table below are in 2010 prices (future numbers have been discounted back using a discount rate of 3.5%). Using all the costs and benefits the carbon cost effectiveness for installing the feasible potential of each measure can be calculated. The cost effectiveness indicator and the annual carbon saved in 2020 are used to produce the MACC.

Table A4.5a:Total costs and benefits of measures: Low scenario

(2013-20, **£bn** 2010 prices)	**LA external SWI**		**Private external SWI to U=0.35 W/m2K**		**Private internal SWI to U=0.35 W/m2K**		**Loft top ups**		**CWI**		**Glazing**	**Door Insulation**	**Party Wall**
	3 bed semi	**Flats**	**During major renovation**	**Individual installation**	**During major renovation**	**Individual installation**	**Professional**	**DIY**					
Costs (2013-20, **£bn** 2010 prices)													
Installation costs	£0.95	£0.63	£0.80	£2.45	£0.38	£1.17	£0.45	£0.05		£0.17	£0.24	£0.35	£0.18
Administration costs	£0.17	£0.11	£0.14	£0.44	£0.07	£0.21	£0.08	£0.01		£0.03	£0.04	£0.06	£0.03
Household costs[198]	£0.35	£0.24	£0.00	£1.80	£0.32	£1.96	£0.19	£0.06		£0.03	£0.02	£0.07	£0.06
Total costs[199]	**£1.48**	**£0.98**	**£0.93**	**£4.62**	**£0.77**	**£3.35**	**£0.73**	**£0.12**		**£0.23**	**£0.31**	**£0.48**	**£0.26**
Society Benefits (2013-20, **£bn** 2010 prices)													
Energy savings for society (non-traded)	£1.05	£0.68	£0.51	£1.56	£0.42	£1.29	£0.47	£0.12		£0.68	£0.35	£0.23	£0.26
Energy savings for society (Traded)	£0.42	£0.27	£0.21	£0.65	£0.17	£0.51	£0.19	£0.05		£0.27	£0.13	£0.09	£0.11
Carbon savings (Non-traded)	£0.66	£0.43	£0.36	£1.10	£0.30	£0.91	£0.31	£0.08		£0.44	£0.17	£0.14	£0.18
Carbon savings (Traded)	£0.04	£0.03	£0.02	£0.06	£0.02	£0.05	£0.02	£0.00		£0.02	£0.02	£0.01	£0.01
Total air quality impact	£0.04	£0.03	£0.02	£0.06	£0.02	£0.05	£0.02	£0.00		£0.03	£0.01	£0.01	£0.01
Comfort	£0.48	£0.31	£0.24	£0.73	£0.19	£0.59	£0.37	£0.09		£0.53	£0.16	£0.11	£0.20
Total benefits	**£2.70**	**£1.75**	**£1.37**	**£4.17**	**£1.11**	**£3.41**	**£1.39**	**£0.35**		**£1.97**	**£0.84**	**£0.58**	**£0.77**
Net benefit (2013-20, **£bn** 2010 prices)	£1.22	£0.78	£0.44	-£0.46	£0.34	£0.06	£0.66	£0.22		£1.74	£0.53	£0.10	£0.51
CEI for non-traded sector (£)	**-37.19**	**-35.61**	**-10.01**	**64.03**	**-7.09**	**42.15**	**-50.44**	**-84.43**		**-133.57**	**-84.42**	**11.17**	**-81.26**
	(44.57)	(44.57)	(45.25)	(45.25)	(45.25)	(45.25)	(45.38)	(45.38)		(45.39)	(40.57)	(43.3	(45.37)

[198] Includes the 'make good' costs and disruption costs and loss of floor space. Make good costs are included in the total investment cost calculations.
[199] The total cost may not equal the above costs as some of the costs are spread over different numbers of years and therefore the adding them all together affects the NPV differently.

(2013-20, **£bn** 2010 prices)	**LA external SWI**		**Private external SWI to U=0.35 W/m2K**		**Private internal SWI to U=0.35 W/m2K**		**Loft top ups**		**CWI**		**Glazing**	**Door Insulation**	**Party Wall**
	3 bed semi	**Flats**	**During major renovation**	**Individual installation**	**During major renovation**	**Individual installation**	**Professional**	**DIY**					
												9)	
Non-traded Carbon impact in 2020 (MtCO2)	**-0.41**	**-0.27**	**-0.22**	**-0.68**	**-0.18**	**-0.56**	**-0.17**	**-0.04**		**-0.23**	**-0.21**	**-0.11**	**-0.11**
Traded Carbon impact in 2020 (MtCO2)	-0.08	-0.05	-0.04	-0.13	-0.03	-0.10	-0.03	-0.01		-0.05	-0.04	-0.02	-0.02
Non-traded Life time carbon impact (MtCO2)	-14.91	-9.69	-7.96	-24.30	-6.54	-20.11	-6.88	-1.72		-9.74	-4.26	-3.22	-3.99
Traded life time carbon impact (MtCO2)	-1.54	-1.00	-0.69	-2.11	-0.54	-1.65	-0.69	-0.17		-0.98	-0.61	-0.34	-0.35

Table A4.5b:Total costs and benefits of measures: High scenario

(2013-20, **£bn** 2010 prices)	**LA external SWI**		**Private external SWI to U=0.35 W/m2K**		**Private internal SWI to U=0.35 W/m2K**		**Loft top ups**		**CWI**	**Glazing**	**Door Insulation**	**Party Wall**
	3 bed semi	**Flats**	**During major renovation**	**Individual installation**	**During major renovation**	**Individual installation**	**Professional**	**DIY**				
Costs												
Installation costs	£0.95	£0.62	£1.06	£3.24	£0.50	£1.55	£0.66	£0.08	£3.11	£0.37	£0.52	£0.26
Administration costs	£0.17	£0.11	£0.19	£0.58	£0.09	£0.28	£0.12	£0.01	£0.56	£0.07	£0.09	£0.05
Household costs[200]	£0.35	£0.23	£0.00	£2.48	£0.43	£2.70	£0.28	£0.09	£0.31	£0.03	£0.11	£0.09
Total costs[201]	**£1.47**	**£0.97**	**£1.23**	**£6.22**	**£1.03**	**£4.53**	**£1.06**	**£0.18**	**£3.98**	**£0.46**	**£0.72**	**£0.40**
Society Benefits												
Energy savings for society (non-traded)	£1.04	£0.68	£0.70	£2.14	£0.58	£1.77	£0.69	£0.17	£2.90	£0.53	£0.35	£0.39

[200] Includes the 'make good' costs and disruption costs and loss of floor space. Make good costs are included in the total investment cost calculations.
[201] The total cost may not equal the above costs as some of the costs are spread over different numbers of years and therefore the adding them all together affects the NPV differently.

(2013-20, **£bn** 2010 prices)	**LA external SWI**		**Private external SWI to U=0.35 W/m2K**		**Private internal SWI to U=0.35 W/m2K**		**Loft top ups**		**CWI**	**Glazing**	**Door Insulation**	**Party Wall**
	3 bed semi	**Flats**	**During major renovation**	**Individual installation**	**During major renovation**	**Individual installation**	**Profes sional**	**DIY**				
Energy savings for society (Traded)	£0.42	£0.27	£0.29	£0.89	£0.23	£0.70	£0.28	£0.07	£1.17	£0.19	£0.13	£0.16
Carbon savings (Non-traded)	£0.66	£0.43	£0.48	£1.47	£0.40	£1.22	£0.46	£0.11	£1.92	£0.26	£0.21	£0.27
Carbon savings (Traded)	£0.04	£0.03	£0.03	£0.08	£0.02	£0.07	£0.03	£0.01	£0.11	£0.02	£0.01	£0.01
Total air quality impact	£0.04	£0.03	£0.03	£0.08	£0.02	£0.07	£0.03	£0.01	£0.11	£0.02	£0.01	£0.02
Comfort	£0.48	£0.31	£0.33	£1.00	£0.26	£0.81	£0.54	£0.14	£2.26	£0.24	£0.16	£0.30
Total benefits	**£2.69**	**£1.75**	**£1.86**	**£5.67**	**£1.51**	**£4.64**	**£2.03**	**£0.51**	**£8.47**	**£1.26**	**£0.88**	**£1.15**
Net benefit	£1.22	£0.78	£0.63	-£0.55	£0.48	£0.11	£0.96	£0.33	£4.49	£0.80	£0.16	£0.76
CEI for non-traded sector (£)	**-37.45**	**-35.89**	**-13.93**	**61.89**	**-9.57**	**40.86**	**-50.13**	**-84.04**	**-60.58**	**-84.42**	**11.17**	**-81.26**
	(44.61)	(44.61)	(45.11)	(45.11)	(45.11)	(45.11)	(45.37)	(45.37)	(45.37)	(40.57)	(43.39)	(45.37)
Non-traded Carbon impact in 2020 (MtCO2)	**-0.41**	**-0.27**	**-0.30**	**-0.91**	**-0.25**	**-0.76**	**-0.25**	**-0.06**	**-1.04**	**-0.32**	**-0.16**	**-0.16**
Traded Carbon impact in 2020 (MtCO2)	-0.08	-0.05	-0.06	-0.18	-0.05	-0.14	-0.05	-0.01	-0.21	-0.06	-0.03	-0.03
Non-traded Life time carbon impact (MtCO2)	-14.91	-9.69	-10.71	-32.68	-8.79	-27.05	-10.08	-2.52	-42.37	-6.39	-4.82	-5.99
Traded life time carbon impact (MtCO2)	-1.52	-0.99	-0.97	-2.95	-0.75	-2.31	-1.00	-0.25	-4.15	-0.92	-0.50	-0.53

Table A4.5c:Total costs and benefits of measures: Maximum feasible technical potential

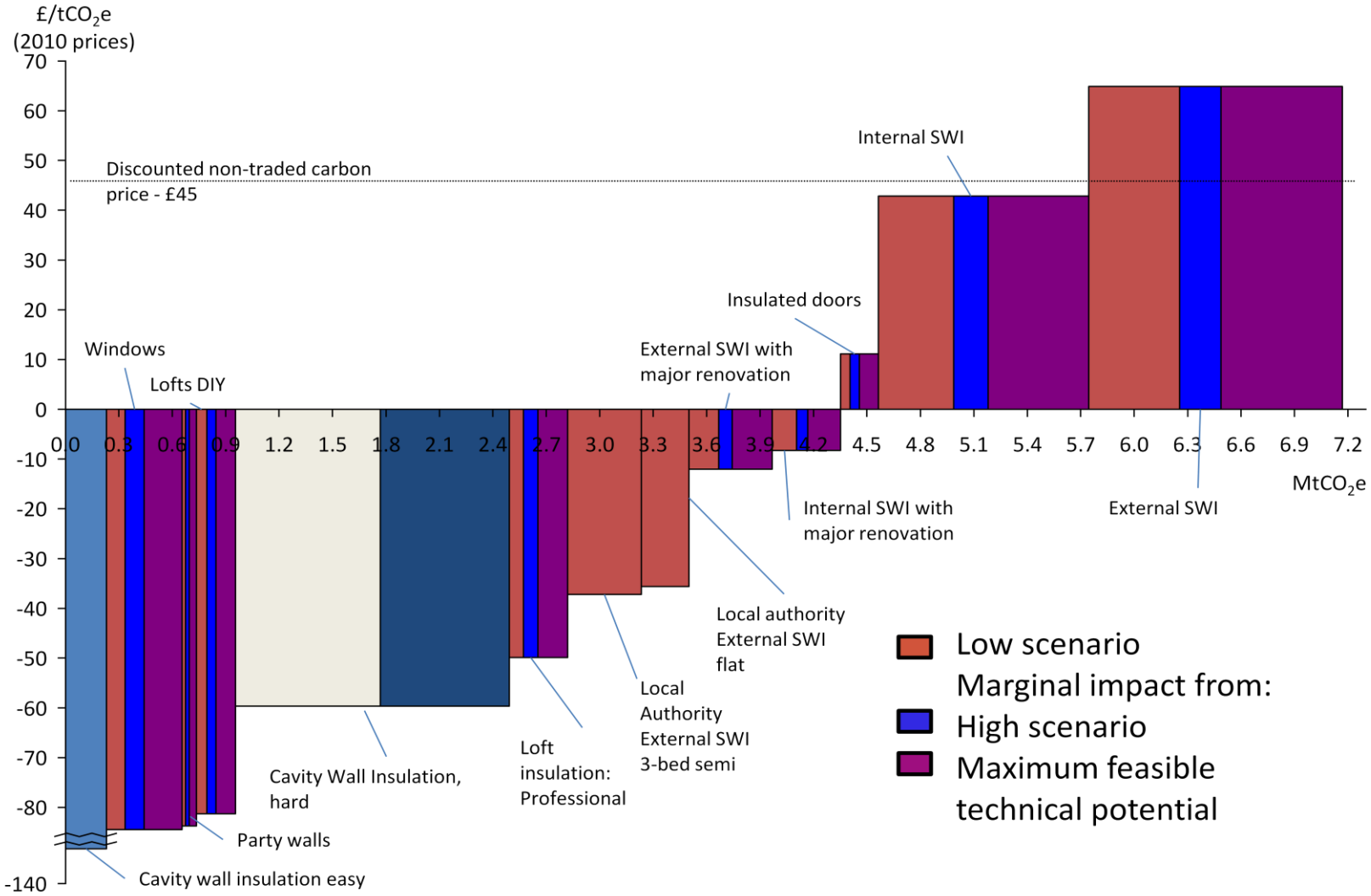
(2013-20, **£bn** 2010 prices)	**LA external SWI**		**Private external SWI to U=0.35 W/m2K**		**Private internal SWI to U=0.35 W/m2K**		**Loft top ups**		**CWI**	**Glazing**	**Door Insulation**	**Party Wall**
	3 bed semi	**Flats**	**During major renovation**	**Individual installation**	**During major renovation**	**Individual installation**	**Profes sional**	**DIY**				
Costs (2013-20, **£bn** 2010 prices)												
Installation costs	£0.95	£0.63	£1.70	£5.20	£0.81	£2.48	£0.87	£0.10	£5.38	£0.49	£0.70	£0.35
Administration costs	£0.17	£0.11	£0.31	£0.94	£0.15	£0.45	£0.16	£0.02	£0.97	£0.09	£0.13	£0.06
Household costs[202]	£0.35	£0.24	£0.00	£3.92	£0.69	£4.28	£0.37	£0.12	£0.53	£0.04	£0.14	£0.11
Total costs[203]	**£1.48**	**£0.98**	**£1.97**	**£9.94**	**£1.64**	**£7.21**	**£1.40**	**£0.24**	**£6.89**	**£0.61**	**£0.96**	**£0.53**
Society Benefits (2013-20, **£bn** 2010 prices)												
Energy savings for society (non-traded)	£1.05	£0.68	£1.11	£3.39	£0.91	£2.80	£0.91	£0.23	£4.98	£0.70	£0.47	£0.51
Energy savings for society (Traded)	£0.42	£0.27	£0.46	£1.40	£0.36	£1.10	£0.37	£0.09	£2.03	£0.26	£0.18	£0.22
Carbon savings (Non-traded)	£0.66	£0.43	£0.75	£2.30	£0.62	£1.90	£0.60	£0.15	£3.34	£0.35	£0.28	£0.36
Carbon savings (Traded)	£0.04	£0.03	£0.04	£0.13	£0.03	£0.10	£0.03	£0.01	£0.18	£0.03	£0.02	£0.02
Total air quality impact	£0.04	£0.03	£0.04	£0.13	£0.04	£0.11	£0.04	£0.01	£0.19	£0.02	£0.02	£0.02
Comfort	£0.48	£0.31	£0.52	£1.57	£0.42	£1.29	£0.71	£0.18	£3.90	£0.32	£0.21	£0.41
Total benefits	**£2.70**	**£1.75**	**£2.92**	**£8.92**	**£2.37**	**£7.30**	**£2.66**	**£0.66**	**£14.63**	**£1.68**	**£1.17**	**£1.54**
Net benefit (2013-20, **£bn** 2010 prices)	£1.22	£0.78	£0.95	-£1.01	£0.73	£0.09	£1.26	£0.43	£7.74	£1.07	£0.21	£1.01
CEI for non-traded	**-37.19**	**-35.61**	**-12.02**	**64.87**	**-8.26**	**42.88**	**-49.91**	**-83.75**	**-59.66**	**-84.42**	**11.17**	**-81.26**

[202] Includes the 'make good' costs and disruption costs and loss of floor space. Make good costs are included in the total investment cost calculations.
[203] The total cost may not equal the above costs as some of the costs are spread over different numbers of years and therefore the adding them all together affects the NPV differently.

(2013-20, **£bn** 2010 prices)	**LA external SWI**		**Private external SWI to U=0.35 W/m2K**		**Private internal SWI to U=0.35 W/m2K**		**Loft top ups**		**CWI**	**Glazing**	**Door Insulation**	**Party Wall**
	3 bed semi	**Flats**	**During major renovation**	**Individual installation**	**During major renovation**	**Individual installation**	**Profes sional**	**DIY**				
sector (£)												
	(44.57)	(44.57)	(45.02)	(45.02)	(45.02)	(45.02)	(45.37)	(45.37)	(45.36)	(40.57)	(43.39)	(45.37)
Non-traded Carbon impact in 2020 (MtCO2)	**-0.41**	**-0.27**	**-0.47**	**-1.42**	**-0.38**	**-1.18**	**-0.33**	**-0.08**	**-1.86**	**-0.42**	**-0.21**	**-0.22**
Traded Carbon impact in 2020 (MtCO2)	-0.08	-0.05	-0.09	-0.28	-0.07	-0.22	-0.07	-0.02	-0.37	-0.08	-0.04	-0.04
Non-traded Life time carbon impact (MtCO2)	-14.91	-9.69	-16.72	-51.05	-13.73	-42.25	-13.27	-3.32	-73.69	-8.52	-6.43	-7.98
Traded life time carbon impact (MtCO2)	-1.54	-1.00	-1.55	-4.72	-1.20	-3.70	-1.31	-0.33	-7.07	-1.22	-0.67	-0.70

The above tables were used to produce the following two marginal abatement cost (MAC) curves. The MAC curve demonstrate the most cost effective scenario of measures that could be employed post 2012 under the different policy scenarios discussed in this document. The MAC curve includes all the scenarios; building up from the low scenario the colours darken for each measure to represent the additional amount of non-traded carbon saved for the high and maximum feasible potential scenarios.

Figure A4.2: Marginal abatement cost curve in 2020 demonstrating the additional level of carbon from each scenario



*The chart includes measures that are additional to current polices. Costs and benefits calculated assuming installations between 2013 and 2020 applying learning rates for new technologies; discounted back to 2010.

Table A4.6: Sources and assumptions for the insulation measures estimates presented above

	LA external SWI		Private external SWI		Private internal SWI		Loft top ups		CWI	Windows	Door insulation	Party walls
	3 bed semi	**Flats**	**During major renovation**	**Individual installation**	**During major renovation**	**Individual installation**	**Profes sional**	**DIY**	**Hard**			
Life time (yrs)	Consiste nt with CERT insuranc e lifetime plus 20%	Consiste nt with CERT insuranc e lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%	Consist ent with CERT insuran ce lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%	Consiste nt with CERT insuranc e lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%	Consistent with CERT insurance lifetime plus 20%
Installation cost (£)	EEPH report: cost of EWI material s and installati on for 100 plus propertie s	EEPH report: 100 plus propertie s cost reduced by 33% (cost differenc e for flats and terrace)	EEPH report: Cost of EWI materials and installation for a single property.	EEPH report: Cost of EWI materials and installation for a single property.	EEPH report: Cost of EWI materials and installation for a single property	EEPH report: Cost of EWI materials and installation for a single property	CERT extensi on	CERT extension	CERT extensio n	CERT extension	Internal assessment	Internal assessment
Maintenance costs (£)			Internal assessment	Internal assessment								
Admin costs (% of installation)	Assume d admin cost for supplier-LA	Assume d admin cost for supplier-LA	Assumed admin cost for supplier-LA	Assumed admin cost for supplier-LA	Assumed admin cost for supplier-LA	Assumed admin cost for supplier-LA	Assum ed admin cost for supplie	Assumed admin cost for supplier-LA	Assume d admin cost for supplier-LA	Assumed admin cost for supplier-LA partnership	Assumed admin cost for supplier-LA partnership	Assumed admin cost for supplier-LA partnership

	LA external SWI		Private external SWI		Private internal SWI		Loft top ups		CWI	Windows	Door insulation	Party walls
	partnership	partnership	partnership	partnership	partnership	partnership	r-LA partnership	partnership	partnership			
Household costs (£)of which:							ECOFYS report: Average of the high and low total hidden cost estimates	ECOFYS report: High estimate	ECOFYS report: High estimate	**ECOFYS**	**ECOFYS**	**Internal assessment**
'make good'	EEPH report: low end of 100 plus estimate	EEPH report: 33% less than 3 bed semi estimate	Assumed already part of major works	EEPH report: Mid-point 'make good' cost for a single property	Assumed already part of major works	EEPH report: Mid-point 'make good' cost for a single property						
Household time cost			Assumed already part of major works	ECOFYS report: Mid-point between the high and low estimates reported for household time.	Assumed already part of major works	ECOFYS report: Mid-point between the high and low estimates reported for household time.						
Disruption			Assumed already part of major works	ECOFYS report: mid-point. Includes	Assumed already part of major works	ECOFYS report: mid point. Includes						

	LA external SWI		Private external SWI		Private internal SWI		Loft top ups		CWI	Windows	Door insulation	Party walls
				financial costs behind survey, protective covers and temporary accommodation costs		financial costs behind survey, protective covers and temporary accommodation costs						
Loss of floor space					ECOFYS report: mid-point between zero cost impact on floor space and max estimate	ECOFYS report: mid-point between zero cost impact on floor space and max estimate						
Annual Energy saved (kWh)	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**	**DECC calculations**
Comfort taken (%)	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT	Consistent with CERT

Assumptions for sensitivities

Table A4.7: Low estimates

	LA external SWI		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing	Door insulation	Party wall
	3 bed semi	Flats	During major renovation	Individual installation	During major renovation	Individual installation	Professional	DIY	Hard	Easy	Old to double		
Life time (yrs)	**36**	**36**	**36**	**36**	**36**	**36**	**42**	**42**	**42**	**42**	**20**	**30**	**42**
Installation cost (£)[204]	**4500**	**3000**	**7000**	**7000**	**4500**	**4500**	**268**	**100**	**1500**	**356**	**400**	**300**	**400**
Household costs (£) of which:	1200	800	0	3000	0	1077	31	150	150	17	30	50	150

Table A4.8: maximum feasible potential estimates

	LA external SWI		Private external SWI to U=0.35 W/m2K		Private internal SWI to U=0.35 W/m2K		Loft top ups		CWI		Glazing	Door insulation	Party wall
	3 bed semi	Flats	During major renovation	Individual installation	During major renovation	Individual installation	Professional	DIY	Hard	Easy	Old to double		
Life time (yrs)	**36**	**36**	**36**	**36**	**36**	**36**	**42**	**42**	**42**	**42**	**20**	**30**	**42**
Installation cost (£)[205]	**5100**	**3320**	**8200**	**8200**	**5500**	**5500**	**297**	**156**	**1740**	**395**	**500**	**400**	**600**
Household costs (£) of which:	**1800**	**1200**	**0**	**7020**	**6800**	**12654**	**221**	**180**	**190**	**126**	**40**	**100**	**190**

[204] See learning table, later in this document, for detail on the cost of installation for private solid wall with time. In addition the counterfactual for external collide wall is that walls will receive a re-rendering when appropriate whether solid wall installation has been installed or not.
[205] See learning table, later in this document, for detail on the cost of installation for private solid wall with time. In addition the counterfactual for external collide wall is that walls will receive a re-rendering when appropriate whether solid wall installation has been installed or not.

Annex 5: Sensitivities for domestic overarching scenarios

The domestic overarching scenarios offer an illustration of the costs and benefits to society given an estimated cost per measure, future carbon price and future energy prices. However the costs of the cost of the measure is different depending on the house type and householder, consequently the average cost could vary substantially. In addition future energy prices (and carbon prices) are difficult to estimate as they are subject to many factors[206].
Consequently the social impacts estimated in the main document are best estimates. This annex aims to illustrate the possible alternative impacts on society if costs and prices in the future are different to central estimates.

The tables below provide information not just on the total impact on society but the aggregate impact by each particular measure. The cost effectiveness of the different measures varies considerable with the cost and price sensitivities; e.g. some solid wall insulation becomes cost effective if higher energy prices are assumed and/or lower capital costs.

Table A5.1: High scenario; high capital costs; low energy and carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs	£3.30	£0.26	£1.31	£0.21	£1.61	£1.05	£1.32	£7.57	£1.52	£6.99	£0.51	£0.84	£0.47	£26.96
Total benefits	£3.87	£1.17	£1.21	£0.30	£1.55	£1.01	£1.06	£3.24	£0.86	£2.65	£0.73	£0.50	£0.68	£18.82
Net benefit	£0.57	£0.91	-£0.11	£0.09	-£0.06	-£0.05	-£0.26	-£4.33	-£0.66	-£4.34	£0.22	-£0.34	£0.21	-£8.14
CEI for non-traded sector	5.19	-70.99	33.34	-14.48	26.27	27.11	47.05	155.02	97.76	182.95	-14.39	92.21	-12.74	£45.24

[206] The detailed capital cost sensitivities are found in annex 4 above and the energy and price sensitivities can be found in the IAG guidance http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx

Table A5.2: High scenario; low capital costs; high energy and carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs	£2.83	£0.19	£0.81	£0.15	£1.33	£0.88	£1.13	£4.87	£0.53	£2.06	£0.41	£0.60	£0.32	£16.12
Total benefits	£8.26	£2.48	£2.57	£0.64	£3.48	£2.26	£2.40	£7.33	£1.95	£6.01	£1.62	£1.13	£1.46	£41.58
Net benefit	£5.43	£2.29	£1.75	£0.49	£2.15	£1.37	£1.27	£2.46	£1.42	£3.94	£1.21	£0.53	£1.14	£25.46
CEI for non-traded sector	-97.94	-167.67	-105.80	-125.79	-77.18	-74.90	-51.16	-7.51	-93.64	-77.97	-129.21	-45.56	-121.89	-£88.79

Table A5.3: High scenario; central capital costs; low energy prices and central carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs	£3.07	£0.23	£1.06	£0.18	£1.47	£0.97	£1.23	£6.22	£1.03	£4.53	£0.46	£0.72	£0.40	£21.54
Total benefits	£4.66	£1.40	£1.45	£0.36	£1.90	£1.23	£1.32	£4.02	£1.07	£3.29	£0.87	£0.62	£0.82	£23.00
Net benefit	£1.59	£1.17	£0.38	£0.18	£0.43	£0.27	£0.09	-£2.20	£0.04	-£1.23	£0.41	-£0.11	£0.43	£1.46
CEI for non-traded sector	-3.31	-75.62	7.20	-26.71	15.58	17.14	36.74	112.56	40.34	90.77	-24.28	65.28	-26.06	£20.40

Table A5.4: High scenario; central capital costs; high energy prices and central carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs	£3.07	£0.23	£1.06	£0.18	£1.47	£0.97	£1.23	£6.22	£1.03	£4.53	£0.46	£0.72	£0.40	£21.54
Total benefits	£7.47	£2.25	£2.32	£0.58	£3.12	£2.03	£2.15	£6.55	£1.74	£5.36	£1.48	£1.02	£1.32	£37.41
Net benefit	£4.41	£2.02	£1.26	£0.40	£1.66	£1.06	£0.92	£0.33	£0.72	£0.84	£1.02	£0.30	£0.92	£15.87
CEI for non-traded sector	-89.57	-163.18	-79.79	-113.70	-66.61	-65.05	-40.96	34.86	-36.32	14.12	-119.50	-18.75	-108.65	-£64.07

Table A5.5: High scenario; central capital costs; high high energy prices and central carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs	£3.07	£0.23	£1.06	£0.18	£1.47	£0.97	£1.23	£6.22	£1.03	£4.53	£0.46	£0.72	£0.40	£21.54
Total benefits	£8.78	£2.64	£2.73	£0.68	£3.65	£2.37	£2.49	£7.60	£2.02	£6.22	£1.74	£1.19	£1.54	£43.66
Net benefit	£5.71	£2.42	£1.67	£0.50	£2.18	£1.40	£1.26	£1.38	£0.99	£1.70	£1.29	£0.47	£1.14	£22.12
CEI for non-traded sector	-129.39	-203.93	-120.13	-154.04	-101.71	-100.15	-73.02	2.80	-68.00	-17.57	-160.52	-54.25	-145.42	-£100.68

Table A5.6: Low scenario; high capital costs; low energy and carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs		£0.26	£0.90	£0.14	£1.62	£1.06	£0.99	£5.68	£1.14	**£5.26**	£0.34	£0.56	£0.31	£18.26
Total benefits		£1.16	£0.82	£0.21	£1.55	£1.01	£0.81	£2.46	£0.65	**£2.01**	£0.49	£0.34	£0.45	£11.97
Net benefit		£0.90	-£0.07	£0.06	-£0.07	-£0.05	-£0.18	-£3.21	-£0.49	**-£3.25**	£0.15	-£0.23	£0.14	-£6.29
CEI for non-traded sector		-70.88	33.25	-14.69	26.81	27.66	44.23	150.45	94.83	**178.63**	-14.39	92.21	-12.74	£49.89

Table A5.7: Low scenario; low capital costs; high energy and carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs		£0.19	£0.55	£0.10	£1.34	£0.89	£0.84	£3.65	£0.40	£1.54	£0.27	£0.40	£0.22	£10.40
Total benefits		£2.47	£1.75	£0.44	£3.49	£2.27	£1.83	£5.59	£1.49	£4.58	£1.08	£0.75	£0.97	£26.72
Net benefit		£2.28	£1.20	£0.33	£2.15	£1.37	£0.99	£1.94	£1.09	£3.04	£0.81	£0.36	£0.76	£16.32
CEI for non-traded sector		-167.47	-106.29	-126.33	-77.14	-74.84	-52.46	-9.52	-93.58	-78.16	-129.21	-45.56	-121.89	-£87.12

Table A5.8: Low scenario; central capital costs; low energy prices and central carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs		£0.23	£0.73	£0.12	£1.48	£0.98	£0.91	£4.66	£0.77	£3.40	£0.31	£0.48	£0.26	£14.33
Total benefits		£1.39	£0.99	£0.25	£1.91	£1.24	£1.00	£3.06	£0.82	£2.51	£0.58	£0.41	£0.55	£14.71
Net benefit		£1.17	£0.26	£0.12	£0.43	£0.26	£0.09	-£1.60	£0.05	-£0.89	£0.28	-£0.07	£0.29	£0.38
CEI for non-traded sector		-75.51	7.05	-26.94	16.03	17.61	34.23	108.80	38.45	88.05	-24.28	65.28	-26.06	£23.18

Table A5.9: Low scenario; central capital costs; high energy prices and central carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs		£0.23	£0.73	£0.12	£1.48	£0.98	£0.91	£4.66	£0.77	£3.40	£0.31	£0.48	£0.26	£14.33
Total benefits		£2.24	£1.59	£0.40	£3.14	£2.04	£1.64	£4.99	£1.33	£4.08	£0.99	£0.68	£0.88	£23.99
Net benefit		£2.01	£0.86	£0.27	£1.66	£1.06	£0.72	£0.33	£0.56	£0.68	£0.68	£0.20	£0.61	£9.66
CEI for non-traded sector		-162.98	-80.22	-114.21	-66.49	-64.92	-42.54	32.04	-37.28	12.33	-119.50	-18.75	-108.65	-£60.52

Table A5.10: Low scenario; central capital costs; high high energy prices and central carbon prices

£bn	CWI hard	CWI easy	lofts prof	lofts DIY	LA ESWI 3 bed semi	LA ESWI flat	ESWI – with major renovation	External SWI	ISWI – with major renovation	Internal SWI	windows (av old to c)	insulated doors	party walls	Total
Total costs		£0.23	£0.73	£0.12	£1.48	£0.98	£0.91	£4.66	£0.77	£3.40	£0.31	£0.48	£0.26	£14.33
Total benefits		£2.63	£1.87	£0.47	£3.66	£2.38	£1.89	£5.78	£1.54	£4.73	£1.16	£0.80	£1.03	£27.94
Net benefit		£2.41	£1.14	£0.34	£2.18	£1.40	£0.98	£1.12	£0.77	£1.33	£0.86	£0.31	£0.76	£13.61
CEI for non-traded sector		-203.67	-120.74	-154.73	-101.79	-100.22	-73.96	0.62	-68.33	-18.72	-160.52	-54.25	-145.42	-£96.45

Annex 6: Individual measures

To compare the different impacts of individual measures that might be used in the ECO, including heating measures, the net present value (net benefit) for an individual installation is calculated. The table below demonstrates that the solid wall and non gas heating measures have a negative NPV, thus they are not cost effective. The table also illustrates the equity weighted impact assuming that measures are targeted to vulnerable groups (as an illustration this is assumed to be the priority group in CERT, i.e. cold weather payment and child tax credit claimants with incomes less than £16,000). The equity weighting provides an understanding of the marginal utility as seen by different income groups in society. The detail behind these results is presented below.

Table A6.1: Net present value per cost for different measures for an individual household.

Measure	Cost	**NPV**	Total transfer benefit[1]	**Equity weighted NPV**
CWI easy	376	**£3,522.49**	£1,209.75	**£4,732.24**
Loft insulation prof	283	**£371.71**	£136.13	**£507.84**
External SWI	7600	**-£2,694.63**	-£2,439.87	**-£5,134.50**
Internal SWI	5000	**-£1,077.92**	-£3,958.41	**-£5,036.33**
ISWI with ren	5000	**£1,881.61**	-£840.43	**£1,041.18**
LA 3 bed semi	4800	**£3,790.54**	£898.10	**£4,688.64**
LA flat	3160	**£2,406.33**	£561.27	**£2,967.60**
ESWI with renovation	7600	**£1,754.71**	£2,247.68	**£4,002.39**
CWI hard	1620	**£2,113.69**	£1,120.85	**£3,234.54**
Loft DIY	128	**£503.30**	£101.19	**£604.49**
Electric central heating	1069	**-£5,098**	-£1,556.68	**-£6,654.98**
Gas central heating	2322	**£721**	£1,226.60	**£1,947.42**
heating repairs	773	**£579**	£1,183.60	**£1,762.51**
Oil replacement	1466	**£123**	£2,141.93	**£2,265.17**
boiler replacement	2520	**£1,538**	£2,117.28	**£3,655.16**
Solid fuel replacement	1624	**-£8,184**	£2,412.10	**-£5,772.10**
Wall heating	1274	**£2,104**	£1,375.38	**£3,479.44**
Warm air replacement	1071	**£2,645**	£2,035.20	**£4,679.75**
LPG replacement	1953	**£3,055**	£3,144.09	**£6,198.66**

Costs and benefit assumptions

The costs and benefits for insulation measures are presented in annex 4.

Table A6.2: Cost and benefit assumptions for heating measures

	Electric central heating	Gas central heating	Heating repairs	Oil replacement	Gas Boiler replacement	Solid fuel replacement	Wall heating	Warm air replacement	LPG replacement

[1] This uses equity weightings to calculate the marginal utility depending on the income decile. For illustrative purposes it is assumed that the measures are targeted on people who receive cold weather payments and child tax credits with incomes of less than £16,000, which is the same as the CERT priority group. The equity weighting has been applied to household hassle costs, comfort taking and annual average energy bill savings

Life time (yrs)	12	12	4	12	12	12	10	12	12
Installation cost (£)	1069	2322	773	1466	2520	1624	1274	1071	1953
Admin costs (% of installation)	254	254	254	254	254	254	254	254	254
Household costs (£)[2]	97	1697	57	74	74	74	1374	74	74
Estimate of annual energy saved 2010, before comfort correction – electric [3] (kWh/year)	11116	11116	11116	11116	11116	11116	11116	11116	11116
Energy used[4]	16957	18715	18715	18036	18715	22095	15129	18715	18715
Comfort taken (%)	15	15	15	15	15	15	15	15	15

Equity weighted benefits

Equity weights were applied to different costs and benefits to attempt to capture the value to households of the inherent transfers associated with assistance under the scheme. Equity weights were applied in line with Green Book guidance[5] to the reduction in household energy bills, the comfort taken and to the hidden costs.

The equity weighting associated with each income decile is calculated as the ratio between the marginal utility of consumption for that decile and the average marginal utility of consumption across all deciles. These are calculated in accordance with Green Book guidance using the median level of income in each income decile. The marginal utility of consumption for each income decile is calculated using the Green Book methodology; assuming that the elasticity of the marginal utility is one, then this implies that the utility function is U = log C (where C is consumption). Consequently the marginal utility of consumption is 1/C. In addition it is also assumed that the marginal propensity to consume is one therefore all income is spent on consumption. So for example the marginal utility for the lowest income decile is 1/7500 = 0.000133. The equity weighting is calculated by dividing each income groups marginal utility by the average marginal utility of consumption.

Table A6.3: Equity weightings across income deciles

Income Deciles	Average Income	No of HH	Total income	Marginal U of Consumption	Equity Weight
1	£7,500	2,529,000	£18,967,500,000	0.000133	3.46
2	£10,600	2,525,000	£26,765,000,000	0.000094	2.45
3	£13,400	2,530,000	£33,902,000,000	0.000075	1.93
4	£16,400	2,530,000	£41,492,000,000	0.000061	1.58
5	£19,800	2,529,000	£50,074,200,000	0.000051	1.31

[2] The hidden costs associated with installations were calculated by adapting the costs estimated in the ECOFYS report
[3] It is assumed that all heating measures are broken and households heat their properties to the national average internal temperature using electric radiators indefinitely (so savings are assumed for the lifetime of the measure).
[4] This will differ according to the measures being installed.
[5] Page 91 of the Green Book: http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

6	£23,700	2,525,000	£59,842,500,000	0.000042	1.09
7	£28,300	2,531,000	£71,627,300,000	0.000035	0.92
8	£34,100	2,532,000	£86,341,200,000	0.000029	0.76
9	£42,900	2,526,000	£108,365,400,000	0.000023	0.60
10	£62,500	2,532,000	£158,250,000,000	0.000016	0.41
Total		25,289,000	£655,627,100,000		

Average Income	£25,925
Average Marginal U	0.00004

Equity weighted energy bill benefit

The total reduction in energy bills as a result of a measure is calculated by multiplying the total amount of energy saved by the appropriate energy retail prices[6]. These benefits are then assumed to be spread across the income deciles for households that claim cold weather payments and child tax credits with incomes lower than £16,000. The table below demonstrates the spread across the different income groups of this assumption. The flows to each decile are then weighted with the appropriate equity weight and are summed to give the total equity benefit. The total un-weighted energy bill benefit is subsequently subtracted from the total benefit. This removes the value of the revenue loss to energy suppliers associated with reduction in energy bills of assisted households. The final figure represents the net equity impact of the energy bill reductions to recipient households.

Table A6.4: Spread of benefiting households across income deciles for an illustrative vulnerable group proxy

Income Deciles	Spread of CWP and CTC <£16k across deciles
1	0.15
2	0.23
3	0.22
4	0.2
5	0.11
6	0.05
7	0.02
8	0.01
9	0.01
10	0

Equity weighted hidden cost and comfort taken

The estimated hidden costs and comfort taken are distributed between income deciles according to the estimated split across deciles of eligible households (see table above). The benefits and costs accruing to each decile subsequently receive the relevant equity weight and are summed across income deciles to represent the total equity benefit or cost. The net equity impact is then gained by subtracting from these totals the un-weighted hidden cost and comfort taken respectively, to avoid double counting the benefit or cost in the NPV figures.

The net equity impact hence represents the additional value of the benefit or cost to the household over the un-weighted value included in the un-weighted NPV.

[6] For energy price estimates see: http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx

Annex 7 - Green Deal private affordability analysis – domestic insulation measures

346. This annex sets out an analysis of the private affordability of the insulation installations assumed under maximum technical potential scenario (see annex 4 for details), were they to be financed entirely through Green Deal finance, under several different interest rate scenarios. **This analysis does not describe likely take-up of the Green Deal, since it does not reflect the interaction of the energy company obligation, consumer preferences, and financial affordability together.**

347. The methodology for estimating these scenarios is as follows:

a. The opportunities described in the maximum feasible technical potential scenario are disaggregated by house type and number of bedrooms along with primary fuel into a number of categories, hereafter referred to as "situations".

b. Data from the English Housing Survey[7] is used to derive estimates of the number of homes and number offering opportunities for each measure, in each situation.

c. The proportion of homes suitable for each measure in each category is used to apportion the installations described in the technically feasible opportunities across all situations.

d. An estimated cost for each measure in each situation is derived using information on wall area, floor area and window area from the English Housing Survey. In combination with the assumptions provided in annex 4.

e. Energy savings for each measure in each situation are estimated using scaling factors used by Ofgem to award "carbon scores" to suppliers installing measures in different homes. Combined with the assumptions provided in annex 4.

f. For each measure in each situation, the maximum finance is calculated using estimated energy savings, energy prices, the assumed length of the finance term and one of several assumed interest rates.

g. In addition it is assumed that there is a notional "headroom" in the finance package, of £12 per year (£1 per month). So that marginal installations are assumed to provide some benefit, either as bill savings, or as comfort, which is otherwise excluded from this affordability analysis.

h. Comparing the costs to the maximum possible finance reveals which measures are not privately affordable at any given interest rate.

348. Table A7.1 describes the situations used in the disaggregate analysis[8]:

[7] 2008 English housing survey, see http://www.communities.gov.uk/housing/housingresearch/housingsurveys/englishhousingsurvey/

[8] Not every situation is applicable for each installation.

Table A7.1: List of situations used in disaggregate analysis of affordability

Situation	house type	bedrooms	fuel	Situation	house type	bedrooms	fuel
1	end terrace	1	gas	38	semi detached	2	solid fuel
2	end terrace	1	oil	39	semi detached	2	electrical
3	end terrace	1	solid fuel	40	semi detached	3	gas
4	end terrace	1	electrical	41	semi detached	3	oil
5	end terrace	2	gas	42	semi detached	3	solid fuel
6	end terrace	2	oil	43	semi detached	3	electrical
7	end terrace	2	solid fuel	44	semi detached	4+	gas
8	end terrace	2	electrical	45	semi detached	4+	oil
9	end terrace	3	gas	46	semi detached	4+	solid fuel
10	end terrace	3	oil	47	semi detached	4+	electrical
11	end terrace	3	solid fuel	48	detached	1	gas
12	end terrace	3	electrical	49	detached	1	oil
13	end terrace	4+	gas	50	detached	1	electrical
14	end terrace	4+	oil	51	detached	2	gas
15	end terrace	4+	electrical	52	detached	2	oil
16	mid terrace	1	gas	53	detached	2	solid fuel
17	mid terrace	1	oil	54	detached	2	electrical
18	mid terrace	1	solid fuel	55	detached	3	gas
19	mid terrace	1	electrical	56	detached	3	oil
20	mid terrace	2	gas	57	detached	3	solid fuel
21	mid terrace	2	oil	58	detached	3	electrical
22	mid terrace	2	solid fuel	59	detached	4+	gas
23	mid terrace	2	electrical	60	detached	4+	oil
24	mid terrace	3	gas	61	detached	4+	solid fuel
25	mid terrace	3	oil	62	detached	4+	electrical
26	mid terrace	3	solid fuel	63	flat	1	gas
27	mid terrace	3	electrical	64	flat	1	solid fuel
28	mid terrace	4+	gas	65	flat	1	electrical
29	mid terrace	4+	oil	66	flat	2	gas
30	mid terrace	4+	solid fuel	67	flat	2	solid fuel
31	mid terrace	4+	electrical	68	flat	2	electrical
32	semi detached	1	gas	69	flat	3	gas
33	semi detached	1	oil	70	flat	3	solid fuel
34	semi detached	1	solid fuel	71	flat	3	electrical
35	semi detached	1	electrical	72	flat	4+	gas
36	semi detached	2	gas	73	flat	4+	electrical
37	semi detached	2	oil				

349. Table A.7.2 lists the wall window and top floor sizes used to estimate the situation specific installation costs in combination with the fixed and variable cost assumptions in table A.7.3.

Table A.7.2: List of situations used in disaggregate analysis of affordability

Sit	house	beds	fuel	wall	loft	Sit	house	beds	fuel	wall	loft
1	end ter	1	gas	50	40	38	semi	2	solid	81	48
2	end ter	1	oil	63	41	39	semi	2	elec	63	48
3	end ter	1	solid	46	50	40	semi	3	gas	86	49
4	end ter	1	elec	51	32	41	semi	3	oil	101	61
5	end ter	2	gas	82	39	42	semi	3	solid	89	48
6	end ter	2	oil	93	57	43	semi	3	elec	92	51
7	end ter	2	solid	83	40	44	semi	4+	gas	112	71
8	end ter	2	elec	73	40	45	semi	4+	oil	135	108
9	end ter	3	gas	91	45	46	semi	4+	solid	110	81
10	end ter	3	oil	99	59	47	semi	4+	elec	117	65
11	end ter	3	solid	93	46	48	det	1	gas	84	54
12	end ter	3	elec	89	47	49	det	1	oil	60	24
13	end ter	4+	gas	121	65	50	det	1	elec	99	47
14	end ter	4+	oil	125	88	51	det	2	gas	85	75
15	end ter	4+	elec	93	49	52	det	2	oil	105	89
16	mid ter	1	gas	36	37	53	det	2	solid	95	65
17	mid ter	1	oil	32	52	54	det	2	elec	89	62
18	mid ter	1	solid	35	24	55	det	3	gas	119	72
19	mid ter	1	elec	38	32	56	det	3	oil	126	99
20	mid ter	2	gas	47	38	57	det	3	solid	144	88
21	mid ter	2	oil	50	71	58	det	3	elec	107	75
22	mid ter	2	solid	50	36	59	det	4+	gas	158	91
23	mid ter	2	elec	41	35	60	det	4+	oil	183	126
24	mid ter	3	gas	55	44	61	det	4+	solid	158	139
25	mid ter	3	oil	68	55	62	det	4+	elec	150	121
26	mid ter	3	solid	67	44	63	flat	1	gas	43	15
27	mid ter	3	elec	59	45	64	flat	1	solid	44	18
28	mid ter	4+	gas	74	60	65	flat	1	elec	33	8
29	mid ter	4+	oil	88	61	66	flat	2	gas	50	18
30	mid ter	4+	solid	77	60	67	flat	2	solid	53	31
31	mid ter	4+	elec	62	47	68	flat	2	elec	44	12
32	semi	1	gas	51	46	69	flat	3	gas	59	21
33	semi	1	oil	72	44	70	flat	3	solid	59	26
34	semi	1	solid	53	64	71	flat	3	elec	76	19
35	semi	1	elec	53	49	72	flat	4+	gas	89	41
36	semi	2	gas	69	49	73	flat	4+	elec	48	20
37	semi	2	oil	69	59						

350. Table A.7.3 lists the fixed and variable costs assumptions that have been used to estimate costs in each situation. These estimates are taken from the same sources as described in annex 4. The assumed repayment periods have also been included, these are shorter than the lifetimes of the measures used in the cost benefit analysis (listed in annex 4) as it is not expected that finance will extend over such long periods of time. Table A.7.4 describes the energy scaling factors taken from ofgem[9] that are applied to the energy savings for each measure in each situations.

[9] See http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=14&refer=Sustainability/Environment/EnergyEff/InfProjMngrs

Table A.7.3: Variations in assumptions surrounding installation costs

Fixed and variable installation and make good cost assumptions (£, 2010)		**CWI easy**	**Loft insul^{n} professional (from > 60mm)**	**External SWI**	**Internal SWI**	**Internal SWI – with major renovation**	**LA ESWI 3 bed semi**	**LA ESWI flat**	**External SWI – with major renovation**	**CWI hard**	**DIY loft >60mm**
low	cost per m^2	4	2	53	52	52	33	33	53	4	3
low	fixed	0	198	1520	0	0	960	960	1520	0	0
low	make good per m^2	0	0	0	0	0	0	0	0	0	0
low	make good fixed	0	0	3000	1000	0	750	495	0	1000	0
mid	cost per m^2	4	2	66	58	58	42	42	66	4	3
mid	fixed	0	198	1900	0	0	1200	1200	1900	0	0
mid	make good per m^2	0	0	0	0	0	0	0	0	0	0
mid	make good fixed	0	0	5000	2000	0	1500	990		1250	0
high	cost per m^2	4	2	83	64	64	52	52	83	4	3
high	fixed	0	198	2375	0	0	1500	1500	2375	0	0
high	make good per m^2	0	0	0	0	0	0	0	0	0	0
high	make good fixed	0	0	7000	3000	0	1950	1287		1500	0
Repayment period	years	25	15	25	25	25	25	25	25	25	15
m^2 value used		wall	loft	wall	wall	wall	wall	wall	wall	wall	loft

Table A.7.4: Variations in assumptions surrounding installation costs

Type	Beds	CWI easy	Loft insul^{n} professional (from > 60mm)	External SWI	Internal SWI	Internal SWI – with major renovation	LA ESWI 3 bed semi	LA ESWI flat	External SWI – with major renovation	CWI hard	DIY loft >60mm
End ter	**1**	0.853	0.716	0.853	0.853	0.853	0.853	0.853	0.853	0.853	0.716
End ter	**2**	0.853	0.716	0.853	0.853	0.853	0.853	0.853	0.853	0.853	0.716
End ter	**3**	0.955	0.898	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.898
End ter	**4**	0.955	0.898	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.898
Mid ter	**1**	0.486	0.663	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.663
Mid ter	**2**	0.486	0.663	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.663
Mid ter	**3**	0.544	0.831	0.544	0.544	0.544	0.544	0.544	0.544	0.544	0.831
Mid ter	**4**	0.544	0.831	0.544	0.544	0.544	0.544	0.544	0.544	0.544	0.831
semi	**1**	0.930	0.865	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.865
Semi	**2**	0.930	0.865	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.865
Semi	**3**	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Semi	**4**	1.071	1.146	1.071	1.071	1.071	1.071	1.071	1.071	1.071	1.146
Detached	**1**	1.517	1.070	1.517	1.517	1.517	1.517	1.517	1.517	1.517	1.070
Detached	**2**	1.517	1.070	1.517	1.517	1.517	1.517	1.517	1.517	1.517	1.070
Detached	**3**	1.631	1.236	1.631	1.631	1.631	1.631	1.631	1.631	1.631	1.236
Detached	**4**	1.751	1.427	1.751	1.751	1.751	1.751	1.751	1.751	1.751	1.427
Flat	**1**	0.381	0.886	0.381	0.381	0.381	0.381	0.381	0.381	0.381	0.886
Flat	**2**	0.459	1.286	0.459	0.459	0.459	0.459	0.459	0.459	0.459	1.286
Flat	**3**	0.555	1.876	0.555	0.555	0.555	0.555	0.555	0.555	0.555	1.876
Flat	**4**	0.555	1.876	0.555	0.555	0.555	0.555	0.555	0.555	0.555	1.876

Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2AW
www.decc.gov.uk

URN 11D/881