



Department  
of Energy &  
Climate Change

# The Future of the Energy Company Obligation: Assessment of Impacts

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# 1. Introduction

- 1.1. This assessment of impacts accompanies the government's consultation on a number of proposed changes to the current Energy Company Obligation (ECO) regulations and the level of ECO targets for the two year period to 31 March 2017. It provides our early assessment of the impact of the package of policy measures described in the government's consultation document ("The Future of the Energy Company Obligation") compared to a Business as Usual (BAU) scenario (described in 'Policy options consulted on' section). We intend to complete a full Impact Assessment (IA) as part of the Government's response to the consultation.
- 1.2. The majority of the individual measures in this package are deregulatory, with the remaining measures being cost neutral. The package includes some provisions to ensure that the overall deregulatory impact does not have disproportionate effects on certain sectors, and other provisions to better align part of the scheme with the original policy intent.
- 1.3. The document is structured as follows:
  - **Rationale for intervention;**
  - **Description of the current policy framework and the policy options consulted on;**
  - **Impact analysis** of the policy options on uptake of measures, carbon savings, employment, and households supported;
  - Analysis of the estimated cost to suppliers of delivering the obligations, and the monetised **benefits** associated with them;
  - A detailed **description of the Green Deal Household Model and the Affordable Warmth Model** used in the analysis; and
  - **Annexes** which provide a detailed background on some of the aspects of the analysis.

# 2. Rationale for intervention

- 2.1. The ECO is a key government policy to improve energy efficiency in the domestic sector. By improving energy efficiency, it contributes to reducing Greenhouse Gas emissions, improving energy security, mitigating fuel poverty, increasing productivity and reducing the costs of meeting the UK's renewable energy targets. A detailed assessment of the objectives supported by improved energy efficiency and the rationale for government intervention were provided in the 2012 Final Stage IA for the Green Deal

and ECO.<sup>1</sup> The arguments presented in that IA remain valid for the next phase of ECO targets and are therefore not repeated in this assessment.

- 2.2. The overarching rationale for intervention to amend the current ECO policy framework is to reduce the pressure on consumer energy bills and to improve the operation of ECO in light of evidence on the operation of the scheme over its first year. Early market evidence on ECO costs suggest that delivery costs are around £1.4bn p.a., which is higher than what we estimated in the 2012 IA (£1.3bn p.a. on average).<sup>2</sup> Further, the obligated energy companies have raised concerns that ECO delivery costs will rise over time as they approach the current 31 March 2015 ECO target, particularly as Hard To Treat Cavity Wall Insulation (HTT CWI) opportunities become scarce. Given these concerns, the government is consulting on measures designed to provide relief to households' domestic energy bills in the short term whilst not compromising on long-term climate change targets through setting ECO targets in legislation for a further two years to 31 March 2017. Some of the measures in the package consulted on will reduce the size of the obligated targets, whilst others will ensure that the unit cost of complying with these targets are lower than those under the current set of policy rules.
- 2.3. The intended effect of the proposed changes to the two carbon targets (the Carbon Saving Communities Obligation (CSCO, with a Rural Safeguard) and the Carbon Emission Reduction Obligation (CERO)) is to reduce the cost to suppliers of delivering these targets. This, in turn, is intended to deliver the government's commitment to reduce the cost of policies on domestic consumers' energy bills, as announced 2 December 2013.<sup>3</sup> The intended impacts and trade-offs associated with the individual measures of the package are summarised below.
- 2.4. **Changes to CERO.** Cutting the current CERO target in legislation by 33 % aims to reduce directly the cost to suppliers of delivering this obligation. The reduced level of CERO activity will, however, imply reduced uptake of energy efficiency measures with associated impacts on energy and carbon savings and the energy efficiency market more broadly. Extending the list of eligible measures should also reduce the cost of delivery (see Annex C for details). A Solid Wall Insulation (SWI) minimum will be introduced to provide the market with certainty of a minimum level of demand for SWI. It could mitigate any negative impact on SWI delivery of the other measures in the package.
- 2.5. Two other changes to CERO seek to further reduce delivery costs. The primary purpose of the uplifted score for early CERO delivery is to mitigate any adverse impact of the changes to CERO on those suppliers who delivered a significant amount of ECO compliance in the current high CERO abatement cost environment where Easy to Treat Cavity Wall Insulation (ETT CWI) Loft Insulation (LI) and District Heating Systems (DHS) are not eligible as primary measures. The uplifted score could reduce the amount of abatement required and therefore lower ECO delivery costs. Further, suppliers that over-delivered under previous obligation schemes (the Carbon Emissions Reduction Target (CERT) and Community Energy Saving Programme (CESP)) will be credited all their

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<sup>1</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/42984/5533-final-stage-impact-assessment-for-the-green-deal-a.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42984/5533-final-stage-impact-assessment-for-the-green-deal-a.pdf)

<sup>2</sup> Domestic Green Deal, Energy Company Obligation and Insulation Levels in Great Britain, Quarterly report [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/267963/Quarterly\\_Statistical\\_Release\\_-\\_GD\\_ECO\\_and\\_insulation\\_levels\\_in\\_Great\\_Britain\\_-\\_19\\_December\\_2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267963/Quarterly_Statistical_Release_-_GD_ECO_and_insulation_levels_in_Great_Britain_-_19_December_2013.pdf)

<sup>3</sup> <https://www.gov.uk/government/news/govt-action-to-help-hardworking-people-with-energy-bills>

over-delivery which can be carried forward to their ECO targets (this could impact both CERO and CSCO delivery costs). Both of these measures could, however, result in reduced ECO activity with the associated drawbacks described above.

- 2.6. Replacing an uncertain fine for non-compliance with CERO targets to 31 March 2015 with a rule based system provides the obligated suppliers with more flexibility in their delivery trajectories, and an incentive to avoid a cliff-edge in CERO activity during the period to 31 March 2015. It also provides government with certainty that any loss of abatement from CERO under-delivery will be compensated with higher energy efficiency delivery in the next target period.
- 2.7. **Changes to CSCO.** Extending the CSCO eligible areas and removing the benefit requirement of the Rural Safeguard increase flexibility for suppliers to deliver their obligations, and should therefore reduce search and delivery costs. These measures could, however, lead to a lower level of support for fuel poor households given that a less stringent threshold of area deprivation would be used.
- 2.8. **Changes to Affordable Warmth (AW).** There are two reasons why we are making changes to AW. The first is to increase the number of non-gas fuelled households who benefit from the policy. This is because these households have received less than 2 per cent of measures delivered to date under the policy, despite this group being more vulnerable to fuel poverty than gas fuelled households.<sup>4</sup> Therefore, as one of the government's flagship fuel poverty policies, changes are proposed to increase the policy's ability to support these households. These changes are therefore proposed on distributional grounds. The specific proposals to reach this aim are 1) to uplift the AW score achieved by non-gas fuelled households, and 2) to allow electric storage heaters to count as a 'qualifying boiler' which would effectively lead to a further increase in the AW score from the replacement of these measures.
- 2.9. The second reason for the proposed changes is to ensure there is adequate customer protection in all installations delivered under the policy. Delivery evidence to date shows that this is not always the case and, given that vulnerable households are the target group of the policy, it is the government's intention to ensure this quality of installation is guaranteed. We therefore propose to require that a warranty is included with the delivery of all boiler replacements. The details of this warranty are subject to consultation views.
- 2.10. The government is also seeking views on a number of other potential changes to the current ECO regulations. These are policy options for which specific proposals have not been formulated at this stage, but which the government is seeking evidence on and views of through consultation. Two of these proposals in particular could have an impact on ECO target levels or the cost of delivering these. Firstly, the government is seeking views on whether measures funded through ECO should be recommended on the basis of a Green Deal Advice Report (GDAR) and restrict the use of Chartered Surveyors Report to 'exceptional circumstances' only (whereby the use of GDAR would be inappropriate and/or too costly). Secondly, the government is seeking views on whether a proportion of the delivery of LI and ETT CWI under CERO should be directed at vulnerable and low income households. See Annex C for rationale and a qualitative assessment of the impact of these proposals, and the 'Modelling the policy package' section for the approach taken on these measures in our modelling.

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<sup>4</sup> See:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/211137/fuel\\_poverty\\_strategic\\_framework\\_analytical\\_annex.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211137/fuel_poverty_strategic_framework_analytical_annex.pdf)

## 3. Description of policies

### Current framework

- 3.1. The ECO places an obligation on energy suppliers to deliver heating and energy efficiency measures to domestic energy users.<sup>5</sup> The current ECO consists of three separate targets which energy suppliers are required to meet by 31 March 2015 (estimated annual cost to suppliers in 2011 prices, from 2012 IA):
- **The CERO target (c.£760m p.a.):** 20.9 MtCO<sub>2</sub> lifetime savings from the installation of HTT CWI or SWI, or other insulation measures packaged with these two primary measures;<sup>6</sup>
  - **The CSCO target (c. £190m p.a.):** 6.8 MtCO<sub>2</sub> lifetime savings from installation of a wider list of insulation measures to low income areas (households in the 15% lowest Index of Multiple Deprivation (IMD) areas).
    - **CSCO Rural Safeguard:** at least 15 % of the CSCO target must be achieved by promoting measures to households on AW benefits (see definition below) in rural areas.
  - **The AW target (c. £350m p.a.):** £4.2bn reduction in lifetime notional space and water heating costs through the installation of insulation measures or heating technologies. Only privately rented or owned households on certain benefits are eligible.<sup>7</sup>
- 3.2. The current ECO targets in legislation are for the period 1 January 2013 to 31 March 2015. In introducing the original phase of ECO beginning from 1 January 2013, the government agreed, and made clear in the consultation process, that it expected ECO to continue at a broadly similar level of ambition until at least the end of 2022. This approach underpinned Ministerial decisions leading to the 2 December 2013 announcement. In the 2012 IA, government assumed that all three ECO targets would continue at their current level of ambition for the full 10 year period. The ECO target ambition after 31 March 2015 was assumed to be set at the amount of carbon and heating cost savings that could be achieved at an estimated annual average delivery cost to energy suppliers of around £1.3bn on average (in 2011 prices).<sup>8</sup>

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<sup>5</sup> Only suppliers that have more than 250,000 domestic customer accounts and supply more than certain specified amounts of electricity or gas are eligible.

<sup>6</sup> A full list of the current primary and secondary measures under the ECO obligations is available here: <https://www.ofgem.gov.uk/ofgem-publications/83100/ecomeasurestable03102013.pdf>

<sup>7</sup> These include those on certain elements of working tax credit under a household income of £15,860 and those in receipt of qualifying means tested benefits with children aged 19 years or under full time education. See the ECO 2012 order for further details:

[http://www.legislation.gov.uk/ukxi/2012/3018/pdfs/ukxi\\_20123018\\_en.pdf](http://www.legislation.gov.uk/ukxi/2012/3018/pdfs/ukxi_20123018_en.pdf)

<sup>8</sup> Due to the upwards sloping nature of the Marginal Abatement Cost Curve, the estimated carbon and heating costs savings from a fixed level of spend reduces over time.



## Policy options consulted on

### Option 1: Do nothing (BAU)

- 3.3. Under the BAU scenario, the carbon and heating cost reduction targets to 31 March 2015 and the ECO target eligibility remain as described in paragraph 3.1 and the 2012 IA.<sup>9</sup> In the updated BAU scenario, the cost of delivering the ECO targets for the period to 31 March 2015 is around £1.4bn p.a. This estimate of annual average costs is higher than what was estimated in the 2012 IA. This is primarily because the updated modelling takes into account early market evidence on ECO costs which suggests higher ECO unit delivery costs than estimated in the 2012 IA for the ECO carbon targets (see paragraph 5.2 for details).<sup>10</sup>
- 3.4. ECO targets for the period 1 April 2015 to 31 March 2017 are assumed to be set at a level of estimated annual cost to the energy suppliers of around £1.3bn per annum on average (allocated £950m in total for the two carbon saving targets and £350m for AW, in 2011 prices). The level of ECO carbon reduction ambition set for the period from 1 April 2015 is lower than that estimated in the 2012 IA, partly because the updated modelling takes into account the early market evidence on costs and partly because we assume there is less low-cost ETT CWI potential available.<sup>11</sup>

### Option 2:

- 3.5. A package of measures is introduced which impacts both the carbon targets currently in legislation to 31 March 2015 and the next set of ECO targets for the two year period to 31 March 2017. The policy changes in the period to 31 March 2017 could have an impact on future target periods through changing the technical potential of ECO eligible measures that remains for future years. Changes that reduce the target ambition in the period to 2017, for example, would leave a larger amount of cost-effective technical potential for future target periods. This implies that a greater target ambition in future years could be achieved for a given level of spend.
- 3.6. Our modelling of Option 2 does not include a safeguard to ensure that a certain proportion of ETT CWI and LI measures under the CERO target are delivered to low income households. This is because the government does not at present have specific proposals on what this safeguard (which is proposed for the target period to 31 March 2017) could be, or what level a specific proportion should be set at. See Annex C for a qualitative assessment of the impact that this measure could have. Our modelling of the carbon targets under BAU and Option 2 assumes that all measures are taken up with a

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<sup>9</sup> The projected mix of measures taken up under BAU in this assessment differs from that presented in the central scenario in the 2012 IA. This is due to updates to the models used and underlying key assumptions as fuel costs, measures' energy savings and costs, and the administrative costs of delivering ECO.

<sup>10</sup> The increased cost also reflects revised assumptions on abatement potential and the installation cost of measures.

<sup>11</sup> For the 2012 consultation, DECC set ECO targets based on what we estimated the energy companies can deliver for a given amount of ECO spending (by the companies). This is the approach taken under BAU also for this assessment. Our updated modelling for this assessment of the carbon targets currently in legislation suggests that the cost of meeting these carbon targets are lower than what early market evidence on delivery costs shows. Our modelling is therefore calibrated to the market evidence on delivery costs. This calibration increases the estimated delivery costs per unit of carbon target abatement (£/tCO<sub>2</sub> lifetime). Compared to the previous IA, therefore, our updated analysis suggests that total cost of delivering the ECO targets currently in legislation (targets for the 2.25 year period to 31 March 2015) is greater than £1.3 bn p.a. A higher carbon target unit cost also implies that a given amount of ECO spend per annum from 1 April 2015 (£1.3 bn overall, £760 m for the carbon targets) results in a lower level of carbon targets, and therefore that the estimate targets for the two year period to 31 March 2017 in this assessment is lower than what the equivalent target would have been estimated at in the 2012 IA.

GDAR. However, our modelling of the AW targets (under either option) does not include the cost of a GDAR. If the GDAR policy measure is to be implemented for AW, it would not affect our estimated AW delivery costs as any increase in the unit cost for AW would be compensated for by a reduction in the AW target (see Annex C for details).

- 3.7. The AW policy changes take effect from 1 April 2015 and are assumed to apply throughout the target period, but the targets will continue to be set based on an annual cost to the suppliers of around £350 m p.a. in 2011 prices (£365 m p.a. in 2013 prices).
- 3.8. Table 1 below shows a summary of the individual measures that comprise the package under Option 2 which have been modelled for this assessment. It also provides a brief description of the impact of the measures when these are considered in isolation. Annex C provides further details of the estimated impact of the individual measures, and the 'Modelling the policy package' section explains how the policy package as a whole has been modelled for the purpose of this assessment. An assessment of the aggregate impact of the package of measures is provided in section the 'Impact analysis' section.

| Policy measure   | Summary of impact  |
|--|--|
| <b><i>2 December announcement package of carbon target measures<sup>12</sup></i></b>   |  |
| <b>33 % cut to 31 March 2015 CERO target, target for the two years to 31 March 2017 will be based on a pro-rata of CERO market activity in the period to 31 March 2015</b> | Directly reduces the size of the CERO target to 31 March 2015 by 33 % (from 20.9 MtCO <sub>2</sub> to 14 MtCO <sub>2</sub> ) and therefore directly reduces delivery costs. For the purpose of the analysis, targets for the two year period to 31 March 2017 are assumed to be set on a pro-rata level of the 14 MtCO <sub>2</sub> target, so that the target for the two year period to 31 March 2017 is 12.4 MtCO <sub>2</sub> . <sup>13</sup>            |
| <b>Extended list of primary measures eligible under CERO</b>   | Suppliers can deliver ETT CWI, LI and DHS in addition to SWI and HTT CWI. This increases the flexibility for suppliers to deliver the CERO target and should reduce delivery costs. <sup>14</sup>  |
| <b>Maximising carry forward of CERT CESP</b>   | Suppliers that over-delivered under previous obligation schemes will be credited a greater volume of over-delivery that can be carried forward to their 31 March 2015 ECO targets.   |
| <b>Uplifted scores for early CERO delivery</b>   | Directly reduces the size of the CERO target for companies that meet certain criteria. Suppliers that have delivered more than a certain amount of their Phase 1 and Phase 2 <sup>15</sup> CERO targets (before 33 % reduction and any CERT/CESP carry forward) by the end of March 2014 will receive a higher score for each unit of compliance above the threshold amount. These uplifted amounts will count towards their allocated 31 March 2015 target. |
| <b>Removing CERO 31 March 2015 hard target (targets to 31 March 2017 uplifted in case of under-delivery)</b>   | Increases flexibility for suppliers to deliver their CERO target between the 31 March 2015 and 31 March 2017 target periods. Companies that under-deliver on their CERO targets to 31 March 2015 will not be subject to enforcement actions  |

<sup>12</sup> The package of measures and the parameters in the individual measures were decided through a process of negotiation with the energy companies.

<sup>13</sup> Calculated as: (14MtCO<sub>2</sub>/2.25 years) \* 2 years = 12.4 MtCO<sub>2</sub>

<sup>14</sup> Our modelling of Option 2 does not include DHS (see paragraph 3.12 for details).

<sup>15</sup> 20 % of the ECO targets were allocated in Phase 1, 40 % in Phase 2, the remaining 40 % will be allocated in Phase 3. See the ECO order for details

[http://www.legislation.gov.uk/uksi/2012/3018/pdfs/uksi\\_20123018\\_en.pdf](http://www.legislation.gov.uk/uksi/2012/3018/pdfs/uksi_20123018_en.pdf)

|   |  |
|---|--|
|   | (potential fines), but would see their allocated CERO target for the two year period to 31 March 2017 increased by 1.1 times its shortfall of delivery against their March 2015 targets. This replaces an uncertain but potentially very large fine with a clear rules-based system allowing more flexibility for obligated parties and an incentive to maintain insulation activity during the period to 31 March 2015. |
| <b>CSCO eligible areas extended from the 15 % to the 25 % most deprived areas in the country<sup>16</sup></b> | The number of CSCO eligible households increases from approximately 3.9 million to approximately 6.5 million. This increases flexibility for suppliers to deliver the CSCO targets which should reduce their delivery costs.   |
| <b>Removing benefit requirement of the Rural Safeguard</b>  | Increases the flexibility for suppliers to deliver the Rural Safeguard target which could reduce their cost of delivery. We estimate that this could expand the number of eligible households from around 600,000 to around 1.3 million.   |
| <b>SWI minimum</b>  | Suppliers must deliver 100,000 SWI (or the carbon equivalent of 4 MtCO <sub>2</sub> ) between 1 January 2013 and 31 March 2017. The target is set at a level below the expected SWI delivery under BAU.  |
| <b>AW measures</b>  |  |
| <b>Incentivise off-grid delivery</b>  | Higher AW scores to suppliers delivering measures to off-gas grid homes. The reduction in the estimated cost of delivery is offset by increasing the size of the target.   |
| <b>Requirement of warranties for boiler replacement (from April 2015)</b>                                     | The size of the target is set based on the estimated cost of the policy being £350m (in 2011 prices). Therefore the increase in the unit cost of delivery from requiring a warranty with a boiler replacement leads to a reduction in the estimated amount of notional bill savings that can be delivered for a fixed budget. The target is decreased as a result.   |

**Table 1: Summary of proposed policy measures under Option 2**

- 3.9. A full assessment of the impact of the measures above and the other less specific proposals the government is seeking views on through consultation will be undertaken in the final assessment for the government's response to the consultation. We welcome evidence from consultees from the likely impact of the individual measures, and the package as a whole, to inform our final assessment.
- 3.10. **Option 2 is the Government's preferred option.** It enables the Government to realise its intention to reduce the cost of ECO, which is assumed to be passed through to consumer bills (see Table 13 and Table 14 for details on the estimated cost of ECO under BAU and Option 2). Although Option 2 delivers fewer carbon savings in the current ECO period, it does so at lower cost per tonne of carbon abated. The ability to deliver measures in future ECO periods more cost effectively within a given spending envelope means that carbon losses are reduced in future periods. The opportunity cost of this option compared to BAU is a less developed market in delivering hard to treat measures, such as SWI; costs of installing SWI could be expected to fall less steeply in Option 2 as a result.
- 3.11. There are great uncertainties associated with estimating the impact of the package of measures at this stage. This is because the impact depends in part on the obligated

<sup>16</sup> As under BAU, up to 25 % of the obligation can be delivered in adjacent areas.

suppliers' commercial decisions about trajectories for compliance (which will determine the extent of the impact of the up-lift mechanism in particular) and whether they choose to fully subsidise measures or leverage Green Deal finance or other sources of finance to cover the cost of measures. Furthermore, the final pro-rata methodology for setting carbon targets for the two year period to 31 March 2017 will have a significant impact on the target levels themselves and the associated impact of the ECO package. The estimated target levels presented in this analysis, and their associated impact, should therefore be interpreted with caution at this consultation stage. The government's consultation proposition, used for the purpose of the analysis, is that the carbon targets will be set on a pro-rata level for CERO and CSCO (in terms of carbon targets) in the period to 31 March 2015.

- 3.12. Further, we have not been able to fully capture all aspects of the proposed measures under Option 2 which could reduce ECO delivery costs due to modelling restrictions. In particular, our modelling predicts that more SWI than the 100,000 minimum would be delivered under Option 2. This does not reflect our expectation, as we assume that SWI is the most expensive source of carbon abatement. This predicted over-delivery of SWI could imply that the estimated cost under Option 2 is (everything else being equal) greater than the actual costs. Similarly, we are not able to model DHS measures at this stage. Our estimated ECO cost under Option 2 therefore does not reflect the ECO delivery cost reductions associated with giving suppliers the option to deliver DHS measures. We will be updating the analysis for the final assessment based on evidence received through consultation and further developments to the modelling tools used in this assessment.
- 3.13. The exact impact on ECO costs to the obligated suppliers, and therefore on the costs that are assumed to be passed through to energy bills, will depend on the final detailed policy package and how it is implemented. Early indications from energy suppliers of how they will respond to the announced policy package suggest that the proposed changes to the ECO carbon targets could result in an average reduction in energy bills of £30-£35 (before VAT) in 2014 (see 'Cost of the ECO targets' section for details).<sup>17</sup> Furthermore, the proposed changes to AW are expected to improve the policy's ability to reduce fuel poverty given that the proposed changes incentivise delivery to target households most at risk of being in fuel poverty i.e. non-gas fuelled households. Our early modelled assessment of the impact on costs of ECO under BAU and Option 2 is provided in the 'Delivery cost' section.
- 3.14. Our preliminary estimates of the target levels for the 2.25-year ECO target period to 31 March 2015 and the subsequent two year target period to 31 March 2017, under BAU and Option 2, are set out in Table 2 below. It shows that the total ECO target in the period to 31 March 2017 is lower under Option 2 than under BAU. The level of the targets for the two year period to 31 March 2017 will depend on the final pro-rata methodology for estimating the carbon targets.
- 3.15. The lower ECO target under Option 2 between 1 January 2013 and 31 March 2015 is driven by the 33 % reduction to CERO. Other policy measures under Option 2 widen the ECO eligibility criteria<sup>18</sup> and further reduce the actual amount of abatement required

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<sup>17</sup> The government estimated that an energy bill rebate could save the average customer £12 on their annual energy bill for the next two years and a one-off reduction to electricity network costs could further reduce bills by around £5, meaning that the total impact of the measures announced on 2 December would be a saving of around £50 on energy bills. See 2013 Autumn Statement [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/263942/35062\\_Autumn\\_Statement\\_2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263942/35062_Autumn_Statement_2013.pdf)

<sup>18</sup> These are the extended range of CERO eligible technologies and the increased CSCO eligibility criteria.

during this period to comply with the targets in legislation.<sup>19</sup> All these changes not only reduce the total delivery costs under Option 2 relative to BAU, but also the cost per tonne of carbon abated. The effect of reducing the costs of delivering insulation measures, coupled with less abatement up to 31 March 2015, means that the cost of delivering insulation between 1 April 2015 and 31 March 2017 is significantly lower for CERO under option 2 than under the BAU (see tables 13 and 14 for details on estimated ECO delivery costs under BAU and option 2).

|                                      | <b>Option 1: BAU</b>  |   |
|--------------------------------------|---|---|
|                                      | <b>1 Jan'13 to 31 Mar'15</b>  | <b>1 Apr'15 to 31 Mar'17</b>                  |
| <b>Carbon Target (CERO and CSCO)</b> | 27.7 MtCO <sub>2</sub> lifetime <i>(before impact of excess actions)</i> <sup>20</sup>                  | 20.8 MtCO <sub>2</sub> lifetime               |
| <b>AW</b>                            | £4.2bn lifetime heating savings   | £3.8bn lifetime heating savings               |
|                                      | <b>Option 2</b>   |   |
| <b>Carbon Target (CERO and CSCO)</b> | 20.8 MtCO <sub>2</sub> lifetime <i>(before impact of excess actions and levelisation)</i> <sup>21</sup> | 18.5 MtCO <sub>2</sub> lifetime               |
| <b>AW</b>                            | As BAU  | £3.8bn lifetime heating savings <sup>22</sup> |

**Table 2: ECO target levels consulted on**

## 4. Impact analysis

- 4.1. This section sets out the preliminary assessment of the impact of the central policy package under Option 2 and compares this to the BAU scenario (Option 1) in the target period from 1 January 2013 to 31 March 2017. The model used in this assessment estimates uptake of measures based on remaining insulation potential, the level of ECO subsidy and the willingness of households to take up these measures. There are great uncertainties related to the actual impact of the policy package, and we have therefore undertaken a range of sensitivities around the preferred option (Option 2) to assess the impact of these in terms of carbon target delivery costs. There are also uncertainties associated with the impact of the novel mechanisms in Option 2, as unknown parameters such as the companies' trajectories for compliance will determine the impact

<sup>19</sup> These are the CERT/CESP excess actions measure and the CERO early delivery up-lift mechanism.

<sup>20</sup> The actual carbon target that suppliers will have to meet will be lower than that set in legislation due to the effects of excess actions from CERT/CESP.

<sup>21</sup> As under BAU, the actual targets that suppliers will have to meet will be lower than that set in legislation due to the effects of excess actions from CERT/CESP. Under Option 2, there will be a further impact on actual CERO targets from the levelisation mechanism, as well as additional carry-forward from their excess actions under CERT/CESP.

<sup>22</sup> The proposed target for AW with policy changes is the same as that estimated in the BAU. However this is not by design but instead a product of the marginal costs and savings from all the proposed policy changes cancelling each other out.



of these mechanisms on the ECO package (see section 'Modelling the policy package' section for details).

- 4.2. The analysis presents the gross impact of BAU Option 1 and Option 2, which includes the costs and benefits of a modest number of measures assumed to be taken up under a counterfactual scenario of no ECO. The total number of measures, households and jobs supported, carbon savings and monetised costs and benefits would all be lower if counterfactual uptake was netted off the two Options. The adjustment would not affect the ECO target levels or the estimated costs to energy suppliers of delivering the targets. The final assessment will present the impact of ECO with the counterfactual impact netted off.

## Uptake of measures

- 4.3. The analysis suggests that around 120,000 SWI, 900,000 CWI and 600,000 LI would be taken up under Option 2 up to the end of March 2017. The uptake of ETT CWI is around 100,000 (51 %) greater than BAU driven by the proposed policy change under Option 2 to allow ETT CWI to be delivered as a primary measure under CERO. Uptake of HTT CWI is around 600,000 lower under Option 2 to the end of March 2017, whilst SWI uptake is only around 14,000 lower because SWI uptake is safeguarded by the SWI minimum. The lower uptake of HTT measures under Option 2 also leads to lower uptake of LI under Option 2, because the vast majority of LI is assumed to be taken up alongside HTT measures. The reduction in HTT measures is partly due to the change to the mix of measures eligible under CERO but also to the 33 % cut to the CERO target level under Option 2. The number of heating measures delivered is estimated to increase under Option 2. This is driven by the uplift proposed for AW heating measures to non-gas fuelled households making them more cost effective in meeting the AW target.
- 4.4. Our modelling predicts that SWI delivery under Option 2 exceeds the 100,000 SWI minimum. In reality, the market is unlikely to deliver more than the minimum because SWIs are assumed to be the most expensive sources of abatement available to suppliers. If the market delivers fewer SWI than our modelling predicts, then our estimated cost of delivering the ECO carbon targets (everything else being equal) would be lower than what we have estimated in this assessment. The higher SWI uptake is predicted in our modelling due to an artefact in how the carbon targets are modelled, which we will seek to address for the final assessment.<sup>23</sup>
- 4.5. Our modelling also predicts that a large share of total SWI uptake will be internal SWI. This is because we assume that the total cost of an average external SWI is greater than that of an internal SWI, even when taking into account our assumption that the 'hidden cost' of an internal SWI is almost £10,000 greater than the hidden cost of an external SWI. However, statistics on early ECO delivery up to the end of November 2013 suggests that the vast majority of SWI uptake under ECO was external SWI.<sup>24</sup> We

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<sup>23</sup> The modelling artefact arises from our modelling assumption about how the SWI minimum will be delivered across the CERO and CSCO. In our modelling, SWI delivery is divided across CERO and CSCO according to historic delivery between these two targets. However, the changes we are consulting on affect the relative cost effectiveness of SWI delivery between the two targets. In our modelling, this results in SWI delivery in the CSCO which is more than the 'allocated' CSCO share of the 100,000 SWIs delivery we are targeting. This over-delivery in the CSCO target more than compensate for a 'lower than allocated' CERO share of the minimum projected to be delivered under CERO, which results in a total SWI delivery greater than 100,000. We will review our modelling assumption about the balance of SWI delivery for the final assessment.

<sup>24</sup> 97 % of SWIs delivered under ECO to the end of November 2013 were external SWIs. See: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/273805/Statistics](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/273805/Statistics)

welcome evidence from consultees on what factors are driving the difference between actual versus predicted uptake of SWIs, and whether the currently observed split between internal and external SWI delivery is likely to change over time.

|                                | <b>Option 1: BAU</b>                           |                |                |                     |                     |
|--------------------------------|--|----------------|----------------|---------------------|---------------------|
|                                | <b>LI (stand alone and as part of package)</b> | <b>ETT CWI</b> | <b>HTT CWI</b> | <b>Internal SWI</b> | <b>External SWI</b> |
| <b>1 Jan'13 – 31 Mar'14</b>    | 162,000  | 50,000         | 130,000        | -                   | 27,000              |
| <b>1 Apr'14 – 31 Mar'15</b>    | 193,000  | 58,000         | 472,000        | 26,000              | 17,000              |
| <b>1 Apr'15– 31 Mar'17</b>     | 272,000  | 89,000         | 612,000        | 37,000              | 28,000              |
| <b>Cumulative to 31 Mar'17</b> | 627,000  | 197,000        | 1,214,000      | 63,000              | 73,000              |
|                                | <b>Option 2</b>                                |                |                |                     |                     |
|                                | <b>LI (stand alone and as part of package)</b> | <b>ETT CWI</b> | <b>HTT CWI</b> | <b>Internal SWI</b> | <b>External SWI</b> |
| <b>1 Jan'13 – 31 Mar'14</b>    | 162,000  | 50,000         | 130,000        | -                   | 27,000              |
| <b>1 Apr'14 – 31 Mar'15</b>    | 130,000  | 78,000         | 121,000        | 16,000              | 14,000              |
| <b>1 Apr'15– 31 Mar'17</b>     | 308,000  | 169,000        | 354,000        | 40,000              | 25,000              |
| <b>Cumulative to 31 Mar'17</b> | 599,000  | 296,000        | 605,000        | 56,000              | 65,000              |

**Table 3: Total uptake of measures under BAU and Option 2 (total across all three ECO targets)**

- 4.6. The following sections present our early assessment of the delivery of measure by tenure, house size and fuel type, and compare this with early ECO delivery statistics. We recognise that there is great uncertainty about what the actual distribution of measures will be, and also about the extent to which the early delivery statistics are illustrative of what the distribution of measures will be in later stages of the scheme. We welcome views and evidence from consultees on the robustness of our early assessment, in particular in those cases where our projections seemingly contradict the early delivery statistics.
- 4.7. Our analysis suggests that there is no significant difference in the proportion of measures delivered to different tenures under the carbon targets between BAU and Option 2. The majority (60 %) of total measures delivered under the carbon targets for the period 1 April 2014 to 31 March 2017 are predicted to be delivered in the Owner Occupied Sector. Delivery statistics on the provisional number of households benefiting from ECO measures up to 30 September 2013 suggest, however, that an even greater share (80 %) of ECO measures were delivered to the Owner Occupier tenure.<sup>25</sup>

[tical\\_Release\\_-\\_Green\\_Deal\\_and\\_Energy\\_Company\\_Obligation\\_in\\_Great\\_Britain\\_-\\_21\\_Jan\\_2014.pdf](#).

<sup>25</sup> Domestic Green Deal, Energy Company Obligation and Insulation Levels in Great Britain, Quarterly report [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/267963/Quart](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267963/Quart)

|   | Option1: BAU |             | Option 2    |             |
|---|--------------|-------------|-------------|-------------|
| <b>1 Jan'13 to 31 Mar'14 (ECO supported delivery only)<sup>26</sup></b> | <b>CERO</b>  | <b>CSCO</b> | <b>CERO</b> | <b>CSCO</b> |
| Owner-occupied  | 75 %         | 84 %        | 75 %        | 84 %        |
| Rented (private)  | 11 %         | 8 %         | 11 %        | 8 %         |
| Rented (social)   | 15 %         | 9 %         | 15 %        | 9 %         |
| <b>1 Apr'14 to 31 Mar'17</b>  | <b>CERO</b>  | <b>CSCO</b> | <b>CERO</b> | <b>CSCO</b> |
| Owner-occupied  | 76 %         | 27 %        | 66 %        | 32 %        |
| Rented (private)  | 1 %          | 1 %         | 1 %         | 1 %         |
| Rented (social)   | 23 %         | 72 %        | 32 %        | 66 %        |

**Table 4: Proportion of measures installed by tenure under BAU and Option 2 (CERO and CSCO targets)<sup>27</sup>**

4.8. The majority of measures delivered under the carbon target are predicted to be delivered to larger houses; around 30 % of all measures delivered under the carbon targets in the period 1 April 2014 to 31 March 2017 are projected to be delivered in detached houses.

|                                 | Option 1: BAU |             | Option 2    |             |
|---------------------------------|---------------|-------------|-------------|-------------|
| <b>01 Apr'14 to 31 Mar'17</b>   | <b>CERO</b>   | <b>CSCO</b> | <b>CERO</b> | <b>CSCO</b> |
| Detached house                  | 40 %          | 3 %         | 38 %        | 3 %         |
| Semi-detached or end-of-terrace | 47 %          | 30 %        | 45 %        | 29 %        |
| Mid-terrace                     | 6 %           | 9 %         | 7 %         | 11 %        |
| Flat                            | 6 %           | 57 %        | 10 %        | 56 %        |

**Table 5: Predicted proportion of measures installed by property type under BAU and Option 2 (CERO and CSCO targets)<sup>28</sup>**

4.9. Statistics on the provisional number of households in receipt of ECO measures by property type and ECO obligation broadly support our analysis; 83 % of households in receipt of measures lived in houses and 12 % in flats.<sup>29</sup>

| <b>% of main insulation measures delivered to 30 Sep' 13</b> | <b>CERO</b> | <b>CSCO</b> | <b>AW</b> |
|--|-------------|-------------|-----------|
| House  | 69 %        | 89 %        | 90 %      |
| Bungalow   | 3 %         | 3 %         | 5 %       |
| Flat   | 27 %        | 8 %         | 4 %       |
| Maisonette   | 1 %         | 0 %         | 0 %       |

**Table 6: Actual proportion of ECO measures installed by property type to end September 2013<sup>30</sup>**

[erly Statistical Release - GD ECO and insulation levels in Great Britain - 19 December 2013.pdf](#)

<sup>26</sup> These estimates are based on the reported delivery statistics of ECO supported measures (i.e. excluding measures taken up by Green Deal Finance only) to the end of September 2013. We have assumed that the proportion of delivery between tenures remains for the period to 31 Mar'14.

<sup>27</sup> The AW modelling does not split uptake by tenure.

<sup>28</sup> The AW modelling does not split uptake by house size.

<sup>29</sup> The remaining households were split between bungalows (4 %) and maisonettes (0.4 %).

<sup>30</sup> These estimates are based on the reported delivery statistics of ECO supported measures (i.e. excluding measures taken up by Green Deal Finance only).



- 4.10. Our modelling predicts that up to around 25 % of total measures delivered under the carbon targets will be delivered to houses that are heated by electricity. Our analysis is based on the assumption that, everything else being equal, the obligated suppliers should have a strong incentive to deliver measures to non-gas heated households. This is because a greater volume of carbon savings (and therefore ECO carbon target compliance units) will be realised from a unit of energy saving from properties heated by electricity or solid fuels compared to properties heated by gas.<sup>31</sup>

|  | BAU         |             | Option 2    |             |
|--|-------------|-------------|-------------|-------------|
| <b>1 Jan'13 to 31 Mar'14 (ECO supported delivery)<sup>32</sup></b> | <b>CERO</b> | <b>CSCO</b> | <b>CERO</b> | <b>CSCO</b> |
| Electricity  | 10 %        | 2 %         | 10 %        | 2 %         |
| Gas  | 88 %        | 97 %        | 88 %        | 97 %        |
| Solid fuels, Oil & Other   | 2 %         | 1 %         | 2 %         | 1 %         |
| <b>1 Apr'14 to 31 Mar'17</b>                                       | <b>CERO</b> | <b>CSCO</b> | <b>CERO</b> | <b>CSCO</b> |
| Electricity  | 12%         | 32%         | 19%         | 33%         |
| Gas  | 76%         | 62%         | 55%         | 60%         |
| Solid fuels, Oil & LPG   | 13%         | 6%          | 26%         | 8%          |

**Table 7: Proportion of measures installed by heating fuel under BAU and Option 2 (CERO and CSCO targets)**

- 4.11. ECO delivery statistics suggests that for ECO as a whole, only 4 % of measures delivered to the end of September 2013 were to houses with electricity as the main fuel type, and that the majority of measures (almost 95 %) were to gas-heated properties. The statistics do, however, show that measure delivery by fuel type varies between the carbon and AW targets. Under CERO, around 10 % of measures were to properties heated by electricity, whereas less than 2 % of measures delivered under AW were delivered to properties heated by non-gas fuels.<sup>33</sup>
- 4.12. This wide discrepancy so far between actual and predicted delivery to non-gas heated properties arises in part because our model assumes that more cost-effective measures will be delivered before less cost-effective measures and that the delivery of measures to electrically heated households is more cost-effective than in the equivalent gas-heated homes. Also, it is possible that the energy companies have continued to use existing delivery models from previous supplier obligations (e.g., CERT and CESP), which focused delivery efforts on parts of the country that lie on the gas grid. As the market develops, we would expect to see a rising concentration of electrically heated properties being treated, as they tend to be where the most cost effective savings lie.
- 4.13. For AW, we are proposing to incentivise delivery to non-gas fuelled households from 1 April 2015, primarily through uplifting the notional lifetime bill saving scores of these households. This is because non-gas fuelled households are more vulnerable to being in fuel poverty,<sup>34</sup> and delivery statistics to the end of September 2013 show that less than 2 % of delivery of AW measures have been delivered to these households. Table 8

<sup>31</sup> Other factors that would differentiate gas and non-gas heated households would influence the extent to which the market would target households. For example, there could be supply chain constraints associated with delivering measures to households that are off the domestic gas grid.

<sup>32</sup> These estimates are based on the reported delivery statistics of ECO supported measures (i.e. excluding measures taken up by Green Deal Finance only) to the end of September 2013. We have assumed that this proportion of delivery by fuel remains for the period to 31 Mar'14.

<sup>33</sup> These include electricity, oil, coal, District Heating Systems, Liquefied Petroleum Gas and renewables.

<sup>34</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/211137/fuel\\_poverty\\_strategic\\_framework\\_analytical\\_annex.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211137/fuel_poverty_strategic_framework_analytical_annex.pdf)

below highlights how the incentives to non-gas fuelled households are estimated to increase the proportion of measures reaching these households from 0 % to 12 %.

|                 | Time period             | Scenario                  | AW    |
|-----------------|-------------------------|---------------------------|-------|
| <b>Electric</b> | To 30 Sept '13          | N/A (delivery statistics) | 1 %   |
|                 | 1 Apr '15 to 31 Mar '17 | BAU                       | 0 %   |
|                 | 1 Apr '15 to 31 Mar '17 | Option 2                  | 7 %   |
| <b>Gas</b>      | To 30 Sept '13          | N/A (delivery statistics) | 98 %  |
|                 | 1 Apr '15 to 31 Mar '17 | BAU                       | 100 % |
|                 | 1 Apr '15 to 31 Mar '17 | Option 2                  | 88 %  |
| <b>Other</b>    | To 30 Sept '13          | N/A (delivery statistics) | 1 %   |
|                 | 1 Apr '15 to 31 Mar '17 | BAU                       | 0 %   |
|                 | 1 Apr '15 to 31 Mar '17 | Option 2                  | 5 %   |

**Table 8: Proportion of ECO measures installed by heating fuel: statistics to end September 2013 and projections for BAU and Option 2 (AW targets) <sup>35</sup>**

## Households supported

- 4.14. We estimate that around 0.9 million households would be supported under ECO to the end of March 2015 under Option 2, and that by 31 March 2017, a cumulative total of around 1.8 million households will be supported.
- 4.15. Our analysis suggests that, on average, around 270,000 low income and vulnerable households, or households in deprived areas, would be supported by AW and CSCO every year up to 1 April 2017 under Option 2. We also estimate that around a further 40,000 households in social housing are supported each year through CERO. In comparison to the BAU, the number of households assisted through AW and CSCO remains fairly constant.

| <b>Option 1: BAU</b>     | <b>CERO</b> | <b>CSCO</b> | <b>AW</b> | <b>Total</b> |
|--------------------------|-------------|-------------|-----------|--------------|
| 1 Jan'13 – 31 Mar'15     | 590,000     | 320,000     | 300,000   | 1,220,000    |
| 1 Apr'15 – 31 Mar'17     | 510,000     | 280,000     | 250,000   | 1,040,000    |
| Cumulative to 31 Mar 17  | 1,110,000   | 600,000     | 550,000   | 2,260,000    |
| <b>Option 2</b>          | <b>CERO</b> | <b>CSCO</b> | <b>AW</b> | <b>Total</b> |
| 1 Jan'13 – 31 Mar'15     | 270,000     | 310,000     | 300,000   | 890,000      |
| 1 Apr'15 – 31 Mar'17     | 390,000     | 290,000     | 250,000   | 930,000      |
| Cumulative to March 2017 | 660,000     | 600,000     | 560,000   | 1,820,000    |

**Table 9: Number of households benefitting by ECO target group: uptake of package of measures (including heating measures) for BAU and Option 2 (CERO, CSCO and AW)**

## Fuel Poverty impacts

- 4.16. The Fuel Poverty Strategic Framework's Analytical Annex presented for the first time a 'Marginal Alleviation Cost Curve' for fuel poverty.<sup>36</sup> This analysis highlighted which types

<sup>35</sup> The projections are reported from 1 April 2015 the proposed policy changes would take effect from then.

<sup>36</sup> See:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/211137/fuel\\_poverty\\_strategic\\_framework\\_analytical\\_annex.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211137/fuel_poverty_strategic_framework_analytical_annex.pdf)

of measures were the most cost effective means of reducing fuel poverty and this form of analysis is due to be updated in the forthcoming Fuel Poverty Draft Strategy. The results were clear in showing that lower cost insulation and conventional heating measures represented the most cost-effective means of tackling fuel poverty. Moreover, assistance directed to non-gas fuelled households represented particularly good value. This evidence highlights why ECO, and the proposed changes under option 2, are fundamental to tackling fuel poverty. Indeed the policy is designed to deliver precisely those measures which are the most cost-effective means of supporting the fuel poor, by beginning to align ECO delivery with the principles set out in the Strategic Framework work of prioritising those facing the most severe problem (often those with non-gas heating) and supporting them with cost-effective measures.

- 4.17. The marginal impacts of the proposed changes to ECO on fuel poverty in England by the end of 2016 are shown in Table 10. These results highlight that option 2 reduces fuel poverty in comparison to the BAU on all three metrics. These results are not the overall impact that ECO is expected have on fuel poverty in comparison to no policy at all, but – consistent with comparison of options throughout this Impact Assessment – shows the impact of the changes to the policy suggested for Option 2 in comparison to the BAU option. The positive impact of these proposed changes have occurred because 1) low income households are estimated to make up a greater proportion of those receiving assistance through ECO in Option 2 in comparison to BAU 2) AW now offers more support for those not only more likely to be in fuel poverty but also in deeper levels of fuel poverty (i.e. non-gas fuelled households) and 3) the lower cost of delivering the ECO leads to a reduction in gas and electricity prices under Option 2, which leads to a reduction in energy bills across all households in comparison to the BAU. The average fuel poverty gap is estimated to stay fairly constant between the two scenarios suggesting that, on average, people who are not moved out of fuel poverty experience broadly the same change in their energy bills as the median energy bill. These results only show the impacts on fuel poverty in England because Scotland and Wales adopt a different definition of fuel poverty (the ‘10 %’ definition) and therefore cannot be included in this analysis. However we would expect these changes to have broadly similar impacts on fuel poverty elsewhere in Great Britain under this alternative 10 % definition.

| <b>Fuel poverty indicator (Low Income High Cost (LIHC))</b> | <b>Impact of Option 2 compared to BAU</b> |
|---|---|
| Numbers of households in fuel poverty                       | - 32,000                                  |
| Aggregate fuel poverty gap                                  | - £18,000,000                             |
| Average fuel poverty gap                                    | - £1                                      |

**Table 10: Difference in fuel poverty between Option 2 and Option1: BAU, end of 2016**

- 4.18. DECC’s fuel poverty projection model has been used to estimate these results. For details of how this model works please see Section Four of the July 2013 Fuel Poverty Strategic Framework Analytical Annex.<sup>37</sup> The inputs used to derive these results are both 1) the uptake of different measures and 2) the estimated price per KWh of gas and electricity up to the end of 2016. These inputs are required for both the BAU and Option 2, with the differences in the two scenarios then taken to generate the changes in fuel poverty. The uptake of each measure type, under each ECO target, is disaggregated by tenure and whether households projected to take up measures are in receipt of AW eligible benefits. The prices used in these results are derived using the costs of ECO shown in tables Table 13 and Table 14, in particular using the smooth delivery profile for

<sup>37</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/211137/fuel\\_poverty\\_strategic\\_framework\\_analytical\\_annex.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211137/fuel_poverty_strategic_framework_analytical_annex.pdf)

Option 2. However it is important to recognise the inherent difficulties in modelling and projecting policy impacts on fuel poverty given the large number of variables and uncertainties that go into the calculation, therefore this estimate should be treated as a broad estimate of the impact on fuel poverty.

## Carbon savings

- 4.19. The Climate Change Act 2008 established a target for the UK to reduce its emissions by at least 80 % from 1990 levels by 2050. The Act also established a system of five-yearly Carbon Budgets (CBs), currently stretching out to 2027. Reducing emissions from domestic buildings will be important in order for the UK to meet its 2050 emission reduction targets, and energy efficiency supplier obligation policies play an important role in this.
- 4.20. Table 11 below shows our preliminary estimates of difference in carbon savings under Option 2 relative to BAU for the CB periods to 2022.<sup>38</sup> It shows the difference in total cumulative savings in a given five year CB Period which includes the savings from measures installed under ECO in the years prior to that particular five year period. Negative figures in the below implies that carbon savings are greater under Option 1 BAU than under Option 2.
- 4.21. In this analysis, we have only estimated the savings from measures that are installed under ECO in the period to 31 March 2017 (under BAU and Option 2). We have therefore assumed that there are no savings from ECO in the period from 1 April 2017. This does not reflect the government's expectation for ECO and Green Deal to be long term, ambitious programmes. The consultation which this assessment accompanies is concerned only with the setting of scheme rules and legal targets to 31 March 2017. Any subsequent targets will be the subject of separate consultation exercises, with appropriate accompanying analysis, in due course. For the moment there is therefore uncertainty about the exact nature of ECO policy design beyond 31 March 2017.

|                          | Difference (Option 2 minus Option 1:BAU) |                  |
|--------------------------|--|------------------|
| <i>MtCO<sub>2</sub>e</i> | CB (2013-2017)                           | CB 3 (2018-2022) |
| CERO                     | -0.9                                     | -1.3             |
| CSCO                     | 0.0                                      | 0.0              |
| AW                       | 0.0                                      | -0.1             |
| <b>Total</b>             | <b>-0.9</b>                              | <b>-1.3</b>      |

*Figures do not add due to rounding*

**Table 11: Difference in estimated contribution from ECO and domestic Green Deal to CB periods (traded and non-traded sector) between Option 1: BAU and Option 2**

- 4.22. The analysis indicates that total contributions to carbon savings are around 1.3 MtCO<sub>2</sub>e lower under Option 2 than under BAU in CB 3. The figures in the table above capture the difference between the options due to the ECO changes we are consulting on, including the 33 % reduction to CERO and the levelisation mechanism. The Option 2

<sup>38</sup> An updated assessment of the impact of the policies on carbon emissions will be published in the 2014 Updated Energy Emission Projections (UEP). The UEP estimated impacts could differ from the ones presented here because of potential differences in final energy use and emission factors assumptions underpinning the forthcoming UEP projections. The ECO and Green Deal savings published in the latest UEP (September 2013) was based on modelling for the 2012 IA, but with adjustments made to the IA estimated energy savings to reflect comfort taking. The estimates in the UEP projections also reflected updated emission factors compared to those that were used in the 2012 IA estimates.

figure also includes energy companies' CERT and CESP over-compliance being used to offset their ECO obligations (around 3.0MtCO<sub>2</sub> lifetime savings compared to 2.5MtCO<sub>2</sub> assumed in BAU).<sup>39</sup>

- 4.23. The government has announced an intention to ensure that the impact of the reduced carbon savings ambition under ECO under Option 2, relative to BAU, will be mitigated by new schemes to boost energy efficiency savings for home-movers, landlords and public sector building.<sup>40</sup> The government will be announcing the details of the schemes in due course. The impact of these mitigation schemes has not been included in our modelling of the ECO policy package.
- 4.24. The figures below show the relationship between annual average ECO spend and carbon target unit savings under the CSCO and CERO under BAU and Option 2 for the period to 31 March 2017. Please note the difference in scale on the vertical axis between the two figures.

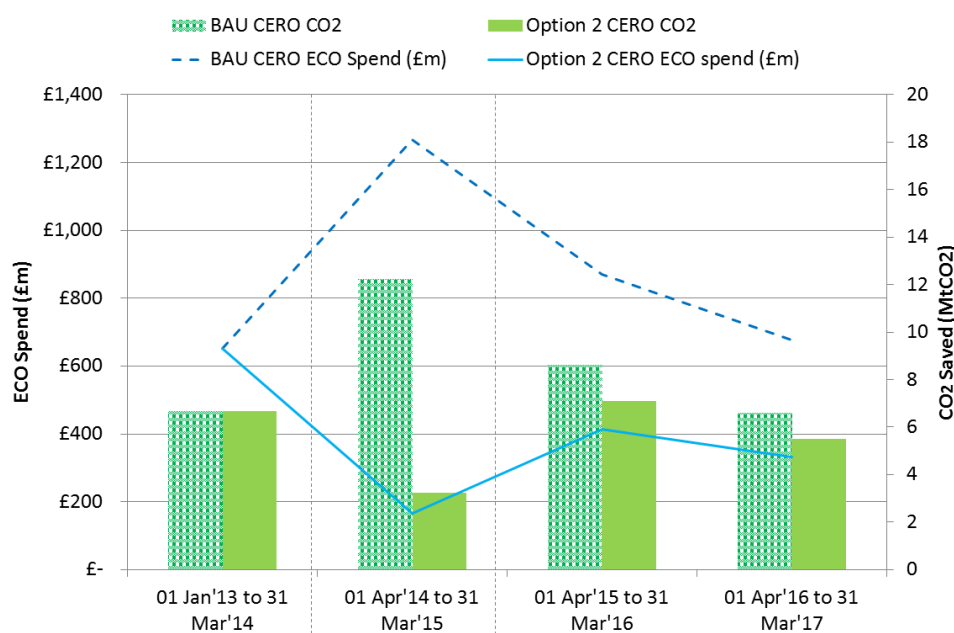
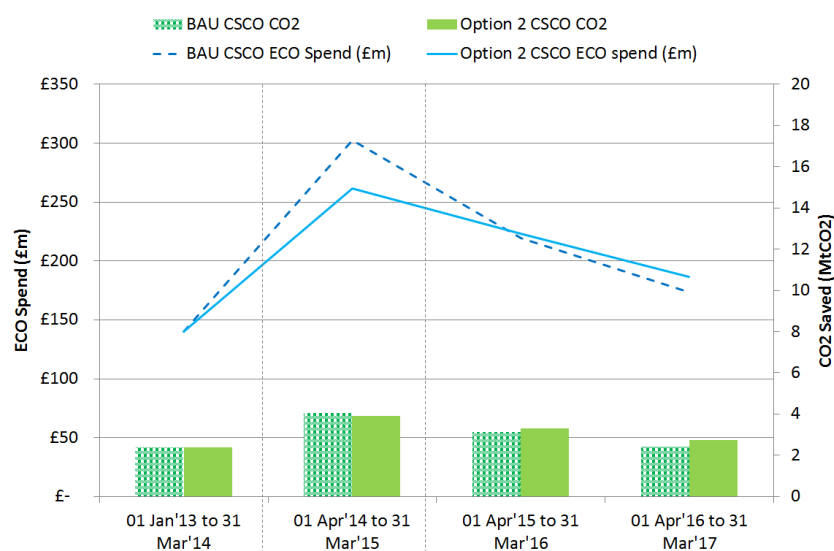


Figure 1: CERO annual spend and lifetime carbon savings under BAU and Option 2

<sup>39</sup> All of the over-delivery from CERT and CESP has been incorporated into the Department's 2013 Carbon Budget emissions projections before ECO savings are incorporated. The impact on a CB period of lifetime savings is the lifetime saving divided by the assumed lifetime of the measures (typically around 36 years) times five years (a CB period lasts five years).

<sup>40</sup> DECC press notice 2 December <https://www.gov.uk/government/news/govt-action-to-help-hardworking-people-with-energy-bills>



**Figure 2: CSCO annual spend and lifetime carbon savings under BAU and Option 2**

## Employment

4.25. Our analysis of Option 2 suggests that between 35,000 and 36,000 jobs would be supported as a result of the uptake of insulation measures expected by the preferred policy option in 2015.<sup>41</sup> This is an estimate of the gross number of jobs supported as a direct consequence of the policy package, and does not attempt to capture the net employment impact. Under BAU, we estimate that between 42,000 and 50,000 jobs would be supported in 2015. The higher estimate of jobs supported under BAU is a result of an overall higher level of uptake of measures under BAU than Option 2 in 2015. Employment impacts will vary over time according to the estimated trajectories for uptake of measures under the two options (see Table 3 for details on uptake trajectories under BAU and Option 2).

| Option 1: BAU   |            |   |                      |        |
|-----------------|------------|---|----------------------|--------|
|                 | Installers | Supply chain jobs (excluding assessors) | Green Deal Assessors | Total  |
| <b>Method A</b> | 8,000      | 38,000                                  | 4,000                | 50,000 |
| <b>Method B</b> |            | 38,000                                  | 4,000                | 42,000 |
| Option 2        |            |   |                      |        |
|                 | Installers | Supply chain jobs (excluding assessors) | Green Deal Assessors | Total  |
| <b>Method A</b> | 6,000      | 27,000                                  | 3,000                | 36,000 |
| <b>Method B</b> |            | 32,000                                  | 3,000                | 35,000 |

**Table 12: Jobs supported by ECO in 2015 broken down by supply chain component: Option 1 (BAU) and Option 2**

4.26. **Method A.** The number of installers is based on our projections about the number of measures installed each year multiplied an assumed number of man days required to complete measures (the number of man days differ by technology). Supply chain job estimates are based on evidence from Innovas on the ratio between installer numbers

<sup>41</sup> CWI, SWI, LI and floor insulation.



and supply chain jobs (manufacturing, supply, distribution and development). This evidence suggests that there were around 4.75 jobs in the supply chain for an installer job.<sup>42</sup> The number of Green Deal assessors has been estimated based on the assumption that an assessor will conduct an average of two assessments per day and that there will be three assessments for every successful Green Deal. A detailed description of the methodology for estimating jobs is provided in the 2012 IA.

- 4.27. **Method B.** This estimate of jobs is based on comparing the total estimated capital spend under ECO in 2015 with the labour to capital spending ratio estimate by the Sector Skills Council for construction of 32.6 jobs per £1m output. This estimate of installer and supply chain jobs (excluding assessors) is calculated applying this ratio to the projected CERO, CSCO and AW capital investment in 2015. The total jobs estimate is calculated by adding the estimated number of Green Deal Assessors to the installer and supply chain jobs.

## 5. Cost and benefits of ECO

- 5.1. This section provides an overview of the monetised costs and benefits of the ECO options. The majority of this section is focused on evidence and analysis of the cost to suppliers of meeting the ECO given that the main rationale for intervention is founded on the aim to reduce the cost of ECO on consumer energy bills.

### Cost of the ECO targets

#### Delivery cost

- 5.2. Our 2012 IA estimate of the annual average cost of ECO compliance of around £1.3bn p.a. (under the current ECO legislation) has been contested by some of the obligated suppliers. Early market evidence on costs from suppliers since the publication of the 2012 IA suggests the actual annual cost to companies of delivering ECO is just under £1.4bn p.a. for the target as a whole.<sup>43</sup> This is based on evidence on the average delivery cost for each obligation up to September 2013, as reported by the companies themselves. Market evidence from the average traded prices for measures contracted on the ECO brokerage platform also suggests that annual costs will be around £1.4bn.<sup>44</sup> This updated evidence on costs has been used to inform the modelling of the two options in this assessment. The modelled ECO delivery costs have also been updated to include ECO administrative costs (see 'Administrative cost' section below).

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<sup>42</sup> Innovas (2009) *Low Carbon Good and Services: an industry analysis*, <http://www.bis.gov.uk/files/file50253.pdf>

<sup>43</sup> Domestic Green Deal, Energy Company Obligation and Insulation Levels in Great Britain, Quarterly report [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/267963/Quarterly\\_Statistical\\_Release\\_-\\_GD\\_ECO\\_and\\_insulation\\_levels\\_in\\_Great\\_Britain\\_-\\_19\\_December\\_2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267963/Quarterly_Statistical_Release_-_GD_ECO_and_insulation_levels_in_Great_Britain_-_19_December_2013.pdf)

<sup>44</sup> The ECO brokerage platform is a transparent auction platform where the obligated energy suppliers can buy units of ECO compliance from accredited Green Deal Providers. Detailed information from each auction is published here: <https://www.gov.uk/government/statistical-data-sets/eco-brokerage-results>.

- 5.3. Our assessment of the impact of delivery costs under Option 1 and Option 2 are set out in the tables below. We estimate that the average annual delivery costs for the market as a whole under Option 2 are around 36 % (£510m) lower than our estimated BAU costs in the period to 31 March 2015, and 30 % (£390m) lower on average over the two year target period to 31 March 2017. Under Option 2, suppliers can count SWI delivery under any of their three ECO targets towards the 100,000 SWI minimum (or 4 MtCO<sub>2</sub> equivalent). The cost of delivering the SWI minimum is therefore a sub-set of the cost of delivering the CSCO, CERO and AW targets. However, we are aware of two modelling restrictions which means that the estimated costs under Option 2 is (everything else being equal) likely to be higher than what we would expect in reality. Firstly, our modelling does not capture the possible negative impact on costs from allowing DHS as primary measures under CERO. Secondly, the modelling projects a larger volume of SWI uptake than we expect to happen in reality under Option 2 (see paragraph 4.5 for details).
- 5.4. The government's assessment that Option 2 would lead to a significant reduction in ECO costs relative to Option 1 is supported by the energy suppliers' public statements. However, the government's estimates of the impact of the options on ECO costs are not comparable with the estimates of impact on energy bills announced by the individual energy suppliers. In particular, the reported costs suggest that the ECO delivery costs vary greatly by supplier. The government's assessment of costs should not affect the real world bill impacts as announced by suppliers, nor should a difference between our and the supplier's estimates imply that real world bill reductions should fall short of what the companies announced in December. Government is seeking further evidence and transparency of cost data through the consultation (see 'Impact on energy bills' section for details).

|              | <b>Option 1: BAU</b>        |                             |
|--------------|-----------------------------|-----------------------------|
|              | <b>1 Jan'13 – 31 Mar'15</b> | <b>1 Apr'15 – 31 Mar'17</b> |
| <b>CERO</b>  | £855m                       | £775m                       |
| <b>CSCO</b>  | £195m                       | £195m                       |
| <b>AW</b>    | £365m                       | £365m                       |
| <b>Total</b> | <b>£1,415m</b>              | <b>£1,335m</b>              |
|              | <b>Option 2</b>             |                             |
|              | <b>1 Jan'13 – 31 Mar'15</b> | <b>1 Apr'15 – 31 Mar'17</b> |
| <b>CERO</b>  | £365m                       | £375m                       |
| <b>CSCO</b>  | £180m                       | £205m                       |
| <b>AW</b>    | £365m                       | £365m                       |
| <b>Total</b> | <b>£905m</b>                | <b>£940m</b>                |

**Table 13: Average annual ECO delivery costs under Option 1 BAU and Option 2 (£m, 2013 prices)**

- 5.5. The exact impact on target levels and associated delivery costs is very uncertain. In particular, it will depend on the unknown scale of the impact of carry forward and levelisation. The table above, and our modelling more generally, assumes that

<sup>45</sup> The cost figures in this assessment are in 2013 prices, the 2012 IA costs were presented in 2011 prices. For AW, for example, the £365 million in 2013 prices is equivalent to £350million in 2011 prices due to the effects of inflation. For CERO and CSCO, costs for the period from 1 Apr'14 are based on our modelling of the policies in this period. Costs in the period 1 Jan'13 to 31 Mar'14 are based on off-model estimations of costs associated with reported statistics on actual delivery to Oct'13, and off-model estimated trajectories for delivery from Oct'13 to 31 Mar'14.



companies comply with their 31 March 2015 and 31 March 2017 targets, but do not carry forward any over-delivery between these two phases. This means that spend in the period to 31 March 2015 will be low for the companies that can easily achieve their reduced targets to 31 March 2015, but that their spend would increase in subsequent years in order to meet the new target to 31 March 2017. If, however, energy companies smooth their delivery profile between 1 April 2014 and 31 March 2017, and carry forward over-delivery from 2015 to their 31 March 2017 targets, some delivery costs will be brought forwards for those who will easily achieve the lower targets to 31 March 2015. Table 14 shows this alternative cost profile where we assume that the industry delivers its CERO obligation in this way, but maintains its profile of CSCO and AW spend to that required to meet each target without over-delivering.<sup>46</sup>

|              | <b>Option 2</b>             |                             |
|--------------|-----------------------------|-----------------------------|
|              | <b>1 Jan'13 – 31 Mar'15</b> | <b>1 Apr'15 – 31 Mar'17</b> |
| <b>CERO</b>  | £425m                       | £305m                       |
| <b>CSCO</b>  | £180m                       | £205m                       |
| <b>AW</b>    | £365m                       | £365m                       |
| <b>Total</b> | £965m                       | £870m                       |

**Table 14: Average annual ECO delivery costs under Option 2 (£m, 2013 prices) with smooth delivery profile**

- 5.6. Our analysis assumes that the ECO subsidy rate for each measure within each of the targets is set at the market clearing rate.<sup>47</sup> This implies that economic rent (or 'surplus') will be realised on the most cost-effective measures within each target obligation. This rent could be captured by the energy supplier, the installers or householders. Economic theory suggests that these rents could be captured by households if they were aware of the value of the ECO units (carbon savings or heating cost reductions) the companies generate from installing measures in their homes. However, due to market imperfections such as information barriers and market power in the market for ECO units, this is unlikely to happen in practice. In reality, it is likely that installers will be able to generate demand for ECO measures while offering a subsidy rate below the market clearing rate. In these instances, the supply chain would capture some of the economic rent.
- 5.7. However, we do not have any empirical data upon which to base our assumptions of rent capture or indeed the extent to which energy companies apply marginal cost pricing to their cost pass-through decisions. For the purpose of this analysis, we have assumed that the economic rent is fully captured by householders receiving the measures. This is a conservative approach to estimating the cost of ECO to energy suppliers as it means they capture none of the economic rent. Under this assumption, the cost of ECO to the energy suppliers includes the full amount of the economic rent, and the cost to them of meeting each ECO target is the ECO marginal subsidy rate (£/tCO<sub>2</sub> or £/heating saving units) multiplied by the number of units of compliance (tCO<sub>2</sub> or £ heating costs savings) for each of the target periods.<sup>48</sup> The estimated cost to energy suppliers will be lower if they do capture some of this rent. This methodology is consistent with the analysis for the 2012 IA.

<sup>46</sup> **Error! Reference source not found.** is constructed off-model by applying CERO's estimated average delivery cost between 1 April 2014 to 31 March 2017 to each of those years; CSCO and AW costs are as per Option 2 in **Error! Reference source not found.**

<sup>47</sup> The modelling caps the total ECO support to any measure at 150 % of the measure's installation cost.

<sup>48</sup> See 2012 IA for further details on the methodology.

## Administrative costs

- 5.8. Evidence from the obligated energy suppliers suggests that the total administrative costs of ECO on a pro-rata basis of its first year of operation were around £76million in total across the obligated suppliers.<sup>49</sup> This is based on quarterly returns from energy companies and includes: set up costs to administer the scheme; the cost of reporting and compliance; marketing costs, procurement costs; additional IT infrastructure; and all staff costs including specialist support, such as lawyers.
- 5.9. It is difficult to conclude the extent of the one-off costs compared to the on-going costs incurred from the pattern of costs reported by the energy companies. For the purpose of this assessment, therefore, we have assumed that the annual administrative cost of ECO to energy suppliers continue at £76million p.a. (in 2013 prices) for the entire ECO period, both under BAU and Option 2. This assumption will be revisited when more information is available on the split of set-up versus on-going costs. Likewise, any changes to administration costs resulting from Option 2 will be reviewed when more evidence is available. Companies will have transitional set-up costs to accommodate the new policy landscape, such as primary ETT measures delivered under CERO and proving that a warranty has been provided for all boiler replacements. However, these costs should be mitigated by lower compliance costs for measures such as HTT CWI.
- 5.10. The estimated administrative costs are included in the total ECO delivery costs. For the purpose of modelling the ECO target levels associated with the ECO delivery costs, we have assumed that the £76million annual administrative costs have been spread proportionally between the three ECO obligations.<sup>50</sup>

## Impact on energy bills

- 5.11. The cost of measures delivered under ECO will be partly or fully funded by energy suppliers and we assume that the suppliers will pass through these costs to domestic energy consumers. The pricing decisions and pass-through of costs associated with ECO are commercial decisions for the obligated energy suppliers, and we do not have firm evidence on how policy costs are passed through in practice.
- 5.12. All of the seven obligated ECO suppliers have made public announcement to welcome the proposed measures announced in December, which are covered by this consultation.<sup>51</sup> Some suppliers have made public estimates about the scale of ECO delivery cost savings they expect to pass on to consumers as a consequence of the package of measures being implemented.
- 5.13. The companies' public estimates of the reduction in ECO costs on energy bills following the 2 December announcements include:
- **Scottish Power:** The changes will reduce their cost of ECO by approximately £30 per household.<sup>52</sup>

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<sup>49</sup> This is based on reported administrative costs for the period to end September 2013.

<sup>50</sup> We have made the simple assumption that the total administrative costs are split between the ECO targets according to the share of the target's total delivery costs under BAU. This implies that around 27 % of £76m are included in AW, 15 % in CSCO delivery costs and 58 % in CERO delivery costs.

<sup>51</sup> <https://www.gov.uk/government/news/govt-action-to-help-hardworking-people-with-energy-bills>

<sup>52</sup> [http://www.scottishpower.com/news/pages/scottishpower\\_comment\\_on\\_household\\_energy\\_costs.asp](http://www.scottishpower.com/news/pages/scottishpower_comment_on_household_energy_costs.asp)

- **SSE:** The impact of the overall package (including electricity distribution costs reductions, rebate and ECO changes) should equate to a saving of around £50 for a typical dual fuel customer.<sup>53</sup> This implies an ECO-related cost reduction of £33.
  - **British Gas:** Price reduction for domestic consumers equivalent to £41 on average off the annual dual fuel bill as a result of reduced ECO costs and reductions to electricity distribution costs.<sup>54</sup> This implies an ECO-related cost reduction of £36.
  - **Npower:** Customers that received a price increase in December 2013 will receive a reduction which will typically mean a £50 annual reduction for the average dual fuel customer when the government's one off £12 rebate is included. The £38 tariff change reflects the changes to ECO and reduced network costs.<sup>55</sup> This implies an ECO related cost reduction of £33.
- 5.14. **E.ON** announced that they had reduced the overall level of price rises in December due to the announced changes.<sup>56</sup> **EDF**, similarly, have announced that they have already held back price increases on the expectation that ECO costs would be reduced.<sup>57</sup> The seventh obligated supplier, **First Utility** (which has an estimated ECO target share of only around 1 %) stated that the changes have a minimal impact on them.<sup>58</sup>
- 5.15. It should be noted that the impact of ECO on energy bills is two-fold. The amount of ECO costs that the suppliers are assumed to pass through to bills increases the unit cost of energy (which other things being equal increases bills). At the same time, the installation of energy efficiency measures supported by ECO reduces domestic energy consumption which helps to offset price increases and therefore (everything else being equal) reduces bills. The government publishes its estimates of the impact of all energy and climate change policies on energy prices and bills on an annual basis, and the forthcoming prices and bill report will include further analysis of the government's assessment of the impact of ECO. We would welcome any evidence, from the energy companies and other interested parties, on this issue.
- 5.16. Government does not have visibility of the detailed analysis underpinning the companies' announcements of the impact on bills. The estimates above are the individual companies' own public estimates of what the reduction in bills would be compared to their own estimates of BAU bills. The underlying assumptions about ECO costs (and other factors affecting energy bills) are not necessarily the same across the different companies' estimates. One individual company's estimate of bill savings as a result of implementing the ECO package is therefore not necessarily comparable with the estimates of other companies.

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<sup>53</sup> <http://www.sse.com/PressReleases/2013/StatementOnGBHouseholdEnergyTariffs/>

<sup>54</sup> <http://britishgas.presscentre.com/Press-releases/British-Gas-energy-bills-to-reduce-by-over-50-34d.aspx> British Gas has not split out the ECO and distribution cost saving element of the £41 saving. The government estimates that the changes to the electricity distribution costs could lead to a one-off reduction of an average of around £5 on electricity bills.

<sup>55</sup> <http://www.npowermediacentre.com/Press-releases/npower-announces-energy-bill-reduction-1303.aspx>

<sup>56</sup> E.On has not split out the ECO particular share of the cost reduction but suggested that an £18 reduction was due to a reduced cost in 'delivering social obligation programmes'. <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2013/12/06/2329.aspx>

<sup>57</sup> <http://newsroom.edfenergy.com/News-Releases/EDF-Energy-customers-won-t-wait-to-benefit-from-Government-action-on-energy-charges-1ff.aspx>

<sup>58</sup> <http://www.first-utility.com/eco-reform>

## Benefits of the ECO targets

- 5.17. The overarching benefits of ECO in improving energy efficiency are outlined in paragraph 2.1, but not all of these benefits have been monetised for this assessment. The following benefits have been monetised in line with Green Book Supplementary Guidance: carbon savings, energy savings and air quality. We have also monetised the comfort benefit to consumers associated with improved energy efficiency in their homes.<sup>59</sup>

## Overall monetised cost and benefits

- 5.18. We have estimated the monetised costs and benefits of the two options for the target period we are consulting on making changes to (1 April 2014 to 31 March 2017). The Net Present Value (NPV) of the policy under Option 2 is £2.1bn, compared to £2.6bn under BAU. The difference in NPV between the two options is explained by differences in the volume and nature of the insulation and heating measures taken up under the two options. Over half of the total costs under both options are related to installation costs, and the majority (over 60 %) of the monetised benefits are from energy savings.
- 5.19. Several factors drive the difference in NPV between the two options. Firstly, a ‘target size’ effect of energy efficiency policies implies that the greater the target the greater the expected NPV (everything else being equal). This is due to the cost-effective nature of domestic energy efficiency policies where benefits outweigh the costs. Secondly, policies that increase the flexibility for suppliers in terms of eligible measures imply that companies have a larger pool of technical potential of cost-effective measures to deliver, and a given amount of spend will result in greater energy savings and associated benefits.<sup>60</sup> Our analysis of BAU and Option 2 suggests that the larger ‘target size’ effect dominates, so the NPV under BAU is greater than Option 2 despite the fact that ETT measures are eligible under Option 2. Option 2 is, however, favourable to BAU when compared in terms of cost-effectiveness. This is because the modelling predicts that the increase in eligible technical potential under Option 2 compared to BAU (as a result of allowing ETT measures under CERO and expanding the CSCO eligible area under Option 2) is slightly biased towards properties heated by fuels that generate non-traded savings (i.e. solid, oil and LPG fuels). This result is, in turn, driven by the underlying assumptions about the housing stock from the English Household Survey.
- 5.20. The higher uptake of measures, in particular of costly insulation measures (HTT CWI and SWI), under BAU explains why the total installation cost is around £0.7bn PV (25 %) greater under BAU relative to Option 2. These two factors, and in particular higher SWI uptake under BAU, also explain why hidden/hassle costs are higher under BAU than Option 2.
- 5.21. Total monetised benefits are around £1.7bn PV (21 %) higher under BAU than under Option 2. This is driven primarily by the higher monetised value energy savings under BAU than Option 2, related to the larger size of the ECO target under BAU. Details of the central estimate of the monetised impact of the Green Deal and ECO policies under BAU and Option 2 are set out in Table 15 below.

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<sup>59</sup> We assume a comfort taking factor of 15 % of the energy saved from the measure and value the savings at the retail price of energy.

<sup>60</sup> Provided that the benefits exceed any crowding out of the uptake of measures that would have otherwise been self-funded.

|   | Option 1: BAU         | Option 2: (central scenario) |
|---|-----------------------|------------------------------|
| Installation costs                                  | £2,897m               | £2,168m                      |
| Hidden/hassle costs <sup>61</sup>                   | £1,156m               | £963m                        |
| Assessment costs <sup>62</sup>                      | £421m                 | £285m                        |
| Finance costs <sup>63</sup>                         | £225m                 | £246m                        |
| Admin Costs   | £213m                 | £213m                        |
| Green Deal mechanism costs <sup>64</sup>            | £261m                 | £178m                        |
| <b>Total costs</b>                                  | <b>£5,174m</b>        | <b>£4,053m</b>               |
| Energy savings                                      | £4,882m               | £3,923m                      |
| Comfort benefits                                    | £1,069m               | £940m                        |
| Air quality benefits                                | £415m                 | £372m                        |
| Lifetime non-traded carbon savings                  | £1,300m               | £771m                        |
| Lifetime EU Allowance savings                       | £140m                 | £132m                        |
| <b>Total benefits</b>                               | <b>£7,807m</b>        | <b>£6,139m</b>               |
| <b>Net Present Value</b>                            | <b>£2,633m</b>        | <b>£2,086m</b>               |
| Life time non-traded carbon savings                 | 24 MtCO <sub>2</sub>  | 14 MtCO <sub>2</sub>         |
| Cost effectiveness £/tCO <sub>2</sub> <sup>65</sup> | -£56/tCO <sub>2</sub> | -£94/tCO <sub>2</sub>        |

**Table 15: Monetised social impacts for the period from 1 April 2014 to 31 March 2017 (£m, 2013 prices, unless otherwise stated)**

5.22. Our modelling predicts that the volume of Green Deal Finance will be higher under Option 2 than BAU despite the lower volume of measures taken up under Option 2. This is because our modelling predicts that a larger number of measures will be fully funded under BAU than under Option 2, and that there will be a greater degree of blending of ECO funding and Green Deal finance under Option 2 (see Table 16 below). ECO subsidy rates (£/tCO<sub>2</sub>) is lower under Option 2 than BAU, and more Green Deal finance (or other sources of private finance) is therefore required to meet the cost of a given measure. This effect of higher blending outweighs the fact that fewer measures overall is taken up under Option 2. In reality we have observed limited blending of Green Deal finance and ECO funding to date. The extent to which blending will increase above historic rates is naturally uncertain. A lower degree of blending in the market than what our modelling predicts over the period we are assessing would impact on the appraisal of the policy option.

<sup>61</sup> Hidden or hassle costs are costs to the householders above installation costs. These are related to time spent by householders researching, arranging, preparing for installation and returning their home to its previous condition. These costs also cover costs in addition to the installation costs that may be required when work is carried out independently of other major refurbishment or redecoration.

<sup>62</sup> This is the cost of the Green Deal Assessment Report (GDAR) for the two carbon targets. We assume that all packages of measures taken up under CERO and CSCO are accompanied by a GDAR. Assessment costs are therefore related to the number of households supported. See the 'Households supported' section for details on of the number of households supported under both options.

<sup>63</sup> This is the Green Deal finance repayment and interest costs. The costs reflect the *volume* of Green Deal finance, but not necessarily the number of Green Deal plans, and are therefore not directly related to the number of households supported.

<sup>64</sup> This is the Green Deal plan set-up and annual costs. The costs are related to the number of Green Deal Plans taken up, but not the *volume* of Green Deal finance.

<sup>65</sup> Calculated as: (NPV-monetised value of lifetime non-traded carbon savings)/lifetime non-traded carbon savings



|                             | <b>Option 1: BAU</b> |                       |                    |                     |
|-----------------------------|----------------------|-----------------------|--------------------|---------------------|
| <b>1 Apr'14 – 31 Mar'17</b> | <b>0 %</b>           | <b>&gt;0 % - 49 %</b> | <b>50 % - 99 %</b> | <b>100 %- 150 %</b> |
| <b>CSCO</b>                 | 0                    | 31,369                | 271,791            | 170,830             |
| <b>CERO</b>                 | 29,283               | 3,367                 | 188,811            | 699,060             |
|                             | <b>Option 2</b>      |                       |                    |                     |
| <b>1 Apr'14 – 31 Mar'17</b> | <b>0 %</b>           | <b>&gt;0 % - 49 %</b> | <b>50 % - 99 %</b> | <b>100 %- 150 %</b> |
| <b>CSCO</b>                 | 0                    | 37,612                | 279,211            | 158,264             |
| <b>CERO</b>                 | 0                    | 79,184                | 257,199            | 138,510             |

**Table 16: Percentage of measures' costs funded by ECO subsidy under Option 1 (BAU) and Option 2**

- 5.23. Table 17 below shows the breakdown of costs and benefits by the three ECO targets under Option 2. It shows that the CERO target has the greatest NPV when compared to the other two ECO targets. This is related to the 'target size'; the level of insulation market activity is highest under CERO, which results in greater benefits from energy and carbon savings under this target.
- 5.24. The monetised savings from EU allowances are greater under CSCO than under CERO despite the fact that the CSCO target is smaller in size than the CERO target. This is because our modelling predicts that a larger proportion of measures will be delivered to electrically heated homes under CSCO than under CERO. This, in turn, stems from the underlying assumption of the housing stock from the English Household Survey which suggests that the distribution of technical potential between CSCO and CERO eligible areas is such that electrically heated homes are disproportionately distributed in CSCO areas.

|                                    | <b>CERO</b>    | <b>CSCO</b>    | <b>AW</b>      |
|------------------------------------|----------------|----------------|----------------|
| Installation costs                 | £740m          | £519m          | £909m          |
| Hidden/hassle costs <sup>66</sup>  | £646m          | £309m          | £8m            |
| Assessment costs                   | £142m          | £143m          | N/A            |
| Finance costs                      | £146m          | £100m          | N/A            |
| Administration costs               | £124m          | £31m           | £57m           |
| Green Deal mechanism costs         | £90m           | £88m           | N/A            |
| <b>Total costs</b>                 | <b>£1,888m</b> | <b>£1,191m</b> | <b>£974m</b>   |
| Energy savings (Variable element)  | £1,533m        | £1 045m        | £1,345m        |
| Comfort benefits                   | £329m          | £240m          | £370m          |
| Air quality benefits               | £272m          | £80m           | £21m           |
| Lifetime non-traded carbon savings | £661m          | £314m          | -£204m         |
| Lifetime EU Allowance savings      | £28m           | £38m           | £67m           |
| <b>Total benefits</b>              | <b>£2,823m</b> | <b>£1,717m</b> | <b>£1,598m</b> |

<sup>66</sup> Hidden or hassle costs are costs to the householders above installation costs. These are related to time spent by householders researching, arranging, preparing for installation and returning their home to its previous condition. These costs also cover costs in addition to the installation costs that may be required when work is carried out independently of other major refurbishment or redecoration.

| <b>Net Present Value</b>                                 | <b>£936m</b>          | <b>£525m</b>          | <b>£625m</b>                            |
|--|-----------------------|-----------------------|---|
| Life time non-traded carbon savings (MtCO <sub>2</sub> ) | 12 MtCO <sub>2</sub>  | 6 MtCO <sub>2</sub>   | -4 MtCO <sub>2</sub>                    |
| <b>Cost effectiveness £/tCO<sub>2</sub></b>              | -£22/tCO <sub>2</sub> | -£36/tCO <sub>2</sub> | £0.18 / £ lifetime notional bill saving |

**Table 17: Monetised social impacts of the Green Deal and ECO from 1 April 2014 to 31 March 2017 (£m, 2013 prices, unless otherwise stated) under Option 2**

- 5.25. Overall NPV analysis does not capture the distributional benefits of policies targeted at low income and vulnerable households. For example, whilst the NPV of the AW component of ECO is around £625m, the equity weighted NPV is estimated to be around £3.7bn. This significantly higher equity weighted NPV reflects the strong distributional benefits of AW given that only low income and vulnerable households are eligible for AW measures.

## 6. The Green Deal Household Model and the modelling of the CERO and CSCO

### Model Overview

- 6.1. The Green Deal Household Model (GDHM) is used to model the uptake of insulation measures within the CERO and CSCO obligations. It models measures that are either fully funded through ECO, part-funded through ECO, and those funded wholly outside ECO by various sources of private finance, including Green Deal finance.
- 6.2. The model contains a typology of around 1,350 different households. This breaks down the GB housing stock into households with different: property sizes; loft and wall insulation types; heating fuels/ technologies; tenures; and priority groups.
- 6.3. Within each typology, households are classified as suitable for measures if they have not yet received an insulation measure. We assume a proportion of this household stock make a decision about whether or not to take out an insulation measure in any given year – their decision making frequency (DMF). Of those households who make this decision in a given year, the model assesses which (combination of) measures met the Golden Rule, after an ECO subsidy is applied (see below for the calculation of this). A utility function calculates how much a household is likely to value installing those insulation measures that meet the Golden Rule. Based on this value, a proportion of households are assumed to take up the respective measure. This is based on the findings of the conjoint surveys undertaken before the Green Deal and ECO were launched (see figure, below). The uptake of measures and the cost of ECO are calibrated to mimic the observed market prices as much as possible. This methodology is described below.
- 6.4. The model introduces an ECO subsidy, which enables energy companies to deliver their carbon targets by reducing the cost of installing measures to households. This subsidy

risks to a level at which the energy companies just meet their obligations. The model assumes that the ECO price will rise to the cost of delivering the marginal measure's CO2 savings required to meet the companies' obligations. This is the cost which, when multiplied by the volume of CO2 saving required, establishes the total cost of the energy companies' obligation that we assume is passed on to energy customers. Where the cost does not meet the SW minimum, a higher ECO price for SW is established.

- 6.5. More information about the GDHM and the way in which ECO costs are set and assumed to be passed through is presented in the 2012 IA.

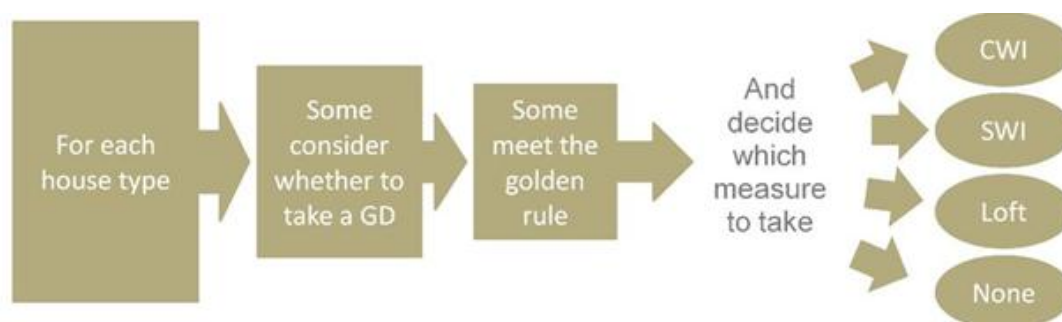


Figure 3: Schematic presentation of the Green Deal Household model

## Modelling the BAU

- 6.6. The BAU modelling assumes a world in which the carbon target package of measures (as announced on 2 December 2013) is not implemented and the current ECO regulations continue unaltered. Further, it assumes consecutive two-year extensions to ECO beyond 31 March 2015 with the same overall spend ambition (£1.3bn per annum in 2011 prices). We assume 100% compliance with each ECO targets for each interim target period under BAU and the policy options, and there is therefore no carry over between ECO target periods.
- 6.7. The model is calibrated to market data using the methodology described below.

## Modelling the counterfactual including PRS regulations

- 6.8. The results presented in this assessment are the gross impact of Option 1 (BAU) and Option 2, and they therefore include the impact of the measures taken up in a modelled counterfactual scenario. The modelled counterfactual scenario is the same under both options, so this does not impact on the relative comparison between the two options that we assess. We intend to present the impact of the policy option net of a counterfactual without ECO in the final assessment.
- 6.9. Under the counterfactual scenario, there are no ECO regulations but Green Deal finance is available and PRS regulations are laid to encourage the uptake of energy efficiency measures in that sector. This increases the numbers of PRS households coming forward to undertake an insulation measure but, because there is no ECO subsidising measures in the market, fewer households meet the Golden Rule than with the ECO policy. This provides an estimate of the uptake of insulation measures in the absence of any ECO subsidy in the market.
- 6.10. The counterfactual uptake of measures cannot be calibrated like the policy options, however, as the level of uptake without a subsidy cannot be observed in the market, because there has been some form of Supplier Obligation for subsidising insulation measures for over a decade.



- 6.11. For the purposes of this assessment, the compliance rate with the PRS regulations and with the requirement to obtain an EPC when a property in the PRS is let out or sold, are assumed to be 100%. We assume full compliance rates with these policies due to the current lack of robust evidence on actual compliance rates. These compliance rates may be revised in the IA for the secondary legislation of the PRS regulations if additional evidence becomes available.

## Modelling the policy package

### Calibration to market data

- 6.12. Information from the ECO brokerage has informed the cost of delivering the targets. Statistics about the number of SWI measures delivered into households are also used.
- 6.13. The model is calibrated until it gets to a total ECO spend for CERO and CSCO for the modelled uptake of measures from 1 April 2013 to 31 March 2015 which reflects market evidence. This, combined with the delivered costs between 1 January and 31 March 2013, gives an average annual cost of delivering ECO in the period to 31 March 2015.
- 6.14. The following parameters were altered in order to calibrate the model to these market data: households' decision making frequency; households' utility;<sup>67</sup> the cost of HTT CWI; and Local Authorities' costs of delivering measures.
- 6.15. The calibration changes the values of the above parameters to a level where cost and quantities are consistent with the market's delivery. The final choice of values is based on the extent to which the parameters' values are changed, so adjusting a mix of parameters by a moderate amount is preferred to adjusting a single parameter by a significant extent.

### Including easy to treat and DHS measures

- 6.16. The model assumes that only SWI and HTT CWI primary measures will be delivered within CERO up to 31 March 2014. After that date, LI and ETT CWI are eligible as primary measures within CERO.
- 6.17. Our modelling of CERO does not include a safeguard to ensure that a proportion of ETT measures are delivered specifically to low income and vulnerable households.
- 6.18. We have not modelled the uptake of DHS under BAU or the options because we do not currently have a sufficient evidence base or suitable modelling tools to assess the potential uptake of this technology under ECO. The government is seeking evidence on this policy measure through consultation, and will be looking to firm up our evidence of its potential (including on additionality over time) before a final policy decision is made.

### Expanding the CSCO eligible area

- 6.19. The model has been adjusted to accommodate the proposed wider definition of eligible households under CSCO (from the 15 % to the 25 % most deprived area households, plus adjacent areas). However, we are reviewing how well this captures the distribution of property types and tenures across CSCO. We restrict modelling of CERO to areas not covered by CSCO. This produces conservative estimates with respect to CERO delivery to avoid double counting uptake from eligible households. However, combined modelling of the CERO and CSCO targets would be misleading because the modelling indicates very different unit costs of delivery between CERO and CSCO.

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<sup>67</sup> Utility is the overall benefit that households get from installing a measure or package of measures.

## Reducing the size of CERO by 33 %

- 6.20. The original CERO target was set at 20.9 MtCO<sub>2</sub> to be delivered by 31 March 2015. The December policy announcement proposed a cut of 33 % to this figure, reducing it to 14 MtCO<sub>2</sub>. This is the target level from which energy companies' revised obligations are calculated.<sup>68</sup>
- 6.21. Different rules for the methodology of implementing the 33 % CERO cut might have different impacts between different obligated suppliers. For modelling purposes, we have assumed that the 6.9MtCO<sub>2</sub> total reduction to the CERO target to 31 March 2015 will affect the allocation of targets in Phase 3 of the current target period (i.e. that element of the overall 31 March 2015 target which is allocated by Ofgem in Spring 2014). Under BAU, 8.4 MtCO<sub>2</sub> (40 %) of the 20.9 MtCO<sub>2</sub> target would be split between eligible suppliers in Phase 3.<sup>69</sup> With the 33 % CERO reduction under Option 2, we assume that the 6.9MtCO<sub>2</sub> total CERO target reduction will purely impact the allocation between suppliers in Phase 3 and not be spread across all three Phases. This means that a CERO target of 1.5 MtCO<sub>2</sub> (8.4 MtCO<sub>2</sub> minus 6.9 MtCO<sub>2</sub>) is allocated in Phase 3. Under an alternative implementation scenario, the new 14 MtCO<sub>2</sub> total CERO target would be spread across the three Phases. Under this scenario, 5.6 MtCO<sub>2</sub> (40 % of 14 MtCO<sub>2</sub>) would be allocated in Phase 3. A supplier that becomes eligible in Phase 3 would therefore have a larger CERO target under this scenario than if the 33 % cut is taken into account in Phase 3 only. The government welcomes views on the merits of the different approaches to allocating the overall 33 % cut.

## Levelisation

- 6.22. The levelisation mechanism provides an up-lift to the carbon scoring for energy companies that have already delivered a significant element of their CERO target by 31 March 2014. The central scenario assumes that suppliers that have delivered more than 35 % of their current phase 1 and 2 CERO targets by the end of March 2014 will receive an uplift of 1.75 times the carbon score for the primary measures delivered above that threshold. For modelling purposes, we have assumed that the threshold and uplift are in terms of CERO units from both primary and secondary measures, but the policy intent for consultation is that the threshold and uplift will apply to savings from primary measures only. Early analysis suggests that the impact of specifying the threshold and uplift factor in terms of CERO units from primary measures only is unlikely to have a material effect on the impact of the levelisation mechanism.
- 6.23. The expected delivery profile of energy companies to 2014 has been estimated using the latest available delivery levels on a company basis, as reported by Ofgem (approved measures to December 2013 and notified measures to November 2013). These delivery rates are then interpolated to the end of March 2015, assuming that each company fully meets its ECO targets to the end of March 2015 before levelisation has been accounted for.

## CERT/CESP carry-over of excess actions

- 6.24. Some energy companies over-delivered carbon savings required to meet their CERT and CESP obligations. They are allowed to carry-over some or all of their excess actions to count towards their new March 2015 target, which reduces further the amount of

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<sup>68</sup> Not all companies are expected to deliver their full allocated shares because of the levelisation mechanism and carry forward of CERT/CESP excess actions.

<sup>69</sup> The ECO targets to 31 March 2015 are allocated in phases. 20 % of the target was allocated in Phase 1, 40 % in Phase 2, and 40 % remains to be allocated for Phase 3.

carbon delivered in this target period. The model uses estimates of the percentage of unadjusted CERO and CSCO obligations met through excess actions. However, these carried-over carbon savings will not count towards energy companies' compliance for the purposes of the levelisation calculation.

### Pro-rata extension from 1 April 2015 to 31 March 2017

- 6.25. While there are different options for the precise pro-rata methodology for target setting for the two year period to 31 March 2017, the government's consultation proposition, used for the purpose of the analysis, is to assume that the CERO target will be set on a pro-rata level of CERO activity (in terms of carbon targets) in the period to 31 March 2015. Different methodologies for pro-rata will have very different impacts on the CERO target level. The two-year pro-rata extension target has been calculated on the basis of a constant, annual level of carbon delivery effort. Specifically, it has been calculated as:  $(14 \text{ MtCO}_2 / 2.25 \text{ years}) * 2 \text{ years} = 12.4 \text{ MtCO}_2$ .
- 6.26. We have also assumed that the CSCO targets for the two year target period to 31 March 2017 are set based on the above methodology for CERO. This is in line with the policy intent outlined in the consultation. The two year CSCO target has been calculated as:  $(6.8 \text{ MtCO}_2 / 2.25 \text{ years}) * 2 \text{ years} = 6.0 \text{ MtCO}_2$ .

### 100,000 SWI minimum

- 6.27. The model runs a central scenario where the CO<sub>2</sub> equivalent of 100,000 SWIs is delivered to households between 1 January 2013 and 31 March 2017. It runs an initial scenario where the SWI price is modelled separately from other measures and is constrained to meet the carbon equivalent of 100,000 households, a third over the period 01 April 2014 to 31 March 2015 and two-thirds in the two year period to 31 March 2017 (after the projected delivery to the end of March 2014 has been accounted for). Once the SWI minimum is established, the remaining carbon required to be delivered is optimised across all qualifying measures.
- 6.28. Our initial modelling suggests that the carbon target equivalent to the 100,000 SWI minimum is 4 MtCO<sub>2</sub> lifetime (after in-use factors but before comfort taking). This target only takes into account savings from the SWIs and not from secondary measures installed alongside SWIs, which mirrors the policy intent outlined in the consultation.
- 6.29. Analysis of the ECO measures delivered to the end of June 2013 suggests that the average ECO carbon score from SWI measures is lower than is predicted by our modelling in this assessment.<sup>70</sup> This is likely to reflect that fact that the market is not necessarily delivering savings from the most cost-effective SWI potential, especially electrically heated properties. We believe that the industry will start to deliver larger carbon savings per SWI property as the SWI market matures.

### Requiring all ECO measures to be delivered with a GDAR

- 6.30. A policy measure to enforce the use of GDARs will not impact our estimated costs to suppliers of delivering their carbon targets. This is because, for carbon target modelling purposes, we assume that a GDAR will have been undertaken for all CSCO and CERO measures delivered (see paragraph 7.60 for details).

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<sup>70</sup> This analysis is based on a limited number of SWI delivered to the end of June 2013; around 2,400 SWI installed under CERO and 700 SWI measures installed under CSCO.

## Carry forward of ECO excess actions between ECO target periods and uplifted CERO targets in case of under-delivery

- 6.31. We assume that companies will comply with their ECO targets in all the target periods, in line with appraisal guidance. We therefore assume that the proposal to uplift CERO targets in the two year target period to 31 March 2017 in the case of under-delivery of 31 March 2015 target has no impact. This assumption about 100 % compliance also implies that a proposal to cap the amount of carry forward of over-compliance between ECO target periods will not have an impact on our modelled impacts of the ECO targets.

## Sensitivity analysis modelling and results

- 6.32. The ECO targets are quantity-based targets and there is therefore uncertainty over the costs to energy suppliers of meeting their obligations. We have therefore undertaken sensitivity analysis on key uncertain parameters that we believe could have a significant impact on ECO costs. These include parameters that are external to the policy such as future fossil fuel prices and consumer preferences towards measures. We have also included sensitivities around some of the input cost assumptions that we use in the modelling, such as the cost of HTT CWI and SWI measures, on the basis that we recognise that there is uncertainty about the actual cost of delivering measures.
- 6.33. A further driver of ECO cost uncertainty stems from the interlinkages between ECO and the domestic Green Deal. A high degree of blending of ECO funding and Green Deal finance (or other sources of private finance) will tend to reduce the costs of ECO and vice versa. We have undertaken analysis of different assumptions around the Green Deal policy to illustrate how sensitive the ECO costs estimates are to the domestic Green Deal. Factors that affect the uptake of private finance, such as the requirements around the Green Deal golden rule and the costs associated with taking up a Green Deal Plan, will therefore also affect the cost to suppliers of meeting the ECO targets.
- 6.34. Some of the Green Deal sensitivities reflect the market based nature of this mechanism and the associated uncertainty about costs and availability of Green Deal finance. We have also included a Green Deal 'headroom' sensitivity to illustrate the impact that allowing customers to borrow more on their Green Deal plans could have on ECO costs. This assumption is strictly illustrative of the large impact that such a change could have, as the government does not currently have specific proposals to change the Green Deal regulations to this effect. The impact of the Green Deal sensitivities on ECO costs is based on our assumption that there is blending of ECO funding and Green Deal finance. As discussed in paragraph 5.22, we have observed limited blending of these funding streams to date. If limited blending continues, we would not expect an impact on ECO costs from different Green Deal sensitivities.
- 6.35. Table 18 summarises the ECO carbon target sensitivity scenarios we have analysed and details the assumptions in these scenarios compared to the central scenario.

| <b>Sensitivity scenario</b>            | <b>Description of sensitivity</b>   | <b>Central scenario assumption</b>  |
|--|---|---|
| <b>Low Golden Rule headroom (-25%)</b> | The low headroom scenario models bill savings that can be 25 % less than costs to meet the Golden rule. The effect is to deliver more measures at a lower ECO cost. | There is no headroom: bill savings have to be greater than or equal to costs for the Golden Rule to be met. |
| <b>IAG Price Series</b>                | The IAG price series uses an averaging methodology and includes a standing  | We use a SAP based price series. This series has lower energy prices than the                               |

|   |   |   |
|---|---|---|
|   | charge element of the bill (equivalent to a tariff where the standing charge is included in a fixed unit charge). Using this price series delivers more cost-effective abatement to households and lowers the cost of delivering ECO. | IAG series as it exclude any standing charge element.   |
| <b>Strong Local Authority (LA) action</b>               | A 20 % cut in costs for measures delivered to social housing.   | Cost of measures delivered to social housing is 10 % lower than cost of measures delivered to private rented and owner occupied households. |
| <b>Owner Occupiers pay assessment costs upfront</b>     | Owner Occupiers (not households in other tenures) pay for Green Deal assessments up front.  | The costs of GDAs are assumed to be delivered free of charge and recovered in the Green Deal Plan.  |
| <b>High GDF availability</b>                            | Green Deal finance is available to 90 % of households in the country.   | Green Deal finance is available to 80 % of households.  |
| <b>Increased SWI decision making frequency</b>          | Increases the Decision Making Frequency (DMF) for SWI from 1 April 2014 by 1 % per annum.   | There is no change in DMF for SWI over time.  |
| <b>High fossil fuel prices</b>                          | DECC's high fossil fuel price projections.  | DECC's central fossil fuel price projections.   |
| <b>Low hidden costs</b>                                 | Uses the low hidden costs assumptions (for all measures) from the Ecofys report.  | Uses the average hidden cost assumptions from the Ecofys report.  |
| <b>High SWI learning by doing rates</b>                 | Increases the rate at which costs of SWI installations decline over time to 20 % per annum.   | Installation costs don't decline over time.   |
| <b>Low SWI learning by doing rates</b>                  | Increases the rate at which costs of SWI installations decline over time to 10 % per annum.   | Installation costs don't decline over time.   |
| <b>Owner Occupiers pay 10% of capital costs upfront</b> | Householders in the Owner Occupier sector contribute up to 10 % of the cost of the measures upfront.  | Householders in the Owner Occupier sector do not pay any up-front costs.  |
| <b>Low GDF availability</b>                             | GD finance is available to 70 % of the population.  | GD finance is available to 80 % of the population.  |
| <b>More SWIs are already thermally efficient</b>        | The ratio of solid walls with U-values of 1.9 and 1.4 is 30:70 respectively.  | The ratio of solid walls with U-values of 1.9 and 1.4 is 70:30 respectively.  |
| <b>High hidden costs</b>                                | This scenario uses the high hidden costs from the Ecofys report.  | Uses the average hidden costs from the Ecofys report.   |
| <b>Low fossil</b>                                       | DECC's low fossil fuel price projections.   | DECC's central fossil fuel price projections.   |

|  |  |   |
|--|--|---|
| <b>fuel prices</b>                               |  |   |
| <b>Constant GDF repayments over loan length</b>  | No ability to increase GD plan repayments over time.   | GD plan repayments can increase by 2 % per annum.   |
| <b>Decreased Decision Making Frequency (DMF)</b> | Reduces DMF for CWI and SWI by 1% per annum from 2014.   | No change in DMF for CWI and SWI over time.   |
| <b>Cost of carry</b>                             | This imposes a cost of carry effect of 9 % per annum.  | No cost of carry.   |
| <b>High search costs</b>                         | Doubles search costs for all measures.   | Search costs are assumed to make up 6 % of SW installation costs and 15 % of CWI and LI installation costs.                                 |
| <b>Increased Green Deal Plan costs</b>           | Doubles the one-off/set Green Deal plan set-up costs and the annual Green Deal plan charge to £120 and £38 respectively. | Green Deal plan one off/set up costs is £60, and the on-going Green Deal plan charge is £19 per annum.                                      |
| <b>High Golden Rule headroom (25%)</b>           | Energy bill savings have to be 25 % higher than the Green Deal costs in year 1 in order to meet the Golden rule.         | Energy bill savings need to be greater than or equal to Green Deal costs in year 1 of the Green Deal plan in order to meet the Golden Rule. |
| <b>Maximal HTT CWI costs</b>                     | Doubles the costs of HTT CWI measures to £2,591.   | HTT CWI installation cost is £1,296.  |
| <b>High admin costs</b>                          | Doubles the annual carbon target admin costs to £111m  | Annual carbon target admin costs are £56m   |

**Table 18: Sensitivity scenario assumptions**

6.36. Two combination scenarios have been modelled in addition to the individual sensitivity scenarios listed above.

6.37. **ECO low uptake scenario.** A scenario which combines the following sensitivity assumptions:

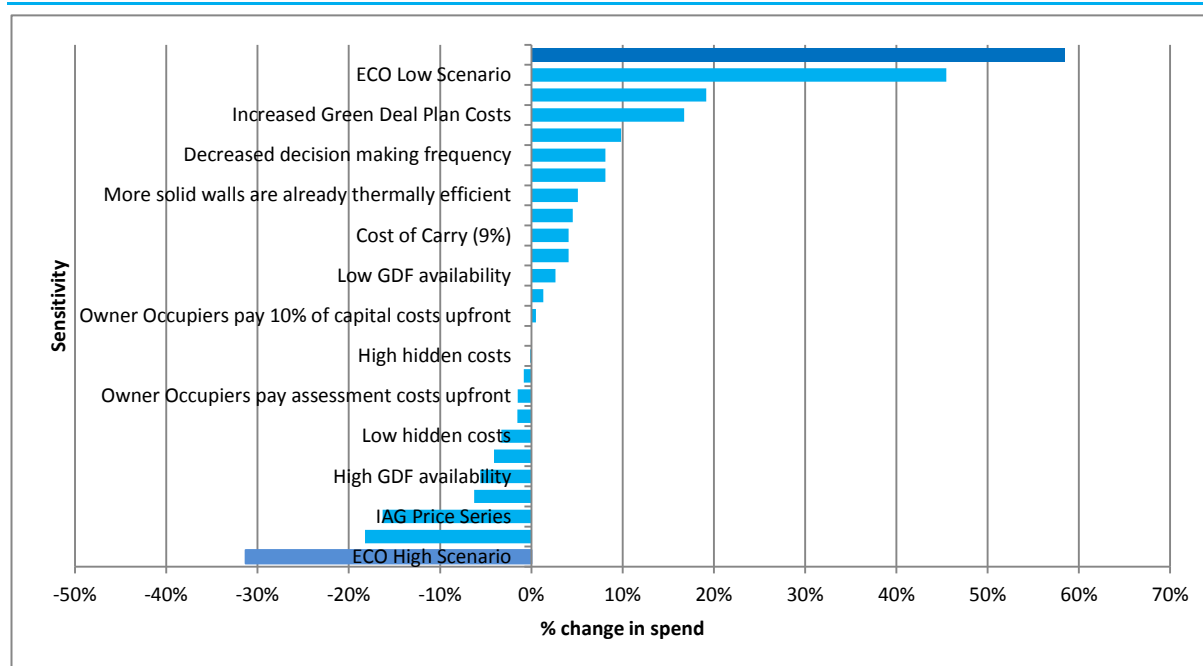
- Cavity wall decision making frequency decreases by 1 % a year from 2014/15
- Solid wall decision making frequency decreases by 1 % a year from 2014/15
- Energy prices are low
- Bill savings must exceed costs by 25 % to meet the Golden rule
- GD Finance covers 70 % of the population
- Search costs are double those in the central scenario
- More SWIs are already thermally efficient

6.38. **ECO high uptake scenario.** A scenario which combines the following sensitivity assumptions:

- Solid wall decision making frequency increases by 1 % a year from 2014/15



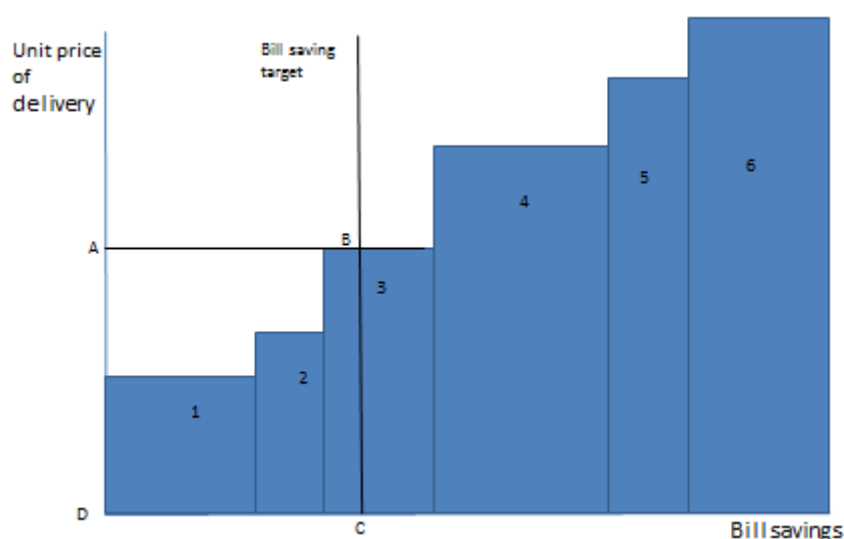
- Energy prices are high
  - Bill savings can be 25 % less than costs to meet the Golden rule
  - Green Deal Finance covers 90 % of the population
  - Solid Wall learning by doing rate reducing costs by 20 % from 2014/15.
- 6.39. The analysis shows that the actual costs of delivering the ECO carbon targets can vary considerably around the central estimate. Figure 4 shows the estimated difference in the annual average cost to companies of meeting their two carbon targets in the two year period to 31 March 2017 for 23 individual sensitivity factors and two combination scenarios (the 'ECO high demand' and 'ECO low demand' scenarios). The bars represent the marginal impact of each scenario, and should not be read as cumulative.
- 6.40. The analysis shows that the highest positive difference in ECO costs is a scenario with high HTT CWI costs, where we estimate that the annual delivery cost in the target period to 31 March 2015 is just under 60 % higher than our central estimate. This result is driven by our assumption that a large amount of HTT CWI will be taken up under the CERO target.
- 6.41. We estimate that the greatest reduction on ECO carbon target costs is in the combination 'high ECO demand' scenario, where annual average costs are around 30 % lower than under the central scenario. We have not undertaken an assessment of the likelihood of each of the individual sensitivity scenario, or of the combination scenarios, materialising. Within the 'high ECO demand' scenario, it seems reasonable to assume a link between increased SWI decision making frequency (and thus uptake) and SWI learning by doing. However, these factors are separate to potential changes to the Green Deal (lower headroom required and greater coverage of GDF) and the external factor of energy prices. This scenario could therefore be interpreted as a 'best case' scenario, but it is not given that all the underlying factors would coincide. The largest reduction on costs from an individual sensitivity scenario is under the 'low Golden Rule headroom' scenario, where costs are just under 20 % lower than the central scenario.



**Figure 4: Marginal variation in the estimated annual average cost of meeting the 31 March 2017 carbon targets**

## 7. The Affordable Warmth Model and the impact of proposals to Affordable Warmth

- 7.1. AW sets energy companies a target to deliver a certain amount of notional lifetime bill savings by a specific time. The cost of meeting this target is estimated using the AW Model which constructs the supply curve for delivering this target. This is shown in Figure 5 below.



**Figure 5: Supply curve for AW**

- 7.2. Measures are ranked in terms of their cost effectiveness to deliver the target; therefore each bar numbered 1-6 in the diagram represents a distinct measure or package of measures that could be delivered by an energy company. The width of each bar shows the total available potential of each package of measures to the supply chain. The height of each bar shows the unit cost of delivering these packages. The total cost of meeting the obligation is then equal to the marginal unit price of meeting the target (the target itself is depicted by the vertical 'bill saving target' line and the marginal unit price is shown by the point where this line intersects the supply curve) multiplied by the total amount of bill savings delivered, i.e. area ABCD.
- 7.3. The original IA estimated that a target of £4.2billion of notional lifetime bill savings would cost around £350million per annum (2011 prices) to deliver between 1 January 2013 and 31 March 2015. This is now the AW target set in legislation for 31 March 2015, and the original IA projected forward this level of spending for the policy out to 2022 (in real terms).

### Changes to the AW model

- 7.4. The model used to analyse AW is broadly the same as the model used for the original IA (see section 5.2 of the 2012 Green Deal and ECO for a detailed description of how the model works).
- 7.5. Below are the updates to the AW model since the 2012 IA:



- SAP prices have now been used to model the estimated lifetime notional bill savings from measures that count towards a supplier's target. DECC energy prices were previously used, however this change better reflects how energy savings are actually estimated. This change has caused an increase in the estimated unit cost of delivery.
- For all non-gas fuelled households, we have assumed there is an additional £300 search cost compared to gas fuelled households. There were previously no additional search costs for non-gas fuelled households. However, this assumption has been made to reflect the apparent difficulties in delivering to these households and the consequential low levels of delivery experienced to date in these house types. This has caused the estimated unit cost of delivery to increase.
- The administration costs of the scheme have now been estimated using actual reported data from the current scheme, instead of the previous methodology which was based on estimated staff time. This has caused the estimated cost of administration to increase, leading to less of the £350 million policy cost available for delivery of insulation and heating measures.
- The model has been made more granular, so that it now assesses the cost effectiveness of insulation measures dependent on the main fuel-type of each household. This change has been made not only to make the model more accurate, but also so that it can evaluate the impact of any off-grid incentive. By splitting out the fuel types of each measure being delivered, it means a more cost-effective delivery pattern emerges than the previous scenario which was based on a single 'weighted-average fuel-type household'. This change has therefore led to a reduction in the estimated cost of delivery.
- The SAP estimates of the lifetime notional bill savings from heating measures being installed have been updated in line with latest advice from the Building Research Establishment (BRE). These updated values are higher than previously used, leading to a reduction in the estimated cost of unit delivery.
- The total number of households eligible for AW has increased from 2.7 million to 3.4 million households. This change has occurred because we have worked with BRE to improve our methodology for identifying people in the English Housing Survey (EHS) who are on benefits which make them eligible for AW. This improved methodology is based on matching DWP benefit records with data in the EHS to identify eligible households, instead of relying solely on the EHS's estimate of people on certain benefits. This data has then been inflated to represent the housing stock of Great Britain (GB), based on the proportion of British homes that are in England. We have chosen to inflate the data from EHS to represent GB instead of relying on data from Scotland and Wales because the under-reporting of people on means tested benefits in the surveys from these two countries impedes their ability to accurately capture the total eligible stock. This increase in the estimated eligible population has led to a reduction in the unit cost of AW as more, cost effective measures are available to the supply chain.

7.6. The cumulative impact of these changes has been to reduce the estimated unit cost of ECO 1 delivery from 19p to 18.5p. A key assumption that remains in the model is that all measures are 100 % subsidised. However there is evidence from delivery to date that

this is not always the case and this may explain why the average unit cost of the scheme through the first year of delivery, around 17p, is lower than what the model currently predicts.<sup>71</sup> We are consulting on the applicability of customer contributions in AW and will take account of any decision made on this in the analysis for the final stage Impact Assessment.

- 7.7. In the period from 1 April 2015 to 31 March 2017 the model estimates that, in the absence of any of the proposed changes, £350million (in 2011 prices) per annum would deliver around £3.8billion of lifetime notional bill savings over two years. This would in effect be the new AW target if there were no proposed policy changes.
- 7.8. As discussed above this includes spending around £20million per annum on administration, and frictional costs associated with changes to AW. This £20million is 27 % of the total administration costs of the first year of ECO, as reported by energy companies to DECC, which is the same proportion of the total cost of ECO attributable to AW. These reported administration costs not only include the on-going reporting costs of the scheme but also the total set up costs associated with ECO. The £20million annual administration costs thus includes a highly conservative figure for the set up/frictional costs associated with all of the proposed changes to AW, such as being able to prove that a warranty has been provided with all boiler replacements, and setting up the capability to uplift the scores of measures delivered to off grid households. Without taking account of these administrative and frictional costs, the target would be set at around £4.0 billion as there would be an additional £20million per annum for delivery of measures.
- 7.9. For the final IA we will also be considering how much the proposed introduction of data matching in AW would reduce these administration costs. Sufficient evidence is not currently available to make this estimate; however we will be seeking this evidence during the consultation period.

## Analytical methodology and impact of proposed policy changes

- 7.10. All of the proposed changes for AW are designed to begin from April 2015, for ECO 2, and last for the remainder of the policy period, until 2022. There are two broad proposals for AW which would lead to a change in the unit cost of delivery. Both of these changes have been included in the option 2 scenario presented in the main body of this document. These changes are: 1) incentivising off-grid delivery, and 2) requiring a warranty be included when any replacement boiler is delivered.
- 7.11. **Rationale to incentivise delivery to non-gas fuelled households.** AW's primary aim is to reduce fuel poverty on a long term basis. We know that rising energy prices are a key driver of fuel poverty, both under a 10 per cent and a LIHC indicator.
- 7.12. Under the LIHC measurement of fuel poverty, we know that a shared characteristic of a significant proportion of fuel poor homes is that they are off the gas grid. This was highlighted in the fuel poverty strategic framework where analysis shows that households using fuels other than natural gas (referred to from this point forward as 'non-gas fuelled households') are more likely to be in fuel poverty, under the LIHC

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[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/267963/Quarterly\\_Statistical\\_Release\\_-\\_GD\\_ECO\\_and\\_insulation\\_levels\\_in\\_Great\\_Britain\\_-\\_19\\_December\\_2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267963/Quarterly_Statistical_Release_-_GD_ECO_and_insulation_levels_in_Great_Britain_-_19_December_2013.pdf)

definition, compared to gas fuelled household.<sup>72</sup> Moreover the latest fuel poverty statistics highlight that these households are not only disproportionately represented in the LIHC population (compared to their proportion in the overall housing stock) but these households are also in deeper levels of fuel poverty compared to other fuel poor households.<sup>73</sup>

- 7.13. AW was designed to be of benefit to a wide-range of households, including to non-gas fuelled households. However, delivery data from the first year of the scheme shows that fewer than 2 per cent of measures have been delivered to non-gas fuelled households. We do not believe this skew of delivery in AW is right and are therefore providing more support for non-gas fuelled households is a priority for government.
- 7.14. One of the main reasons for the current skew of delivery to gas fuelled households is that scoring rules used for the replacement of a 'qualifying boiler' state that when a boiler (of any type) is broken, the household is assumed to be using an electric room heater to heat their home over the lifetime of a new boiler – 12 years. Therefore the notional bill savings that result from replacing a broken 'qualifying boiler' with a gas fuelled boiler are particularly large. This is because there are savings achieved not only from installing a more efficient heating system, but also from the assumption that households are switching from electricity (an expensive fuel type) to natural gas (the cheapest fuel type).
- 7.15. This scoring rule was adopted because we use SAP to measure the level of notional lifetime bill savings from installing measures, and SAP does not have a means of calculating the heating bill of a household when a boiler is broken. Therefore an assumption is required about what technology households use to heat their homes in this scenario. While it was recognised that this assumption would incentivise the delivery of heating measures, it was not intended to incentivise delivery almost exclusively to gas-fuelled households.
- 7.16. **Proposal to incentivise delivery to non-gas fuelled households.** We are proposing two means of incentivising delivery to non-gas fuelled households, starting from March 2015. Both options would be implemented together.
- 7.17. The first is to change the definition of what constitutes a boiler so that the term includes electric storage heaters. This will mean that replacing broken electric storage heaters will lead to a higher notional bill saving score than is currently the case and therefore the measure will become more cost effective for installers to deliver. This is because the baseline heating technology used for a new electric storage heater (running on Economy 7 prices) would change from the current scenario, where the electric storage heaters are assumed to be still working, to one where electric room heaters are assumed to be used (running on standard electricity tariffs). This change would cause the assumed heating bills of the household to be far higher when an electric storage heater is broken compared to what the current set of rules depict. Consequently, the savings achieved from installing a new electric storage heater is increased following this change. This alternative counterfactual is already used for all other qualifying boilers and this change will align the treatment of electric storage heaters with other types of boilers and will help to level the playing field across heating technologies.

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<sup>72</sup> Source:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/211137/fuel\\_poverty\\_strategic\\_framework\\_analytical\\_annex.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211137/fuel_poverty_strategic_framework_analytical_annex.pdf)

<sup>73</sup> Source: <https://www.gov.uk/government/publications/green-deal-energy-company-obligation-eco-and-insulation-levels-in-great-britain-quarterly-report-to-september-2013>

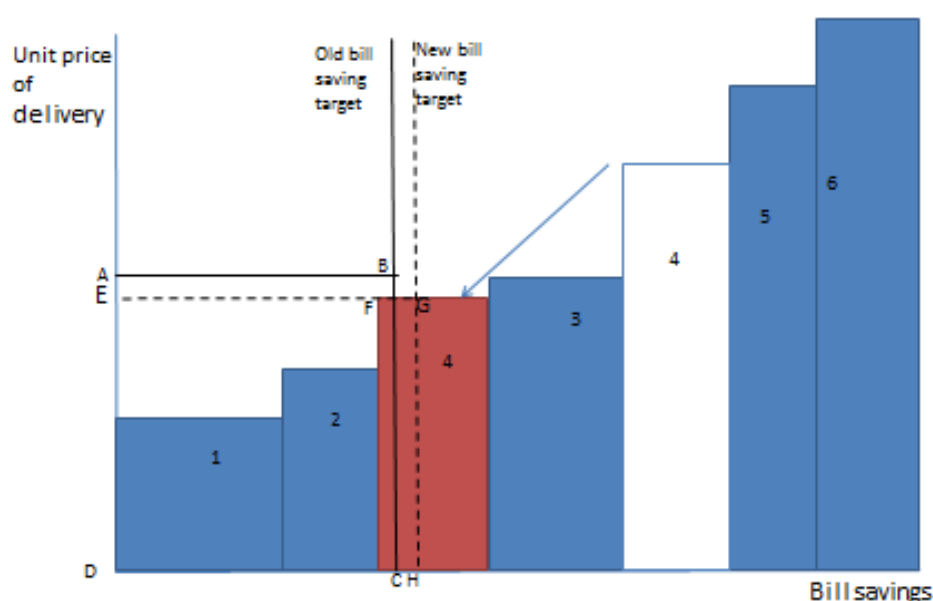
- 7.18. This will not only increase the number of cost effective measures companies can use to meet their target, but also bring the management and AW score of replacing broken electric storage heaters in line with the original policy intent.
- 7.19. The second proposal is to uplift the notional bill saving score of measures delivered to non-gas fuelled households. The government proposes to uplift Electric Storage Heaters (scored, as proposed, on the same basis as a qualifying boiler) and insulation measures by a factor of 1.05 and all other non-gas fuelled measures by a factor of 2. For example if, in the absence of these uplifts, all of these measures gained a score of £100 of notional lifetime bill savings, then insulation and electric storage heaters would now gain a score of £105 and all other heating technologies would gain a score of £200.
- 7.20. The level of uplifts proposed for non-gas fuelled heating measures has been chosen to ensure these measures are a cost effective option for the supply chain. Table 19 below sets out the estimated unit cost of delivering heating measures in a typical household. In the absence of this proposal, the estimated unit cost of delivery is £0.18. Therefore the uplift required in the table is estimated based on the score change needed to change to allow the resulting unit cost to equal £0.18.

| Measure type            | Cost   | Score   | Unit cost (£/ £ lifetime notional bill saving) | Uplift required to make measure cost effective |
|-------------------------|--------|---------|--|--|
| Electric storage heater | £1,900 | £9,400  | 0.19   | 1.05   |
| Replacement oil boiler  | £4,200 | £13,100 | 0.32   | 1.75   |
| Replacement LPG boiler  | £3,200 | £3,000  | 1.07   | 5.75   |

**Table 19: Estimated unit cost of measures in a typical household**

- 7.21. Table 19 highlights that electric storage heaters require an uplift of 1.05 to make these measures comparable on cost grounds to the marginal price of the scheme. This is why this level of uplift is proposed for these measures.
- 7.22. Furthermore, Table 19 highlights that, of the remaining non-gas fuelled heating measures, replacement oil boilers are the most cost effective measure and that they require an uplift factor of 1.75. However, for a replacement LPG boiler to be cost effective to deliver it would need an uplift of 5.75. We still think it is right that suppliers are incentivised to target and deliver cost effective measures in this group and therefore propose to only uplift all non-gas fuelled heating measures (other than electric storage heaters) by a factor of 2. This level is proposed to ensure there is potential to deliver cost effective measures in this group (in particular oil boilers), but excessive rents are still not achievable. An uplift value of more than 1.75 has been chosen to ensure suppliers are incentivised to search for these households given they are likely to be in more remote areas of the country where the supply chain is less developed.
- 7.23. For insulation measures, non-gas fuelled households are already estimated to be more cost effective than gas fuelled households. This is because these households face higher heating bills and thus the bill savings gained from reduced energy demand post insulation is higher than gas fuelled households. This is true even after assuming an additional £300 of search costs for such households. However, there is still limited delivery of AW measures to non-gas fuelled households suggesting that an up-lift for these households is required to incentivise delivery. That is why we are proposing an uplift of 1.05 which is in line with that used for electric storage heaters – the most cost-effective non gas fuelled heating measure.

- 7.24. Both of these options (making electric storage heaters a qualifying boiler and uplifting non gas fuelled measures) would reduce the cost to suppliers in meeting their target, ceteris paribus, as they increase the number of cost effective measures available to the supply chain. Therefore we propose to make this change alongside an increase in the target such that the estimated cost of delivering the policy remains at £350 million per annum. Put another way, were we not proposing these changes then the target for the two year target period to 31 March 2017 would be set at a lower level consistent with the policy costing business £350 million per annum to deliver. They are, therefore, zero cost changes.
- 7.25. In the AW model this is represented by reordering the supply curve as shown in Figure 6 below. The 4th bar in the graph (supposing that the 4th bar represents all non-gas fuelled household potential) moves to the left of the supply curve, thereby becoming a part of the group of measures expected to be delivered.

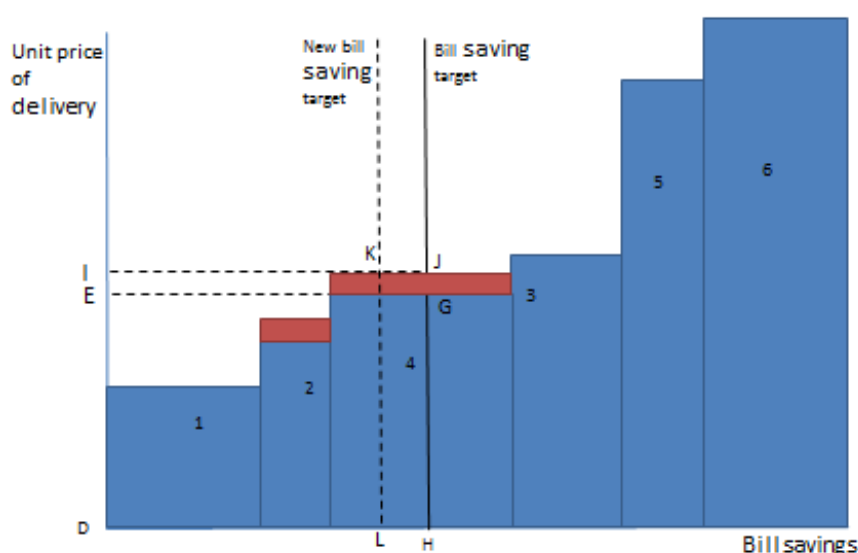


### Figure 6: Effect of incentivising off-grid delivery

- 7.26. The effect of this change is to reduce the cost of the original target from ABCD to EFCD. Modelling estimates these changes would lead to a cost reduction of around £20million (equivalent to area ABFE), with non-gas fuelled households making up 12 % of delivery, compared to 0 % in the original scenario. Given we are aiming to keep the cost of the policy at the same level modelled in the original 2012 IA, this cost reduction allows for a more stretching target to be set. Modelling estimates suggest that having only this policy change would lead to a new target of £4billion of lifetime notional bill savings. This is equivalent to the dotted vertical line in Figure 6 where the area EGHD is equivalent to a cost of £350million per annum. Moreover, this scenario would lead to around 130,000 low income households being assisted each year; an increase of around 8,000 households. This net change makes intuitive sense as the cost of meeting the original target has decreased by around 4 % from these changes; to offset this, the target has increased by around the same proportion: 5 %.
- 7.27. We have been conservative in extending target as a result of this policy change. This is because we have assumed there is an additional search cost of £300 for non-gas fuelled households, on top of the existing allowance for search costs used in the model. This ensures that any cost estimate of non-gas delivery is conservatively high and thus fewer such households and fewer bill savings would be delivered within the £350million budget.



- 7.28. Whilst these are two of our proposed changes, we are interested in stakeholders' views of the viability of these options and whether there are other, more effective routes to incentivise delivery to non-gas fuelled households. Two options we are seeking particular views on are whether we should change the counterfactual heating technology for a 'qualifying boiler', or ask for a minimum level of the AW target to be delivered to non-gas fuelled households.
- 7.29. **Boiler warranty.** DECC have received feedback stating concern about the quality of some of the boiler replacements delivered through AW. The consequence of this is that the benefits to the household in terms of bill savings are not reaching their full potential. Furthermore, many vulnerable households are left without a properly functioning heating system in their household. We thus propose that, from March 2015, all boiler replacements delivered through the policy must include a two year warranty for the household. This will cause an increase in the unit cost of delivery which will be offset by reducing the AW target. As above, the target will be reduced by an amount that is consistent with an average annual cost to suppliers of £350 million. Thus, had we not proposed these changes, the target for ECO 2 would be set at a higher level.
- 7.30. The details of the warranty, and thus ultimately the impact this change has on the cost of delivery, are a subject of consultation. However to illustrate the impact this proposed change has on the target, we have assumed the length of the warranty applied is two years. In this scenario, we would use a conservative cost estimate of £100 for a two year warranty of a replaced boiler. We believe that this estimate is conservative because one energy supplier offers this service for under £96 and because two years' of insurance for heating measures delivered under previous government energy efficiency schemes cost around £80. This price has been included in the cost of boilers and its effect is shown in Figure 7 by increasing the height of bars 2 and 4 by the red blocks (bars 2 and 4 are assumed to be packages which include gas and non-gas boilers in their delivery).



**Figure 7: Effect of enforcing a boiler warranty**

- 7.31. This shows the cost of the policy has increased from EGHD to IJHD, estimated to be an increase of around £25m. To account for this increase in cost, the policy target is reduced from £4.0billion to £3.8billion of lifetime notional bill savings, leading to around 125,000 low income households being assisted each year. This is a conservative reduction in the target; in both modelled scenarios, with and without a required warranty, 77 % of measures delivered are heating measures, however these measures currently



only make up 67 % of actual delivery.<sup>74</sup> Therefore, the cost of the warranty is included in a high proportion of measures in the supply chain, and the estimated cost of the warranty itself is conservative. Moreover, the magnitude of these changes makes intuitive sense as the cost of meeting the original target has increased by just around 7 % and thus to offset this cost the target has reduced by the same proportion : 5 %.

- 7.32. The summary of the impact of these changes is shown in Table 20. The table shows the impact of these changes sequentially such that the change in costs relate to how costs, or the target, change in relation to the row above it i.e. the final row highlights what the change in costs and target is between the full set of policy proposals and a scenario where only the proposals to incentivise delivery to non-gas fuelled households is introduced.
- 7.33. The third proposal for AW, allowing carry forward of excess activity carried out prior to March 2015 that is in accordance with the legislation of the policy over ECO 2, is not shown in the table 2. This is because it is assumed to not change the costs of delivery. This is a conservative assumption given the change increases the flexibility in time that suppliers can deliver activity towards their 2017 target which would therefore create a downward pressure on costs.

| <i>Proposed Change</i>   | <b>Cost of change per annum in the absence of no change in the target (£)</b> | <b>% change in delivery costs in the absence of a change in the target</b> | <b>Amended target to keep total costs at £350m per annum</b> | <b>% change in target so total costs remain at £350m per annum</b> | <b>Number of low income households assisted each year</b> |
|--|---|--|--|--|---|
| <b>Projected scenario given no changes to the policy design</b>  | 0   | 0 %  | £3.8billion  | 0 %  | 122,000   |
| <b>Incentive for delivery to non-gas fuelled households (+ allowing electric storage heater to gain same score as a qualifying boiler)</b> | - £20million  | -4 %   | £4.0billion  | +5 %   | 130,000   |
| <b>Incentive for delivery to non-gas fuelled households + warranty for boiler replacements (summary of AW proposed policy)</b>             | + £25million  | + 7 %  | £3.8billion  | - 5 %  | 1,250,000   |

**Table 20: Summary of AW policy impacts**

<sup>74</sup> Source: <https://www.gov.uk/government/publications/green-deal-and-energy-company-obligation-eco-monthly-statistics-december-2013--2>

## Annex A: Background on CERT/CESP excess action

- 7.34. Under CERT and CESP regulations, obligated energy companies had to notify final positions against each of their obligation, for each of their supply licences, by 31 January 2013. The current ECO regulations make provision for energy companies to carry forward overachievement from CERT and CESP into ECO. However, a number of energy companies are unable to realise the full benefit of their CERT overachievement due to the way they have allocated carbon against their CERT sub-obligations across their licences. Government is consulting on a change to the ECO regulations which would allow energy companies to redistribute the excess action across their supplier licences and therefore carry forward the carbon which is currently 'stranded'. If implemented, the change is likely to lead to an increase in the volume of carry forward of excess action into ECO and therefore benefit the companies concerned.
- 7.35. The volume of excess actions under current ECO regulations has not been determined by Ofgem due to this proposed change. Analysis of the applications provided to Ofgem under the currently legislation shows that excess actions are likely to represent approximately 9 % (2.6 MtCO<sub>2</sub>) of current CERO/CSCO obligations. The additional volumes that would be realised by the proposed redistribution change are unknown. Ofgem estimates that additional excess actions from the proposed redistribution change may be approximately 0.5 MtCO<sub>2</sub>.
- 7.36. The extent to which these volumes will be counted against either the CERO or CSCO targets<sup>75</sup> is also uncertain, as this will be based on commercial decisions made by the affected energy suppliers. For the purpose of the analysis, we have assumed that suppliers will choose to allocate the majority (87 %) of their excess actions against CERO.<sup>76</sup>

|   | Volume without change to regulations | Additional volume with change to regulations (redistribution change) | Total volume following change to regulations |
|---|--------------------------------------|--|--|
| MtCO <sub>2</sub> lifetime (ECO target units) | 2.6                                  | 0.5  | 3.0 <sup>77</sup>                            |

**Table 21: CERT and CESP excess actions assumed in Option 2, central scenario**

<sup>75</sup> Data supplied to Ofgem so far suggest that minimal excess actions will be carried into AW.

<sup>76</sup> This potential allocation between CERO and CSCO is based on the current approximate split between CERO/CSCO of excess actions notified to Ofgem under the existing legislation. Analysis of the new package of proposed legislative amendments suggests that, unlike under existing legislation, ECO carbon unit costs will be higher under CSCO than under CERO. This could lead suppliers to allocate excess actions towards CSCO instead of CERO. Given the uncertainty of the potential allocation and of the underlying excess action volumes itself, we have assumed that the allocation of the volume of excess actions will remain as per the current split of 83 % to CERO and 17 % to CSCO.

<sup>77</sup> Figures do not add due to rounding.

- 7.37. In addition to the change described above (the 'redistribution change'), the government is also consulting on whether any amendments to the legislation should include a new deadline for excess actions applications. Some suppliers are expected to be able to carry over a greater volume of excess action if they are able to resubmit applications for excess action in line with the legislative amendments. The impact on carry-forward volumes is uncertain but Ofgem analysis shows that the change could lead to total carry forward volumes of up to 4.1 MtCO<sub>2</sub> (an additional 1.1 MtCO<sub>2</sub> above the total expected carry forward associated with the redistribution change).
- 7.38. Ofgem analysis of both proposed changes to excess actions has been conducted without visibility of all details of measures installed under CERT and has been limited to the level of data collected under CERT and in current applications for excess action. High level assumptions have been made about suppliers' abilities to maximise their excess action under the proposed changes to the excess action regulations.<sup>78</sup> Whilst analysis shows that the volume of excess action may reach 4.1 MtCO<sub>2</sub> (taking into account both proposed changes), this figure is a maximum and unlikely to be realised.
- 7.39. Our modelling of Option 2 in this assessment does not take into account the additional volumes of carry forward that could be realised from a change that allows suppliers to resubmit applications. If the additional 1.1 MtCO<sub>2</sub> of carry forward was indeed realised, then this would reduce our estimated ECO delivery costs in the period to 31 March 2015 (because a lower level of abatement will be required to comply with CERO and CSCO). The final impact assessment will take into account the final policy position and the latest available evidence on the scale of carry-forward volumes associated with this.

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<sup>78</sup> The below high level assumptions were made by Ofgem when analysing the impact of the proposed regulatory changes to excess actions: 1) applications for excess action from CESP will not change; 2) if the legislation allows a 'redistribution change', suppliers will be able to carry forward all carbon in excess of their total CERT obligation. This figure has been reduced based on feedback from energy suppliers and the level of excess action originally submitted for the 01 June 2013 application deadline (whichever is lower); 3) if the legislation change allows a new application deadline, suppliers will be able to carry forward all measures professionally installed between 02/01/12 and 31/12/12 that are in excess of a supplier's total CERT obligation; 4) CERT sub-obligation limitations have been taken into account; and 5) any excess CERT delivery which is not eligible for CERO can instead be carried forward into CSCO (this assumes that sufficient volumes of measures were delivered in the final year of CERT to CSCO-eligible LSOAs – this data was not reported to Ofgem under CERT).

## Annex B: Detailed modelling analysis: Uptake of measures by ECO target

7.40. Table 22 below shows the estimated uptake of measures under Option 2 by ECO target. As with the figures in Table 3, the table below shows the total uptake of measures including measures that we project would have been taken up in the absence of the ECO policy.

| CERO                           |   |         |         |              |              |
|--------------------------------|---|---------|---------|--------------|--------------|
|                                | LI (stand alone and as part of package) | ETT CWI | HTT CWI | Internal SWI | External SWI |
| 1 Jan'13 – 31 Mar'14           | 29,000                                  | 1,000   | 123,000 | -            | 24,000       |
| 1 Apr'14- 31 Mar'15            | 34,000                                  | 27,000  | 29,000  | 10,000       | 8,000        |
| 1 Apr'15– 31 Mar'17            | 140,000                                 | 90,000  | 209,000 | 32,000       | 13,000       |
| <b>Cumulative to 31 Mar'17</b> | 203,000                                 | 118,000 | 360,000 | 42,000       | 46,000       |
| CSCO                           |   |         |         |              |              |
|                                | LI (stand alone and as part of package) | ETT CWI | HTT CWI | Internal SWI | External SWI |
| 1 Jan'13 – 31 Mar'15           | 88,000                                  | 37,000  | 1,000   | -            | 3,000        |
| 1 Apr'14- 31 Mar'15            | 62,000                                  | 47,000  | 89,000  | 6,000        | 5,000        |
| 1 Apr'15– 31 Mar'17            | 99,000                                  | 73,000  | 145,000 | 8,000        | 11,000       |
| <b>Cumulative to 31 Mar'17</b> | 250,000                                 | 157,000 | 236,000 | 15,000       | 20,000       |
| AW                             |   |         |         |              |              |
|                                | LI (stand alone and as part of package) | ETT CWI | HTT CWI | Internal SWI | External SWI |
| 1 Jan'13 – 31 Mar'15           | 44,000                                  | 13,000  | 6,000   | -            | -            |
| 1 Apr'14- 31                   | 34,000                                  | 3,000   | 2,000   | -            | -            |

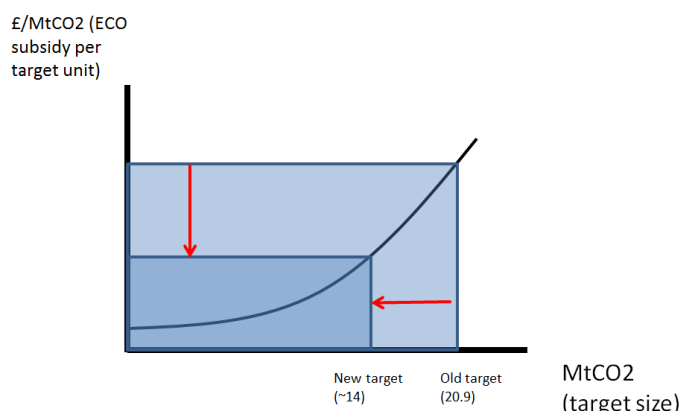
|                                       |         |        |       |   |   |
|---------------------------------------|---------|--------|-------|---|---|
| <b>Mar'15</b>                         |         |        |       |   |   |
| <b>1 Apr'15– 31 Mar'17</b>            | 68,000  | 6,000  | 1,000 | - | - |
| <b><i>Cumulative to 31 Mar'17</i></b> | 146,000 | 22,000 | 9,000 | - | - |

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**Table 22: Uptake of measures broken down by ECO target under Option 2.**

## Annex C: Detailed descriptions of the impact of the individual measures in Option 2

- 7.41. **33 % reduction to CERO.** A reduction to the target size will reduce the cost of delivering the target through directly reducing the amount of abatement required, and through reducing the cost of the marginal measure required to deliver the new target. As in the 2012 IA, it is assumed that the cost to companies of a unit of ECO compliance for each of the targets will be determined by the cost of the marginal unit of compliance.<sup>79</sup>
- 7.42. This effect is illustrated in Figure 8 below. The larger rectangle represents the original cost of meeting the CERO target and the darker rectangle illustrates the revised costs. The horizontal arrows illustrate the reduction in the amount of carbon savings that the companies have to deliver through installing energy efficiency measures, whilst the vertical arrow illustrates the associated reduction in the cost of ECO units. The actual impact on ECO costs from the target reduction will depend on the shape of the ECO point supply curve.

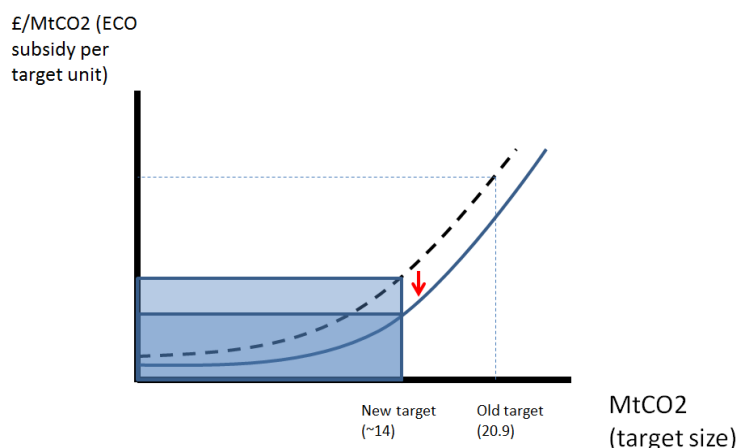


**Figure 8: Illustration of reduced cost of ECO compliance from reduction to target size**

- 7.43. **Extended list of CERO eligible measures.** This change provides the obligated energy suppliers with increased flexibility for delivery of measures under CERO by increasing the number of eligible measures that they have a choice to deliver in order to comply. An illustration of the potential impact of this change is provided in Figure 9 below. The downward shift in the ECO point supply curve is due to new, lower cost sources of abatement having been added to the leftmost part of the supply curve.

<sup>79</sup> See the June 2012 IA for a detailed explanation of the assumptions behind marginal cost pricing that we assume to be a feature of the market for ECO units.





**Figure 9: Illustration of further reduced cost of ECO compliance from allowing lower cost abatement potential**

- 7.44. Our modelling of BAU and Option 2 do not include DHS measures. Our modelling of Option 2 could therefore underestimate the reduction in CERO delivery costs relative to BAU.
- 7.45. **Maximise CERT/CESP carry-forward of excess actions to ECO.** The amended regulations would allow greater volumes of (currently 'stranded'<sup>80</sup>) over-delivery from CERT and CESP to be carried forward to ECO. The excess action volumes would count towards the relevant supplier's allocated ECO targets and therefore effectively reduce the amount of delivery required under ECO and therefore reduce these companies' cost of compliance. The companies that do not stand to realise any additional excess actions amounts with the amended regulations will not see a difference to their allocated targets. They could however, benefit from a small saving in ECO compliance costs, as the marginal cost of meeting the ECO targets is likely to be slightly lower for all companies due to the lower level of demand in the market as a whole.
- 7.46. **Up-lifted CERO scores for early delivery.** The impact on energy suppliers that benefit from the up-lift is to reduce their CERO target and therefore reduce delivery costs. The impact on those companies that do not benefit directly from the up-lift is at worst zero. These companies could, however, benefit from a small saving in ECO compliance costs, as the marginal cost of meeting the ECO targets is likely to be slightly lower for all companies.
- 7.47. The energy companies' trajectories for ECO compliance will be a result of commercial decisions by the companies. However, the available evidence on ECO delivery and contracted volumes to date suggests that most of the companies could stand to benefit from the uplift.
- 7.48. **Removing CERO 31 March 2015 'hard' target.** Under BAU, all three ECO targets to 31 March 2015 are legally binding and suppliers could be fined up to 10 % of their annual turnover if they fail to meet their allocated targets.<sup>81</sup>

<sup>80</sup> See Annex A for background.

<sup>81</sup> Under the current ECO regulations, the scheme administrator has the legal power to fine companies that are found to be in breach of their obligations under ECO up to 10 per cent of the licensed company's annual turnover. This is the maximum penalty the regulator can impose, and the decision on whether a company has breached its obligations, whether to initiate enforcement action, what enforcement action to take and the level of any possible fine are matters to be decided by the regulator.

- 7.49. The government proposes to maintain the AW and CSCO targets to 31 March 2015 as 'hard' targets, but to increase the flexibility for CERO compliance in this period. It will do so by giving the obligated companies the option to comply with their CERO targets by 31 March 2015, or to comply over a longer period of time to 31 March 2017 with an extra burden of doing so. The proposal is to remove the penalty for non-compliance with the CERO target (the companies' new targets after the 33 % reduction to CERO) to 31 March 2015. Companies that under-deliver on their CERO targets to 31 March 2015 would see their allocated CERO target for the two year period to 31 March 2017 increased by 1.1 times its shortfall of delivery against their March 2015 targets.<sup>82</sup> This replaces an uncertain but potentially very large fine with a clear rules-based system allowing more flexibility for obligated parties and an incentive to maintain insulation activity during the period to 31 March 2015.
- 7.50. A company that chooses to under-deliver on their 31 March 2015 targets would do so only in one circumstance. That is, if the additional cost of delivery in the two year period to 31 March 2017 is lower than their estimated value of the avoided costs of delivery and the associated penalty for non-compliance in the period to 31 March 2015. On the assumption that companies do comply with their targets, the suppliers that struggle to meet their CERO targets under BAU would have to exert additional effort to comply and avoid a penalty. The cost of this is uncertain but potentially large.<sup>83</sup> Under the proposed change, suppliers can still choose to exert this effort, should they decide that it is less costly for them to do this than to deliver an increased target to 31 March 2017. With the change, therefore, suppliers benefit from having an increased number of options available to them in terms of CERO compliance and can choose whichever route is most cost-effective for them.
- 7.51. **CSCO eligible areas extended.** This mechanism should reduce the cost of delivering CSCO units by increasing the pool of eligible households. We estimate that the number of CSCO eligible households increases from approximately 3.9 million to approximately 6.5 million with the policy change.<sup>84</sup> This policy change is deregulatory by increasing the flexibility for companies to deliver their CSCO targets in the period to 31 March 2017.
- 7.52. **Benefit requirement of the Rural Safeguard removed.** We estimate that this measure could expand the number of eligible households from around 600,000<sup>85</sup> to around 1.3 million.<sup>86</sup> Energy suppliers and the supply chain have indicated that there is a large administrative burden associated with meeting the benefit criteria of the CSCO target. This is due to high search costs of finding households that meet the very specific eligibility criteria. At least one of the obligated energy suppliers has specifically recommended this option for reducing costs

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<sup>82</sup> For example, a supplier with a target to March 2015 of 5MtCO<sub>2</sub> that only delivers 3.5 MtCO<sub>2</sub> will have a two year target to March 2017 that is  $(5-3.5)*1.1=1.65$  MtCO<sub>2</sub> greater than they would have otherwise been given

<sup>83</sup> The total cost would depend on the delivery costs of the additional units required for the two year period to 31 March 2017 and enforcement actions from the ECO scheme which is at the discretion of the scheme administrator. The maximum penalty the regulator could impose is a fine of 10 % of a company's annual turnover. The likely enforcement action is unknown, but it is reasonable to assume that it will be proportionate and punitive to the extent that it would strongly dis-encourage non-compliance. The added benefit of flexibility described above is likely to outweigh the potentially higher costs of delivery of the uplifted CERO units.

<sup>84</sup> Source: Consensus survey data.

<sup>85</sup> This is the incremental impact of removing the benefit criteria after increasing the IMD criteria; 600,000 is the number of rural households on defined benefits in the 25 % lowest IMD and is based on English Household Survey data. The exact comparison with the 6.5 million estimate, sourced from census data, is imperfect due to differences in data sources.

<sup>86</sup> This is the estimate of the number of rural households in the lowest 25% IMD.

- 7.53. **SWI minimum.** The government is consulting on whether the minimum should be specified in terms of the number of SWI, or the ECO carbon score equivalent to 100,000 SWI.<sup>87</sup> The government's intention is that the target will reflect the amount of carbon savings delivered only from SWI and not secondary measures that have been delivered alongside SWI. The obligated suppliers can meet their allocated minima by delivering SWI under any of their ECO obligations.
- 7.54. Compared to other insulation measures, the SWI market is still in an early phase with limited deployment to date<sup>88</sup> and large remaining technical potential.<sup>89</sup> SWI is one of the key technologies for long term mitigation targets in the domestic building sector, and supporting the deployment of SWI now through introducing a minimum should drive down the cost of this technology in the future through learning by doing and innovation. Reducing the cost of this technology now, and therefore the cost of carbon abatement in the domestic sector in the future, is therefore strategically important for the UK's long term carbon reduction ambitions. A SWI minimum was suggested by some respondents to the government's September 2013 Call for Evidence on SWI delivery as one way to address existing barriers to SWI delivery.<sup>90</sup>
- 7.55. The impact on ECO delivery costs will depend on the extent to which the measure forces a change in the mix of measures delivered for ECO compliance compared to BAU. ECO delivery costs would be higher if the SWI minimum is greater than the level expected to be delivered by the obligated suppliers under the BAU option, as suppliers would have to deliver more SWI than they would have otherwise chosen to do. Our analysis suggests that the level of the minimum is likely to be below the estimated level of SWI delivery under BAU for the market as a whole over the period to 31 March 2017 (at around 136,000).<sup>91</sup> The minimum would therefore not represent a binding constraint compared to BAU. This analysis is supported by anecdotal evidence from some of the obligated suppliers and the ECO supply chain that the minimum is below the volumes of SWI some suppliers currently have tentative delivery plans for.
- 7.56. **Safeguard of CERO ETT CWI and LI delivery to low-income households.** The rationale for this measure is related to the distributional impact of ECO and the underlying rationale behind the Green Deal as a means of ensuring that households that are able to pay for energy efficiency measures do so. We assume that the subsidy cost of measures supported by ECO is passed through to all energy consumers through energy bills and therefore that the cost of measures supported by ECO is borne not just by the beneficiary of the measure. The impact of ECO is therefore regressive because, on average, low-income households spend a greater proportion of their income on energy bills. Moreover, ETT CWI and LI both generally lead to a higher level of energy bill savings for the household than their up-front cost. Therefore, there is a legitimate

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<sup>87</sup> The potential SWI minimum carbon target would be uplifted to take into account estimated savings from secondary measures in the event that the target is set based on savings also from these measures.

<sup>88</sup> Around 27,500 SWI measures were installed under ECO up to end of December 2013 (Domestic Green Deal and Energy Company in Great Britain, Monthly Report (February) ([https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/282915/Statistical\\_Release\\_-\\_Green\\_Deal\\_and\\_Energy\\_Company\\_Obligation\\_in\\_Great\\_Britain\\_-\\_20\\_Feb\\_2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/282915/Statistical_Release_-_Green_Deal_and_Energy_Company_Obligation_in_Great_Britain_-_20_Feb_2014.pdf)))

<sup>89</sup> The technical potential for SWI in GB was estimated at 7.65m properties at the end of September (Table 2.5 <https://www.gov.uk/government/publications/green-deal-energy-company-obligation-eco-and-insulation-levels-in-great-britain-quarterly-report-to-september-2013>)

<sup>90</sup> Open letter issued 10 September 2013, "Invitation to submit views, plans and evidence on solid wall insulation (SWI) delivery and finance".

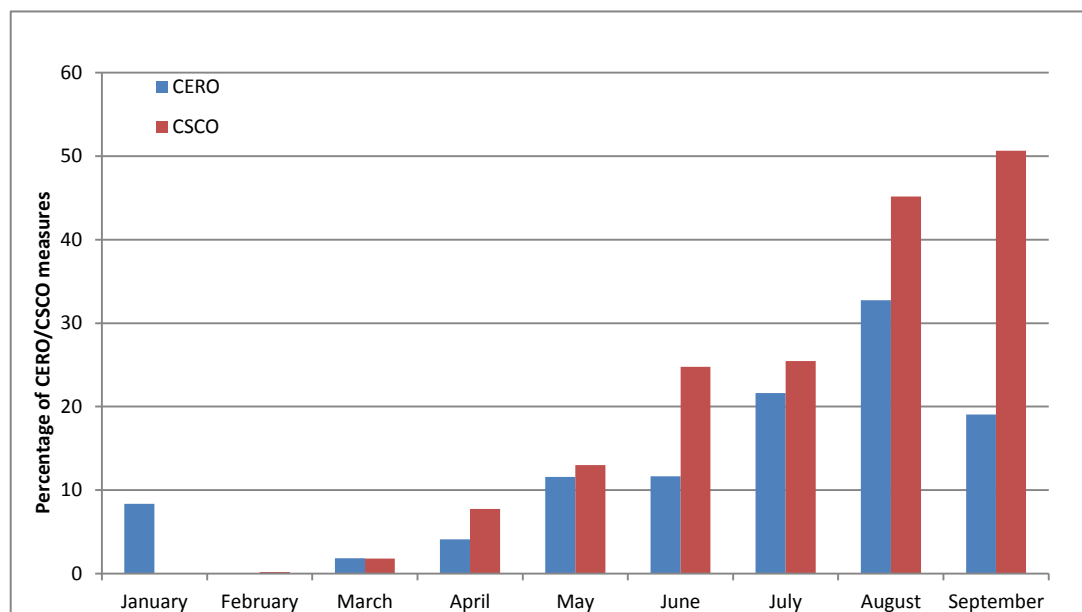
<sup>91</sup> This is based on our updated modelling of ECO. We do not model delivery for individual companies.

question to whether CERO subsidy should be reserved for those households who are unable to pay for this upfront cost – low income households.

- 7.57. The government currently has no statistical evidence on the delivery of CERO measures across income groups, but we are seeking this evidence from the evaluation. With this policy proposal at least a certain proportion of low-income households would receive CERO subsidy for ETT CWI and LI. Such a proposal would therefore improve the distributional benefits of the policy and help tackle fuel poverty, with a mind to the future fuel poverty target for England, which will seek to cut bills and increase efficiency in the coldest low income homes.
- 7.58. A safeguard of this nature could have an impact on ECO administrative, the scale of which would depend on the complexity of the rules, for instance in relation to reporting compliance to the regulator and proving that households are eligible. Such a safeguard could also impact on ECO delivery costs if suppliers are constrained to deliver measures to households that they would not otherwise choose to deliver CERO measures to. Similarly, the positive impact of government action to facilitate further data matching, notably allowing obligated suppliers to quickly and efficiently verify a customer's eligibility (e.g. are they in receipt of certain benefits / tax credits) prior to the installation of measures would need to be taken into account. Such a service could be in place prior to March 2015 and we would expect it to ease the administrative costs, notably the reporting and compliance costs associated with verifying AW Group (AWG) customers. Alongside this we continue to explore other ways to improve targeting of policy using the LIHC Indicator.
- 7.59. This measure is just one of many possible ways to improve the distributional impact of ECO and safeguard ETT measures to low income groups. The consultation will seek views on what the appropriate mechanism is to achieve this objective.
- 7.60. **GDAR required for all measures funded by ECO from 1 April 2015.** The rationale for requiring that all measures funded through ECO should be recommended on the basis of a GDAR (except for in the exceptional case of blocks of flats) is to ensure that all ECO measures are installed by an appropriate professional and to ensure alignment with the Green Deal.
- 7.61. The measure could impact on ECO delivery costs across all three targets by constraining the markets current flexibility in ECO delivery compared to BAU. A recommendation report is currently not required for AW. For the two carbon targets the supply chain can currently choose whether to undertake a GDAR or a Chartered Surveyors Report. Up to the end of September 2013 20 % of CSCO measures and 16 % of CERO measures were accompanied by a GDAR. The statistics indicate that less than 1 % of AW measures were delivered with a GDAR.<sup>92</sup> This suggests that the change could impose a binding constraint in the real world and could therefore have an impact on ECO delivery costs.

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<sup>92</sup> DECC believes that there may be issues with the AW GDAR data quality as no AW measures were expected to be delivered with a GDAR.



**Figure 10: Percentage of CERO and CSCO measures installed with a GDAR by month, to end of September 2013<sup>93</sup>**

- 7.62. The change would not impact on DECC's modelled estimates for ECO delivery costs. This is because we already assume, for modelling purposes, that all carbon target measures are undertaken with a GDAR. The cost of a GDAR is not included in the modelling of the AW target, and it is likely that a requirement for GDARs would increase the unit delivery cost for AW measures. However, should this measure be implemented, government will account for the increases in unit costs by reducing the AW target accordingly (like it would if the boiler warranty proposal is implemented).

<sup>93</sup> January data includes some measures installed between 1 October and the end of December 2012. Percentages are based on ECO measures data from the November 2013 GD/ECO Statistical Release (the latest information for which further breakdowns have been published)

<https://www.gov.uk/government/publications/green-deal-and-energy-company-obligation-eco-monthly-statistics-november-2013>

## Annex D: Assumptions log

- 7.63. Most assumptions in the GDHM are unaltered since the 2012 final IA, except for the following:
- Prices have been updated to 2013 prices;
  - Present value calculations use 2013 as their base year;
  - Hard to treat cavity wall costs have changed from £1,875 (2011 prices) to £1,250 (2011 prices) or £1,296 (2013 prices);
  - Hidden costs have been updated to £12,250 for internal SWI, £1,720 for external SWI, £100 for CWI and £125 for LI;
  - ECO Administration costs have been updated to £76m per annum applied proportionally across CERO, CCSO and AW;
  - The set up costs of a Green Deal plan have been increased from £16 to £63 and the annual charge for a Green Deal plan has been increased from £8 to £20;
  - The energy price series has been updated to use a historic price from SAP, projected forwards using the IAG price series used in the 2012 final IA; and
  - Households are assumed to fully comply with EPC regulations and the PRS regulations once they have been introduced



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