

# RECOMMENDATIONS FOR A FUTURE ENERGY COMPANY OBLIGATION

Enabling innovation, taking a multi-measure approach and delivering in-situ performance

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# Acknowledgements

This report is based on a series of stakeholder workshops co-hosted by the Sustainable Energy Association (SEA) and the Department for Business, Energy & Industrial Strategy (BEIS). Representatives were drawn from Ofgem, obligated suppliers, consultancies, charities, installers, manufacturers, social housing providers and beyond. The scope of the workshops was defined in partnership with the BEIS ECO team to provide a summary of cross-industry feedback on the Energy Company Obligation (ECO). Findings from the workshop were supplemented in the final report by secondary research, and a survey of installers undertaken by NAPIT on behalf of the SEA. We would like to thank them for their contribution and all workshop attendees, the BEIS ECO team and SEA members for their input.



## Foreword by Lord Best

President of the  
Sustainable Energy Association

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*In June 2020, the Committee on Climate Change released its Annual Progress Report to Parliament, which assessed the headway that government has made in moving towards a net-zero economy by 2050. The Committee found that progress in building and heating policy lags far behind what is needed and commented that ‘the key remaining elements of the net-zero policy package must be put in place in the coming months, early enough to demonstrate the UK’s credentials ahead of COP26’ (the 26th United Nations Climate Change conference, which the UK is hosting in November 2021)<sup>1</sup>. We are expecting a host of announcements before this event which could demonstrate the UK’s leadership in addressing climate change.*

*It is expected that among other measures, government will want to take action that combats fuel poverty through programmes like ECO. Given the Government’s aspiration to bring all fuel poor homes up to an Energy Performance Certificate (EPC) band C by 2030, ECO will be a key programme in realising this goal. However, with less than a decade to achieve this, additional funding and reforms to fuel poverty programmes are needed.*

*The coronavirus pandemic has increased the urgency for action. It has confined us to our homes and, for many, this will mean spending more on energy costs. This will hit those in fuel poverty especially hard. Moreover, warm and dry homes are essential if COVID-19 sufferers are to fully recover when discharged from hospital.*

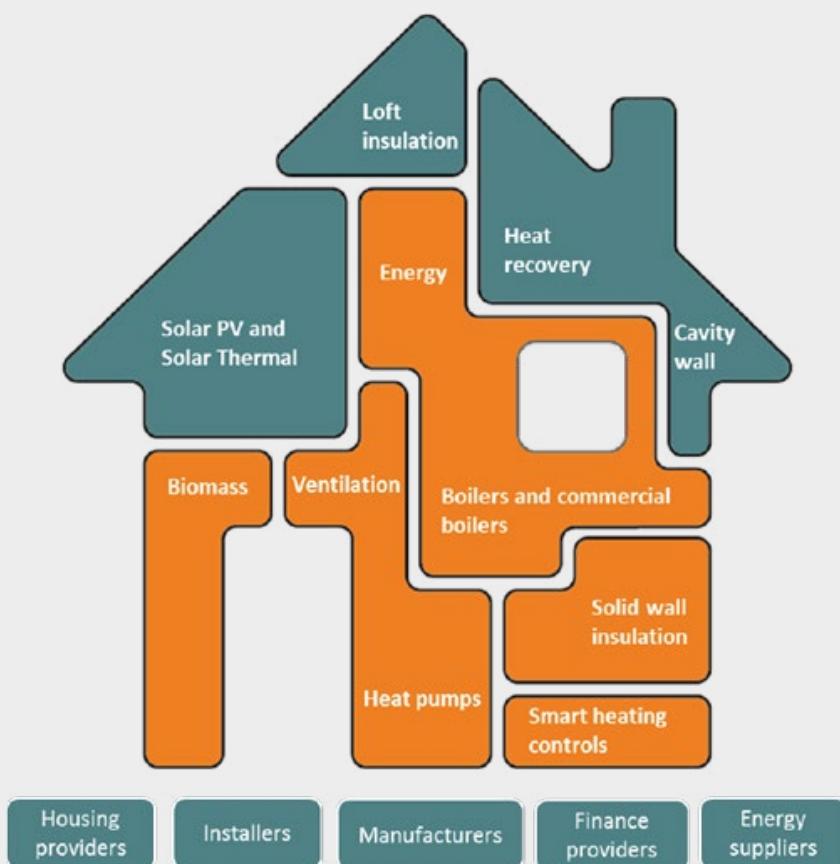
*As we enter a new heating season, policymakers must focus on prioritising those most in need by improving the energy efficiency of the most poorly insulated homes. To assist, ECO needs revising from its current emphasis on the installation of one or two energy efficiency measures towards a more holistic approach that delivers multiple measures to make homes energy efficient, low carbon, warm and healthy. To get the buy-in of households, public campaigns and education will be key; this will help to ensure occupants understand not only the cost savings that energy efficiency can bring, but how this can improve their comfort, health and wellbeing.*

*Given the climate emergency, the Government will want to support market innovation that increases installation speeds of energy efficiency measures and improves the holistic retrofit of fuel poor homes. Innovation is supported in the current ECO programme, but modifications are needed to successfully back product development in the sector.*

*This report contributes to the discussion through evaluating how the current ECO scheme can be improved to ensure fuel poverty is tackled in this decade. These SEA recommendations offer practicable solutions to improve the delivery of ECO and are aimed at informing policy development ahead of future consultations on the scheme. I commend the Sustainable Energy Association and its members for this timely contribution during a vital year for climate change action.*



# About the Sustainable Energy Association



*In a world of finite resources, the Sustainable Energy Association exists to help create living and working spaces fit for future generations. Our work seeks to align the interests of business, politicians and consumers to make this a reality.*

We are industry leaders in energy in buildings. We provide objective, evidence-based policy positions which help shape how we think about, generate and use energy. We are constructive, collaborative and committed to achieving our vision, by ensuring that buildings are energy efficient, low carbon, warm and healthy.

The Sustainable Energy Association (SEA) is a member-based industry body. We draw on our wide-ranging membership from manufacturers of energy saving technologies and heating systems to housing associations with an interest in sustainable energy. SEA members manufacture, distribute, install, retail or regulate a range of technologies; they also own and manage homes and supply energy. We take an objective 'whole building, technology agnostic approach' that recognises that there is no single solution to the energy challenges faced by the UK.

# Executive summary

The Energy Company Obligation (ECO) has traditionally focused on the installation of single energy efficiency measures in eligible households at the lowest possible cost. In 2021, the Government proposes to outline details for a successor. This report focusses on three specific elements for a future ECO programme: the delivery model, innovation routes, and in-situ performance.

Delivery of ECO is evolving to incorporate a whole house view, utilising the PAS2035:2019 standard to guide the installation process and sequencing of measures. The shift to a multi-measure approach must incentivise the delivery of structural improvements and be accompanied by greater engagement with eligible households.

Innovation routes were added to ECO in 2018 but have had minimal impact on delivery. There are several simple administrative reforms that, if made, will drive greater deployment and improve retrofit outcomes for the worst performing homes. Similarly, the in-situ performance mechanism was introduced in 2018 but to date no obligated suppliers have used it. The technologies incentivised under the in-situ performance mechanism have the potential to transform the retrofit and construction markets but there are challenges in reconciling them with ECO's current delivery model. Therefore, unless the incentive structure for suppliers is made more attractive, it is unlikely that any will choose to deliver their obligation through in-situ performance.



# The full list of recommendations:

## A Multi Measure Approach:



- A fundamental change to the scheme's primary objectives is needed to move to a multiple measure approach. Any successor scheme should restrict eligibility to the worst performing homes (i.e. EPC band E, F & G) where significant improvements will be required to meet the Government's target of bringing all fuel poor homes up to an EPC band C by 2030.
- Any requirement to improve homes by EPC bands should include interim bands, for example, from a high EPC band F to a high EPC band D, tied to a specific increase in SAP points.
- The scoring framework needs to appropriately incentivise a multi measure approach to cover the costs of the new roles required under PAS2035:2019.
- Installing multiple measures in the worst performing homes will require structural improvements in addition to energy efficiency measures so enabling works should be given a score.
- Timely advice will be critical to gain the trust of householders, who should have access to different sources of engagement before, during and after installation. Following completion, recipients of ECO measures should be advised of how they can access and use the Property Hub, to build a sense of co-ownership in the work undertaken and knowledge of future improvements that may be necessary.
- It is crucial that households understand the full benefits (beyond bill savings) of a multi measure approach, such as comfort levels, respiratory health, and the reduced disruption of installing multiple measures simultaneously, as opposed to incrementally.
- Only measures included in the medium-term retrofit plan should be installed, and households should be permitted to refuse a measure if the retrofit coordinator judges that its exclusion will not lead to unintended consequences.
- Installing a single measure should be permitted where it is not technically possible to install a second, provided it does not generate unintended consequences.

## Enabling Innovation:



- Standard Assessment Procedure (SAP) needs to be updated more regularly to give more frequent opportunities for innovation to be recognised in the methodology.
- The application process for Appendix Q must be clearly communicated to all innovators applying for innovation funding through ECO.
- Applications for demonstration actions are restricted to those with a Technology Readiness Level (TRL) of eight or nine, limiting eligibility to companies who may have already conducted live testing. Relaxing this requirement to include TRL-7 will increase the diversity and number of applicants who need support in testing their products.
- Recruiting participants for live field trials is costly and resource intensive. To simplify this process, the Government should create a database of ECO eligible residents who are willing to participate in field trials.
- Clear advice on evidence requirements should be given. Currently, applicants for demonstration actions must present their own monitoring methodology with insufficient levels of guidance from Ofgem.
- Communication with Ofgem is sporadic and inconsistent. Direct communication between obligated suppliers and Ofgem's Technical Advisory Panel (TAP) would foster a mutual understanding and knowledge transfer between innovators and decision makers.
- Applicants are not asked what the research outputs from a demonstration action trial will be used for. This question should be introduced into the application process to better understand applicant motivations and generate learnings to further refine the innovation routes.
- Measures delivered through demonstration actions are not automatically included in SAP despite its importance in commercialising building-related products. Products that are approved through demonstration actions should receive financial support to fast-track their innovation into SAP's Appendix Q.
- Innovation uplifts granted in ECO3 should continue into the next iteration of the scheme to stimulate delivery.

## Delivering In-Situ Performance:



- Fuel poor households often ration energy use, and may seek to increase their consumption to achieve greater levels of warmth post-installation of energy efficiency measures. ECO scores should not be impacted negatively by this increased energy spend, so any reforms to an in-situ performance mechanism must de-risk under-consumption for suppliers.
- Set up costs for in-situ performance monitoring are deemed excessive by suppliers. ECO should provide support to partially cover the set-up costs which should vary according to the accuracy of the monitoring methodology used by suppliers.
- The Government should expand the 10% limit on obligation delivery to further incentivise adoption and enable greater economies of scale.



# Introduction

ECO was first introduced in 2013, with the aim of improving the energy efficiency of fuel poor households in Great Britain.<sup>2</sup> It requires obligated suppliers to supply funding for the retrofit of energy efficiency improvements, or measures, within households. The obligation applies to medium and large energy suppliers, who generally outsource the installation of measures to managing agents. Obligated suppliers have targets based on their share of the British domestic energy market. There have been three rounds of ECO funding, with the current iteration (ECO3) running from 2018-22. From January 2013 to December 2019, 2,064,700 households had measures installed, generating lifetime emissions savings of ~ 49.0 MtCO<sub>2</sub>.<sup>3</sup> However, the current rate of delivery is not enough to meet the UK Government's target of upgrading every fuel poor home to EPC C by 2030, and all homes to EPC C by 2035. This is partially due to an ECO framework and delivery model that has not yet tackled complex cases where a multi-measure approach would significantly improve carbon reduction.

In 2021, the Government proposes to consult on proposals to refine any subsequent ECO programmes. This is an ideal time to assess the performance of the scheme so far and what changes need to be made. The scheme has a history of evolution as targets have shifted to meet delivery priorities. The first programme, ECO1, had three main obligations: the Carbon Emissions Reduction Obligation (CERO), the Carbon Saving Community Obligation (CSCO), and the Home Heating Cost Reduction Obligation (HHCRO). CERO focused on the insulation of solid and hard-to-treat cavity walls and included able to pay households in its scope. CSCO focused on the installation of insulation measures or connections to district heating schemes in homes situated within an area of low income or rural setting. HHCRO focused on cost savings and improving the affordability of eligible fuel poor households to heat their homes. This has evolved with each iteration, and the current scheme (which runs from 2018-2022) focusses installations on vulnerable occupants; installations are limited to the social housing sector, eligible (under HHCRO) fuel poor homes, and residents who are means tested by their local authority. The Government must decide whether the next iteration of ECO will continue to limit installations to the most vulnerable or reintroduce CERO and widen eligibility to include the able to pay sector. Doing so could increase the volume of measures installed and reduce administrative costs but could reduce delivery for fuel poor homes.

Such amendments to the primary legislation which underpins ECO can only be made through new primary legislative powers, and the forthcoming Energy Bill will be an ideal opportunity to make these changes through Parliament. The current pressure on delivery through HHCRO has increased the costs in finding eligible households and exposed flaws in the obligation itself. For example, the current legislation only refers to 'space' heating, excluding any measures that reduce carbon in other ways, such as heating of water. Therefore, the wording of the HHCRO legislation must be amended in any future ECO scheme to broaden the definition of heating and allow inclusion for a greater range of measures. In addition to eligibility criteria, the Government needs to decide how the programme should be delivered.

Until now, ECO has aimed to deliver large volumes of single measure installations at the lowest cost to consumers, managed by obligated suppliers. The households where more expensive interventions are required to significantly increase bill savings have repeatedly been filtered out, leading to a backlog of the worst performing homes. In the worst performing homes, one energy efficiency measure will rarely be significant enough to increase the property by multiple EPC bands and many of them will require structural work prior to making any energy efficiency improvements. The Government will have to consider whether energy suppliers are best placed to deliver these complicated retrofits or whether it can be delivered more efficiently through other providers. Given the seismic shift to multi-measure delivery, consideration should be given to the possibilities of opening up delivery to other interested parties in the construction sector.

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Regardless of the overarching delivery model, there are several factors that can smooth the transition from a single to a multi-measure approach. For example, the benefits of a multi-measure approach need to be appropriately communicated to consumers to get their buy-in and prepare them for any short-term disruption. Furthermore, the supply chain must be incentivised through an ECO scoring framework that rewards enabling work and multiple measures.

ECO3 has been utilised to support innovation in the energy efficiency market in recent years. New delivery mechanisms to promote building performance testing and innovations in energy efficiency products were introduced in 2018 yet both are currently underutilised. The innovation routes have provided support for a range of technologies, but the application process is overly burdensome for many Small & Medium Sized Enterprises (SMEs). This report summarises these delivery mechanisms and outlines recommendations to improve their efficacy.

More broadly, the Government must decide if support for innovation should even remain in ECO at all. A range of new schemes like the Green Homes Grant, Social Housing Decarbonisation Fund, and the Homes Upgrade Grant offer new opportunities to support innovative technologies and monitoring approaches that, until recently, have been solely supported through ECO. Therefore, policymakers have to consider whether new funding programmes have greater potential to deliver market growth for innovations or if ECO remains the best place to support innovation, despite the current rate of underutilisation.

However, not all barriers to innovation stem from ECO alone. SAP methodology is used as the basis to score the installation of measures in ECO and is therefore integral to the inclusion of new innovations. The lengthy delays between SAP updates has led to the methodology itself becoming a barrier to new technologies and more regular amends are needed to include new products. Funding through ECO innovation mechanisms does not automatically lead to SAP inclusion, so a future ECO scheme should aim to facilitate this to smooth the commercialisation process for innovators.

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In-situ performance was introduced as a voluntary delivery mechanism in ECO3 but has not seen any uptake. This permits suppliers to deploy real time data monitoring to measure the impact made by an installed measure as opposed to an estimation. Such technologies have the potential to revolutionise the retrofit and construction markets but there are challenges in reconciling them with ECO's current delivery model. De-risking issues around underconsumption of energy will be a key barrier to overcome, and reforms are needed to the incentive structure. In-situ performance should not be mandated within ECO but be incentivised to keep pace with developments in other countries and other domestic funding programmes.

This report follows a series of industry stakeholder workshops jointly hosted by the SEA and BEIS. The three workshops covered the headline topics: a multi-measure approach, enabling innovation, and delivering in-situ performance. They were also supplemented with secondary research, stakeholder feedback, and industry data collected by NAPIT for the production of this report, which seeks to coalesce recommendations that inform the policy development for any future ECO scheme.



# A Multi-Measure Approach: A Step Change in Delivery

## Driving a multi measure approach

Historically, ECO has aimed to deliver the greatest volume of measures at the lowest cost to consumers, which has led to a huge number of cavity wall, and more recently boiler, installations. Since commencement, 77 per 1000 households have had measures installed under ECO, with the highest rates of installation observed in the North East (102 per 1000) and West (117 per 1000) respectively<sup>4</sup>. However, the focus on cost-efficient delivery has led to a cherry-picking of properties where installations are simpler and cheaper, ignoring those in need of structural work or more expensive measures, which traps the worst performing homes in fuel poverty.<sup>5</sup> The most poorly insulated homes are often inhabited by those most in need of support, so ECO must evolve to take a multi-measure approach in order to address fuel poverty.

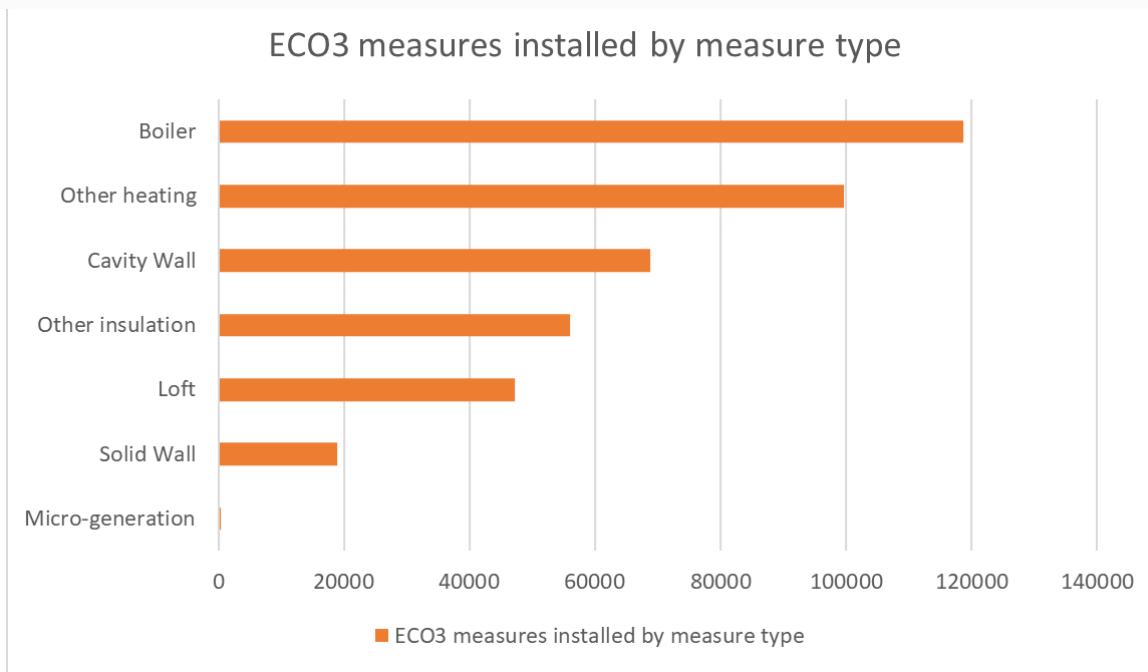
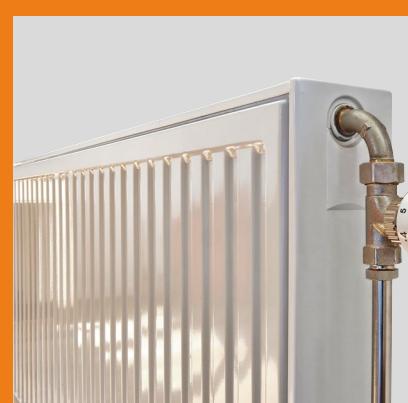


Figure 1: Installed Measures by Type under ECO3, up to September 2020. BEIS Household Energy Efficiency Statistics, Headline Release October 2020<sup>6</sup>



ECO has slowly increased the delivery rate of multiple measures but this has not necessarily supported a fabric first approach tailored to each property. For example, poorly insulated homes often require solid wall insulation (SWI) to significantly improve comfort levels, yet it accounts for only 4.6% of measures installed since 2018 (See Figure 1)<sup>7</sup>. To incentivise a fabric first approach, a cap on the number of broken boiler replacements installed yearly was introduced in ECO3. Beyond the cap, additional boiler replacements can only be installed alongside some form of insulation. This has not disincentivised the installation of boilers but has led to more being installed with accompanying insulation rather than as a single measure. The vast majority (83%) of insulation measures installed alongside these boilers have been floor insulation, rather than the more expensive SWI that will be needed in the worst performing homes.

Despite the cap on like-for-like boiler replacements, around 86% of ECO3 installations have been ‘single measure’ projects, demonstrating how entrenched the current model is<sup>8</sup>. A fundamental change to the scheme’s primary objectives is needed to move to a multiple measure approach. Any successor scheme should restrict eligibility to the worst performing homes (i.e. EPC band E, F & G) where significant improvements will be required to meet the Government’s target of bringing all fuel poor homes up to an EPC band C by 2030. Doing so will result in fewer homes receiving measures under ECO but enable a higher spend per property to fully address the complex structural problems that the worst performing homes have.

The exclusive application to certain EPC bands is not without issue. SAP bands are wide ranging, making it simpler to push a house at the upper threshold of an EPC band into a higher one compared to one at the bottom of the same band. In theory, a house could start as an EPC band F (with a SAP score of 21) and improve 33 points, but still be at an EPC band E. Alternatively, a home could shift from an EPC band E (with a SAP score of 54) and get to an EPC band C (with a SAP score of 69) but only improve 15 points in the process. Interim bands that differentiate between high and low EPC bands would mitigate this through rewarding measures that significantly increase SAP points.

The existing supply chain developed to serve the ECO delivery model of single measures at low cost. As a result, there is a fragmented knowledge base of specialist companies and few who take a whole house approach. From July 2021, all ECO installers must follow the PAS 2035:2019 standard which will enable a multi-measure approach but create additional overhead costs through the introduction of five additional roles including a 'retrofit coordinator' and 'retrofit assessor'. The retrofit coordinator is the key role as they project manage each retrofit and can undertake other roles in advice, assessment, design and evaluation as required. The supply chain will adapt to these new requirements but should be compensated for doing so. The scoring framework needs to appropriately incentivise a multi measure approach to cover the costs of the new roles under PAS2035:2019. Insight from the Welsh Government's Warm Homes (Arbed) scheme indicates that almost every EPC band E, F and G rated home will require some form of enabling/structural work before insulation<sup>10</sup>. These preparatory works could include a range of actions from fixing damp issues and cracks to clearing rubble from cavities. A thorough approach to retrofit costs more than a single measure intervention so it is essential that the supply chain is incentivised accordingly and that enabling measures are given a score under ECO.

## A Framework for Engagement

Timely advice will be critical to gain the trust of householders, who should have access to different sources of engagement before, during and after installation. Prior to any engagement with the retrofit coordinator or assessor, householders need access to an independent source of advice, as recommended in the Each Home Counts Review<sup>11</sup>. This should include both online sources like the Government's simple Energy Advice website - which should be expanded to cover the benefits of a multi-measure approach - and tailored customer engagement delivered by trusted partners like the Energy Savings Trust.<sup>12</sup>

As a new piece in the retrofit puzzle, it is unknown how effective the retrofit coordinator role will be in consumer engagement. Though the role includes consideration of householder needs, it is unlikely that coordinators will be used in an advisory capacity. As an additional overhead cost and limited resource in the supply chain, their resource will be spent on assessments first and foremost. However, households should have a point of contact throughout the installation process to build a sense of co-ownership. This will be crucial to treating recipients of ECO measures as customers rather than barriers to installation.

Following completion, all relevant installation data should be logged in the TrustMark Data Warehouse. This industry facing store of information, detailing works undertaken in each property, was created following the Hackitt Review's recommendation for a 'golden thread' of information that is transferable between current and future property owners<sup>13</sup>. This 'building passport' will include a consumer facing element via TrustMark's online Property Hub that includes details of previous installations, any guarantees, and information on additional recommended measures in the retrofit plan. Recipients of ECO measures should be advised of how they can access and use the Property Hub, to build a sense of co-ownership in the work undertaken and knowledge of future improvements that may be necessary.



## Stressing the Benefits of a Multi Measure Approach

Installing energy efficiency measures in isolation can lead to unintended consequences that are not widely understood by the public. Engaging households in different ways and at different points helps to bridge this knowledge gap, which could otherwise undermine the installation of multiple measures. A package of measures may appear overly disruptive and intrusive if the potential unintended consequences are not communicated to a household. For example, if internal SWI is required for a property in a listed area, this could necessitate the removal and refitting of the kitchen and/or bathroom. Residents may object on the basis that this creates unnecessary disruption, but leaving those rooms, which will likely experience elevated levels of condensation, uninsulated will rapidly exacerbate issues with moisture control.

Similarly, residents are generally unaware that ventilation is crucial to indoor air quality and that installing a poorly designed insulation measure without ventilation can lead to issues with damp, poor air quality and overheating. Therefore, it is crucial that households understand the full benefits (beyond bill savings) of a multi measure approach, such as comfort levels, respiratory health, and the reduced disruption of installing multiple measures simultaneously, as opposed to incrementally.

## Realising a Recipient Focussed Retrofit Plan

The importance of choice should not be underestimated in empowering and engaging consumers, but this should be constrained within a multi measure approach. Allowing consumers to pick and choose measures may not be possible if there are only a couple of products that significantly improve the EPC banding. Households should feel that they have been consulted and have some level of choice, but this should be aligned with the recommendations made by the retrofit coordinator's medium-term improvement plan. Each retrofit plan outlines which measures should be installed in what sequence and follows a risk-based approach in which measures in isolation or in a combination are assessed as low, medium or high risk. Only measures included in the medium-term retrofit plan should be installed. Households should be permitted to refuse a measure if the retrofit coordinator judges that its exclusion will not lead to unintended consequences.

Allowing consumers to refuse one measure will not run counter to the aim of improving the worst performing homes first. In some cases, there will be a greater benefit from the installation of a single measure in a less energy efficient property. Installing external wall insulation in an EPC band F rated property could improve the SAP rating by 20 points and move the home up to a EPC band D, but installing the same measure in a low EPC band E rated property will only raise the rating up to an EPC band D. Installing a single measure should be permitted where it is not technically possible to install a second provided it does not generate unintended consequences. Whilst it will be necessary to return to the property at a later stage (possibly when a technical solution is available) it should be easier to identify these properties as the retrofit plan will have recorded measures for future installation and be stored on TrustMark's Data Warehouse. In allowing consumers to refuse a measure, further consideration is needed around possible rules. For example, if a householder refuses insulation, the installation of a new low carbon heating system should only be allowed if the full retrofit plan can show that it is affordable and efficient to run.

## Multi-Measure Recommendations:

- A fundamental change to the scheme's primary objectives is needed to move to a multiple measure approach. Any successor scheme should restrict eligibility to the worst performing homes (i.e. EPC band E, F & G) where significant improvements will be required to meet the Government's target of bringing all fuel poor homes up to an EPC band C by 2030.
- Any requirement to improve homes by EPC bands should include interim bands, for example, from a high EPC band F to a high EPC band D, tied to a specific increase in SAP points.
- The scoring framework needs to appropriately incentivise a multi measure approach to cover the costs of the new roles under PAS2035:2019.
- Installing multiple measures in the worst performing homes will require structural improvements in addition to energy efficiency measures so enabling works should be given a score.
- Timely advice will be critical to gain the trust of householders, who should have access to different sources of engagement before, during and after installation. Following completion, recipients of ECO measures should be advised of how they can access and use the TrustMark Property Hub, to build a sense of co-ownership in the work undertaken and knowledge of future improvements that may be necessary.
- It is crucial that households understand the full benefits (beyond bill savings) of a multi measure approach, such as comfort levels, respiratory health, and the reduced disruption of installing multiple measures simultaneously, as opposed to incrementally.
- Only measures included in the medium-term retrofit plan should be installed, and households should be permitted to refuse a measure if the retrofit coordinator judges that its exclusion will not lead to unintended consequences.
- Installing a single measure should be permitted where it is not technically possible to install a second, provided it does not generate unintended consequences.

# Encouraging Innovation within ECO

Obligation delivery via innovation routes was proposed to support the commercialisation of new products and encourage delivery of new and innovative technologies through the scheme. Under ECO3, energy suppliers can deliver up to 10% of their obligation via the two innovation routes. The Government is currently considering whether these should continue in the future ECO programme or be delivered by other funding streams. As one of the largest domestic retrofit funding programmes, ECO was one of the only viable options for the Government to support new market innovations in energy efficiency. However, proposed new schemes like the Social Housing Decarbonisation Fund and Homes Upgrade Grant have emerged as alternative funding streams that could encourage market innovation.

The place of innovation funding in ECO has faced criticisms. For example, there is an observation that innovation is often delivered at higher cost without generating higher bill savings, contrary to the underpinning objective of the current ECO scheme. Regardless, this support has helped to stimulate research and development in sectors lacking in disruption, as innovators know there are routes to funded testing in a live environment. A wide range of innovations have been approved by Ofgem across a range of technologies such as insulation materials with increased lifespans or fireproofing, smart control systems and innovations that minimise disruption during installation<sup>14</sup>. The following section will discuss how each innovation route can be adapted to improve their uptake in ECO.

## SAP as a Barrier to Innovation

SAP is a simple energy model based on the physical characteristics of a dwelling to estimate its energy use, running costs, CO<sub>2</sub> emissions and EPC rating. SAP informs the development of ECO's deemed scores, which predict the level of energy saving generated by a set measure. ECO uses the SAP methodology as the basis to score the installation of different measure types, taking into account the size and type of dwelling. Until relatively recently, SAP was updated every three years to take into account rapidly changing variables (like the CO<sub>2</sub> emissions factor) and incorporate new innovative technologies. However, the rate of updates has slowed greatly which has made it difficult for new products to be recognised in SAP.

Any organisation can make a request to have their technology recognised but timing is essential. Requests submitted a few months before the release of a new update are unlikely to have their technology included and will have to wait at least another three years until the next SAP update is released. Given the increasing time periods between SAP updates, innovators are left with few alternative options to ensure that their technology receives a SAP score. Product types that are already modelled in SAP can log innovative improvements by sending laboratory test data to the Product Characteristics Database (PCDB) which is updated monthly. Where a new technology is similar to one that already exists within SAP, the features of the pre-modelled product is duplicated for the new innovation, through convention changes. However, where there is no existing methodology in SAP, applicants must go through Appendix Q. This route is expensive as it requires the savings be evidenced through field trials.

The innovation routes have similar data requirements to Appendix Q so SMEs may use ECO funding to assist in building an evidence base (through delivery of a demonstration action). However, ECO innovation funding may not be sufficient to cover the costs of testing and recruitment due to the need to ensure value for money, and it does not automatically lead to SAP inclusion. Some innovators have received support for an ECO demonstration action but have still had to blend it with other sources of funding to recruit the required number of households for a field trial. Anecdotally, there are other examples of project budgets being reduced during the application process which could negatively impact delivery.

Updating the SAP methodology more regularly will not only keep the system up to date, but it will also give more frequent opportunities for new innovations to be recognised. As the main route into SAP (between updates) for new innovations, the application process for Appendix Q needs to be communicated more clearly. Innovative SMEs often have limited resources so greater clarity will help them to navigate SAPs complexity.

## Demonstration Actions

The Demonstration Actions (DAs) support live testing of technologies or encourage delivery of marketable products that need additional support. All products have performance monitoring carried out before and after installation to monitor the savings achieved through the DA. The data collected during a DA can also be used to produce a deemed score to allow installation under ECO. However, this is not the primary objective of the innovation route so must be applied for separately. Obligated energy suppliers support innovators in applying for a DA and are incentivised to do so. If an application is successful and the innovations are successfully installed in a live test environment, the supplier is rewarded with a 'Lifetime Bill Savings' score, which is a generous contribution towards meeting their delivery targets.

Very few applications for a DA have been successful and this is partially due to the strict eligibility criteria. The application process stipulates a technology readiness level (TRL) of TRL-8 or TRL-9. However, at this stage of product development, companies tend to have completed testing and are looking to bring their technology to the market and scale up production. Relaxing this requirement to include TRL-7 will increase the diversity and number of applicants who need support in testing their products.

The approval process is not prescriptive but specifies that applicants present their own testing methodology, which is then scrutinised by Ofgem's Technical Advisory Panel (TAP). Clearer guidance on the monitoring requirements is needed to simplify this application process. The innovation routes have been running for over two years (at the time of publication), so Ofgem has a better understanding of the types of technologies that DA funding attracts. It should therefore consolidate these learnings to give clearer guidance for applicants and shorten the application process itself. However, applicants should still be allowed to submit their own testing methodology if they wish to.





It can be a challenge to find a significant number of ECO eligible households who will permit the installation and monitoring of DA products in their homes. SMEs cite unrealistic expectations from Ofgem around monitoring when so few homes have an interoperable smart meter. This makes it difficult to find a large enough sample size and the added cost of finding homes with smart meters may be insurmountable for some. The Government could mitigate this through creating a database of ECO eligible residents that are willing to participate in trials, similar to the Living Lab run by the Energy Systems Catapult<sup>15</sup>, (subject to compliance with the General Data Protection Regulation). This would reduce the resources and time taken to recruit the number of trial participants required to complete a DA.

Many candidates have expressed disappointment that communications with Ofgem are sporadic and/or irregular, who often issue large numbers of clarifications midway through the application process. This causes confusion during the application process and it can be costly. For example, there can be a substantial lag between submission of an application and notification of its success. This can delay testing and complicate monitoring requirements if alterations are then needed in coordination with the start or end of a heating season. More flexibility is needed to change project plans post-approval as challenges inevitably occur during live trials regarding recruitment and monitoring duration. This has been a particularly pressing issue in 2020 due to Covid-19 restrictions. Direct communication between obligated suppliers and the TAP would foster a mutual understanding and knowledge transfer between innovators and decision makers.

More broadly, there is a lack of understanding around the purpose of DAs, and the current application form does not request information on the rationale for the research i.e. for product improvement or towards deployment in the wider ECO scheme. This should not influence the success of an application but it would be useful information to capture. Many applicants believe the primary objective of DAs is to provide a route into ECO and SAP, rather than conduct live product testing. Whilst data collected from testing can be used towards achieving a deemed score in ECO, and ultimately inclusion in SAP, it is not included as an eligible cost for DA funding. Innovators do not receive the financial support they expect which creates another hidden cost onto commercialisation. Therefore, products that are approved through DAs should receive financial support to fast-track their innovation into SAP's Appendix Q. Field trials through a DA do not automatically lead to inclusion in SAP so reducing barriers between the two will help commercialise new products more quickly.

## Innovation Measures

Innovation Measures (IMs) provide support for products that have not previously been installed under ECO and can demonstrate an improvement on existing measures. The uplift is intended to expand deployment of new energy efficiency measures which outperform their standard counterparts. Improvements can be reductions in cost or speed of installation, a more efficient fabric, or less disruption to householder. Measures will have existing evidence of being able to potentially outperform their traditional counterpart.

Successful approval of an application results in a 25% uplift on the existing deemed score for the standard measure type. Where a product does not already have a deemed score, a supplier may apply for an alternative methodology to calculate the claimed savings. Once approved, these measures are published on Ofgem's website and can be delivered with the uplift by any obligated supplier through the scheme.

As of July 2020, only 433 innovation measures (IMs) - less than 0.2% of measures - had been delivered under ECO3. Therefore, ongoing support for innovations through an uplift score should continue through to the next iteration of ECO to support market growth. The 25% uplift is insufficient to drive delivery of low value measures so this could be addressed through a sliding scale of uplift scores which are tweaked to support different measure types depending on the scheme priorities. For example, this could follow a fabric-first hierarchy or favour technologies that improve delivery of enabling works, given the focus on the worst performing homes.

## Innovation Recommendations:

- SAP needs to be updated more regularly to give more frequent opportunities for innovation to be recognised in the methodology.
- The application process for Appendix Q must be clearly communicated to all innovators applying for innovation funding through ECO.
- Applications are restricted to those with a Technology Readiness Level (TRL) of eight or nine, limiting eligibility to companies who may have already conducted live testing. Relaxing this requirement to include TRL-7 will increase the diversity and number of applicants who need support in testing their products.
- Recruiting participants for live field trials is costly and resource intensive. To simplify this process, the Government should create a database of ECO eligible residents who are willing to participate in field trials.
- Applicants for demonstration actions must present their own monitoring methodology which is then evaluated by Ofgem with insufficient guidance. Clearer requirements on evidence and monitoring methodologies should be offered to applicants.
- Communication with Ofgem is sporadic and inconsistent. Direct communication between obligated suppliers and the TAP would foster a mutual understanding and knowledge transfer between innovators and decision makers.
- Clear advice on evidence requirements should be given. Currently, applicants for demonstration actions must present their own monitoring methodology with insufficient levels of guidance from Ofgem.
- Measures delivered through demonstration actions are not automatically included in SAP despite its importance in commercialising building-related products. Products that are approved through DAs should receive financial support to fast-track their innovation into SAP's Appendix Q.
- Innovation uplifts granted in ECO 3 should continue into the next iteration of the scheme to stimulate delivery.

# In-Situ Performance

In the UK, monitoring of energy efficiency measures is undertaken in two main ways: via the National Energy Efficiency Data-Framework (NEED), or through alternative monitoring technologies. The NEED involves data collection with pre-defined parameters including household gas and electricity consumption, installed measures, and socio-demographic and behavioral parameters.<sup>16</sup> It requires measurements to be taken one year prior to and one-year post installation, which has led to an inconsistent application across ECO so data quality varies.

The deemed scores of measures within ECO are based on SAP and RdSAP, which use standardised occupancy and heating patterns for a property. There can be a significant gap between an EPC generated through RdSAP calculations and the true performance of a building. In contrast to the current deemed scores approach, alternative monitoring methodologies measure the performance of energy efficiency measures in real time. Real time data monitoring technologies can be utilised to underpin robust installation standards or to better incentivise and reward higher performing products. At scale, the digitalisation of remote data monitoring has the potential to reduce the administration burden and costs for all parties.

Within this technology grouping, there are two main types of product: those that focus solely on the building's thermal efficiency, and those that focus on thermal efficiency and occupant behaviour. The former covers a more limited range of measures and does not monitor occupant behaviours, of which underconsumption is especially prevalent in fuel poor households. These homes often ration energy consumption and can turn up their heating to reach comfortable levels of warmth after the installation of energy efficiency measures. The latter category brings these human variables into scope but in doing so is more complex to monitor in the context of a fuel poor scheme.

There have been numerous trials and applications of monitoring technologies across the world. In the UK, the Government has supported research and development though funding streams like the Smart Meter Enabled Thermal Efficiency (SMETER) competition. This £4 million fund aims to test and demonstrate technologies that measure the thermal performance of homes using smart meters and other data<sup>17</sup>. Similarly, the Social Housing Decarbonisation Fund Demonstrator requires applicants to monitor installed measures for six months to demonstrate cost and energy savings<sup>18</sup>.

In-situ performance (ISP) monitoring was introduced into ECO3 as a voluntary mechanism through which suppliers could choose to deliver up to 10% of their obligation. It was designed to support the installation of modern monitoring equipment in tandem with energy efficiency improvements. If monitoring shows that the measures installed improve building performance, suppliers receive increased points towards their obligation in the form of an increased Lifetime Bill Saving. However, if a measure performs worse than expected, then the score still remains unaffected. Currently, suppliers must apply for the ISP route and are responsible for measuring performance before submitting results to Ofgem. To determine point eligibility, a comparison is then made between measured performance and the baseline energy use of the property, with adjustment factors applied where necessary, dependent on the installed measure and house type.

Uptake of ISP has not been observed to date as the cost of setting up robust monitoring systems is thought to be greater than the available incentive. Also, the consumption levels observed in fuel poor households have the potential to limit the number of points gained by suppliers towards their obligations.<sup>19</sup> BEIS must reform ISP either through an improved incentive structure or by mandating suppliers to deliver a set percentage of their obligation through the mechanism. Mandating ISP would place significant strain and risk on the supply chain, which is likely to be adapting to a multi-measure approach and PAS2035:2019 standards. Indeed, there is a risk that mandating ISP onto these existing changes will lead to an exodus of the labour market, who may choose to work in less heavily scrutinised areas of the construction sector. It would also be disruptive in practice and costly to establish, when compared to the current

delivery model. The current deemed scores approach offers a high degree of certainty over returns for installed measures in various property and fuel types. For the development of their business plans and delivery strategies, suppliers need to understand the potential number and type of measures that they must deliver to achieve their target. If the returns for installing measures vary and are highly influenced by customer behaviour or immediate geographic or climatic events, then planning a delivery programme becomes challenging to forecast. Therefore, any reform should seek to incentivise suppliers and de-risk issues of underconsumption.

A reformed incentive would need to include a minimum guaranteed score to de-risk some of the potential variability introduced by utilising ISP. In line with the current mechanism, suppliers should be rewarded for improvements made beyond a set baseline, ensuring they are not penalised for under-delivery. This will ensure that the upfront costs and returns can be accounted for, with a final additional payment received after a post-install monitoring period. This should be paired with financial support to cover set up costs for a supplier's technical monitoring programme. This financial support should not be uniform but should seek to reward the accuracy of monitoring methodologies. This will incentivise suppliers to source higher quality monitoring products rather than opt for the lowest cost option. The Government should expand the 10% limit on obligation delivery to further incentivise adoption and enable greater economies of scale.

There are two divergent goals that ISP may be used to target, and whichever one is chosen will impact the practicalities of administration. They can be used to quantify the performance of a certain type of measure when installed across hundreds of homes, or they can monitor the impact of multiple measures upon each home, taking the occupants behaviour into account. The latter aligns with the shift to a multi-measure, whole house approach by allowing the cumulative impact of measures to be ascertained. When one part of a home is insulated, heat loss will still occur through other less efficient elements. However, this is addressed through a holistic data monitoring approach that assesses the entire home. It also accounts for elements of best practice such as good junction detailing or air permeability improvements that are overlooked by SAP, which only examines savings from individual measures.

In the context of ECO, there are advantages to monitoring the thermal performance of the fabric in isolation, as per the current ISP mechanism. Reforms to incorporate occupant behaviour would require a pre-installation monitoring period to measure behaviour patterns. Suppliers are under pressure to identify ECO eligible households and then deliver measures as quickly as possible. The pre-installation monitoring periods required to establish occupant behaviour would add significant time and cost onto the delivery process for suppliers who are obligated to meet their delivery numbers within a set period. In addition, any tenancy changes that may occur during a post-install monitoring period (invalidating the results) is no longer a risk, and the problem of underconsumption (and the perceived risks to suppliers ECO scores) is not an issue when considering the fabric only. Therefore, the current approach to modelling ISP is better suited to the ECO delivery framework, so any reforms should instead address the incentive structure for suppliers.



## In-Situ Performance Recommendations:

- Fuel poor households often ration energy use and may seek to increase their consumption to achieve greater levels of warmth post-installation of energy efficiency measures. ECO scores should not be impacted negatively by this increased energy spend, so any reforms to an in-situ performance mechanism must de-risk under-consumption for suppliers.
- Set up costs for in-situ performance monitoring are deemed excessive by suppliers. ECO should provide support to partially cover the set-up costs which should vary according to the accuracy of the monitoring methodology used by suppliers.
- The Government should expand the 10% limit on obligation delivery to further incentivise adoption and enable greater economies of scale.



# Conclusion

Whilst ECO has been effective in delivering single measures at a relatively low cost, delivery volumes are insufficient to meet the UK Government's target of upgrading every fuel poor home to EPC C by 2030. The households where more complex and/or expensive interventions are required have repeatedly been filtered out, leading to a backlog of the worst performing homes. Therefore, the overarching delivery model and mechanisms within ECO need to be reformed to increase deployment rates and support a multi-measure approach. The benefits of a multi-measure approach need to be appropriately communicated to consumers to get their buy-in for any short-term disruption. However, the supply chain must also be incentivised to undertake preparatory works and multiple measures.

Implementing significant changes to the overarching objective of ECO offers additional opportunities to reform specific delivery mechanisms around innovation and in-situ performance (ISP), both of which have had relatively little impact. Innovators in the energy efficiency sector are faced with numerous hurdles to commercialisation, not least the irregular updates to SAP and a flawed application process for those seeking support in ECO. Applications for innovation funding should be clarified and simplified where possible and the funding routes should offer support in gaining recognition in SAP.

The building performance monitoring technologies that the ISP mechanism seeks to promote undoubtedly have significant potential in the broader retrofit market. However, the peculiarities of ECO limit the deployment potential, especially in an incentive structure where suppliers feel they may be penalised. The costs of setting up ISP monitoring methodologies should be partially covered to incentivise take up of suppliers, and this should be weighted towards the accuracy of proposed methodologies, as opposed to the cheapest system available. Furthermore, allowing suppliers to deliver a greater percentage of their obligation through ISP could allow for greater economies of scale and cheaper costs of monitoring. However, suppliers must be reassured that they will not be penalised if occupants then increase energy use after receiving energy efficiency measures. If suppliers believe their delivery scores to be uncertain, they will not view the risk as being outweighed by the reward.

ECO is one of a raft of government policies needed to eradicate fuel poverty in the UK and early engagement with industry and the supply chain will be crucial to ensuring that the policy is designed optimally. The 2020s is a crucial decade for home retrofit. Any successor ECO scheme should play a crucial role in improving the energy efficiency of the worst performing homes to help those in the greatest need of support.

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