

Re-energising the UK's approach to domestic energy efficiency

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Abstract

UK residential energy efficiency policy over the last decade is widely seen to have been relatively successful. Significant improvements have been made to a notoriously old and inefficient housing stock, primarily through the installation of condensing boilers and retrofitting of basic insulation measures in large utility programmes. Energy demand has fallen by 20 % in absolute terms. Despite the success there has always been concern that the rate of deep refurbishment has remained low. Seeking to address this, the UK Government has made a major change in policy in 2013 introducing the Green Deal and re-focusing the Energy Efficiency Obligations. Ex ante assessments indicated that this would result in a significant reduction in the scale of energy efficiency activity. Since then, further significant reforms have been made and additional changes are planned following from an increasingly politicised debate around energy prices and the impact of 'green levies' on consumers. This paper presents an analysis of early programme results that are even more concerning, with almost no take up of the Green Deal. The paper identifies the reasons for the observed changes; it draws lessons about the relative success of regulatory and voluntary approaches; and it discusses the design details that have resulted in very low take up. The paper also presents a roadmap for recovery and identifies potential modifications that could overcome the current hiatus and increase the uptake of energy efficiency measures in the UK much more rapidly.

Introduction

The Green Deal, introduced in January 2013, was supposed to deliver a step-change in domestic energy efficiency and one of the UK government's flagship policies. The Green Deal is untested in the UK, allowing financing of energy efficiency retrofits of buildings via an on-bill charge, which is attached to the property rather than the occupant. The Green Deal was supposed to provide a framework for funding cost-effective energy efficiency improvements. Alongside of the Green Deal the Energy Company Obligation (ECO) was introduced which is an energy efficiency obligation focusing on the domestic sector with the aim to support primarily high-cost measures.

In 2012, we published the first academic paper providing a comprehensive analysis of the likely implications of this major policy change (Rosenow and Eyre, 2012) which has since been revised and published in a peer-reviewed journal (Rosenow and Eyre, 2013). Our analysis showed that under the new policy regime there would be a significant reduction of energy savings and that multiple barriers were not addressed sufficiently by the Green Deal. At the time of publishing the paper, the Green Deal was still in its infancy and our predictions were largely based on past experience with energy efficiency programmes and the government's ex-ante impact assessment.

The Green Deal has received a great deal of attention since its inception with predominantly critical media coverage so far. High political expectations did not match the reality of domestic retrofits in terms of number of properties being refurbished using Green Deal finance. In this paper we take stock and analyse the predicted and the actual outcomes of the new policy regime and also suggest several ideas for policy reform.

The remainder of the paper is structured as follows: First, we provide background information on the policy changes and set

out the new policy design. Second, we sketch the main developments since the restructuring of residential energy efficiency policy in early 2013. Third, we compare the predictions made prior to policy implementation and our revised estimates based on actual activity. Finally, we make a number of proposals for reform and outline a ‘roadmap for recovery’.

Policy changes

Traditionally, domestic demand side policy in the UK incentivising energy efficiency improvements consisted of a portfolio involving regulations (such as for new buildings and major alterations of existing buildings), taxpayer funded grant programmes (including Warm Front and similar programmes in the devolved administrations), and, most importantly in terms of scale, energy or carbon savings obligations (the Carbon Emissions Reduction Target (CERT) and its predecessors (Rosenow, 2012)). All of the above require a high degree of government intervention – in case of building regulations the government defines the minimum energy performance standards, grant programmes are funded by public expenditure administered by government, and although energy savings obligations put the onus on energy companies, it is the government setting the targets and specifications of delivery. Most effort was directed towards take-up of low cost energy efficiency measures such as efficient boilers, cavity and loft insulation. The result has been remarkable – from 2004 to 2011 domestic gas consumption decreased on average by 5 % per year (DECC, 2012b), our own calculations show that if temperature corrected the figure is about 3.6 %. Most of this reduction relates to energy efficiency improvements (Centre for Economics and Business Research, 2011) largely triggered by the Energy Efficiency Commitment (EEC) 1, EEC 2, and CERT.

Despite the apparent success, the UK government decided to radically overhaul the existing system at an unprecedented pace. Energy savings obligations were supposed to be directed towards *high* cost measures such as solid wall insulation, even though international experience has been to use such obligations mainly for *low* cost measures (Eyre et al., 2009; York, 2008). Almost all support for low cost measures was supposed to come through the Green Deal, the new flagship programme for building refurbishment. The Green Deal is an on-bill finance mechanism and allows loans for investment in energy efficiency measures to be attached to the property rather than the owner (Rosenow and Eyre, 2013). Also, for the first time since 1978, there will be no taxpayer funded energy efficiency programme for the most vulnerable. The only remaining fuel poverty policy consists of provisions for low-income households in the Energy Company Obligation (ECO), the current energy savings obligation in place.

Overall, the Green Deal determines the policy landscape: Because of its Golden Rule, which prescribes that projected cost savings from energy efficiency measures must be larger than the investment, only low cost technologies are eligible for full funding through Green Deal finance. Low cost measures were previously targeted by energy savings obligations, a quantity based instrument, where the outcomes are more or less certain. In contrast, the Green Deal does not require a specific level of delivery, it is left entirely to the market and the outcomes are uncertain. The implications are profound as the following analyses shows.

Developments since policy inception in 2013

GREEN DEAL

Since the official launch of the Green Deal in January 2013 the government released statistics of the uptake of Green Deal assessments. Until the end of November 2014 422,436 *assessments* were made. Of those assessments 8,133 resulted in a Green Deal Plan, although only 3,961 properties were renovated by the end of November using Green Deal finance. The other Green Deal Plans were in the process of being delivered (where households have signed a Green Deal Plan or signalled their willingness to do so to a Green Deal Provider). This is equivalent to a conversion rate of 1.9 % (assuming all Green Deal Plans in the process of being delivered are implemented).

The low conversion rate can be attributed to a number of issues, some of them common for new policy instruments but others of a more fundamental nature related to the policy design:

- A large proportion of the early Green Deal assessments were provided free of charge to households making it more likely that free-riders benefited from them who would not otherwise have had a Green Deal assessment and who had no intention to install any measures. 56–60 % of respondents stated that they had an assessment being done because it was free (GfK NOP, 2014b).
- The Green Deal cash-back scheme in place from January 2013 to June 2014 offered households rebates if they installed energy efficiency measures recommended by a Green Deal assessment. The majority of the cash-back scheme-funded measures were condensing boilers and there is anecdotal evidence that many households only had the Green Deal assessment to get access to the rebates with no intention to fund the measures using Green Deal finance. There appears to be a high proportion of free-riders amongst those who benefited from the early cash-back scheme. This is also confirmed by research carried out on behalf of DECC that shows how recipients had been offered a discount by installers being unaware of the links to the Green Deal (GfK NOP, 2014a).
- The IT systems required for administering the Green Deal (both within government and the energy companies) were not fully functioning when the Green Deal was launched in January 2013. This led to delays logging Green Deal Plans and arranging repayment through electricity bills.
- Green Deal Finance was not available until 15 May 2013. British Gas was the first utility that offered customers the facility to repay Green Deal loans through electricity bills.
- The interest rate of around 7.5 % has been criticised for being unattractive for households (this may be different for commercial sector organisations). Surveys showed that most households considered a 7.5 % interest rate too high. Many households who had a Green Deal assessment decided to fund Green Deal measures independently of the Green Deal using their savings or different loans such as an extension on their mortgage or an energy efficiency loan. This applies particularly to the lower-cost measures such as cavity wall insulation and loft insulation.

The government expected that by the end of 2013 at least 10,000 Green Deal-funded retrofits would have been carried out. In reality, only 626 home retrofits through the Green Deal were completed, just over 5 % of the anticipated figure. Still, government officials have argued that even though the number of Green Deal-funded retrofits was lower than expected, research shows that more than 80 % of households who had a Green Deal assessment done proceed and install energy efficiency measures (GfK NOP, 2013).

However, the direction of causality is not that clear. Due to the free Green Deal assessments some households who would have installed measures anyway using their own finance are likely to have taken advantage of a free assessment. Furthermore, the decision to purchase a new boiler is not necessarily triggered by a Green Deal assessment. The Green Deal assessment may simply have been carried out to get access to the cash-back scheme and there is indeed evidence that when boilers were being replaced households were made aware of the cash-back scheme rather than the cash-back scheme triggering the boiler purchase in the first place. Furthermore, Green Deal Assessments were to a significant extent driven by activity delivered as part of ECO – Green Deal Assessments (or an equivalent assessment) are a prerequisite for receiving ECO funding. The majority of those who received loft (76 %), cavity wall (81 %) or solid wall insulation (87 %) received ECO funding (GfK NOP, 2014b).

In response to the slow take-up the government introduced a new cash-back scheme (the Green Deal Home Improvement Fund) in June 2014 and another phase in December 2014 offering up to £7,600 in form of a non-repayable grant for households installing solid wall insulation and other measures. The cash-back scheme has been very successful in that demand for the grants has exceeded expectations by far. Particularly for solid wall insulation where up to 75 % of the total cost are paid by DECC the cash-back scheme is likely to result in increased uptake. However, the scheme is capped and a maximum of £120 million will be paid over the course of one year, an amount that would be sufficient to finance the insulation of about 13,000 solid-walled properties. This means that although it stimulates demand in the short-term it provides no long-term solution to financing energy efficiency retrofits. In fact, the first phase of the Green Deal Home Improvement Fund lasted for six weeks and funds provided during the second phase were spent in just one day.

ECO

The uptake of ECO was initially very slow. By May 2014 the energy suppliers had achieved only 22 % of the Carbon Emissions Reduction Obligation (CERO) and 28 % of the Carbon Saving Community Obligation (CSCO) (which together make up the lion share of the total obligation) leaving them with more than 60 % of the obligation to be delivered in just 37 % of the entire obligation period (Ofgem, 2014). The slow uptake was due to a sharp decline with regard to the number of energy efficiency measures installed: During the last years of the Carbon Emissions Reduction Target (CERT) and the Community Energy Saving Programme (CESP) more than 45,000 cavity walls, almost 70,000 lofts and about 4,000 solid walls were insulated every month (Ofgem, 2013b, 2013c). In the first 15 months of ECO about 18,000 cavity walls were insulated every month,

about 11,000 lofts and about 3,000 solid walls (Ofgem, 2013a). While a shortfall had been predicted by government for cavity wall and loft insulation, the reduction in the number of solid wall insulation was unexpected, as the impact assessment of the Green Deal and ECO predicted a substantial *increase* in the number of solid wall insulation installations to about 8,000 per month by 2015.

The reasons for the slow uptake were manifold including:

- ECO was more complex in terms of delivery than CERT and CESP because it focused on more complex measures such as solid wall insulation and hard-to-treat cavity insulation. Industry experts also highlight the fact that the amount of paperwork required to get approval for measures is significantly higher than previous.
- A radical change of the policy landscape takes time to be translated into new business models. The established delivery routes under CERT and CESP are not fully compatible with the new system and learning processes slow down uptake.
- Because ECO focused on more expensive measures, the expected contribution from consumers was higher than under CERT. However, anecdotal evidence suggests that at this point consumers were not willing to pay high contributions to expensive measures, particularly because most measures were provided free of charge in the last years of CERT and CESP.

These all result from the re-orientation of Energy Efficiency Obligations towards more costly measures such as solid wall insulation and hard-to-treat cavity wall insulation.

However, there have been profound modifications to ECO following a debate around rising energy prices and the impact of so-called 'green levies' on consumers which took place in the winter of 2013/14 after the Labour Party announced that it would 'freeze' energy prices until 2017 and significant price increases by energy companies.

The impact of Energy Efficiency Obligations on consumers' energy bills has been systematically assessed since their inception in 1994 in the various impact assessments carried out by government. Evaluations (e.g. Lees 2006, 2008) have shown that over time the cost of the Obligations are not only recouped but consumers are better off as they benefit from reduced energy bills. Recent analysis conducted by DECC assessing the impact of energy and climate policies on energy bills (2013, p. 11) concludes that 'in 2020 households are estimated on average to save around 11 % [...] on their energy bills compared to what they would have paid in that year in the absence of policies'. In short, the evidence clearly shows that in the long-term consumers benefit from energy efficiency policies even if funded through energy bills.

However, the debate around rising energy prices became increasingly politicised and short-termist with little regard for the evidence. Whilst controversial debates around energy prices in the winter months are not unusual in the UK and almost part of the annual political debate cycle, until 2013 'green levies' such as Efficiency Obligations were not discussed as the main drivers. On the contrary, the CERT target was increased by 20 % in 2009 following wide-spread media coverage of rising energy prices and windfall profits made by the energy companies (see

Rosenow (2012) for a comprehensive overview of the history of Energy Efficiency Obligations and the role of energy prices).

In the winter of 2013/14, ECO and other bill-funded climate policies became a focal point of attention with suggestions that the Prime Minister called for cutting the 'green crap'. In December 2013, DECC eventually announced that it would propose to significantly reduce the size of the CERO target and allow energy suppliers to use cheaper measures in order to fulfil their obligations (DECC, 2013b). Together, the proposed changes would reduce the cost of ECO by about 2/3. Three months later DECC published the detailed proposals for consultation and in July 2014 confirmed the plans in a formal government response.

The main changes to ECO are a reduction in the overall obligation by 33 %, eligibility of loft insulation and easy to treat cavity wall insulation from April 2014 and a 'levelisation' mechanism that provides additional credit for measures undertaken before the changes. The combined effect is that targets have very nearly been met already. So although low cost measures have become eligible in ECO, their uptake has further declined as energy suppliers need to do very little more to deliver their targets.

Predicted and actual impacts

In order to appraise the efficacy of energy efficiency programmes it is important to analyse metrics that indicate the extent the programme has delivered actual energy savings.

HIGH LEVEL ANALYSIS BASED ON PREVIOUS EVALUATIONS

One of those metrics is carbon savings as it is directly linked to the energy savings. In our earlier paper (Rosenow and Eyre, 2012) we presented a graph showing how the predicted carbon savings of the Green Deal and ECO compare to historic carbon savings from the various incarnations of supplier obligations. Our analysis, which was based on the government's impact assessment, showed a significant decline in terms of carbon savings delivered per year. However, this analysis was associated with a relatively high degree of uncertainty given the unknown uptake of the Green Deal. We have now updated our analysis based on actual delivery of energy efficiency measures in 2013 presented in Figure 1. Actual carbon savings of the Green Deal for 2013 have been calculated bottom-up by using the official government estimates for carbon savings of the main energy efficiency measures. The data is almost invisible on the chart which is a reflection of the much lower than predicted uptake.

Our analysis of the carbon savings in 2013 compared to 2008–2012 previously indicated a reduction of 77 % in terms of tCO₂ lifetime emissions saved. When using the actual figures for 2013 (DECC, 2014b) the reduction is 86 %. This is a result of very low uptake of the Green Deal (actual carbon savings are just 0.9 % compared to the estimate in the impact assessment) and the revisions to ECO (the revised target will deliver 25 % less carbon savings than the initial ECO target).

There are various caveats to comparing the carbon savings as they have not been calculated on a like-for-like basis. Parameters that have significant impact on the calculation of carbon savings include the assumed energy savings from specific measures and issues around the additionality of some meas-

ures that have been promoted under past schemes (mainly compact fluorescent light bulbs). We have discussed those in detail elsewhere (Rosenow and Eyre, 2013) and conclude that the methodological differences between the calculations carried out when evaluating the different schemes are likely to overplay the differences between ECO/Green Deal and previous obligations.

We therefore use another metric to validate the overall picture of our analysis. An alternative indicator that can be used for appraising the effectiveness of energy efficiency programmes is the installation rate of energy efficiency measures.

NUMBER OF INSULATION MEASURES DELIVERED

We have used data provided by the Climate Change Committee (2014) and government statistics of measures installed through ECO and the Green Deal. For simplicity we only select the most important insulation measures, namely cavity wall insulation, loft insulation, and solid wall insulation. For all three measures we note a significant reduction in the level of activity (Figure 2). Loft insulation, one of the major measures supported by previous energy efficiency programmes, was delivered in 2013 at a rate 92 % lower than in 2012. Cavity wall insulation shows a 65 % drop and the uptake of solid wall insulation was reduced by 66 % in 2013.

When comparing the predicted uptake in 2014 (using data available until October 2014) to the 2012 levels the reduction is about the same for loft and cavity wall insulation (95 % and 69 %) but less profound for solid wall insulation (39 %).¹

DECC's impact assessment for the plans for the future of ECO (DECC, 2014a) anticipates cavity and loft insulation installation rates to remain broadly where they were in 2013/2014 but indicates significant reductions in the uptake of solid wall insulation (in total about 100,000 solid walls are expected to be insulated from January 2013 to March 2017).

While the number of measures is an informative indicator, the most appropriate metric with regard to energy efficiency improvements is the amount of energy saved in the different years.

ENERGY SAVINGS FROM INSULATION MEASURES

As already mentioned above, one problem of using previous evaluations for deriving the energy and carbon savings (see Figure 1) is that the methodologies applied varied significantly over time which can potentially have a significant effect on the comparability of the savings estimates.

The quarterly statistics on the Green Deal and ECO contain an estimate of the energy and carbon savings delivered by the policies broken down to the different technology categories. Assuming the same energy savings for the different types of energy efficiency measures the energy savings can be calculated for the Energy Efficiency Obligation Schemes since 1994 as well as for the Green Deal (Figure 3).

The analysis shows that during the period 2008–2012 when CERT and CESP were in place about 106 TWh (lifetime) were

1. The reported number of measures under the various elements of the Green Deal and ECO cannot simply be added up as they overlap to some extent. However, it is not possible to account for these overlaps as the data published by DECC does not allow for this. Overall, this approach results in slightly increased figures for the number of measures installed but the impact is negligible.

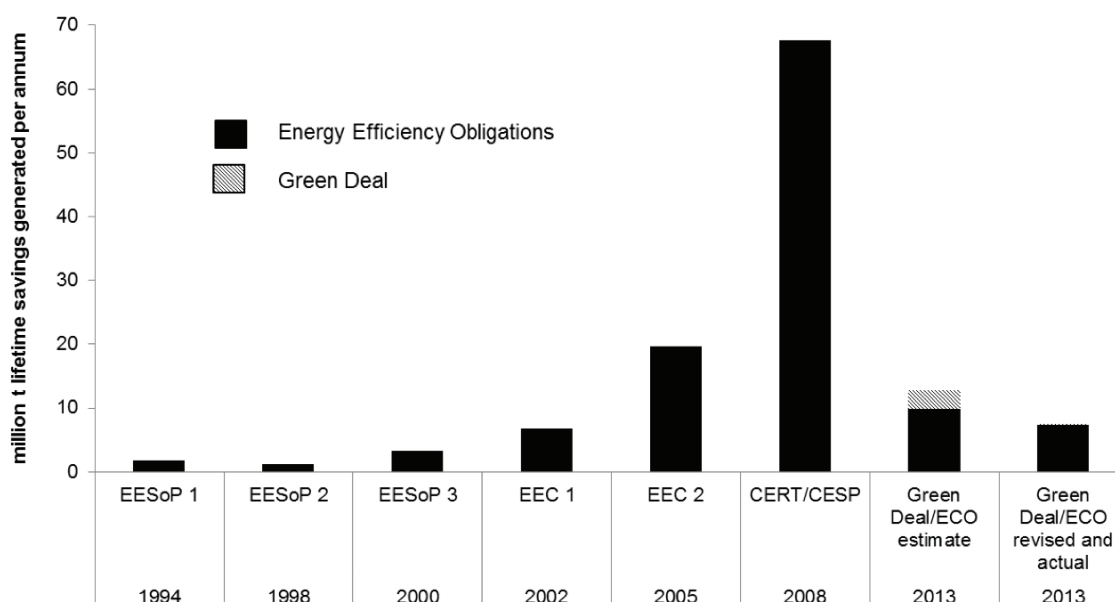


Figure 1. Estimated carbon savings in million tCO₂ lifetime emissions delivered per annum. Source: based on Rosenow and Eyre (2013), DECC (2014a), DECC (2014b).

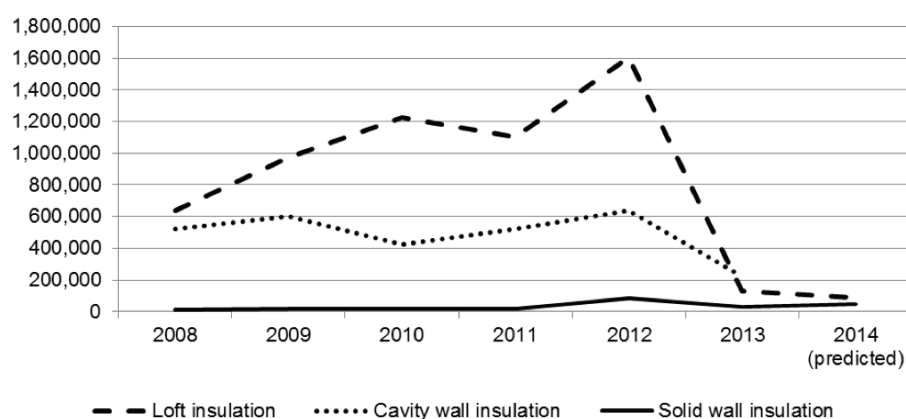


Figure 2. Development of installation rates of major energy efficiency measures. Source: Climate Change Committee, 2014 and DECC, 2014b.

delivered on average every year. In 2013 and 2014 this dropped to 29 TWh (lifetime) and 28 TWh (lifetime) respectively. Although this reduction is less profound than the 86 % calculated based on carbon savings, it is still of a very large reduction (72 %–74 %).

In summary, the different metrics (carbon savings, installation rates and energy savings) clearly show that the Green Deal/ECO policy package results in a significantly lower level of activity with fewer homes being refurbished. Whilst there are uncertainties around future delivery, without major modifications of the policies the overall picture is unlikely to change.

In the next section we present ideas how both the Green Deal and ECO could be reformed in order to achieve a much higher delivery rate of energy efficiency measures.

Options for policy reform

The original concept of the Green Deal was developed because, towards the end of the last decade, it was becoming clear that CERT, whilst hugely successful by most standards, would be unable to address the newer challenges in refurbishing the building stock. The most obvious reason was that low cost insulation measures, the staple of CERT, would be used up before the end of this decade and a generous subsidy programme funded out of energy bills would be politically impossible for measures costing thousands of pounds. The insight was that approaches that socialised a low proportion of costs would be needed to incentivise expensive and deep refurbishments, and that the households that benefit can reasonably be expected to contribute to the investment costs. That insight remains

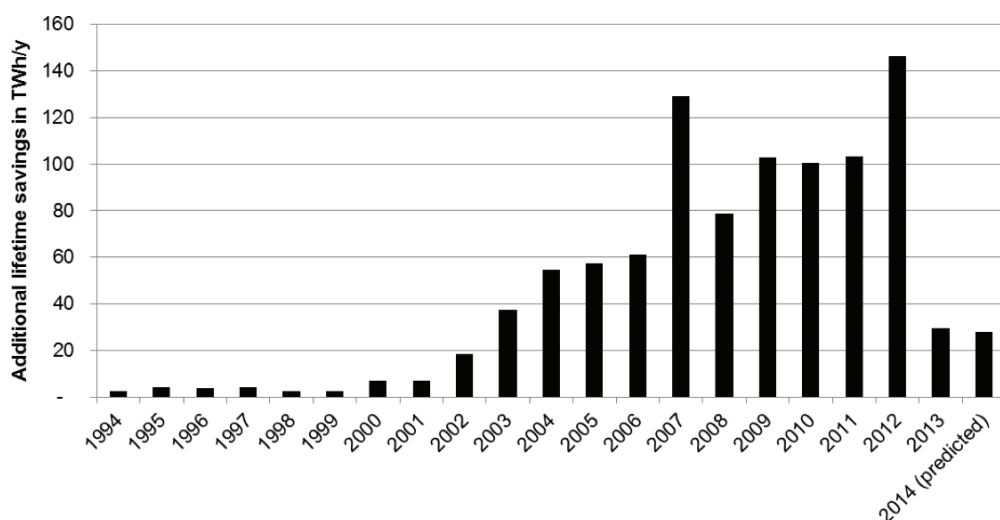


Figure 3. Delivered energy savings per year in TWh (lifetime).

valid and we have analysed elsewhere how energy efficiency programmes can maximise leverage of private capital (Rohde et al., 2014).

The problem with the major policy change in 2012 was two-fold. First, it was undertaken as a step change, with no attempt to phase in the change from generous grants to rather unattractive loans. The suddenness of this change in public policy and lack proper trialling, despite well-argued concerns, showed a rather cavalier approach to energy efficiency policy, and we have argued elsewhere (Rosenow, Croft et al., 2013) that this would not be done in a sector with more powerful and better organised lobby groups.

Secondly, the design of the Green Deal significantly misunderstood the case for involving other sources of capital, interpreting it as a reason to remove socialised incentives from energy efficiency, at least outside the special cases justified by innovation policy (e.g. solid walls) and social policy (e.g. low income groups). The fact that energy efficiency provides a variety of public goods, notably carbon emissions reduction and improved energy security was completely ignored. Ironically the change was undertaken at about the same time as the introduction of Electricity Market Reform, which marked the beginning of across the board support for low carbon electricity generation, with Contracts for Difference support for all low carbon supply technologies, irrespective of their potential for cost reduction. This left UK energy policy subsidising rather expensive options for carbon emissions reductions at the expense of cheaper energy efficiency solutions. It has been shown elsewhere that this simply increases the cost of achieving any given level of carbon emissions reduction (Eyre, 2013).

Our proposed roadmap for changes starts from the assumption that the UK Government will continue to want to reduce carbon emissions, and to do so at a reasonable cost. This requires energy efficiency improvement at much higher rates than achieved since 2012, which will require the use of socialised funding (whether from direct taxation or via energy bills) and private investment. Both sources of funding are needed, and both are justified as there are public and private benefits.

The key design task is to make them work effectively together and the following sections set how that might be achieved.

REFORMING THE GREEN DEAL

The pay-as-you-save concept of the Green Deal – in which the cost of the loan for energy efficiency improvements is paid for from the monthly savings they provide from household energy bills – is compelling, particularly in rented buildings where it helps to solve the landlord-tenant dilemma where the landlord bears the costs of making improvements, but the tenant reaps the benefits. The challenge is to take the best aspects of the scheme and make it work better. In our view, there are three main areas that need to be considered – a new marketing approach, a relaxed golden rule, and a more attractive interest rate.

Shifting the emphasis

The Green Deal was mainly sold as a means to save households money, but critics pointed out that, as repayments are calculated from estimated rather than actual energy bill savings, they might conceivably be larger than the actual savings made. A great deal of attention has been paid to this issue, in many ways more than it merits, because we know that building refurbishment is very rarely undertaken for energy or cost saving reasons, but far more often to improve the house in other ways (Wilson, 2013).

A new approach should emphasise these non-financial benefits, such as comfort or adding to the value of the house. For example, in Germany households take out significant loans of up to £60,000 provided by the publicly owned KfW Banking Group. While in most cases the bill savings do not pay back the loan over the time a household occupies the property, the programme has been successful because it is seen as a way of financing home improvements, making houses more saleable, and making people feel more comfortable in their homes.

Relaxing the golden rule

At the heart of the Green Deal is the golden rule, which stipulates that the cost of the repayments must not exceed the projected energy savings. This implies that the scheme can only

finance measures with a relatively short pay-back period – but such measures usually come with moderate up-front costs, and many of these are likely to be financed through ECO in the future given recent policy changes. Experience shows that people are most likely to take out loans for measures that have high up-front costs and have long pay-back periods.

Proposed changes to ECO will leave significantly less support for more expensive measures such as solid wall insulation, meaning households will have to find other sources of finance for the remaining cost, which may discourage them from making the investment. In June 2014, DECC introduced a Green Deal Home Improvement Fund to provide extra finance in the form of direct grants (particularly for solid wall insulation) of up to £7,600 per household. However, this is a one-off programme with only limited funding available. It is not a long-term solution and does not provide a framework giving assurance to the energy efficiency industry.

Given the lack of available finance for more expensive measures, for those households willing to take out loans, even if the costs of repayments are higher than the energy savings, government should relax the golden rule, leading to a wider range of measures being available on the scheme without the need for householders to find additional funding.

Modifying the interest rate

The interest rate of a Green Deal loan at 7.5 % is deemed commercially attractive against comparable unsecured loans. However, households are more likely to compare the Green Deal interest rate to that of their mortgage, or to high street loans, which means the interest rate needs to be set closer to 3 % or less in order to appear attractive (Ipsos MORI, 2011).

International experience with low-interest loan programmes has shown that if the interest rate is sufficiently low the market follows – the German KfW loan programme's interest rate is 1 %, for example, and the scheme has been oversubscribed for years. In France consumers have access to a 0 % loan scheme for energy efficiency improvements. Establishing such schemes requires considerable public subsidies but research by Ricardo-AEA and others (Rosenow et al. 2014) has shown that the Treasury could recoup some or even all of those costs. The Treasury could even end up profiting from the scheme, as it is budget positive, creating more revenues and savings than it costs.

It does seem DECC is rethinking the Green Deal, with the new Home Improvement Fund providing attractive incentives to encourage home retrofits. It is a short-term measure but a step in the right direction as high take up has shown.

Making changes to the scheme quickly has the potential to turn it into a real success story. But if there's no new deal soon, the Green Deal may not have a long term future.

ECO

The original design of ECO was predicated on its need to 'support the Green Deal', by subsidizing only those measures (high cost) and those consumers (low income) for whom the Green Deal would not work. The effect was to force energy supplier obligations to address measures higher up the marginal abatement cost curve. This was always a risk as there was no experience of such an approach anywhere in the world. The obligated suppliers never agreed with this approach and, by failing to deliver at anything like the originally required rate, fatally

undermined the original design intention, resulting in the recent policy changes outlined above. Once it is recognized that a loan scheme like Green Deal is better suited to supporting the larger and more expensive investment, ECO is freed up to play other roles, to which it is better suited. We suggest there are potentially five.

Support the remaining potential of lower cost insulation measures

The first is to support the remaining potential of lower cost insulation measures. These are often described as 'low hanging fruit' based on their cost effectiveness. However, those that have not yet been implemented are low hanging fruit that have not yet been picked despite years of relatively generous subsidies. So there remains a case for continuing to use ECO in this area. ACE (2012b) suggested a potential solution that would enable Green Deal and ECO to launch, whilst giving the industry more confidence over the continued delivery of lower-cost energy efficiency measures. Their proposal centred on allowing the low-cost measures to contribute to the ECO to a limited extent and for a limited period, regardless of whether the measures had been financed through the Green Deal by the consumer, or through the conventionally supplier obligation subsidy. Were the Green Deal to prove successful and most measures installed via that mechanism, these measures could be removed from the supplier obligation. Conversely, if the Green Deal failed to gain interest, Government would be able to amend the offering without the negative impact on the delivery of energy efficiency measures and industry jobs that would otherwise ensue. It is now clear that Green Deal has failed and the case for continuing to use ECO to support low cost measures is therefore strong, at least for the next few years. However, to achieve this, targets need to be set to realistic levels.

Support non-insulation measures

The second area ECO could be used is to support measures that were excluded from ECO, because of its (and Green Deal's) focus on insulation. The most obvious are energy efficient lights and appliances. CERT and its predecessors provided support for these from 1994–2012. Their exclusion from ECO was never properly justified, although the detailed design problem with support for CFLs in CERT may have affected the decision. Current Government policy in electricity demand reduction projects significant savings, but the only UK based policy initiative is a very small (£25 million) pilot in the new capacity mechanism in electricity market reform. Otherwise savings are apparently expected to be delivered by EU product policy. This is unrealistic: product standards and labels are a very important part of the policy mix, but cannot alone deliver the levels of innovation needed. Short term incentive programmes for products with performance better than the legal minimum were an effective part of UK energy policy for 18 years, through CERT and its predecessors. They were largely delivered through the high street, white goods sales outlets and were highly cost effective. They could easily be so again, supporting the Government's electricity demand reduction goals.

Deep refurbishment

The third area is support for deep refurbishment. Even with better design and lower interest rates, the Green Deal would be unlikely to secure rapid, mass take-up. Yet the recent experience

of the Green Deal Home Improvement Fund shows there is demand if the financial offer is sufficiently attractive. So the original concept in ECO, of using socialised funding to incentivised support private investment, is valid. What is needed is a long term framework against which the industry can plan. We have shown elsewhere (Eyre, 2013) that incentives sized at the same implicit rate of subsidy as now being put in place to support low carbon supply would be more than enough to achieve this.

Low-income households

The fourth potential role relates to energy efficiency programme in low-income households. This has always been and remains an important focus for energy efficiency obligations and forms the dominant part of the proposed plans for the future by the main opposition party (Labour, 2014). By retaining such an approach as a major part of ECO, the socialised costs of obligations on low income households remain lower than the benefits. If focused on low-income households, ECO can be a progressive policy instrument, although evidence suggests that this is currently not the case and that low-income households proportionally receive less net benefits (Rosenow et al., 2013). There is a parallel discussion about whether low income energy efficiency programmes are better supported from general taxation, which would be even but it seems a reasonable working assumption that large taxpayer funded programmes will not be forthcoming in the foreseeable future.

Non-domestic energy efficiency measures

The fifth and last potential area would be to use ECO to support non-domestic energy efficiency programmes. This has attracted very little attention as an option, despite the UK being unique in the world in restricting its supplier obligation to households. Current non-residential sector policies are rather weak. The Electricity Demand Reduction Pilot is very small. Other existing measures such as the CRC Energy Efficiency Scheme and the Climate Change Levy rely on the very blunt instrument of energy taxation, and therefore some additional policy is needed if the UK is to make faster progress in this sector. The only argument ever proffered for the restriction of supplier obligations to households related to avoiding cross-subsidy between different classes of customer, but experience elsewhere in the world shows that both residential and non-residential customer tend to benefit from using energy efficiency to avoid new supply.

In all of these potential areas, the benefit of ECO is that it can socialise the costs of incentives across the broad base of energy users. It is effectively an energy tax hypothecated to energy efficiency investment. There is another debate about whether energy supplier obligations are the best way to achieve this end. Arguably, the experience of feed-in tariffs for PV shows that separating the means of raising the funding from programme implementation, with a feed-in tariff approach to incentives, provides a more effective system for engaging potential investors. This has been discussed in more detail elsewhere (Eyre, 2013). One reason this approach has not been adopted in the UK in Electricity Market Reform is the fear that it would fall under the Levy Control Framework, which limits the size of combined 'green levies', and therefore energy efficiency would squeeze out investment in renewables and nuclear. Whilst the concerns of low carbon generators are understandable, the result of prioritizing low carbon supply over energy efficiency

works against cost effective climate policy. However, this option may well ultimately prove more attractive than relying on (currently extremely unpopular) energy suppliers to deliver environmental policy.

Conclusion

This paper presented the recent policy reforms in the UK home energy efficiency market. It illustrated how predictions compare to recent developments, although it is too early to draw definite conclusions. Whilst we can have some confidence that the suppliers will achieve the targets set under the Energy Company Obligation, the big uncertainty with the delivery of energy efficiency under the new policy-mix is the likely success or otherwise of the Green Deal.

Never before has a financing mechanism without additional subsidies been the centrepiece of a national government's energy efficiency programme. The most prominent loan programmes such as the CO₂-Building Rehabilitation Programme in Germany received substantial amounts of public funding to lower the interest rates (Rosenow, 2013).

It is now clear that the Green Deal has failed to deliver any significant amount of energy efficiency. Its existence also resulted in ECO being focussed in areas it was less immediately effective, with the result that targets have now been reduced. Together, this has been a major setback for UK energy efficiency policy.

We propose a roadmap that can address the problem. The Green Deal would be resigned to meet the needs of more expensive refurbishments, with lower interest rates and no Golden Rule. ECO would be targeted initially back on the low cost measures for which it is a proven approach, but also to provide incentives for other energy efficiency investments at a scale consistent with their public benefits.

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